Preface

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

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.

Refer to "FUJITSU Storage ETERNUS DX 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.

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The Contents and Structure of this Manual

This manual is composed of the following 11 chapters.

• "Chapter 1 Workflow" (page 6)
  This chapter describes how to connect the ETERNUS DX storage systems to a server running Linux.

• "Chapter 2 Checking the Server Environment" (page 10)
  This chapter describes which servers can be connected to ETERNUS DX storage systems.

• "Chapter 3 Notes" (page 11)
  This chapter describes issues that should be noted when connecting the ETERNUS DX storage systems and server.

• "Chapter 4 Installing and Setting Up ETERNUSmgr" (page 14)
  This chapter describes how to install ETERNUSmgr.

• "Chapter 5 Setting Up the ETERNUS DX" (page 15)
  This chapter describes how to set up an ETERNUS DX.

• "Chapter 6 Setting Up the Fibre Channel Switches and the CEE/FCoE Switches" (page 16)
  This chapter describes how to set up Fibre Channel switches and CEE/FCoE switches.

• "Chapter 7 Installing Drivers and Setting Up the Server" (page 18)
  This chapter describes how to install the Converged Network Adapter card drivers and set up the server.

• "Chapter 8 Connecting the Server to the ETERNUS DX storage systems" (page 19)
  This chapter describes how to connect the server and ETERNUS DX storage systems.

• "Chapter 9 Setting Up the Server to Recognize the Logical Units" (page 20)
  This chapter describes how to make the server recognize the LUNs of the ETERNUS DX.

• "Chapter 10 Setting Up and Checking the Multipath Driver" (page 23)
  This chapter describes how to set multipaths for multipath connection.

• "Chapter 11 Setting a File System" (page 24)
  This chapter describes how to create a file system.
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Chapter 1
Workflow

This chapter describes how to connect the ETERNUS DX to a server running Linux. Procedure varies according to whether a single-path or multipath configuration is used.

**Note**

When a Fibre Channel switch and a CEE/FCoE switch are used for the connection, follow the relevant procedures in "FUJITSU Storage ETERNUS DX Configuration Guide -Server Connection- (Fibre Channel) Fibre Channel Switch Settings" or the relevant procedures in "Converged Enhanced Ethernet Administrator's Guide" and "Fabric OS Administrator's Guide".

The workflow is shown below.

**Usable Multipath Drivers**
- ETERNUS Multipath Driver
- device-mapper multipath

**Required Documents**
- "Server Support Matrix"
- "Server Support Matrix for CEE/FCoE-SWITCH-Linux"
- "FUJITSU Storage ETERNUS DX Configuration Guide -Server Connection- Disk Storage System Settings" that corresponds to the ETERNUS DX to be connected
- "FUJITSU Storage ETERNUS DX Configuration Guide -Server Connection- (Fibre Channel) Fibre Channel Switch Settings"
- "FUJITSU Storage ETERNUS DX Configuration Guide -Server Connection- (Fibre Channel/FCoE/iSCSI/SAS) for Linux device-mapper multipath"
- "FUJITSU Storage ETERNUS DX Configuration Guide -Server Connection- (FCoE) for Linux Driver Settings for Converged Network Adapter Cards"
- "Converged Enhanced Ethernet Administrator's Guide"
- "Fabric OS Administrator's Guide"
- "ETERNUS Web GUI User's Guide"
- "ETERNUSmgr Install Guide"
- "ETERNUSmgr User Guide"
- Manuals supplied with the server, Converged Network Adapter card, Converged Network Adapter card driver, and multipath driver
Workflow

1 Installing ETERNUSmgr and Setting Up the ETERNUS DX

If ETERNUSmgr is to be used, install it and set up the ETERNUS DX.
- "Chapter 4 Installing and Setting Up ETERNUSmgr" (page 14)
- "Chapter 5 Setting Up the ETERNUS DX" (page 15)
- Checking the ETERNUS Web GUI operational procedures
  - "ETERNUS Web GUI User's Guide"
- Installing ETERNUSmgr
  - "ETERNUSmgr Install Guide"
- Checking the ETERNUSmgr operational procedures
  - "ETERNUSmgr User Guide"
- Setting up the ETERNUS DX
  - "FUJITSU Storage ETERNUS DX Configuration Guide -Server Connection- Disk Storage System Settings" that corresponds to the ETERNUS DX to be connected

