



Hitachi Compute Blade Emulex Adapter User's Guide for Driver

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[Getting Help](#)

[Contents](#)

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Contents

Preface	v
Document Conventions	vi
Getting Help	viii
Comments	viii
Overview of This Manual	1-1
1.1 Hitachi Compute Blade Emulex Adapter User's Guide	1-2
Flow Chart of Setting up	2-1
2.1 The Flow Chart of Setting up for Onboard CNA / CNA expansion card / LAN expansion card	2-2
2.2 The Flow Chart of Setting up for 8Gb/16Gb FC expansion card	2-3
Installation of Drivers	3-1
3.1 Driver Installation (Onboard CNA / CNA expansion card / LAN expansion card)	3-2
3.1.1 The available combinations of CNA drivers and the CNA firmware	3-2
3.1.2 Windows Server 2008 / Windows Server 2008 R2 Environment	3-13
(1) NIC Driver	3-13
(2) iSCSI Driver	3-15
(3) FCoE Driver	3-17
3.1.3 Windows Server 2012 / Windows Server 2012 R2 Environment	3-20
(1) NIC Driver	3-20
(2) iSCSI Driver	3-22
(3) FCoE Driver	3-24
3.1.4 Red Hat Enterprise Linux 5.7 / 5.9 / 6.2 Environment	3-27
(1) NIC Driver	3-27
(2) iSCSI Driver	3-29
(3) FCoE Driver	3-31
3.1.5 Red Hat Enterprise Linux 6.4 / 6.5 / 6.6 Environment	3-33
(1) NIC Driver	3-33

(2) iSCSI Driver	3-35
(3) FCoE Driver	3-43
3.2 Driver Installation (Fibre channel expansion card)	3-46
3.2.1 The available combinations of the FC driver and the FC firmware	3-46
3.2.2 Windows Server 2008 / Windows Server 2008 R2 Environment	3-48
(1) Fibre Channel Driver	3-48
3.2.3 Windows Server 2012 / Windows Server 2012 R2 Environment	3-50
(1) Fibre Channel Driver	3-50
3.2.4 Red Hat Enterprise Linux 5.7/ 5.9 / 6.2 Environment	3-52
(1) Fibre Channel Driver	3-52
3.2.5 Red Hat Enterprise Linux 6.4 / 6.5 / 6.6 Environment	3-53
(1) Fibre Channel Driver	3-53
Driver Configuration.....	4-1
4.1 NIC Driver Options	4-2
4.2 iSCSI Driver Configuration Parameters	4-13
4.3 FCoE/FC Driver Configuration Parameters.....	4-15
Notes and Restrictions	5-1
5.1 Notes and Restrictions.....	5-2



Preface

Thank you very much for purchasing the Hitachi Compute blade. This manual describes operation methods, restrictions, and other information of the drivers for the Emulex 10Gb Converged Network products and the Fibre Channel products.

This preface includes the following information:

- [Document Conventions](#)
- [Getting Help](#)
- [Comments](#)

Document Conventions






The term “Compute Blade” refers to all the models of the Compute Blade, unless otherwise noted.

The Hitachi Virtualization Manager (HVM) name has been changed to Hitachi logical partitioning manager (LPAR manager, or LP). If you are using HVM based logical partitioning feature, substitute references to Hitachi logical partitioning manager (LPAR manager, or LP) with HVM.

This document uses the following typographic conventions:

Convention	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, fields, and labels. Example: Click OK .
<i>Italic</i>	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: <i>copy source-file target-file</i> Note: Angled brackets (< >) are also used to indicate variables.
screen/code	Indicates text that is displayed on screen or entered by the user. Example: # pairdisplay -g oradb
< > angled brackets	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: # pairdisplay -g <group> Note: Italic font is also used to indicate variables.
[] square brackets	Indicates optional values. Example: [a b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a b } indicates that you must choose either a or b.
vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a b] indicates that you can choose a, b, or nothing. { a b } indicates that you must choose either a or b.
<u>underline</u>	Indicates the default value. Example: [<u>a</u> b]

This document uses the following icons to draw attention to information:

Icon	Meaning	Description
	WARNING	This indicates the presence of a potential risk that might cause death or severe injury.
	CAUTION	This indicates the presence of a potential risk that might cause relatively mild or moderate injury.
	NOTICE	This indicates the presence of a potential risk that might cause severe damage to the equipment and/or damage to surrounding properties.
	Note	This indicates notes not directly related to injury or severe damage to equipment.
	Tip	This indicates advice on how to make the best use of the equipment.

Abbreviated Notations of Operating Systems (OS)

In this manual, OS names are expressed as follows:

- Microsoft(R) Windows Server(R) 2012 R2 Standard
(Windows Server 2012 R2 hereafter)
- Microsoft(R) Windows Server(R) 2012 R2 Datacenter
(Windows Server 2012 R2 hereafter)
- Microsoft(R) Windows Server(R) 2012 Standard
(Windows Server 2012 hereafter)
- Microsoft(R) Windows Server(R) 2012 Datacenter
(Windows Server 2012 hereafter)
- Microsoft(R) Windows Server(R) 2008 Standard 32-bit
(Windows Server 2008 (32bit) hereafter)
- Microsoft(R) Windows Server(R) 2008 Enterprise 32-bit
(Windows Server 2008 (32bit) hereafter)
- Microsoft(R) Windows Server(R) 2008 Standard
(Windows Server 2008 hereafter)
- Microsoft(R) Windows Server(R) 2008 Enterprise
(Windows Server 2008 hereafter)
- Microsoft(R) Windows Server(R) 2008 Standard without Hyper-VTM 32-bit
(Windows Server 2008 (32bit) hereafter)
- Microsoft(R) Windows Server(R) 2008 Enterprise without Hyper-VTM 32-bit
(Windows Server 2008 (32bit) hereafter)
- Microsoft(R) Windows Server(R) 2008 Standard without Hyper-VTM
(Windows Server 2008 hereafter)
- Microsoft(R) Windows Server(R) 2008 Enterprise without Hyper-VTM
(Windows Server 2008 hereafter)
- Microsoft(R) Windows Server(R) 2008 R2 Standard
(Windows Server 2008 R2 hereafter)
- Microsoft(R) Windows Server(R) 2008 R2 Enterprise
(Windows Server 2008 R2 hereafter)
- Microsoft(R) Windows Server(R) 2008 R2 Datacenter
(Windows Server 2008 R2 hereafter)
- Red Hat(R) Enterprise Linux(R) Server 6.6
(RHEL6.6 hereafter)
- Red Hat(R) Enterprise Linux(R) Server 6.5
(RHEL6.5 hereafter)
- Red Hat(R) Enterprise Linux(R) Server 6.4
(RHEL6.4 hereafter)
- Red Hat(R) Enterprise Linux(R) Server 6.2
(RHEL6.2 hereafter)
- Red Hat(R) Enterprise Linux(R) Server 5.9
(RHEL5.9 hereafter)
- Red Hat(R) Enterprise Linux(R) Server 5.7
(RHEL5.7 hereafter)

Abbreviations for 10Gb Converged Network Expansion Cards

Abbreviations for the following card model names are written in this manual.

- Abbreviation "onboard CNA" :
CB500 series server blade onboard CNA
CB2500 series server blade onboard CNA
- Abbreviation "CNA expansion card" :
CB500 4-port converged network expansion card
CB2000 2/4-port converged network expansion card
CB2000 CNA board (PCI express adapter type)
CB2500 CNA board (PCI express adapter type)
- Abbreviation "LAN expansion card" :
CB500 10Gb 4-port LAN expansion card
CB2000 10Gb 2/4-port LAN expansion card

Abbreviation for Fiber Channel (FC) Card

Abbreviation for the following FC card model name is written in this manual.

- Abbreviation "8Gb FC expansion card"
CB500 8Gb 2-port Fibre Channel expansion card
CB2000 8Gb 2-port Fibre Channel expansion card
CB2000 8Gb 2-port Fibre Channel board (PCI express adapter type)
CB2500 8Gb 2-port Fibre Channel board (PCI express adapter type)
- Abbreviation "8Gb FC board"
CB2000 8Gb 2-port Fibre Channel board (PCI express adapter type)
CB2500 8Gb 2-port Fibre Channel board (PCI express adapter type)
- Abbreviation "16Gb FC expansion card"
CB500 16Gb 2-port Fiber Channel expansion card
CB2000 16Gb 2-port Fibre Channel board (PCI express adapter type)
CB2500 16Gb 2-port Fibre Channel board (PCI express adapter type)
- Abbreviation "16Gb FC board"
CB2000 16Gb 2-port Fibre Channel board (PCI express adapter type)
CB2500 16Gb 2-port Fibre Channel board (PCI express adapter type)
- Abbreviation "FC expansion card"
8Gb FC expansion card
16Gb FC expansion card

Getting Help

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Comments

Please send us your comments on this document: doc.comments@hds.com. Include the document title and number including the revision level (for example, -07), and refer to specific sections and paragraphs whenever possible. All comments become the property of Hitachi Data Systems Corporation. **Thank you!**

Overview of This Manual

This manual describes the drivers of the Emulex products.

- [1.1 Hitachi Compute Blade Emulex Adapter User's Guide](#)

1.1 Hitachi Compute Blade Emulex Adapter User's Guide

Hitachi Compute Blade Emulex Adapter User's Guide is the manual for the following products.

#	System Model	Products	Product Code	Remarks	
1	CB500 series	540A B1 Onboard CNA	GGAGDOB1-TNNX14Y		
2		520H B1 Onboard CNA	GGAGCOB1-TNNX14Y		
3		520H B2 Onboard CNA	GG-RV3XGC0B2X1-Y		
4		520H B3 Onboard CNA	GG-RV3XGC0B3X1-Y		
5		520X B1 Onboard CNA	GG-RV3XGE0B1X1-Y		
6		CNA expansion card		GG-CN3MXG2X1-Y	
7				GGX-CN3MXG2X1[EX]	
8				GGX-CN3MXG2X3[EX]	for CB500 x2 model
9		LAN expansion card		GG-CN3MXG2X2-Y	
10				GGX-CN3MXG2X2[EX]	
11				GGX-CN3MXG2X4[EX]	for CB500 x2 model
12		8Gb FC expansion card		GG-CC3M8G1X1-Y	
13				GGX-CC3M8G1X1[EX]	
14		16Gb FC expansion card		GG-CC3M161X1-Y	
15				GGX-CC3M161X1[EX]	
16	CB2000 series		CNA board (for chassis)	GV-CN2NXG3X1-Y	
17				GV-CN2NXG3XR-Y	for RoHS
18				GVX-CN2NXG3X1[BX]	
19			GVX-CN2NXG3X2[BX]	for CB2000 x4 model	
20		CNA board (for I/O slot expansion unit)		GV-CN2DXG3X1-Y	
21				GVX-CN2DXG3X1[EX]	
22				GVX-CN2DXG3X2[EX]	for CB2000 x4 model
23		LAN expansion card (2-port)		GV-CN2MXG1X1-Y	
24				GVX-CN2MXG1X1[EX]	
25				GVX-CN2MXG1X2[EX]	for CB2000 x4 model
26		LAN expansion card (4-port)		GV-CN2MXG2X1-Y	
27				GVX-CN2MXG2X1[EX]	
28				GVX-CN2MXG2X2[EX]	for CB2000 x4 model
29		CNA expansion card (2-port)		GV-CN2MXG3X1-Y	
30				GVX-CN2MXG3X1[EX]	
31				GVX-CN2MXG3X2[EX]	for CB2000 x4 model
32		CNA expansion card (4-port)		GV-CN2MXG4X1-Y	
33				GVX-CN2MXG4X1[EX]	
34				GVX-CN2MXG4X2[EX]	for CB2000 x4 model
35		8Gb FC board (for chassis)		GV-CC2N8G3X1-Y	
36				GV-CC2N8G3XR-Y	for RoHS
37				GVX-CC2N8G3X1[BX]	
38		8Gb FC board (for I/O slot expansion unit)		GV-CC2D8G3X1-Y	
39				GVX-CC2D8G3X1[EX]	
40		8Gb FC expansion card		GV-CC2M8G3X1-Y	
41				GV-CC2M8G3XR-Y	for RoHS
42				GVX-CC2M8G3X1[EX]	
43		16Gb FC board (for chassis)		GV-CC2N163X1-Y	
44				GVX-CC2N163X1[BX]	
45				GV-CC2D163X1-Y	
46	16Gb FC board (for I/O slot expansion unit)		GVX-CC2D163X1[EX]		
47	CB2500 series	520X B1 Onboard CNA	GG-RV3XGE0B1X1-Y		
48		520H B3 Onboard CNA	GG-RV3XGC0B3X1-Y		
49		CNA board	GG-CN4NXG3X1-Y		
50		8Gb FC board	GG-CC4N8G3X1-Y		
51		16Gb FC board	GG-CC4N163X1-Y		

Hitachi Compute Blade Emulex Adapter User's Guide has three parts : for Driver, for Hardware and for Utility.

See the document "Hitachi Compute Blade LAN Advanced Function Manual for Emulex (MK-99COM082)" for how to setup the NIC teaming and how to setup the VLAN.

#	Document Name	Contents
1	Hitachi Compute Blade Emulex Adapter User's Guide for Driver (MK-99COM103)	This document. How to install the drivers of the adapters How to setup the drivers
2	Hitachi Compute Blade Emulex Adapter User's Guide for Hardware (MK-99COM104)	Outline of Emulex adapters BIOS parameter list and the way to configure the parameters
3	Hitachi Compute Blade Emulex Adapter User's Guide for Utility (MK-99COM105)	How to install and to operate the utility that manages the Emulex adapters How to configure the parameters with the utility
4	Hitachi Compute Blade LAN Advanced Function Manual for Emulex (MK-99COM082)	How to setup the NIC teaming How to setup the VLAN

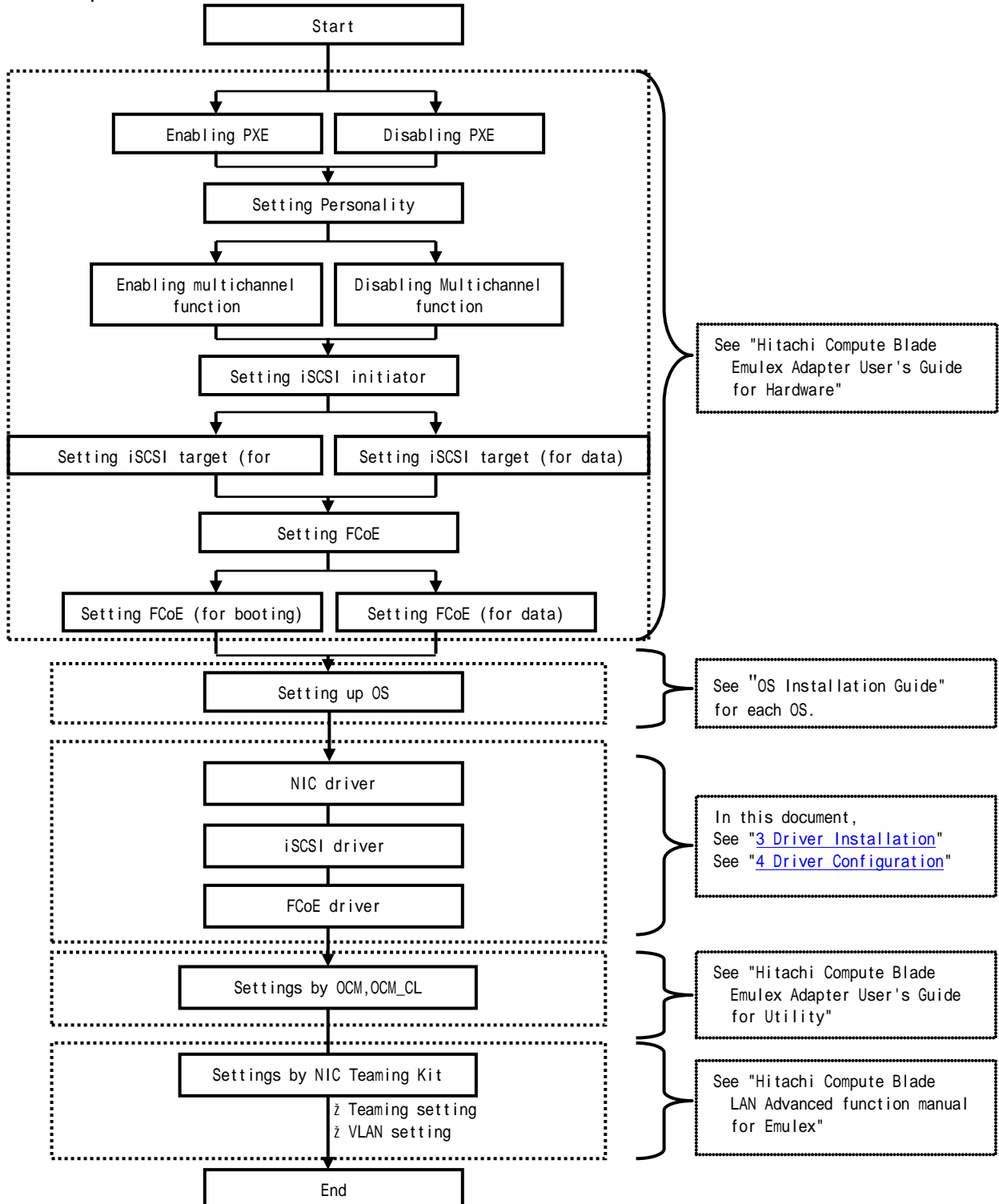
Flow Chart of Setting up

This chapter describes the flow chart of setting up for Emulex adapters.

- [2.1 The flow chart of setting up for onboard CNA / CNA expansion card / LAN expansion card](#)
- [2.2 The flow chart of setting up for Fibre Channel expansion card](#)

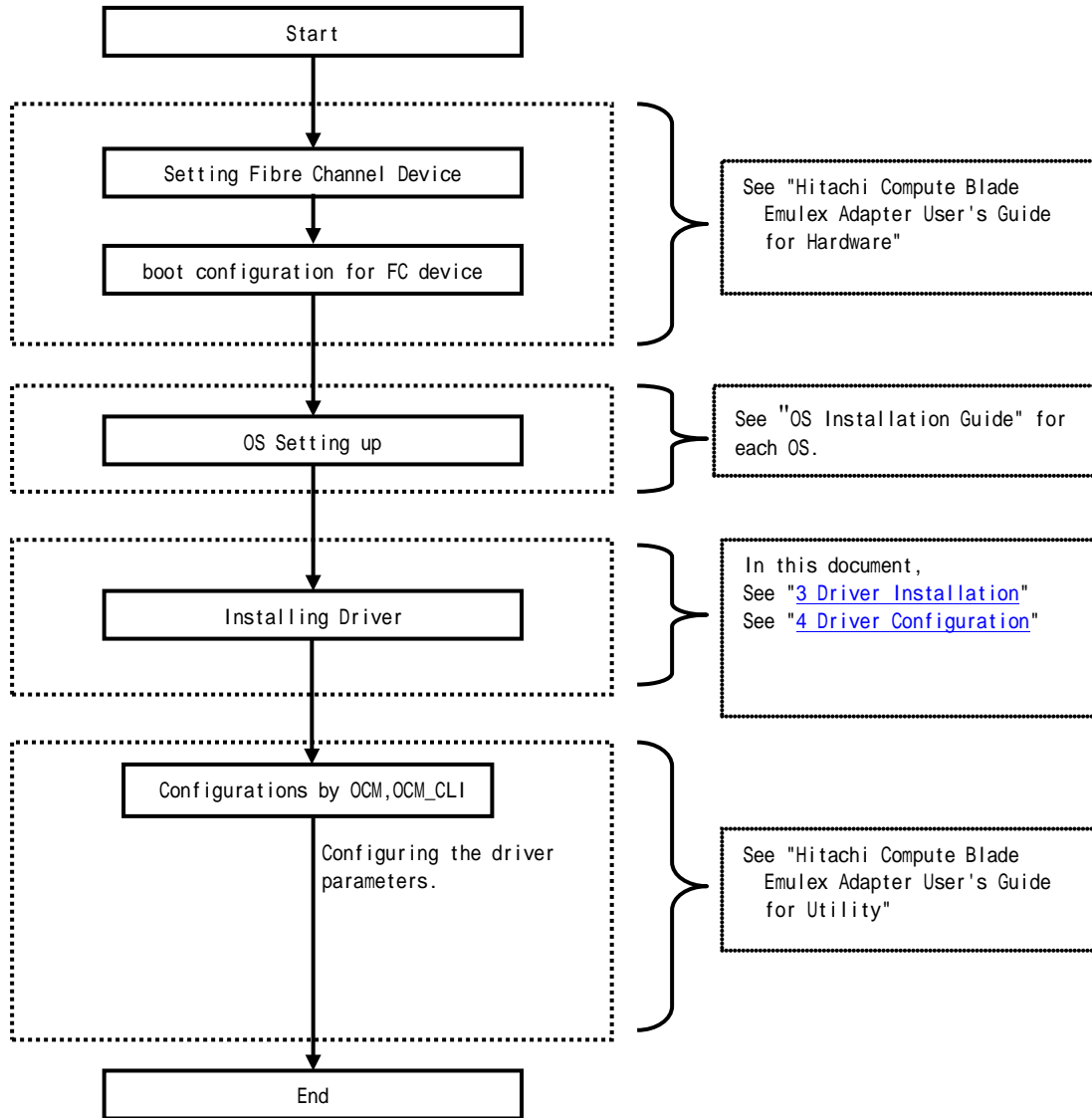
2.1 The Flow Chart of Setting up for Onboard CNA / CNA expansion card / LAN expansion card

The flow chart of setting up for onboard CNA / CNA expansion card / LAN expansion card is as follows.



2.2 The Flow Chart of Setting up for 8Gb/16Gb FC expansion card

The setting flow of 8Gb/16Gb FC expansion card is as follows



Installation of Drivers

This chapter describes how to install drivers of the Emulex adapters.

- [3.1 Driver Installation \(Onboard CNA / CNA expansion card / LAN expansion card\)](#)
- [3.2 Driver Installation \(Fibre channel expansion card\)](#)

3.1 Driver Installation (Onboard CNA / CNA expansion card / LAN expansion card)

3.1.1 The available combinations of CNA drivers and the CNA firmware

The available combinations of CNA firmware, CNA drivers and OCM(OneCommand Manager) are listed as follows.

