
ETERNUS Multipath Driver (Linux Version) Installation Information

November 2009

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Supported Operating System (OS) Versions

The following tables show the version of Linux kernels supported by the ETERNUS Multipath Driver (MPD). If you are going to install ETERNUS Multipath Driver newly, please install ETERNUS Multipath Driver product, don't reboot the system, and then apply the latest ETERNUS Multipath Driver patch. After that, please reboot the system.

ETERNUS Multipath Driver for Red Hat Enterprise Linux 5

Operating System *1	Linux Kernel Versions	ETERNUS MPD Version Level
Red Hat Enterprise Linux 5 (for Intel Itanium)	2.6.18-8.el5	V2.0L11 or later
Red Hat Enterprise Linux 5 (for Intel64)		
Red Hat Enterprise Linux 5 (for x86)		
Red Hat Enterprise Linux 5.1 (for Intel Itanium)	2.6.18-53.el5	V2.0L12, Patch T00812-12 or later
	2.6.18-53.1.21.el5	V2.0L13, Patch T00812-14 or later
Red Hat Enterprise Linux 5.1 (for Intel64)	2.6.18-53.el5	V2.0L12, Patch T00812-12 or later
Red Hat Enterprise Linux 5.1 (for x86)		
Red Hat Enterprise Linux 5.2 (for Intel Itanium)	2.6.18-92.el5 *2*3	V2.0L13, Patch T00812-14 or later
Red Hat Enterprise Linux 5.2 (for Intel64)		
Red Hat Enterprise Linux 5.2 (for x86)		
Red Hat Enterprise Linux 5.3 (for Intel Itanium)	2.6.18-128.el5 *3	V2.0L13, Patch T00812-16 or later
Red Hat Enterprise Linux 5.3 (for Intel64)		
Red Hat Enterprise Linux 5.3 (for x86)		
Red Hat Enterprise Linux 5.4 (for Intel Itanium)	2.6.18-164.el5 *3	V2.0L14, Patch T00812-17 or later
Red Hat Enterprise Linux 5.4 (for Intel64)		
Red Hat Enterprise Linux 5.4 (for x86)		

*1 ETERNUS Multipath Driver can be installed into only Dom0 on Xen system. Don't install ETERNUS Multipath Driver into DomU. When using Xen system on the Intel Itanium platform, Red Hat Enterprise Linux 5.1 or later is required.

*2 The kernel version 2.6.18-92.1.18.el5 or later is needed to use ETERNUS Multipath Driver on the server which has a SATA interface HDD.

*3 errata kernel is supported.

ETERNUS Multipath Driver for Red Hat Enterprise Linux v.4

Operating System	Linux Kernel Versions	ETERNUS MPD Version Level
Red Hat Enterprise Linux AS (v.4 for Itanium)*1	2.6.9-5.0.3.EL	V2.0L01 or later
	2.6.9-22.EL(Update 2)	V2.0L03, Patch T00812-04 or later
	2.6.9-42.EL(Update 4)	V2.0L10. Patch T00812-05 or later
Red Hat Enterprise Linux AS (4.5 for Itanium)	2.6.9-55.EL	V2.0L11. Patch T00812-08 or later
Red Hat Enterprise Linux AS (4.6 for Itanium)	2.6.9-67.EL	V2.0L12, Patch T00812-12 or later
Red Hat Enterprise Linux AS (4.7 for Itanium)	2.6.9-78.EL *3	V2.0L13, Patch T00812-15 or later
Red Hat Enterprise Linux AS (4.8 for Itanium)	2.6.9-89.EL *3	V2.0L13, Patch T00812-17 or later
Red Hat Enterprise Linux AS (v.4 for EM64T)*1	2.6.9-11.EL(Update 1)	V2.0L02 or later
Red Hat Enterprise Linux ES (v.4 for EM64T)*1	2.6.9-22.EL(Update 2)	V2.0L03, Patch T00812-03 or later

Operating System	Linux Kernel Versions	ETERNUS MPD Version Level
	2.6.9-34.EL(Update 3)	
	2.6.9-42.EL(Update 4)	V2.0L10, Patch T00812-05 or later
Red Hat Enterprise Linux AS (4.5 for EM64T) Red Hat Enterprise Linux ES (4.5 for EM64T)	2.6.9-55.EL	V2.0L11, Patch T00812-08 or later
Red Hat Enterprise Linux AS (4.6 for EM64T) Red Hat Enterprise Linux ES (4.6 for EM64T)	2.6.9-67.EL	V2.0L12, Patch T00812-12 or later
Red Hat Enterprise Linux AS (4.7 for EM64T) Red Hat Enterprise Linux ES (4.7 for EM64T)	2.6.9-78.EL *3	V2.0L13, Patch T00812-15 or later
Red Hat Enterprise Linux AS (4.8 for EM64T) Red Hat Enterprise Linux ES (4.8 for EM64T)	2.6.9-89.EL *3	V2.0L13, Patch T00812-17 or later
Red Hat Enterprise Linux AS (v.4 for x86)*2 Red Hat Enterprise Linux ES (v.4 for x86)*2	2.6.9-11.EL(Update 1)	V2.0L02 or later
	2.6.9-22.EL(Update 2)	V2.0L03, Patch T00812-03 or later
	2.6.9-34.EL(Update 3)	
	2.6.9-42.EL(Update 4)	V2.0L10, Patch T00812-05 or later
Red Hat Enterprise Linux AS (4.5 for x86)*2 Red Hat Enterprise Linux ES (4.5 for x86)*2	2.6.9-55.EL	V2.0L11, Patch T00812-08 or later
Red Hat Enterprise Linux AS (4.6 for x86)*2 Red Hat Enterprise Linux ES (4.6 for x86)*2	2.6.9-67.EL	V2.0L12, Patch T00812-12 or later
Red Hat Enterprise Linux AS (4.7 for x86)*2 Red Hat Enterprise Linux ES (4.7 for x86)*2	2.6.9-78.EL *3	V2.0L13, Patch T00812-15 or later
Red Hat Enterprise Linux AS (4.8 for x86)*2 Red Hat Enterprise Linux ES (4.8 for x86)*2	2.6.9-89.EL *3	V2.0L13, Patch T00812-17 or later

*1 largesmp kernel is not supported.

*2 hugemem kernel is not supported.

*3 errata kernel is supported.

ETERNUS Multipath Driver for SUSE Linux Enterprise Server 10

Operating System	Linux Kernel Versions	ETERNUS MPD Version Level
SUSE Linux Enterprise Server 10 for Itanium Processor Family	2.6.16.46-0.12 (SP1)	V2.0L12 or later
	2.6.16.60-0.21 (SP2)	V2.0L13, T00812-16 or later
SUSE Linux Enterprise Server 10 for EM64T	2.6.16.46-0.12 (SP1)	V2.0L12 or later
	2.6.16.60-0.21 (SP2)	V2.0L13, T00812-16 or later
SUSE Linux Enterprise Server 10 for x86	2.6.16.46-0.12 (SP1)	V2.0L12 or later
	2.6.16.60-0.21 (SP2)	V2.0L13, T00812-16 or later

* ETERNUS Multipath Driver does not support Xen kernel.

