

# FUJITSU Storage ETERNUS AF, ETERNUS DX

## Configuration Guide -Server Connection-



(Fibre Channel) for Windows®  
Driver Settings for Non-Fujitsu Fibre Channel Cards

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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 Windows® and using non-Fujitsu Fibre Channel card via a Fibre Channel interface.

This manual is used when performing the setup procedure described in "Installing Drivers and Setting up the Server" of the "Configuration Guide -Server Connection- (Fibre Channel) for Windows®".

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

In this manual, the setting procedures are explained using examples in the BIOS mode.

For the UEFI mode, the parameter names and the procedures may differ from those in this manual. Replace the setting values of the BIOS mode in this manual with the corresponding setting values found in the manuals of the Fibre Channel card and the server.

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

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

- ["Chapter 1 Setup Procedure for Emulex Fibre Channel Cards" \(page 6\)](#)

This chapter describes the workflow required to establish a connection between a server with Emulex Fibre Channel cards and an ETERNUS AF/DX.

- ["Chapter 2 Setup Procedure for QLogic Fibre Channel Cards" \(page 25\)](#)

This chapter describes the workflow required to establish a connection between a server with QLogic Fibre Channel cards and an ETERNUS AF/DX.

- ["Chapter 3 Operations When Using Brocade Fibre Channel Cards" \(page 49\)](#)

This chapter describes the workflow required to establish a connection between a server with Brocade Fibre Channel cards and an ETERNUS AF/DX.

The appendix contains the management tables that are used in "Installing the Fibre Channel Card" and a calculation example of the Queue Depth value.

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# Chapter 1

## Setup Procedure for Emulex Fibre Channel Cards

This chapter describes how to install and set up Emulex Fibre Channel cards.

### 1.1 Workflow

#### Workflow

1

##### Setting Up the Fibre Channel Cards

Install the Fibre Channel card and its driver, and set up the Fibre Channel card.

- ["1.2 Setting Up the Fibre Channel Cards" \(page 7\)](#)



2

##### Setting Up SAN Boot

Set up the SAN Boot configuration (if SAN Boot is to be used).

- ["1.3 Setting Up SAN Boot" \(page 16\)](#)



3

##### Installing Windows®

Install Windows®.

- ["1.4 Installing Windows®" \(page 18\)](#)



# 4

## Installing the Driver

Install the Fibre Channel card driver.

- "1.5 Installing the Driver" (page 18)
- "1.6 Checking the Driver Version" (page 18)
  - "Configuration Guide -Server Connection- (Fibre Channel) for Windows®"



# 5

## Setting Up the Fibre Channel Card Driver Parameters

Install HBAnyware, and set the Topology, QueueDepth and other parameters.

- "1.8 Setting Up the Driver Parameters" (page 19)



# 6

## Installing the Driver for ETERNUS AF/DX Storage Systems

If it is required, install the driver for ETERNUS AF/DX storage systems.

- Checking the driver-related notes
  - "1.10 Installing the Driver for ETERNUS AF/DX Storage Systems" (page 24)



After all of the required procedures in this manual are complete, proceed to the procedure that is described in "Configuration Guide -Server Connection- (Fibre Channel) for Windows®".

## 1.2 Setting Up the Fibre Channel Cards

Install the Fibre Channel cards in the server, acquire the relevant physical addresses and World Wide Names (WWNs), and perform Topology and LinkSpeed settings.

The physical address and WWN of a Fibre Channel card are required information in the following cases: when an error has occurred in the system, when using the ETERNUS AF/DX storage systems (security function, host affinity function, etc.) to restrict server access, or when connecting the ETERNUS AF/DX storage systems and the server using a Fibre Channel switch.

## ■ Checking and Configuring with UEFI

The workflow is shown below.

- (1) Install the Fibre Channel card
- (2) Turn on the server
- (3) Acquire the WWN for the Fibre Channel card
- (4) Add a record for the server in the WWN instance management table for the server
- (5) Set the Topology and LinkSpeed

The following shows an example of the checking and configuration procedure.

### **Note**

If the setting window is different, confirm that the parameters are same as the example and then perform a configuration.

### **Procedure**

- 1 Install the Fibre Channel card in the server.  
For the installation method, slot positions, activation of the installed slot, and notes regarding the Fibre Channel card, refer to the manual provided with the Fibre Channel card or the user guide of the server.
- 2 Turn on the server, and start the [UEFI BIOS setup] menu.  
To display the menu, refer to the User's Guide for the server.
- 3 Select the port for the Fibre Channel card that is to be checked and press the [Enter] key.



- 4 Check the value of [Port Name].  
 The value of [Port Name] is the WWN.



- 5 Record the WWN in the "WWN instance management table for the server".  
 (found in "Appendix A WWN Instance Management Table for the Server (Blank)" (page 59)).  
 The following shows an example of this.

WWN instance management table for the server

Host name	Server#1		
IP Address	192.168.0.10		
Physical slot name	Fibre Channel card WWN	Instance name	Cable tag
slot0	100000109B1B97C0		SRV1_SLOT0 to G620_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 the installed Fibre Channel card.

For the installation location, refer to the User's Guide for each server.

**Fibre Channel card WWN:**

Record the value of [Port Name].

**Instance name:**

Not necessary to record.

**Cable tag:**

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

- 6 Select "Configure HBA and Boot Parameters" and press the [Enter] key.
- 7 Select "Topology" and press the [Enter] key.

 **Note**

This setting is not required if an LPe3xxxx series Fibre Channel card is used. Proceed to [Step 9](#).

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- 8 Select "FC-AL" (for a direct connection) or "Point to Point" (for a switch connection), and then press the [Enter] key.

When a direct connection is used and the LinkSpeed is 16Gbit/s, select "Point to Point".

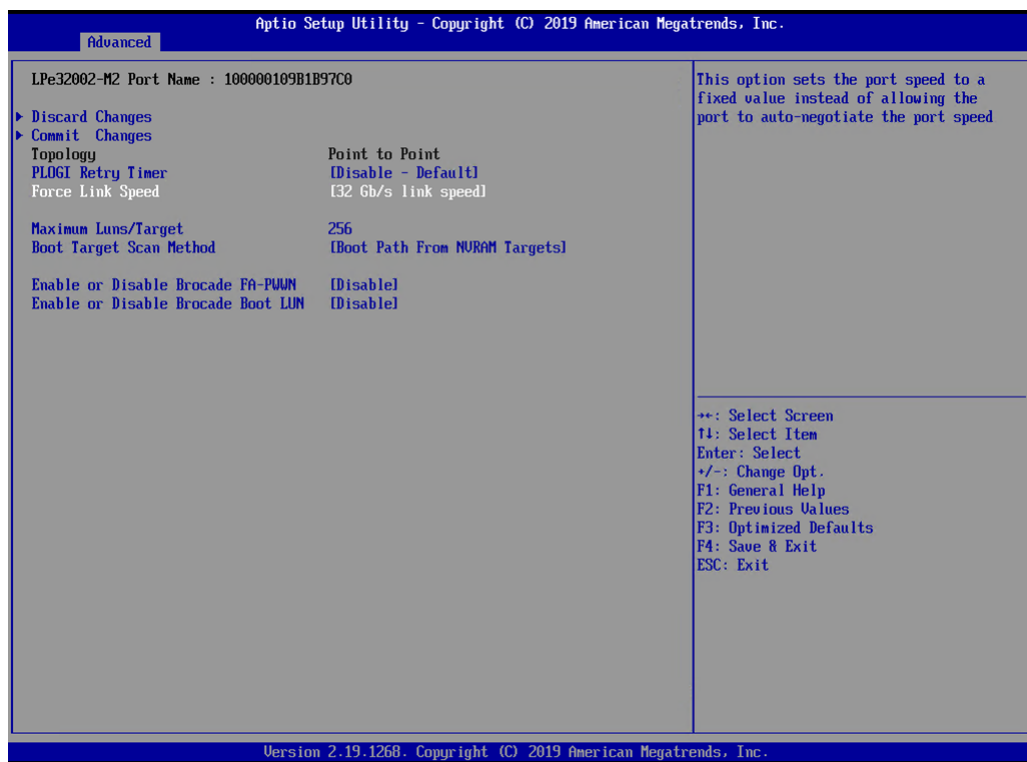


- 9 Select "Force Link Speed" and press the [Enter] key.

- Select the transfer rate according to the values listed in the LinkSpeed settings table below, and press the [Enter] key.

**LinkSpeed settings**

Maximum transfer rate of the Fibre Channel card to be connected	Switch connection Fibre Channel switch maximum transfer rate					Direct connection Maximum CA transfer rate			
	64Gbit/s	32Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s	32Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s
64Gbit/s	64	32	16	8	—	32	16	8	—
32Gbit/s	32	32	16	8	4	32	16	8	4
16Gbit/s	16	16	16	8	4	16	16	8	4
8Gbit/s	8	8	8	8	4	8	8	8	4
4Gbit/s	—	4	4	4	4	—	4	4	4



**Caution**

Contact the server vendor for supported transfer speeds because the supported transfer speeds vary depending on the OS and the storage system that is used.

- Select "Commit Changes" and press the [Enter] key.
- Return to the [UEFI BIOS setup] menu by pressing the [Esc] key.
- Save the settings in the [UEFI BIOS setup] menu and then reboot.  
For details, refer to the User's Guide for the server.

**End of procedure**

## ■ Checking and Configuring with Emulex LightPulse FC BIOS Utility

The relationship between a physical address and WWN cannot be determined from BIOS and OS. The physical address and WWN must be recorded as a pair when each Fibre Channel 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 Fibre Channel card
- (2) Turn on the server
- (3) Acquire the physical address and WWN for the Fibre Channel card
- (4) Add a record for the server in the WWN instance management table for the server
- (5) Set the Topology and LinkSpeed

When installing two or more Fibre Channel cards in the server, first turn off the server, then repeat Steps (1) through (5) above for each Fibre Channel card to be installed.

The following shows an example of the checking and configuration procedure.

### Note

If the setting window is different, confirm that the parameters are same as the example and then perform a configuration.

## Procedure

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

```
!!! Emulex LightPulse x86 BIOS !!!, Version xxxxxx  
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.
```

"Emulex LightPulse FC BIOS Utility" starts.

- 3 Select the port for the Fibre Channel card that is to be checked and press the [Enter] key.

- 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 WWN.

```

-----
Emulex LightPulse FC BIOS Utility, KA6.00a13
-----
01: LPe16002-M6:                               Bus#: 02 Dev#: 00 Func#: 00
Mem Base: CE000000 Firmware Version: 1.1.8.0   BIOS: Disabled
Port Name: 10000090FA02097E Node Name: 20000090FA02097E
                                                Link Status: Link Down
-----
Fibre Channel card WWN
Physical address

Enable/Disable Boot from SAN
Scan for Target Devices
Reset Adapter Defaults
Configure Boot Devices
Configure Advanced Adapter Parameters

Enter <Esc> to Previous Menu
<1/↓> to Highlight, <Enter> to Select
    
```

**Note**

The name of the physical address might be "I/O Base", "I/O Address", or "Mem Base", depending on the HBA BIOS version. For more information about how to check the physical address, refer to the HBA manual.

- 5 Record the physical address and WWN in the "WWN instance management table for the server". (found in "Appendix A WWN Instance Management Table for the Server (Blank)" (page 59)).  
 The following shows an example of this.

WWN instance management table for the server

Host name				
IP Address				
Physical slot name	Fibre Channel card WWN	Instance name	Physical address	Cable tag
slot0	10000090FA02097E		CE000000	

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 the installed Fibre Channel card.  
 For the installation location, refer to the User's Guide for each server.

**Fibre Channel card WWN:**

Record the value of [Port Name] or [Adapter Port Name].

**Instance name:**

Not necessary to record.

**Physical address:**

Record the value of [I/O Base], [I/O Address], or [Mem Base].

