
**FUJITSU Storage ETERNUS Multipath Driver
(Oracle Solaris Version)
Installation Information**

Nov 2019

Preface

FUJITSU Storage ETERNUS Multipath Driver 3.1.0 is bundling two drivers.

- the driver for Solaris 11 OS and Solaris 10 OS
- the driver for Solaris 10 OS and Solaris 9 OS

HBA	OS	the driver for Solaris 11 OS and Solaris 10 OS	the driver for Solaris 10 OS and Solaris 9 OS
SE0X7F31F, SE0X7F32F, SP1X7FAB2F, SE0X7F21F, SE0X7F22F, SP1X7FBA2F, SP1X7FAA2F, SP1X7FAR2F, SP1X7FAS2F, SP1X7FBR2F, SP1X7FBS2F, SP1X5FAR2F, SP1X5FAS2F, SP1X5FBR2F, SP1X5FBS2F, SP1X5FAA2F, SP1X5FBA2F (SE0X7F11F, SE0X7F12F*1)	Solaris11 Solaris10	✓	
SE0X7F11F, SE0X7F12F, SE0X7SA1F, Emulex LP10000	Solaris10		✓

*1 Please refer to notes (the driver for Solaris 11 OS and Solaris 10 OS).

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Supported OS

FUJITSU Storage ETERNUS Multipath Driver (MPD) supports the following Solaris OS versions:

OS Versions	MPD Version Levels/Patch
Solaris 11 OS	3.1.0
Solaris 10 OS 8/11 ~ 1/13	3.0.4 or later
Solaris 10 OS 3/05 ~ 9/10	2.0.0 or later

Note1: MPD 3.0.0 or later consists of the following one driver.

- the driver for Solaris 10 OS and Solaris 9 OS

Note2: MPD 3.1.0 or later consists of the following drivers. The driver to install varies with the type of Solaris OS/HBA.

- the driver for Solaris 11 OS and Solaris 10 OS
- the driver for Solaris 10 OS and Solaris 9 OS

Restrictions and Resolution schedule (the driver for Solaris 11 OS and Solaris 10 OS)

ETERNUS Multipath Driver Restrictions with Solaris 11 OS and Solaris 10 OS

Restrictions	Resolution schedule
This software cannot be used on the guest domain of Oracle VM.	3.1.1
TPG Referrals function is not support in Non-global-zone	T011535SP-05

Restrictions and Resolution schedule (the driver for Solaris 10 OS and Solaris 9)

ETERNUS Multipath Driver Restrictions with Solaris 10 OS

Restrictions	Resolution schedule
11 ETERNUS or more cannot be connected.	3.0.0 914267-06
SAS interface is not supported.	3.0.0 914267-06
When setting mplb-special files, ZFS is not supported.	3.0.0 914267-06
When setting mplb-special files, EFI partition tables are not supported.	3.0.0 914267-06
lpfc 6.20 or later is not supported.	3.0.1 914267-09
Solaris 10 8/11 or later is not supported.	3.0.4 914267-14
Kernel patch 144500-19 is not supported.	3.0.4 914267-14

Related Products Requirements

Supported Related Products are as follows:

Related Hardware Product Requirements

- FC Card

FC Card Types	MPD Version Levels/Patch
Emulex LP10000 *1	2.0.1 or later 3.0.1 or later *2 914267-09 or later *2
Emulex LP10000DC *1	2.0.1 or later 3.0.1 or later *2 914267-09 or later *2
SE0X7F11F, SE0X7F12F	2.0.3 or later 914267-04 or later
SE0X7F31F, SE0X7F32F, SP1X7FAB2F, SE0X7F21F, SE0X7F22F, SP1X7FBA2F, SP1X7FAA2F	3.1.0 or later

*1: LPFC 6.20j, LPFC 6.21f and LPFC 6.21g are not supported.

*2: LPFC 6.30g is supported by this MPD Version Levels/Patch.

- FCoE

FCoE Card Types	MPD Version Levels/Patch
SP1X7FAR2F, SP1X7FAS2F, SP1X7FBR2F, SP1X7FBS2F	3.1.0 or later

- SAS

SAS Card Types	MPD Version Levels/Patch
SE0X7SA1F	3.0.0 or later 914267-06 or later

- PCIe ExpressModule

PCIe ExpressModule Types	MPD Version Levels/Patch
SP1X5FAR2F, SP1X5FAS2F, SP1X5FBR2F, SP1X5FBS2F, SP1X5FAA2F, SP1X5FBA2F	3.1.0 or later

Related Software Product Requirements (the driver for Solaris 11 OS and Solaris 10 OS)

Related Software Product Names, Version Levels	Patch	MPD Version Levels / Patch
PRIMECLUSTER 4.2 or later	-	3.1.0 or later
ETERNUS SF Storage Cruiser V13 or later	-	3.1.0 or later

Related Software Product Requirements (the driver for Solaris 10 OS and Solaris 9 OS)

Related Software Product Names, Version Levels	Patch	MPD Version Levels / Patch
PRIMECLUSTER 4.1A40 or later	4.1A40 or later	2.0.1 or later
PRIMECLUSTER 4.1A30	914112-01 or later	2.0.1 or later
SafeCLUSTER 2.0	910910-30 or later	2.0.1 or later
SafeCLUSTER 2.0.x	911820-20 or later	2.0.1 or later
SafeCLUSTER 1.x	-	Not available
Softek Storage Cruiser 1.2.1 Softek Storage Cruiser V01L21	914057-02 or later (Agent) 913708-05 or later (Solaris Manager) TP38107 or later (Windows Manager) TP38104 or later (Windows Client)	2.0.1 or later
Softek Storage Cruiser 1.2 Softek Storage Cruiser V01L20	913305-04 or later (Agent) 913323-05 or later (Solaris Manager) TP28107 or later (Windows Manager) TP28104 or later (Windows Client)	2.0.1 or later
Softek Storage Cruiser 1.1.1 Softek Storage Cruiser V01L12	913304-04 or later (Agent) 913322-06 or later (Solaris Manager) TP18107 or later (Windows Manager) TP18104 or later (Windows Client)	2.0.1 or later
Softek Storage Cruiser 1.1 Softek Storage Cruiser V01L11	913078-05 or later (Agent) 913114-07 or later (Solaris Manager) TP08107 or later (Windows Manager) TP08104 or later (Windows Client)	2.0.1 or later
ETERNUS SF Storage Cruiser V13 or later	V13 or later	2.0.1 or later
Softek Storage Cruiser 1.2.2 or later Softek Storage Cruiser V01L22	1.2.2 or later V01L22 or later	2.0.1 or later
Systemwalker Resource Coordinator V12L20 or later	V12L20 or later	2.0.1 or later
Systemwalker Resource Coordinator V11L01	914057-02 or later (Agent) 913708-05 or later (Solaris Manager) TP38104 or later (Windows Client)	2.0.1 or later
Systemwalker Resource Coordinator V11L01E	914057-02 or later (Agent) 913708-05 or later (Solaris Manager) TP38104 or later (Windows Client)	2.0.1 or later
Systemwalker Resource Coordinator V11L00	913305-04 or later (Agent) 913323-05 or later (Solaris Manager) TP28104 or later (Windows Client)	2.0.1 or later

Softek Storage Cruiser and Systemwalker Resource Coordinator V11 agents can connect with the same or higher level manager and client. However, the manager and client must be at the same level.

Notes (the driver for Solaris 11 OS and Solaris 10 OS)

1. Support HBA

HBA that had been supported before ETERNUS Multipath Driver 3.0.4 cannot be used.

SE0X7F11F and SE0X7F12F can be used with the following limitations in ETERNUS Multipath Driver 3.1.1 or later.

