
**FUJITSU Storage
ETERNUS Multipath Driver (Windows Version)
Installation Information**

Jan. 2022

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About ETERNUS Multipath Driver for Windows

ETERNUS Multipath Driver for Windows (hereafter referred to as "Multipath Driver") is based on Microsoft Storage Technologies - MPIO framework. Multipath Driver is equivalent to Device Specific Module (DSM) in MPIO framework.

Supported Operation System (OS) Versions

This table shows the versions of Windows supported by Multipath Driver.

Supported OS Versions	Multipath Driver Version Level
Microsoft® Windows Server® 2008 Standard Microsoft® Windows Server® 2008 Enterprise Microsoft® Windows Server® 2008 Datacenter Microsoft® Windows Server® 2008 for Itanium-Based Systems Microsoft® Windows HPC Server® 2008	V2.0L14 or later
Microsoft® Windows Server® 2008 R2 Standard Microsoft® Windows Server® 2008 R2 Enterprise Microsoft® Windows Server® 2008 R2 Datacenter Microsoft® Windows Server® 2008 R2 for Itanium-Based Systems Microsoft® Windows HPC Server® 2008 R2	V2.0L16 or later
Microsoft® Windows Server® 2012 Essentials Microsoft® Windows Server® 2012 Standard Microsoft® Windows Server® 2012 Datacenter	V2.0L19 or later
Microsoft® Windows Server® 2012 R2 Essentials Microsoft® Windows Server® 2012 R2 Standard Microsoft® Windows Server® 2012 R2 Datacenter Microsoft® Windows Storage Server® 2012 R2 Standard	V2.0L20 or later
Microsoft® Windows Server® 2016 Essentials Microsoft® Windows Server® 2016 Standard Microsoft® Windows Server® 2016 Datacenter	V2.0L23 or later
Microsoft® Windows Server® 2019 Essentials Microsoft® Windows Server® 2019 Standard Microsoft® Windows Server® 2019 Datacenter	V2.0L24 or later
Microsoft® Windows Server® 2022 Essentials Microsoft® Windows Server® 2022 Standard Microsoft® Windows Server® 2022 Datacenter	V2.0L25 or later

For Windows Server 2008

The architecture types of x86 (32-bit), x64 and IA64 (Itanium) are supported.

The software levels of SP1 (no SP applied) and SP2 are supported. SP2 is supported by V2.0L14 or later.

For Windows Server 2008 R2

The architecture types of x64 and IA64 (Itanium) are supported.

The software levels of SP0 (no SP applied) and SP1 are supported. SP1 is supported by V2.0L16 or later.

For Windows Server 2016

Nano Server is not supported.

For Windows Server 2019

Nano Server is not supported.

For Windows Server 2022

Nano Server is not supported.

Hyper-V are supported, see also [Hyper-V environment](#).

Supported Storage Systems

Multipath Driver supports the following storage systems.

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

ETERNUS DX60 S2, ETERNUS DX80 S2, ETERNUS DX90 S2

Storage System	Multipath Driver Product Names	Version Level
ETERNUS DX60 S2 ETERNUS DX80 S2 ETERNUS DX90 S2	for Entry Model for Standard Model for Enterprise Model	V2.0L18 or later

ETERNUS DX60 S3, ETERNUS DX100 S3, ETERNUS DX200 S3, ETERNUS DX200F, ETERNUS DX500 S3, ETERNUS DX600 S3

Storage System	Multipath Driver Product Names	Version Level
ETERNUS DX60 S3 ETERNUS DX100 S3 ETERNUS DX200 S3 ETERNUS DX200F	for Entry Model for Standard Model for Enterprise Model	V2.0L20 or later
ETERNUS DX500 S3 ETERNUS DX600 S3	for Standard Model for Enterprise Model	

ETERNUS DX60 S4, ETERNUS DX100 S4, ETERNUS DX200 S4, ETERNUS DX500 S4, ETERNUS DX600 S4

Storage System	Multipath Driver Product Names	Version Level
ETERNUS DX60 S4 ETERNUS DX100 S4 ETERNUS DX200 S4	for Entry Model for Standard Model for Enterprise Model	V2.0L21 or later
ETERNUS DX500 S4 ETERNUS DX600 S4	for Standard Model for Enterprise Model	

ETERNUS DX60 S5, ETERNUS DX100 S5, ETERNUS DX200 S5, ETERNUS DX500 S5, ETERNUS DX600 S5

Storage System	Multipath Driver Product Names	Version Level
ETERNUS DX60 S5 ETERNUS DX100 S5 ETERNUS DX200 S5	for Entry Model for Standard Model for Enterprise Model	V2.0L21 or later
ETERNUS DX500 S5 ETERNUS DX600 S5	for Standard Model for Enterprise Model	

ETERNUS AF150 S3, ETERNUS AF250 S3/AF250 S2/AF250

ETERNUS AF150 S3 ETERNUS AF250 S3 ETERNUS AF250 S2 ETERNUS AF250	for Entry Model for Standard Model for Enterprise Model	V2.0L22 or later
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ETERNUS AF650 S3/AF650 S2/AF650

Storage System	Multipath Driver Product Names	Version Level
ETERNUS AF650 S3 ETERNUS AF650 S2 ETERNUS AF650	for Standard Model for Enterprise Model	V2.0L22 or later

ETERNUS DX900 S5

Storage System	Multipath Driver Product Names	Version Level
ETERNUS DX900 S5	for Standard Model for Enterprise Model	V2.0L22 or later

ETERNUS DX400 S2 series

Storage System	Multipath Driver Product Names	Version Level
ETERNUS DX400 S2 series	for Standard Model for Enterprise Model	V2.0L18 or later

ETERNUS DX8000 S2 series

Storage System	Multipath Driver Product Names	Version Level
ETERNUS DX8000 S2 series up to 2 Paths	for Standard Model for Enterprise Model	V2.0L18 or later
ETERNUS DX8000 S2 series	for Enterprise Model	

ETERNUS DX8900 S4, ETERNUS DX8000 S3 series

Storage System	Multipath Driver Product Names	Version Level
ETERNUS DX8700 S3 up to 2 Paths ETERNUS DX8900 S3 up to 2 Paths ETERNUS DX8900 S4 up to 2 Paths	for Standard Model for Enterprise Model	V2.0L22 or later
ETERNUS DX8700 S3 ETERNUS DX8900 S3 ETERNUS DX8900 S4	for Enterprise Model	

Related Products Requirements

Supported Related Products are as follows:
For the combinations of servers, HBAs, and topologies, please contact us.

