P3AM-3472-14ENZ0

FUJITSU Storage
ETERNUS DX

Configuration Guide -Server Connection-

(SAS) for Linux

FUJITSU

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Preface

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

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

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

14th Edition

April 2018

The Contents and Structure of this Manual

This manual is composed of the following ten chapters.

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Chapter 1 Workflow

This chapter describes how to connect the ETERNUS DX to a server running Linux.

Which documents need to be referred to varies with the connection environment. Refer to the workflow that follows to determine which documents are required.

Required Documents

- "Server Support Matrix"
- "Configuration Guide -Server Connection- Storage System Settings" that corresponds to the ETERNUS DX to be connected
- "Configuration Guide -Server Connection- (Fibre Channel/FCoE/iSCSI/SAS) for Linux device-mapper multi-path"
- "ETERNUS Web GUI User's Guide"
- Manuals supplied with the server, SAS cards, and multipath driver

1.1 When the Multipath Driver is not Used

The documents and workflow required when a multipath driver is not used are as follows.

Workflow

1

Setting Up the ETERNUS DX

Set the various parameters required to operate the ETERNUS DX.

- Checking the setup and maintenance operations
  - "Chapter 2 Checking the Server Environment" (page 10)
  - "Chapter 4 Setting Up the ETERNUS DX" (page 13)
  - "ETERNUS Web GUI User's Guide"
- Setting up the ETERNUS DX
  - "Configuration Guide -Server Connection- Storage System Settings" that corresponds to the ETERNUS DX to be connected

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Setting Up the SAS Switches

Set up the SAS switch.

- "Chapter 5 Setting Up the SAS Switches" (page 14)

3

Installing the Driver

Install the appropriate driver for the SAS card being used.

- Checking the SAS card driver versions
  - "Chapter 6 Installing the Driver" (page 16)
  - "Server Support Matrix"

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Setting Up the Server

Set the parameters required for connection to the ETERNUS DX.

- "7.1 For Fujitsu SAS Cards" (page 17)
- "7.2 For LSI Logic SAS Cards" (page 17)

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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 8 LUN Recognition" (page 18)

1.2 When the Multipath Driver is Used

The documents and workflow required when a multipath driver is used are as follows.

Workflow

1

Setting Up the ETERNUS DX

Set the various parameters required to operate the ETERNUS DX.

- Checking the setup and maintenance operations
  - "Chapter 2 Checking the Server Environment" (page 10)
  - "Chapter 4 Setting Up the ETERNUS DX" (page 13)
  - "ETERNUS Web GUI User's Guide"
- Setting up the ETERNUS DX
  - "Configuration Guide -Server Connection- Storage System Settings" that corresponds to the ETERNUS DX to be connected

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Install the appropriate driver for the SAS card being used.

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  - "Chapter 6 Installing the Driver" (page 16)
  - "Server Support Matrix"

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Setting Up the Server

Set the parameters required for connection to the ETERNUS DX.

- "7.1 For Fujitsu SAS Cards" (page 17)
- "7.2 For LSI Logic SAS Cards" (page 17)

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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 8 LUN Recognition" (page 18)

When the ETERNUS Multipath Driver is used

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Set up and check the ETERNUS Multipath Driver.

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Setting Up and Checking the device-mapper multipath

Set up and check the device-mapper multipath.

- "9.2 Setting Up and Checking the device-mapper multipath" (page 21)
- "Configuration Guide -Server Connection- (Fibre Channel/FCoE/iSCSI/SAS) for Linux device-mapper multipath"

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 Operating System (OS)

Refer to the "Server Support Matrix".

2.3 SAS Cards

Refer to the "Server Support Matrix".

2.4 ETERNUS Multipath Driver or 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 SAS Card Notes

Check the BIOS and firmware versions for the SAS cards being used. If these are different from the versions in the "Server Support Matrix", download and install the appropriate BIOS or firmware version from the SAS card vendor's web-site.

3.2 Server Startup Notes

Before turning the server on, check that the ETERNUS DX storage systems 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 UPS power supply linkage, make sure that the ETERNUS DX is never turned off before the connected servers. 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.

3.3 Red Hat Enterprise Linux Notes

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

3.4 SUSE Linux Enterprise Server Notes

For details involving SLES, refer to the Novell web-site and any documentation available.

3.5 Notes on Creating and Mounting File Systems

If the environment meets all the following conditions, the file system creation command may fail due to an error.

- RHEL7.3 or later, or SLES12 SP2 or later is used
- ETERNUS DX S3 series is used with firmware version earlier than V10L70
- A TPV or an FTV with an Allocation setting of "Thick" is used

Add the following options according to the file system type and execute the command.