ETERNUS Multipath Driver for SUSE Linux Enterprise Server 9

Operating System	Linux Kernel Versions	ETERNUS MPD Version Level
SUSE Linux Enterprise Server 9 for Itanium Processor Family	2.6.5-7.191 (SP2)	V2.0L10 or later
	2.6.5-7.244 (SP3)	V2.0L03 or later
	2.6.5-7.308 (SP4)	V2.0L12, T00812-12 or later
SUSE Linux Enterprise Server 9 for EM64T	2.6.5-7.191 (SP2)	V2.0L10 or later
	2.6.5-7.244 (SP3)	V2.0L03 or later

Operating System	Linux Kernel Versions	ETERNUS MPD Version Level
	2.6.5-7.308 (SP4)	V2.0L12, T00812-12 or later
SUSE Linux Enterprise Server 9 for x86	2.6.5-7.191 (SP2)	V2.0L10 or later
	2.6.5-7.244 (SP3)	V2.0L03 or later
	2.6.5-7.308 (SP4)	V2.0L12, T00812-12 or later

ETERNUS Multipath Driver for Red Hat Enterprise Linux v.3, v.2.1

Operating System	Linux Kernel Versions	ETERNUS MPD Version Level
Red Hat Enterprise Linux AS (v.3 for Itanium)	2.4.21-4.0.1.EL	V2.0L02 or later
	2.4.21-9.EL (Update 1)	
	2.4.21-15.EL (Update 2)	
	2.4.21-20.EL (Update 3)	
	2.4.21-32.EL (Update 5)	V2.0L03, Patch T00704-04 or later
	2.4.21-37.EL (Update 6)	
	2.4.21-40.EL (Update 7)	
Red Hat Enterprise Linux AS (v.3 for EM64T) Red Hat Enterprise Linux ES (v.3 for EM64T)	2.4.21-47.EL (Update 8)	V2.0L10, Patch T00704-07 or later
	2.4.21-27.0.2EL (Update 4)	V2.0L02 or later
	2.4.21-32.EL (Update 5)	
	2.4.21-37.EL (Update 6)	V2.0L03, Patch T00704-04 or later
Red Hat Enterprise Linux AS (3.9 for EM64T) Red Hat Enterprise Linux ES (3.9 for EM64T)	2.4.21-40.EL (Update 7)	V2.0L03, Patch T00704-06 or later
	2.4.21-47.EL (Update 8)	V2.0L10, Patch T00704-07 or later
Red Hat Enterprise Linux AS (v.3 for x86) Red Hat Enterprise Linux ES (v.3 for x86)	2.4.21-50.EL	V2.0L12, Patch T00704-09 or later
	2.4.21-4.0.1.EL	V2.0L02 or later
	2.4.21-9.EL (Update 1)	
	2.4.21-15.EL (Update 2)	
	2.4.21-20.EL (Update 3)	
	2.4.21-32.0.1.EL (Update 5)	V2.0L03, Patch T00704-04 or later
	2.4.21-37.EL (Update 6)	
2.4.21-40.EL (Update 7)		
Red Hat Enterprise Linux AS (3.9 for x86) Red Hat Enterprise Linux ES (3.9 for x86)	2.4.21-47.EL (Update 8)	V2.0L10, Patch T00704-07 or later
	2.4.21-50.EL	V2.0L12, Patch T00704-09 or later
Red Hat Enterprise Linux AS (v.2.1 for x86) Red Hat Enterprise Linux ES (v.2.1 for x86)	2.4.21-57.EL	V2.0L13, Patch T00704-10 or later
	2.4.9-e.8 (Update 1)	V2.0L02 or later
	2.4.9-e.9 (Update 1)	
	2.4.9-e.12 (Update 1)	
	2.4.9-e.25 (Update 2)	
	2.4.9-e.27 (Update 2)	
	2.4.9-e.49 (Update 5)	V2.0L03, Patch T00704-06 or later
2.4.9-e.62 (Update 7)		

Restrictions and Resolution schedule

The ETERNUS Multipath Driver has following restrictions on each OS.

Red Hat Enterprise Linux AS v.4, Red Hat Enterprise Linux ES v.4

Restrictions	Resolution schedule
The hot deletion of LUs, paths and disk storage systems cannot be executed.	TBD
The hot addition of paths and disk storage systems is not supported.	TBD
The hot addition of LUs using PG-FCD101, PG-FCD102 (QLogic QLA2342) cannot be executed.	TBD
The maximum number of LU which can be assigned to a LU Mapping and an Affinity Group is 255 when using the mptsas driver. This restriction is due to mptsas driver.	RHEL4.8 *

* Red Hat Enterprise Linux AS 4.8 or Red Hat Enterprise Linux ES 4.8

SUSE Linux Enterprise Server 9

Restrictions	Resolution schedule
The hot deletion of LUs, paths and disk storage systems cannot be executed.	TBD
The hot addition of paths and disk storage systems is not supported.	TBD
The hot addition of LUs using PG-FCD101, PG-FCD102 (QLogic QLA2342) cannot be executed.	TBD
The PCI Hot Plug (PHP) of a HBA under control of the ETERNUS Multipath Driver is not supported.	V2.0L11
Hot addition of LUs using iSCSI initiator on SUSE Linux Enterprise Server 9 Service Pack 3.	TBD
Do not use iompadm change adapter and iompadm restart adapter commands for iSCSI initiator path on SUSE Linux Enterprise Server 9. Use iompadm change controller and iompadm restart controller commands instead.	TBD

Supported Disk Storage Systems

Supported disk storage systems and available path numbers depend on the model of ETERNUS Multipath Driver. In the case of SAS interface, the maximum number of available is 2 for all models. Please check the table below.

- FC and iSCSI interface

Model of ETERNUS MPD	Disk Storage System	Maximum number of available path
ETERNUS Multipath Driver for Entry Model	ETERNUS DX60, ETERNUS DX80	2 – 4
	ETERNUS2000	
	ETERNUS3000 model 50/80/100	
	ETERNUS4000 model 80/100	
	GR710 *3	
ETERNUS Multipath Driver for Standard Model *1	ETERNUS DX400 series	2 – 8
	ETERNUS3000 model 200/300/400/500/600/700	
	ETERNUS4000 model 300/400/500/600	
	GR720, GR730 *3	2
	ETERNUS DX8000 series	
	ETERNUS6000	
	ETERNUS8000	
GR740, GR820, GR840 *3		
ETERNUS Multipath Driver for Enterprise Model *2	ETERNUS DX8000 series	3 – 8
	ETERNUS6000	
	ETERNUS8000	
	GR740, GR820, GR840 *3	

- SAS interface

Model of ETERNUS MPD	Storage System	Maximum number of available path
ETERNUS Multipath Driver for Entry Model	ETERNUS DX60, ETERNUS DX80	2
	ETERNUS2000	
ETERNUS Multipath Driver for Standard Model *1		2
ETERNUS Multipath Driver for Enterprise Model *2		2

*1 Standard Model includes the capability of Entry Model.