Related Hardware Product Requirements

- FC card

Server	HBAs	Multipath Driver Version Level
PRIMERGY/ PRIMEQUEST	PG-FC105	S26361-F2624-E1
	PG-FC106	S26361-F2843-E1 S26361-F2843-E201
	PG-FC107	S26361-F3141-E10 S26361-F3141-E210
	PG-FC201	S26361-F3141-E1
	PG-FC202(L)	S26361-F3306-E1 S26361-F3306-E201
	PG-FC203(L) PY-FC201(L)	S26361-F3961-E1 S26361-F3961-E201
	PG-FC204(L) PY-FC202(L)	S26361-F3961-E2 S26361-F3961-E202
	PG-FC205(L) PY-FC211(L)	S26361-F3631-L1
	PG-FC206(L) PY-FC212(L)	S26361-F3631-L2
	PY-FC221 (L)	
	PY-FC222 (L)	
	PG-FCD101 PG-FCD102	S26361-F3023-E1 S26361-F3023-E2 S26361-F3023-L2
	PG-FCD201	S26361-F3306-E601 S26361-F3306-L601
	PG-FCD202 PY-FCD02	MC-FC82E
	PY-FCD12	
	PY-FC311(L) PY-FC312(L)	
	MC-08FCxx	
	MC-0JFCxx	
MCX0JFCxx		
3rd party PC servers	Emulex FC Cards Qlogic FC Cards	V2.0L10 or later
	Brocade FC Cards	V2.0L16 or later

• SAS card

Server	HBAs	Multipath Driver Version Level
PRIMERGY	PG-228B(L) PY-SC1Y0(L)	V2.0L14 or later
	PG-22DC(L) PY-SC2Z0	
	PY-SCD08	V2.0L19 or later
	PG-SAD201	V2.0L20 or later
	PY-SC3FE	
3rd party PC servers	LSI Logic SAS Cards	V2.0L14 or later

• iSCSI

Server	NICs	Multipath Driver Version Level
PRIMERGY/ PRIMEQUEST	S26361-F3011-E1 etc.	V2.0L12 or later
3rd party PC servers	Intel Pro/1000MT etc.	
		Qlogic iSCSI Cards

• FCoE

Server	CNAs	Multipath Driver Version Level	
PRIMERGY	PG-292B(L) PY-CN202(L)	S26361-F3592-L2 S26361-F3592-L202	V2.0L16 or later
	PG-CND201	MC-CNA102E-F	
	PY-CND02	MC-CNA112E-F	
	PY-CN302		V2.0L18 or later
3rd party PC servers	Emulex CNA Cards	V2.0L16 or later	

• Topology

Interface	Topology	Multipath Driver Version Level
FC	FC-AL	V2.0L10 or later
	Fabric	
SAS	Point-to-Point	V2.0L14 or later
	Fabric (*1)	V2.0L18 or later
iSCSI	Point-to-Point	V2.0L10 or later
	Switch	
FCoE	Fabric	V2.0L16 or later

*1: Only ETERNUS DX80 S2, DX90 S2, DX60 S3, DX100 S3 or DX200 S3.

Related Software Product Requirements

- Clustering Software

Clustering Software	Multipath Driver Version Level
SafeCLUSTER	V2.0L10 or later
EXPRESSCLUSTER	V2.0L18 or later
LifeKeeper	V2.0L18 or later
WSFC (Windows Server 2008)	V2.0L14 or later
WSFC (Windows Server 2008 R2)	V2.0L16 or later
WSFC (Windows Server 2012)	V2.0L19 or later
WSFC (Windows Server 2012 R2)	V2.0L20 or later
WSFC (Windows Server 2016)	V2.0L23 or later
WSFC (Windows Server 2019)	V2.0L24 or later
WSFC (Windows Server 2022)	V2.0L25 or later

WSFC: Windows Server Failover Cluster

- Microsoft iSCSI Software Initiator

iSCSI Software Initiator Version	Multipath Driver Version Level
Version 2.02 or later	V2.0L12 or later

- HBA Drivers

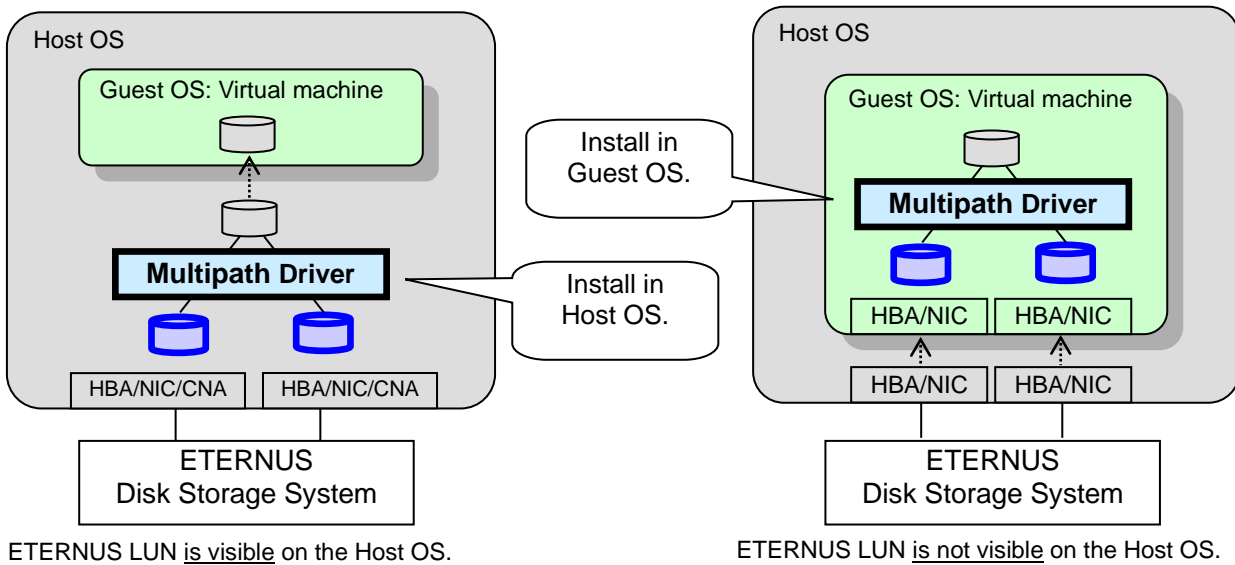
HBA Drivers	Multipath Driver Version Level
SCSIport Miniport Driver	V2.0L10 or later
Storport Miniport Driver (*2)	