2 Setting Up the Fibre Channel Switches and the CEE/FCoE Switches

If a Fibre Channel switch and a CEE/FCoE switch are to be used, set them up.
- "Chapter 6 Setting Up the Fibre Channel Switches and the CEE/FCoE Switches" (page 16)
- Setting up the Fibre Channel switches and the CEE/FCoE switches
  - "FUJITSU Storage ETERNUS DX Configuration Guide -Server Connection- (Fibre Channel) Fibre Channel Switch Settings"
  - "Converged Enhanced Ethernet Administrator's Guide"
  - "Fabric OS Administrator's Guide"
- Checking the FCoE connection requirements
  - "Server Support Matrix for CEE/FCoE-SWITCH-Linux"
Installing the Driver
Install the appropriate driver for the Converged Network Adapter card being used. Applicable manual varies according to the server, OS, and Converged Network Adapter card type being used. Select from the following list.
- "Chapter 7 Installing Drivers and Setting Up the Server" (page 18)
- Installing Converged Network Adapter cards, installing drivers, and performing setup
  - "FUJITSU Storage ETERNUS DX Configuration Guide -Server Connection- (FCoE) for Linux Driver Settings for Converged Network Adapter Cards"
- Checking the Converged Network Adapter card driver versions
  - "Server Support Matrix"

Installing the ETERNUS Multipath Driver
Install the ETERNUS Multipath Driver.
- "Chapter 10 Setting Up and Checking the Multipath Driver" (page 23)
- Installing and setting up the Multipath Driver
  - Manuals provided with the Multipath Driver
- Checking the corresponding Multipath Driver
  - "Server Support Matrix"

Connecting the Server to the ETERNUS DX Storage Systems
Connect the server and the ETERNUS DX storage systems using the Fibre Channel cables.
- "Chapter 8Connecting the Server to the ETERNUS DX storage systems" (page 19)

Setting Up the Server to Recognize the Logical Units
Set up the server so that it can recognize the LUNs (logical unit numbers) of the ETERNUS DX.
- "Chapter 9 Setting Up the Server to Recognize the Logical Units" (page 20)
When the ETERNUS Multipath Driver is used or when the Multipath Driver is not used

Setting Up the device-mapper multipath
Set up and confirm the device-mapper multipath.
- "Chapter 10 Setting Up and Checking the Multipath Driver" (page 23)
- Setting up the device-mapper multipath
  - "FUJITSU Storage ETERNUS DX Configuration Guide - Server Connection - (Fibre Channel/FCoE/iSCSI/SAS) for Linux device-mapper multipath"

Creating a File System
Create a file system.
- "Chapter 11 Setting a File System" (page 24)
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
Refer to the "Server Support Matrix".

2.2 OS (Operating System)
Refer to the "Server Support Matrix".

2.3 Converged Network Adapter Cards
Refer to the "Server Support Matrix".

2.4 ETERNUS Multipath Driver
Refer to the "Server Support Matrix".

2.5 device-mapper multipath
Refer to the "Server Support Matrix".
Chapter 3
Notes

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

3.1 Connection Notes

3.1.1 SCSI Devices and Linux

The ETERNUS DX storage systems are recognized by the server as a set of Fibre Channel connected SCSI disks. The server then recognizes the ETERNUS DX storage systems' disks as LUNs (logical units). For Linux, SCSI disk devices have the following definitions in "/dev":

<table>
<thead>
<tr>
<th>Device (LUN)</th>
<th>Partition</th>
</tr>
</thead>
<tbody>
<tr>
<td>sda</td>
<td>sda1, sda2, ... sda15</td>
</tr>
<tr>
<td>sdb</td>
<td>sdb1, sdb2, ... sdb15</td>
</tr>
<tr>
<td>sdz</td>
<td>sdz1, sdz2, ... sdz15</td>
</tr>
<tr>
<td>sdaa-sdaz</td>
<td>sdaa1, sdaa2, ... sdaa15</td>
</tr>
<tr>
<td>sdba-sdbz</td>
<td>sdba1, sdba2, ... sdba15</td>
</tr>
<tr>
<td>sdca-sdcz</td>
<td>sdca1, sdca2, ... sdca15</td>
</tr>
<tr>
<td>sdda-sddx</td>
<td>sdda1, sdda2, ... sdda15</td>
</tr>
<tr>
<td>sdia-sdiv</td>
<td>sdia1, sdia2, ... sdia15</td>
</tr>
</tbody>
</table>

3.2 Red Hat Enterprise Linux Notes

For details involving RHEL, refer to the Red Hat web-site and any documentation available.