*2 Enterprise Model includes the capability of Standard Model and Entry Model.

*3 PRIMEQUEST doesn't support GR series.

The version of ETERNUS Multipath Driver which supports the disk storage system is as below.

Disk Storage System	Interface	ETERNUS MPD Version Level
ETERNUS DX60, ETERNUS DX80	FC	V2.0L13, Patch T00812-17 or later
	SAS	V2.0L14, Patch T00812-19 or later
ETERNUS DX400 series,	FC	V2.0L14, Patch T00812-19 or later
ETERNUS DX8000 series	FC	V2.0L14, Patch T00812-19 or later
ETERNUS8000 model 700/900/1100/2100	FC	V2.0L03, Patch T00812-04, T00704-06 or later
ETERNUS8000 model 800/ 1200/ 2200	FC	V2.0L13, Patch T00812-15 or later, T00704-10 or later
ETERNUS6000	FC	V2.0L01 or later
ETERNUS4000 model 80/100/300/500	FC	V2.0L03, Patch T00812-04, T00704-06 or later
ETERNUS4000 model 400/600	FC	V2.0L13, Patch T00812-15 or later, T00704-10 or later
ETERNUS3000	FC	V2.0L01 or later
ETERNUS2000	FC	V2.0L12, Patch T00812-11, T00704-09 or later
	SAS*1	V2.0L13, Patch T00812-15 or later
	iSCSI*2	V2.0L13, Patch T00812-15 or later
GR710	FC	V2.0L01 or later
GR720	FC	V2.0L01 or later
GR730	FC	V2.0L01 or later
GR740	FC	V2.0L01 or later
GR820	FC	V2.0L01 or later
GR840	FC	V2.0L01 or later

*1 ETERNUS Multipath Driver supports the SAS interface only on Red Hat Enterprise Linux AS (v.4.6 for x86) or later, Red Hat Enterprise Linux ES (v.4.6 for x86) or later, Red Hat Enterprise Linux AS (v.4.6 for EM64T) or later and Red Hat Enterprise Linux ES (v.4.6 for EM64T) or later.

*2 ETERNUS Multipath Driver supports the iSCSI interface only on SUSE Linux Enterprise Server 9 Service Pack 3 and on SUSE Linux Enterprise Server 9 Service Pack 4.

Connection Requirements

The tables below shows related products supported by ETERNUS Multipath Driver. For combination of servers and FC cards, please contact us.

Hardware Requirements

Please use the same cards of product ID to configure a multipath access. If using the different cards of product ID, a multipath access cannot be configured. For example, the combination of a PG-FC202 and a PG-FC202 is good, but the combination of a PG-FC201 and a PG-FC202 is not good.

- FC Card

Product ID	ETERNUS MPD Version Level
MC-08FC11	V2.0L01 or later
MC-08FC31, MC-08FC41, MC-08FC51, MC-08FC61, MC-08FC71	V2.0L03, Patch T00812-04 or later
MC-08FC81, MC-08FC91	V2.0L13, Patch T00812-17 or later
PG-FC106, PG-FCD101, PG-FCD102	V2.0L02 or later
PG-FC107, PG-FC201, PG-FC202, PG-FC202L	V2.0L03, Patch T00812-03, Patch T00704-06 or later
PG-FC102*1, PG-FC105*2	V2.0L02 or later
PG-FCD201	V2.0L11, Patch T00704-10 or later
PG-FC203, PG-FC203L	V2.0L13, Patch T00812-15 or later
PG-FC204, PG-FC204L	V2.0L13, Patch T00812-17 or later

*1 The PG-FC102 is supported only on Red Hat Enterprise Linux v.2.1.

*2 The PG-FC105 is supported only on Red Hat Enterprise Linux v.2.1 and Red Hat Enterprise Linux v.3.

- SAS Card

Card	ETERNUS MPD Version Level
PG-228B, PG-228BL	V2.0L13, T00812-15 or later

- Topology

Interface	Topology	ETERNUS MPD Version Level
FC	FC-AL	V2.0L01 or later
	Fabric	
SAS	Direct connection	V2.0L13, T00812-15 or later
iSCSI	Point-to-Point	V2.0L13, Patch T00812-15 or later
	Switch	

- Virtualization Switch

Model Name	ETERNUS MPD Version Level	Caution
VS900 model 300	V2.0L13, Patch T00812-15 or later	When using VS900 model 300, please set the Max Throttle to 16.

Software Requirements

- Clustering Software

Clustering Software	ETERNUS MPD Version Level
PRIMECLUSTER	V2.0L01 or later (except for ETERNUS Multipath Driver V2.0L03 for SUSE Linux Enterprise Server 9)
LifeKeeper for Linux v6	V2.0L12, Patch T00812-11 or later (only on Red Hat Enterprise Linux AS (v.4 for x86) Update 4 or later and Red Hat Enterprise Linux ES (v.4 for x86) Update 4 or later)

Adapter Port Number and Connection Points

The `iompadm` command with "info" option shows attached disks information with adapter port number as the following example. The adapter port number means a connection point and is uniquely defined on each disk storage system. The figures below show the adapter port number of supported disk storage systems.

Example of V2.0L10 or later:

```
# /opt/FJSVmpd/bin/iompadm info
```

IOMP: `vhba0`

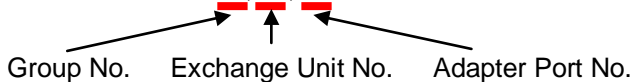
Element:

DISK: `E6000- 000001-0000-0180 (sdf)`

PATH:

`sdf 0000:02:03.0 active "online" 0, 21, 87`

`sdf 0000:02:09.0 active "online" 10, 31, c7`



Example of earlier than V2.0L10

```
# /usr/fjsvgmpd/bin/iompadm info
```

IOMP: `vhba0`

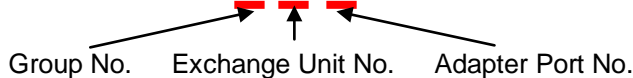
Element:

DISK: `E6000-000001-4846-0180 (sdf)`

PATH:

`sdf 0000:02:03.0 active "online" 0, 21, 87`

`sdf 0000:02:09.0 active "online" 10, 31, c7`



Note:

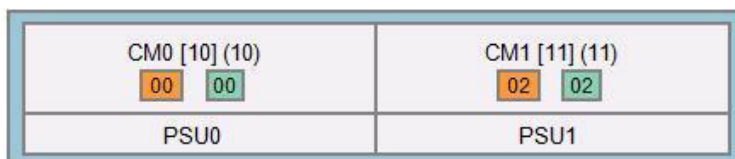
An adapter port number is different from a port number. Please refer to the User Guide of a storage system to check a port number. The relation between the port number and the physical position of the port depends on a storage system.