Virtualization Environments

Virtualization Environments	Running on Host OS	Running on Guest OS
Hyper-V	Supported	Supported
VMware	N/A	Not Supported
Linux Xen	N/A	Not Supported
Linux KVM	N/A	Not Supported

Hyper-V environment

Multipath Driver must be installed in the OS which see the multipath connections to the LUNs.



The figure above to the left is for a LUN on storage system that is recognized on Host OS. In a configuration like this, Multipath Driver must be installed in Host OS.

The figure above to the right is for a LUN on storage system is not recognized on Host OS. The Guest OS directly recognizes the LUN on storage system without going through Host OS. For example, if you install MS iSCSI Initiator in Guest OS, the right figure is applied. Multipath Driver must be installed in the Guest OS.

CAUTION

- For the configuration shown above in the figure to the left, even if the LUN on the Host OS is configured to be seen by the Guest OS, Multipath Driver does not need to be installed in Guest OS.
- The host interface which supports the configuration shown above in the figure to the right is iSCSI and Virtual Fibre Channel.
- When use Virtual Fibre Channel,It is necessary to connect FC switch corresponding to NPIV.

The supported Host OS of Multipath Driver.

- Microsoft Windows Server 2012 Standard
- Microsoft Windows Server 2012 Datacenter
- Microsoft Windows Server 2012 R2 Standard
- Microsoft Windows Server 2012 R2 Datacenter
- Microsoft Windows Server 2016 Standard
- Microsoft Windows Server 2016 Datacenter
- Microsoft Windows Server 2019 Standard
- Microsoft Windows Server 2019 Datacenter
- Microsoft Windows Server 2022 Essentials
- Microsoft Windows Server 2022 Standard
- Microsoft Windows Server 2022 Datacenter

The supported Guest OS of Multipath Driver.

- Microsoft Windows Server 2012 Essentials
- Microsoft Windows Server 2012 Standard
- Microsoft Windows Server 2012 Datacenter

- Microsoft Windows Server 2012 R2 Essentials
- Microsoft Windows Server 2012 R2 Standard
- Microsoft Windows Server 2012 R2 Datacenter
- Microsoft Windows Server 2016 Essentials
- Microsoft Windows Server 2016 Standard
- Microsoft Windows Server 2016 Datacenter
- Microsoft Windows Server 2019 Essentials
- Microsoft Windows Server 2019 Standard
- Microsoft Windows Server 2019 Datacenter
- Microsoft Windows Server 2022 Essentials
- Microsoft Windows Server 2022 Standard
- Microsoft Windows Server 2022 Datacenter

Channel Adapter ID and Connection Points

CAID is the information displayed on the Multipath Manager window and it can identify the location of the port in the storage system.

CAID is different from a physical port number. To confirm a physical port number, refer to the manual of the storage system. Please note that the port position and the physical port number depend on the type of storage system.

ETERNUS DX60 S2 rear view

[FC / iSCSI]



CM: Controller Module, PSU: Power Supply Unit

 : When using 2 port CM

[SAS]



CM: Controller Module, PSU: Power Supply Unit

 : When using 2 port CM

ETERNUS DX60 S5, ETERNUS DX60 S4, ETERNUS DX60 S3 rear view

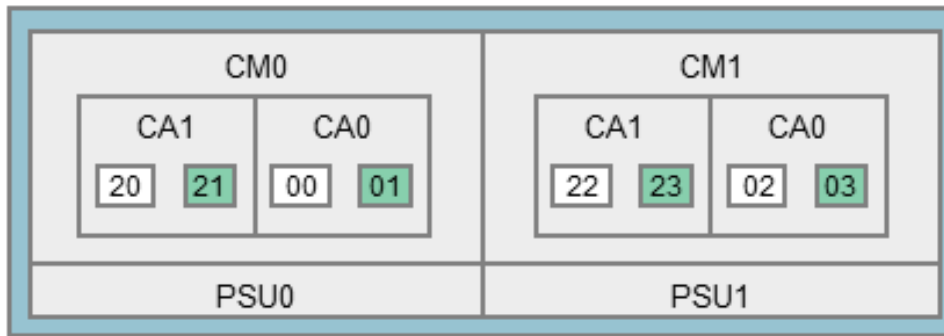


CM: Controller Module, PSU: Power Supply Unit

 : When using 2 port CM

ETERNUS DX100 S5, ETERNUS DX100 S4, ETERNUS DX100 S3 rear view

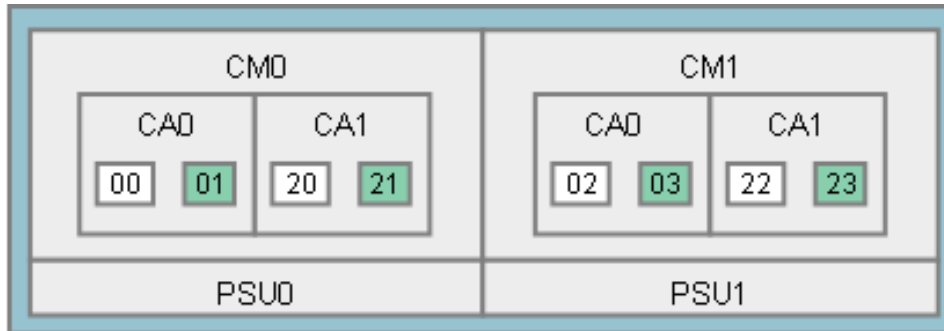
When CA of FC is installed in the basic host interface