**Cable tag:**

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

- 6 Select "Configure Advanced Adapter Parameters" and press the [Enter] key.
- 7 Select "Topology Selection" and press the [Enter] key.
- 8 Select "FC-AL" (for a direct connection) or "Fabric Point to Point" (for a switch connection), and then press the [Enter] key.

When a direct connection is used and the LinkSpeed is 16Gbit/s, select "Fabric Point to Point".

**Note**

This setting is not required if an LPe3xxxx series Fibre Channel card is used.

- 9 Press the [Esc] key to return to the window shown in [Step 7](#).
- 10 Select "Link Speed Selection" and press the [Enter] key.
- 11 Select the transfer rate according to the values listed in the LinkSpeed settings table below, and press the [Enter] key.

LinkSpeed settings

Maximum transfer rate of the Fibre Channel card to be connected	Switch connection Fibre Channel switch maximum transfer rate					Direct connection Maximum CA transfer rate			
	64Gbit/s	32Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s	32Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s
64Gbit/s	64	32	16	8	—	32	16	8	—
32Gbit/s	32	32	16	8	4	32	16	8	4
16Gbit/s	16	16	16	8	4	16	16	8	4
8Gbit/s	8	8	8	8	4	8	8	8	4
4Gbit/s	—	4	4	4	4	—	4	4	4

- 12 Press the [Esc] key to quit the "Emulex LightPulse FC BIOS Utility".  
 When the total number of ports for installed Fibre Channel cards is two or more, first repeat [Step 3](#) through [Step 11](#) for each port, and then press the [Esc] key to exit "Emulex LightPulse FC BIOS Utility".

**Caution**

If two or more Fibre Channel cards have already been installed in the server at the time of purchase, the one-to-one relationship between the WWNs and Fibre Channel cards may not be easy to determine. The WWNs that are obtained in this section may need to be repeatedly registered and set up on the ETERNUS AF/DX until a server recognizes the ETERNUS AF/DX logical disks.

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

**End of procedure**

## 1.3 Setting Up SAN Boot

Refer to "Server Support Matrix" to check the support status of SAN Boot and refer to the manual of the server, OS, or the Fibre Channel card that is to be used.

When using a logical unit (LUN) of the ETERNUS AF/DX storage systems as a boot disk, make sure that the LUN has enough capacity to install the OS.

### ■ Configuring with UEFI

The following shows an example of a configuration procedure.

**Note**

If the setting window is different, confirm that the parameters are same as the example and then perform a configuration.

### Procedure

- 1 Turn on the server, and start the [UEFI BIOS setup] menu.  
To display the menu, refer to the User's Guide for the server.
- 2 Select the Fibre Channel card port to be used for SAN Boot and press the [Enter] key.



3 Select "Set Boot from SAN" and press the [Enter] key.



4 Select "Enable" and press the [Enter] key.



5 Return to the [UEFI BIOS setup] menu by pressing the [Esc] key.

- 6 Save the settings in the [UEFI BIOS setup] menu and then reboot.  
For details, refer to the User's Guide for the server.

End of procedure

## 1.4 Installing Windows®

Refer to the documentation supplied with the product for Windows® installation details.

## 1.5 Installing the Driver

Refer to the documentation provided with each Fibre Channel card for details on how to obtain and install a Fibre Channel card driver for it.

## 1.6 Checking the Driver Version

Use the Device Manager to check the version of the Fibre Channel card driver.

### Procedure

- 1 In the Device Manager, go to [Storage controllers], and open the [Properties] of the Fibre Channel card.
- 2 Select the [Driver] tab, and open [Driver Details].
- 3 Select the driver file, and check its [File version].

### Caution

If a different driver version is displayed from that shown in "Server Support Matrix", reinstall the driver.

End of procedure

## 1.7 Setting Up the Fibre Channel Card Parameters

Various Fibre Channel card driver parameters now need to be set.

# 1.8 Setting Up the Driver Parameters

**Note**

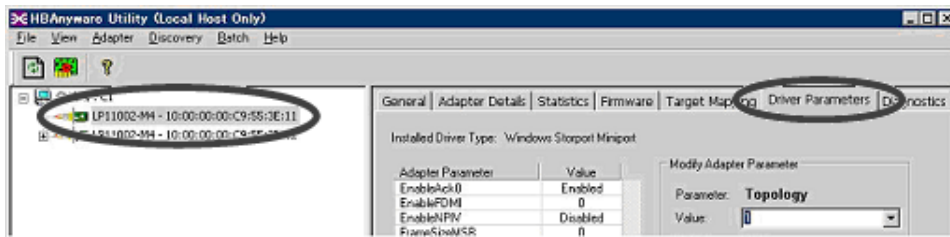
The maximum transfer rate of the Fibre Channel card being used can be checked via the Fibre Channel card manual or the Emulex web-site.

Emulex web-site: <https://www.broadcom.com/>

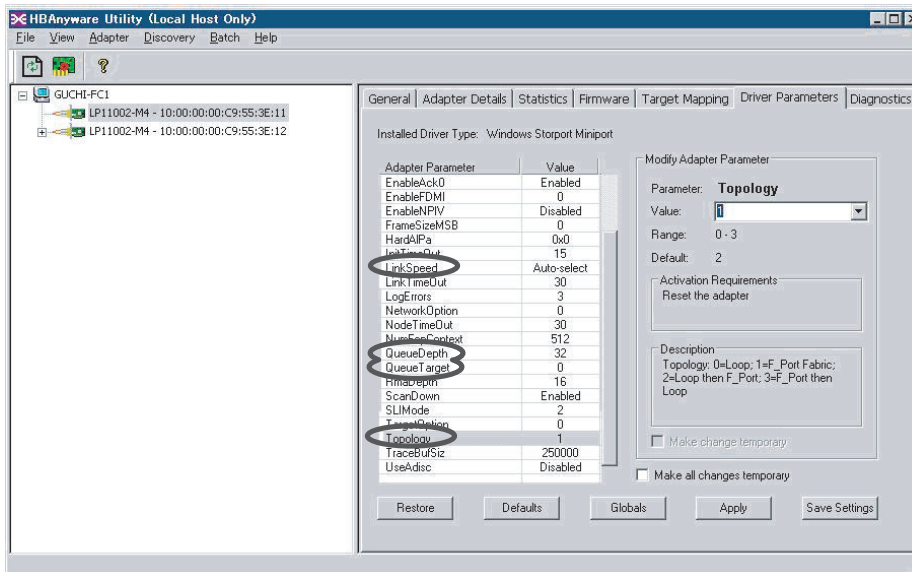
## 1.8.1 For 64Gbit/s, 32Gbit/s, 16Gbit/s, 8Gbit/s, and 4Gbit/s Fibre Channel Cards

### Procedure

- 1 Install HBAnyware.  
For installation, refer to the Fibre Channel card manual.
- 2 Start the "HBAnyware Utility".
- 3 Select the target Fibre Channel card port and click the [Driver Parameters] tab.



- 4 Check the parameter values in the [Adapter Parameter] list.



Compare with the parameter values in the following tables, and correct the current value if necessary. Select the parameter whose value is to be corrected from the [Adapter Parameter] list and modify the value in the [Modify Adapter Parameter] area.

- For Windows Server® 2022, Windows Server® 2019, Windows Server® 2016, Windows Server® 2012 R2, or Windows Server® 2012

Fibre Channel card transfer rate	Setting value			
	Topology (*1)	QueueDepth	QueueTarget	LinkSpeed
64Gbit/s 32Gbit/s 16Gbit/s 8Gbit/s 4Gbit/s	0 (direct connection) 1 (switch connection) When a direct connection is used and the LinkSpeed is 16Gbit/s, select "1".	Arbitrary (*2) For a calculation example of the QueueDepth value, refer to "Appendix B Example of a QueueDepth Value Calculation" (page 60).	0	(*3)

**\*1:** This setting is not required if an LPe3xxx series Fibre Channel card is used.

**\*2:** Use the following formula to obtain the QueueDepth value for the node with the largest number of recognized LUNs among the hosts and virtual machines. Specify the recommended value for the host.

Recommended value = (maximum number of simultaneous command processes per CA port) ÷ (number of Fibre Channel port WWNs 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 processes
ETERNUS AF S3 series, ETERNUS DX S5 series, ETERNUS DX8900 S4	2048
Models other than the above	1024

- The number of Fibre Channel port WWNs is the total number of physical WWNs and virtual WWNs when the vFC function is used.
- Both AddressSetA and AddressSetB are assigned to each port that is used in the vFC function. However, only one virtual WWN is assigned to each port.
- 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.

**\*3:** LinkSpeed setting value list

Maximum transfer rate of the Fibre Channel card to be connected	Switch connection Fibre Channel switch maximum speed					Direct connection Maximum CA transfer rate			
	64Gbit/s	32Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s	32Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s
64Gbit/s	64	32	16	8	—	32	16	8	—
32Gbit/s	32	32	16	8	4	32	16	8	4
16Gbit/s	16	16	16	8	4	16	16	8	4
8Gbit/s	8	8	8	8	4	8	8	8	4
4Gbit/s	—	4	4	4	4	—	4	4	4

 **Caution**

Do not modify any parameters other than those described here.

The following describes each parameter:

- "Topology" parameter  
Set the connection configuration between the server and ETERNUS AF/DX storage systems.
  - "QueueDepth" parameter  
Set the command queue depth.
  - "QueueTarget" parameter  
Set to specify the command queue depth to either the LUN or to the target.
  - "LinkSpeed" parameter  
Set the link speed.
- 5 After the values have been modified, click the [Apply] button.  
Parameters that are displayed in red in the [Adapter Parameter] column show that their values have been modified but not yet applied. Click the [Apply] button to apply the changed values.
  - 6 If there are multiple cards, repeat [Step 2](#) through [Step 5](#) to change the settings for all cards.
  - 7 After all the cards have been set, select [Exit] from the [File] menu to quit the "HBAnyware Utility".

**End of procedure**

## 1.9 Fixing the Target IDs

Each device connected to a Fibre Channel card is allocated a Target ID. By default, the Target IDs are automatically allocated in order of the device WWPNs (lowest first). Under this default, the device Target IDs may be reallocated as devices are added and removed, or depending on how the devices are recognized. If the Target IDs have changed when the server reboots, devices may end up off-line, and unavailable depending on the OS or application being used. To avoid this, it is recommended that a fixed Target ID be allocated to each device and automatic Target ID allocation be disabled.

Perform this setting as necessary.

 **Caution**

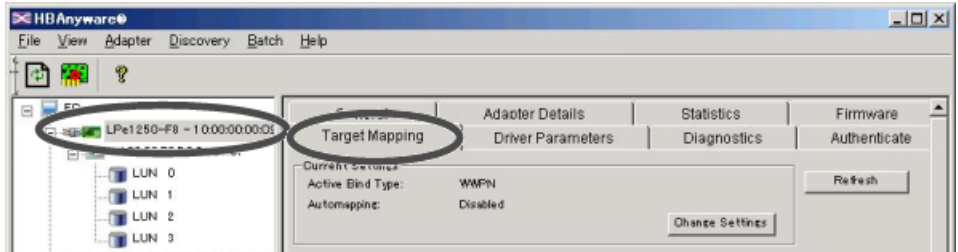
- Once automatic Target ID allocation is disabled, devices are no longer recognized automatically when they are added. Target IDs must be manually allocated for each added device.
- A Target ID must be allocated to each device connected to each port.
- For multipath configurations, Target ID settings are required for both ports. When a single device is connected to both ports, allocate the same Target ID to both ports.
- Perform the Target ID settings with devices connected.