- "fjpfca.conf" must be set manually.
- A definition must be manually added to "sd.conf" for a LUN to be recognized.
- When an error occurs, it takes more time to switch a path than other HBAs.
- OVM guest domains are not supported.
- SAN Boot is not supported.
- For Oracle Solaris 11, SE0X7F11F and SE0X7F12F cannot be used.

2. Upgrade Install from ETERNUS Multipath Driver 2.0.x/3.0.x

The overwrite install cannot be done. Refer to Software Information.

3. ETERNUS Multipath Driver 2.0.x/3.0.x

This product cannot be used together with the following software. ETERNUS Multipath Driver 2.0.x/3.0.x

4. Migration from MPxIO

Refer to Software Information.

5. Oracle VM

This software cannot be used on the guest domain of Oracle VM.

The disk allocation to the guest domain of Oracle VM supports only block device and s2 (/dev/FJsvmp/b/dsk/mpb*s2).

6. SVM (Solaris Volume Manager)

SVM is not supported.

7. Solaris Containers

ETERNUS Multipath Driver only supports the installation on global-zone.

8. EFI Disk Label

The entire disk is represented by mpb*s7 when the mpb compatible files is selected for a disk with an EFI label.

9. boot archive

When shutdown cannot be normally done with Panic, the change in the composition might not be reflected in 3.1.0 or 3.1.1. Please renew boot archive to prevent it after changing the composition.

- Boot archive is renewed from 3.1.2 or T011535SP-01 with grmpdautoconf.
When the load of I/O is high, update of boot-archive might take time. Please execute when the load of I/O is few.
- Boot archive is renewed from T011535SP-05 with PRIMECLUSTER automatic resource registration and mpbconfig.

10. iompadm change

The iompadm change command might fail. In that case, please reexecute it.

11. About uninstall

The following errors might be output when uninstalling in 3.1.0 and 3.1.1. Please uninstall again in that case. Uninstallation is a success if displayed, "Successful".

```
pkgrm: ERROR: unable to remove existing directory at </dev/FJSVmplb/rdisk>
```

```
pkgrm: ERROR: unable to remove existing directory at </dev/FJSVmplb/dsk>
```

12. About offline when server starts

Please execute the following action when the following messages are output when the server boot and path becomes offline in 3.1.0 and 3.1.1.

Messages:

```
NOTICE: mplbxx: I/O Lun degraded.
```

Action:

Please add "forceload: drv/ssd" ahead of the line of "forceload: drv/mplb" of /etc/system.

```
Ex)# vi /etc/system
```

```
    forceload: drv/ssd
```

```
    forceload: drv/mplb
```

13. About I/O might not respond.

In ETERNUS Multipath Driver 3.1.1, I/O might not respond when 256 IO or more is issued at the same time. Please apply T011535SP-01 or execute the following evasion procedures.

1. Please add "mplb-max-recv-io=10000000;" to /kernel/drv/mplb.conf.

```
Ex) # vi /kernel/drv/mplb.conf
```

```
    # Global user option define
```

```
    mplb-max-recv-io=10000000;
```

2. Please reboot the server.

14. About silent installation

In ETERNUS Multipath Driver 3.1.1, The error message is not notified of when silent installation. Moreover, the unwanted message might be output. In that case, please install ETERNUS Multipath Driver in the superscription by non-silent installation.

15. About SAN BOOT

- When the system volume is made ZFS file system, you need to prepare two same size LUN.
 - When the system volume is made UFS file system, the ssd path is displayed by the format command etc.
-

16. About installation

Please reboot the server after the installation.

17. About mplbstrtrc that is the resting process

The mplbstrtrc process does not accept the signal with the system call issued to the mplb driver. Therefore, pfiles and prctl, etc. that keep waiting for the response of the system call become no responses. Do not execute those commands.

18. About OracleASM

If the EFI label is used under the OracleASM to which T011535SP-03 is applied, path status might become warning. In that case, please set the slice (/dev/FJSVmplb/rdisk/ mplb*s7) that shows the entire disk of EFI off the subject by the ASM_DISKSTRING parameter of OracleASM. Please refer to the manual of OracleASM about the setting method.

19. About ZFS

- Please note the following when you make zpool with the entire disk of the EFI label(/dev/FJSVmplb/dsk/mplbXs7, X is an instance number) in Solaris11.
 - Please disregard it though an unnecessary slice might be made with zpool create.
 - In the environment before SRU16031 (SRU11.3.6.5.0) or after SRU17021 (SRU11.3.17.5.0), when zpool is exported, cannot do importing of zpool with mplbXs7. Do importing according to the following procedures.
 1. The symbolic link of /dev/FJSVmplb/[r]disk/mplbX is made.

Example)

```
# ln -s /dev/FJSVmplb/rdisk/mplb2s7 /dev/FJSVmplb/rdisk/mplb2
```

```
# ln -s /dev/FJSVmplb/dsk/mplb2s7 /dev/FJSVmplb/dsk/mplb2
```
 2. zpool import is done specifying the symbolic link.

Example)

```
# zpool import -d /dev/FJSVmplb/dsk/mplb2 zpoolname
```
 - In the environment SRU16042(SRU11.3.7.6.0) - SRU17011(SRU11.3.16.3.0), import is possible with mplbXs7.
 - In the environment since SRU16042(SRU11.3.7.6.0), all paths might become warning status at import. The path will return to online in 5 minutes for the diagnosis. Please execute the iompadm restart command when you want to return online the path at once.
-

20. Uninstall

/dev/FJSVmplb/[r]disk/* files and directories might not be deleted. Please delete them if necessary.

Example)

```
# rm -rf /dev/FJSVmplb
```

21. About Solaris 11.4

Refer to [About Solaris 11.4](#)

Notes (the driver for Solaris 10 OS and Solaris 9 OS)

1. Routing through multiple FC switches

The `grmpdautoconf` command cannot choose a path routed through multiple FC switches. This is because path redundancy is not verified by the MPD driver or the `grmpdautoconf` command.

To use a path routed through multiple FC switches, verify the path redundancy, and then execute the `grmpdautoconf` command with the `-X` option.

2. Boot devices and Swap devices

When setting a Solaris-standard-special file with Solaris 10 OS, the devices controlled by Multipath Driver cannot be used as Boot devices or Swap devices. In addition, boot on disks greater than 1 Tbyte is not supported.

3. Migration from Multipath Disk Control (MPHD)

Migration from Multipath Disk Control is not possible.

4. SVM(Solaris Volume Manager)

SVM is not supported.

5. DR (Dynamic Reconfiguration)

Dynamic Reconfiguration is not supported when setting a Solaris-standard-special file. For a server with Dynamic Reconfiguration function, an `mplb` special file is automatically selected if the `"grmpdautoconf"` command is not executed with the `"-p"` option.

6. 8Gbit/s Fibre Channel Card

8Gbit/s Fibre Channel Card, SE0X7F21F/SE0X7F22F, or later are not supported.

7. Solaris Containers

ETERNUS Multipath Driver only supports the installation on global-zone.

8. EFI Disk Label

The entire disk is represented by `mplb*s7` when the `mplb` compatible files is selected for a disk with an EFI label.

9. grmpdautoconf command

In MPD 3.0.4 or patch 914267-15, ETERNUS DX60 S2 is displayed that DXL and ETERNUS DX8000 S2 series are DXM2. It is possible to use it though the device name is not displayed in the annotation.

switch	WWN	device	slot/port
1	500000e0d0xxxxxx	DXL	CM0P0
1	500000e0d4yyyyyy	DXM2	CM1CA0P0
*DXL :ETERNUS DX Entry Model(DX60, DX80, DX90)			
*DXM2 :ETERNUS DX400 S2 series			

10. boot archive

When shutdown cannot be normally done with Panic, the change in the composition might not be reflected in 3.1.0 or 3.1.1. Please renew boot archive to prevent it after changing the composition.

