

Hitachi Dynamic Link Manager (for Solaris) 8.1.2-00 Release Notes

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About this document

This document (RN-00HS273-31, February 2015) provides late-breaking information about Hitachi Dynamic Link Manager (for Solaris) 8.1.2-00. It includes information that was not available at the time the technical documentation for this product was published, as well as a list of known problems and solutions.

Intended audience

This document is intended for customers and Hitachi Data Systems partners who license and use Hitachi Dynamic Link Manager (for Solaris).

Getting help

The Hitachi Data Systems Support Center staff is available 24 hours a day, seven days a week. To reach us, please visit the support website at <https://portal.hds.com> for current telephone numbers and other contact

About this release

information. If you purchased this product from an authorized HDS reseller, contact that reseller for support.

About this release

This release is a major release that adds new features and resolves multiple known problems.

Product package contents

Medium	CD-ROM	Revision	Release Type
Software	Hitachi Dynamic Link Manager (for Solaris)	8.1.2-00	Full Package
Documents	Release Notes (this document)		
	MK-92DLM114-31		
	Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris)		
	Statement of Delivery and Usage Consent Form		

New features and important enhancements

[8.1.2-00 Added Functions]

(1) Functionality for specifying the number of times the same path can be used for extended load balancing (random I/O) is now supported.

System requirements

Refer to Chapter 3. Creating an HDLM Environment of the Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris).

Host

For details on supported hosts, refer to the following manual:

- Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris) Chapter 3. Creating an HDLM Environment - HDLM System Requirements - Hosts and OSs Supported by HDLM

Host Bus Adapter (HBA)

For information on supported HBAs and drivers, refer to Appendix A - Host Bus Adapter (HBA) Support Matrix.

Storage

For details on supported storage systems, refer to the following manual:

System requirements

- Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris) Chapter 3. Creating an HDLM Environment - HDLM System Requirements - Storage Systems Supported by HDLM

When the Dynamic I/O Path Control function is enabled on Hitachi AMS 2000 series, use a microprogram version 08B8/D or later.

Requirements to use a HAM environment are as follows:

- HDLM supports the HAM functionality of the following storage system:
 - Hitachi Universal Storage Platform V/VM
 - Hitachi Virtual Storage Platform
 - HP XP24000/XP20000
 - HP P9500
 - Hitachi Unified Storage VM

The required microprogram versions are listed below:

Storage system	Interface	Microprogram version	Remark
Universal Storage Platform V/VM	FC I/F	60-06-10-XX/XX or later	X: voluntary number
Virtual Storage Platform	FC I/F	70-01-42-XX/XX or later (*1)	X: voluntary number
XP24000/XP20000	FC I/F	60-06-10-XX/XX or later	X: voluntary number
P9500	FC I/F	70-01-42-XX/XX or later (*1)	X: voluntary number
Hitachi Unified Storage VM	FC I/F	73-03-0X-XX/XX or later	X: voluntary number

*1: If you use the HAM functionality with USP V or XP24000, apply 70-03-00-XX/XX or later.

- When using HAM in a Solaris environment, set up a Host Mode Option 48. For details, see "Preventing Unnecessary Failover" in High Availability Manager User's Guide.

Operating system requirements

For details on supported operating system, refer to the following manual:

- Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris) Chapter 3. Creating an HDLM Environment - HDLM System Requirements - Hosts and OSs Supported by HDLM
- When using HAM in a Solaris environment, HDLM supports only Solaris 10.

The versions of JDK listed below are now supported.

System requirements

To link with Global Link Manager, make sure that one of the following JDK Solaris packages is already installed on the host.

- JDK 1.4.2_xx (32-bit edition) (where xx is 15 or later)
- JDK 5.0 (32-bit edition) (Update 11 or later)
- JDK 6.0 (32-bit edition) (Update 17 or later)
- JDK 7.0 (32-bit edition)
- JDK 8.0 (64-bit edition)

Prerequisite programs

None.