CM: Controller Module, CA: Channel Adapter, PSU: Power Supply Unit

 : When using 2 port CA

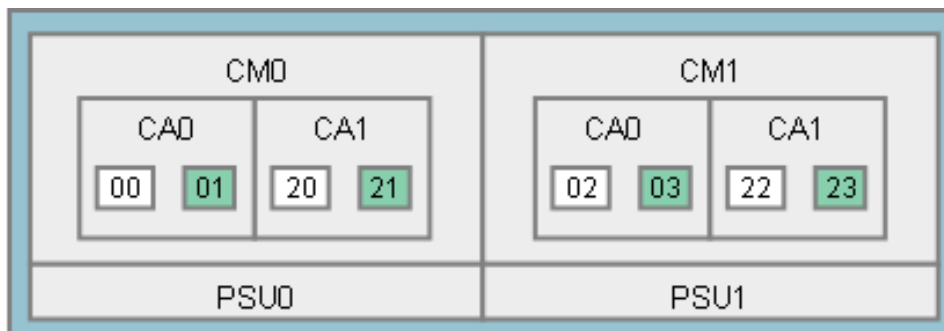
When CA other than FC are installed in the basic host interface



CM: Controller Module, CA: Channel Adapter, PSU: Power Supply Unit

 : When using 2 port CA

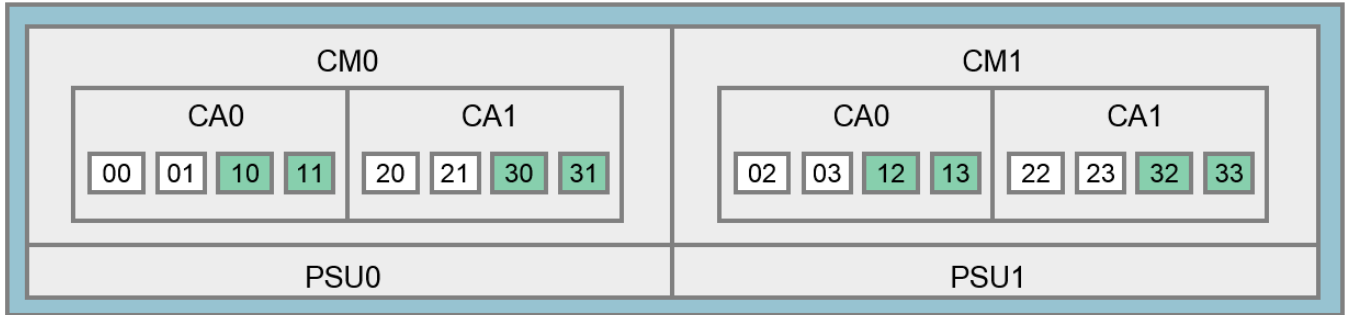
ETERNUS DX200 S4, ETERNUS DX200 S3, ETERNUS DX200F, ETERNUS AF150 S3/AF250 S2/AF250, ETERNUS DX80 S2, ETERNUS DX90 S2 rear view