ETERNUS DX60, ETERNUS DX80 rear view (FC connection)



[] : Group No. () : Exchange Unit No. ■ : Adapter Port No. ■ : When using 2 port CM

ETERNUS DX60, ETERNUS DX80 rear view (SAS connection)



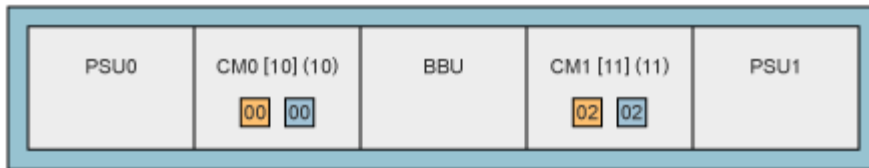
[] : Group No. () : Exchange Unit No. ■ : Adapter Port No. ■ : When using 2 port CM

ETERNUS2000 rear view (FC, iSCSI connection)



[] : Group No. () : Exchange unit No. [orange] : Adapter Port No. [blue] : When using 2port-CA

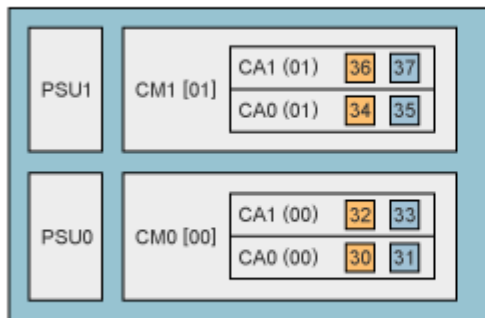
ETERNUS2000 rear view (SAS connection)



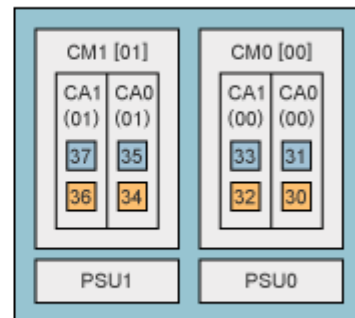
[] : Group No. () : Exchange unit No. [orange] : Adapter Port No. [blue] : When using 2port-CA

ETERNUS3000 model 200/300/400/500/600/700 rear view

[Rack mount]



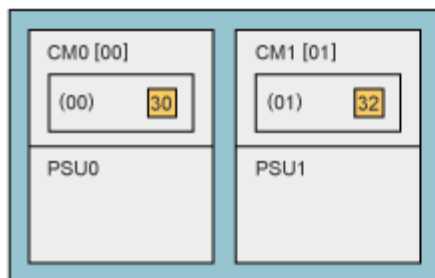
[Pedestal]



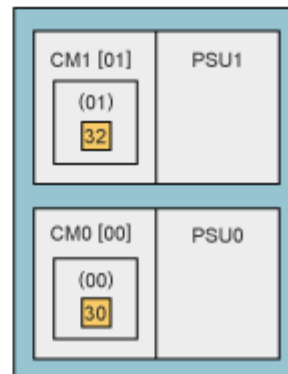
[] : Group No. () : Exchange unit No. [orange] : Adapter Port No. [blue] : When using 2port-CA

ETERNUS3000 model 50, GR710 rear view

[Rack mount]

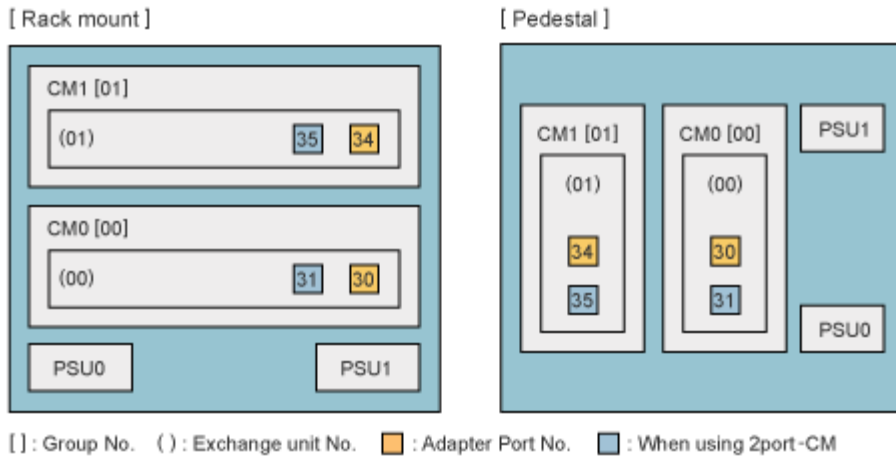


[Pedestal]