Related Programs

For details on related programs, refer to the following manual:

- Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris) Chapter 3. Creating an HDLM Environment - HDLM System Requirements - Cluster Software Supported by HDLM, Volume Manager Supported by HDLM, and Combinations of Cluster Software and Volume Managers Supported by HDLM

The following tables list the number of LUs and number of paths supported by HDLM, and the supported configuration.

This table lists the supported number of LUs and number of paths in a configuration where cluster software and virtualization software are not used:

OS	Number of LUs	Total number of paths	Supported configuration
Solaris10	4096LUs	8192paths	Boot disk environment
Solaris11			

This table lists the number of LUs supported and number of paths supported in a configuration where cluster software and virtualization software are used:

OS	Number of LUs	Total number of paths	Supported configuration
Solaris10	4096LUs	8192paths	- Configurations using VCS cluster software - Configurations using Oracle VM Server for SPARC ^{#1}
	256LUs	4096paths	- Configurations using cluster software other than VCS - Configurations using virtualization software other than Oracle VM Server for SPARC
Solaris11	256LUs	4096paths	- Configurations using cluster software - Configurations using virtualization software

Resolved problems

#1: The system limits the number of LUs that can be exported from control domains to guest domains.

Memory and disk space requirements

For details on memory and disk capacity requirements, refer to the following manual:

- Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris) Chapter 3. Creating an HDLM Environment - HDLM System Requirements - Memory and Disk Capacity Requirements

HDLM Supported Configurations

For details on the condition that HDLM can manage capacity requirements, refer to the following manual:

- Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris) Chapter 3. Creating an HDLM Environment - HDLM System Requirements - The Number of Paths Supported in HDLM

Resolved problems

[8.1.2-00 Modifications]

(1) The following problem has been corrected:

HDLM outputs the KAPL05023-E error message to syslog if EACCES is returned^{#1} from the SCSI device.

*1: If, for example, you restart the standby host in a cluster environment.

[Conditions]

This problem may occur if all of the following conditions both (a) to (b) are met.

(a) EACCES is returned^{#1} when the SCSI device is accessed.

(b) The SCSI device is accessed.

#1: For example, if the SCSI device is accessed on the standby host while a reservation is being issued on the active host in a cluster environment.

[Case ID]

None.

(2) The following problem has been corrected:

In HDLM for Solaris, if Solaris 11 is used, an upgrade installation, a reinstallation, an uninstallation, or a dynamic configuration of an HDLM device fails in a Japanese language environment where the environment variable LC_ALL is undefined.

[Conditions]

(1) An upgrade installation, reinstallation, or uninstallation of HDLM fails.

Known problems

This problem may occur if all of the following conditions both (a) to (d) are met.

(a) Solaris 11 is used.

If Solaris 11.0 or 11.1 is used, the solaris-desktop package is installed.

(b) Japanese is set for the environment variable LANG, or for the environment variables other than LC_ALL for a locale category (LC_CTYPE, LC_MESSAGES, etc.).

(c) The environment variable LC_ALL is not defined.

(d) One of the following conditions is met:

(i) The installhdlm utility is used to perform an upgrade installation or a reinstallation.

(ii) The installux.sh utility is used to perform an upgrade installation or a reinstallation.

(iii) The removehdlm utility is used to perform an uninstallation.

(2) An attempt to configure an HDLM device fails when a host that was installed is not restarted.

This problem may occur if all of the following conditions both (a) to (d) are met.

(a) Solaris 11 is used.

If Solaris 11.0 or 11.1 is used, the solaris-desktop package is installed.

(b) Japanese is set for the environment variable LANG, or for the environment variables other than LC_ALL for a locale category (LC_CTYPE, LC_MESSAGES, etc.).

(c) The environment variable LC_ALL is not defined.

(d) One of the following conditions is met:

(i) The installhdlm utility is executed with the -r or -t option specified.

(ii) [device_config=y] is specified in the installation information settings file, and the installhdlm utility is executed with the -f option specified.