CM: Controller Module, CA: Channel Adapter, PSU: Power Supply Unit

 : When using 2 port CA

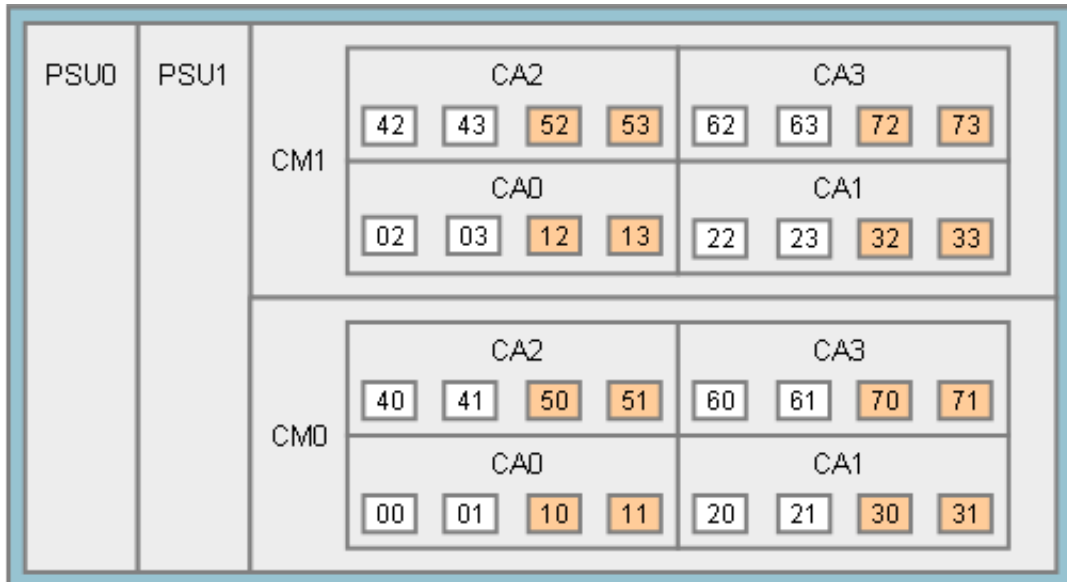
ETERNUS DX200 S5, ETERNUS AF250 S3



CM: Controller Module, CA: Channel Adapter, PSU: Power Supply Unit

: When using 4 port CA

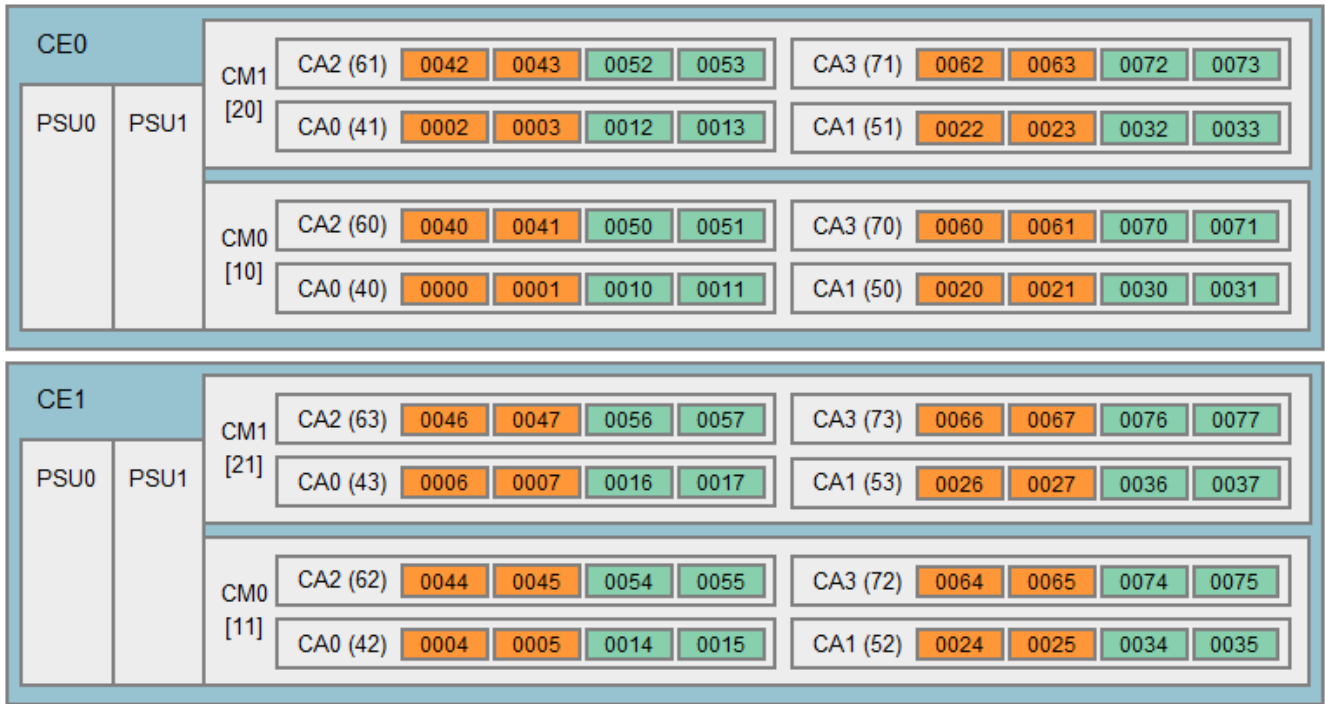
ETERNUS DX500 S5/DX500 S4/DX500 S3, ETERNUS DX600 S5/DX600 S4/DX600 S3, ETERNUS AF650 S3/AF650 S2/AF650, ETERNUS DX8100 S3, ETERNUS DX400 S2 series rear view