Table 3-1:

- Windows Server 2008(32bit) :

System Model/Device	CNA Firmware Ver.	NIC Driver Ver.	iSCSI Driver Ver.	FCoE Driver Ver.	OCM Ver.
CB500 series					
CB500 CB520A A1 CNA/LAN expansion card	4.1.334.28 / 4.1.334.2801	4.1.334.25(*1)	4.1.334.0	5.2.70.018	6.1.34.1-1
	4.2.433.604	4.1.334.25(*1) 4.2.390.6(*1)	4.1.334.0	5.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB500 CB540A x1 CNA/LAN expansion card, Onboard CNA	4.1.334.28 / 4.1.334.2801	4.1.334.25(*1)	4.1.334.0	5.2.70.018	6.1.34.1-1
	4.2.433.604	4.1.334.25(*1) 4.2.390.6(*1)	4.1.334.0	5.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB500 CB520H x1 CNA/LAN expansion card, Onboard CNA	4.1.334.28 / 4.1.334.2801	4.1.334.25(*1)	4.1.334.0	5.2.70.018	6.1.34.1-1
	4.2.433.604	4.1.334.25(*1) 4.2.390.6(*1)	4.1.334.0	5.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB500 CB520H x2 CNA/LAN expansion card , Onboard CNA	4.2.433.604	4.2.390.6(*1)	4.1.334.0	5.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB500 CB520X B1	Not supported	Not supported	Not supported	Not supported	Not supported
CB500 CB520H B3	Not supported	Not supported	Not supported	Not supported	Not supported
CB2500 series					
CB2500 520X B1	Not supported	Not supported	Not supported	Not supported	Not supported
CB2500 520H B3	Not supported	Not supported	Not supported	Not supported	Not supported
CB2000 series					
CB2000 X57A2 CNA board	4.2.433.604	4.2.390.6(*1)	4.1.334.0	5.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB2000 X55x3 CNA board	4.2.433.604	4.2.390.6(*1)	4.1.334.0	5.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB2000 X55R4 CNA board	4.2.433.604	4.2.390.6(*1)	4.1.334.0	5.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1

(*1) : This version can be applied to the guest OS in LPAR manager environment.(SR-IOV is not supported. All LPAR manager models are supported.)

- Windows Server 2008 /Windows Server 2008 R2 :

System Model/Device	CNA Firmware Ver.	NIC Driver Ver.	iSCSI Driver Ver.	FCoE Driver Ver.	OCM Ver.
CB500 series					
CB500 CB520A A1 CNA/LAN expansion card	4.1.334.28 / 4.1.334.2801	4.1.334.25(*1)	4.1.334.0	7.2.70.018	6.1.34.1-1
	4.2.433.604	4.1.334.25(*1) 4.2.390.6(*1)	4.1.334.0	7.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB500 CB540A x1 CNA/LAN expansion card , Onboard CNA	4.1.334.28 / 4.1.334.2801	4.1.334.25(*1)	4.1.334.0	7.2.70.018	6.1.34.1-1
	4.2.433.604	4.1.334.25(*1) 4.2.390.6(*1)	4.1.334.0	7.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB500 CB520H x1 CNA/LAN expansion card , Onboard CNA	4.1.334.28 / 4.1.334.2801	4.1.334.25(*1)	4.1.334.0	7.2.70.018	6.1.34.1-1
	4.2.433.604	4.1.334.25(*1) 4.2.390.6(*1)	4.1.334.0	7.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB500 CB520H x2 CNA/LAN expansion card , Onboard CNA	4.2.433.604	4.2.390.6(*1)	4.1.334.0	7.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB500 520X B1 CNA/LAN expansion card(*5)	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
	10.2.340.10	10.2.298.37 (*1)(*2)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB500 520X B1 Onboard CNA (*5)	10.2.370.16	10.2.298.37 (*2)(*4)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB500 520H B3 CNA/LAN expansion card	Not Supported	Not Supported	Not Supported	Not Supported	Not Supported
CB500 520H B3 Onboard CNA	Not Supported	Not Supported	Not Supported	Not Supported	Not Supported
CB2500 series					
CB2500 520X B1 CNA board(*5)	10.2.340.10	10.2.298.37 (*1)(*2)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB2500 520X B1 Onboard CNA(*5)	10.2.370.16	10.2.298.37 (*2)(*4)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB2500 520H B3 CNA board	Not Supported	Not Supported	Not Supported	Not Supported	Not Supported
CB2500 520H B3 Onboard CNA	Not Supported	Not Supported	Not Supported	Not Supported	Not Supported
CB2000 series					
CB2000 X57A2 CNA board	4.2.433.604	4.2.390.6(*1)	4.1.334.0	7.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB2000 X55x3 CNA board	4.2.433.604	4.2.390.6(*1)	4.1.334.0	7.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB2000 X55R4 CNA board	4.2.433.604	4.2.390.6(*1)	4.1.334.0	7.2.70.018	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1

(*1) : This version can be applied to the guest OS in LPAR manager environment.(SR-IOV is not supported. All LPAR manager models are supported.)

(*2) : Before installing the NIC driver, the following hotfix is required to apply. Otherwise, the installation will fail.
<http://support.microsoft.com/kb/2846340/>

(*3) : When using for iSCSI boot, producing a page file to an internal HDD is required for memory dump. See the appendix in "Emulex Adapter User's Guide for Hardware (MK-99COM104-07 or higher)"

(*4) : This version can be applied to the guest OS in LPAR manager environment. (SR-IOV is not supported. Only LPAR manager Essential model is supported.)

(*5) : Windows Server 2008 is not supported.(Windows Server 2008 R2 is supported.)

- Windows Server 2012 :

System Model/Device	CNA Firmware Ver.	NIC Driver Ver.	iSCSI Driver Ver.	FCoE Driver Ver.	OCM Ver.
CB500 series					
CB500 CB520A A1 CNA/LAN expansion card	4.1.334.28 / 4.1.334.2801	4.2.313.0	4.2.281.0	2.72.012.001	6.1.34.1-1
	4.2.433.604	4.2.313.0 4.2.390.6(*1)	4.2.281.0	2.72.012.001	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1) 10.0.835.0(*2) 10.2.478.1(*2)(*6)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB500 CB540A x1 CNA/LAN expansion card , Onboard CNA	4.1.334.28 / 4.1.334.2801	4.2.313.0	4.2.281.0	2.72.012.001	6.1.34.1-1
	4.2.433.604	4.2.313.0 4.2.390.6(*1)	4.2.281.0	2.72.012.001	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1) 10.0.835.0(*2) 10.2.478.1(*2)(*6)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB500 CB520H x1 CNA/LAN expansion card , Onboard CNA	4.1.334.28 / 4.1.334.2801	4.2.313.0	4.2.281.0	2.72.012.001	6.1.34.1-1
	4.2.433.604	4.2.313.0 4.2.390.6(*1)	4.2.281.0	2.72.012.001	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1) 10.0.835.0(*2) 10.2.478.1(*2)(*6)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB500 CB520H x2 CNA/LAN expansion card , Onboard CNA	4.2.433.604	4.2.390.6(*1)	4.2.281.0	2.72.012.001	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1) 10.0.835.0(*2) 10.2.478.1(*2)(*6)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB500 520X B1 CNA/LAN expansion card	4.6.348.0	4.6.142.8(*1) 10.0.835.0(*2)	4.6.130.0	2.74.14.1	6.3.16.1-1
	10.2.340.10	10.2.298.37(*1)(*2) 10.2.478.1(*2)(*6)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB500 520X B1 Onboard CNA	10.2.370.16	10.2.298.37(*2)(*4) 10.2.478.1(*2)(*6)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB500 520H B3 CNA/LAN expansion card	10.2.340.10	10.2.298.37(*1)(*2) 10.2.478.1(*2)(*6)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB500 520H B3 Onboard CNA	10.2.370.16	10.2.298.37(*2)(*4) 10.2.478.1(*2)(*6)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB2500 series					
CB2500 520X B1 CNA board	10.2.340.10	10.2.298.37(*1)(*2)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB2500 520X B1 Onboard CNA	10.2.370.16	10.2.298.37(*2)(*4)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB2500 520H B3 CNA board	10.2.340.10	10.2.298.37(*1)(*2)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB2500 520H B3 Onboard CNA	10.2.370.16	10.2.298.37(*2)(*4)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB2000 series					
CB2000 X57A2 CNA board	4.2.433.604	4.2.390.6(*1)	4.2.281.0	2.72.012.001	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB2000 X55x3 CNA board	4.2.433.604	4.2.390.6(*1)	4.2.281.0	2.72.012.001	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1
CB2000 X55R4 CNA board	4.2.433.604	4.2.390.6(*1)	4.2.281.0	2.72.012.001	6.1.34.1-1
	4.6.348.0	4.6.142.8(*1)	4.6.130.0	2.74.14.1	6.3.16.1-1

(*1) : This version can be applied to the guest OS in LPAR manager environment. (SR-IOV is not supported. All LPAR manager models are supported.)

(*2) : Before installing the NIC driver, the following hotfix is required to apply. Otherwise, the installation will fail.
<http://support.microsoft.com/kb/2846340/>

- (*3) : When using for iSCSI boot, producing a page file to an internal HDD is required for memory dump. See the appendix in "Emulex Adapter User's Guide for Hardware (MK-99COM104-07 or higher)"
- (*4) : This version can be applied to the guest OS in LPAR manager environment. (SR-IOV is not supported. Only LPAR manager Essential model is supported.)
- (*6) : This version supports VMQ (Virtual Machine Queue) feature in Hyper-V environment. (Does not support in LPAR manager environment.)

- Windows Server 2012 R2:

System Model/Device	CNA Firmware Ver.	NIC Driver Ver.	iSCSI Driver Ver.	FCoE Driver Ver.	OCM Ver.
CB500 series					
CB500 CB520A A1 CNA/LAN expansion card	4.6.348.0	10.0.430.1003(*1) 10.0.835.0 10.2.478.1(*6)	4.9.160.0	2.76.002.001	6.3.16.1-1
CB500 CB540A x1 CNA/LAN expansion card , Onboard CNA	4.6.348.0	10.0.430.1003(*1) 10.0.835.0 10.2.478.1(*6)	4.9.160.0	2.76.002.001	6.3.16.1-1
CB500 CB520H x1 CNA/LAN expansion card , Onboard CNA	4.6.348.0	10.0.430.1003(*1) 10.0.835.0 10.2.478.1(*6)	4.9.160.0	2.76.002.001	6.3.16.1-1
CB500 CB520H x2 CNA/LAN expansion card , Onboard CNA	4.6.348.0	10.0.430.1003(*1) 10.0.835.0 10.2.478.1(*6)	4.9.160.0	2.76.002.001	6.3.16.1-1
CB500 520X B1 CNA/LAN expansion card	4.6.348.0	10.0.430.1003(*1) 10.0.835.0	4.9.160.0	2.76.002.001	6.3.16.1-1
	10.2.340.10	10.2.298.37(*1) 10.2.478.1(*6)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB500 520X B1 Onboard CNA	10.2.370.16(*7)	10.2.298.37(*4) 10.2.478.1(*6)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB500 520H B3 CNA/LAN expansion card	10.2.340.10	10.2.298.37(*1) 10.2.478.1(*6)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB500 520H B3 Onboard CNA	10.2.370.16(*7)	10.2.298.37(*4) 10.2.478.1(*6)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB2500 series					
CB2500 520X B1 CNA board	10.2.340.10	10.2.298.37(*1)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB2500 520X B1 Onboard CNA	10.2.370.16(*7)	10.2.298.37(*4)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB2500 520H B3 CNA board	10.2.340.10	10.2.298.37(*1)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB2500 520H B3 Onboard CNA	10.2.370.16(*7)	10.2.298.37(*4)	10.2.254.0(*3)	10.2.261.4	10.2.340.5-1
CB2000 series					
CB2000 X57A2 CNA board	4.6.348.0	10.0.430.1003(*1)	4.9.160.0	2.76.002.001	6.3.16.1-1
CB2000 X55x3 CNA board	4.6.348.0	10.0.430.1003(*1)	4.9.160.0	2.76.002.001	6.3.16.1-1
CB2000 X55R4 CNA board	4.6.348.0	10.0.430.1003(*1)	4.9.160.0	2.76.002.001	6.3.16.1-1

(*1) : This version can be applied to the guest OS in LPAR manager environment. (SR-IOV is not supported. All LPAR manager models are supported.)

(*3) : When using for iSCSI boot, producing a page file to an internal HDD is required for memory dump. See the appendix in "Emulex Adapter User's Guide for Hardware (MK-99COM104-07 or higher)"

(*4) : This version can be applied to the guest OS in LPAR manager environment. (SR-IOV is not supported. Only LPAR manager Essential model is supported.)

(*6) : This version supports VMQ (Virtual Machine Queue) feature in Hyper-V environment. (Does not support in LPAR manager environment.)

(*7) : This version supports RoCE(RDMA over Converged Ethernet). See "Hitachi Compute Blade Emulex Adapter User's Guide for Hardware " 4.2.2 Personality configuration (UEFI) .

- RHEL5.7 / 5.9 :

System Model/Device	CNA Firmware Ver.	NIC Driver Ver.	iSCSI Driver Ver.	FCoE Driver Ver.	OCM Ver.
CB500 series					
CB500 CB520A A1 CNA/LAN expansion card	4.1.334.28 / 4.1.334.2801	4.1.334.18(*1)	4.1.334.15/ 4.2.374.0	8.2.0.126	6.1.34.2
	4.2.433.604	4.1.334.18(*1) 4.2.456.0(*1)	4.1.334.15/ 4.2.374.0	8.2.0.126	6.1.34.2
	4.6.348.0	4.6.352.0(*8)	4.6.188.0	8.2.2.18	6.3.16.2
CB500 CB540A x1 CNA/LAN expansion card , Onboard CNA	4.1.334.28 / 4.1.334.2801	4.1.334.18(*1)	4.1.334.15/ 4.2.374.0	8.2.0.126	6.1.34.2
	4.2.433.604	4.1.334.18(*1) 4.2.456.0(*1)	4.1.334.15/ 4.2.374.0	8.2.0.126	6.1.34.2
	4.6.348.0	4.6.352.0(*8)	4.6.188.0	8.2.2.18	6.3.16.2
CB500 CB520H x1 CNA/LAN expansion card , Onboard CNA	4.1.334.28 / 4.1.334.2801	4.1.334.18(*1)	4.1.334.15/ 4.2.374.0	8.2.0.126	6.1.34.2
	4.2.433.604	4.1.334.18(*1) 4.2.456.0(*1)	4.1.334.15/ 4.2.374.0	8.2.0.126	6.1.34.2
	4.6.348.0	4.6.352.0(*8)	4.6.188.0	8.2.2.18	6.3.16.2
CB500 CB520H x2	Not supported	Not supported	Not supported	Not supported	Not supported
CB500 CB520X B1	Not supported	Not supported	Not supported	Not supported	Not supported
CB500 CB520H B3	Not supported	Not supported	Not supported	Not supported	Not supported
CB2500 series					
CB2500 520X B1	Not supported	Not supported	Not supported	Not supported	Not supported
CB2500 520H B3	Not supported	Not supported	Not supported	Not supported	Not supported
CB2000 series					
CB2000 X57A2 CNA board	4.2.433.604	4.1.334.18(*1) 4.2.456.0(*1)	4.1.334.15/ 4.2.374.0	8.2.0.126	6.1.34.2
	4.6.348.0	4.6.352.0(*8)	4.6.188.0	8.2.2.18	6.3.16.2
CB2000 X55x3 CNA board	4.2.433.604	4.1.334.18(*1) 4.2.456.0(*1)	4.1.334.15/ 4.2.374.0	8.2.0.126	6.1.34.2
	4.6.348.0	4.6.352.0(*8)	4.6.188.0	8.2.2.18	6.3.16.2
CB2000X55R4 CNA board	Not supported	Not supported	Not supported	Not supported	Not supported

(*1) : This version can be applied to the guest OS in LPAR manager environment.(SR-IOV is not supported. All LPAR manager models are supported.)

(*8) : This version can be applied to the guest OS in LPAR manager environment.(SR-IOV is supported. All LPAR manager models are supported.)

- RHEL6.2 :

System Model/Device	CNA Firmware Ver.	NIC Driver Ver.	iSCSI Driver Ver.	FCoE Driver Ver.	OCM Ver.
CB500 series					
CB500 CB520A A1 CNA/LAN expansion card	4.1.334.28 / 4.1.334.2801	4.1.334.18(*1)	4.1.334.15/ 4.2.374.0	8.3.5.65	6.1.34.2
	4.2.433.604	4.1.334.18(*1) 4.2.456.0(*1)	4.1.334.15/ 4.2.374.0	8.3.5.65	6.1.34.2
	4.6.348.0	4.6.352.0(*8)	4.6.176.0	8.3.7.20	6.3.16.2
CB500 CB540A x1 CNA/LAN expansion card , Onboard CNA	4.1.334.28 / 4.1.334.2801	4.1.334.18(*1)	4.1.334.15/ 4.2.374.0	8.3.5.65	6.1.34.2
	4.2.433.604	4.1.334.18(*1) 4.2.456.0(*1)	4.1.334.15/ 4.2.374.0	8.3.5.65	6.1.34.2
	4.6.348.0	4.6.352.0(*8)	4.6.176.0	8.3.7.20	6.3.16.2
CB500 CB520H x1 CNA/LAN expansion card , Onboard CNA	4.1.334.28 / 4.1.334.2801	4.1.334.18(*1)	4.1.334.15/ 4.2.374.0	8.3.5.65	6.1.34.2
	4.2.433.604	4.1.334.18(*1) 4.2.456.0(*1)	4.1.334.15/ 4.2.374.0	8.3.5.65	6.1.34.2
	4.6.348.0	4.6.352.0(*8)	4.6.176.0	8.3.7.20	6.3.16.2
CB500 CB520H x2	Not supported	Not supported	Not supported	Not supported	Not supported
CB500 CB520X B1	Not supported	Not supported	Not supported	Not supported	Not supported
CB500 CB520H B3	Not supported	Not supported	Not supported	Not supported	Not supported
CB2500 series					
CB2500 520X B1	Not supported	Not supported	Not supported	Not supported	Not supported
CB2500 520H B3	Not supported	Not supported	Not supported	Not supported	Not supported
CB2000 series					
CB2000 X57A2 CNA board	4.2.433.604	4.2.456.0(*1)	4.2.374.0	8.3.5.65	6.1.34.2
	4.6.348.0	4.6.352.0(*8)	4.6.176.0	8.3.7.20	6.3.16.2
CB2000 X55x3 CNA board	4.2.433.604	4.2.456.0(*1)	4.2.374.0	8.3.5.65	6.1.34.2
	4.6.348.0	4.6.352.0(*8)	4.6.176.0	8.3.7.20	6.3.16.2
CB2000X55R4 CNA board	Not supported	Not supported	Not supported	Not supported	Not supported

(*1) : This version can be applied to the guest OS in LPAR manager environment. (SR-IOV is not supported. All LPAR manager models are supported.)

(*8) : This version can be applied to the guest OS in LPAR manager environment. (SR-IOV is supported. All LPAR manager models are supported.)

- RHEL6.4 :

System Model/Device	CNA Firmware Ver.	NIC Driver Ver.	iSCSI Driver Ver.	FCoE Driver Ver.	OCM Ver.
CB500 series					
CB500 CB520A A1 CNA/LAN expansion card	4.1.334.28 / 4.1.334.2801	4.1.334.18(*1)	4.1.334.15/ 4.2.374.0	8.3.5.65	6.1.34.2
	4.2.433.604	4.2.456.0(*1)	4.2.374.0	8.3.5.65	6.1.34.2
	4.6.348.0	4.6.352.0(*8)	4.6.176.0	8.3.7.20 10.0.803.24	6.3.16.2 6.3.22.1
CB500 CB540A x1 CNA/LAN expansion card, Onboard CNA	4.1.334.28 / 4.1.334.2801	4.1.334.18(*1)	4.1.334.15/ 4.2.374.0	8.3.5.65	6.1.34.2
	4.2.433.604	4.2.456.0(*1)	4.2.374.0	8.3.5.65	6.1.34.2
	4.6.348.0	4.6.352.0(*8)	4.6.176.0	8.3.7.20 10.0.803.24	6.3.16.2 6.3.22.1
CB500 CB520H x1 CNA/LAN expansion card, Onboard CNA	4.1.334.28 / 4.1.334.2801	4.1.334.18(*1)	4.1.334.15/ 4.2.374.0	8.3.5.65	6.1.34.2
	4.2.433.604	4.2.456.0(*1)	4.2.374.0	8.3.5.65	6.1.34.2
	4.6.348.0	4.6.352.0(*8)	4.6.176.0	8.3.7.20 10.0.803.24	6.3.16.2 6.3.22.1
CB500 CB520Hx2 CNA/LAN expansion card, Onboard CNA	4.2.433.604	4.2.456.0(*1)	4.2.374.0	8.3.5.65	6.1.34.2 6.3.16.2
	4.6.348.0	4.6.352.0(*8)	4.6.176.0	8.3.7.20 10.0.803.24	6.3.16.2 6.3.22.1
CB500 CB520X B1	Not supported	Not supported	Not supported	Not supported	Not supported
CB500 CB520H B3	Not supported	Not supported	Not supported	Not supported	Not supported
CB2500 series					
CB2500 520X B1	Not supported	Not supported	Not supported	Not supported	Not supported
CB2500 520H B3	Not supported	Not supported	Not supported	Not supported	Not supported
CB2000 series					
CB2000 X57A2 CNA board	4.2.433.604	4.2.456.0(*1)	4.2.374.0	8.3.5.65	6.1.34.2/ 6.3.16.2
	4.6.348.0	4.6.352.0(*8)	4.6.176.0	8.3.7.20 10.0.803.24	6.3.16.2 6.3.22.1
CB2000 X55x3 CNA board	4.2.433.604	4.2.456.0(*1)	4.2.374.0	8.3.5.65	6.1.34.2/ 6.3.16.2
	4.6.348.0	4.6.352.0(*8)	4.6.176.0	8.3.7.20 10.0.803.24	6.3.16.2 6.3.22.1
CB2000 X55R4 CNA board	4.2.433.604	4.2.456.0(*1)	4.2.374.0	8.3.5.65	6.1.34.2/ 6.3.16.2
	4.6.348.0	4.6.352.0(*8)	4.6.176.0	8.3.7.20 10.0.803.24	6.3.16.2 6.3.22.1

(*1) : This version can be applied to the guest OS in LPAR manager environment. (SR-IOV is not supported. All LPAR manager models are supported.)

(*8) : This version can be applied to the guest OS in LPAR manager environment. (SR-IOV is supported. All LPAR manager models are supported.)