 **Note**

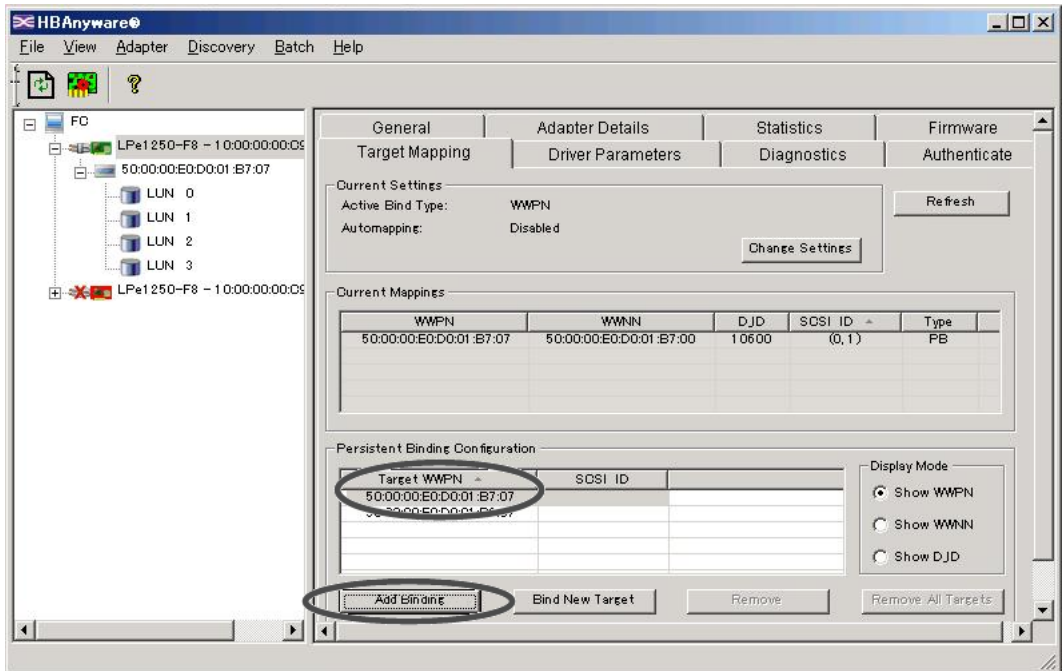
The HBAnyware screenshots in the following procedure are examples. The actual display may be different.

## Procedure

- 1 Start "HBAnyware".
- 2 Select the target Fibre Channel card and click the [Target Mapping] tab.

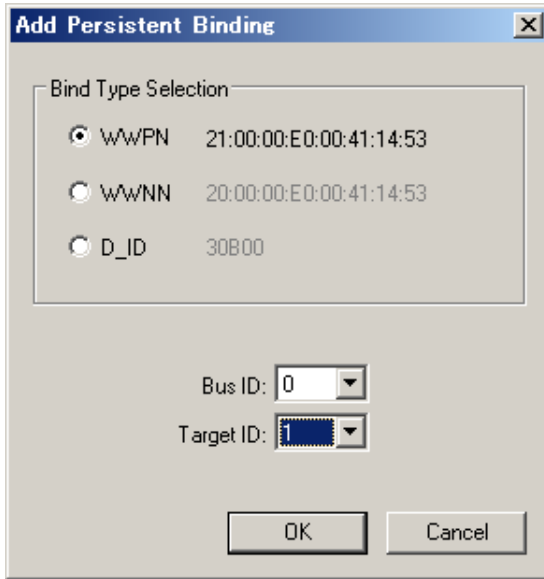


- 3 Select one of the listed Target WWPNs and click [Add Binding] in the [Persistent Binding Configuration] area.

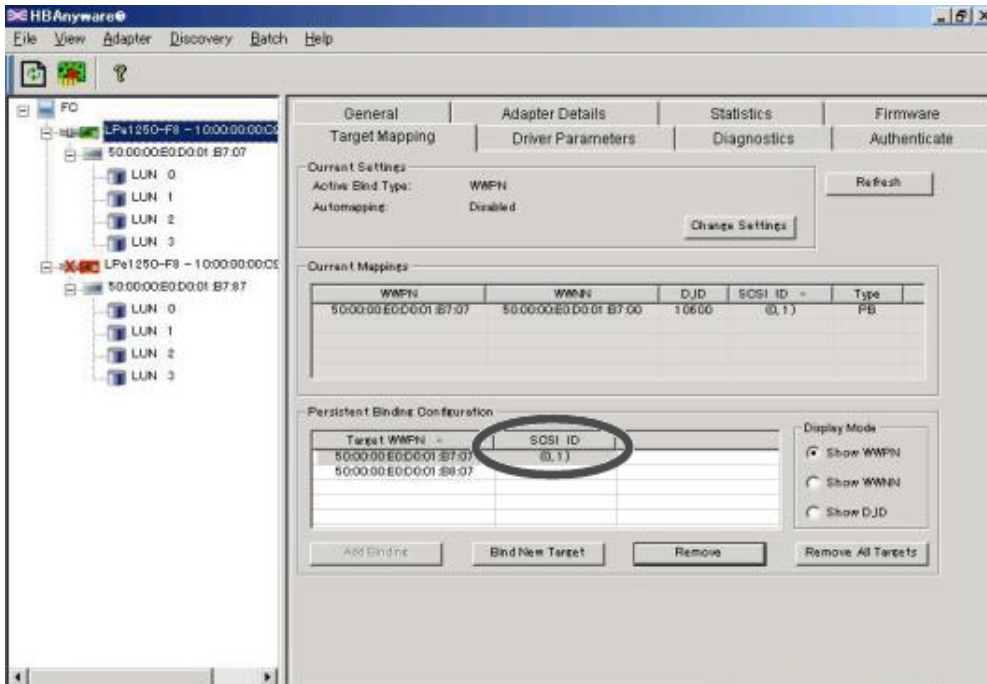


The [Add Persistent Binding] dialog box appears.

- 4 Select a "Target ID" from the drop-down list.  
Unless problems arise, "Bind Type Selection" may be left set to "WWPN" and "Bus ID" to "0".

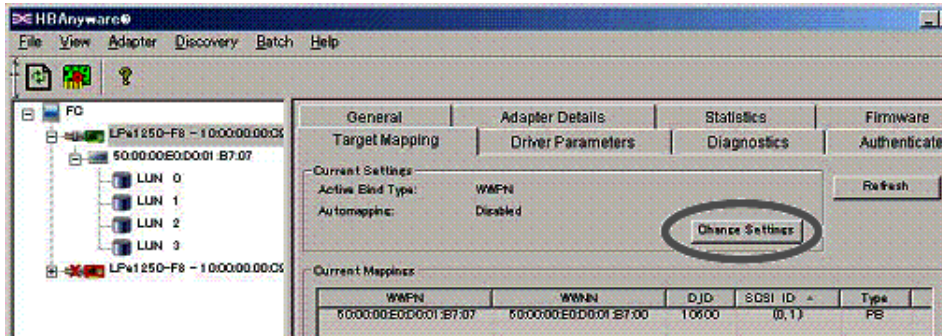


- 5 Click [OK].  
A confirmation screen appears. Click [OK].
- 6 Confirm that the specified Target ID appears in the "SCSI ID" area.



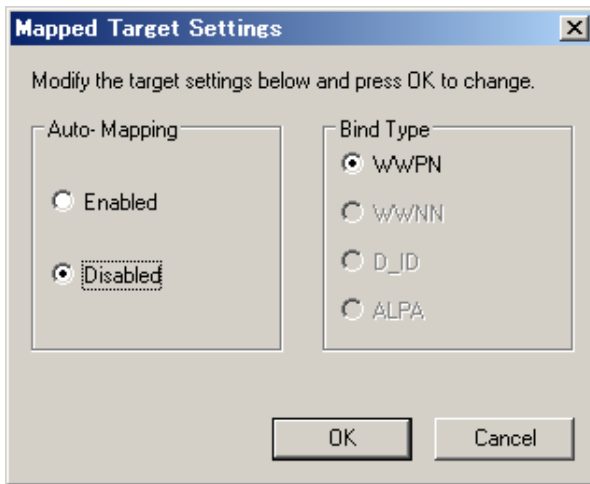
Specify Target IDs for all devices.  
For a multipath configuration, specify the same Target ID for both Fibre Channel cards.

- 7 Click [Change Settings] in the [Current Settings] area.



The [Mapped Target Settings] dialog box appears.

- 8 Select [Disabled] in the [Auto-Mapping] area.



- 9 Click [OK].  
A confirmation screen appears. Click [OK].
- 10 Restart the server OS.

End of procedure

## 1.10 Installing the Driver for ETERNUS AF/DX Storage Systems

Install the driver for ETERNUS AF/DX storage systems as required.

- Refer to the "Driver Notes" section in "Configuration Guide -Server Connection- (Fibre Channel) for Windows®" for notes on each driver in cases such as when connecting the server to the ETERNUS AF/DX in multipath configuration and using the path redundancy control (path fail-over) function, and for when single-path connection is used between the ETERNUS AF/DX and server.
- For the procedure about how to install (or uninstall), set up, and use the drivers for ETERNUS AF/DX storage systems, refer to the software manuals.



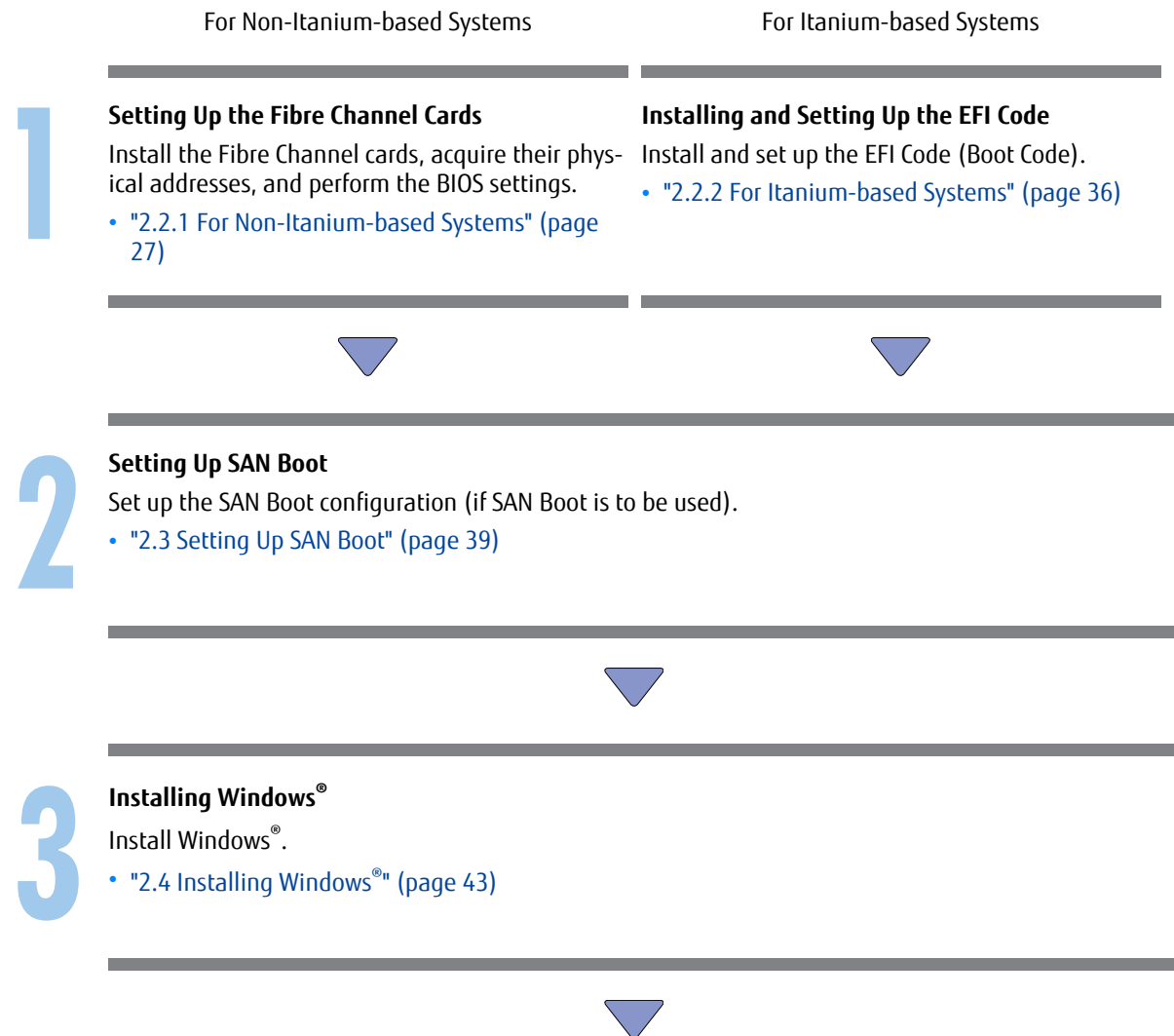
# Chapter 2

## Setup Procedure for QLogic Fibre Channel Cards

This chapter describes how to install and set up QLogic Fibre Channel cards.