CM: Controller Module, CA: Channel Adapter , PSU: Power Supply Unit

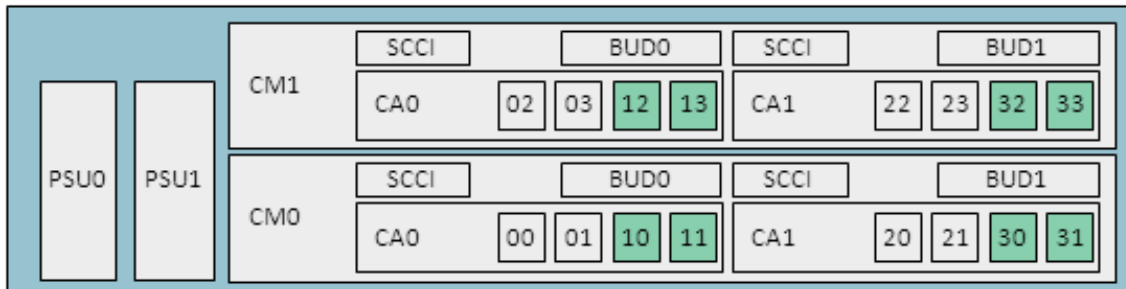
: When using 4 port CA

ETERNUS DX 900 S5 rear view



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

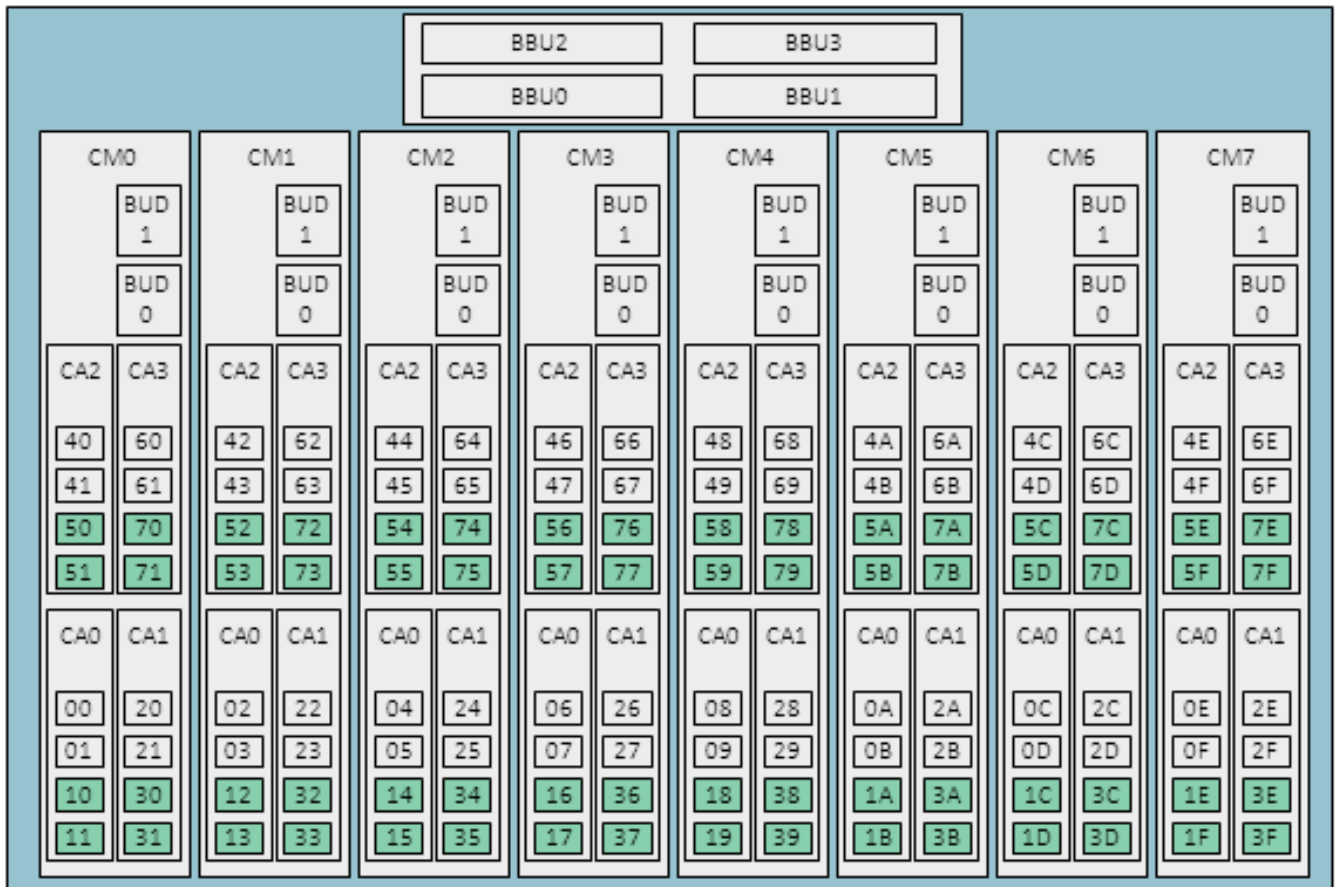
ETERNUS DX8100 S2 rear view



CM: Controller Module, CA: Channel Adapter, PSU: Power Supply Unit

When using 4 port-CA