- RHEL6.5 :

System Model/Device	CNA Firmware Ver.	NIC Driver Ver.	iSCSI Driver Ver.	FCoE Driver Ver.	OCM Ver.
CB500 series					
CB500 CB520A A1 CNA/LAN expansion card	4.6.348.0	4.6.352.0 (*8)	4.6.345.0	10.0.803.24	6.3.22.1
CB500 CB540A x1 CNA/LAN expansion card, Onboard CNA	4.6.348.0	4.6.352.0 (*8)	4.6.345.0	10.0.803.24	6.3.22.1
CB500 CB520H x1 CNA/LAN expansion card, Onboard CNA	4.6.348.0	4.6.352.0 (*8)	4.6.345.0	10.0.803.24	6.3.22.1
CB500 CB520Hx2 CNA/LAN expansion card, Onboard CNA	4.6.348.0	4.6.352.0 (*8)	4.6.345.0	10.0.803.24	6.3.22.1
CB500 520X B1 CNA/LAN expansion card (*10)	4.6.348.0	4.6.352.0 (*8)	4.6.345.0	10.0.803.24	6.3.22.1
CB500 520X B1 Onboard CNA (*10)	10.2.340.10	10.2.340.7 (*8)	10.2.340.7 (*9)	10.2.340.0	10.2.340.5-1
CB500 520X B1 Onboard CNA (*10)	10.2.370.16	10.2.340.7 (*11)	10.2.340.7	10.2.340.0	10.2.340.5-1
CB500 520H B3 CNA/LAN expansion card (*10)	10.2.340.10	10.2.340.7 (*8)	10.2.340.7	10.2.340.0	10.2.340.5-1
CB500 520H B3 Onboard CNA (*10)	10.2.370.16	10.2.340.7 (*11)	10.2.340.7	10.2.340.0	10.2.340.5-1
CB2500 series					
CB2500 520X B1 CNA board (*10)	10.2.340.10	10.2.340.7 (*8)	10.2.340.7	10.2.340.0	10.2.340.5-1
CB2500 520X B1 Onboard CNA (*10)	10.2.370.16	10.2.340.7 (*11)	10.2.340.7	10.2.340.0	10.2.340.5-1
CB2500 520H B3 CNA board (*10)	10.2.340.10	10.2.340.7 (*8)	10.2.340.7	10.2.340.0	10.2.340.5-1
CB2500 520H B3 Onboard CNA (*10)	10.2.370.16	10.2.340.7 (*11)	10.2.340.7	10.2.340.0	10.2.340.5-1
CB2000 series					
CB2000 X57A2 CNA board	4.6.348.0	4.6.352.0 (*8)	4.6.345.0	10.0.803.24	6.3.22.1
CB2000 X55x3 CNA board	4.6.348.0	4.6.352.0 (*8)	4.6.345.0	10.0.803.24	6.3.22.1
CB2000 X55R4 CNA board	4.6.348.0	4.6.352.0 (*8)	4.6.345.0	10.0.803.24	6.3.22.1

(*8) : This version can be applied to the guest OS in LPAR manager environment. (SR-IOV is supported. All LPAR manager models are supported.)

(*9) : The iSCSI driver version 10.2.340.7 cannot be updated from the driver version 4.6.345.0.

(*10) : RHEL6.5(32-bit x86) is not supported.

(*11) : This version can be applied to the guest OS in LPAR manager environment. (SR-IOV is supported. Only LPAR manager Essential model is supported.)

- RHEL6.6 :

System Model/Device	CNA Firmware Ver.	NIC Driver Ver.	iSCSI Driver Ver.	FCoE Driver Ver.	OCM Ver.
CB500 series					
CB500 CB520A A1 CNA/LAN expansion card	Not supported	Not supported	Not supported	Not supported	Not supported
CB500 CB540A x1 CNA/LAN expansion card, Onboard CNA	Not supported	Not supported	Not supported	Not supported	Not supported
CB500 CB520H x1 CNA/LAN expansion card, Onboard CNA	Not supported	Not supported	Not supported	Not supported	Not supported
CB500 CB520Hx2 CNA/LAN expansion card, Onboard CNA	4.6.348.0	10.2.469.0 (*12)	Not supported	10.2.469.0	10.2.470.0
CB500 520X B1 CNA/LAN expansion card (*10)	10.2.340.10	10.2.469.0 (*8)	10.2.469.0	10.2.469.0	10.2.470.0
CB500 520X B1 Onboard CNA (*10)	10.2.370.16	10.2.469.0 (*11)	10.2.469.0	10.2.469.0	10.2.470.0
CB500 520H B3 CNA/LAN expansion card (*10)	10.2.340.10	10.2.469.0 (*8)	10.2.469.0	10.2.469.0	10.2.470.0
CB500 520H B3 Onboard CNA (*10)	10.2.370.16	10.2.469.0 (*11)	10.2.469.0	10.2.469.0	10.2.470.0
CB2500 series					
CB2500 520X B1 CNA board (*10)	10.2.340.10	10.2.469.0 (*8)	10.2.469.0	10.2.469.0	10.2.470.0
CB2500 520X B1 Onboard CNA (*10)	10.2.370.16	10.2.469.0 (*11)	10.2.469.0	10.2.469.0	10.2.470.0
CB2500 520H B3 CNA board (*10)	10.2.340.10	10.2.469.0 (*8)	10.2.469.0	10.2.469.0	10.2.470.0
CB2500 520H B3 Onboard CNA (*10)	10.2.370.16	10.2.469.0 (*11)	10.2.469.0	10.2.469.0	10.2.470.0
CB2000 series					
CB2000 X57A2 CNA board	Not supported	Not supported	Not supported	Not supported	Not supported
CB2000 X55x3 CNA board	Not supported	Not supported	Not supported	Not supported	Not supported
CB2000 X55R4 CNA board	Not supported	Not supported	Not supported	Not supported	Not supported

(*8) : This driver can be applied to the guest OS in LPAR manager environment. (SR-IOV is supported. All LPAR manager models are supported.)

(*10) : RHEL6.6(32-bit x86) is not supported.

(*11) : This driver can be applied to the guest OS in LPAR manager environment. (SR-IOV is supported. Only LPAR manager Essential model is supported.)

(*12) : This driver is not supported in LPAR manager environment.



In VMware environment, when using multichannel mode, be sure to apply the NIC driver in the following URL.

VMware vSphere(R) ESXi 5.1

NIC driver : be2net 10.2.453.0

<https://my.vmware.com/web/vmware/details?downloadGroup=DT-ESXI51-EMULEX-BE2NET-1024530&productId=285>

VMware vSphere(R) ESXi 5.5

NIC driver : elx2net 10.2.445.0

<https://my.vmware.com/web/vmware/details?downloadGroup=DT-ESXI55-EMULEX-ELXNET-1024450&productId=353>

3.1.2 Windows Server 2008 / Windows Server 2008 R2 Environment

This section describes the driver installation procedure for onboard CNA, CNA expansion card LAN expansion card or CNA board. The following description assumes that user logs on with administrator privilege (such as Administrator).

The drivers are provided with CD/DVD media. : "Server installation and monitoring tool" or "10Gb CNA Driver CD". For the information of the driver version, see "Support_EN.html" or "readme_en.html" included in the media.

(1) NIC Driver

This section describes the NIC driver installation procedure for onboard CNA, CNA expansion card, LAN expansion card or CNA board.

1. Check the current driver version.
Confirm the indication under [Start] – [Administrative tool] – [Computer Management] – [Device Manager] – [Network Adapter].
2. Double-click on the target Network Adapter name, then its property window will open. See Table 3-2 for the Network Adapter name.

Table 3-2:

Model	Indication under Network Adapter
Onboard CNA (4-port) (CB500/CB2500 520X B1)	Emulex OneConnect OCI14104-U-HI, NIC
Onboard CNA (2-port) (except CB500/CB2500 520X B1)	Emulex OneConnect OCI11102-F-HI, NIC/TOE
CNA expansion card (2-port) CNA expansion card (4-port)	Emulex OneConnect OCm11104-F2-HI, NIC/TOE
LAN expansion card (2-port) LAN expansion card (4-port)	Emulex OneConnect OCm11104-N2-HI, NIC/TOE
CNA board (2-port)	Emulex OneConnect OCe11102-F-HI, NIC/TOE



- The Network Adapters are indicated with "#x" (x: a sequential number). The number of NIC ports depend on the CNA device and are as follows.

- The multichannel mode is disabled :

- CNA expansion card(2-port) (one 2-port controller) : 2 NIC ports
- CNA expansion card(4-port) (two 2-port controllers) : 4 NIC ports
- CNA board(2-port) (one 2-port controller) : 2 NICports
- Onboard CNA(2-port) (one 2-port controller) : 2 NIC ports
- Onboard CNA(4-port) (two 2-port controllers) : 4 NIC ports
- Onboard CNA(4-port) (one 4-port controller) : 4 NIC ports
- LAN expansion card(2-port) (one 2-port controller) : 2 NIC ports
- LAN expansion card(4-port) (two 2-port controller) : 4 NIC ports

- The multichannel mode is enabled:
 - CNA expansion card(2-port) (one 2-port controller): 8 NIC ports
 - CNA expansion card(4-port) (two 2-port controllers): 16 NIC ports
 - CNA board(2-port) (one 2-port controller): 8 NIC ports
 - Onboard CNA(2-port) (one 2-port controller): 8 NIC ports
 - Onboard CNA(4-port) (two 2-port controllers): 16 NIC ports
 - Onboard CNA(4-port) (one 4-port controller): 8 NIC ports
 - LAN expansion card(2-port) (one 2-port controller): 8 NIC ports
 - LAN expansion card(4-port) (two 2-port controller): 16 NIC ports

3. Click on "Driver Details" button in "Driver" tab.
4. Select and click on the file name followed by ".sys".
5. Confirm the value for "file version" which means the driver version.
When the driver version is listed in Table 3-1, the driver installation is not necessary. Otherwise, go to next step.
6. Insert the driver media into the DVD-ROM drive, and open the appropriate folder to install the NIC driver. See Table 3-3 for the folder path.

Table 3-3:

- CB500 CB520A x1, CB540A x1 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	4.6.142.8	\WinSrv2008\Drivers\NIC\EmulexXG_03\x86
Windows Server 2008	4.6.142.8	\WinSrv2008\Drivers\NIC\EmulexXG_03\x64
Windows Server 2008 R2	4.6.142.8	\WinSrv2008R2\Drivers\NIC\EmulexXG_03\x64

- CB500 CB520H x1 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	4.6.142.8	\WinSrv2008\Drivers\NIC\EmulexXG_03\x86
Windows Server 2008	4.6.142.8	\WinSrv2008\Drivers\NIC\EmulexXG_03\x64
Windows Server 2008 R2	4.6.142.8	\WinSrv2008R2\Drivers\NIC\EmulexXG_03\x64

- CB500 CB520H x2 model: "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	4.6.142.8	\WinSrv2008\Drivers\NIC\EmulexXG_03\x86
Windows Server 2008	4.6.142.8	\WinSrv2008\Drivers\NIC\EmulexXG_03\x64
Windows Server 2008 R2	4.6.142.8	\WinSrv2008R2\Drivers\NIC\EmulexXG_03\x64

- CB500 CB520X B1: "CB500 10Gb CNA Driver CD ver.01-06 (or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2008 R2	10.2.298.37	\WinSrv2008R2\Drivers\NIC\EmulexXG_02\x64

- CB2500 520X B1: "CB2500 10Gb CNA Driver CD ver.01-06 (or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2008 R2	10.2.298.37	\WinSrv2008R2\Drivers\NIC\EmulexXG_02\x64

- CB2000 Standard server blade x3 model: "Server installation and monitoring tool " media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	4.6.142.8	\WinSrv2008\Drivers\NIC\EmulexXG_03\x86
Windows Server 2008	4.6.142.8	\WinSrv2008\Drivers\NIC\EmulexXG_03\x64
Windows Server 2008 R2	4.6.142.8	\WinSrv2008R2\Drivers\NIC\EmulexXG_03\x64

- CB2000 High performance server blade, Standard server blade x4 model :
"Server installation and monitoring tool " media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	4.6.142.8	\WinSrv2008\Drivers\NIC\EmulexXG_03\x86
Windows Server 2008	4.6.142.8	\WinSrv2008\Drivers\NIC\EmulexXG_03\x64
Windows Server 2008 R2	4.6.142.8	\WinSrv2008R2\Drivers\NIC\EmulexXG_03\x64

7. Execute **APIinstall.exe** in the folder.

Installation starts automatically. Wait until **AutoPilot Installer** in the task bar disappears. The installation will be completed in three to five minutes.

When **AutoPilot Installer** disappears, installation of the NIC driver is complete.



Before installing the NIC driver version 10.0.835.0 or 10.2.298.37 for Windows Server 2008R2, the following hotfix is required to apply. Otherwise, the installation will fail.

<http://support.microsoft.com/kb/2846340/>

(2) iSCSI Driver

This section describes the iSCSI driver installation procedure for onboard CNA, CNA expansion card or CNA board.

1. Check the current driver version.
Confirm the indication under [Start] – [Administrative tool] – [Computer Management] – [Device Manager] – [Storage Controllers].
2. Double-click on the target storage controller name, then its property window will open. See Table 3-4 for the storage controller name.

Table 3-4:

Model	Indication under Storage Controllers
Onboard CNA(4-port) (CB500/CB2500 520X B1)	Emulex OneConnect OCI14104-U-HI,iSCSI Initiator
Onboard CNA(2-port) (except CB500/CB2500 520X B1)	Emulex OneConnect OCI11102-F-HI, iSCSI Initiator
CNA expansion card (2-port) CNA expansion card (4-port)	Emulex OneConnect OCm11104-F2-HI, iSCSI Initiator
CNA board (2-port)	Emulex OneConnect OCe11102-F-HI, iSCSI Initiator



- The Storage Controllers are indicated with "#x" (x: a sequential number). The number of iSCSI ports depend on the CNA device and are as follows.
- The multichannel mode is disabled, and the personality is iSCSI :
CNA expansion card(2-port) (one 2-port controller) :
2 NIC + 2 iSCSI ports
CNA expansion card(4-port) (two 2-port controllers) :

CNA board(2-port)	(one 2-port controller) :	4 NIC + 4 iSCSI ports
Onboard CNA(2-port)	(one 2-port controller) :	2 NIC + 2 iSCSI ports
Onboard CNA(4-port)	(two 2-port controllers) :	2 NIC + 2 iSCSI ports
Onboard CNA(4-port)	(one 4-port controller) :	4 NIC + 4 iSCSI ports
		4 NIC + 4 iSCSI ports

- The multichannel mode is enabled :

CNA expansion card(2-port)	(one 2-port controller) :	6 NIC + 2 iSCSI ports
CNA expansion card(4-port)	(two 2-port controllers) :	12 NIC + 4 iSCSI ports
CNA board(2-port)	(one 2-port controller) :	6 NIC + 2 iSCSI ports
Onboard CNA(2-port)	(one 2-port controller) :	6 NIC + 2 iSCSI ports
Onboard CNA(4-port)	(two 2-port controllers) :	12 NIC + 4 iSCSI ports
Onboard CNA(4-port)	(one 4-port controller) :	(Not supported)

- Click on "Driver Details" button in "Driver" tab.
- Select and click on the file name followed by ".sys".
- Confirm the value for "file version" which means the driver version.
When the driver version is listed in Table 3-1, the driver installation is not necessary. Otherwise, go to next step.
- Insert the driver media into the DVD-ROM drive, and open the appropriate folder to install the iSCSI driver. See Table 3-5 for the folder path.

Table 3-5:

- CB500 CB520A x1, CB540A x1 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	4.6.130.0	\WinSrv2008\Drivers\iSCSI\Emulex_02\x86
Windows Server 2008	4.6.130.0	\WinSrv2008\Drivers\iSCSI\Emulex_02\x64
Windows Server 2008 R2	4.6.130.0	\WinSrv2008R2\Drivers\iSCSI\Emulex_02\x64

- CB500 CB520H x1 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	4.6.130.0	\WinSrv2008\Drivers\iSCSI\Emulex_02\x86
Windows Server 2008	4.6.130.0	\WinSrv2008\Drivers\iSCSI\Emulex_02\x64
Windows Server 2008 R2	4.6.130.0	\WinSrv2008R2\Drivers\iSCSI\Emulex_02\x64

- CB500 CB520H x2 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	4.6.130.0	\WinSrv2008\Drivers\iSCSI\Emulex_02\x86
Windows Server 2008	4.6.130.0	\WinSrv2008\Drivers\iSCSI\Emulex_02\x64
Windows Server 2008 R2	4.6.130.0	\WinSrv2008R2\Drivers\iSCSI\Emulex_02\x64

- CB500 CB520X B1: "CB500 10Gb CNA Driver CD ver.01-06(or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2008 R2	10.2.254.0	\WinSrv2008R2\Drivers\iSCSI\Emulex_02\x64

- CB2500 520X B1: "CB2500 10Gb CNA Driver CD ver.01-06(or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2008 R2	10.2.254.0	\WinSrv2008R2\Drivers\iSCSI\Emulex_02\x64

- CB2000 Standard server blade x3 model: "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	4.6.130.0	\WinSrv2008\Drivers\iSCSI\Emulex_02\x86
Windows Server 2008	4.6.130.0	\WinSrv2008\Drivers\iSCSI\Emulex_02\x64
Windows Server 2008 R2	4.6.130.0	\WinSrv2008R2\Drivers\iSCSI\Emulex_02\x64

- CB2000 Standard server blade x4 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	4.6.130.0	\WinSrv2008\Drivers\iSCSI\Emulex_02\x86
Windows Server 2008	4.6.130.0	\WinSrv2008\Drivers\iSCSI\Emulex_02\x64
Windows Server 2008 R2	4.6.130.0	\WinSrv2008R2\Drivers\iSCSI\Emulex_02\x64

7. Execute **APIInstall.exe** in the folder.

Installation starts automatically. Wait until **AutoPilot Installer** in the task bar disappears. The installation will be completed in three to five minutes.

When **AutoPilot Installer** disappears, installation of the iSCSI driver is complete.

(3) FCoE Driver

This section describes the FCoE driver installation procedure for onboard CNA, CNA expansion card or CNA board.

1. Check the current driver version.
Confirm the indication under [Start] – [Administrative tool] – [Computer Management] – [Device Manager] – [Storage Controllers].
2. Double-click on the target storage controller name, then its property window will open. See Table 3-6 for the storage controller name.

Table 3-6:

Model	Indication under Storage Controllers
Onboard CNA (4-port) (CB500/CB2500 520X B1)	Emulex OCI14104-U-HI, PCI Slot 0, Storport Miniport Driver
Onboard CNA (2-port) (except CB500/CB2500 520X B1)	Emulex OneConnect OCI11102-F-HI, Storport Miniport Driver
CNA expansion card (2-port) CNA expansion card (4-port)	Emulex OneConnect OCm11104-F2-HI, Storport Miniport Driver
CNA board(2-port)	Emulex OneConnect OCe11102-F-HI, Storport Miniport Driver



- The Storage Controllers are indicated with "#x" (x: a sequential number). The number of FCoE ports depend on the CNA device and are as follows.

- The multichannel mode is disabled, and the personality is FCoE:

CNA expansion card(2-port) (one 2-port controller) :	2 NIC + 2 FCoE ports
CNA expansion card(4-port) (two 2-port controllers) :	4 NIC + 4 FCoE ports
CNA board(2-port) (one 2-port controller) :	2 NIC + 2 FCoE ports
Onboard CNA(2-port) (one 2-port controller) :	2 NIC + 2 FCoE ports
Onboard CNA(4-port) (two 2-port controllers) :	4 NIC + 4 FCoE ports
Onboard CNA(4-port) (one 4-port controller) :	4 NIC + 4 FCoE ports

- The multichannel mode is enabled :

CNA expansion card(2-port) (one 2-port controller) :	6 NIC + 2 FCoE ports
CNA expansion card(4-port) (two 2-port controllers) :	12 NIC + 4 FCoE ports
CNA board(2-port) (one 2-port controller) :	6 NIC + 2 FCoE ports
Onboard CNA(2-port) (one 2-port controller) :	6 NIC + 2 FCoE ports
Onboard CNA(4-port) (two 2-port controllers) :	12 NIC + 4 FCoE ports
Onboard CNA(4-port) (one 4-port controller) :	(Not supported)

3. Click on "Driver Details" button in "Driver" tab.
4. Select and click on the file name followed by ".sys".
5. Confirm the value for "file version" which means the driver version.
When the driver version is listed in Table 3-1, the driver installation is not necessary. Otherwise, go to next step.
6. Insert the driver media into the DVD-ROM drive, and open the appropriate folder to install the FCoE driver. See Table 3-7 for the folder path.

Table 3-7:

- CB500 CB520Ax1, CB540Ax1 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	2.74.14.1	\WinSrv2008\Drivers\FCoE\Emulex_02\x86
Windows Server 2008	2.74.14.1	\WinSrv2008\Drivers\FCoE\Emulex_02\x64
Windows Server 2008 R2	2.74.14.1	\WinSrv2008R2\Drivers\FCoE\Emulex_02\x64

- CB500 CB520Hx1 model : "Server installation and monitoring tool " media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	2.74.14.1	\WinSrv2008\Drivers\FCoE\Emulex_02\x86
Windows Server 2008	2.74.14.1	\WinSrv2008\Drivers\FCoE\Emulex_02\x64
Windows Server 2008 R2	2.74.14.1	\WinSrv2008R2\Drivers\FCoE\Emulex_02\x64

- CB500 CB520H x2 model : "Server installation and monitoring tool " media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	2.74.14.1	\WinSrv2008\Drivers\FCoE\Emulex_02\x86
Windows Server 2008	2.74.14.1	\WinSrv2008\Drivers\FCoE\Emulex_02\x64
Windows Server 2008 R2	2.74.14.1	\WinSrv2008R2\Drivers\FCoE\Emulex_02\x64

- CB500 CB520X B1 : "CB500 10Gb CNA Driver CD ver.01-06 (or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2008 R2	10.2.261.4	\WinSrv2008R2\Drivers\FCoE\Emulex_02\x64

- CB2500 520X B1 : "CB2500 10Gb CNA Driver CD ver.01-06 (or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2008 R2	10.2.261.4	\WinSrv2008R2\Drivers\FCoE\Emulex_02\x64

- CB2000 High performance server blade, Standard server blade x3 model:

"Server installation and monitoring tool " media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	2.74.14.1	\Win2008\Drivers\FCoE\Emulex_02\x86
Windows Server 2008	2.74.14.1	\Win2008\Drivers\FCoE\Emulex_02\x64
Windows Server 2008 R2	2.74.14.1	\Win2008R2\Drivers\FCoE\Emulex_02\x64

- CB2000 Standard server blade x4 model :

"Server installation and monitoring tool " media :

OS	Driver ver.	Folder Path
Windows Server 2008 (32bit)	2.74.14.1	\WinSrv2008\Drivers\FCoE\Emulex_02\x86
Windows Server 2008	2.74.14.1	\WinSrv2008\Drivers\FCoE\Emulex_02\x64
Windows Server 2008 R2	2.74.14.1	\WinSrv2008R2\Drivers\FCoE\Emulex_02\x64

7. Execute **APIInstall.exe** in the folder.

Installation starts automatically. Wait until **AutoPilot Installer** in the task bar disappears. The installation will be completed in three to five minutes.

When **AutoPilot Installer** disappears, installation of the FCoE driver is complete.

3.1.3 Windows Server 2012 / Windows Server 2012 R2 Environment

This section describes the driver installation procedure for onboard CNA, CNA expansion card, LAN expansion card or CNA board. The following description assumes that user logs on with administrator privilege (such as Administrator). The drivers are provided with CD/DVD media. : "Server installation and monitoring tool 03-00 or higher" or "10Gb CNA Driver CD". For the information of the driver version, see "Support_EN.html" or "readme_en.html" included in the media.

(1) NIC Driver

This section describes the NIC driver installation procedure for onboard CNA, CNA expansion card, LAN expansion card or CNA board.

1. Check the current driver version.
 Confirm the indication under [Start] – [Administrative tool] – [Computer Management] – [Device Manager] – [Network Adapter].
2. Double-click on the target Network Adapter name, then its property window will open. See Table 3-8 for the Network Adapter name.