Boot archive is renewed from 914267-18 with `grmpdautoconf`.

When the load of I/O is high, update of boot-archive might take time. Please execute when the load of I/O is few.

Patch Information

The following are the most recent patches for the Multipath Driver. The patch to install depends on which driver is installed.

Type of installed driver	Patch
The driver for Solaris 11 OS and Solaris 10 OS	T011535SP-06
The driver for Solaris 10 OS and Solaris 9 OS	914267-18

Product Names & IDs

Product names	Product IDs(with media)
FUJITSU Storage ETERNUS Multipath Driver3 (for Oracle Solaris)	B011103H0H

Supported Storage Systems

ETERNUS Multipath Driver supports the following storage systems:

- ETERNUS DX60 S5/DX60 S4
- ETERNUS DX100 S5/DX200 S5/DX100 S4/DX200 S4
- ETERNUS DX500 S5/DX600 S5/DX500 S4/DX600 S4
- ETERNUS DX900 S5
- ETERNUS DX8900 S4
- ETERNUS AF150 S3/AF250 S3/AF250 S2/AF250
- ETERNUS AF650 S3/AF650 S2/AF650
- ETERNUS DX60 S2
- ETERNUS DX60 S3
- ETERNUS DX80 S2/DX90 S2
- ETERNUS DX100 S3/DX200 S3
- ETERNUS DX200F
- ETERNUS DX400 S2 series
- ETERNUS DX500 S3/DX600 S3
- ETERNUS DX8000 S2 series
- ETERNUS DX8700 S3/ DX8900 S3

ETERNUS DX60 S5/DX60 S4

Supported Storage Systems	Version Level
ETERNUS DX60 S5	3.1.1 or later
ETERNUS DX60 S4	914267-18 or later *1

*1 Refer to "Preparation that uses ETERNUS DX60 S3/DX100 S3/DX200 S3, ETERNUS DX200F, ETERNUS AF250/AF250 S2 shipped after June, 2016 and ETERNUS DX60 S4, DX100 S4, DX200 S4 (the driver for Solaris 10 OS and Solaris 9 OS)".

ETERNUS DX100 S5, DX200 S5, ETERNUS DX500 S5, DX600 S5, ETERNUS DX100 S4, DX200 S4, ETERNUS DX500 S4, DX600 S4

Supported Storage Systems	Version Level
ETERNUS DX100 S5 ETERNUS DX200 S5	3.1.1 or later
ETERNUS DX100 S4 ETERNUS DX200 S4	914267-18 or later *1
ETERNUS DX500 S5 ETERNUS DX600 S5	3.1.1 or later
ETERNUS DX500 S4 ETERNUS DX600 S4	914267-18 or later

*1 Refer to "Preparation that uses ETERNUS DX60 S3/DX100 S3/DX200 S3, ETERNUS DX200F, ETERNUS AF250/AF250 S2 shipped after June, 2016 and ETERNUS DX60 S4, DX100 S4, DX200 S4 (the driver for Solaris 10 OS and Solaris 9 OS)".

ETERNUS DX900 S5

Supported Storage Systems	Version Level / Patch
ETERNUS DX900 S5	3.1.3 or later T011535SP-05 914267-18 or later

ETERNUS DX8900 S4

Supported Storage Systems	Version Level / Patch
ETERNUS DX8900 S4	3.1.3 or later T011535SP-05 914267-18 or later

ETERNUS AF150 S3, AF250 S3, AF250 S2, AF250, AF650 S3, AF650 S2, AF650

Supported Storage Systems	Version Level
ETERNUS AF150 S3 ETERNUS AF250 S3, AF250 S2, AF250	3.1.2 or later 914267-18 or later *1
ETERNUS AF650 S3, AF650 S2, AF650	3.1.2 or later 914267-18 or later

*1 Refer to "Preparation that uses ETERNUS DX60 S3/DX100 S3/DX200 S3, ETERNUS DX200F, ETERNUS AF250/AF250 S2 shipped after June, 2016 and ETERNUS DX60 S4, DX100 S4, DX200 S4 (the driver for Solaris 10 OS and Solaris 9 OS)".

ETERNUS DX60 S2

FC interface

Supported Storage Systems	Version Level
ETERNUS DX60 S2	3.0.4 or later 914267-14 or later

SAS interface

Supported Storage Systems	Version Level
ETERNUS DX60 S2	3.0.4 or later 914267-14 or later

ETERNUS DX60 S3

Supported Storage Systems	Version Level
ETERNUS DX60 S2	3.1.0 or later 914267-17 or later *1

*1 Refer to "Preparation that uses ETERNUS DX S3, ETERNUS DX200F with patch 914267-17".

ETERNUS DX100 S3/DX200 S3/DX500 S3/DX600 S3, ETERNUS DX200F

Supported Storage Systems	Version Level
ETERNUS DX100 S3/DX200 S3 ETERNUS DX500 S3/DX600 S3 ETERNUS DX200F	3.1.0 or later 914267-17 or later *1

*1 Refer to "Preparation that uses ETERNUS DX S3, ETERNUS DX200F with patch 914267-17".

ETERNUS DX80 S2/DX90 S2

FC interface

Supported Storage Systems	Version Level
ETERNUS DX80 S2/DX90 S2	3.0.3 or later 914267-13 or later 912651-23 or later

SAS interface

Supported Storage Systems	Version Level
ETERNUS DX80 S2/DX90 S2	3.0.3 or later 914267-13 or later

ETERNUS DX400 S2 series

Supported Storage Systems	Version Level / Patch
ETERNUS DX400 S2	3.0.3 or later
ETERNUS DX410 S2	914267-13 or later
ETERNUS DX440 S2	912651-23 or later

ETERNUS DX8000 S2 series

Supported Storage Systems	Version Level / Patch
ETERNUS DX8100 S2	3.0.4 or later
ETERNUS DX8700 S2	914267-15 or later
	912651-23 or later

ETERNUS DX8700 S3/DX8900 S3

Supported Storage Systems	Version Level / Patch
ETERNUS DX8700 S3	3.1.2 or later
ETERNUS DX8900 S3	T011535SP-01
	914267-18 or later

Supplementary information

This section provides supplementary information not included in the manuals supplied with this product. Refer to this information in addition to the manuals supplied with this product.

Assigned-Non-assigned-CM Type Storage Systems

There are two types of supported disk storage system: “Assigned-CM” and “Non-assigned-CM.” With Assigned-CM storage systems, the preferred paths for each LUN are assigned to a particular controller. With Non-assigned-CM storage systems, there are no assigned preferred LUN access paths.

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

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

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

Assigned-CM type	ETERNUS DX60 S5, DX60 S4, DX60 S3 ETERNUS DX100 S5, DX100 S4, DX100 S3 ETERNUS DX200 S5, DX200 S4, DX200 S3 ETERNUS DX500 S5, DX500 S4, DX500 S3 ETERNUS DX600 S5, DX600 S4, DX600 S3 ETERNUS DX900 S5 ETERNUS DX60 S2 ETERNUS DX80 S2 ETERNUS DX90 S2 ETERNUS DX400 S2 series ETERNUS AF150 S3 ETERNUS AF250 S3, AF250 S2, AF250 ETERNUS AF650 S3, AF650 S2, AF650 ETERNUS DX200F
Non-assigned-CM type	ETERNUS DX8900 S4 ETERNUS DX8000 S3 series ETERNUS DX8000 S2 series

Change unit

The table below shows the change unit and the corresponding replacement.