- If the file system is ext3/ext4

  -E discard option

  Example:

```
# mkfs.ext4 -E discard <Device name>
```

- If the file system is xfs

  -K option

  Example:

```
# mkfs.xfs -K <Device name>
```

Do not specify the "discard" option when mounting these file systems.

3.6 Notes on Changing the max_sectors_kb Value

Change /sys/block/sdX/queue/max_sectors_kb to a value of 7992 or less when tuning the maximum I/O size.

Chapter 4
Setting Up the ETERNUS DX

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

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

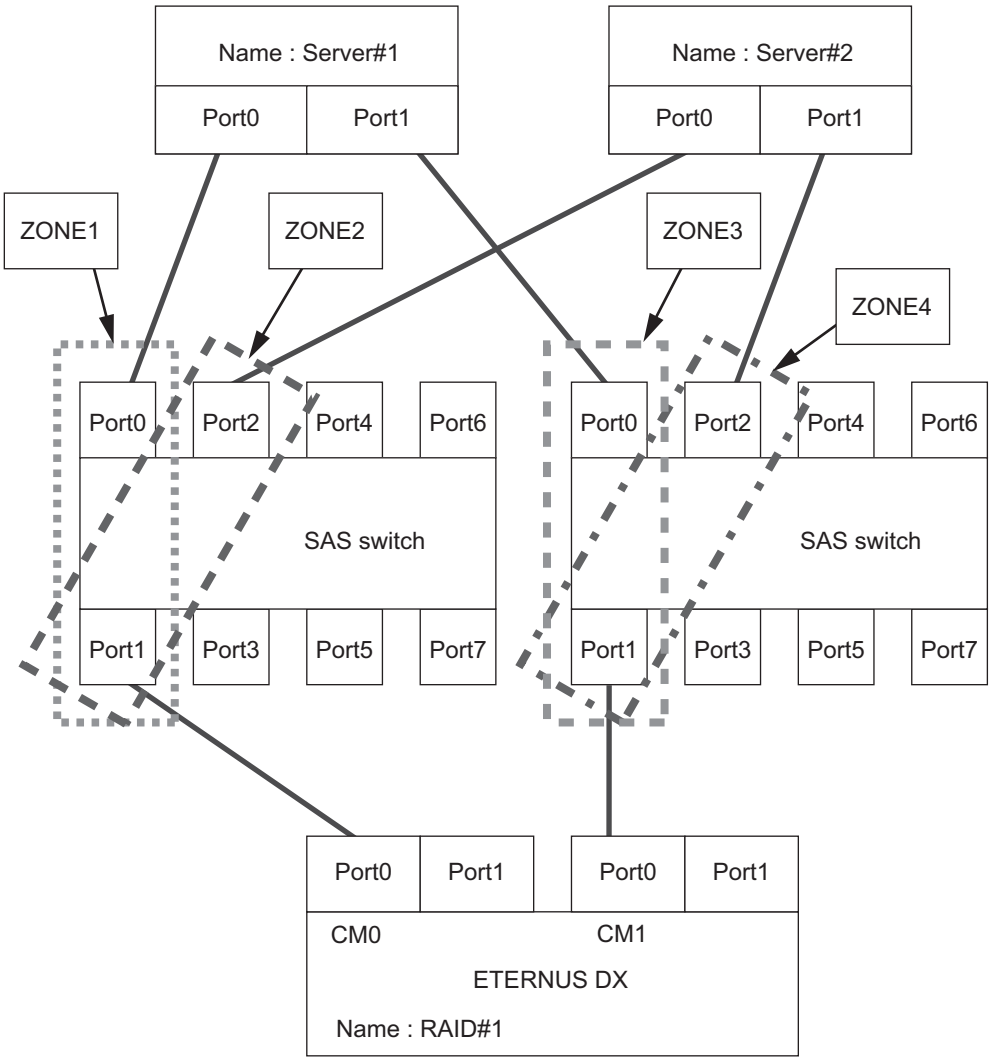
- "Configuration Guide -Server Connection- Storage System Settings" that corresponds to the ETERNUS DX to be connected
- "ETERNUS Web GUI User's Guide"