Table 3-8:

Model	Indication under Network Adapter
Onboard CNA (4-port) (CB500/CB2500 520X B1)	Emulex OneConnect OCI14104-U-HI, NIC
Onboard CNA (4-port) (CB500/CB2500 520H B3)	Hitachi OCI14104-U3-HI 4-port 10GbE Converged Network Controller
Onboard CNA (2-port) (except CB500/CB2500 520X B1, CB500/CB2500 520H B3)	Emulex OneConnect OCI11102-F-HI, NIC/TOE
CNA expansion card (2-Port) CNA expansion card (4-Port)	Emulex OneConnect OCm11104-F2-HI, NIC/TOE
LAN expansion card (2-port) LAN expansion card (4-port)	Emulex OneConnect OCm11104-N2-HI, NIC/TOE
CNA board (2-port)	Emulex OneConnect OCe11102-F-HI, NIC/TOE



- The Network Adapters are indicated with "#x" (x: a sequential number). The number of NIC ports depend on the CNA device and are as follows.

- The multichannel mode is disabled :
 - CNA expansion card(2-port) (one 2-port controller) : 2 NIC ports
 - CNA expansion card(4-port) (two 2-port controllers) : 4 NIC ports
 - CNA board(2-port) (one 2-port controller) : 2 NIC ports
 - Onboard CNA(2-port) (one 2-port controller) : 2 NIC ports
 - Onboard CNA(4-port) (two 2-port controllers) : 4 NIC ports

Onboard CNA(4-port) (one 4-port controller) : 4 NIC ports
 LAN expansion card(2-port) (one 2-port controller) : 2 NIC ports
 LAN expansion card(4-port) (two 2-port controller) : 4 NIC ports

- The multichannel mode is enabled :

CNA expansion card(2-port) (one 2-port controller) : 8 NIC ports
 CNA expansion card(4-port) (two 2-port controllers): 16 NIC ports
 CNA board(2-port) (one 2-port controller) : 8 NIC ports
 Onboard CNA(2-port) (one 2-port controller) : 8 NIC ports
 Onboard CNA(4-port) (two 2-port controllers): 16 NIC ports
 Onboard CNA(4-port) (one 4-port controller) : 8 NIC ports
 LAN expansion card(2-port) (one 2-port controller) : 8 NIC ports
 LAN expansion card(4-port) (two 2-port controller) : 16 NIC ports

3. Click on "Driver Details" button in "Driver" tab.
4. Select and click on the file name followed by ".sys".
5. Confirm the value for "file version" which means the driver version.
 When the driver version is listed in Table 3-1, the driver installation is not necessary. Otherwise, go to next step.
6. Insert the driver media into the DVD-ROM drive, and open the appropriate folder to install the NIC driver. See Table 3-9 for the folder path.

Table 3-9:

- CB500 CB520A x1, CB540A x1 model : "CB500 10Gb CNA Driver CD ver.01-09 (or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2012	10.2.478.1	\WinSrv2012\Drivers\NIC\EmulexXG_04\x64
Windows Server 2012 R2	10.2.478.1	\WinSrv2012R2\Drivers\NIC\EmulexXG_04\x64

- CB500 CB520H x1 model : "CB500 10Gb CNA Driver CD ver.01-09 (or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2012	10.2.478.1	\WinSrv2012\Drivers\NIC\EmulexXG_04\x64
Windows Server 2012 R2	10.2.478.1	\WinSrv2012R2\Drivers\NIC\EmulexXG_04\x64

- CB500 CB520H x2 model: "CB500 10Gb CNA Driver CD ver.01-09 (or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2012	10.2.478.1	\WinSrv2012\Drivers\NIC\EmulexXG_04\x64
Windows Server 2012 R2	10.2.478.1	\WinSrv2012R2\Drivers\NIC\EmulexXG_04\x64

- CB500 CB520X B1, CB520H B3 model: "CB500 10Gb CNA Driver CD ver.01-09 (or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2012	10.2.478.1	\WinSrv2012\Drivers\NIC\EmulexXG_04\x64
Windows Server 2012 R2	10.2.478.1	\WinSrv2012R2\Drivers\NIC\EmulexXG_04\x64

- CB2500 520X B1, 520H B3 model: "CB2500 10Gb CNA Driver CD ver.01-06 (or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2012	10.2.298.37	\WinSrv2012\Drivers\NIC\EmulexXG_03\x64
Windows Server 2012 R2	10.2.298.37	\WinSrv2012R2\Drivers\NIC\EmulexXG_03\x64

- CB2000 Standard server blade x3 model: "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2012	4.6.142.8	\WinSrv2012\Drivers\NIC\EmulexXG_03\x64
Windows Server 2012 R2	10.0.430.1003	\WinSrv2012R2\Drivers\NIC\EmulexXG_03\x64

- CB2000 High performance server blade, Standard server blade x4 model :
"Server installation and monitoring tool " media :

OS	Driver ver.	Folder Path
Windows Server 2012	4.6.142.8	\WinSrv2012\Drivers\NIC\EmulexXG_03\x64
Windows Server 2012 R2	10.0.430.1003	\WinSrv2012R2\Drivers\NIC\EmulexXG_03\x64



Before installing the NIC driver version 10.0.835.0, 10.2.298.37 or 10.2.478.1 for Windows Server 2012, the following hotfix is required to apply. Otherwise, the installation will fail.

<http://support.microsoft.com/kb/2846340/>

7. Execute **APIinstall.exe** in the folder.

Installation starts automatically. Wait until **AutoPilot Installer** in the task bar disappears. The installation will be completed in three to five minutes.

When **AutoPilot Installer** disappears, installation of the NIC driver is complete.



Note for 520H Server Blade B3 :

When Multichannel Mode is enabled, the Network Connections window on Windows Server 2012 or Windows Server 2012 R2 displays the ports of LoM as Ethernet X and Function X (X: a number) .

When Multichannel Mode is disabled, the Network Connections window displays the ports of LoM as Function X (X: a number).

(2) iSCSI Driver

This section describes the iSCSI driver installation procedure for onboard CNA, CNA expansion card or CNA board.

1. Check the driver version.
Confirm the indication under [Start] – [Administrative tool] – [Computer Management] – [Device Manager] – [Storage Controllers].
2. Double-click on the target storage controller name, then its property window will open. See Table 3-10 for the storage controller name.

Table 3-10:

Model	Indication under Storage Controllers
Onboard CNA (4-port) (CB500/CB2500 520X B1)	Emulex OneConnect OCI14104-U-HI,iSCSI Initiator
Onboard CNA (4-port) (CB500/CB2500 520H B3)	Hitachi OCI14104-U3-HI 4-port 10GbE Converged Network Controller
Onboard CNA (2-port) (except CB500/CB2500 520X B1, CB500/CB2500 520H B3)	Emulex OneConnect OCI11102-F-HI, iSCSI Initiator

Model	Indication under Storage Controllers
CNA expansion card (2-port) CNA expansion card (4-port)	Emulex OneConnect OCm11104-F2-HI, iSCSI Initiator
CNA board (2-port)	Emulex OneConnect OCe11102-F-HI, iSCSI Initiator

If the indication "Mass Storage Controller" is located under [Device Manager]
- [Other devices], go to step 6.



- The Storage Controllers are indicated with "#x" (x: a sequential number). The number of iSCSI ports depend on the CNA device and are as follows.

- The multichannel mode is disabled, and the personality is iSCSI :

CNA expansion card(2-port) (one 2-port controller) :

2 NIC + 2 iSCSI ports

CNA expansion card(4-port) (two 2-port controllers) :

4 NIC + 4 iSCSI ports

CNA board(2-port) (one 2-port controller) :

2 NIC + 2 iSCSI ports

Onboard CNA(2-port) (one 2-port controller) :

2 NIC + 2 iSCSI ports

Onboard CNA(4-port) (two 2-port controllers) :

4 NIC + 4 iSCSI ports

Onboard CNA(4-port) (one 4-port controller) :

4 NIC + 4 iSCSI ports

- The multichannel mode is enabled :

CNA expansion card(2-port) (one 2-port controller) :

6 NIC + 2 iSCSI ports

CNA expansion card(4-port) (two 2-port controllers) :

12 NIC + 4 iSCSI ports

CNA board(2-port) (one 2-port controller) :

6 NIC + 2 iSCSI ports

Onboard CNA(2-port) (one 2-port controller) :

6 NIC + 2 iSCSI ports

Onboard CNA(4-port) (two 2-port controllers) :

12 NIC + 4 iSCSI ports

Onboard CNA(4-port) (one 4-port controller) :

(Not supported)

3. Click on "Driver Details" button in "Driver" tab.

4. Select and click on the file name followed by ".sys".

5. Confirm the value for "file version" which means the driver version.

When the driver version is listed in Table 3-1, the driver installation is not necessary. Otherwise, go to next step.

6. Insert the driver media into the DVD-ROM drive, and open the appropriate folder to install the iSCSI driver. See Table 3-11 for the folder path.

Table 3-11:

- CB500 CB520A x1, CB540A x1 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2012	4.6.130.0	\\WinSrv2012\Drivers\iSCSI\Emulex_02\x64
Windows Server 2012 R2	4.9.160.0	\\WinSrv2012R2\Drivers\iSCSI\Emulex_02\x64

- CB500 CB520H x1 model : "Server installation and monitoring tool " media :

OS	Driver ver.	Folder Path
Windows Server 2012	4.6.130.0	\\WinSrv2012\Drivers\iSCSI\Emulex_02\x64
Windows Server 2012 R2	4.9.160.0	\\WinSrv2012R2\Drivers\iSCSI\Emulex_02\x64

- CB500 CB520H x2 model: "Server installation and monitoring tool " media :

OS	Driver ver.	Folder Path
Windows Server 2012	4.6.130.0	\\WinSrv2012\Drivers\iSCSI\Emulex_02\x64
Windows Server 2012 R2	4.9.160.0	\\WinSrv2012R2\Drivers\iSCSI\Emulex_02\x64

- CB500 CB520X B1, CB520H B3 model: "CB500 10Gb CNA Driver CD ver.01-06(or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2012	10.2.254.0	\\WinSrv2012\Drivers\iSCSI\Emulex_02\x64
Windows Server 2012 R2	10.2.254.0	\\WinSrv2012R2\Drivers\iSCSI\Emulex_02\x64

- CB2500 520X B1, 520H B3 model: "CB2500 10Gb CNA Driver CD ver.01-06(or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2012	10.2.254.0	\\WinSrv2012\Drivers\iSCSI\Emulex_02\x64
Windows Server 2012 R2	10.2.254.0	\\WinSrv2012R2\Drivers\iSCSI\Emulex_02\x64

- CB2000 Standard server blade x3 model: "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2012	4.6.130.0	\\WinSrv2012\Drivers\iSCSI\Emulex_02\x64
Windows Server 2012 R2	4.9.160.0	\\WinSrv2012R2\Drivers\iSCSI\Emulex_02\x64

- CB2000 High performance server blade, Standard server blade x4 model :
"Server installation and monitoring tool " media :

OS	Driver ver.	Folder Path
Windows Server 2012	4.6.130.0	\\WinSrv2012\Drivers\iSCSI\Emulex_02\x64
Windows Server 2012 R2	4.9.160.0	\\WinSrv2012R2\Drivers\iSCSI\Emulex_02\x64

7. Execute **APIInstall.exe** in the folder.

Installation starts automatically. Wait until **AutoPilot Installer** in the task bar disappears. The installation will be completed in three to five minutes.

When **AutoPilot Installer** disappears, installation of the iSCSI driver is complete.

(3) FCoE Driver

This section describes the FCoE driver installation procedure for onboard CNA, CNA expansion card or CNA board.

1. Check the current driver version.
Confirm the indication under [Start] – [Administrative tool] – [Computer Management] – [Device Manager] – [Storage Controllers].
2. Double-click on the target storage controller name, then its property window will open. See Table 3-12 for the storage controller name.

Table 3-12:

Model	Indication under Storage Controllers
Onboard CNA (4-port) (CB500/CB2500 520X B1)	Emulex OCI14104-U-HI, PCI Slot 0, Storport Miniport Driver
Onboard CNA (4-port) (CB500/CB2500 520H B3)	Emulex OCI14104-U2-HI, PCI Slot 0, Storport Miniport Driver
Onboard CNA (2-port) (except CB500/CB2500 520X B1, CB500/CB2500 520H B3)	Emulex OneConnect OCI11102-F-HI, Storport Miniport Driver
CNA expansion card (2-port) CNA expansion card (4-port)	Emulex OneConnect OCm11104-F2-HI, Storport Miniport Driver
CNA board (2-port)	Emulex OneConnect OCe11102-F-HI, Storport Miniport Driver

If the indication "Fibre Channel Controller" is located under [Device Manager] – [Other devices], go to step 6.



- Network Adapter is indicated as "#x" (x: number of ports) for the second and subsequent indication. The number of ports are as follows.

- The multichannel mode is disabled, and the personality is FCoE:
 - CNA expansion card(2-port) (one 2-port controller) :
2 NIC + 2 FCoE ports
 - CNA expansion card(4-port) (two 2-port controllers) :
4 NIC + 4 FCoE ports
 - CNA board(2-port) (one 2-port controller) :
2 NIC + 2 FCoE ports
 - Onboard CNA(2-port) (one 2-port controller) :
2 NIC + 2 FCoE ports
 - Onboard CNA(4-port) (two 2-port controllers) :
4 NIC + 4 FCoE ports
 - Onboard CNA(4-port) (one 4-port controller) :
4 NIC + 4 FCoE ports
- The multichannel mode is enabled :
 - CNA expansion card(2-port) (one 2-port controller) :
6 NIC + 2 FCoE ports
 - CNA expansion card(4-port) (two 2-port controllers) :
12 NIC + 4 FCoE ports
 - CNA board(2-port) (one 2-port controller) :
6 NIC + 2 FCoE ports
 - Onboard CNA(2-port) (one 2-port controller) :
6 NIC + 2 FCoE ports
 - Onboard CNA(4-port) (two 2-port controllers) :
12 NIC + 4 FCoE ports
 - Onboard CNA(4-port) (one 4-port controller) :
(Not supported)

3. Click on "Driver Details" button in "Driver" tab.
4. Select and click on the file name followed by ".sys".
5. Confirm the value for "file version" which means the driver version.
When the driver version is listed in Table 3-1, the driver installation is not necessary. Otherwise, go to next step.
6. Insert the driver media into the DVD-ROM drive, and open the appropriate folder to install the FCoE driver. See Table 3-13 for the folder path.

Table 3-13:

- CB500 CB520A x1, CB540A x1 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2012	2.74.14.1	\WinSrv2012\Drivers\FCoE\Emulex_02\x64
Windows Server 2012 R2	2.76.002.001	\WinSrv2012R2\Drivers\FCoE\Emulex_02\x64

- CB500 CB520H x1 model : "Server installation and monitoring tool " media :

OS	Driver ver.	Folder Path
Windows Server 2012	2.74.14.1	\WinSrv2012\Drivers\FCoE\Emulex_02\x64
Windows Server 2012 R2	2.76.002.001	\WinSrv2012R2\Drivers\FCoE\Emulex_02\x64

- CB500 CB520H x2 model: "Server installation and monitoring tool " media :

OS	Driver ver.	Folder Path
Windows Server 2012	2.74.14.1	\WinSrv2012\Drivers\FCoE\Emulex_02\x64
Windows Server 2012 R2	2.76.002.001	\WinSrv2012R2\Drivers\FCoE\Emulex_02\x64

- CB500 CB520X B1, CB520H B3 model: "CB500 10Gb CNA Driver CD ver.01-06 (or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2012	10.2.261.4	\WinSrv2012\Drivers\FCoE\Emulex_02\x64
Windows Server 2012 R2	10.2.261.4	\WinSrv2012R2\Drivers\FCoE\Emulex_02\x64

- CB2500 520X B1, 520H B3 model: "CB2500 10Gb CNA Driver CD ver.01-06 (or higher)" media :

OS	Driver ver.	Folder Path
Windows Server 2012	10.2.261.4	\WinSrv2012\Drivers\FCoE\Emulex_02\x64
Windows Server 2012 R2	10.2.261.4	\WinSrv2012R2\Drivers\FCoE\Emulex_02\x64

- CB2000 Standard server blade x3 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Folder Path
Windows Server 2012	2.74.14.1	\WinSrv2012\Drivers\FCoE\Emulex_02\x64
Windows Server 2012 R2	2.76.002.001	\WinSrv2012R2\Drivers\FCoE\Emulex_02\x64

- CB2000 High performance server blade, Standard server blade x4 model :
"Server installation and monitoring tool " media :

OS	Driver ver.	Folder Path
Windows Server 2012	2.74.14.1	\WinSrv2012\Drivers\FCoE\Emulex_02\x64
Windows Server 2012 R2	2.76.002.001	\WinSrv2012R2\Drivers\FCoE\Emulex_02\x64

7. Execute **APIinstall.exe** in the folder.

Installation starts automatically. Wait until **AutoPilot Installer** in the task bar disappears. The installation will be completed in three to five minutes. When **AutoPilot Installer** disappears, installation of the FCoE driver is complete.

3.1.4 Red Hat Enterprise Linux 5.7 / 5.9 / 6.2 Environment

This section describes the driver installation procedure for onboard CNA, CNA expansion card and LAN expansion card. The following description assumes that user logs on with administrator privilege (such as Administrator), and also assumes that the personality of the device is iSCSI mode.

The drivers are provided with CD media. : "10Gb CNA Driver CD" or "DriverKit". For the information of the driver version, see "Readme.html" or "Support_EN.html" etc. included in the media.

(1) NIC Driver

This section describes the NIC driver installation procedure for onboard CNA, CNA expansion card and LAN expansion card.

1. Display the information of the driver version with [modinfo] command.

```
# modinfo -F version be2net
```

2. Confirm that the driver version is listed in Table 3-1.

When the driver version is listed in Table 3-1, the driver installation is not necessary. Otherwise, go to next step.

3. Insert the driver media into the DVD-ROM drive, mount the media and open the following folder to install the NIC driver.

Table 3-14:

- CB500 series : "CB500 10Gb CNA Driver CD ver.01-01 or higher" :

OS	Location of the installation file
RHEL5.7/5.9	/RHEL5/Drivers/
RHEL6.2 (32-bit x86)	/RHEL6/Drivers/x86/
RHEL6.2 (64-bit x86_64)	/RHEL6/Drivers/x64/

- CB2000 series : "CB2000 10Gb CNA Driver CD ver.01-05 or higher":

OS	Location of the installation file
RHEL5.7/5.9	/RHEL5/Drivers/
RHEL6.2 (32-bit x86)	/RHEL6/Drivers/x86/
RHEL6.2 (64-bit x86_64)	/RHEL6/Drivers/x64/

(a) RHEL5.7/5.9

4. Copy elx-be2net-dd-<version>.tar.gz file and extract it. Execute the following shell script.

```
# ./elx_net_install.sh
```

5. When the script is complete normally, the driver installation is complete.

(b) RHEL6.2

4. Copy the rpm file to /tmp directory. The following shows the rpm file name on each architecture.

OS	rpm file name
RHEL6.2 (32-bit x86)	kmod-be2net-<version>.el6.i686.rpm
RHEL6.2 (64-bit x86_64)	kmod-be2net-<version>.el6.x86_64.rpm

5. Check whether the be2net driver is installed or not. Execute the following command. If an be2net driver is installed, the package name of the be2net driver is displayed.

```
#rpm -qa | grep be2net
```

(Output Example)

```
kmod-be2net-4.6.352.0-1.el6.i686
```

If nothing is displayed, go to step 7.

6. Execute the following command to uninstall the installed be2net driver. The < be2net package name> is the output of step 5.

```
# rpm -e < be2net package name>
```

7. Execute the following command to install the new be2net driver. The <rpm file name> is the rpm file name in step 4.

```
# rpm -ivh /tmp/<rpm file name>
```

8. Reboot the system.

```
# reboot
```

9. Confirm new be2net driver version. Execute the following command. If the version is proper, the installation is complete.

```
# modinfo -F version be2net
```

(2) iSCSI Driver

This section describes the iSCSI driver installation procedure for onboard CNA and CNA expansion card.

1. Display the information of the driver version with [modinfo] command.

```
# modinfo -F version be2iscsi
```

2. Confirm that the driver version is listed in Table 3-1.
Install or reinstall the driver even if the driver version is listed in Table 3-1.
3. Insert the driver media into the DVD-ROM drive, mount the media and open the following folder to install the iSCSI driver.

Table 3-15:

- CB500 series : "CB500 10Gb CNA Driver CD ver.01-01 or higher" :

OS	Location of the installation file
RHEL5.7/5.9	/RHEL5/Drivers/
RHEL6.2 (32-bit x86)	/RHEL6/Drivers/x86/
RHEL6.2 (64-bit x86_64)	/RHEL6/Drivers/x64/

- CB2000 series : "CB2000 10Gb CNA Driver CD ver.01-05 or higher":

OS	Location of the installation file
RHEL5.7/5.9	/RHEL5/Drivers/
RHEL6.2 (32-bit x86)	/RHEL6/Drivers/x86/
RHEL6.2 (64-bit x86_64)	/RHEL6/Drivers/x64/

- (a) RHEL5.7/5.9
4. Copy elx-be2iscsi-dd-<version>.tar.gz file and extract it. Execute the following shell script.

```
# ./elx_iscsi_install.sh
```

5. When the script is complete normally, the driver installation is complete.

(b) RHEL6.2

4. Copy the rpm file to /tmp directory. The following shows the rpm file name on each architecture.

OS	rpm file name
RHEL6.2 (32-bit x86)	kmod-be2iscsi-<version>.el6.i686.rpm
RHEL6.2 (64-bit x86_64)	kmod-be2iscsi-<version>.el6.x86_64.rpm

5. Check whether the be2iscsi driver is installed or not. Execute the following command. If an be2iscsi driver is installed, the package name of the be2iscsi driver is displayed.

```
#rpm -qa | grep be2iscsi
```

(Output Example)

```
kmod-be2iscsi-4.6.176.0-1.el6.i686
```

If nothing is displayed, go to step 7.

6. Execute the following command to uninstall the installed be2iscsi driver. The < be2iscsi package name> is the output of step 5.

```
# rpm -e < be2iscsi package name>
```

7. Execute the following command to install the new be2iscsi driver. The <rpm file name> is the rpm file name in step 4.

```
# rpm -ivh /tmp/<rpm file name>
```

8. Reboot the system.

```
# reboot
```

9. Confirm new be2iscsi driver version. Execute the following command. If the version is proper, the installation is complete.

```
# modinfo -F version be2iscsi
```

(3) FCoE Driver

This section describes the FCoE driver installation procedure for onboard CNA and CNA expansion card.

1. Display the information of the driver version with [modinfo] command.

```
# modinfo -F version lpfc
```

2. Confirm that the driver version is listed in Table 3-1.
Install or reinstall the driver even if the driver version is listed in Table 3-1.
3. Insert the driver media into the DVD-ROM drive, mount the media and open the following folder to install the FCoE driver.