Storage Systems	cu/controllerunit	g/groupmodule
ETERNUS DX60 S5, DX60 S4, DX60 S3 ETERNUS DX100 S5, DX100 S4, DX100 S3 ETERNUS DX200 S5, DX200 S4, DX200 S3 ETERNUS DX60 S2 ETERNUS DX80 S2 ETERNUS DX90 S2 ETERNUS DX200F ETERNUS AF150 S3 ETERNUS AF250 S3, AF250 S2, AF250	-	CM
ETERNUS DX500 S5, DX500 S4, DX500 S3 ETERNUS DX600 S5, DX600 S4, DX600 S3 ETERNUS DX900 S5 ETERNUS DX8900 S4 ETERNUS DX8700 S3/DX8900 S3 ETERNUS DX400 S2 series ETERNUS DX8000 S2 series ETERNUS AF650 S3, AF650 S2, AF650	CA	CM

LPFC Driver 6.30g

When LPFC Driver 6.30g and ETERNUS Multipath driver (the driver for Solaris 10 OS and Solaris 9 OS) are used, the following procedures are executed.

[HBA Configuration]

Edit /kernel/drv//lpfc.conf file to set target-disk.

```
lpfc#-target-disk="mplbt"
```

Example:

```
lpfc0-target-disk="mplbt";
```

```
lpfc1-target-disk="mplbt";
```

[Adding a LUN]

hbacmd or server reboot is necessary before the grpmdautoconf command is executed.

```
hbacmd RescanLuns HBA-WWN ETERNUS-WWN
```

Example:

```
/opt/HBAnyware/hbacmd RescanLuns 10:00:00:00:c9:5a:d7:0e 20:00:00:0B:5D:6A:02:99
```

[Adding a Path or Storage System Device]

hbacmd or server reboot is necessary before the grpmdautoconf command is executed.

```
hbacmd SetPersistentBinding HBA-WWN B P ETERNUS-WWN 0 targetID
```

Example:

```
/opt/HBAnyware/hbacmd SetPersistentBinding 10:00:00:00:c9:51:38:c3 B P 20:40:00:0B:5D:6A:02:99 0 16
```

[Note]

When grmpdautoconf is executed in the environment where the lpfc driver and the sd driver connect devices other than the storage systems, the devices might be detached. If any devices are detached, please reattach by executing the hbacmd command with RescanLuns option or reboot the server.

Please refer to HBAnyware User Manual for hbacmd.

Performing "add device" for mplb Special Files in Non-Global Zones

Perform the following procedure to "add device" for the mplb special files in a non-global zone.

1. Create a non-global zone (example: test-zone).
2. Create a directory for mplb under /dev/ in the non-global zone.

```
# mkdir /export/test-zone/dev/FJSVmplb
# mkdir /export/test-zone/dev/FJSVmplb/dsk
# mkdir /export/test-zone/dev/FJSVmplb/rdisk
```

3. Select the target multipath device from the test-zone, and check the device major and minor numbers.

The following example is for when "mplb0s0" is added:

```
# ls -l /dev/FJSVmplb/rdisk/mplb0s0
lrwxrwxrwx 1 root root 36 Aug 28 20:28 /dev/FJSVmplb/rdisk/mplb0s0
-> ../../../../devices/pseudo/mplb@0:a,raw
# ls -l /devices/pseudo/mplb@0:a,raw
crw-r----- 1 root sys 253, 0 Aug 30 04:19 /devices/pseudo/mplb@0:a,raw
# ls -l /devices/pseudo/mplb@0:a
brw-r----- 1 root sys 253, 0 Aug 30 04:19 /devices/pseudo/mplb@0:a
```

The underlined parts are the major and minor numbers.

4. Create a special file under /export/test-zone/dev/FJSVmplb using the "mknod" command.

```
# mknod /export/test-zone/dev/FJSVmplb/rdisk/mplb0s0 c 253 0
# mknod /export/test-zone/dev/FJSVmplb/dsk/mplb0s0 b 253 0
```

5. Log in to the non-global zone and then access the mplb device.

Method of "add device" to Non-global zone of Solaris11 (the driver for Solaris 11 OS and Solaris 10 OS)

1. Create a non-global zone (example: sol11-zone).
2. Execute Add device.

```
# zonecfg -z sol11-zone
zonecfg:sol11-zone> add device
zonecfg:sol11-zone:device> set match=/dev/FJSVmplb/*dsk/mplb0s*
zonecfg:sol11-zone:device> end
```

Note1: USCSI command is not support in Non-global-zone

ZFS (the driver for Solaris 10 OS and Solaris 9 OS)

If ETERNUS Multipath Driver devices are under the control of ZFS, the following message may be output when the server is rebooted.

```
SUNW-MSG-ID: ZFS-8000-CS, TYPE: Fault, VER: 1, SEVERITY: Major
EVENT-TIME: Mon Jun 25 14:43:42 JST 2007
PLATFORM: FJSV,GPUZC-M, CSN: -, HOSTNAME: raid-server2
SOURCE: zfs-diagnosis, REV: 1.0
EVENT-ID: ad895d1d-c04f-6686-88e8-bb23b276f467
DESC: A ZFS pool failed to open. Refer to http://sun.com/msg/ZFS-8000-CS for more
information.
AUTO-RESPONSE: No automated response will occur.
IMPACT: The pool data is unavailable
REC-ACTION: Run 'zpool status -x' and either attach the missing device or
restore from backup.
```

This message is not displayed if the setting forceload of mplbt is defined in /etc/system file. Edit /etc/system file to set forceload.

Example.

```

* forceload:
*
* Cause these modules to be loaded at boot time, (just before mounting
* the root filesystem) rather than at first reference. Note that
* forceload expects a filename which includes the directory. Also
* note that loading a module does not necessarily imply that it will
* be installed.
*
* Example:
* forceload: drv/foo
forceload: drv/mplbt

* set:
*
* Set an integer variable in the kernel or a module to a new value.
* This facility should be used with caution. See system(4).
:
```

Upgrade Install from GR Multipath Driver

If PRIMECLUSTER is installed, execute the following command after uninstalling the GR Multipath Driver.

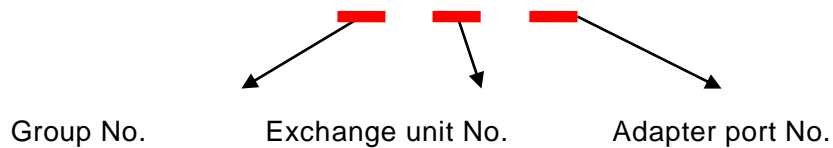
```
# rm /etc/opt/FJSVcluster/sys/cldiskadm
# ln -s /opt/FJSVclapi/sys/cldiskadm /etc/opt/FJSVcluster/sys/cldiskadm
```

Disk_device_controller_id and Connection Points

The iompadm command with “info” option shows information for the attached disks. The example below shows the Adapter port No. The Adapter port No is the connection path and is uniquely defined on each storage system.

Example:

```
# iompadm -c mplb info /dev/FJSVmplb/fiomp/adm0
IOMP : /dev/FJSVmplb/fiomp/adm0
Element :
/dev/rdisk/c4t500000E0D46EB981d0s2 online standby block "good status
      [ETERNUS_DXL- 112EB9-CM10-CA10-PORT01] (ssd7)"
/dev/rdisk/c5t500000E0D46EB991d0s2 online active block "good status
      [ETERNUS_DXL- 112EB9-CM11-CA11-PORT03] (ssd23)"
```



The figures below show the Adapter port No of supported storage systems.

The adapter port No is different from the physical port number. Refer to the manual of your storage system device for further information of the physical port number. Please note that the port position and the physical port number depend on the type of storage system.