Chapter 5
Setting Up the SAS Switches

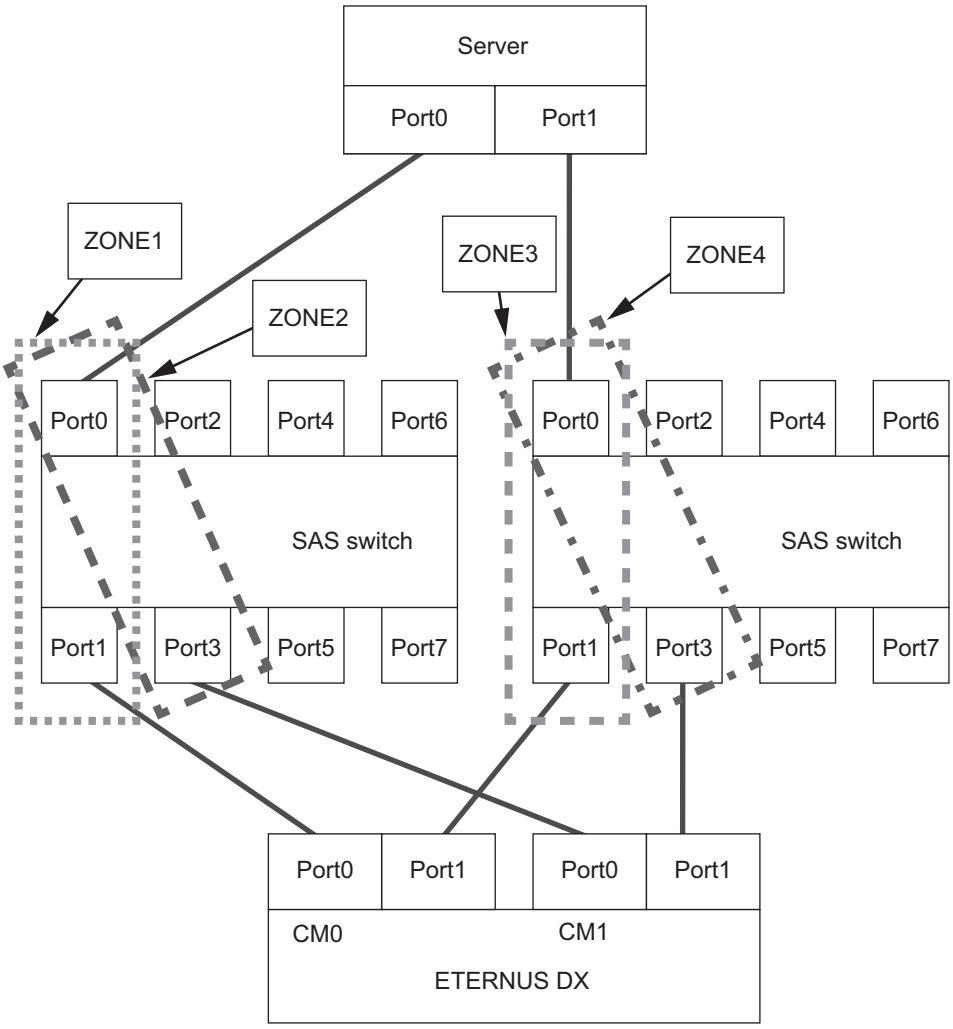
The following describes the required settings when connecting the server and the ETERNUS DX storage systems using a SAS switch. For details, refer to the SAS switch manual.

The following examples show configurations in which a server is connected to a SAS 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 6
Installing the Driver

6.1 For Fujitsu SAS Cards

Refer to the documentation provided with the SAS card for the SAS card driver installation procedure.

6.2 For LSI Logic SAS Cards

The SAS card driver does not need to be installed because it is one of the OS default drivers.

Chapter 7
Setting Up the Server

7.1 For Fujitsu SAS Cards

Refer to the documentation provided with the SAS card for the server setup procedure.

7.2 For LSI Logic SAS Cards

The server does not need to be set up.

Chapter 8
LUN Recognition

8.1 Setting Up the Server to Recognize LUNs

The following procedure is used to get the server to recognize the ETERNUS DX LUNs.

Procedure

1 When the driver installation process is complete, shut down the OS and turn the server power off.

2 Use the SAS cables to connect the server to the ETERNUS DX.

3 After connecting to the ETERNUS DX, start the OS.

Check that the Linux server recognizes the ETERNUS DX LUNs.

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. For example, if there is one internal SCSI disk and three ETERNUS DX LUNs, SCSI device names are assigned as follows:

SCSI device name	by-id name (Example)	Explanation
/dev/sda	/dev/disk/by-id/scsi-36003005700026cc011251e4b0b80ac59	Internal SCSI disk
/dev/sdb	/dev/disk/by-id/scsi-3600000e00d0000000001000000000000	ETERNUS DX storage systems' LUN
/dev/sdc	/dev/disk/by-id/scsi-3600000e00d0000000001000000010000	
/dev/sdd	/dev/disk/by-id/scsi-3600000e00d0000000001000000020000	

End of procedure

8.2 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.