### 2.1 Workflow

#### Workflow



# 4

## Installing the Driver

Install the Fibre Channel card driver.

- "2.5 Installing the Driver" (page 43)
- "2.6 Checking the Driver Version" (page 43)



For Non-Itanium-based Systems



For Itanium-based Systems

# 5

## Setting Up the Fibre Channel Card Driver

Set up the parameters for the Fibre Channel card driver.

- "2.7 Setting Up the Driver Parameters" (page 44)



# 6

## Installing the Driver for ETERNUS AF/DX Storage Systems

Install the driver for ETERNUS AF/DX storage systems.

- "2.8 Installing the Driver for ETERNUS AF/DX Storage Systems" (page 48)
- Checking the driver-related notes
  - "Configuration Guide -Server Connection- (Fibre Channel) for Windows<sup>®</sup>"



After all of the required procedures in this manual are complete, proceed to the procedure that is described in "Configuration Guide -Server Connection- (Fibre Channel) for Windows<sup>®</sup>".

## 2.2 Setting Up the Fibre Channel Cards

### 2.2.1 For Non-Itanium-based Systems

Install the Fibre Channel cards in the server, acquire the relevant physical addresses and World Wide Names (WWNs), and perform Topology and LinkSpeed settings.

The physical address and WWN of a Fibre Channel card are required information in the following cases: when an error has occurred in the system, when using the ETERNUS AF/DX storage systems (security function, host affinity function, etc.) to restrict server access, or when connecting the ETERNUS AF/DX storage systems and the server using a Fibre Channel switch.

#### ■ Checking and Configuring with UEFI

The workflow is shown below.

- (1) Install the Fibre Channel card
- (2) Turn on the server
- (3) Acquire the WWN for the Fibre Channel card
- (4) Add a record for the server in the WWN instance management table for the server
- (5) Set the Topology and LinkSpeed

The following shows an example of the checking and configuration procedure.

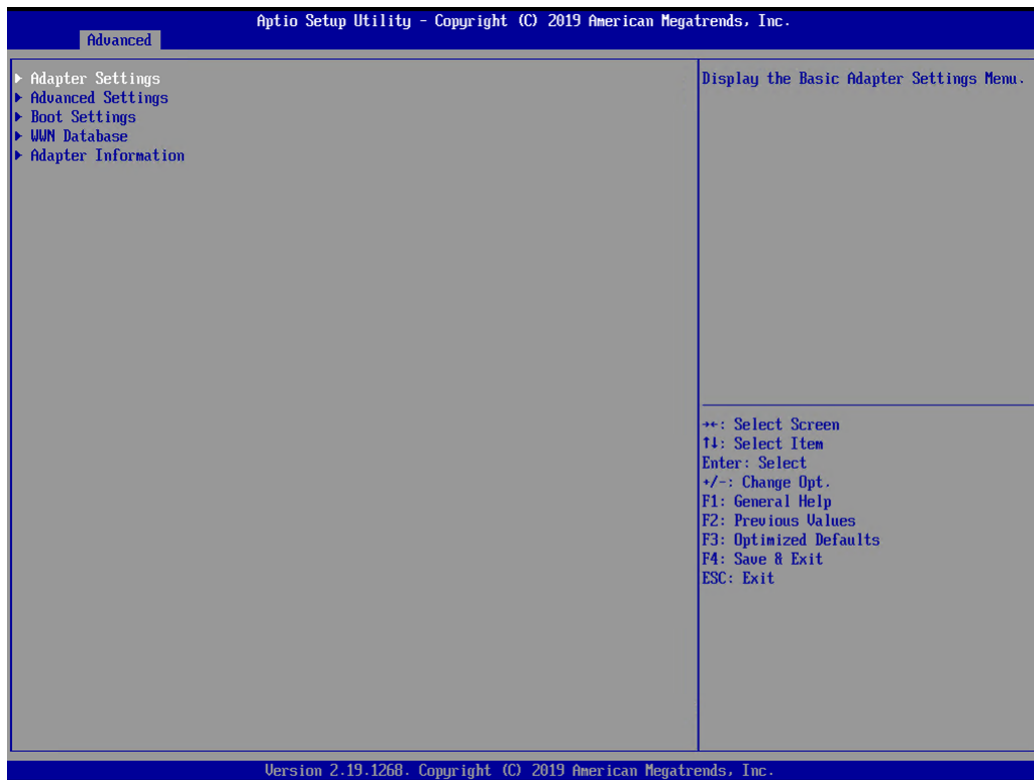
#### Note

If the setting window is different, confirm that the parameters are same as the example and then perform a configuration.

#### Procedure

- 1 Install the Fibre Channel card in the server.  
For the installation method, slot positions, activation of the installed slot, and notes regarding the Fibre Channel card, refer to the manual provided with the Fibre Channel card or the user guide of the server.
- 2 Turn on the server, and start the [UEFI BIOS setup] menu.  
To display the menu, refer to the User's Guide for the server.
- 3 Select the port for the Fibre Channel card that is to be checked and press the [Enter] key.

- 4 Select "Adapter Information" and press the [Enter] key.



- 5 Check the "WWPN" setting.



- Record the WWN in the "WWN instance management table for the server".  
(found in "[Appendix A WWN Instance Management Table for the Server \(Blank\)](#)" (page 59)).  
The following shows an example of this.

WWN instance management table for the server

Host name	Server#1		
IP Address	192.168.0.10		
Physical slot name	Fibre Channel card WWN	Instance name	Cable tag
slot0	21000024FF1712F4		SRV2_SLOT0 to G620_2_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 the installed Fibre Channel card.

For the installation location, refer to the User's Guide for each server.

**Fibre Channel card WWN:**

Record the value of [WWPN].

**Instance name:**

Not necessary to record.

**Cable tag:**

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

- Return to the menu shown in [Step 3](#) by pressing the [Esc] key.
- Select "Adapter Settings" and press the [Enter] key.

- 9 Select "FC Tape" and press the [Enter] key.

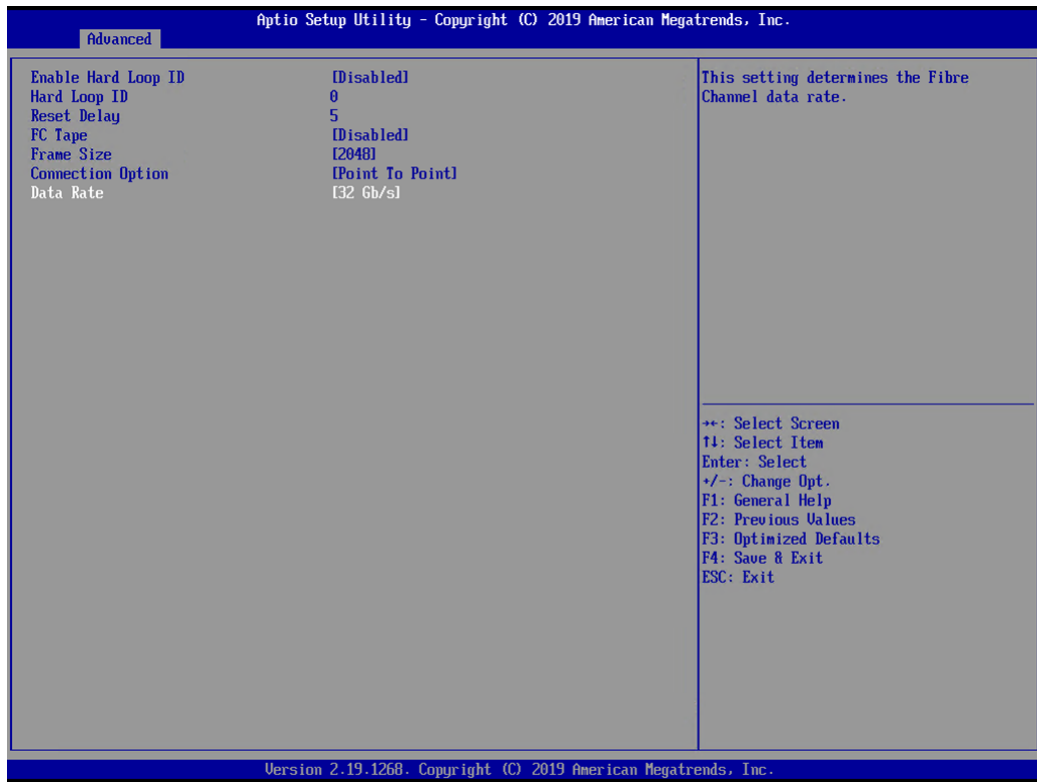


- 10 Select "Disabled" and press the [Enter] key.
- 11 Select "Connection Option" and press the [Enter] key.
- 12 Select "FC-AL" (for direct connections with an 8Gbit/s or lower Link Speed) or "Point to Point" (for other speeds), and then press the [Enter] key.
- 13 Select "Data Rate" and press the [Enter] key.

- Select the transfer rate according to the values listed in the LinkSpeed settings table below, and press the [Enter] key.

**LinkSpeed settings**

Maximum transfer rate of the Fibre Channel card to be connected	Switch connection Fibre Channel switch maximum transfer rate					Direct connection Maximum CA transfer rate			
	64Gbit/s	32Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s	32Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s
64Gbit/s	64	32	16	8	—	32	16	8	—
32Gbit/s	32	32	16	8	4	32	16	8	4
16Gbit/s	16	16	16	8	4	16	16	8	4
8Gbit/s	8	8	8	8	4	8	8	8	4
4Gbit/s	—	4	4	4	4	—	4	4	4



**Caution**

Contact the server vendor for supported transfer speeds because the supported transfer speeds vary depending on the OS and the storage system that is used.

- Press the [Esc] key twice to return to the [UEFI BIOS setup] menu.
- Save the settings in the [UEFI BIOS setup] menu and then reboot.  
For details, refer to the User's Guide for the server.

**End of procedure**

### ■ Checking and Configuring with Fast!UTIL

Acquire the physical address and WWN when installing the Fibre Channel card, because they cannot be determined from BIOS and OS. Physical address and WWN must be assigned to "WWN instance management table for the server".

The workflow is shown below.

- (1) Install the Fibre Channel card
- (2) Turn on the server
- (3) Acquire the physical address and WWN for the Fibre Channel card
- (4) Add a record for the server in the WWN instance management table for the server
- (5) Set the Fibre Channel card BIOS

When installing two or more Fibre Channel cards in the server, first turn off the server, then repeat Steps (1) through (5) above for each Fibre Channel card to be installed.

The following shows an example of the checking and configuration procedure.

#### Note

If the setting window is different, confirm that the parameters are same as the example and then perform a configuration.