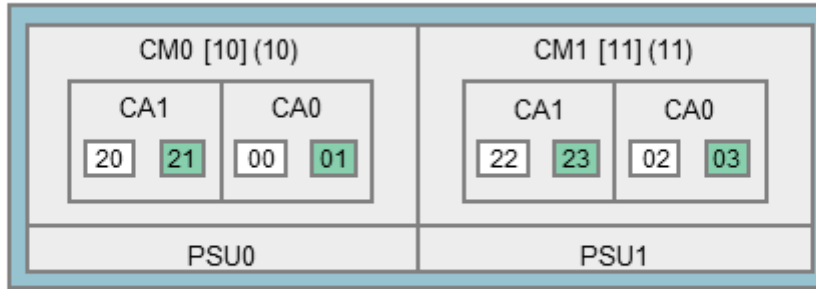
ETERNUS DX60 S5, ETERNUS DX60 S4, ETERNUS DX60 S3



[]: Group No. (): Exchange unit No. □ : adapter Port No. ■ : When using 2port-CM

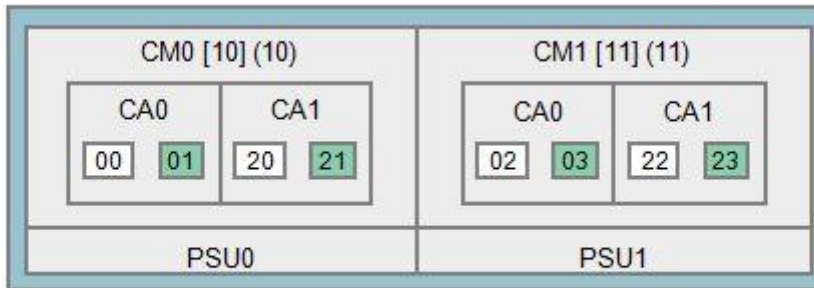
ETERNUS DX100 S5, ETERNUS DX100 S4, ETERNUS DX100 S3

When CA of FC is installed in the basic host interface



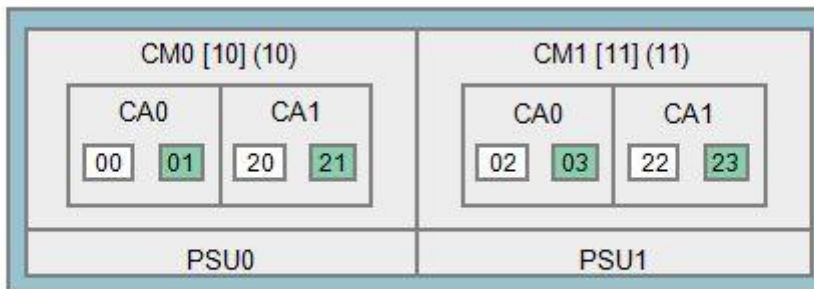
[]: Group No. (): Exchange unit No. : adapter Port No. : When using 2port-CA

When CA other than FC are installed in the basic host interface



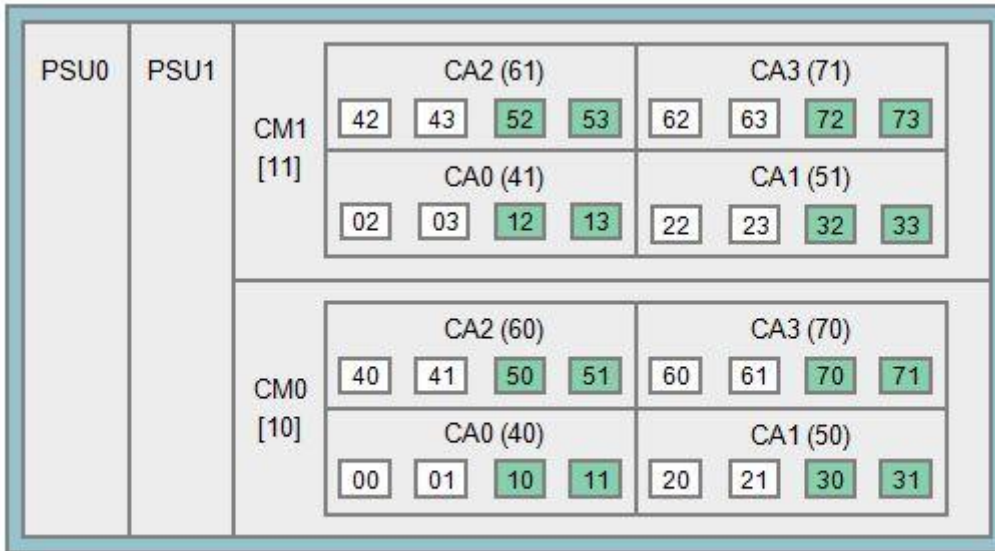
[]: Group No. (): Exchange unit No. : adapter Port No. : When using 2port-CA

ETERNUS DX200 S5, ETERNUS DX200 S4, ETERNUS DX200 S3, ETERNUS AF150 S3, ETERNUS AF250 S3, ETERNUS AF250 S2, ETERNUS AF250, ETERNUS DX200F, ETERNUS DX80 S2, ETERNUS DX90 S2



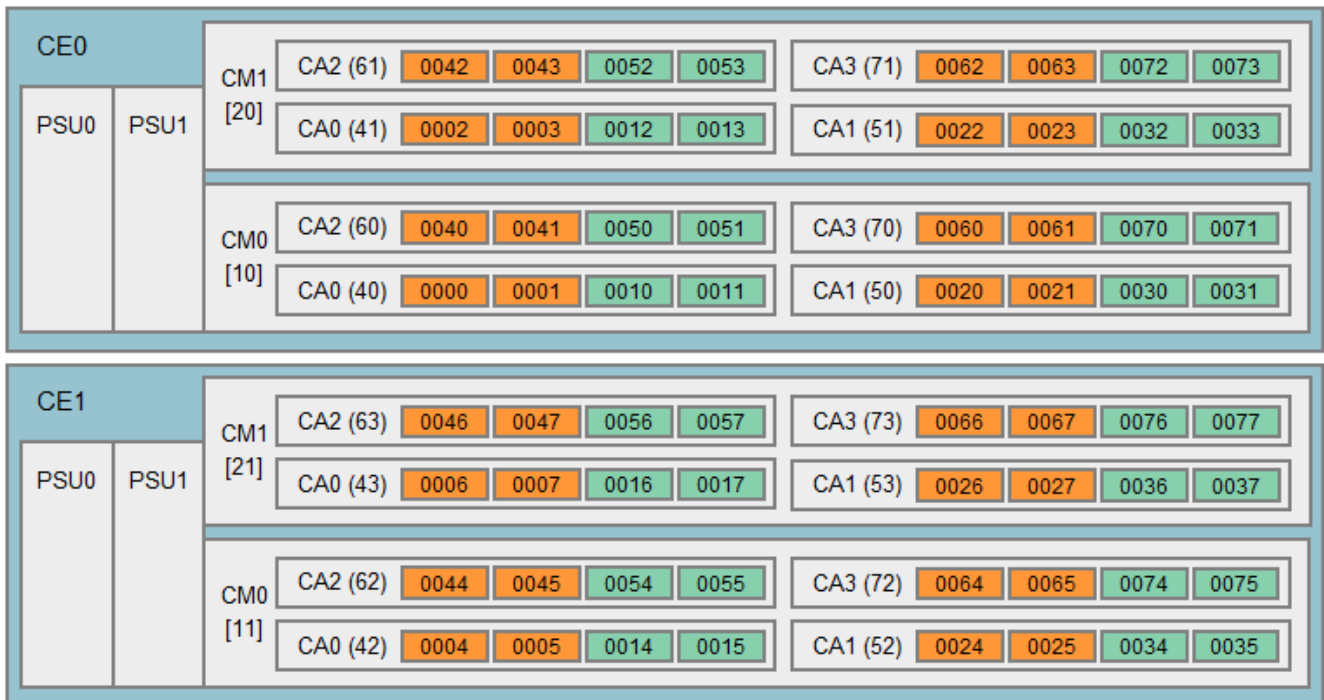
[]: Group No. (): Exchange unit No. : adapter Port No. : When using 2port-CA