Table 3-16:

- CB500 series : "CB500 10Gb CNA Driver CD ver.01-01 or higher" :

OS	Location of the installation file
RHEL5.7/5.9	/RHEL5/Drivers/
RHEL6.2 (32-bit x86)	/RHEL6/Drivers/x86/
RHEL6.2 (64-bit x86_64)	/RHEL6/Drivers/x64/

- CB2000 series : "CB2000 10Gb CNA Driver CD ver.01-05 or higher":

OS	Location of the installation file
RHEL5.7/5.9	/RHEL5/Drivers/
RHEL6.2 (32-bit x86)	/RHEL6/Drivers/x86/
RHEL6.2 (64-bit x86_64)	/RHEL6/Drivers/x64/

- (a) RHEL5.7/5.9
4. Copy elx-lpfc-dd-rhel5-<version>.tar.gz file and extract it. Execute the following shell script.

```
# ./elx_lpfc_install.sh
```

5. When the script is complete normally, the driver installation is complete.

(b) RHEL6.2

4. Copy the rpm file to /tmp directory. The following shows the rpm file name on each architecture.

OS	rpm file name
RHEL6.2 (32-bit x86)	kmod-lpfc-<version>.el6.i686.rpm
RHEL6.2 (64-bit x86_64)	kmod-lpfc-<version>.el6.x86_64.rpm

5. Check whether the lpfc driver is installed or not. Execute the following command. If an lpfc driver is installed, the package name of the lpfc driver is displayed.

```
#rpm -qa | grep lpfc
```

(Output Example)

```
kmod-lpfc-8.3.7.20-1.el6.i686
```

If nothing is displayed, go to step 7.

6. Execute the following command to uninstall the installed lpfc driver. The <lpfc package name> is the output of step 5.

```
# rpm -e <lpfc package name>
```

7. Execute the following command to install the new lpfc driver. The <rpm file name> is the rpm file name in step 4.

```
# rpm -ivh /tmp/<rpm file name>
```

8. Reboot the system.

```
# reboot
```

9. Confirm new lpfc driver version. Execute the following command. If the version is proper, the installation is complete.

```
# modinfo -F version lpfc
```


3.1.5 Red Hat Enterprise Linux 6.4 / 6.5 / 6.6 Environment

This section describes the driver installation procedure for onboard CNA, CNA expansion card and LAN expansion card. The following description assumes that user logs on with administrator privilege (such as Administrator). The drivers are provided with CD media. : "10Gb CNA driver CD".



- When installing RHEL6.4, RHEL6.5 or RHEL6.6, make the multichannel function disabled before the OS installation. See the manual "Emulex Adapter User's Guide for Hardware (MK-99COM104)" for how to enable/disable the multichannel function.
 - When using Multichannel function in combination with internal HDD boot or SAN boot through Emulex FC adapter, be sure to add "udevchild=32" to the kernel boot parameter in the grub.conf. Otherwise, the OS boot will fail with the following message.

"udev[X]: worker [Y] unexpectedly returned with status 0x0100"

The Emulex FC adapter's product code is GG-CC3M8G1X1-Y, GG-CC3M161X1-Y, GG-CC4N8G3X1-Y, or GG-CC4N163X1-Y.
 - Multichannel function in combination with SAN boot through Hitachi FC adapter is not supported. If the multichannel function is enabled, the SAN boot will fail.
-

(1) NIC Driver

This section describes the NIC driver installation procedure for onboard CNA, CNA expansion card and LAN expansion card.

1. Display the information of the driver version with [modinfo] command.

```
# modinfo -F version be2net
```

Confirm that the driver version is listed in Table 3-1. If the installed driver is listed, this installation is not necessary. If the installed driver is needed to be updated, go to step 3.

2. Insert "10Gb CNA driver CD " media into the CD/DVD-ROM drive of system console. Select [Tools] - [Launch Virtual Media] located in upper side of Remote Console menu and open [Virtual Media Session] window. Check the "Mapped" check box of the CD/DVD drive to set the virtual drive.

Mount the media to any directory in the system. and copy the following installation file (rpm file) to any directory of the system. In this procedure, the directory is /tmp for example.

Table 3-18:

OS	Media path to the driver file
RHEL6.4 / 6.5 / 6.6 (32-bit x86)	/RHEL6/Drivers/x86/kmod-be2net-<version>.el6.i686.rpm
RHEL6.4 / 6.5 / 6.6 (64-bit x86_64)	/RHEL6/Drivers/x64/kmod-be2net-<version>.el6.x86_64.rpm

3. Check whether the be2net driver is installed or not. Execute the following command. If the be2net driver is installed, the package name of the be2net driver is displayed.

```
#rpm -qa | grep be2net
```

(Output example)

```
kmod-be2net-4.2.456.0_rh6u4-1.x86_64
```

If nothing is displayed, go to step (5).

4. Uninstall the driver with the following command. < be2net package name > is the output of step 3..

```
# rpm -e < be2net package name >
```

5. Execute the following command to install the new be2net driver. The following <rpm file name> is the rpm file name in step 2

```
# rpm -ivh /tmp/<rpm file name>
```

6. Reboot the system.

```
# reboot
```

7. Confirm the newly installed driver version with the following command.

```
# modinfo -F version be2net
```

8. If the driver version is correct, the installation procedure is complete. If the driver version is not correct, repeat the procedure from step 2.
9. Restart OS.

(2) iSCSI Driver

This section describes the iSCSI driver installation procedure for onboard CNA and CNA expansion card.

1. Display the information of the driver version with [modinfo] command.

```
# modinfo -F version be2iscsi
```

Confirm that the driver version is listed in Table 3-1. If the installed driver is listed, this installation is not necessary. If the installed driver is needed to be updated, go to step 3.



The iSCSI drivers version 10.2.340.7 cannot be updated from the driver version 4.6.345.0.

2. Insert "10Gb CNA driver CD " media into the CD/DVD-ROM drive of system console. Select [Tools] - [Launch Virtual Media] located in upper side of Remote Console menu and open [Virtual Media Session] window. Check the "Mapped" check box of the CD/DVD drive to set the virtual drive.

Mount the media to any directory in the system. and copy the following installation file (rpm file) to any directory of the system. In this procedure, the directory is /tmp for example.

Table 3-19:

OS	Media path to the driver file
RHEL6.4 / 6.5 / 6.6 (32-bit x86)	/RHEL6/Drivers/x86/kmod-be2iscsi-<version>.el6.i686.rpm
RHEL6.4 / 6.5 / 6.6 (64-bit x86_64)	/RHEL6/Drivers/x64/kmod-be2iscsi -<version>.el6.x86_64.rpm

3. Check whether the be2iscsi driver is installed or not. Execute the following command. If the be2iscsi driver is installed, the package name of the be2iscsi driver is displayed.

```
#rpm -qa | grep be2iscsi
```

(Output example)

```
kmod-be2iscsi-4.6.345.0-1.el6.x86_64
```

If nothing is displayed, go to step (5).

4. Uninstall the driver with the following command. < be2iscsi package name > is the output of step 3..

```
# rpm -e < be2iscsi package name >
```

- Execute the following command to install the new be2iscsi driver. The following <rpm file name> is the rpm file name in step 2

```
# rpm -ivh /tmp/<rpm file name>
```

- Reboot the system.

```
# reboot
```

- Confirm the newly installed driver version with the following command.

```
# modinfo -F version be2iscsi
```

- If the driver version is correct, the installation procedure is complete. If the driver version is not correct, repeat the procedure from step 2.
- Unmount the media.
- Update the image of initial boot.

Backup the image file. "/boot/initramfs-<current kernel version>.img.org" is made for the backup file in this procedure for example.

```
# cp -a /boot/initramfs-< current kernel version >.img /boot/initramfs-<
current kernel version >.img.org
# dracut -f /boot/initramfs-< current kernel version >.img
```



Red Hat does not officially support saving kdump files to iSCSI targets. In RHEL 6.4 and higher, to save kdump files to iSCSI targets:

The following procedure must be applied for both iSCSI boot and iSCSI data connection.

- The system must reserve at least 256 MB for the crash dump. In a kernel line in /boot/grub/grub.conf (for LegacyBIOS) or in /boot/efi/EFI/redhat/grub.conf (for UEFI), change "crashkernel=auto" into "crashkernel=256M". And configure kdump service to start automatically.

```
# chkconfig kdump 345 on
```

- Reboot the system for this change to take effect.
- Execute the following commands to recognize the iSCSI disk when kdump performs

```
# cp /etc/dracut.conf /etc/kdump-adv-conf/initramfs.conf
# service kdump restart
Stopping kdump: [ OK ]
Detected change(s) the following file(s):

/etc/kdump.conf
Rebuilding /boot/initrd-2.6.32-358.11.1.el6.x86_64kdump.img
Starting kdump: [ OK ]
```



The kdump in iSCSI configuration can not be outputted to the external storage for data.

Table : The relation between storage and the possibility of kdump

No.	Storage for boot	Storage for data	kdump target	
			Storage for boot	Storage for data
1	Inner SAS HDD	External storage for iSCSI	Possible	Impossible (outputted to the inner SAS HDD)
2	External storage for iSCSI	External storage for iSCSI	Possible	Impossible (Outputted to the external storage for boot)
3	External storage for iSCSI	Inner SAS HDD	Possible	Possible
4	External storage for iSCSI	(Not connected)	Possible	(Not connected)

The iSCSI driver installation is complete.

If the version of iSCSI driver for iSCSI data configuration is 10.*.*.*, the following packages are required to install additionally.

- iscsi-initiator-utils
- dracut-network

1. Confirm that the packages are installed or not.

```
[Format] # rpm -qa | grep <Package name>
```

The following is the example.

```
[root@localhost ~]# rpm -qa | grep iscsi-initiator-utils [Enter]
iscsi-initiator-utils-6.2.0.873-10.el6.x86_64
[root@localhost ~]#
[root@localhost ~]# rpm -qa | grep dracut-network [Enter]
dracut-network-004-335.el6.noarch
[root@localhost ~]#
```

2. If the packages are not installed, install the packages with following procedure.

- (1) Prepare the RHEL media that is used to installation to the system.
- (2) Execute "find" command to confirm the location of the installed package.

```
[Format] # find <mount point> -name <package name>
```

(3) Execute "rpm -ivh" command to install the package.

```
[Format] # rpm -ivh <the package name and the location in step (2)>
```

The following the example of the package "iscsi-initiator-utils". Perform the same procedure for the package " dracut-network".

```
[root@localhost ~]# find /media/ -name "iscsi-initiator-utils*" [Enter]
/media/Packages/iscsi-initiator-utils-6.2.0.873-10.el6.x86_64.rpm
[root@localhost ~]#
[root@localhost ~]# rpm -ivh /media/Packages/iscsi-initiator-utils-
6.2.0.873-10.e 16.x86_64.rpm [Enter]
:
Preparing... c(100%)#
(100%)##### [100%]
 1: iscsi-initiator-utils
[root@localhost ~]#
```

3. Add the iSCSI storage in be2iscsi driver (ver.10.*.*.* (* is a number).) environment.

(1) See "Hitachi Compute Blade Emulex Adapter User's Guide for Hardware" 4. Procedure of the Adapter Configuration, and configure the iSCSI environment.

(2) Boot the OS (RHEL).

(3) Configure the network for iSCSI. The following is the example of "eth2".

```
[root@localhost ~]# cat /etc/sysconfig/network-scripts/ifcfg-eth2 [Enter]
DEVICE="eth2"
NM_CONTROLLED="no"
ONBOOT="yes"
IPADDR=192.168.0.210
NETMASK=255.255.255.0
[root@localhost ~]#
```

(4) Start the iSCSI service.

Check that the following service is enabled. If the values of "3:", "4:" and "5:" are "on", the service is enabled.

- iscsi
- iscsid

```
[Format] # chkconfig -list <service name> [Enter]
```

The following is the example for iscsid service.

```
[root@localhost ~]# chkconfig --list iscsid [Enter]
iscsid          0:off  1:off  2:on   3:on   4:on   5:on   6:off
[root@localhost ~]#
```

If the iscsi or iscsid service is unavailable, i.e. the values of "3:", "4:" and "5:" are "off", perform the following procedure to enable the iscsid service.

```
[Format] # service <service name> start [Enter]
[Format]# chkconfig <service name> on [Enter]
```

The example to enable iscsid service is as follows.

```
[root@localhost ~]# service iscsid start [Enter]
[root@localhost ~]# chkconfig iscsid on [Enter]
[root@localhost ~]#
```

(5) Execute "hbacmd listhbas pt=iSCSI" command to record MAC address for iSCSI.

```
[root@localhost ~]# hbacmd listhbas pt=iSCSI [Enter]
Manageable HBA List

Permanent MAC : f8:48:97:24:0f:e9
Current MAC   : f8:48:97:24:0f:e9
Logical HBA#  : 0
Flags        : 80000722
Host Name     : localhost.localdomain
Mfg          : Emulex Corporation
Serial No.   : BG38L006
Port Number   : 0
Mode         : Initiator
PCI Bus Number : 139
PCI Function  : 4
Port Type    : iSCSI
Model        : OCI14104-U-HI
:
(omitted)
:
[root@localhost ~]#
```



"hbacmd" is a command of OneCommand Manager CLI (OCM_CLI hereafter). See the manual "Hitachi Compute Blade Emulex Adapter User's Guide for Utility, 4 The OneCommand Manager application CLI" for OCM_CLI.

If OCM_CLI is not installed, BIOS or uEFI can be used to confirm the MAC address, too. See the manual "Hitachi Compute Blade Emulex Adapter User's Guide for Hardware".

(6) Make iface file of the port that is used as iSCSI connection.

```
[Format : 1] iscsiadm -m iface -o new -I be2iscsi.<MAC address in step (5)>
[Enter]

[Format : 2] iscsiadm -m iface -I be2iscsi.<MAC address in step (5)> --
op=update -n iface.hwaddress -v <MAC address in step (5)>
[Enter]

[Format : 3] iscsiadm -m iface -I be2iscsi.<MAC address in step (5)> --
op=update -n iface.transport_name -v be2iscsi [Enter]

[Format : 4] iscsiadm -m iface -I be2iscsi.<MAC address in step (5)> --
op=update -n iface.initiatorname -v <iSCSI initiator name>
[Enter]
```



```

[root@localhost ~]# iscsiadm -m iface -o new -l be2iscsi.f8:48:97:24:0f:e9
[Enter]
New interface be2iscsi.f8:48:97:24:0f:e9 added
[root@localhost ~]#
[root@localhost ~]# iscsiadm -m iface -l be2iscsi.f8:48:97:24:0f:e9 --
op=update -n iface.hwaddress -v f8:48:97:24:0f:e9 [Enter]
be2iscsi.f8:48:97:24:0f:e9 updated.
[root@localhost ~]#
[root@localhost ~]# iscsiadm -m iface -l be2iscsi.f8:48:97:24:0f:e9 --
op=update -n iface.transport_name -v be2iscsi [Enter]
be2iscsi.f8:48:97:24:0f:e9 updated.
[root@localhost ~]#
[root@localhost ~]# iscsiadm -m iface -l be2iscsi.f8:48:97:24:0f:e9 --
op=update -n iface.initiatorname -v iqn.1990-
07.com.emulex:f8:48:97:24:0f:e9 [Enter]
be2iscsi.f8:48:97:24:0f:e9 updated.
[root@localhost ~]#
[root@localhost ~]# cd /var/lib/iscsi/ifaces/ [Enter]
[root@localhost ifaces]# cat be2iscsi.f8:48:97:24:0f:e9 [Enter]
# BEGIN RECORD 6.2.0-873.10.el6
iface.iscsi_ifacename = be2iscsi.f8:48:97:24:0f:e9
iface.hwaddress = f8:48:97:24:0f:e9
iface.transport_name = be2iscsi
iface.initiatorname = iqn.1990-07.com.emulex:f8:48:97:24:0f:e9
iface.vlan_id = 0
iface.vlan_priority = 0
iface.iface_num = 0
iface.mtu = 0
iface.port = 0
# END RECORD
[root@localhost ifaces]#

```

(7) Get the iSCSI target information.

```

[Format] iscsiadm -m discovery -t st -p <target IP address>:<TCP port
No.> -l be2iscsi.<MAC address in step (5)> [Enter]

```

```

[root@localhost ~]# iscsiadm -m discovery -t st -p 192.168.0.204:3260 -l
be2iscsi.f8:48:97:24:0f:e9 [Enter]
192.168.0.204:3260,1 iqn.1994-04.jp.co.hitachi:rsd.d9s.t.10198.0e014
[fe80::200:87ff:fe53:469e]:3260,11 iqn.1994-
04.jp.co.hitachi:rsd.d9s.t.10198.0e014

[root@localhost ~]#

```

(8) Connect to the iSCSI target.

```
[Format] iscsiadm -m node -p <target IP address>: <TCP port No.> -l  
[Enter]
```

```
[root@localhost ~]# iscsiadm -m node -p 192.168.0.204:3260 -l [Enter]  
:  
Login to [iface: be2iscsi.f8:48:97:24:0f:e9, target: 192.168.0.204:3260,1  
iqn.1994-04.jp.co.hitachi:rsd.d9s.t.10198.0e014, portal:  
192.168.0.204,3260] successful.  
[root@localhost ~]#
```

(9) In order to configure the iSCSI disk array to be mounted automatically when the system boot up, add mount option `_netdev` to `/etc/fstab`.

```
[root@localhost ~]# cat /etc/fstab [Enter]  
:  
UUID=6d9c645c-6581-4cac-96c4-b082ab3bdbf4 /mnt/disk1 ext4  
defaults,_netdev 0 0  
[root@localhost ~]#
```



In the OneCommand Manager services enabling, the following message may be displayed in iSCSI driver `be2iscsi ver.10.*.*.*` (* is a number.) environment.

```
sh: iscsiadm: command not found  
sh: iscsiadm: command not found  
sh: iscsiadm: command not found  
sh: iscsiadm: command not found  
:  
:
```

The reason is that the `iscsi-initiator-utils` package is not installed or `iscsi` service is not available. Then, perform step 1, 2 and step 3 (4) to install `iscsi-initiator-utils` package and enable the service.

(3) FCoE Driver

This section describes the FCoE driver installation procedure for onboard CNA and CNA expansion card.

1. Display the information of the driver version with [modinfo] command.

```
# modinfo -F version lpfc
```

Confirm that the driver version is listed in Table 3-1. If the installed driver is listed, this installation is not necessary. If the installed driver is needed to be updated, go to step 3.

2. Insert "10Gb CNA driver CD " media into the CD/DVD-ROM drive of system console. Select [Tools] - [Launch Virtual Media] located in upper side of Remote Console menu and open [Virtual Media Session] window. Check the "Mapped" check box of the CD/DVD drive to set the virtual drive.

Mount the media to any directory in the system. and copy the following installation file (rpm file) to any directory of the system. In this procedure, the directory is /tmp for example.

Table 3-20:

OS	Media path to the driver file
RHEL6.4 / 6.5 / 6.6 (32-bit x86)	/RHEL6/Drivers/x86/kmod-lpfc-<version>.el6.i686.rpm
RHEL6.4 / 6.5 / 6.6 (64-bit x86_64)	/RHEL6/Drivers/x64/kmod-lpfc-<version>.el6.x86_64.rpm

3. Check whether the lpfc driver is installed or not. Execute the following command. If the lpfc driver is installed, the package name of the lpfc driver is displayed.

```
#rpm -qa | grep lpfc
```

(Output example)

```
kmod-lpfc-8.3.7.20-1.el6.x86_64
```

If nothing is displayed, go to step (5).

4. Uninstall the driver with the following command. < lpfc package name > is the output of step 3..

```
# rpm -e < lpfc package name >
```

5. Execute the following command to install the new lpfc driver. The following <rpm file name> is the rpm file name in step 2

```
# rpm -ivh /tmp/<rpm file name>
```

6. Reboot the system.

```
# reboot
```

7. Confirm the newly installed driver version with the following command.

```
# modinfo -F version lpfc
```

8. If the driver version is correct, the installation procedure is complete. If the driver version is not correct, repeat the procedure from step 2.

9. Update the image of initial boot.

Backup the image file. "/boot/initramfs-<current kernel version>.img.org" is made for the backup file in this procedure for example.

```
# cp -a /boot/initramfs-< current kernel version >.img /boot/initramfs-<
  current kernel version >.img.org
# dracut -f /boot/initramfs-< current kernel version >.img
```

10. The system must reserve at least 256 MB for the crash dump. In a kernel line in /boot/grub/grub.conf (for LegacyBIOS) or in /boot/efi/EFI/redhat/grub.conf (for UEFI), change "crashkernel=auto" into "crashkernel=256M". And configure kdump service to start automatically.

```
# chkconfig kdump 345 on
```

11. Reboot the system for this change to take effect.
12. Execute the following commands to recognize the FCoE disk when kdump performs

```
# cp /etc/dracut.conf /etc/kdump-adv-conf/initramfs.conf
# service kdump restart
Stopping kdump: [ OK ]
Detected change(s) the following file(s):

/etc/kdump.conf
Rebuilding /boot/initrd-2.6.32-358.11.1.el6.x86_64kdump.img
Starting kdump: [ OK ]
```



The kdump in FCoE configuration can not be outputted to the external storage for data.

Table : The relation between storage and the possibility of kdump

No.	Storage for boot	Storage for data	kdump target	
			Storage for boot	Storage for data
1	Inner SAS HDD	External storage for FCoE	Possible	Impossible (outputted to the inner SAS HDD)
2	External storage for FCoE	External storage for FCoE	Possible	Impossible (Outputted to the external storage for boot)
3	External storage for FCoE	Inner SAS HDD	Possible	Possible
4	External storage for FCoE	(Not connected)	Possible	(Not connected)

3.2 Driver Installation (Fibre channel expansion card)

3.2.1 The available combinations of the FC driver and the FC firmware

The available combinations of FC drivers and the FC firmware are as follows.