### Procedure

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

```
QLogic Corporation
QLA23xx PCI Fibre Channel ROM BIOS Version *.*
Copyright (C) QLogic Corporation 2000. All rights reserved
www.qlogic.com

Press <CTRL-Q> for Fast!UTIL
```

The "Fast!UTIL" program starts up (Startup may take longer than usual).

```
----- Select Host Adapter -----
Adapter Type      I/O Address
    QLA2xxx        3400
    QLA2xxx        3800
```

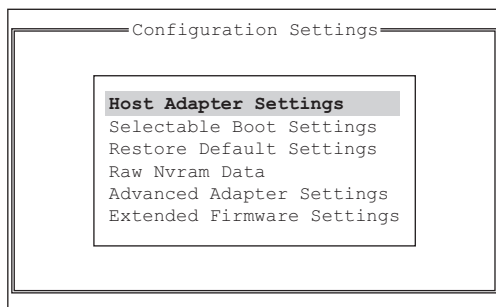
- 3 Check the value of [I/O Address] of the [Select Host Adapter] window.  
The value of [I/O Address] is the physical address.

```
----- Select Host Adapter -----
Adapter Type      I/O Address
    QLA2xxx        3400
```

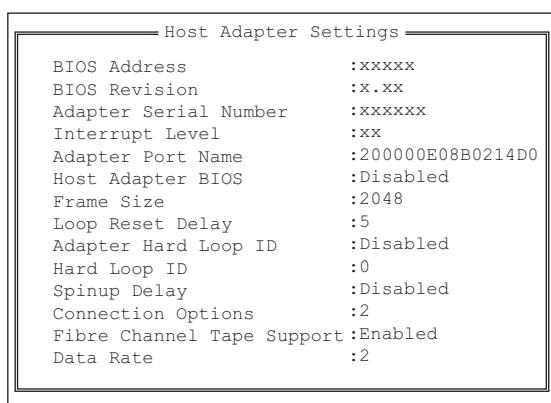
Physical address



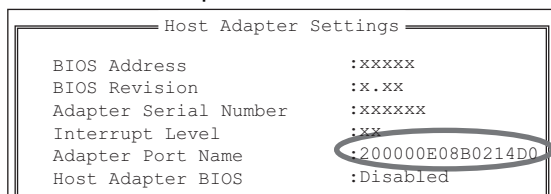
- 4 Select [Configuration Settings] from the [Fast!UTIL Options] menu and press the [Enter] key.  
The [Configuration Settings] menu appears.



- 5 Select [Host Adapter Settings] from the [Configuration Settings] menu and press the [Enter] key.  
The [Host Adapter Settings] window appears.



- 6 Check the value of [Adapter Port Name].  
The value of [Adapter Port Name] is the Fibre Channel card WWN.



- 7 Record the physical address and WWN in the "WWN instance management table for the server". (found in "Appendix A WWN Instance Management Table for the Server (Blank)" (page 59)).

The following shows an example of this.

**WWN instance management table for the server**

<b>Host name</b>	Server#1			
<b>IP Address</b>	192.168.0.10			
<b>Physical slot name</b>	<b>Fibre Channel card WWN</b>	<b>Instance name</b>	<b>Physical address</b>	<b>Cable tag</b>
slot0	20 00 00 E0 8B 02 14 D0		3400	SERV1_SLOT0 to SN200_1_port0

- 8 Set up the Fibre Channel card.

Check the values for each parameter in the [Host Adapter Settings] window. See the following tables and set each value. For details on how to set the values, refer to the BIOS Readme file and Fibre Channel card user's guide.

Use the default values for any parameters that are not listed in the following table.

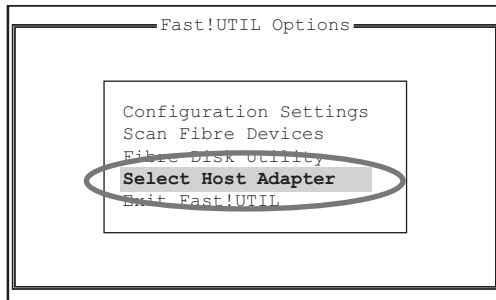
Parameter	Host Adapter settings value	Remarks
BIOS Address	Fixed for each card	Settings cannot be changed.
BIOS Revision (*1)		
Adapter Serial Number		
Interrupt Level		
Adapter Port Name		
Host Adapter BIOS	Enabled or Disabled	<ul style="list-style-type: none"> <li>Set "Enabled" for SAN Boot.</li> <li>Set "Disabled" for non SAN Boot.</li> </ul>
Frame Size	2048	If the current parameter values are different, change them to the indicated values.
Loop Reset Delay	5	
Adapter Hard Loop ID	Disabled	
Hard Loop ID	0	
Spinup Delay	Disabled	
Connection Options	0 or 1	<ul style="list-style-type: none"> <li>For direct connection: 0 (*2)</li> <li>For switch connection: 1 (*3)</li> </ul>
Fibre Channel Tape Support	Disabled	If "Enabled" is displayed, change the value to "Disabled".
Data Rate	(*4)	1: 2Gbit/s fixed 2: Auto-negotiated 3: 4Gbit/s fixed 4: 8Gbit/s fixed 5: 16Gbit/s fixed 6: 32Gbit/s fixed 7: 64Gbit/s fixed

**\*1:** The BIOS version of the Fibre Channel card is displayed. Check that the BIOS version is the same as shown in "Server Support Matrix".

- \*2: A setting value used for directly connecting to the ETERNUS AF/DX storage systems via a Fibre Channel pass-through blade.  
 However, select "1" for direct connections between a 16Gbit/s, a 32Gbit/s, or a 64Gbit/s Fibre Channel card and CAs with a 16Gbit/s or faster transfer rate.
- \*3: A setting value used for connecting the Fibre Channel Switch to the ETERNUS AF/DX storage systems via a Fibre Channel pass-through blade or Fibre Channel switch blade.  
 However, select "1" for direct connections with a 16Gbit/s, a 32Gbit/s, or a 64Gbit/s Fibre Channel card.
- \*4: Data Rate setting value list

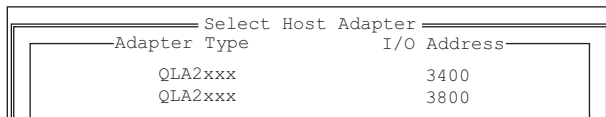
Maximum transfer rate of the Fibre Channel card to be connected	Switch connection Fibre Channel switch maximum speed					Direct connection Maximum CA transfer rate			
	64Gbit/s	32Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s	32Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s
64Gbit/s	7	6	5	4	—	6	5	4	—
32Gbit/s	6	5	5	4	—	6	5	4	—
16Gbit/s	5	5	5	4	3	5	5	4	3
8Gbit/s	4	4	4	4	3	4	4	4	3
4Gbit/s	—	—	3	3	3	—	3	3	3

- 9 Return to the [Configuration Settings] menu by pressing the [Esc] key.
- 10 Press the [Esc] key twice to return to the [Fast!UTIL Options] menu.  
 If the BIOS settings were changed, save the settings using [Save xxxxxx]. If two or more Fibre Channel cards are installed in the server, select the second or a subsequent Fibre Channel card using the following steps and set the BIOS for the selected card.
  - (1) Select [Select Host Adapter] from the [Fast!UTIL Options] menu and press the [Enter] key.



The [Select Host Adapter] window appears.

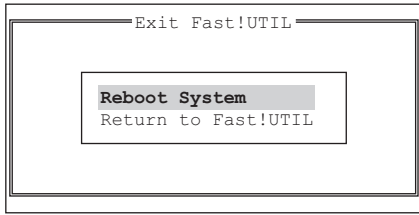
- (2) Select the Fibre Channel card to be set (BIOS setting) in the [Select Host Adapter] window.



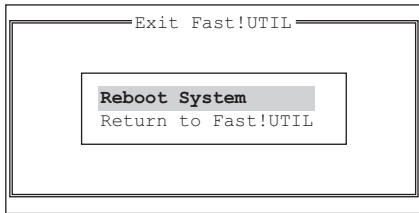
The [Fast!UTIL Options] menu appears. Then perform [Step 3](#) through [Step 10](#).

- 11 Select [Exit Fast!UTIL] and press the [Enter] key.

The following window appears.



- 12 Select [Reboot System] and press the [Enter] key.



The server reboots.

To return to the [Fast!UTIL] menu, select [Return to Fast!UTIL].

End of procedure

## 2.2.2 For Itanium-based Systems

### Procedure

- 1 Install the EFI code.
  - (1) Download the EFI code from the QLogic Corp. web-site.
  - (2) Unpack the downloaded file and copy it to a floppy disk.  
Example: Unpack "qlx24xx-qlc2x0cf1.56risc4.00.26.zip" and copy "Q24CF156.BIN", "update.nsh", and "efiutil.efi" to a floppy disk.
  - (3) Load the EFI floppy disk in the server and (re)boot the server.
  - (4) Select the EFI shell, search for the floppy disk using the device map and move to the floppy disk.

#### Caution

On Japanese keyboards, press the [Shift] + [;] keys to get the ":" character.

```
Shell>blk0:
```

- (5) Identify and record all the installed adapter information details.  
Execute the following commands from the EFI shell.

For the QLA2462, information for two ports will be displayed.

```
blk0>efiutil all info
```

- (6) Write the driver image to the ROM.

Execute the following commands from the EFI shell.

**Caution**

On Japanese keyboards, press the [^] key to get the "=" character.

```
blk0>efiutil adapter=0 efi_write=Q24CF156.BIN
blk0>efiutil adapter=1 efi_write=Q24CF156.BIN
```

- (7) Execute the "exit" command and return to EFI shell.

2 Set the EFI code.

- (1) Execute the following command.

```
Shell>drivers-b
```

The QLogic Fibre Channel Driver value (DRVNUM) will be displayed on the very left, in the DRV column.

- (2) Execute the following command.

```
Shell>drvcfg DRVNUM
```

The "CTRLNUM" is displayed.

- (3) Execute the following command with these DRVNUM and CTRLNUM values.

```
Shell>drvcfg -s DRVNUM CTRLNUM
```

The [Edit Adapter Settings] window and the [Edit Advanced Settings] window appear.

- (i) Select "Edit Adapter Settings"

Set the various parameters, referring to the following table.

When 4Gbit/s Fibre Channel cards are used, set following EFI-related parameters to the indicated values.

Parameter	Setting value	Remarks
Enable Hard Loop ID	n	Cannot be changed
Hard Loop ID	0	
Reset Delay	5	
Enable FC Type	n	
Frame Size	2048	

Parameter	Setting value	Remarks
Connection Options	<ul style="list-style-type: none"> <li>• Loop Only (direct connection)</li> <li>• Point To Point (switch connection)</li> </ul>	–
Data Rate	4Gb/s (4Gbit/s fixed) 2Gb/s (2Gbit/s fixed) 1Gb/s (1Gbit/s fixed)	<ul style="list-style-type: none"> <li>• Use "4Gb/s" for a direct connection.</li> <li>• For switch connections to a Fibre Channel switch                              16Gbit/s port: set "4Gb/s"                              to a Fibre Channel switch                              8Gbit/s port: set "4Gb/s"                              to a Fibre Channel switch                              4Gbit/s port: set "4Gb/s"                              to a Fibre Channel switch                              2Gbit/s port: set "2Gb/s"                              to a Fibre Channel switch                              1Gbit/s port: set "1Gb/s"</li> </ul>

(ii) Select "Edit Advanced Settings"

Set the various parameters, referring to the following table.

When 4Gbit/s Fibre Channel cards are used, set following EFI-related parameters to the indicated values.

Parameter	Setting value
Operation Mode	Interrupt for every I/O completion
Interrupt Delay Timer (dec)	0
Execution Throttle (dec)	Arbitrary (*1) (Up to 1024 for each FC port of the ETERNUS AF/DX)
Login Retry Count (dec)	8
Port Down Retry Count (dec)	30
Link Down Timeout (dec)	30
Luns Per Target (dec)	128
Enable Extended Logging	n
Enable LIP Reset	n
Enable LIP Full Login	y
Enable Target reset	y
LED Mode	QLogic

**\*1:** Recommended value =  $1024 \div (\text{number of Fibre Channel ports that are connected to a single CA port})$

(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 AF/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.