3.3 SUSE Linux Enterprise Server Notes

For details involving SLES, refer to the Novell web-site and any documentation available.
3.4 Converged Network Adapter Card Notes

When a Converged Network Adapter card is installed in the server after installation of the OS, it should be automatically recognized the next time the OS is restarted. Proceed as follows when a response is requested:

- For Red Hat Enterprise Linux
  The kudzu starts automatically during the system reboot. Select "Ignore".
- For SUSE Linux Enterprise Server
  The "New hardware detection" window appears during the system reboot. Select "No".

3.5 Fibre Channel Switch and CEE/FCoE Switch Notes

When using a Fibre Channel switch and a CEE/FCoE switch between the server and ETERNUS DX storage systems, it is necessary to prepare and set the Fibre Channel switch and the CEE/FCoE switch in advance. When using a Fibre Channel switch and a CEE/FCoE switch, be sure to read "FUJITSU Storage ETERNUS DX Configuration Guide -Server Connection- (Fibre Channel) Fibre Channel Switch Settings" or "Converged Enhanced Ethernet Administrator's Guide" and "Fabric OS Administrator's Guide".

3.6 Server Startup and Power Supply Control Notes

Before turning the server on, check that the ETERNUS DX storage systems, Fibre Channel switches, and CEE/FCoE switches are all "Ready". If the server is turned on and they are not "Ready", the server will not be able to recognize the ETERNUS DX storage systems.

Also, when the ETERNUS DX power supply is being controlled by a connected server, make sure that the ETERNUS DX does not shut down before the connected servers. Similarly, the Fibre Channel switches and the CEE/FCoE 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 DX storage systems, and already saved data may also be affected.

3.7 System Design Sheet Notes

The system design sheet is a spreadsheet program work sheet that is used to simplify the process of installing the ETERNUS DX. It is important that the system details be recorded after first installing the system and also each time the system is subsequently modified, expanded, or has maintenance work performed on it. Creating a system design sheet makes installation and maintenance of the system easy.

3.8 Notes on Connecting the ETERNUS DX to a Server

When connecting the ETERNUS DX to a server using a Fibre Channel cable, make sure to confirm that all the settings on the ETERNUS DX are complete. The WWN Automatic Acquisition function should not be used because it requires the server to be connected. Otherwise, LUNs in the ETERNUS DX may not be recognized properly.
3.9 SAN Boot Notes

When using an ETERNUS DX LUN (Logical Unit) as the boot disk, check the "Server Support Matrix" for the server environment being used, as well as any SAN boot documentation (such as in a system installation guide) provided with the server.

When an ETERNUS DX LUN is to be used as a boot disk, it must be provided with sufficient capacity to install the OS.
Chapter 4
Installing and Setting Up ETERNUSmgr

If ETERNUSmgr is to be used, install it according to the directions given in the “ETERNUSmgr Install Guide”. After installation is complete, follow the instructions in “ETERNUSmgr User Guide” and set up ETERNUSmgr.
Chapter 5
Setting Up the ETERNUS DX

Set up the ETERNUS DX storage systems using ETERNUS Web GUI or ETERNUSmgr. ETERNUS DX setup can be performed independently of server setup. For details on how to perform these settings, refer to the following manuals.

- "FUJITSU Storage ETERNUS DX Configuration Guide -Server Connection- Disk Storage System Settings" that corresponds to the ETERNUS DX to be connected
- "ETERNUS Web GUI User's Guide" or "ETERNUSmgr User Guide"
Chapter 6
Setting Up the Fibre Channel Switches and the CEE/FCoE Switches

This chapter describes the required settings when connecting the server and the ETERNUS DX storage systems using a Fibre Channel switch and a CEE/FCoE switch.

Follow the procedures provided in "FUJITSU Storage ETERNUS DX Configuration Guide -Server Connection- (Fibre Channel) Fibre Channel Switch Settings" or "Converged Enhanced Ethernet Administrator's Guide" and "Fabric OS Administrator's Guide".