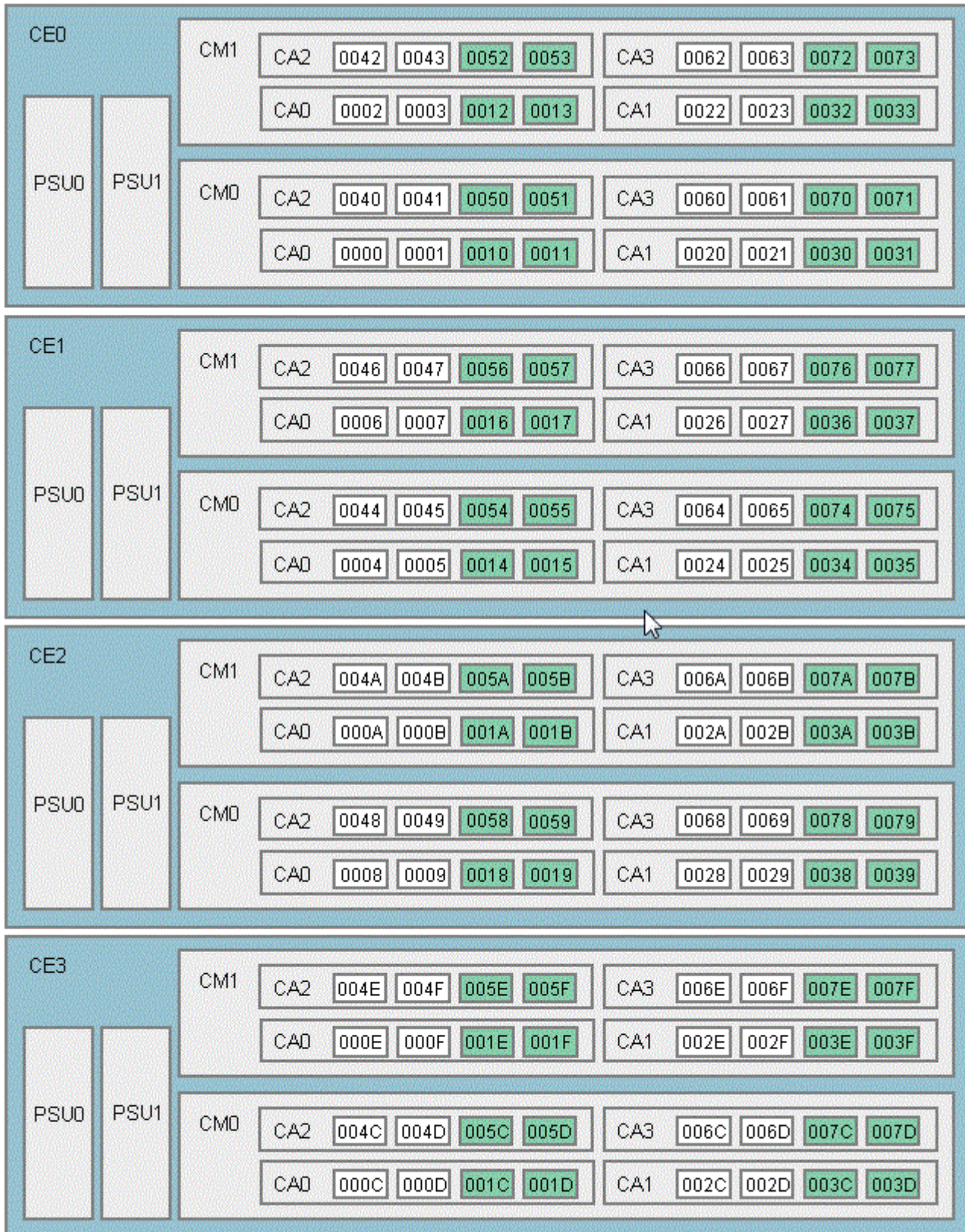
ETERNUS DX8700 S2 front view



CM: Controller Module, CA: Channel Adapter, PSU: Power Supply Unit

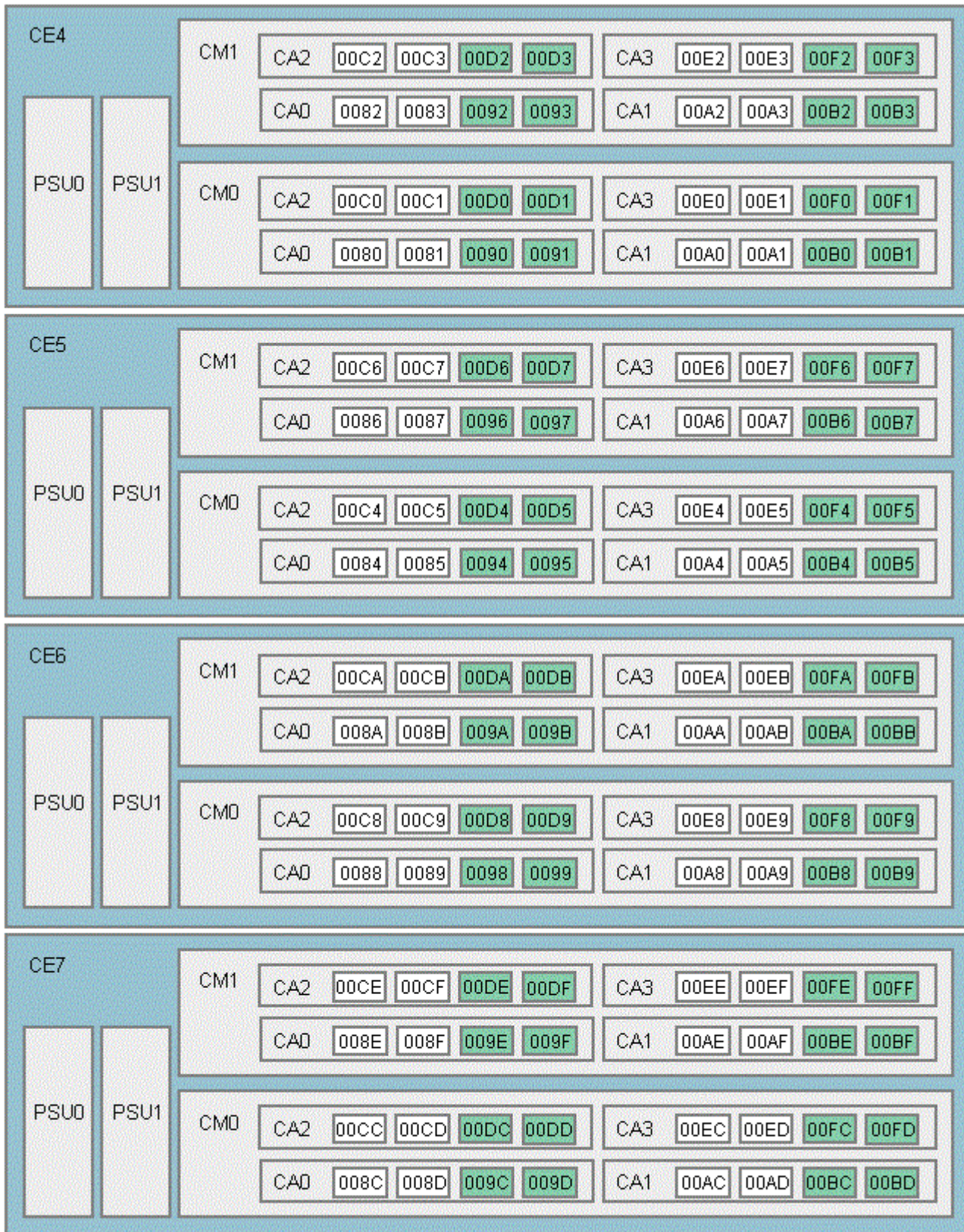
When using 4 port-CA

ETERNUS DX8900 S4, ETERNUS DX8700 S3, ETERNUS DX8900 S3 rear view




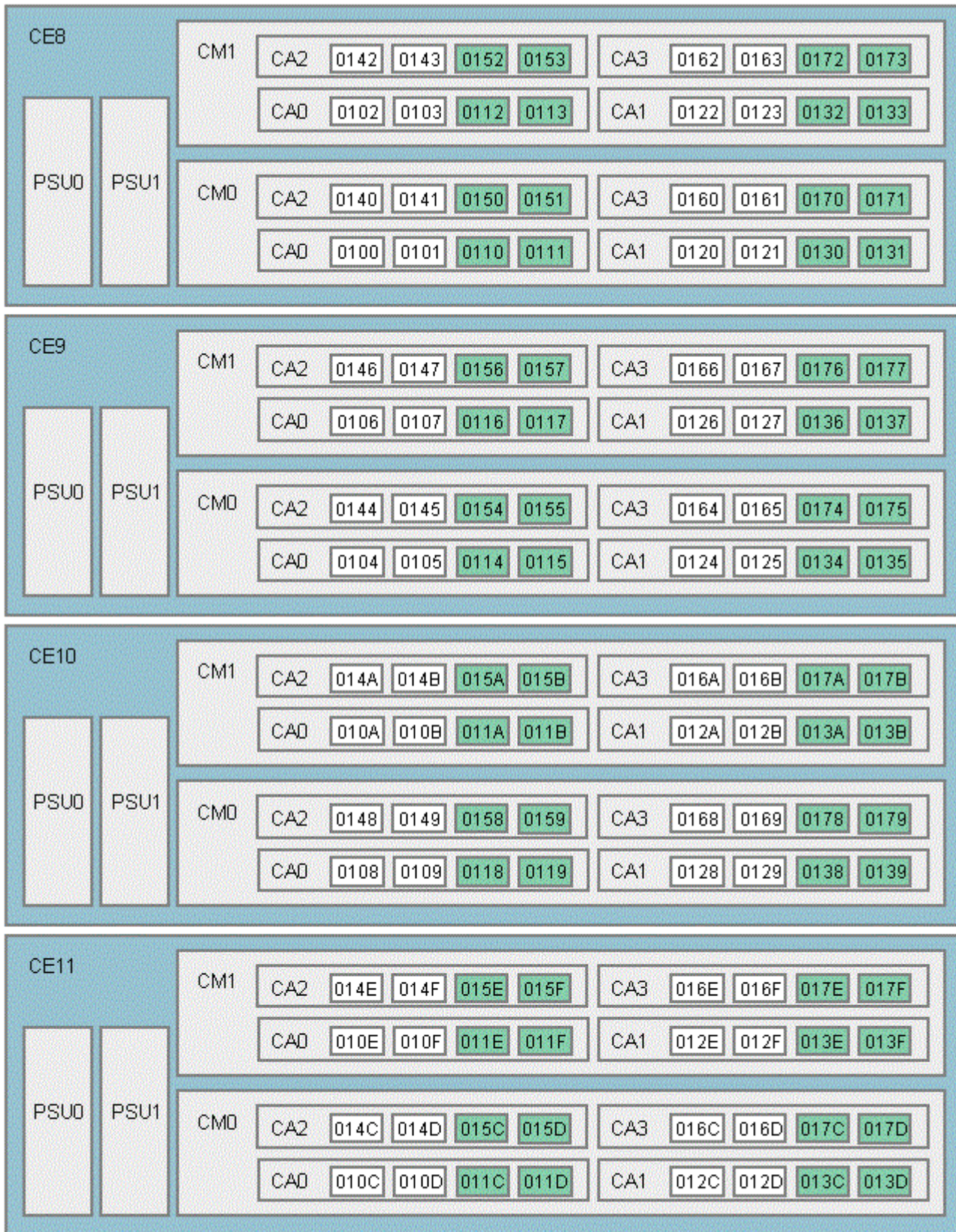
CM: Controller Module, CA: Channel Adapter, PSU: Power Supply Unit