- (iii) Enter "Write" to save any changes to the adapter settings.  
Referring to the above tables, check that the appropriate parameters have been correctly set for each Fibre Channel card.
  - (iv) Enter "Quit" to return to the EFI shell.
- 3 When setting the driver parameters for multiple adapters, specify the next adapter's DRVNUM and CTRLNUM and repeat from [Step \(3\)](#).

**End of procedure**

## 2.3 Setting Up SAN Boot

Refer to "Server Support Matrix" to check the support status of SAN Boot and refer to the manual of the server, OS, or the Fibre Channel card that is to be used.

When using a logical unit (LUN) of the ETERNUS AF/DX storage systems as a boot disk, make sure that the LUN has enough capacity to install the OS.

### ■ Configuring with UEFI

The following shows an example of a configuration procedure.

#### **Note**

If the setting window is different, confirm that the parameters are same as the example and then perform a configuration.

#### **Procedure**

- 1 Turn on the server, and start the [UEFI BIOS setup] menu.  
To display the menu, refer to the User's Guide for the server.
- 2 Select the Fibre Channel card port to be used for SAN Boot and press the [Enter] key.

3 Select "Boot Settings" and press the [Enter] key.



4 Select "Adapter Driver" and press the [Enter] key.





- 5 Select "Enabled" and press the [Enter] key.



- 6 Press the [Esc] key twice to return to the [UEFI BIOS setup] menu.
- 7 Save the settings in the [UEFI BIOS setup] menu and then reboot.  
For details, refer to the User's Guide for the server.

**End of procedure**

## ■ Configuring with Fast!UTIL

The following shows an example of a configuration procedure.

### **Note**

If the setting window is different, confirm that the parameters are same as the example and then perform a configuration.

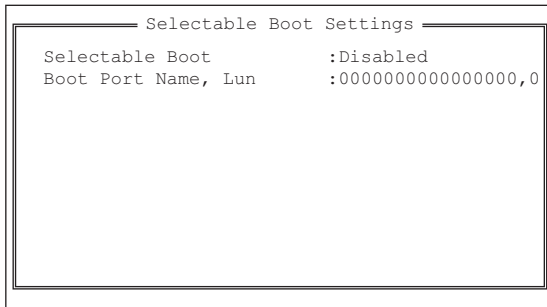
### **Procedure**

- 1 Select [Selectable Boot Settings] from the [Configuration Settings] menu in [Fast!UTIL] and press the [Enter] key.
- 2 Set [Selectable Boot] to "Enabled".
- 3 Select a boot path (ETERNUS AF/DX port WWN) and boot LUN#.

**Caution**

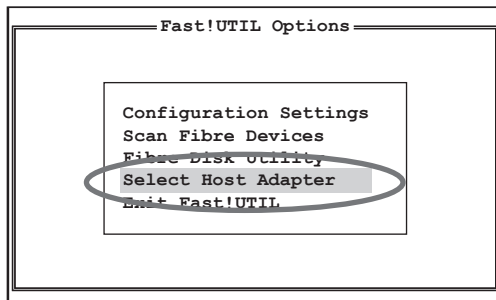
The boot path and boot LUN# selection window only appears when [Host Adapter BIOS] is "Enabled" in [SAN Boot].  
 If [Host Adapter BIOS] is "Disabled", the boot path and boot LUN# selection window does not appear. Instead, the window shown in Step 4 appears when [Selectable Boot Settings] is selected.

4 Check the values for each parameter.

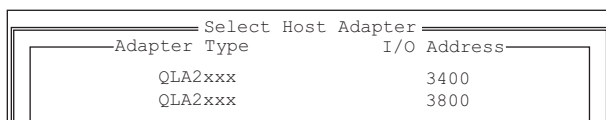


Parameter	Setting value	Remarks
Selectable Boot	Enabled or Disabled	<ul style="list-style-type: none"> <li>Set [Enabled] for SAN Boot.</li> <li>Set [Disabled] for non SAN Boot.</li> </ul>
Boot Port Name, Lun	ETERNUS AF/DX port WWN, LUN# or 0000000000000000, 0	<ul style="list-style-type: none"> <li>The boot path (ETERNUS AF/DX port WWN) and boot LUN# for SAN Boot are separated by a comma.</li> <li>"0000000000000000, 0" for non SAN Boot.</li> </ul>

- 5 Return to the [Configuration Settings] menu by pressing the [Esc] key.
- 6 Press the [Esc] key twice to return to the [Fast!UTIL Options] menu.  
 If the settings were changed, save the settings using [Save xxxxxx].  
 If two or more Fibre Channel cards are installed in the server, select the second or a subsequent Fibre Channel card using the following steps and check the settings for the selected card.
- (1) Select [Select Host Adapter] from the [Fast!UTIL Options] menu and press the [Enter] key.

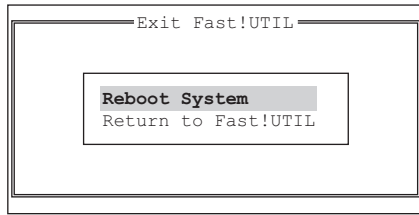


(2) Select the Fibre Channel card to be set (BIOS setting).



(3) The [Fast!UTIL Options] menu appears. Then perform Step 1 through Step 6.

- 7 Select [Exit Fast!UTIL] and press the [Enter] key.
- 8 Select [Reboot System] and press the [Enter] key.



The server reboots.

To return to the [Fast!UTIL] menu, select [Return to Fast!UTIL].

End of procedure

## 2.4 Installing Windows®

Refer to the documentation supplied with the product for Windows® installation details.

## 2.5 Installing the Driver

Refer to the documentation provided with each Fibre Channel card for details on how to obtain and install a Fibre Channel card driver for it.

## 2.6 Checking the Driver Version

Use the Device Manager to check the version of the Fibre Channel card driver.

### Procedure

- 1 In the Device Manager, go to [Storage controllers], and open the [Properties] of the Fibre Channel card.
- 2 Select the [Driver] tab, and open [Driver Details].
- 3 Select the driver file, and check its [File version].

### Caution

If a different driver version is displayed from that shown in "Server Support Matrix", reinstall the driver.

End of procedure

## 2.7 Setting Up the Driver Parameters

Driver parameters must be set when non-Itanium-based Systems are used.

If Itanium-based Systems are used, proceed to "2.8 Installing the Driver for ETERNUS AF/DX Storage Systems" (page 48).

Set the driver parameters using the following procedure.

### Note

The setup method described here uses QConvergeConsole, however, tools such as Fast!UTIL can also be used for the setup.

### Procedure

- 1 Install QConvergeConsole.  
For installation, refer to the Fibre Channel card manual.
- 2 Start QConvergeConsole.
- 3 Select the target Fibre Channel card port to be set.
- 4 Select the [HBA Parameter] tab in [Parameter].  
Compare with the parameter values in the following tables, and correct the current value if necessary.

Parameter	Host Parameter settings	Remarks
Connection Options	0 – Loop Only or 1 – Point to Point Only	<ul style="list-style-type: none"> <li>• For direct connection: 0 (*1)</li> <li>• For switch connection: 1 (*2)</li> </ul>
Data Rate	(*3)	1: 2Gbit/s fixed 2: Auto-negotiated 3: 4Gbit/s fixed 4: 8Gbit/s fixed 5: 16Gbit/s fixed 6: 32Gbit/s fixed 7: 64Gbit/s fixed
Frame Size	2048	If the current parameter values are different, change them to the indicated values.
Enable HBA Port Hard Loop ID	Unselected (Disabled)	
Loop Reset Delay	5	
Enable HBA Port BIOS	Selected (Enabled) or Unselected (Disabled)	<ul style="list-style-type: none"> <li>• For SAN Boot, select this item.</li> <li>• For non SAN Boot, unselected this item.</li> </ul>
Fibre Channel Tape Support	Unselected (Disabled)	If this item is selected, it must be unselected.

**\*1:** A setting value used for directly connecting to the ETERNUS AF/DX storage systems via a Fibre Channel pass-through blade.

However, select "1" for direct connections between a 16Gbit/s, a 32Gbit/s, or a 64Gbit/s Fibre Channel card and CAs with a 16Gbit/s or faster transfer rate.

- \*2: A setting value used for connecting the Fibre Channel Switch to the ETERNUS AF/DX storage systems via a Fibre Channel pass-through blade or Fibre Channel switch blade.
- \*3: Data Rate setting value list

Maximum transfer rate of the Fibre Channel card to be connected	Switch connection Fibre Channel switch maximum speed					Direct connection Maximum CA transfer rate			
	64Gbit/s	32Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s	32Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s
64Gbit/s	7	6	5	4	—	6	5	4	—
32Gbit/s	6	5	5	4	—	6	5	4	—
16Gbit/s	5	5	5	4	3	5	5	4	3
8Gbit/s	4	4	4	4	3	4	4	4	3
4Gbit/s	—	—	3	3	3	—	3	3	3

- 5 Select the [Advanced HBA Parameter] tab in [Parameter].  
 Compare with the parameter values in the following tables, and correct the current value if necessary.

Parameter	Advanced HBA Parameter settings	Remarks
Execution Throttle	Arbitrary (*1) For a calculation example of the QueueDepth value, refer to " <a href="#">Appendix B Example of a QueueDepth Value Calculation</a> " (page 60).	This setting is for 8Gbit/s Fibre Channel cards. For 16Gbit/s, 32Gbit/s, or 64Gbit/s Fibre Channel cards, set the QueueDepth value (qd="recommended value") in Step 8.
Operation Mode	0 – Interrupt for every I/O completion	If the current parameter values are different, change them to the indicated values.
Interrupt Delay Timer (100 μs)	0	
Login Retry Count	8	
Port Down Retry Count	30	
Enable LIP Full Login	Selected (Yes)	
Link Down Timeout (seconds)	30	
Enable Target Reset	Selected (Yes)	
LUNs per Target	128	
Enable Receiver Out Of Order Frame	Unselected (Disabled)	
Enable LR	Unselected (Disabled)	
Enable Fabric Assigned WWN	Unselected (Disabled)	

- \*1: Use the following formula to obtain the QueueDepth value for the node with the largest number of recognized LUNs among the hosts and virtual machines. Specify the recommended value for the host.

Recommended value = (maximum number of simultaneous command processes per CA port) ÷ (number of Fibre Channel port WWNs 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 processes
ETERNUS AF S3 series, ETERNUS DX S5 series, ETERNUS DX8900 S4	2048
Models other than the above	1024

- The number of Fibre Channel port WWNs is the total number of physical WWNs and virtual WWNs when the vFC function is used.
  - Both AddressSetA and AddressSetB are assigned to each port that is used in the vFC function. However, only one virtual WWN is assigned to each port.
  - Use the value of "8" if the actual result is lower.
  - Use the value of "254" if the actual result is higher.
  - To achieve maximum system performance, this value can be changed according to the server load and the peak operating times.
- 6 After the settings are complete for all the ports, click [Save] to apply the changes.
  - 7 Terminate QConvergeConsole.
  - 8 Set QueueDepth.  
 Specify this item for 16Gbit/s or 32Gbit/s Fibre Channel cards only.

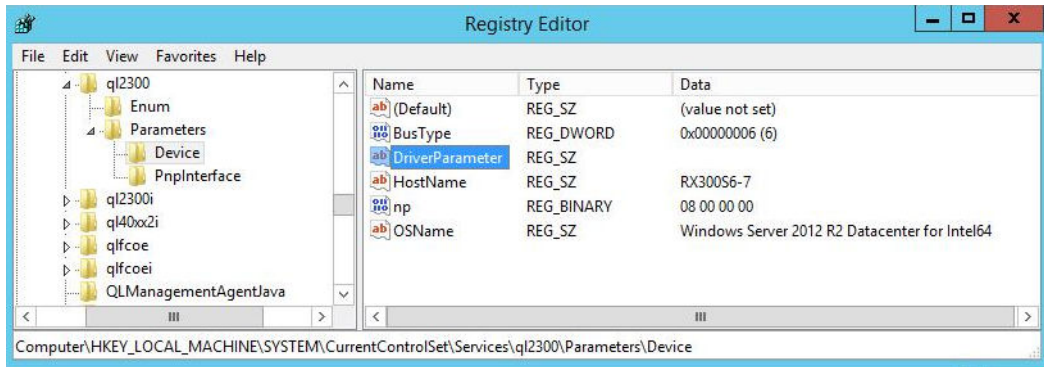
**Caution**

For details on how to edit the registry, refer to the "Changing Keys and Values" Help Topic of the Registry Editor (Regedit.exe). The registry files (System.dat and User.dat) must be backed up before editing.