Table 3-21:

(1) CB500 CB520A A1 / CB540A x1 model :

Firmware ver.	Windows Server 2008 (32bit)	Windows Server 2008	Windows Server 2008 R2	Windows Server 2012	Windows Server 2012 R2
2.01a3 (8G FC)	5.2.70.18	7.2.70.18	7.2.70.18	2.72.12.1	Not supported
2.01a12 (8G FC)	2.74.14.1	2.74.14.1	2.74.14.1	2.74.14.1	2.76.002.001
10.0.803.25(16G FC)	Not supported	Not supported	Not supported	Not supported	Not supported

Firmware ver.	RHEL5.7/5.9	RHEL6.2	RHEL6.4	RHEL6.5	RHEL6.6
2.01a3 (8G FC)	8.2.0.126	8.3.5.65	8.3.5.65	Not supported	Not supported
2.01a12 (8G FC)	8.2.2.18	8.3.7.20	8.3.7.20	10.0.803.24	Not supported
10.0.803.25(16G FC)	Not supported	Not supported	Not supported	Not supported	Not supported

(2) CB500 CB520H x1 model :

Firmware ver.	Windows Server 2008 (32bit)	Windows Server 2008	Windows Server 2008 R2	Windows Server 2012	Windows Server 2012 R2
2.01a3 (8G FC)	5.2.70.18	7.2.70.18	7.2.70.18	2.72.12.1	Not supported
2.01a12 (8G FC)	2.74.14.1	2.74.14.1	2.74.14.1	2.74.14.1	2.76.002.001
10.0.803.25(16G FC)	Not supported	Not supported	Not supported	Not supported	Not supported

Firmware ver.	RHEL5.7/5.9	RHEL6.2	RHEL6.4	RHEL6.5	RHEL6.6
2.01a3 (8G FC)	8.2.0.126	8.3.5.65	8.3.5.65	Not supported	Not supported
2.01a12 (8G FC)	8.2.2.18	8.3.7.20	8.3.7.20	10.0.803.24	Not supported
10.0.803.25(16G FC)	Not supported	Not supported	Not supported	Not supported	Not supported

(3) CB500 CB520H x2 model :

Firmware ver.	Windows Server 2008 (32bit)	Windows Server 2008	Windows Server 2008 R2	Windows Server 2012	Windows Server 2012 R2
2.01a3 (8G FC)	2.74.14.1	2.74.14.1	2.74.14.1	2.74.14.1	(Not supported)
2.01a12 (8G FC)	2.74.14.1	2.74.14.1	2.74.14.1 10.0.720.0	2.74.14.1 10.0.720.0	2.76.002.001 10.0.720.0
10.0.803.25(16G FC)	Not supported	Not supported	10.0.720.0	10.0.720.0	10.0.720.0
10.2.340.10(16G FC)	Not supported	Not supported	10.0.720.0	10.0.720.0	10.0.720.0

Firmware ver.	RHEL5.7/5.9	RHEL6.2	RHEL6.4	RHEL6.5	RHEL6.6
2.01a3 (8G FC)	Not supported	Not supported	8.3.5.65	Not supported	Not supported
2.01a12 (8G FC)	Not supported	Not supported	8.3.7.20 10.0.803.24	10.0.803.24	10.2.469.0
10.0.803.25(16G FC)	Not supported	Not supported	10.0.803.24	10.0.803.24	Not supported
10.2.340.10(16G FC)	Not supported	Not supported	10.0.803.24	10.0.803.24	10.2.469.0

(4) CB500 CB520X B1, CB2500 520X B1 model :

Firmware ver.	Windows Server 2008 (32bit)	Windows Server 2008	Windows Server 2008 R2	Windows Server 2012	Windows Server 2012 R2
2.01a12 (8G FC)	Not supported	Not supported	10.0.720.0 10.2.261.4	10.0.720.0 10.2.261.4	10.0.720.0 10.2.261.4
10.0.803.25(16G FC)	Not supported	Not supported	10.0.720.0	10.0.720.0	10.0.720.0
10.2.340.10(16G FC)	Not supported	Not supported	10.2.261.4	10.2.261.4	10.2.261.4

Firmware ver.	RHEL5.7/5.9	RHEL6.2	RHEL6.4	RHEL6.5 (64bit x86_64)	RHEL6.6 (64bit x86_64)
2.01a12 (8G FC)	Not supported	Not supported	Not supported	8.3.7.33 10.2.340.0	10.2.469.0
10.0.803.25(16G FC)	Not supported	Not supported	Not supported	10.0.803.24	Not supported
10.2.340.10(16G FC)	Not supported	Not supported	Not supported	10.2.340.0	10.2.469.0

(5) CB500 CB520H B3, CB2500 520H B3 model :

Firmware ver.	Windows Server 2008 (32bit)	Windows Server 2008	Windows Server 2008 R2	Windows Server 2012	Windows Server 2012 R2
2.01a12 (8G FC)	Not supported	Not supported	Not supported	10.2.261.4	10.2.261.4
10.2.340.10(16G FC)	Not supported	Not supported	Not supported	10.2.261.4	10.2.261.4

Firmware ver.	RHEL5.7/5.9	RHEL6.2	RHEL6.4	RHEL6.5 (64bit x86_64)	RHEL6.6 (64bit x86_64)
2.01a12 (8G FC)	Not supported	Not supported	Not supported	10.2.340.0	10.2.469.0
10.2.340.10(16G FC)	Not supported	Not supported	Not supported	10.2.340.0	10.2.469.0

(6) CB2000 X57A2 model :

Firmware ver.	Windows Server 2008 (32bit)	Windows Server 2008	Windows Server 2008 R2	Windows Server 2012	Windows Server 2012 R2
1.10a5 (8G FC)	5.2.70.18	7.2.70.18	7.2.70.18	2.72.12.1	Not supported
2.01a12 (8G FC)	2.74.14.1	2.74.14.1	2.74.14.1	2.74.14.1	2.76.002.001
10.0.803.25(16G FC)	Not supported	Not supported	10.0.720.0	10.0.720.0	10.0.720.0

Firmware ver.	RHEL5.7/5.9	RHEL6.2	RHEL6.4	RHEL6.5	RHEL6.6
1.10a5 (8G FC)	8.2.0.126	8.3.5.65	8.3.5.65	Not supported	Not supported
2.01a12 (8G FC)	8.2.2.18	8.3.7.20	8.3.7.20 10.0.803.24	10.0.803.24	Not supported
10.0.803.25(16G FC)	Not supported	Not supported	10.0.803.24	10.0.803.24	Not supported

(7) CB2000 X55A1 / X55A2 / X55x3 model :

Firmware ver.	Windows Server 2008 (32bit)	Windows Server 2008	Windows Server 2008 R2	Windows Server 2012	Windows Server 2012 R2
1.10a5 (8G FC)	5.2.70.18	7.2.70.18	7.2.70.18	2.72.12.1	Not supported
2.01a12 (8G FC)	2.74.14.1	2.74.14.1	2.74.14.1	2.74.14.1	2.76.002.001
10.0.803.25(16G FC)	Not supported	Not supported	10.0.720.0	10.0.720.0	10.0.720.0

Firmware ver.	RHEL5.7/5.9	RHEL6.2	RHEL6.4	RHEL6.5	RHEL6.6
1.10a5 (8G FC)	8.2.0.126	8.3.5.65	8.3.5.65	Not supported	Not supported
2.01a12 (8G FC)	8.2.2.18	8.3.7.20	8.3.7.20 10.0.803.24	10.0.803.24	Not supported
10.0.803.25(16G FC)	Not supported	Not supported	Not supported	Not supported	Not supported

(8) CB2000 X55R4 model :

Firmware ver.	Windows Server 2008 (32bit)	Windows Server 2008	Windows Server 2008 R2	Windows Server 2012	Windows Server 2012 R2
1.10a5 (8G FC)	2.74.14.1	2.74.14.1	2.74.14.1	2.74.14.1	Not supported
2.01a12 (8G FC)	2.74.14.1	2.74.14.1	2.74.14.1	2.74.14.1	2.76.002.001
10.0.803.25(16G FC)	Not supported	Not supported	10.0.720.0	10.0.720.0	10.0.720.0

Firmware ver.	RHEL5.7/5.9	RHEL6.2	RHEL6.4	RHEL6.5	RHEL6.6
1.10a5 (8G FC)	Not supported	Not supported	8.3.5.65	Not supported	Not supported
2.01a12 (8G FC)	Not supported	Not supported	8.3.7.20 10.0.803.24	10.0.803.24	Not supported
10.0.803.25(16G FC)	Not supported	Not supported	10.0.803.24	10.0.803.24	Not supported

3.2.2 Windows Server 2008 / Windows Server 2008 R2 Environment

This section describes the driver installation procedure for fibre channel expansion card. The following description assumes that user logs on with administrator privilege (such as Administrator).

The drivers are provided with DVD media. : "Server installation and monitoring tool ver.03-10 (or higher)" or "10Gb CNA Driver CD". For the information of the driver version, see "Support_EN.html" or "Readme_en.html" included in the media.

(1) Fibre Channel Driver

This section describes the driver installation procedure for fibre channel expansion card.

1. Check the driver version.
 Confirm the indication under [Start] – [Administrative tool] – [Computer Management] – [Device Manager] – [Storage Controllers].
2. Double-click the indications in Table 3-22.

Table 3-22:

Model	Indication under Storage Controllers
8Gb FC expansion card	Emulex LPe12***-HI, Storport Miniport Driver
8Gb FC board	Emulex LPe12002-M8, Storport Miniport Driver
16Gb FC expansion card	Emulex LPm16002B-HI, Storport Miniport Driver
16Gb FC board	Emulex LPe16002B-M6-HI, Storport Miniport Driver

If the indication "Fibre Channel Controller" is located under [Device Manager] – [Other devices], go to step 6.

3. Click "Driver Details" in "Driver" tab.
4. Select the item that has the extension of ".sys".
5. Confirm the value of "file version" area as the driver version.
 When the driver version is listed in Table3-21, the driver installation is not necessary. Otherwise, go to next step.
6. Insert the driver media into the DVD-ROM drive, and open the following folder for installing the Fibre Channel driver.

Table 3-23:

- CB500 CB520Ax1, CB540Ax1 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Location of the installation file
Windows Server 2008 (32bit)	2.74.14.1	\WinSrv2008\Drivers\FibreChannel\Emulex_04\x86
Windows Server 2008	2.74.14.1	\WinSrv2008\Drivers\FibreChannel\Emulex_04\x64
Windows Server 2008 R2	2.74.14.1	\WinSrv2008R2\Drivers\FibreChannel\Emulex_04\x64

- CB500 CB520Hx1 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Location of the installation file
Windows Server 2008 (32bit)	2.74.14.1	\\WinSrv2008\Drivers\FibreChannel\Emulex_04\x86
Windows Server 2008	2.74.14.1	\\WinSrv2008\Drivers\FibreChannel\Emulex_04\x64
Windows Server 2008 R2	2.74.14.1	\\WinSrv2008R2\Drivers\FibreChannel\Emulex_04\x64

- CB500 CB520H x2 model : "Server installation and monitoring tool " media :

OS	Driver ver.	Location of the installation file
Windows Server 2008 (32bit)	10.0.720.0	\\WinSrv2008\Drivers\FibreChannel\Emulex_05\x86
Windows Server 2008	10.0.720.0	\\WinSrv2008\Drivers\FibreChannel\Emulex_05\x64
Windows Server 2008 R2	10.0.720.0	\\WinSrv2008R2\Drivers\FibreChannel\Emulex_05\x64

- CB500 CB520X B1 model : "CB500 10Gb CNA Driver CD ver.01-06(or higher)" media :

OS	Driver ver.	Location of the installation file
Windows Server 2008 R2	10.2.261.4	\\WinSrv2008R2\Drivers\FibreChannel\Emulex\x64

- CB2500 520X B1 model : "CB2500 10Gb CNA Driver CD ver.01-06(or higher)" media :

OS	Driver ver.	Location of the installation file
Windows Server 2008 R2	10.2.261.4	\\WinSrv2008R2\Drivers\FibreChannel\Emulex\x64

- CB2000 Standard server blade x3 model: "Server installation and monitoring tool " media :

OS	Driver ver.	Location of the installation file
Windows Server 2008 (32bit)	2.74.14.1	\\WinSrv2008\Drivers\FibreChannel\Emulex_04\x86
Windows Server 2008	2.74.14.1	\\WinSrv2008\Drivers\FibreChannel\Emulex_04\x64
Windows Server 2008 R2	2.74.14.1	\\WinSrv2008R2\Drivers\FibreChannel\Emulex_04\x64

- CB2000 High performance server blade, Standard server blade x4 model :

" Server installation and monitoring tool " media :

OS	Driver ver.	Location of the installation file
Windows Server 2008 (32bit)	10.0.720.0	\\WinSrv2008\Drivers\FibreChannel\Emulex_05\x86
Windows Server 2008	10.0.720.0	\\WinSrv2008\Drivers\FibreChannel\Emulex_05\x64
Windows Server 2008 R2	10.0.720.0	\\WinSrv2008R2\Drivers\FibreChannel\Emulex_05\x64

7. Execute APInstall.exe in the folder.

Installation starts automatically. Wait until **AutoPilot Installer** in the task bar disappears. The installation will be completed in three to five minutes.

When **AutoPilot Installer** disappears, installation of the Fibre Channel driver is complete.

3.2.3 Windows Server 2012 / Windows Server 2012 R2 Environment

This section describes the driver installation procedure for Fibre Channel expansion card. The following description assumes that user logs on with administrator privilege (such as Administrator).

The drivers are provided with DVD media. : "Server installation and monitoring tool ver.03-10 (or higher)" or "10Gb CNA Driver CD". For the information of the driver version, see "Support_EN.html" or "Readme_en.htm" included in the media.

(1) Fibre Channel Driver

This section describes the Fibre Channel driver installation procedure for Fibre Channel expansion card.

1. Check the driver version.
Confirm the indication under [Start] – [Administrative tool] – [Computer Management] – [Device Manager] – [Storage Controllers].
2. Double-click the indications in Table 3-24 to be checked.

Table 3-24:

Model	Indication under Storage Controllers
8Gb FC expansion card	Emulex LPe12***-HI, Storport Miniport Driver
8Gb FC board	Emulex LPe12002-M8, Storport Miniport Driver
16Gb FC expansion card	Emulex LPm16002B-HI, Storport Miniport Driver
16Gb FC board	Emulex LPe16002B-M6-HI, Storport Miniport Driver

3. Click "Driver Details" in "Driver" tab.
4. Select the item that has the extension of ".sys".
5. Confirm the value of "file version" area.
When the driver version is listed in Table 3-21, the driver installation is not necessary. Otherwise, go to next step.
6. Insert the driver media into the DVD-ROM drive, and open the following folder for installing the FC driver.

Table 3-25:

- CB500 CB520A A1, CB540A x1 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Location of the installation file
Windows Server 2012	2.74.14.1	\\WinSrv2012\Drivers\FibreChannel\Emulex_04\x64
Windows Server 2012 R2	2.76.002.001	\\WinSrv2012R2\Drivers\FibreChannel\Emulex_04\x64

- CB500 CB520H x1 model : "Server installation and monitoring tool" media :

OS	Driver ver.	Location of the installation file
Windows Server 2012	2.74.14.1	\\WinSrv2012\Drivers\FibreChannel\Emulex_04\x64
Windows Server 2012 R2	2.76.002.001	\\WinSrv2012R2\Drivers\FibreChannel\Emulex_04\x64

- CB500 CB520H x2 model: "Server installation and monitoring tool" media :

OS	Driver ver.	Location of the installation file
Windows Server 2012	10.0.720.0	\\WinSrv2012\Drivers\FibreChannel\Emulex_05\x64
Windows Server 2012 R2	10.0.720.0	\\WinSrv2012R2\Drivers\FibreChannel\Emulex_05\x64

- CB500 CB520X B1, CB520H B3 model: "CB500 10Gb CNA Driver CD ver.01-06 (or higher)" media :

OS	Driver ver.	Location of the installation file
Windows Server 2012	10.2.261.4	\\WinSrv2012\Drivers\FibreChannel\Emulex\x64
Windows Server 2012 R2	10.2.261.4	\\WinSrv2012R2\Drivers\FibreChannel\Emulex\x64

- CB2500 520X B1, 520H B3 model: "CB2500 10Gb CNA Driver CD ver.01-06 (or higher)" media :

OS	Driver ver.	Location of the installation file
Windows Server 2012	10.2.261.4	\\WinSrv2012\Drivers\FibreChannel\Emulex\x64
Windows Server 2012 R2	10.2.261.4	\\WinSrv2012R2\Drivers\FibreChannel\Emulex\x64

- CB2000 Standard server blade x3 model: "Server installation and monitoring tool" media :

OS	Driver ver.	Location of the installation file
Windows Server 2012	2.74.14.1	\\WinSrv2012\Drivers\FibreChannel\Emulex_04\x64
Windows Server 2012 R2	2.76.002.001	\\WinSrv2012R2\Drivers\FibreChannel\Emulex_04\x64

- CB2000 High performance server blade, Standard server blade x4 model :
"Server installation and monitoring tool " media :

OS	Driver ver.	Location of the installation file
Windows Server 2012	10.0.720.0	\\WinSrv2012\Drivers\FibreChannel\Emulex_05\x64
Windows Server 2012 R2	10.0.720.0	\\WinSrv2012R2\Drivers\FibreChannel\Emulex_05\x64

7. Execute APInstall.exe in the folder.

Installation starts automatically. Wait until **AutoPilot Installer** in the task bar disappears. The installation will be completed in three to five minutes.

When **AutoPilot Installer** disappears, installation of the FC driver is complete.

3.2.4 Red Hat Enterprise Linux 5.7/ 5.9 / 6.2 Environment

This section describes the driver installation procedure for Fibre Channel expansion card. The procedure is common to RHEL5.7 and RHEL6.2. The following description assumes that user logs on with administrator privilege (such as Administrator).

The drivers are provided with CD media. : "Driver & Utility CD".

(1) Fibre Channel Driver

This section describes the Fibre Channel driver installation procedure for Fibre Channel expansion card.

1. Display the information of the driver version with [modinfo] command.

```
# modinfo -F version lpfc
```

2. Confirm that the driver version is listed in Table 3-17.
Install or reinstall the driver even if the driver version is listed in Table 3-17.
3. Insert the driver media into the DVD-ROM drive, and open the following folder for installing the NIC driver.

Table 3-26:

- "Driver & Utility CD" media :

OS	Location of the installation file
RHEL6.2	/hitachi_workaround/elx/lpfc
RHEL5.7/5.9	The driver to install additionally is not released. See the document "Hitachi Compute Blade 500 Series OS Installation Guide for Red Hat Enterprise Linux (MK-91CB500025) " for the way to install the driver.

- " Driver & Utility CD for RHEL" media :

OS	Location of the installation file
RHEL6.2	/RHEL/Drivers/CF702x_CF704x/RHEL6.2/FCoE
RHEL5.7 / 5.9	The driver to install additionally is not released.

4. Copy the tar.gz file and extract it. Execute the following shell script.

```
# ./elx_lpfc_install.sh
```

5. When the script is complete normally, the driver installation is complete.

3.2.5 Red Hat Enterprise Linux 6.4 / 6.5 / 6.6 Environment

(1) Fibre Channel Driver

This section describes the driver installation procedure for Fibre Channel expansion card. The following description assumes that user logs on with administrator privilege (such as Administrator).

The drivers are provided with CD media. : "Server installation and monitoring tool ver.03-10 (or higher)" or "10Gb CNA Driver CD".

1. Display the information of the driver version with [modinfo] command.

```
# modinfo -F version lpfc
```

Confirm that the driver version is listed in Table 3-1. If the installed driver is listed, this installation is not necessary. If the installed driver is needed to be updated, go to step 3.

2. Insert "10Gb CNA driver CD " media into the CD/DVD-ROM drive of system console. Select [Tools] - [Launch Virtual Media] located in upper side of Remote Console menu and open [Virtual Media Session] window. Check the "Mapped" check box of the CD/DVD drive to set the virtual drive.

Mount the media to any directory in the system. and copy the following installation file (rpm file) to any directory of the system. In this procedure, the directory is /tmp for example.

Table 3-27:

OS	Media path to the driver file
RHEL6.4/6.5/6.6 (32-bit x86)	/RHEL6/Drivers/x86/kmod-lpfc-<version>.el6.i686.rpm
RHEL6.4/6.5/6.6 (64-bit x86_64)	/RHEL6/Drivers/x64/kmod-lpfc-<version>.el6.x86_64.rpm

3. Check whether the lpfc driver is installed or not. Execute the following command. If the lpfc driver is installed, the package name of the lpfc driver is displayed.

```
#rpm -qa | grep lpfc
```

(Output example)

```
kmod-lpfc-8.3.7.20-1.el6.x86_64
```

If nothing is displayed, go to step (5).

4. Uninstall the driver with the following command. < lpfc package name > is the output of step 3..

```
# rpm -e < lpfc package name >
```

5. Execute the following command to install the new lpfc driver. The following <rpm file name> is the rpm file name in step 2

```
# rpm -ivh /tmp/<rpm file name>
```

6. Reboot the system.

```
# reboot
```

7. Confirm the newly installed driver version with the following command.

```
# modinfo -F version lpfc
```

8. If the driver version is correct, the installation procedure is complete. If the driver version is not correct, repeat the procedure from step 2.
9. Update the image of initial boot.



The following procedure must be applied for both FCoE boot and FCoE data connection.

Backup the image file. "/boot/initramfs-<current kernel version>.img.org" is made for the backup file in this procedure for example.

Execute the following commands.

```
# cp -a /boot/initramfs-< current kernel version >.img /boot/initramfs-<  
current kernel version >.img.org  
# dracut -f /boot/initramfs-< current kernel version >.img
```

10. If kdump is configured, execute the following commands

```
# touch /etc/kdump.conf  
# service kdump restart
```

Stopping kdump: [OK]
Detected change(s) the following file(s):

/etc/kdump.conf
Rebuilding /boot/initrd-2.6.32-358.11.1.el6.x86_64kdump.img
Starting kdump: [OK]

11. Restart OS.
12. Update the image of initial boot.



The following procedure must be applied for both FCoE boot and FCoE data connection.

Backup the image file. "/boot/initramfs-<current kernel version>.img.org" is made for the backup file in this procedure for example.

Execute the following commands.

```
# cp -a /boot/initramfs-< current kernel version >.img /boot/initramfs-<  
current kernel version >.img.org  
# dracut -f /boot/initramfs-< current kernel version >.img
```

13. If kdump is configured, execute the following commands

```
# touch /etc/kdump.conf  
# service kdump restart  
Stopping kdump: [ OK ]  
Detected change(s) the following file(s):  
  
/etc/kdump.conf  
Rebuilding /boot/initrd-2.6.32-358.11.1.el6.x86_64kdump.img  
Starting kdump: [ OK ]
```

14. Restart OS.

Driver Configuration

This chapter describes the driver configuration of the onboard CNA / CNA expansion card / LAN expansion card and Fibre Channel expansion card.

- [4.1 NIC Driver Configuration Parameters](#)
- [4.2 iSCSI Driver Configuration Parameters](#)
- [4.3 FCoE/FC Driver Configuration Parameters](#)

4.1 NIC Driver Options

Keep the default value of the NIC driver options except the following options.

- No.12 : Packet Size
Select the appropriate value to the system environment.
- No.13 : Preferred NUMA Node
- No.19 : SR-IOV
Select "Enabled" only for Hyper-V environment on Windows 2012 R2
- No.28 : VMQ (Virtual Machine Queues)
Select "Enabled"(Default value) when using VMQ in Hyper-V environment on Windows 2012 or Windows 2012 R2 (NIC driver ver.10.2.478.1 is needed.). Select "Disabled" when not using VMQ, or in Hyper-V environment on Windows 2008 R2.
- No.30 : VMQ (Virtual Machine Queues) Transmit
Select "Disabled" only for using SR-IOV function in Hyper-V environment on Windows 2012 R2.
- No.33 : NetworkDirect
Select "Enabled" when using RoCE on Windows Server 2012 R2.
- No.34 : NetworkDirect MTU
When using RoCE on Windows Server 2012 R2, the value can be changed from 1024 (default) to proper value. (4096 is recommended.)

The parameter list is shown below for reference.



In 4-socket SMP configuration, the **Preferred NUMA Node** (No.13) value should be changed for enough performance. (The appropriate value of Preferred NUMA Node differs by the system configuration.) The **Preferred NUMA Node** section is located in **Device Manager - Emulex OneConnect OC***** , NIC/TOE (* is a letter) Properties** window - **Advanced** tab - **Performance** - **CPU Affinity**.