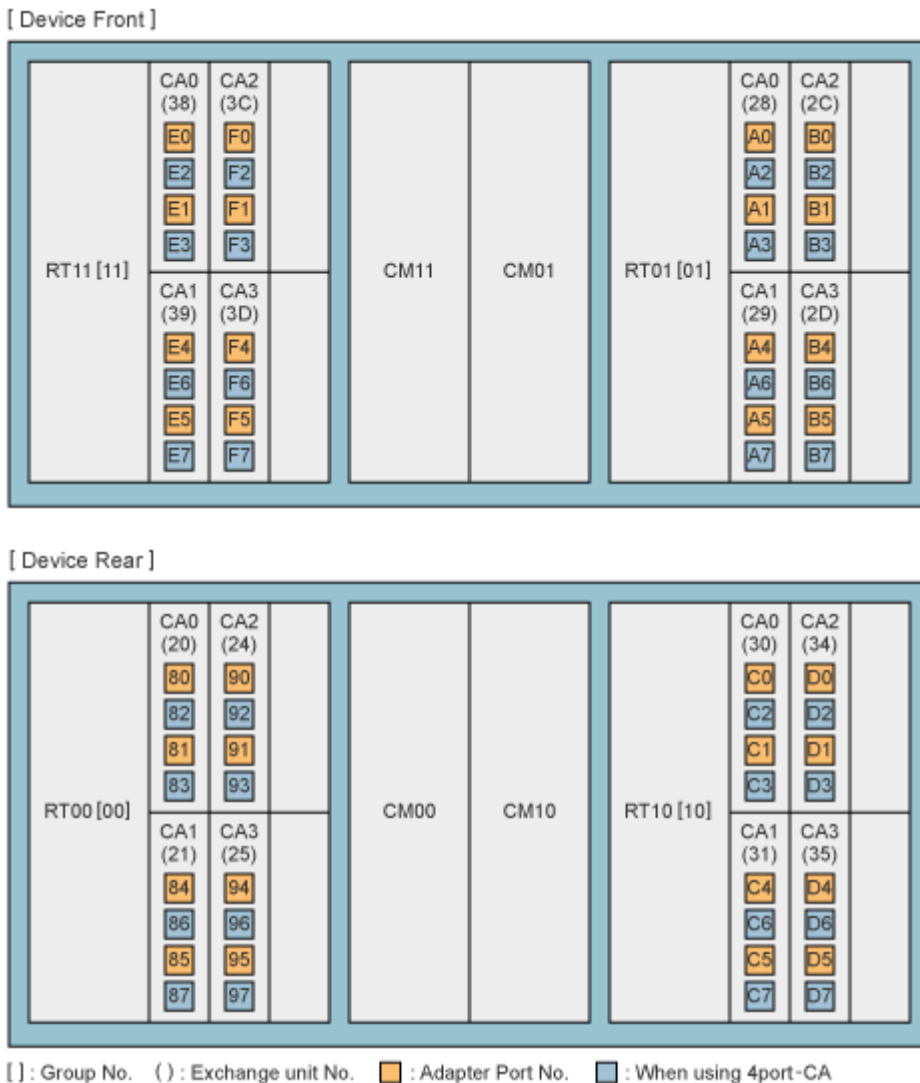


[] : Group No. () : Exchange unit No. [orange] : Adapter Port No.

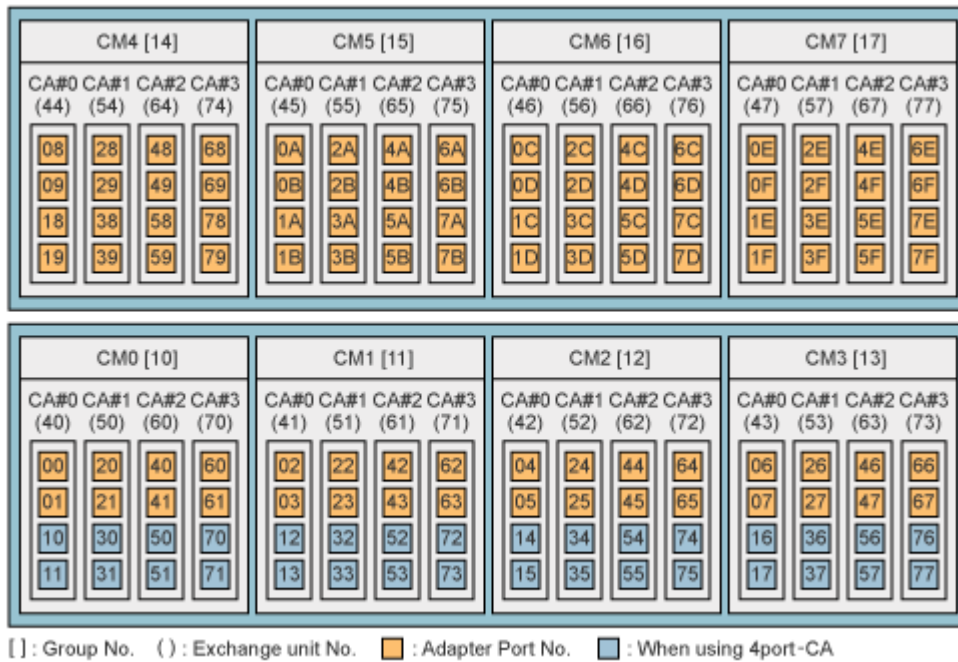
ETERNUS3000 model 80/100, ETERNUS4000 model 80/100 rear view



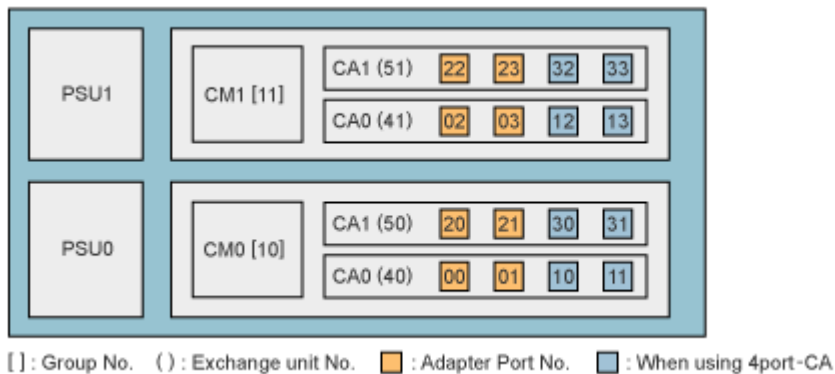
ETERNUS6000 front & rear view



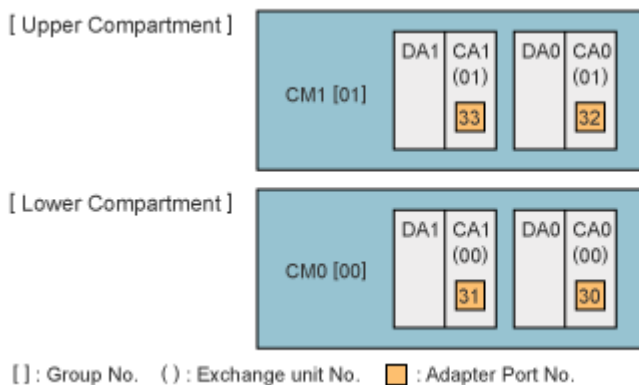
ETERNUS DX8400, ETERNUS DX8700, ETERNUS8000 model 900/1100/1200/2100/2200 rear view