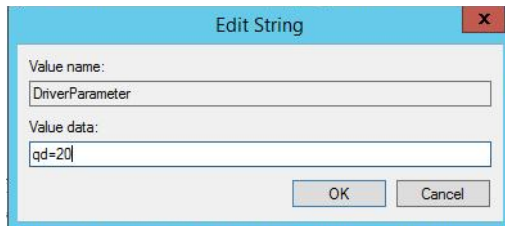
- (1) Click the [Start] button, and then click [Run].
- (2) In the [Run] dialog box, type "regedit", and then click [OK].  
 Registry Editor starts.
- (3) Move to the path as shown below:

```
HKEY_LOCAL_MACHINE
  \SYSTEM
    \CurrentControlSet
      \Services
        \ql2300
          \Parameters
            \Device
```

(4) Double click [DriverParameter].



(5) Enter the QueueDepth value (qd="recommended value") in "Value data" and click the [OK] button.



Use the following formula to obtain the QueueDepth value for the node with the largest number of recognized LUNs among the hosts and virtual machines. Specify the recommended value for the host.

Recommended value = (maximum number of simultaneous command processes per CA port) ÷ (number of Fibre Channel port WWNs 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 processes
ETERNUS AF S3 series, ETERNUS DX S5 series, ETERNUS DX8900 S4	2048
Models other than the above	1024

- The number of Fibre Channel port WWNs is the total number of physical WWNs and virtual WWNs when the vFC function is used.
- Both AddressSetA and AddressSetB are assigned to each port that is used in the vFC function. However, only one virtual WWN is assigned to each port.
- Use the value of "8" if the actual result is lower.
- Use the value of "254" if the actual result is higher.
- To achieve maximum system performance, this value can be changed according to the server load and the peak operating times.

For a calculation example of the QueueDepth value, refer to ["Appendix B Example of a Queue-Depth Value Calculation"](#) (page 60).

(6) Close the Registry Editor.

9 Reboot the server.

End of procedure

## 2.8 Installing the Driver for ETERNUS AF/DX Storage Systems

Install the driver for ETERNUS AF/DX storage systems as required.

- Refer to the "Driver Notes" section in "Configuration Guide -Server Connection- (Fibre Channel) for Windows®" for notes on each driver in cases such as when connecting the server to the ETERNUS AF/DX in multipath configuration and using the path redundancy control (path fail-over) function, and for when single-path connection is used between the ETERNUS AF/DX and server.
- For the procedure about how to install (or uninstall), set up, and use the drivers for ETERNUS AF/DX storage systems, refer to the software manuals.



# Chapter 3

## Operations When Using Brocade Fibre Channel Cards

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This chapter describes how to install and set up Brocade Fibre Channel cards.

### 3.1 Workflow

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#### Workflow

1

#### Setting Up the Fibre Channel Cards

Install the Fibre Channel card and its driver, and set up the Fibre Channel card.

- ["3.2 Setting Up the Fibre Channel Cards" \(page 50\)](#)
- ["3.3 Installing the Driver" \(page 53\)](#)
- ["3.4 Checking the Driver Version" \(page 54\)](#)
- ["Appendix A WWN Instance Management Table for the Server \(Blank\)" \(page 59\)](#)
- Checking the driver version
  - ["Server Support Matrix"](#)



2

#### Setting Up the Fibre Channel Card Driver Parameters

Set the Fibre Channel card driver parameters.

- ["3.5 Setting Up the Driver Parameters" \(page 55\)](#)



# 3

## Installing the Driver for ETERNUS AF/DX Storage Systems

If it is required, install the driver for ETERNUS AF/DX storage systems.

- "3.6 Installing the Driver for ETERNUS AF/DX Storage Systems" (page 58)
- Checking the driver-related notes
  - "Configuration Guide -Server Connection- (Fibre Channel) for Windows®"



After all of the required procedures in this manual are complete, proceed to the procedure that is described in "Configuration Guide -Server Connection- (Fibre Channel) for Windows®".

## 3.2 Setting Up the Fibre Channel Cards

Install the Fibre Channel cards in the server, and acquire their physical addresses and World Wide Names (WWNs).

- The physical address and WWN of a Fibre Channel card are required information in the following cases: when an error has occurred in the system, when using the ETERNUS AF/DX storage systems (security function, host affinity function, etc.) to restrict server access, or when connecting the ETERNUS AF/DX storage systems and the server using a Fibre Channel switch.
- Acquire the physical address and WWN when installing the Fibre Channel card, because they cannot be determined from BIOS and OS. Physical address and WWN must be assigned to "WWN instance management table for the server".

The workflow is shown below.

- (1) Install the Fibre Channel card
- (2) Turn on the server
- (3) Acquire the physical address and WWN for the Fibre Channel card
- (4) Add a record for the server in the WWN instance management table for the server
- (5) Set the Fibre Channel card

When installing two or more Fibre Channel cards in the server, first turn off the server, then repeat Steps (1) through (5) above for each Fibre Channel card to be installed.

The procedure is as follows:

## Procedure

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

```
Brocade BIOS Copyright 2008-09 All rights reserved!  
Version: FCHBAx.x.x.x  
Press <CTL-B> or <ALT-B> to enter config menu, <x> to skip
```

Brocade BIOS Configuration Utility starts.

- 3 In the [Select Host Bus Adapter] screen, select the port for which BIOS is to be set and press the [Enter] key.

```
Select Host Bus Adapter  
  
HBA No      Model No      PCI Bus/Dev/Fn      PWWN  
1/0         Brocade-xxx   09/00/xx            10:00:00:05:1E:D6:5E:C3  
1/1         Brocade-xxx   09/00/xx            10:00:00:05:1E:D6:5E:C4
```

- 4 Check the values of [PCI Bus/Dev/Fn] and [PWWN] for the selected port.  
The value of [PCI Bus/Dev/Fn] is the physical address and the value of [PWWN] is WWN.

```
Brocade BIOS Config Menu  
  
Adapter Selected  
Adapter Model      PCI Bus/Dev/Fn      PWWN  
Brocade-xxx        09/00/xx            10:00:00:05:1E:D6:5E:C3  
  
Adapter Configuration  
  
Adapter Settings  
Boot Device Settings
```

- 5 Record the physical address and WWN in the "WWN instance management table for the server".  
(found in "[Appendix A WWN Instance Management Table for the Server \(Blank\)](#)" (page 59)).

The following shows an example of this.  
 WWN instance management table for the server

Host name				
IP Address				
Physical slot name	Fibre Channel card WWN	Instance name	Physical address	Cable tag
slot0	10:00:00:05:1E:D6:5E:C3		09/00/xx	

**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 the installed Fibre Channel card.

For the installation location, refer to the User's Guide for each server.

**Fibre Channel card WWN:**

Record the value of [PWWN].

**Instance name:**

Not necessary to record.

**Physical address:**

Record the value of [PCI Bus/Dev/Fn].

**Cable tag:**

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

- 6 In the [Adapter Configuration] menu, select [Adapter Settings] and press the [Enter] key.  
 Check the values for each parameter in the port configuration screen.  
 Refer to the following table and set the parameters.  
 For details on how to set the values, refer to Fibre Channel card user's guide.  
 Use the default values for any parameters that are not listed in the following table.

Parameter	Setting value	
	For SAN Boot	For non SAN Boot
BIOS	Enabled	Disabled
Port Speed	(*1)	
Boot LUN	Flash Values	Fabric Discovered
Boot Delay	0min	

Parameter	Setting value	
	For SAN Boot	For non SAN Boot
Topology	P2P	

\*1: Setting value list:

Maximum transfer rate of the Fibre Channel card to be connected	Switch connection Fibre Channel switch maximum speed				Direct connection to Fibre Channel cards
	16Gbit/s	8Gbit/s	4Gbit/s	2Gbit/s	16Gbit/s CA
16Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s	–	16Gbit/s
8Gbit/s	8Gbit/s	8Gbit/s	4Gbit/s	2Gbit/s	–
4Gbit/s	4Gbit/s	4Gbit/s	4Gbit/s	2Gbit/s	–

- 7 If the BIOS setting is changed in [Step 6](#), press the [Alt] + [S] keys to save the setting.
- 8 Select [Exit Brocade Config Menu] and press the [Enter] key.

```

    Brocade BIOS Config Menu

    Exit Brocade Config Menu
    Return to Brocade Config Menu
    
```

The server reboots.

To set multiple ports in the BIOS, select [Return to Brocade Config Menu].

**Caution**

If two or more Fibre Channel cards have already been installed in the server at the time of purchase, the one-to-one relationship between the WWNs and Fibre Channel cards may not be easy to determine. The WWNs that are obtained in this section may need to be repeatedly registered and set up on the ETERNUS AF/DX until a server recognizes the ETERNUS AF/DX logical disks.

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

**End of procedure**

## 3.3 Installing the Driver

Refer to the documentation provided with each Fibre Channel card for details on how to obtain and install a Fibre Channel card driver for it.

## 3.4 Checking the Driver Version

Use the Device Manager to check the version of the Fibre Channel card driver.

### Procedure

- 1 In the Device Manager, go to [Storage controllers], and open the [Properties] of the Fibre Channel card.
- 2 Select the [Driver] tab, and open [Driver Details].
- 3 Select the driver file, and check its [File version].

### Caution

If a different driver version is displayed from that shown in "Server Support Matrix", reinstall the driver.

**End of procedure**

## 3.5 Setting Up the Driver Parameters

Various Fibre Channel card driver parameters now need to be set.

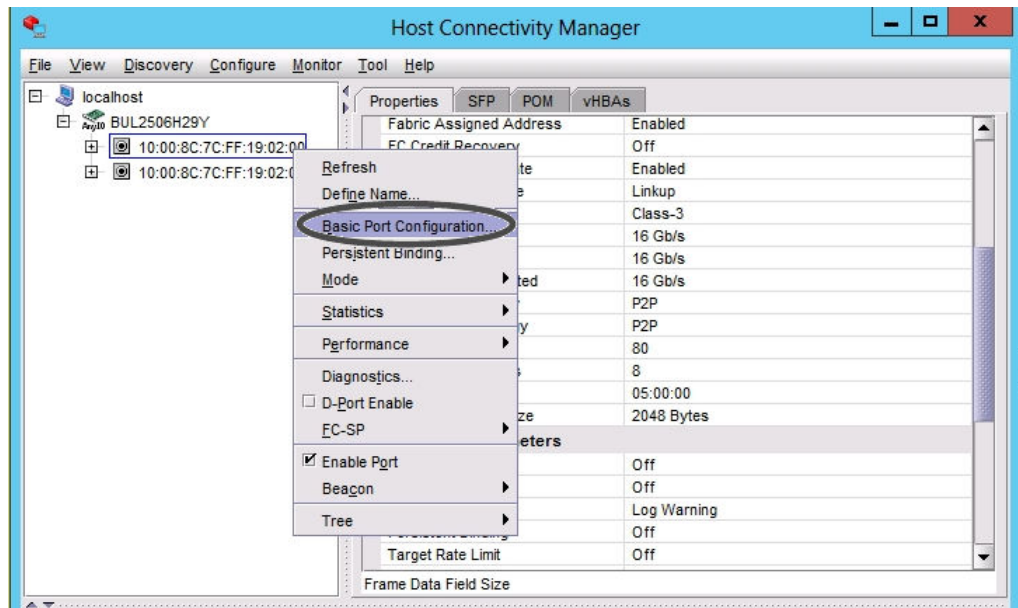
### 3.5.1 Setting the Configured Speed, Port Topology, and Frame Data Field Size Parameters

Use Host Connectivity Manager (HCM) to set the Configured Speed, Port Topology, and Frame data field size parameters.