Caution

If the access path is set with ETERNUS SF Storage Cruiser, the Host Response settings are set to the default values.

If the Host Response settings are changed from the default values, set the Host Response again.

The following examples show configurations in which a server is connected to a Fibre Channel switch and a CEE/FCoE switch with zoning.

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.
Chapter 7
Installing Drivers and Setting Up the Server

Install the Converged Network Adapter card driver, and set up the server environment. Refer to "FUJITSU Storage ETERNUS DX Configuration Guide - Server Connection- (FCoE) for Linux Driver Settings for Converged Network Adapter Cards" for detailed setting procedures.

When Emulex Converged Network Adapter cards or Fujitsu Emulex Converged Network Adapter cards are used, refer to the "Operations When Using Emulex Converged Network Adapter Cards" chapter.
Chapter 8
Connecting the Server to the ETERNUS DX storage systems

After all the required drivers have been installed, shut down the OS and make sure the server is turned off. Connect the shutdown server to the ETERNUS DX storage systems using Fibre Channel cables, then restart the OS.

The server and ETERNUS DX storage systems must be connected for the procedures that follow.
Chapter 9
Setting Up the Server to Recognize the Logical Units

At boot up, Linux automatically recognizes all SCSI disks and assigns them successive device names starting from "sda". When assigning the device names, any internal SCSI disks are assigned first, followed by the assignment of the ETERNUS DX storage systems' LUNs. Example: If there is one internal SCSI disk, it is assigned a SCSI device name as follows:

<table>
<thead>
<tr>
<th>SCSI device name</th>
<th>by-id name (Example)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda</td>
<td>/dev/disk/by-id/scsi-3600000e00d0000000000042200000000</td>
<td>Internal SCSI disk</td>
</tr>
<tr>
<td>/dev/sdb or later</td>
<td>/dev/disk/by-id/scsi-3600000e00d0000000000042200000000:</td>
<td>ETERNUS DX storage systems' LUN</td>
</tr>
</tbody>
</table>

9.1 Displaying the Recognized Logical Units

The driver version and information of each LUN's SCSI device name, etc. are displayed in the console message when Linux is booted up. Although this console message disappears soon from the screen, it can be re-displayed using the following commands.

9.1.1 For Red Hat Enterprise Linux

- "dmesg" command for LUN display

Use the "dmesg" command in order to confirm whether Linux has recognized the LUNs in the ETERNUS DX storage systems.

The following shows an example:

```
# dmesg | less
:
Emulex LightPulse FC SCSI/IP 4.21q
PCI:Found IRQ 10 for device 03:06.0
!lpfc0:031:Link Up Event received Data:1 1 1 2
PCI:Found IRQ 5 for device 04:02.0
IRQ routing conflict for 04:02.0,have irq 10,want irq 5
!lpfc0:031:Link Up Event received Data:1 1 1 2
scsi3:Emulex LPFC SCSI on PCI bus 03 device 30 irq 10
scsi4:Emulex LPFC SCSI on PCI bus 04 device 10 irq 10
Vender: FUJITSU Model: ETERNUS_DX400 Rev: 0000
Type: Direct-Access ANSI SCSI revision: 03
Vender: FUJITSU Model: ETERNUS_DX400 Rev: 0000
Type: Direct-Access ANSI SCSI revision: 03
```
- "cat" command for LUN display

Use the "cat" command to display the "/proc/scsi/scsi" file, which contains a list of recognized SCSI devices.

Check each path of the allocated LUNs.

The following shows an example:

```
# cat /proc/scsi/scsi
Attached devices:
Host: scsi2 Channel: 00 Id: 05 Lun: 00
  Vender: HP Model: SAFTE; U160/M BP Type: processor
  ANSI SCSI revision: 02
Host: scsi2 Channel: 02 Id: 00 Lun: 00
  Vender: MegaRAID Model: LD0 RAID0 8677R Type: Direct-Access
  ANSI SCSI revision: 02
Host: scsi3 Channel: 00 Id: 00 Lun: 00
  Vender: FUJITSU Model: ETERNUS_DX400 Type: Direct-Access
  ANSI SCSI revision: 03
Host: scsi3 Channel: 00 Id: 00 Lun: 01
  Vender: FUJITSU Model: ETERNUS_DX400 Type: Direct-Access
  ANSI SCSI revision: 03
```

At this point the Multipath Driver has not been set up yet, so two SCSI devices are shown for each connected LUN (i.e. if there are 3 LUNs, 6 SCSI devices are shown).