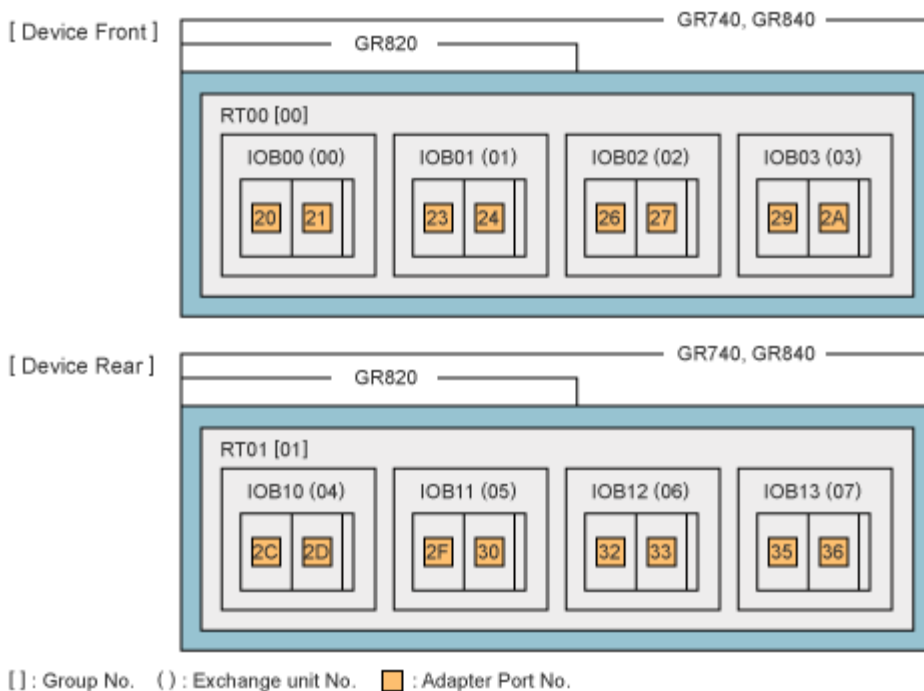
ETERNUS DX400 series, ETERNUS DX8100, ETERNUS4000 model 300/400/500/600, ETERNUS8000 model 700/800 rear view



GR720 and GR730 rear view



GR740, GR820, GR840 front & rear view



Assigned-/Non-assigned CM Type Disk Storage Systems

For ETERNUS disk storage systems, there are two system types: “Assigned-CM” and “Non-assigned-CM.” With Assigned-CM disk storage systems, the main access path for each LU is assigned to a particular controller. With Non-assigned-CM disk storage systems, there are no assigned LU access paths as such.

With “Assigned-CM” type disk storage systems, the path connected to the assigned controller is active. Paths to other controllers are on standby. With “Non-assigned-CM” type disk storage systems, all paths are active and used for access.

The table below shows the “Assigned-CM” and “Non-assigned-CM” disk storage systems.

Load balancing/Failover performance can differ depending on “Assigned-CM” and “Non-assigned-CM” use and the number of paths employed. For details, refer to the supplied product manual.

Assigned CM type	ETERNUS DX60, ETERNUS DX80, ETERNUS2000, ETERNUS DX400 series, ETERNUS3000, ETERNUS4000, GR710, GR720, GR730
Non-assigned CM type	ETERNUS DX8000 series, ETERNUS6000, ETERNUS8000, GR740, GR820, GR840

Change Unit of Disk Storage Systems

The `iompadm change/restart` command has a “change unit” parameter. The change unit represents a module of a disk storage system as follows.

Disk Storage System	cu/controllerunit	g/groupmodule
ETERNUS DX60, ETERNUS DX80, ETERNUS2000, ETERNUS3000, ETERNUS4000 model 80/100	-	CM
ETERNUS6000	CA	ROUTER
ETERNUS DX400 series, ETERNUS DX8000 series, ETERNUS4000 model 300/400/500/600, ETERNUS8000	CA	CM
GR740, GR820, GR840	IOB	ROUTER
GR710, GR720, GR730	-	CM

When a CA of ETERNUS6000 is exchanged, the change unit must be `cu` or `controllerunit`. When a CM of ETERNUS3000 is exchanged, the change unit must be `g` or `groupmodule`.

Linux Kernel and ETERNUS Multipath Driver Update

How to Update Linux Kernel

1. Apply the latest patch of ETERNUS Multipath Driver
2. Update the Linux kernel. If the update fails, refer to the next section.

Recovery from failure of Linux kernel update

When Linux kernel update fails, follow the instructions below.

1. Run the "mpdsetup" command with fjmkernel option as root user.

```
# /opt/FJSVmpd/system/mpdsetup fjmkernel
```

2. If using grub as the boot loader, check the setting.
(grub is generally used on x86 architecture or EM64T architecture)

If using Red Hat Enterprise Linux v.4, check the /boot/grub/grub.conf file. When there is not an initrd line corresponding to the title line, add the initrd line as follows.

Example: When you failed to apply 2.6.9-42.ELsmp kernel

[before correction]

```
title Red Hat Enterprise Linux AS (2.6.9-42.ELsmp)
  root (hd0,0)
  kernel /vmlinuz-2.6.9-42.ELsmp ro root=LABEL=
```

[after correction]

```
title Red Hat Enterprise Linux AS (2.6.9-42.ELsmp)
  root (hd0,0)
  kernel /vmlinuz-2.6.9-42.ELsmp ro root=LABEL=
  initrd /initrd-2.6.9-42.ELsmp.img <- Add this line!
```

Then, set the above kernel as default kernel of grub.

3. Apply the kernel update again.
4. Run the "mpdsetup" command.

```
# /opt/FJSVmpd/system/mpdsetup
```

5. Reboot the server

WARNING Message during Linux Kernel Update

The following message might be displayed when updating the Linux kernel on Red Hat Enterprise Linux AS v.4 or Red Hat Enterprise Linux ES v.4. Please ignore the message.

```
WARNING: No module mpdh found for kernel XXXXX, continuing anyway
(XXXXX: kernel version)
```

ETERNUS Multipath Driver Update

- For all versions of ETERNUS Multipath Driver
Never use '-U' option of the rpm command. Please check an installation guide or a patch installation manual.

Notes

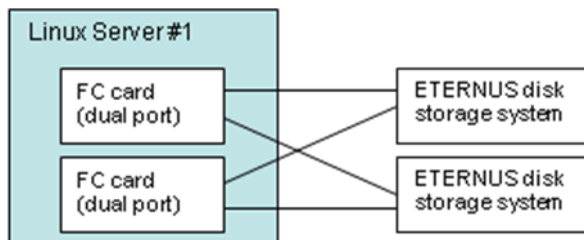
FC Switch

When using ETERNUS Multipath Driver with FC switches, zoning settings must be defined. For the details of setting zones, please refer to the manual of FC switches.

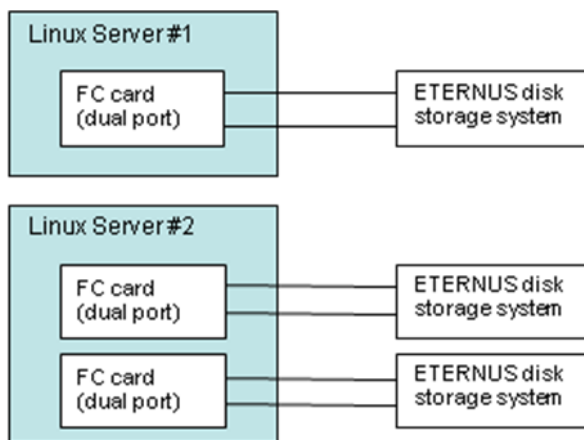
FC card (dual port) Configuration

Don't use two ports on a same FC card (dual port) to construct multipath between a Linux server and an ETERNUS disk storage system. Server may down when the FC card (dual port) break down, because the server can't access the ETERNUS disk storage system. To provide redundancy and prevent single point of failure, construct a multipath between a Linux server and an ETERNUS disk storage system using at least 2 dual ported FC cards. Please use FC cards with the same product ID to construct multipath.