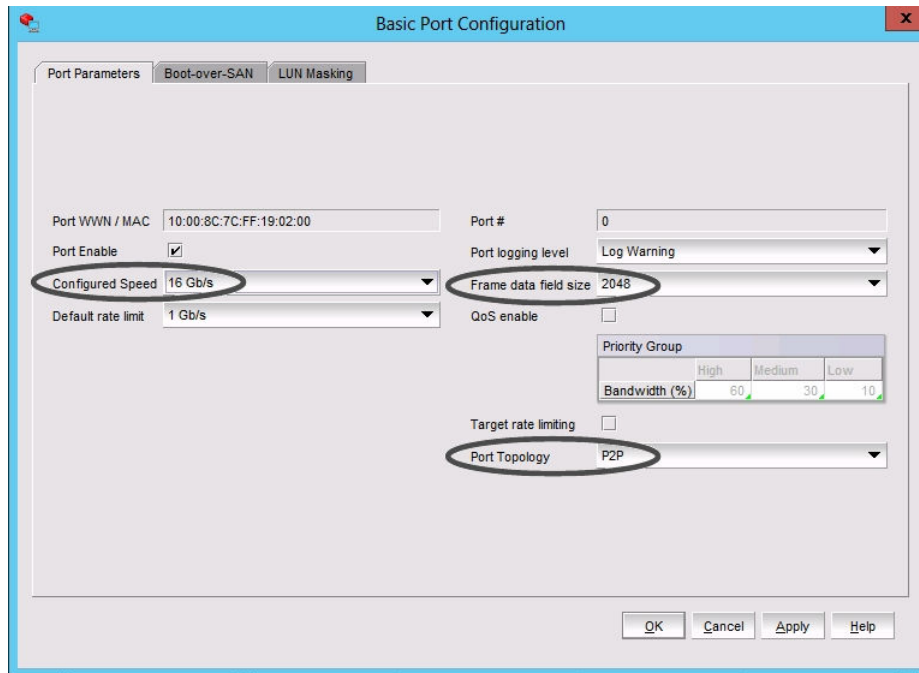
For details on the installation of HCM and the driver parameter setting procedure, refer to the relevant Fibre Channel card manual.

#### Procedure

- 1 Install Host Connectivity Manager.
- 2 Start Host Connectivity Manager Utility.
- 3 Set up the parameters for the driver.
  - (1) Right-click the Fibre Channel card port to be set, and select [Basic Port Configuration] .



- (2) In the [Basic Port Configuration] window, set the "Configured Speed", "Port Topology", and "Frame data field size" parameters.



- Set "P2P" for "Port Topology".
- Set "2048" for "Frame data field size".
- Set the "Configured Speed" parameter according to the values listed below.

Setting value list:

Maximum transfer rate of the Fibre Channel card to be connected	Switch connection Fibre Channel switch maximum speed				Direct connection to Fibre Channel cards 16Gbit/s CA
	16Gbit/s	8Gbit/s	4Gbit/s	2Gbit/s	
16Gbit/s	16Gbit/s	8Gbit/s	4Gbit/s	—	16Gbit/s
8Gbit/s	8Gbit/s	8Gbit/s	4Gbit/s	2Gbit/s	—
4Gbit/s	4Gbit/s	4Gbit/s	4Gbit/s	2Gbit/s	—

- 4 After the value has been modified, click the [OK] button.
- 5 If there are multiple Fibre Channel cards or a Fibre Channel card has multiple ports, repeat [Step 2](#) through [Step 4](#) to change the settings for each port.
- 6 After all the cards have been set, select [Exit] from the [File] menu to quit Host Connectivity Manager Utility.

**Caution**

Do not modify any parameters other than those described here.

**End of procedure**



## 3.5.2 Setting the QueueDepth Parameter and the msix Function

Use Brocade Command-line Utility (BCU) to set the QueueDepth value and the msix function. For details on the driver parameter setting procedure, refer to the relevant Fibre Channel card manual.

### Procedure

- 1 Start up Brocade Command-line Utility (BCU).
- 2 Enter the following command in the BCU screen that appears, and set the "bfa\_lun\_queue\_depth" parameter.

```
bcu drvconf --key bfa_lun_queue_depth --val <queue depth>
```

Refer to the following table and set the parameters.

Driver parameter	Setting value
bfa_lun_queue_depth	Arbitrary (*1) (Up to 1024 for each FC port of the ETERNUS AF/DX)

**\*1:** Recommended value =  $1024 \div (\text{number of Fibre Channel ports that are connected to a single CA port}) \div \text{number of LUNs}$   
(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 AF/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.

The following example shows a QueueDepth setting:

```
C:\> bcu drvconf --key bfa_lun_queue_depth --val 20
```

- 3 In the BCU screen, enter the following command and set the "msix\_disable" parameter.

```
bcu drvconf --key msix_disable --val <value>
```

Refer to the following table and set the parameters.

Driver parameter	Setting value
msix_disable	0

The following example shows an msix\_disable setting:

```
C:\> bcu drvconf --key msix_disable --val 0
```

- 4 Reboot the server.  
The modified settings will be enabled after the reboot.

 **Caution**

Do not modify any parameters other than those described here.

**End of procedure**

## 3.6 Installing the Driver for ETERNUS AF/DX Storage Systems

Install the driver for ETERNUS AF/DX storage systems as required.

- Refer to the "Driver Notes" section in "Configuration Guide -Server Connection- (Fibre Channel) for Windows<sup>®</sup>" for notes on each driver in cases such as when connecting the server to the ETERNUS AF/DX in multipath configuration and using the path redundancy control (path fail-over) function, and for when single-path connection is used between the ETERNUS AF/DX and server.
- For the procedure about how to install (or uninstall), set up, and use the drivers for ETERNUS AF/DX storage systems, refer to the software manuals.

# Appendix A

## WWN Instance Management Table for the Server (Blank)

This management table is used in "Checking the Fibre Channel Card".  
Utilize this table if necessary.

Host name				
IP Address				
Physical slot name	Fibre Channel card WWN	Instance name	Physical address	Cable tag

# Appendix B

## Example of a QueueDepth Value Calculation

This appendix explains how to calculate the QueueDepth to be specified for the driver parameter of the Fibre Channel card.

### Note

If the vFC function is not used, the number of Fibre Channel port WWNs is equal to the number of physical WWNs only. Calculate the QueueDepth value using the number of LUNs that are recognized by the host.

The recommend QueueDepth value is calculated with the following formula.

Recommended value = (maximum number of simultaneous command processes per CA port) ÷ (number of Fibre Channel port WWNs 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:

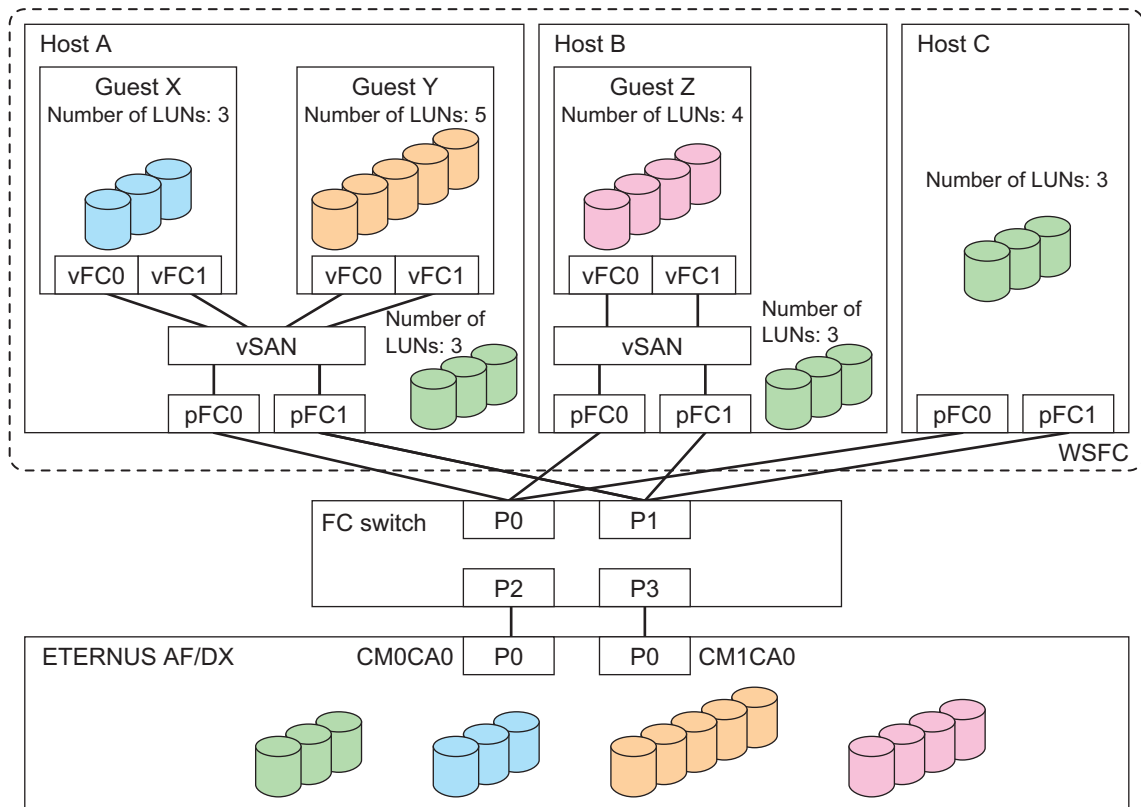
The value is used by multiple servers that share the CA port. The commands are processed until the limit is reached.

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

- Obtain the value of the node with the largest number of recognized LUNs among the hosts and virtual machines.
- The number of Fibre Channel port WWNs is the total number of physical WWNs and virtual WWNs when the vFC function is used.
- Both AddressSetA and AddressSetB are assigned to each port that is used in the vFC function. However, only one virtual WWN is assigned to each port.
- For Emulex Fibre Channel cards
  - 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.
- For QLogic Fibre Channel cards
  - Use the value of "8" if the actual result is lower.
  - Use the value of "254" if the actual result is higher.
  - To achieve maximum system performance, this value can be changed according to the server load and the peak operating times.

The QueueDepth value is calculated using the following configuration as an example.

- Physical WWNs
  - Host A: the number of LUNs is 3
  - Host B: the number of LUNs is 3
  - Host C: the number of LUNs is 3
- Virtual WWNs
  - Guest X: the number of LUNs is 3
  - Guest Y: the number of LUNs is 5
  - Guest Z: the number of LUNs is 4



- Number of Fibre Channel port WWNs that are connected to a single CA port  
Sum of the Hosts (physical WWNs) and the Guests (virtual WWNs)  
 $3 \text{ (Host A, Host B, and Host C)} + 3 \text{ (Guest X, Guest Y, and Guest Z)} = 6 \dots (1)$

- Number of LUNs  
The node with the largest number of recognized LUNs is Guest Y which has five.  
 $5 \text{ (the number of LUNs for Guest Y)} \dots (2)$

Based on the results of (1) and (2) above, the QueueDepth value is calculated with the following formula.

$$1024 \div 6 \div 5 = 34$$

The QueueDepth value to be specified for the host is "34".

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FUJITSU Storage ETERNUS AF, ETERNUS DX Configuration Guide -Server Connection-  
(Fibre Channel) for Windows®  
Driver Settings for Non-Fujitsu Fibre Channel Cards

P3AM-6342-24ENZO

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