Table 4-1:

NIC Driver Parameters

No	Option Name	Acceptable Values	Supported Operating Systems	Definition
1	Class of Service (802.1p)	Automatic Priority (default) Filtered Priority User Priority Disable Priority	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	The following modes are supported for selecting 802.1p priority tags: . Automatic Priority . The DCBX standard allows the network adapter to negotiate priority class usage with DCBX aware endpoints such as switches or network cards.

				<p>If the peer indicates that priority pause is supported for a non-zero priority, the NIC automatically inserts the default priority in all transmitted packets. This is the default mode, allowing priority pause to operate for both storage and network traffic. If the peer indicates a zero default priority (such as when the peer does not support priority pause), the device uses the "Non-Storage Priority" mode discussed below.</p> <p>. Filtered Priority . This mode coerces the user priorities in each packet to avoid sending packets on the network function that may disrupt the converged adapter's storage traffic. The network device uses the next lower priority if a conflict exists. This mode is useful if multiple network priorities are necessary. Only a limited number of classes are supported for priority pause, so typically it does not function optimally in this mode.</p> <p>. User Priority . This mode allows any user specified priority value and should be limited to cases where storage functions are not used.</p> <p>. Disable Priority . The adapter always transmits either untagged packets, or VLAN ID (802.1q) tagged packets with a priority value (802.1p) of zero.</p>
2	Enhanced Transmission Selection	Disabled (default) Enabled	<p>ETS is not supported in conjunction with VMO technology.</p> <p>Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2</p>	<p>If ETS is enabled, the driver filters transmit packets based on the 802.1p priority tag into multiple separate transmit rings. The network switch should be configured for ETS to group priorities into a priority group (or traffic class). Each priority group may be assigned a QoS bandwidth limit. For example, one network priority may to support priority flow control</p>

				<p>to achieve loss-less network traffic. Using separate hardware interfaces in the driver allows each priority to progress at a different rate, or pause temporarily without affecting the other priorities.</p> <p>When ETS is enabled, all configurations regarding bandwidth and priority flow control should be performed on the network switch. The adapter will learn the configuration using the DCBx protocol.</p>
3	Flow Control	<p>Disabled RX and TX Enabled (default) Rx Enable/Tx Disable Tx Enable/Rx Disable</p>	<p>Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2</p>	<p>Flow control is almost always advantageous to avoid packet drops on the network. The switch or network peer must also have flow control enabled.</p> <p>The IEEE 802.3x Ethernet specification defines a control frame between peers that can request a pause in packet transmissions. This allows one system to request a temporary halt of all incoming traffic when receive buffer space is exhausted.</p> <p>The network device may be configured to respond to pause frames (Rx Enable) and/or to send pause frames (Tx Enable).</p>
4	Interrupt Moderation	<p>None Static (90k) Int/sec Static (70k) Int/sec Static (50k) Int/sec Static (40k) Int/sec Static (30k) Int/sec Static (25k) Int/sec Static (20k) Int/sec Static (15k) Int/sec Static (10k) Int/sec Static (5k) Int/sec Adaptive (70k) Int/sec Adaptive (50k) Int/sec Adaptive (40k) Int/sec Adaptive (30k) Int/sec (default) Adaptive (20k) Int/sec</p>	<p>Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2</p>	<p>The network device uses interrupt moderation algorithms to reduce the total amount of CPU cycles spent processing interrupts which increases efficiency for the system. However, interrupt moderation increases the latency of each send and receive. It should only be disabled when short latencies are more important than efficient CPU utilization.</p> <p>The "None" setting disables all delays to minimize latency.</p> <p>The static settings use a constant interrupt delay to avoid any spikes in interrupt rate.</p> <p>The adaptive settings cause the driver to dynamically maintain a target</p>

		Adaptive (15k) Int/sec Adaptive (12k) Int/sec Adaptive (10k) Int/sec Adaptive (7k) Int/sec Adaptive (5k) Int/sec		interrupt rate. If CPU usage is too high, choose a higher adaptive value to increase the interrupt delays (and reduce the rate of interrupts).
5	IP Checksum Offload (IPv4)	Disabled RX and TX Enabled (default) RX Enabled TX Enabled	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	This offloads the transmit and/or receive IPv4 checksum computation. Offloading checksums increases system efficiency.
6	IP Checksum Offload (IPv6)	Disabled RX and TX Enabled (default) RX Enabled TX Enabled	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	This offloads the transmit and/or receive IPv6 checksum computation. Offloading checksums increases system efficiency.
7	Large Send Offload v1 (IPv4)	Disabled Enabled (default)	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	Large Send Offload allows the NIC hardware to segment large TCP packets (up to 64kB) into smaller packets (<= "Packet Size") that may be transmitted. This segmentation increases transmit efficiency for TCP applications that send large buffers. During segmentation, the hardware computes the IPv4 and TCP checksums for each individual packet. The Windows Version 1 LSO supports only IPv4.
8	Large Send Offload v2 (IPv4)	Disable Enable (default)	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	Large Send Offload allows the NIC hardware to segment large TCP packets (up to 64kB) into smaller packets (<= "Packet Size") that may be transmitted. This segmentation increases transmit efficiency for TCP applications that send large buffers. During segmentation, the hardware computes the IPv4 and TCP checksums for each individual packet. The Windows Version2 LSO supports larger offload sizes.
9	Large Send Offload v2 (IPv6)	Disabled Enabled (default)	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	Large Send Offload allows the NIC hardware to segment large TCP packets (up to 64kB) into smaller packets (less than the MTU) that may be transmitted. This segmentation increases transmit efficiency for TCP applications that send large buffers. During segmentation, the hardware computes the TCP checksums for each

				<p>individual packet.</p> <p>IPv6 support requires LSO Version 2, included in Windows 2008 and later.</p>
10	Maximum Number of RSS Queues	<p>4-16</p> <p>8 (default)</p>	<p>Windows 2008 R2</p> <p>Windows 2012</p> <p>Windows 2012 R2</p>	<p>When RSS is enabled, this parameter controls the number of receive queues. Typically, this is left at the maximum value. Windows reduces the number of queues as necessary based on the number of installed CPU cores. This value may be reduced during performance tuning for a particular application. It is possible that system performance may improve by limiting the number of RSS queues.</p> <p>Greater than 4 RSS queues requires Advanced Mode Support be enabled in the BIOS controller configuration.</p>
11	Network Address	<p>Valid MAC Address</p> <p>The default setting is None.</p>	<p>Windows 2008</p> <p>Windows 2008 R2</p> <p>Windows 2012</p> <p>Windows 2012 R2</p>	<p>This overrides the permanent MAC address for the interface. The MAC address should follow this format XX:XX:XX:XX:XX:XX, where X is a hex digit (0-9 or A-F).</p> <ul style="list-style-type: none"> . The address cannot be a multicast address, which has the lowest bit in the first byte set. . The address cannot be all zeros. <p>For example, 01:00:00:00:00:00 is not valid, while 02:00:00:00:00:00 is valid.</p>
12	Packet Size	<p>1514 (default)</p> <p>9014</p> <p>8222</p> <p>4088</p>	<p>Windows 2008</p> <p>Windows 2008 R2</p> <p>Windows 2012</p> <p>Windows 2012 R2</p>	<p>Configures packet size for OneConnect NIC only.</p> <p>This parameter determines the maximum packet size transmitted and received on the interface. A 1514 byte frame size is standard, while larger packets are called jumbo frames.</p> <p>Using a higher frame size is generally more efficient, but it uses more system memory. A larger frame size also requires support on the network switch.</p>
13	Preferred NUMA Node	<p>Not present or a value from 0-65535.</p> <p>Optional. No default setting is set.</p>	<p>Windows 2008</p> <p>Windows 2008 R2</p> <p>Windows 2012</p> <p>Windows 2012 R2</p>	<p>Most modern multi-socket servers have separate memory controllers for each CPU socket. These systems have non-uniform memory access (NUMA)</p>

				<p>latencies for a given CPU core to access the local versus remote memory node.</p> <p>By setting this property, the driver attempts to use both memory and CPU cores from the given NUMA node. If the Preferred NUMA node is not set, the driver uses the preferred NUMA node as specified by the computer's BIOS.</p> <p>For best performance, the network applications should try to use memory and CPU affinity from the same NUMA node. This level of tuning is primarily noticeable when multiple adapters are running.</p>
14	Receive Buffers	64-16384, inclusive The default value is 896.	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	This determines the number of Ethernet receive buffers allocated per receive queue. This number may be adjusted by the driver as needed.
15	Receive CPU	"Not Present" or a value from 0 through (number of CPUs on the system-1). Optional. There is no default setting.	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	Sets the logical CPU used for processing the non-RSS receive packets. By default, the driver intelligently chooses a CPU in the system, so this parameter should only be used for advanced performance tuning. RSS packets are processed by the set of RSS CPUs provided by the Windows operating system.
16	Receive Side Scaling	Disabled Enabled (default)	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	<p>Support for multiple RSS queues if enabled.</p> <p>RSS scales receive processing over multiple CPUs in parallel. This scaling typically improves application performance; however, it tends to increase CPU usage on low end machines.</p> <p>RSS is only supported on two primary adapters per device.</p> <p>For additional PCI functions, RSS does not appear in the Properties List.</p>
17	Recv Segment Coalescing (IPv4)	Disabled (default on Windows 2008, 2008 R2) Enabled (default on Windows 2012)	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	RSC merges multiple TCP segments and identifies them as a single coalesced unit to the operating system's TCP/IP stack. This reduces the per-packet receive processing

				<p>overhead and CPU usage when standard 1514 byte sized frames are in use.</p> <p>Notes:</p> <ul style="list-style-type: none"> . If checksum offloads are disabled, RSC should also be disabled. RSC depends on checksum offloads for better performance. . Both RSC (IPV4) and RSC (IPV6) are coerced to zero if TCP Connection Offload (IPV4) is enabled.
18	Recv Segment Coalescing (IPv6)	<p>Disabled (default on Windows 2008, 2008 R2)</p> <p>Enabled (default on Windows 2012)</p>	<p>Windows 2008</p> <p>Windows 2008 R2</p> <p>Windows 2012</p> <p>Windows 2012 R2</p>	<p>RSC merges multiple TCP segments and identifies them as a single coalesced unit to the operating system's TCP/IP stack. This reduces the per-packet receive processing overhead and CPU usage when standard 1514 byte sized frames are in use.</p> <p>Notes:</p> <ul style="list-style-type: none"> . If checksum offloads are disabled, RSC should also be disabled. RSC depends on checksum offloads for better performance. . Both RSC (IPV4) and RSC (IPV6) are coerced to zero if TCP Connection Offload (IPV4) is enabled.
19	SR-IOV	<p>Disabled (default)</p> <p>Enabled</p>	<p>Windows 2012</p> <p>Windows 2012 R2</p>	<p>SR-IOV enables the adapter to allocate virtual PCI functions for each virtual machine in Hyper-V. Note that the virtual switch and virtual network adapter must have SR-IOV enabled in the Hyper-V Manager.</p> <p>When using SR-IOV, the Emulex NIC driver must be installed on each virtual function within the virtual machine. SR-IOV provides a direct hardware interface from the virtual machine to the networking adapter, which reduces latency and improves performance.</p> <p>The Windows 2012 Server SR-IOV architecture establishes each Emulex virtual NIC with a corresponding emulated NIC. This allows the virtual machine to seamlessly failover to the emulated NIC if SR-IOV is disabled. It</p>

				also allows Live Migration to another system, regardless of the installed NIC hardware.
20	TCP Checksum Offload (IPv4)	Disable RX and TX Enabled (default) RX Enabled TX Enabled	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	TCP Checksum Offload (IPv4) offloads the transmit and/or receive IPv4 TCP checksum computation. Offloading checksums increases system efficiency.
21	TCP Checksum Offload (IPv6)	Disable RX and TX Enabled (default) RX Enabled TX Enabled	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	TCP Checksum Offload (IPv6) offloads the transmit and/or receive IPv6 TCP checksum computation. Offloading checksums increases system efficiency.
22	TCP Connection Offload (IPv4)	Enabled Disabled (default)	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	<p>Note: TCP Connection Offload is not supported on 16Gb UCNAs.</p> <p>If TCP offload is enabled, the device offloads the entire TCP protocol, including ACK processing, retransmits, and timers. Applications that prepost receive buffers (before the data arrives) may avoid data copies in the receive path, which substantially increases the system efficiency and data rates.</p> <p>Windows does not offload TCP connections if any of the following are enabled:</p> <ul style="list-style-type: none"> . Network Load Balancing . IPSEC . Network Address Translation . NDIS 5.1 Intermediate Drivers <p>TCP offload must be enabled in the Windows operating system with the shell command:</p> <pre>netsh int tcp set global chimney=enabled</pre> <p>This parameter appears disabled if the firmware installed on your device does not support TCP connection offload. Upgrading the firmware may resolve this issue.</p> <p>View the "Statistics" property page to ensure that TCP connection offload is working.</p> <p>Note: Both RSC (IPV4) and RSC (IPV6) are coerced to zero if TCP</p>

				Connection Offload (IPv4) is enabled.
23	TCP Offload Optimization	Optimize Latency Optimize Throughput (default)	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	This parameter only applies to TCP connection offload, which must be enabled in the "Protocol Offloads" section. Most applications perform better with TCP Offload Optimization set to "Optimize Throughput" which handles large data transfers with minimal CPU impact. Setting this parameter to "Optimize Latency" causes receive data to be delivered to the application without waiting for a TCP PSH. This causes additional receive indications that typically decrease total throughput.
24	Transmit Buffers	64-256, inclusive The default setting is 256.	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	Transmit Buffers sets the number of Ethernet transmits that may be posted to the hardware at any given time. The default value is sufficient to achieve maximum performance. Reducing this value conserves system memory.
25	Transmit CPU	"Not Present" or a value from 0 through (number of CPUs -1). Optional. There is no default setting.	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	Sets the CPU to be used to process transmit completions. By default, the driver intelligently chooses a CPU in the system, so this parameter should only be set for advanced performance tuning.
26	UDP Checksum Offload (IPv4)	Disabled RX and TX Enabled (default) RX Enabled TX Enabled	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	UDP offload checksum settings offload the transmit and/or receive IPv4 UDP checksum computation. Offloading checksums increases system efficiency.
27	UDP Checksum Offload (IPv6)	Disable RX and TX Enabled (default) RX Enabled TX Enabled	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	User Datagram Protocol (UDP) offload checksum settings offload the transmit and/or receive IPv6 UDP checksum computation. Offloading checksums increases system efficiency.
28	VMQ (Virtual Machine Queues)	Enabled (default) Disabled	VMQs require Windows Server 2008 R2 or later with Hyper-V.	VMQs are dedicated hardware receive queues for virtual machines that filter receive packets based on the destination

				<p>MAC address and/or VLAN.</p> <p>Receive buffers can be allocated for each queue from VM memory.</p> <p>This improves network throughput by distributing processing of network traffic for multiple VMs among multiple processors. It reduces CPU utilization by offloading receive packet filtering to NIC hardware.</p> <p>VMQs prove beneficial when 4 or more VMs are in use.</p>
29	VMQ (Virtual Machine Queues) Lookahead Split	Enabled (default) Disabled	Windows 2008 R2 Lookahead split is not supported for jumbo frames.	<p>If Lookahead split is enabled with VMQs, the NIC can directly DMA received packets to the virtual machine memory, eliminating a packet copy from the host to VM.</p> <p>Lookahead split requires Advanced Mode Support is enabled in the BIOS controller configuration.</p> <p>Note: Lookahead split is not supported for jumbo frames.</p>
30	VMQ (Virtual Machine Queues) Transmit	Enabled (default) Disabled	Windows 2008 R2 Windows 2012 Windows 2012 R2	<p>If this option is enabled with VMQs, separate transmit queues are created for each VM network interface. Send and receive interrupts for a VM network interface are processed on the same CPU(s).</p>
31	VLAN Identifier (802.1q)	Not Present (default) 1 to 4094	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	<p>If selected, the adapter adds a VLAN tag to all transmitted packets, and only receives packets with the matching VLAN tag.</p> <p>Note: This property should not be used when the Emulex Teaming Driver is enabled. In that case, VLAN configuration should be performed in the Teaming Driver application.</p> <p>Note: This property should not be used with Hyper-V. In that case, the Microsoft Hyper-V Manager should be used to configure VLANs on each virtual machine.</p>
32	Wake on LAN	Enabled (default) Disabled Notes:	Windows 2008 Windows 2008 R2 Windows 2012	<p>Enabling "Wake on LAN" allows the network device to wake up the computer when a magic packet is</p>

		. For Windows Server 2012 inbox drivers, "Wake on LAN" is disabled by default and not overwritten on driver updates. . "Wake on LAN" is disabled by default on OCe10102-series adapters.	Windows 2012 R2	received during standby. In Blade server configurations, "Wake On Lan" is only supported on two primary adapters per device. Additional PCI functions appear disabled.
33	NetworkDirect	0—Disabled 1—Enabled (default)	Windows 2012 R2	The Network Direct feature enables an offloaded RDMA interface for SMB 3.0 network attached storage traffic using Microsoft's SMB Direct protocol. For best performance, priority flow control (PFC) should be configured on the network switch. Emulex defaults to priority (PFC) 5 for ROCE traffic, although it will still work without PFC enabled.
34	NetworkDirect MTU	256 512 1024 (default) 2048 4096	Windows 2012 R2	The maximum transmission unit (MTU) or frame size for ROCE traffic may be configured with this parameter.

NIC Driver Parameters (Linux)

No	Option Name	Acceptable Values	Supported Operating Systems	Definition
1	num_vfs	Value : 0 - 16 Default : 0 (SR-IOV is not enabled)	RHEL5.7/5.9/6.2/6.4/6.5/6.6	In systems supporting SR-IOV, when IOV is enabled, this parameter indicates the number of VFs to be enabled per PF.
2	rss_on_mc	Value : 0 - 1 0 : Disabled (default) 1 : Enabled	RHEL5.7/5.9/6.2/6.4/6.5/6.6	Enables receive-side scaling (RSS) on multichannel functions that have the capability.
3	rx_frag_size	Value : 2048 / 4096 / 8192 Default : 2048	RHEL5.7/5.9/6.2/6.4/6.5/6.6	The size of fragments used to DMA received data.

4.2 iSCSI Driver Configuration Parameters

Keep the default configuration of the parameters of the iSCSI driver. The modification of the parameters is not supported. The parameter list is shown below for reference.

Table 4-2:

iSCSI Driver Parameters (Windows)

No	Option Name	Acceptable Values	Supported Operating Systems	Definition
1	ETO	0-3600 seconds 90 seconds (default)	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	ETO in seconds. This parameter determines the amount of time the UCNA driver waits for the target to be available after it has lost connection to the target during an I/O operation. Note: ETO values are configurable via the Windows registry.
2	im_policy	0-4 2 (default)	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	The Interrupt Moderation policy parameter controls the rate of interrupts for the UCNA.
3	large_io	64-512 64 (default)	Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	Maximum transfer size in a single I/O request, in KB. By default, the iSCSI driver supports a maximum of 64 KB of data and 16 scatter/gather entries in a single I/O request. This option enables support for 512 KB of data in a single I/O request. If an application issues an I/O request that is larger than 64 KB or that needs more than 16 scatter/gather entries, the request is split into multiple requests by the Storport driver. Note: If the large_io parameter is set to 512, the amount of physical memory consumed by the driver increases. Also, although intermediate values between 64 and 512 are accepted, the memory used by the driver is the same as is used if large_io is set to 512.
4	LDTO	0-3600 seconds 20 seconds (default)	Windows 2008 Windows 2008 R2 Windows 2012	LDTO, in seconds. This parameter determines the amount of time the universal converged network adapter

			Windows 2012 R2	(UCNA) driver waits for the controller's physical link to be available before reporting that the LUNs are unavailable to the operating system. Note: LDTO values are configurable via the Windows registry.
5	lqd		Windows 2008 Windows 2008 R2 Windows 2012 Windows 2012 R2	

Table 4-3:

iSCSI Driver Parameters (Linux)

No	Option Name	Acceptable Values	Supported Operating Systems	Definition
1	ETO	0-3600 seconds 30 seconds (default)	RHEL5.7/5.9 RHEL6.2/6.4/6.5/6.6	The Extended Timeout (ETO) parameter specifies the amount of time, in seconds that the initiator driver waits for the target to become available once it has lost the connection to the target during an I/O operation.
2	large_io	128 / 512 128 (default)	RHEL5.7/5.9 RHEL6.2/6.4/6.5/6.6	The Large I/O (large_io) parameter specifies the maximum transfer size in a single I/O request in KBs (1KB = 1024 bytes). By default, the OneConnect iSCSI driver supports up to 128 KB of data in a single I/O request. When large_io is set to 512, then up to 512 KB of data can be supported in a single I/O request.
3	LDTO	0-3600 seconds 20 seconds (default)	RHEL5.7/5.9 RHEL6.2/6.4/6.5/6.6	The Link Down Timeout (LDTO) parameter determines the amount of time, in seconds, that the initiator driver waits for the controller's physical link to become available before reporting that the LUNs are unavailable to the operating system.
4	m_policy	. 0 - disables the interrupt algorithm . 1 - highest interrupt rate . 2 - moderate interrupt rate (default) . 3 - an interrupt rate between moderate and lowest . 4 - lowest interrupt rate	RHEL5.7/5.9 RHEL6.2/6.4/6.5/6.6	The Interrupt Moderation policy (m_policy) parameter specifies the rate of interrupts for OneConnect UCNAs. The possible values are: . 0 - disables the interrupt algorithm . 1 - highest interrupt rate . 2 - moderate interrupt rate (default) . 3 - an interrupt rate between moderate and lowest . 4 - lowest interrupt rate

4.3 FCoE/FC Driver Configuration Parameters

The parameter that can be modified is "QueueDepth" on Windows or "lun-queue-depth" on Linux. These parameters may improve the performance.

See the chapter 3 of "Hitachi Compute Blade Emulex Adapter User's Guide for Utility" for how to set the parameter "QueueDepth".

See the chapter 4 of "Hitachi Compute Blade Emulex Adapter User's Guide for Utility" for how to set the parameter "lun-queue-depth".

Keep the default configuration of the other parameters of the FCoE driver. The modification of the parameters is not supported. The parameter list is shown below for reference.

[Notes]

- A parameter has one of the following activation requirements:

-- Dynamic : The change takes effect while the system is running.

-- Reset : An adapter reset from the utility is required before the change takes effect.

-- Reboot : A reboot of the entire machine is required before the change takes effect.

In this case, you are prompted to perform a reboot when you exit the utility.

- If the Adapter/Protocol column is blank, the parameter is supported on both LightPulse and OneConnect adapters. "LightPulse only" indicates that the parameters are supported only on LightPulse adapters. "FC only" indicates that the parameters are supported on LightPulse and non-LightPulse FC adapters.