1. Correct Configuration



2. Wrong Configuration



Hot plug procedure of FC card (dual port)

Update ETERNUS Multipath Driver to V2.0L10, Patch 5(T00812-05) or later in order to enable the Hot Plug of FC card (dual port) on Red Hat Enterprise Linux AS v.4 or Red Hat Enterprise Linux ES v.4. When each port of a FC card (dual port) is connected to ETERNUS disk storage system, perform the following procedure. If only one port of a FC card (dual port) is connected to ETERNUS disk storage system, perform as usual.

- adding a card
Follow the procedure of "PRIMEQUEST 500/400 SERIES REFERENCE MANUAL" Appendix B.5.2.1.
- deleting a card
In the step 1 of "PRIMEQUEST 500/400 SERIES REFERENCE MANUAL" Appendix B.5.2.2, execute 'iompadm change adapter' and 'iompadm del' command for each port, then go to step 2.
- swapping a card
In the step 1 of "PRIMEQUEST 500/400 SERIES REFERENCE MANUAL" Appendix B.5.2.3, execute 'iompadm change adapter' and 'iompadm del' command for each port, then go to step 2.

LU Configuration

The LU number has to be allocated from 0 in ascending order, and the LU configuration of each port that configure a multipath has to be equal.

When setting LUN Mapping, Affinity Group or Zone, please set it in the above condition. When not setting LUN Mapping, Affinity Group or Zone on ETERNUS3000, ETERNUS4000 model 80/100, GR710, GR720 or GR730, please check a logical volume number is from 0 in ascending order. Please refer to the manual of ETERNUS disk storage system for the details of how to set LUN Mapping, Affinity Group or Zone and how to check a logical volume number.

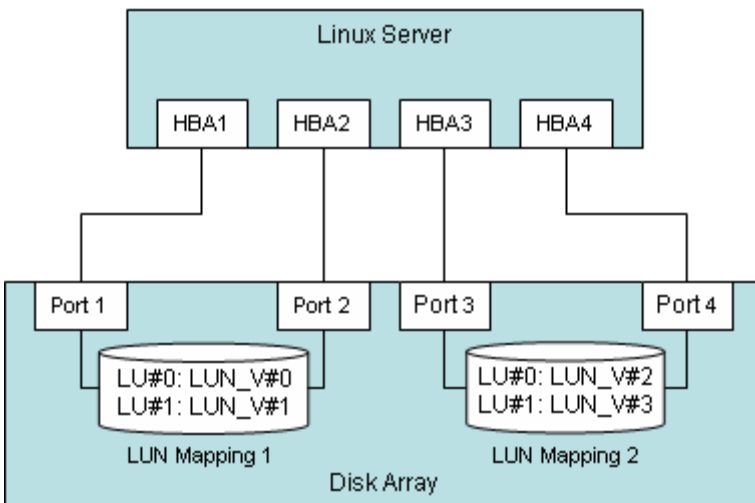
Multiple LUN Mappings Configuration

1. In the case of ETERNUS Multipath Driver V2.0L10 or later

A server can recognize multiple LUN Mappings, Affinity Group or Zones set in a disk storage system.

Example of Multiple LUN Mappings Configuration:

2 paths to the LUN Mapping 1 and 2 paths to the LUN Mapping 2 are correctly configured.



LUN Mapping 1

The logical volume (LUN_V) #0 is mapped on LU#0, and the logical volume (LUN_V) #1 is mapped on LU#1.

LUN Mapping 2

The logical volume (LUN_V) #2 is mapped on LU#0, and the logical volume (LUN_V) #3 is mapped on LU#1.

2. In the case of ETERNUS Multipath Driver V2.0L03 or earlier

“Multiple LUN Mappings Configuration” is not supported. ETERNUS Multipath Driver V2.0L03 or earlier can recognize up to 256 LUs per disk storage system. A server where ETERNUS Multipath Driver V2.0L03 or earlier is installed can recognize up to 702 LUs which include internal SCSI disks, disk storage system and so on. (Available device names are from /dev/sda to /dev/sdzz.) ETERNUS Multipath Driver V2.0L10 or later doesn’t have such a limitation.

Expansion, reduction and replacement of disk storage systems

If expansion, reduction or replacement of disk storage systems is performed on a system where ETERNUS Multipath Driver V2.0L03 or earlier is running, follow the procedure below. For detailed operation, please refer to an installation guide or a patch installation manual.

- 1 Make a variable-recognition-order initrd
A variable-recognition-order initrd was already made, go to the next step. But if any ETERNUS Multipath Driver patches were applied on the system, a variable-recognition-order initrd must be made.
- 2 Reboot a system using the variable-recognition-order initrd made in step 1
Change a boot loader setting to use the variable-recognition-order initrd made in step 1 and reboot a system.

- 3 Make a fixed-recognition-order initrd
- 4 Reboot a system using the fixed-recognition-order initrd made in step 3
Change a boot loader setting to use the fixed-recognition-order initrd made in step 3 and reboot a system.

If using ETERNUS Multipath Driver V2.0L10 or later, please refer to the “ETERNUS Multipath Driver V2.0 User's Guide”.

udev Configuration

When you use the udev function for the device which is controlled by the ETERNUS Multipath Driver, please use by-id names. Because the udev function is formally supported by Red Hat Enterprise Linux AS v.4 Update4 or later and Red Hat Enterprise Linux ES v.4 Update4 or later, apply Update4 or later to your system to use the udev function. Red Hat Enterprise Linux 5 and SUSE Linux Enterprise Server 10 SP1 support by-id names from the first release.

1. Setting

1.1 Setting of ETERNUS disk storage systems.

To use by-id names, the firmware version of ETERNUS disk storage systems should be equal to or later than that of the following table. When earlier version is used, please update the firmware.

Product Name	Version of the firmware
ETERNUS3000 model 80/100 (Product ID: E308xxxA, E308xxxA1, E310xxxA, E310xxxB, E310xxxB1)	V20L61
ETERNUS3000 model 200/400/600	V20L61
ETERNUS3000 model 300/500/700	V10L23
ETERNUS3000 model 300/500/700 (Product ID: E330xxxA, E330xxxB, E330xxxD, E350xxxA, E350xxxB, E350xxxD, E370xxxA, E370xxxB, E370xxxD)	V20L30
ETERNUS3000 model 80/100 (Product ID: E308xxxD, E310xxxD)	V30L11
ETERNUS6000 all models	V30L10
ETERNUS4000 model 80/100	V30L11
ETERNUS4000 model 300/500	V10L53
ETERNUS4000 model 400/600	All versions are available for by-id names
ETERNUS8000 model 700/900/1100/2100	V10L53
ETERNUS8000 model 800/1200/2200	All versions are available for by-id names
ETERNUS2000 all models	All versions are available for by-id names
ETERNUS DX60, ETERNUS DX80	All versions are available for by-id names
ETERNUS DX400 series	All versions are available for by-id names
ETERNUS DX8000 series	All versions are available for by-id names

After checking the firmware version of ETERNUS disk storage system, perform the following setting. Please refer to the manual of ETERNUS disk storage system for details.