ETERNUS DX500 S5, ETERNUS DX500 S4, ETERNUS DX500 S3, ETERNUS DX 600 S5, ETERNUS DX 600 S4, ETERNUS DX 600 S3, ETERNUS AF650 S3, ETERNUS AF650 S2, ETERNUS AF650, ETERNUS DX400 S2 series



[]: Group No. (): Exchange unit No. □ : adapter Port No. ■ : When using 4port-CA

ETERNUS DX 900 S5



[]: Group No. (): Exchange unit No. ■ : adapter Port No. ■ : When using 4port-CA

ETERNUS DX8900 S4, ETERNUS DX8700 S3/DX8900 S3

CE0		PSU0 PSU1	CM1 [20]	CA2 (61) 0042 0043 0052 0053	CA3 (71) 0062 0063 0072 0073
	CA0 (41) 0002 0003 0012 0013			CA1 (51) 0022 0023 0032 0033	
	CM0 [10]		CA2 (60) 0040 0041 0050 0051	CA3 (70) 0060 0061 0070 0071	
			CA0 (40) 0000 0001 0010 0011	CA1 (50) 0020 0021 0030 0031	
CE1		PSU0 PSU1	CM1 [21]	CA2 (63) 0046 0047 0056 0057	CA3 (73) 0066 0067 0076 0077
	CA0 (43) 0006 0007 0016 0017			CA1 (53) 0026 0027 0036 0037	
	CM0 [11]		CA2 (62) 0044 0045 0054 0055	CA3 (72) 0064 0065 0074 0075	
			CA0 (42) 0004 0005 0014 0015	CA1 (52) 0024 0025 0034 0035	
CE2		PSU0 PSU1	CM1 [22]	CA2 (65) 004A 004B 005A 005B	CA3 (75) 006A 006B 007A 007B
	CA0 (45) 000A 000B 001A 001B			CA1 (55) 002A 002B 003A 003B	
	CM0 [12]		CA2 (64) 0048 0049 0058 0059	CA3 (74) 0068 0069 0078 0079	
			CA0 (44) 0008 0009 0018 0019	CA1 (54) 0028 0029 0038 0039	
CE3		PSU0 PSU1	CM1 [23]	CA2 (67) 004E 004F 005E 005F	CA3 (77) 006E 006F 007E 007F
	CA0 (47) 000E 000F 001E 001F			CA1 (57) 002E 002F 003E 003F	
	CM0 [13]		CA2 (66) 004C 004D 005C 005D	CA3 (76) 006C 006D 007C 007D	
			CA0 (46) 000C 000D 001C 001D	CA1 (56) 002C 002D 003C 003D	

[]: Group No. (): Exchange unit No. : adapter Port No. : When using 4port-CA

CE4		PSU0	PSU1	CM1 [24]	CA2 (A1) 00C2 00C3 00D2 00D3	CA3 (B1) 00E2 00E3 00F2 00F3
	CA0 (81) 0082 0083 0092 0093				CA1 (91) 00A2 00A3 00B2 00B3	
	CM0 [14]			CA2 (A0) 00C0 00C1 00D0 00D1	CA3 (B0) 00E0 00E1 00F0 00F1	
				CA0 (80) 0080 0081 0090 0091	CA1 (90) 00A0 00A1 00B0 00B1	
CE5		PSU0	PSU1	CM1 [25]	CA2 (A3) 00C6 00C7 00D6 00D7	CA3 (B3) 00E6 00E7 00F6 00F7
	CA0 (83) 0086 0087 0096 0097				CA1 (93) 00A6 00A7 00B6 00B7	
	CM0 [15]			CA2 (A2) 00C4 00C5 00D4 00D5	CA3 (B2) 00E4 00E5 00F4 00F5	
				CA0 (82) 0084 0085 0094 0095	CA1 (92) 00A4 00A5 00B4 00B5	
CE6		PSU0	PSU1	CM1 [26]	CA2 (A5) 00CA 00CB 00DA 00DB	CA3 (B5) 00EA 00EB 00FA 00FB
	CA0 (85) 008A 008B 009A 009B				CA1 (95) 00AA 00AB 00BA 00BB	
	CM0 [16]			CA2 (A4) 00C8 00C9 00D8 00D9	CA3 (B4) 00E8 00E9 00F8 00F9	
				CA0 (84) 0088 0089 0098 0099	CA1 (94) 00A8 00A9 00B8 00B9	
CE7		PSU0	PSU1	CM1 [27]	CA2 (A7) 00CE 00CF 00DE 00DF	CA3 (B7) 00EE 00EF 00FE 00FF
	CA0 (87) 008E 008F 009E 009F				CA1 (97) 00AE 00AF 00BE 00BF	
	CM0 [17]			CA2 (A6) 00CC 00CD 00DC 00DD	CA3 (B6) 00EC 00ED 00FC 00FD	
				CA0 (86) 008C 008D 009C 009D	CA1 (96) 00AC 00AD 00BC 00BD	

[]: Group No. (): Exchange unit No. : adapter Port No. : When using 4port-CA

CE8				CM1 [28]				CM0 [18]			
PSU0	PSU1	CA2 (E1)	0142	0143	0152	0153	CA3 (F1)	0162	0163	0172	0173
		CA0 (C1)	0102	0103	0112	0113	CA1 (D1)	0122	0123	0132	0133
PSU0	PSU1	CA2 (E0)	0140	0141	0150	0151	CA3 (F0)	0160	0161	0170	0171
		CA0 (C0)	0100	0101	0110	0111	CA1 (D0)	0120	0121	0130	0131

CE9				CM1 [29]				CM0 [19]			
PSU0	PSU1	CA2 (E3)	0146	0147	0156	0157	CA3 (F3)	0166	0167	0176	0177
		CA0 (C3)	0106	0107	0116	0117	CA1 (D3)	0126	0127	0136	0137
PSU0	PSU1	CA2 (E2)	0144	0145	0154	0155	CA3 (F2)	0164	0165	0174	0175
		CA0 (C2)	0104	0105	0114	0115	CA1 (D2)	0124	0125	0134	0135

CE10				CM1 [2A]				CM0 [1A]			
PSU0	PSU1	CA2 (E5)	014A	014B	015A	015B	CA3 (F5)	016A	016B	017A	017B
		CA0 (C5)	010A	010B	011A	011B	CA1 (D5)	012A	012B	013A	013B
PSU0	PSU1	CA2 (E4)	0148	0149	0158	0159	CA3 (F4)	0168	0169	0178	0179
		CA0 (C4)	0108	0109	0118	0119	CA1 (D4)	0128	0129	0138	0139

CE11				CM1 [2B]				CM0 [1B]			
PSU0	PSU1	CA2 (E7)	014E	014F	015E	015F	CA3 (F7)	016E	016F	017E	017F
		CA0 (C7)	010E	010F	011E	011F	CA1 (D7)	012E	012F	013E	013F
PSU0	PSU1	CA2 (E6)	014C	014D	015C	015D	CA3 (F6)	016C	016D	017C	017D
		CA0 (C6)	010C	010D	011C	011D	CA1 (D6)	012C	012D	013C	013D