### 9.1.2 For SUSE Linux Enterprise Server

- Boot message for LUN display

Open the `/var/log/boot.msg` file to confirm that Linux has recognized the ETERNUS DX storage systems' LUNs.

The following shows an example (Messages can be scrolled (back and forth) using the arrow keys).

```
<6> sd 3:0:0:32: reservation conflict
<6> sd 3:0:0:32: reservation conflict
<6> sd 3:0:0:32: reservation conflict
<4> sdcc: test WP failed, assume Write Enabled
<6> sd 3:0:0:32: reservation conflict
<3> sdcc: asking for cache data failed
<3> sdcc: assuming drive cache: write through
<6> sdcc: sdcb3 sdcb8
<4> sdcc3 sdcc8
<5> sd 4:0:0:32: Attached scsi disk sdcb
<5> sd 3:0:0:32: Attached scsi disk sdcc
<5> sd 3:0:0:32: Attached scsi generic sg79 type 0
<5> sd 4:0:0:32: Attached scsi generic sg80 type 0
<5> Vendor: FUJITSU Model: ETERNUS_DX400 Rev: 0000
<5> Type: Direct-Access ANSI SCSI revision: 05
<5> Vendor: FUJITSU Model: ETERNUS_DX400 Rev: 0000
<5> Type: Direct-Access ANSI SCSI revision: 05
<5> SCSI device sdcd: 2097152 512-byte hdwr sectors (1074 MB)
<6> sd 5:0:0:14: reservation conflict
<6> sd 5:0:0:14: reservation conflict
<6> sd 5:0:0:14: reservation conflict
<4> sdcd: test WP failed, assume Write Enabled
<6> sd 5:0:0:14: reservation conflict
<3> sdcd: asking for cache data failed
<3> sdcd: assuming drive cache: write through
<5> SCSI device sdcd: 2097152 512-byte hdwr sectors (1074 MB)
```
- "cat" command for LUN display

Use the "cat" command to display the "/proc/scsi/scsi" file, which contains a list of recognized SCSI devices. Check each path of the allocated LUNs.

The following shows an example:

```
# cat /proc/scsi/scsi
Attached devices:
Host: scsi0 Channel: 00 Id: 04 Lun: 00
  Vender: FUJITSU  Model: MAP3735NC          Rev: 5207
  Type:    Direct-Access                      ANSI SCSI revision: 03
Host: scsi0 Channel: 00 Id: 08 Lun: 00
  Vender: SDR      Model: GEM318             Rev: 0
  Type:    Processor                          ANSI SCSI revision: 02
Host: scsi1 Channel: 00 Id: 05 Lun: 00
  Vender: SEAGATE Model: DAT 9SP40-000    Rev: 9M38
  Type:    Sequential-Access                  ANSI SCSI revision: 03
Host: scsi2 Channel: 00 Id: 00 Lun: 00
  Vender: FUJITSU Model: ETERNUS_DX400      Rev: 0000
  Type:    Direct-Access                      ANSI SCSI revision: 05
Host: scsi2 Channel: 00 Id: 00 Lun: 01
  Vender: FUJITSU Model: ETERNUS_DX400      Rev: 0000
  Type:    Direct-Access                      ANSI SCSI revision: 05
```

At this point the Multipath Driver has not been set up yet, so two SCSI devices are shown for each connected LUN (i.e. if there are 3 LUNs, 6 SCSI devices are shown).
Chapter 10
Setting Up and Checking the Multipath Driver

10.1 ETERNUS Multipath Driver
Refer to the "ETERNUS Multipath Driver" manual (as applicable) for the setup and confirmation procedures.

10.2 Setting Up and Checking the device-mapper multipath
Set up and check the device-mapper multipath.
For the procedures, refer to "FUJITSU Storage ETERNUS DX Configuration Guide -Server Connection- (Fibre Channel/FCoE/iSCSI/SAS) for Linux device-mapper multipath".
After Linux has recognized the ETERNUS DX storage systems' LUNs, access for data storage will be possible after completing the following steps:

- Setting up Partitions
- Formatting Partitions
- Mounting Partitions
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