When using 4 port CA




CM: Controller Module, CA: Channel Adapter, PSU: Power Supply Unit

 When using 4 port CA



CM: Controller Module, CA: Channel Adapter, PSU: Power Supply Unit

 When using 4 port CA

Assigned-/ Non-assigned-CM Type Storage Systems

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

With “Assigned-CM” type storage systems, the path connected to the assigned controller is 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 employed. For details, refer to the supplied product manual.

Assigned-CM type	ETERNUS DX60 S2 ETERNUS DX80 S2 ETERNUS DX90 S2 ETERNUS DX60 S3 ETERNUS DX60 S4 ETERNUS DX60 S5 ETERNUS DX100 S3 ETERNUS DX100 S4 ETERNUS DX100 S5 ETERNUS DX200 S3 ETERNUS DX200 S4 ETERNUS DX200 S5 ETERNUS DX200F ETERNUS AF150 S3 ETERNUS AF250 ETERNUS AF250 S2 ETERNUS AF250 S3 ETERNUS DX400 S2 series ETERNUS DX500 S3 ETERNUS DX500 S4 ETERNUS DX500 S5 ETERNUS DX600 S3 ETERNUS DX600 S4 ETERNUS DX600 S5 ETERNUS AF650 ETERNUS AF650 S2 ETERNUS AF650 S3 ETERNUS DX8100 S3
Non-assigned-CM type	ETERNUS DX900 S5 ETERNUS DX8000 S2 series ETERNUS DX8700 S3 ETERNUS DX8900 S3 ETERNUS DX8900 S4

Notes

1. LUN mapping

If LUN mapping in the storage system is not set properly, Windows may not recognize LUNs correctly. For proper LUN mapping, the LUN numbers Windows recognizes must be in ascending order from LUN 0.

2. HBA driver settings

If the HBA driver settings are not correct, Windows may not recognize LUNs correctly. For proper HBA driver settings, follow the instructions written in the “Disk Storage System Server Connection Guide” or “User Guide – Server Setting Guide” that comes with the storage system.

Multipath Driver Updates

The following table shows the updates for each Multipath Driver version:

Version No.	Detail
V2.0L10 (Jan / 2005)	First edition - Added Microsoft MPIO framework - Added support for iSCSI - Added support for Storport Miniport
V2.0L11 (Jul / 2005)	- Added support for Windows Server 2003 x64 - Included the GR Multipath Driver V1.0L14
V2.0L12 (Jun / 2006)	- Added support for the ETERNUS4000 and ETERNUS8000 - Added support for the QLogic Storport Miniport driver - Added support for load balancing in the MSCS environment (added a function to convert SCSI2 Reserve to Persistent Reserve) - Added a function to collect an event log for the following sense information: 06/fb80 (Sense key = 0x06, ASC = 0xfb, ASCQ = 0x80)
V2.0L13 (Aug / 2007)	- Added support for the ETERNUS2000
V2.0L14 (Apr / 2008)	- Added support for Windows Server 2008 - Added support for SAS - Added event log ID=305 (detection of no controller redundancy in the storage system)
V2.0L15 (Jun / 2009)	- Added support for the ETERNUS DX series - Discontinued the client version package that was included in the product - Discontinued the HTML version user's guide
V2.0L16 (Oct / 2009)	- Added support for Windows Server 2008 R2 - Improved the path switching process when path failures occur - Added a function to collect an event log for the following sense information: 06/fb8x (Sense key = 0x06, ASC = 0xfb, ASCQ = 0x8x)
V2.0L17 (Oct / 2010)	- Added a function to set timeout information of the Emulex Storport Miniport driver - Added a function to monitor I/O response time - Added a function to monitor the recurrence of path reconnection errors - Added a function to scan devices - Added the following event logs ID=203, 204, 306, 308, 310, 311, 1014, 2000, 2002, 2004, 2012, 2022, 2032,2100 - Changed some parts of character strings that are displayed in the description column of the following event logs: ID=201, 202, 301, 304, 305, 401, 402, 403, 1010, 1020, 1030, 1040, 1050,1051, 1100, 1200
V2.0L18 (June / 2011)	- Added support for the ETERNUS DX80 S2, DX90 S2, and DX400 S2 series. - Added the function the warning status remains for six minutes.
V2.0L19 (Nov / 2012)	- Added support for Windows Server 2012
V2.0L20 (Jul / 2013)	- Added support for the TPG Referrals function. For details, refer to "ETERNUS Web GUI User's Guide ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/DX8700 S2" (tenth edition or later) - Added a function to set timeout information to the Emulex Storport Miniport driver that has the file name elxfc.sys - Added the following event logs: ID=312 and 313
V2.0L21 (Jul / 2014)	- Added support for the Storage Cluster function.

Version No.	Detail
V2.0L22 (Jul / 2015)	- Added support for the ETERNUS DX8700 S3/DX8900 S3.
V2.0L23 (Dec / 2016)	- Added support for Windows Server 2016
V2.0L24 (Jan / 2019)	- Added support for Windows Server 2019
V2.0L25 (Jan / 2022)	- Added support for Windows Server 2022

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