[]: Group No. (): Exchange unit No. : adapter Port No. : When using 4port-CA

ETERNUS DX60 S2

FC interface



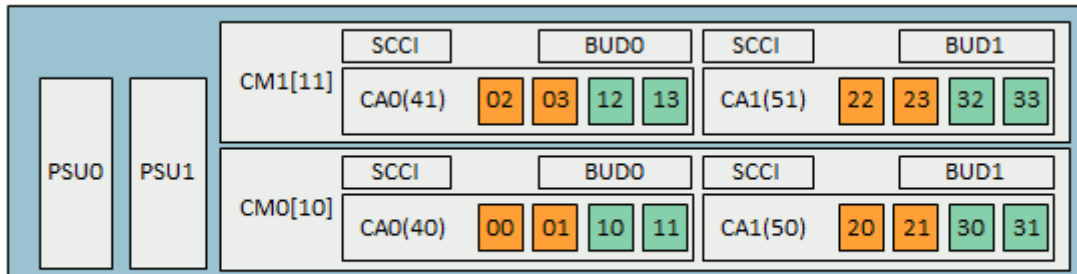
[]: Group No. (): Exchange unit No. □: adapter Port No. ■: When using 2port-CM

SAS interface



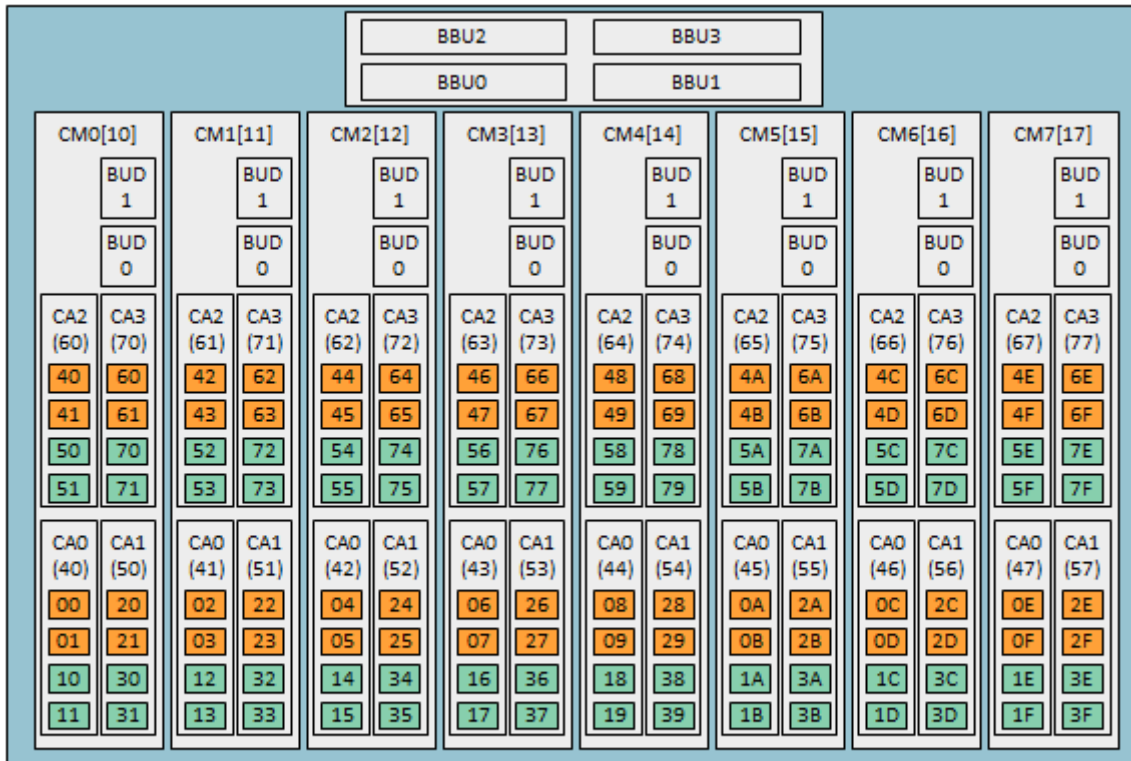
[]: Group No. (): Exchange unit No. □: adapter Port No. ■: When using 2port-CM

ETERNUS DX8100 S2



[]: Group No. (): Exchange unit No. ■: adapter Port No. ■: When using 4port-CA

ETERNUS DX8700 S2



[]: Group No. (): Exchange unit No. : adapter Port No. : When using 4port-CA

OS update to Solaris 10 8/11 or later and kernel patch 144500-19 or later

If ETERNUS Multipath driver 3.0.3 or earlier is installed, please apply patch 914267-14 before applying OS update of Solaris10 8/11 or later or kernel patch 144500-19 or later.

Preparation that uses ETERNUS DX S3, ETERNUS DX200F with patch 914267-17

The procedure is unnecessary in multipath driver 3.1.0 or later or applying 914267-18 environment.

Please add the following a definition to /var/opt/FJSVmplb/catalog.

Storage Systems	definition
ETERNUS DX60 S3/DX100 S3/DX200 S3, ETERNUS DX200F	^500000e0da[0-3]:DXL3:40
ETERNUS DX500 S3/DX600 S3	^500000e0da[8-f]:DXM3:255

It comes to be able to select ETERNUS DX S3 with grmpdautoconf.

Example

```

Search devices ....display device and access paths list after searching.
switch          WWN          device          slot/port
-----
10  100000000e24418f    fjpfca0        -
10  100000000e2441a9    fjpfca1        -
10  500000e0da817c80    DXM3          -
10  500000e0da817c90    DXM3          -
Adapter          Switch          ETERNUS (GR)          Status
instance         WWN          WWN          product
-----+-----+-----+-----+-----
[ ] 1  fjpfca0 100000000e24418f  10 500000e0da817c90  DXM3  -  New
[ ] 2  fjpfca1 100000000e2441a9  10 500000e0da817c80  DXM3  -  New
    
```

Preparation that uses ETERNUS DX60 S3/DX100 S3/DX200 S3, ETERNUS DX200F, ETERNUS AF250/AF250 S2 shipped after June, 2016 and ETERNUS DX60 S4, DX100 S4, DX200 S4 (the driver for Solaris 10 OS and Solaris 9 OS)

Please add the following a definition to /var/opt/FJSVmplb/catalog.

definition
^500000e0da[4-7]:DXL3:255
^500000e0db[0-3]:DXL3:255

ETERNUS DX S4 series is displayed that DXL3. It is possible to use it though the device name is not displayed in the annotation.

Note of Oracle VM

- About the problem that the I/O domain cannot be reboot.
The I/O domain cannot be started when the guest domain is binding.

[Environment]

I/O domain's OS version is:

- Solaris11.1 + SRU14051 (SRU11.1.19.6.0) or later
- Solaris11.2 ~ Solaris11.2 SRU14111
- Solaris10 + 150840-04 or later

[Recommended Action]

In the IO domain, add the following definitions to /etc/system.

```
forceload: drv/px
```

* "forceload: drv/vp" written in the Software Information fro 3.1.1 is a mistake. Please specify "forceload: drv/px".

- About the problem that path cannot be restored by the guest domain after reboot of the I/O domain.
When the I/O domain is reactivated, the USCSI command is not issuable from the guest domain. Path of the guest domain becomes offline, and can't restore to online, because the multipath driver is using the USCSI command.

[Environment]

I/O domain's OS version is:

- Solaris11.1 + SRU14051 (SRU11.1.19.6.0) or later
- Solaris11.2 ~ Solaris11.2 SRU14111
- Solaris10 + 150840-04 or later

[Recommended Action]

Deal with either as follows when the phenomenon is generated.