- In the case of ETERNUS DX60 and ETERNUS DX80, check 'Type1 + Type3 (Default)' is selected as a value of 'Inquiry VPD ID Type' in 'Configuration' -> 'Host I/F Management' -> 'Set Host Response' page.
- In the case of ETERNUS DX400 series and ETERNUS DX8000 series, check 'Type 1 + Type 3 (Default)' is selected as a value of 'Inquiry VPD ID Type' in 'Configuration' -> 'Host Interface Management' -> 'Set Host Response' page.
- In the case of ETERNUS2000, check 'Type1 + Type3 (Default)' is selected as a value of 'Inquiry VPD ID Type'

- in 'Connectivity' -> 'Host Response Pattern' page.
- In the case of ETERNUS3000 and ETERNUS4000 model 80/100, select 'Type 01 & 03' as a value of 'Inquiry Command Page 83' in 'Append/Delete Host Response Pattern(s)' page.
- In the case of ETERNUS6000, select 'type1 + type3' as a value of 'response data type for Inquiry PageCode 0x83' in 'Set Host Response' page.
- In the case of ETERNUS4000 model 300/400/500/600 and ETERNUS8000, check 'Type 1 + Type 3 (Default)' is selected as a value of 'Inquiry VPD ID Type' in 'Set Host Response' page.

1.2 Setting of Linux server.

- In the case of Red Hat Enterprise Linux 5 or later, by-id names can be used in default setting.
- In the case of SUSE Linux Enterprise Server 10 SP1 or later, by-id names can be used in default setting.
- In the case of Red Hat Enterprise Linux AS v.4 Update4 or later and Red Hat Enterprise Linux ES v.4 Update4 or later, in the '/etc/scsi_id.config' file, change from 'options=-b' to 'options=-gu' and add the following lines to end of the file. Then reboot the server.

```
vendor=FUJITSU, model=E8000, options=-p 0x83
vendor=FUJITSU, model=E6000, options=-p 0x83
vendor=FUJITSU, model=E4000, options=-p 0x83
vendor=FUJITSU, model=E400A, options=-p 0x83
vendor=FUJITSU, model=E3000, options=-p 0x83
vendor=FUJITSU, model=E2000, options=-p 0x83
vendor=FUJITSU, model=ETERNUS_DXL, options=-p 0x83
vendor=FUJITSU, model=ETERNUS_DX400, options=-p 0x83
vendor=FUJITSU, model=ETERNUS_DX8000, options=-p 0x83
```

- In the case of Red Hat Enterprise Linux AS v.4 Update2 or earlier and Red Hat Enterprise Linux ES v.4 Update2 or earlier on PRIMEQUEST, add the following lines to end of the '/etc/scsi_id.config' file. Then reboot the server.

```
vendor=FUJITSU, model=E8000, options=-p 0x83
vendor=FUJITSU, model=E6000, options=-p 0x83
vendor=FUJITSU, model=E4000, options=-p 0x83
vendor=FUJITSU, model=E400A, options=-p 0x83
vendor=FUJITSU, model=E3000, options=-p 0x83
vendor=FUJITSU, model=E2000, options=-p 0x83
```

2. Correspondence between the by-id names and the usual /dev/sda type names

The by-id names are symbolic link to /dev/sdX name. So you can confirm relation between the by-id name and /dev/sdX name by executing the 'ls -l /dev/disk/by-id' command.

Example: Check the by-id name of /dev/sdb

```
# ls -l /dev/disk/by-id/
total 0
lrwxrwxrwx 1 root root 9 Dec 2 2006 scsi-3600e000000cb00000000000100000000 -> ../../sdb
lrwxrwxrwx 1 root root 9 Dec 2 2006 scsi-3600e000000cb000000000000100010000 -> ../../sdc
lrwxrwxrwx 1 root root 9 Dec 2 2006 scsi-3600e000000cb000000000000100020000 -> ../../sdd
```

The result shows that the by-id name of /dev/sdb is /dev/disk/by-id/scsi-3600e000000cb000000000000100000000.

3. Notice

- When you use by-id names as device names of disks in a disk storage system, change all disk storage system related settings of OS and applications from /dev/sdX type names to by-id names.
- If you use PRIMECLUSTER GDS, change Host Response setting before installing PRIMECLUSTER GDS. If you have already used PRIMECLUSTER GDS, don't change Host Response setting.
- If sadump is used on PRIMEQUEST server, after changing the setting of ETERNUS, set the sadump again.
- It isn't necessary to use the recognition order setting (fixed-recognition-order initial RAM disk), if by-id names are specified as the device names for all configuration file such as /etc/fstab.

Setting of qla2xxx driver

When downloading and installing the qla2xxx driver from the QLogic Corp. web-site, the following two lines may appear in the "/etc/modprobe.conf" file. They must be commented out. Add "#" to the beginning of the following two lines to comment them out, and install ETERNUS Multipath Driver. If ETERNUS Multipath Driver has already been installed, run the "/opt/FJSVmpd/system/mpdsetup" command after commenting them out.

```
install qla2xxx /sbin/modprobe qla2xxx_conf; /sbin/modprobe --ignore-install qla2xxx  
remove qla2xxx /sbin/modprobe -r --first-time --ignore-remove qla2xxx && { /sbin/modprobe -r --ignore-remove qla2xxx_conf; }
```

Hot Plug of FC Card on Red Hat Enterprise Linux 5.3 (for Intel Itanium)

The lpfc driver bundled with Red Hat Enterprise Linux 5.3 (for Intel Itanium) has a problem about hot plug. The problem is that hot plug procedure takes a lot of time. The problem has been resolved by the following version of the lpfc driver which is released by Fujitsu.

- lpfc-fjstd-RHEL5-8.2.0.33.3p-2
- lpfc-fjext-RHEL5-8.2.0.33.3p-2
- lpfc-fjstd-RHEL5-xen-8.2.0.33.3p-2
- lpfc-fjext-RHEL5-xen-8.2.0.33.3p-2

About This Installation Information

This Installation Information is devoted to providing technical information and an overview of the basic facilities of ETERNUS Multipath Driver. The contents of this document may be modified without any prior notice. Please contact FUJITSU LIMITED if you find any error in descriptions.

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