8.2.1 For Red Hat Enterprise Linux or Oracle 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
           :
ioc0: LSISAS1068E B3: Capabilities={Initiator}
PCI: Setting latency timer of device 0000:09:00.0 to 64
scsi1 : ioc0: LSISAS1068E B3, FwRev=011b2900h, Ports=1, MaxQ=483, IRQ=169
  Vendor: FUJITSU   Model: ETERNUS_DXL       Rev: 0000
  Type:   Direct-Access                      ANSI SCSI revision: 05
  Vendor: FUJITSU   Model: ETERNUS_DXL       Rev: 0000
  Type:   Direct-Access                      ANSI SCSI revision: 05
```

- "cat" command for LUN display

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

  The following shows an example:

```
# cat /proc/scsi/scsi
Attached devices:
Host: scsi0 Channel: 02 Id: 00 Lun: 00
  Vendor: LSI      Model: MegaRAID SAS RMB Rev: 1.02
  Type:   Direct-Access                    ANSI SCSI revision: 05
Host: scsi1 Channel: 00 Id: 01 Lun: 00
  Vendor: FUJITSU  Model: ETERNUS_DXL      Rev: 0000
  Type:   Direct-Access                    ANSI SCSI revision: 05
Host: scsi1 Channel: 00 Id: 01 Lun: 01
  Vendor: FUJITSU  Model: ETERNUS_DXL      Rev: 0000
  Type:   Direct-Access                    ANSI SCSI revision: 05
Host: scsi1 Channel: 00 Id: 01 Lun: 02
  Vendor: FUJITSU  Model: ETERNUS_DXL      Rev: 0000
  Type:   Direct-Access                    ANSI SCSI revision: 05
Host: scsi1 Channel: 00 Id: 01 Lun: 03
  Vendor: FUJITSU  Model: ETERNUS_DXL      Rev: 0000
  Type:   Direct-Access                    ANSI SCSI revision: 05
Host: scsi1 Channel: 00 Id: 01 Lun: 04
  Vendor: FUJITSU  Model: ETERNUS_DXL      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).

8.2.2 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).

```
<5> Vendor: FUJITSU Model: ETERNUS_DXL Rev: 0000
<5> Type: Direct-Access ANSI SCSI revision: 05
<5> Vendor: FUJITSU Model: ETERNUS_DXL Rev: 0000
<5> Type: Direct-Access ANSI SCSI revision: 05
              :
              :
              :
<5>SCSI device sdb: 4096000 512-byte hdwr sectors (2147 MB)
<7> sdb: unknown partition table
<5>SCSI device sdc: 4096000 512-byte hdwr sectors (2147 MB)
<7> sdc: unknown partition table
```

- "cat" command for LUN display

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

  The following shows an example:

```
# cat /proc/scsi/scsi
Attached devices:
Host: scsi0 Channel: 02 Id: 00 Lun: 00
  Vendor: LSI      Model: MegaRAID SAS RMB Rev: 1.02
  Type:   Direct-Access                    ANSI SCSI revision: 05
Host: scsi1 Channel: 00 Id: 01 Lun: 00
  Vendor: FUJITSU  Model: ETERNUS_DXL      Rev: 0000
  Type:   Direct-Access                    ANSI SCSI revision: 05
Host: scsi1 Channel: 00 Id: 01 Lun: 01
  Vendor: FUJITSU  Model: ETERNUS_DXL      Rev: 0000
  Type:   Direct-Access                    ANSI SCSI revision: 05
Host: scsi1 Channel: 00 Id: 01 Lun: 02
  Vendor: FUJITSU  Model: ETERNUS_DXL      Rev: 0000
  Type:   Direct-Access                    ANSI SCSI revision: 05
Host: scsi1 Channel: 00 Id: 01 Lun: 03
  Vendor: FUJITSU  Model: ETERNUS_DXL      Rev: 0000
  Type:   Direct-Access                    ANSI SCSI revision: 05
Host: scsi1 Channel: 00 Id: 01 Lun: 04
  Vendor: FUJITSU  Model: ETERNUS_DXL      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 9
Setting Up and Checking the Multipath Driver

9.1 Setting Up and Checking the ETERNUS Multipath Driver

For the setup and check procedures, refer to the manual that is provided with the ETERNUS Multipath Driver.

9.2 Setting Up and Checking the device-mapper multipath

Set up and check the device-mapper multipath.

For the procedures, refer to "Configuration Guide -Server Connection- (Fibre Channel/FCoE/iSCSI/SAS) for Linux device-mapper multipath".

Chapter 10
Setting a File System

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

Caution

If by-id names are being used with Red Hat Enterprise Linux AS v.4 Update 4 or Red Hat Enterprise Linux ES v.4 Update 4 or later, then the accessible device names will be by-id names.

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(SAS) for Linux

P3AM-3472-14ENZ0

Date of issuance: April 2018
Issuance responsibility: FUJITSU LIMITED