Corrective action 1:

1. Delete path of the rebooted I/O domain from the guest domain.
Ex.) # /usr/opt/FJSViomp/bin/iompadm del /dev/FJSMplb/fiomp/admXX /dev/rdisk/cXdXs2
- The grpmdautoconf command cannot be used.
- Execute it with the I/O domain is active.
2. The allocated vdisk is released.
Ex.) # ldm rm-vdisk vdisk2-0 gdom2
3. The released vdisk is allocated again.
Ex.) # ldm add-vdisk vdisk2-0 vol2-2@iodom1-vds0 gdom2
4. Add path by the grpmdautoconf command.
Ex.) # grpmdautoconf

Corrective action 2:

1. Shutdown the guest domain.
2. Do unbind the guest domain.
Ex.) # ldm unbind-domain gdom2
3. Do bind the guest domain.
Ex.) # ldm bind-domain gdom2
4. Start the guest domain.
Ex.) # ldm start-domain gdom2

- In the Oracle VM environment, when the I/O domain is rebooted, the virtual disk allocated in the guest domain might not be correctly allocated.

[Environment]

I/O domain's OS version is:

- Solaris11.1 + SRU14051 (SRU11.1.19.6.0) or later
- Solaris11.2 ~ Solaris11.2 SRU14111
- Solaris10 + 150840-04 or later

[Recommended Action]

1. Please start I/O domain
2. The state of the guest domain is made bound or inactive.
3. Please execute the following to each virtual disk.
 - # Idm rm-vdisk <vdisk> <guest domain>
 - # Idm add-vdisk <vdisk> <vol>@<vds> <guest domain name>
4. Please start guest domain.

- Don't send the break request to OS at I/O domain while I/O is issued. Select sync or reset or halt when you do "break" by mistake.
- About the hang-up of the I/O domain
 - When the I/O domain does hang-up, the guest domain becomes no I/O response. Please do panic the I/O domain in that case.
- About the Idmp2v command
 - The Idmp2v command cannot use the ETERNUS multipath driver.

Note of Oracle VM SR-IOV environments

The support condition is as follows.

OS version	Solaris 11.3 SRU18031(SRU11.3.30.4.0) or later
MPD Version Levels/Patch	3.1.3 or later or T011535SP-06 or later
HBA	Emulex FC cards

About ssd path name (the driver for Solaris 11 OS and Solaris 10 OS)

Since T011535SP-04

The ssd path name (/dev/[r]dsk/cXt0dXsX) can be used. The following commands are used and set.

Ssd path name:

- cX : Unused c number
- t0 : 0 fixation
- dX : Instance number of mplb
- sX : Slice number

Command:

mplbconfig -S on
The ssd path name is made effective.

mplbconfig -S off
The ssd path name is invalidated.

mplbconfig -S up
When EFI and the SMI label are changed, the ssd path is updated.

```
/opt/FJsvmplb/bin/mpdinfo (*1)
```

The instance number of mplb and the correspondence of the ssd path name are displayed.

(*1)"/opt" is a directory specified when installing.

Note:

- In the PRIMECLUSTER environment, put the ssd path name in the exclusion list of PRIMECLUSTER.
- The ssd path name is unsupported in the environment in which PRIMECLUSTER GDS/PRIMECLUSTER GD is installed.
- The ssd path name cannot be used for the system volume of SAN Boot.

About Solaris 11.4

Solaris 11.4 is supported with ETERNUS multipath driver 3.1.3/patch T011535SP-05.

The procedure and the limitation when Solaris 11.4 is used are described

INSTALLATION

- Procedure of new installation

1. The driver is changed to ssd.
/etc/devices/inception_points is edited.

```
scsa-no-binding-set-fcp
scsa-no-binding-set-vhci
swapgeneric-ssd-loads-sd
```



```
# scsa-no-binding-set-fcp
# scsa-no-binding-set-vhci
# swapgeneric-ssd-loads-sd
```

2. MPxIO is invalidated.
The following command is executed, and the server is reboot.

```
# /usr/sbin/stmsboot -D fp -d
WARNING: This operation will require a reboot.
Do you want to continue ? [y/n] (default: y) y
The changes will come into effect after rebooting the system.
Reboot the system now ? [y/n] (default: y) y
```

3. Please set the label and the partition before installing the multipath driver.
4. Please install by the mpdpkgadd command. Please refer to the "Software Information" for details.
Do not reboot after the installation.

5. Please confirm service by the svcs command after completing the mpdpkgadd command, and start if necessary.

```
# svcs -a | grep fjsvmp1b
Service is started when displayed as follows.
online          xx:xx:xx  svc:/system/fjsvmp1b:default
```

Please start service by the svcadm command when it is displayed as follows.

```
disabled        xx:xx:xx  svc:/system/fjsvmp1b:default
```

```
# svcadm enable svc:/system/fjssvmlb:default
```

6. Please execute the remaining work of the installation procedure of the “Software Information”.
- Procedure of installation in environment updated from Solaris11.3 to 11.4
 1. Please set the label and the partition before installing the multipath driver.
 2. Please install by the mpdpkgadd command. Please refer to the “Software Information” for details.
Do not reboot after the installation.
 3. Please confirm service by the svcs command after completing the mpdpkgadd command, and start if necessary.
 4. Refer to Procedure of new installation 5.
 5. Please execute the remaining work of the installation procedure of the “Software Information”.

RESTRICTIONS

- The format command cannot be used.
Please set the label and the partition before make multipath.
When the format command is needed after the multipath, it is necessary to destroy the multipath.
- It is not possible to use it though the ssd path of multipath are displayed in the list of format.
- Ssd paths are displayed in the list of format. However, they cannot be used.
- The IOR composition supported by ETERNUS multipath driver 3.1.3 needs SRU19011(SRU11.4.5.3.0) or later. Refer to FNS-28221 when the IO root domain is shutdown, reboot or panic.
- The server might not be able to be boot when the service start is not confirmed after the installation and it reactivates.
Please login from the console in that case, and execute 5 of the "Procedure of a new installation".

Errata of User's Guide and Software Information

Version	Document	Part	Correction
3.1.1	User's Guide	Table of page 121	(Not Correct) An I/O error message is sent to the guest domain. The path status changes to "fail". (Correct) An I/O error message is sent to the guest domain. The path status changes to "warning".
3.1.1	Software Information	Page 6	(Not Correct) forceload: drv/vp (Correct) forceload: drv/px
3.1.0	Software Information	10.1 Installation	Please reboot the server after the installation.
3.1.1	Software Information	10.1 New Installation 10.3 Silent Installation	Please reboot the server after the installation.
3.1.2	Software Information	10.1 New Installation 10.3 Silent Installation	Please reboot the server after the installation.
3.1.0- 3.1.2	User's Guide	B.7 Performing "add device" for mplb Special Files in Non-Global Zones	Please refer to "Method of "add device" to Non-global zone of Solaris11 (the driver for Solaris 11 OS and Solaris 10 OS)" in this book when the Non-global zone is Solaris11.
3.1.0- 3.1.2	User's Guide	4.2 Adding a Path or Storage System •When used as a shared disk for PRIMECLUSTER:	(Not Correct) The cluster will implement the automatic resource registration. Refer to the cluster manual for more details. (Correct) For Adding a Path, the grmpdautoconf command is executed. For Adding Storage System, the cluster will implement the automatic resource registration. Refer to the cluster manual for more details.
3.1.2	User's Guide	B.5 Cluster System 4th Caution	(Not Correct) and then execute the "grmpdautoconf" command again to redo the multipath settings. (Correct) and then perform the automatic configuration of the cluster system.

About This Document

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