Table 4-4:

FCoE/FC Driver (Storport Miniport Driver) Configuration Parameters (Windows)

No	Parameter	Definitions	Activation Requirement	Adapter/Protocol
1	AutoMap=n	AutoMap controls the way targets are assigned SCSI IDs. Discovered targets are assigned persistent SCSI IDs according to the selected binding method. Persistent bindings do not take effect with the driver in stand-alone mode. 0 = automap is disabled. The OneCommand Manager application persistently sets the SCSI	Reboot	

		<p>address of a discovered FCP capable FC node (target).</p> <p>1 = automap by WWNN. 2 = automap by WWPN. 3 = automap by DID</p> <p>Value: 0-3 Default = 2</p>		
2	Class=n	<p>Class selects the class of service on FCP commands.</p> <p>If set to 2, class = 2. If set to 3, class = 3.</p> <p>Value: 2-3 Default = 3</p>	Dynamic	FC Only
3	CoalesceMsCnt=n	<p>CoalesceMsCn specifies wait time in milliseconds to generate an interrupt response if CoalesceRspCnt has not been satisfied. Zero specifies an immediate interrupt response notification. A non-zero value enables response coalescing at the specified interval in milliseconds.</p> <p>Value: 0.63 (decimal) or 0x0.0x3F (hex) Default = 0 (0x0)</p>	Reset	LightPulse Only
4	CoalesceRspCnt=n	<p>CoalesceRspCn specifies the number of response entries that trigger an Interrupt response.</p> <p>Value: 0-255 (decimal) or 0x1-0xFF (hex) Default = 8 (0x8)</p>	Reset	LightPulse Only
5	ConfigScale	<p>ConfigScale sets the memory footprint profile in accord with the anticipated use case on a per port basis. While the default value is 4, a value of 1 is considered to be the typical use case. The ConfigScale parameter supersedes the ExtTransferSize parameter for OneConnect adapters.</p> <p>For OneConnect adapters: For all values except 0, up to 1024 targets can be discovered and mapped. When ConfigScale= 0, only 128 targets can be discovered and mapped. A value of 0 limits max XRIs to 512.</p> <p>Note: Use ConfigScale = 0 to minimize the driver's per-port memory foot print. When ConfigScale is set to: - 0 - the max transfer size is limited to 500 KB - 1 - the max transfer size is limited to 1012 KB.</p>	Reboot	OneConnect

		<ul style="list-style-type: none"> - 2 - the max transfer size is limited to 2036KB. --Use ConfigScale = 2 if connecting to tape devices. - 3 - the max transfer size is limited to 2036KB, which is the best setting if you are running performance benchmarks in a non-production environment. - 4 - the max transfer size is limited to 512KB. 		
6	DiscoveryDelay=n	<p>DiscoveryDelay controls whether the driver waits for 'n' seconds to start port discovery after link up. If set to 0 = immediate discovery after link up. If set to 1 or 2 = the number of seconds to wait after link-up before starting port discovery.</p> <p>Value: 0-2 seconds (decimal) Default = 0.</p>	Dynamic	
7	DriverTraceMask	<p>The DriverTraceMask parameter is only available on operating systems that support extended system event logging.</p> <p>If set to 0 = the parameter is disabled. If set to 1 = error events logging is enabled. If set to 4 = warning events logging is enabled. If set to 8 = informational events logging is enabled.</p> <p>The values can be masked to generate multi-levels of events logging.</p> <p>Values: 0, 1, 4, and 8. Default =0.</p>	Dynamic	
8	EnableAck0=n	<p>Set to 1 to force sequence rather than frame level acknowledgement for class 2 traffic over an exchange. This applies to FCP data exchanges on IREAD and IWRITE commands.</p> <p>Value: 0-1 (decimal) Default = 1</p>	Reset	FC only
9	EnableAUTH	<p>EnableAUTH enables fabric authentication. This parameter requires the authentication to be supported by the fabric. Authentication is enabled when this value is set to 1.</p> <p>Value: 0-1 Default = 0</p>	Reboot	FC only (up to and including 8 Gb)
10	EnableFDMI=n	<p>If set to 1, enables management server login on fabric discovery. This allows FDMI to operate on switches that have FDMI-capable firmware.</p> <p>If set to 2, FDMI operates and uses the host name feature of FDMI.</p> <p>Value: 0-2 (decimal) Default = 0</p>	Reset	

11	EnableNPIV=n	<p>If set to 1, enables NPIV. Requires NPIV supported firmware for the adapter.</p> <p>Value: 0-1</p> <p>Default = 0 (disabled)</p> <p>Notes:</p> <ul style="list-style-type: none"> . To run the driver using NPIV or SLI-3 optimization, the firmware must be version 2.72a0 or later. If an earlier version is used, the driver runs in SLI-2 mode and does not support NPIV. . NPIV is not available on 1 Gb/s and 2 Gb/s adapters. 	Reboot	
12	ExtTransferSize	<p>ExtTransferSize is an initialization-time parameter that affects the maximum SGL that the driver can handle, which determines the maximum I/O size that a port will support.</p> <p>If set to 0 = the maximum default transfer size is 512KB for all controller models.</p> <p>If set to 1= the maximum transfer size is 1MB.</p> <p>If set to 2 = the maximum transfer size is 2MB.</p> <p>If set to 3 = the maximum transfer size is 4MB.</p> <p>Value: 0-3</p> <p>Default = 0 (disabled)</p>		LightPulse adapters only including the LPe16000 HBAs.
13	FrameSizeMSB=n	<p>FrameSizeMSB controls the upper byte of receive FrameSize if issued in PLOGI. This allows the FrameSize to be constrained on 256-byte increments from 256 (1) to 2048 (8).</p> <p>Value: 0-8</p> <p>Default = 0</p>	Reset	
14	InitTimeout=n	<p>Determines the number of time-out seconds during driver initialization for the link to come up. If the link fails to come up by InitTimeout, driver initialization exits but is still successful. If the link comes up before InitTimeout, the driver sets double the amount for discovery to complete.</p> <p>Value: 5-30 seconds or 0x5-0x1E (hex)</p> <p>Default = 15 seconds (0xF)</p>	Reboot	
15	LimTransferSize	<p>Limits maximum transfer size when non-zero to selectable values.</p> <p>Values:</p> <ul style="list-style-type: none"> 0 = Port Default 1 = 64Kb 2 = 128 Kb 3 = 256Kb 	Reboot	
16	LinkSpeed=n	LinkSpeed has significance only if the adapter	Reset	FC Only

		<p>supports speeds other than one Gb/s.</p> <p>Value: Auto-select, 1Gb/s, 2Gb/s, 4Gb/s, 8Gb/s, 16Gb/s</p> <p>Default = Auto-select</p> <p>Note:</p> <p>Setting this option incorrectly can cause the adapter to fail to initialize.</p> <p>8Gb 2-port FibreChannel adapter do not support 16Gb/s. 16Gb 2-port FibreChannel adapter do not support 2Gb/s.</p>		
17	LinkTimeOut=n	<p>LinkTimeOut applies to a private loop only. A timer is started on all mapped targets using the link timeout value. If the timer expires before discovery is re-resolved, commands issued to timed out devices returns a SELECTION_TIMEOUT.</p> <p>The Storport driver is notified of a bus change event which leads to the removal of all LUNs on the timed out devices.</p> <p>Value: 1-500 seconds or 0x0-0xFE (hex)</p> <p>Default = 30 (0x1E)</p>	Dynamic	
18	LogErrors=n	<p>LogErrors determine the minimum severity level required to enable entry of a logged error into the system event log. Errors are classified as severe, malfunction or command level.</p> <p>A severe error requires user intervention to correct a firmware or adapter problem. An invalid link speed selection is an example of a severe error.</p> <p>A malfunction error indicates that the system has problems, but user intervention is not required.</p> <p>An invalid fabric command type is an example of a malfunction error.</p> <p>An object allocation failure is an example of a command error.</p> <p>If set to 0 = all errors are logged.</p> <p>If set to 1 = command level errors are logged.</p> <p>If set to 2 = malfunction errors are logged.</p> <p>If set to 3 = severe errors are logged.</p> <p>Value: 0-3</p> <p>Default = 3</p>	Dynamic	
19	NodeTimeout=n	<p>The node timer starts when a node (that is, a discovered target or UCNA) becomes unavailable.</p> <p>If the node fails to become available before the NodeTimeout interval expires, the operating system is notified so that any associated devices (if the node is a target) can be removed. If the node becomes available before NodeTimeout</p>	Dynamic	

		<p>expires the timer is canceled and no notification is made.</p> <p>Value: 1-255 seconds or 0x0.0xFF (hex)</p> <p>Default = 30 (0x1E)</p>		
20	QueueDepth=n	<p>QueueDepth requests per LUN/target (see QueueTarget parameter). If you expect the number of outstanding I/Os per device to exceed 32, then you must increase to a value greater than the number of expected I/Os per device (up to a value of 254). If the QueueDepth value is set too low, a performance degradation can occur due to driver throttling of its device queue.</p> <p>QueueDepth supports more than 1000 outstanding commands per port.</p> <p>Value: 1-254 or 0x1.0xFE (hex)</p> <p>Default = 32 (0x20)</p>	Dynamic	
21	QueueTarget=n	<p>QueueTarget controls I/O depth limiting on a per target or per LUN basis.</p> <p>If set to 0 = depth limitation is applied to individual LUNs.</p> <p>If set to 1 = depth limitation is applied across the entire target.</p> <p>Value: 0-1 or 0x0-0x1 (hex)</p> <p>Default = 0 (0x0)</p>	Dynamic	
22	RmaDepth=n	<p>RmaDepth sets the remote management buffer queue depth. The greater the depth, the more concurrent management controls can be handled by the local node.</p> <p>Value: 8-64, or 0x8-0x40 (hex)</p> <p>Default = 16 (0x10)</p> <p>Note: The RmaDepth driver parameter pertains to the functionality of the OneCommand Manager application.</p>	Reboot	
23	ScanDown=n	<p>If set to 0 = lowest AL_PA = lowest physical disk (ascending AL_PA order).</p> <p>If set to 1 = highest AL_PA = lowest physical disk (ascending SEL_ID order).</p> <p>Value: 0-1</p> <p>Default = 1</p> <p>Note: This option applies to private loop only in DID mode.</p>	Reboot	FC Only
24	SLIMode=n	<p>If set to 0 = autoselect firmware, use the latest firmware installed.</p> <p>If set to 2 = implies running the adapter firmware in SLI-2 mode.</p>	Reboot	LightPulse Only

		<p>If set to 3 = implies running the adapter firmware in SLI-3 mode.</p> <p>Value: 0, 2, and 3</p> <p>Default = 0</p>		
25	SrbTimeout	<p>SrbTimeout limits the SRB timeout value to 60 seconds when set to 1 or enabled. This is a non-displayed parameter where it has to be set manually into the registry. This option alters the I/O timeout behavior where an I/O will be returned in a max timeout of 60 seconds on some long I/O timeout.</p> <p>If set to 1 = enabled</p> <p>If set to 0 = disabled</p> <p>Values: 0, 1</p> <p>Default = 0</p>		
26	Topology=n	<p>Topology values can be 0 to 3.</p> <p>If set to 0 (0x0) = FC-AL.</p> <p>If set to 1 (0x1) = PT-PT fabric.</p> <p>If set to 2 (0x2) = *FC-AL first, then attempt PT-PT.</p> <p>If set to 3 (0x3) = *PT-PT fabric first, then attempt FC-AL.</p> <p>* Topology fail-over requires v3.20 firmware or higher. If firmware does not support topology fail-over, options 0,2 and 1,3 are analogous.</p> <p>Value: 0-3</p> <p>Default = 2 (0x2)</p>	Reset	FC Only
27	TraceBufSiz=n	<p>TraceBufSiz sets the size in bytes for the internal driver trace buffer. The internal driver trace buffer acts as an internal log of the driver's activity.</p> <p>Value: 250,000-2,000,000 or 0x3D090-0x1E8480 (hex).</p> <p>Default = 250,000 (0x3D090)</p>	Reboot	

Static FC / FCoE Driver Parameters (Linux)

Changes to static parameters require a driver reload for the change to take effect.

Table 4-5:

No	Parameter	Description	Sysfs isible
1	lpfc_ack0	When enabled, ACK0 is used for Class 2. The enabled value is 1. The disabled value is 0 (default).	Yes
2	lpfc_dev_loss_initiator	When enabled, engage the devloss timeout for initiators. The enabled value is 1. The disabled value is 0 (default). Note: This parameter is applicable to FC 8.2.0.x drivers only.	Yes
3	lpfc_discovery_threads	Specifies the maximum number of ELS commands that can be outstanding for a discovery. Note: The lpfc_discovery_threads parameter defaults to a value of 64 for private loop topologies regardless of the configured value. If there are multiple ports configured on the host the value of 64 is only used for those ports that are connected in a private loop topology. The configured value is used for all other ports. The minimum value is 1. The maximum value is 64. The default value is 32.	No
4	lpfc_enable_da_id	When enabled, the FC and FCoE driver issues a DA_ID CT command to the fabric when VPorts log out of the fabric. The enabled value is 1. The disabled value is 0 (default).	No
5	lpfc_enable_hba_heartbeat	When enabled, the heartbeat logic in the FC and FCoE driver is able to detect whether the adapter is functional. If the heartbeat logic detects the adapter is not functional, the driver will shut down the adapter. The enabled value is 1 (default). The disabled value is 0.	Yes
6	lpfc_enable_hba_reset	When enabled, the FC and FCoE drivers can pass resets to the adapter. This is typically used for debugging purposes. The enabled value is 1 (default). The disabled value is 0.	Yes
7	lpfc_enable_npiv	When enabled, the FC and FCoE driver can use NPIV to create VPorts (if supported by the fabric). The enabled value is 1 (default). The disabled value is 0.	Yes
8	lpfc_fcp_class	Specifies either FC Class 2 or 3 for FCP data transmission. For Class 2, the value is 2. For Class 3, the value is 3 (default).	Yes
9	lpfc_fcp_eq_count	For OneConnect UCNAs, specifies the number of fast-path FCP event queues, if available. The minimum value is 1. The maximum value is 8. The default	Yes

		value is 4. Note: For LightPulse adapters, this parameter is not applicable and has no effect.	
10	lpfc_fcp_imax	For OneConnect UCNAs, specifies the maximum number of fast-path FCP interrupts per second. The minimum value is 636. The maximum value is 651042. The default value is 10000. Note: For LightPulse adapters, this parameter is not applicable and has no effect.	Yes
11	lpfc_fcp_wq_count	For OneConnect UCNAs, specifies the number of fast-path FCP work queues, if available. The minimum value is 1. The maximum value is 32. The default value is 4. Note: For LightPulse adapters, this parameter is not applicable and has no effect.	Yes
12	lpfc_hba_queue_depth	Specifies the maximum number of FCP commands that can queue to an Emulex adapter. The minimum value is 32. The maximum value is 8192 (default).	Yes
13	lpfc_lun_queue_depth	Specifies the default maximum number of commands sent to a single logical unit (disk drive). The minimum value is 1. The maximum value is 128. The default value is 30.	Yes
14	lpfc_max_luns	Specifies the highest available LUN ID that is valid, per target. For example, a value of 19 means that LUN IDs from 0 to 19 are valid for the target. The SCSI layer scans each target until it reaches this specified LUN ID. The minimum value is 0. The maximum value is 65535. The default value is 255.	Yes
15	lpfc_max_scsicmpl_time	Uses command completion time to control queue depth. The units are in milliseconds. The minimum value is 0 (default). The maximum value is 6000.	Yes
16	lpfc_multi_ring_rctl	When lpfc_multi_ring_support is enabled, identifies the routing control (R_CTL) for the additional ring configuration. The minimum value is 1. The maximum value is 255. The default value is 4.	Yes
17	lpfc_multi_ring_support	Determines the number of primary SLI rings over which to spread IOCB entries. The minimum value is 1 (default). The maximum value is 2.	Yes
18	lpfc_multi_ring_type	When lpfc_multi_ring_support is enabled, identifies the TYPE of the additional ring configuration. The minimum value is 1. The maximum value is 255. The default value is 5 (LLC/SNAP).	Yes
19	lpfc_restrict_login	When enabled, restricts VPorts login to remote initiators. The	No

		<p>enabled value is 1 (default).</p> <p>The disabled value is 0.</p>	
20	lpfc_scan_down	<p>When enabled, selects the “scan down” method (scanning the AL_PA from high to low) to assign a SCSI ID. The enabled value is 1 (default).</p> <p>The disabled value is 0.</p>	Yes
21	lpfc_sg_seg_cnt	<p>Controls the scatter/gather maximum segment count passed to the FC and FCoE driver. This variable is applicable per SCSI command.</p> <p>For LightPulse adapters, the minimum value is 64 (default); and the maximum value is 4096.</p> <p>For SLI-4 OneConnect UCNAs, the values are restricted by the FC and FCoE driver to specific values due to restrictions imposed by the hardware. The possible values are 50 (default), 114, 242, and 498.</p>	Yes (sg_table size)
22	lpfc_sli_mode	<p>For LightPulse adapters, this parameter allows you to force the SLI mode requested by the adapter driver. The possible values are:</p> <ul style="list-style-type: none"> . 0 = Auto-select (default) . 2 = SLI-2 . 3 = SLI-3 <p>Note: For OneConnect UCNAs, this parameter is not applicable and has no effect</p>	No
23	lpfc_use_msi	<p>When enabled, determines whether the driver uses MSI or MSI-X.</p> <ul style="list-style-type: none"> . 0 = MSI disabled; INTx mode is used (default for FC 8.2.0.x drivers). . 1 = MSI; allows a maximum of 32 interrupts. . 2 = MSI-X; allows a maximum of 2048 interrupts (default for FC 8.3.5.x drivers). 	Yes

Dynamic FC / FCoE Driver Parameters (Linux)

Changes to the dynamic parameters take effect immediately. All LPFC dynamic parameters are read/write using sysfs.

Table 4-6:

No	Parameter	Description
1	lpfc_cr_count	For LightPulse adapters, this parameter determines the value for I/O coalescing for lpfc_cr_count outstanding commands. The minimum value is 1 (default). The maximum value is 255. Note: For OneConnect UCNAs, this parameter is not applicable.
2	lpfc_cr_delay	For LightPulse adapters, this parameter determines the value for I/O coalescing for lpfc_cr_delay (milliseconds) outstanding commands. The minimum value is 0 (default). The maximum value is 63. Note: For OneConnect UCNAs, this parameter is not applicable.
3	lpfc_devloss_tmo	Specifies the number of seconds to hold an I/O error when a device disappears. The minimum value is 0. The maximum value is 255. The default value is 30.
4	lpfc_enable_auth	Specifies whether DHCHAP support is enabled. When set to 1, DHCHAP is enabled. When set to 0, DHCHAP is disabled. Note: This property requires a link reset to activate. Note: This parameter is applicable to FC 8.2.0.x drivers only.
5	lpfc_fdmi_on	Specifies the type of FDMI support. The enabled values are 1 or 2 depending on the type needed. The disabled value is 0 (default).
6	lpfc_link_speed	Specifies the FC link speed. The possible values are: . 0 = Auto-select (default) . 1 = 1 Gb/s . 2 = 2 Gb/s . 4 = 4 Gb/s . 8 = 8 Gb/s . 16 = 16 Gb/s Note: This parameter does not affect FCoE 10 Gb/s adapters.
7	lpfc_log_verbose	Specifies the log verbosity level of the messages posted by the driver. Extra activity logging (bit mask). The minimum value is 0x0 (default). The maximum value is 0xFFFF.
8	lpfc_nODEV_tmo (deprecated)	Note: This is a deprecated field and lpfc_devloss_tmo should be used instead. This parameter will not work if you altered lpfc_devloss_tmo. Specifies the number of seconds to hold an I/O error when a device disappears. The minimum value is 1. The maximum value is 255. The default value is 30.
9	lpfc_pci_max_read	Specifies the maximum DMA read byte count. The possible values are 512, 1024, 2048 (default), and 4096.
10	lpfc_poll	Sets the FCP ring polling mode control. The possible values are:

		<p>. 0 = no polling (default)</p> <p>. 1 = poll with interrupts enabled</p> <p>. 3 = poll and disable FCP ring interrupts</p>
11	lpfc_poll_tmo	<p>Specifies the number of milliseconds that the driver waits between polling FCP ring interrupts.</p> <p>The minimum value is 1. The maximum value is 255. The default value is 10.</p>
12	lpfc_topology	<p>For LightPulse adapters, this parameter sets the link topology. The possible values are:</p> <p>. 0x0 = loop first; if loop fails, then point-to-point (default)</p> <p>. 0x2 = point-to-point only</p> <p>. 0x4 = loop only</p> <p>0x6 = point-to-point first; if point-to-point fails, then loop</p> <p>Note: For OneConnect UCNAs, this parameter is not applicable.</p>
13	lpfc_use_adisc	<p>When enabled, an ADISC is sent instead of a PLOGI for device discovery or RSCN. The enabled value is 1.</p> <p>The disabled value is 0.</p>

Notes and Restrictions

- [5.1 Notes and Restrictions](#)

5.1 Notes and Restrictions

1. CNA drivers need to be installed in the following order.
NIC driver -> iSCSI driver -> FCoE driver -> FC driver
2. The following warning message may be logged in the Event Log in Windows environment, but this message can be ignored. This message does not affect the driver.

Warning messages :
Event ID :49
Source : be2net
"Emulex OneConnect OCI11102-F-HI, NIC/TOE : RSS is limited to 4queues.Enable Advanced Mode in the PXE BIOS to use up to 16 queues. This may require firmware update."
3. NIC driver's setting change for NIC teaming has to be done before configuring NIC teaming. Otherwise, the new setting of the NIC driver may not work properly.
4. Logical partitioning manager with the Emulex firmware version 4.6.348.0 or higher, requires the following version.
CB500 series : 01-70 or higher
CB2000 X55** series : 59-41 or higher
CB2000 X57** series : 79-41 or higher
5. If the Linux NIC driver version is 4.6.352.0 with Linux bonding or hbonding environment, the following messages may be logged to /var/log/messages. But these messages can be ignored. These messages do not affect the driver.
- "be2net 0000:XX:XX.X: opcode NN-N failed:status M-M" (N, M : number)
- "Could not use PCIe error reporting"
6. If the system has over 110 CPU cores in RHEL6 environment, the sysreport may not be taken.
7. "Server installation and monitoring tool" doesn't provide the iSCSI driver 10.2.340.7 for RHEL6.5. The iSCSI driver is required to install manually from the " Driver & Utility CD for Red Hat Enterprise Linux 6" media.
8. For CB500 520H B3, When Multichannel Mode is enabled, Network Connections window on Windows Server 2012 or Windows Server 2012 R2 displays the ports of LoM as Ethernet X and Function X (X: a number). When Multichannel Mode is disabled, the Network Connections window displays the ports of LoM as Function X (X: a number).
9. Disable unused CNA ports when the system is running by the following way:
- RHEL : Execute "#ifdown eth X (X : number)" .
- Windows : Right-Click on the device name which means the CNA device port under [Device Manager] – [Network Adapter], and select "Disable".

10. When using Windows Server as a guest OS in VMware ESXi. 5.1 or ESXi.5.5 environment, be sure to apply the latest VMware tools. For the VMware tools software and its installing procedure, click on the following URL.

- VMware Operating System Specific Packages (OSPs)
URL : <https://www.vmware.com/support/packages>

- General installing procedure of VMware Tools (1014294)
URL : <http://kb.vmware.com/kb/1014294>

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