(iii) The installux.sh utility is executed with the -r or -t option specified.

(iv) [device_config=y] is specified in the installation information settings file, and the installux.sh utility is executed with the -f option specified.

(v) The dlmstart utility is executed.

[Case ID]

None.

Known problems

During a license update, if there is an error in the already installed license information, the messages below (which indicate a problem with the license key file) might be displayed even when you are using a correct license key file. If these messages are displayed and there is no problem in the license key file being used, execute the utility for collecting HDLM error information (DLMgetras) to acquire error information, and contact your HDLM vendor or the maintenance company if there is a maintenance contract for HDLM.

KAPL09113-E There is no installable license key in the license key file. File name = /var/tmp/hdlm_license

KAPL01082-E There is no installable license key in the license key file. File name = /var/tmp/hdlm_license

About operation when all paths are disconnected during intermittent error monitoring:

When I/Os are performed continuously for an LU whose paths are all Offline(E), Online(E), or Offline(C) (because, for example, all paths have been disconnected), the number of times that an error occurs (the IEP value when "dlnkmgr view - path -iem" is executed) during intermittent error monitoring might increase even though the automatic failback function did not recover all paths. In such a case, even though an intermittent error did not occur, HDLM often assumes an intermittent error, and excludes paths from the automatic failback function. In such a case, after recovery from the failure, to change the status of a path excluded from automatic failback to online, manually change the status to online.

When installing HDLM to the Solaris server, the installation is terminated and the following messages are output if a user named "install" is defined in the /etc/passwd file. When installing HDLM to the Solaris server, make sure that there is no user named "install" defined in the /etc/passwd file.

When performing installation of HDLM, the following messages are output:

- When Solaris 8 is used and EZ Fibre 2.2.2 is installed:

```
showrev: get_env_var(IS8e8546a, SUNW_PATCHID)
```

:

KAPL09133-E The following patch(es) required for HDLM has not been applied:

- When Solaris 8 is used and EZ Fibre 2.2.2 is not installed, or Solaris 9 or Solaris 10 is used:

```
mkdir: Failed to make directory "/var/opt/DynamicLinkManager"; Permission denied
```

```
mkdir: Failed to make directory "/var/opt/DynamicLinkManager/log"; No such file or directory
```

KAPL09091-E A fatal error occurred in HDLM. The system environment is invalid.

Known problems

There are some notes as follows on an SVM shared diskset function in the configuration where HBA driver other than that of Oracle (other than qlc or emlxs driver) is used in Solaris 10 environment:

- When Solaris Cluster is used:

If an HDLM management-target device is used in SVM shared diskset function, use Solaris Cluster device ID (the logical device file under /dev/did/dsk). The HDLM logical device file name cannot be used in SVM shared diskset function.

- When Solaris Cluster is not used:

An HDLM management-target device cannot be used in SVM shared diskset function.

If I/O Fencing function is used and any of the following operations is performed, the following pattern messages may be output to a console and syslog. Ignore these messages:

- Online VCS disk group resource, or import a disk group of VxVM.
- Execute vxfcntl command without specifying -r option.
- Issue I/O after removing a registration key or a reservation key from a disk by vxfenadm command.

```
scsi: [ID 107833 kern.warning] WARNING:
/pci@1f,2000/SUNW,emlxs@1/fp@0,0/ssd@w50060e8005271760,6 (ssd40):
```

```
Error for Command: read(10)          Error Level: Retryable
```

```
scsi: [ID 107833 kern.notice] Requested Block: 304          Error
Block: 304
```

```
scsi: [ID 107833 kern.notice] Vendor: HITACHI              Serial
Number: 50 02717006B
```

```
scsi: [ID 107833 kern.notice] Sense Key: Unit Attention
```

```
scsi: [ID 107833 kern.notice] ASC: 0x2a (registrations preempted), ASCQ:
0x5, FRU: 0x0
```

Notes for executing DLMgetras utility

If you specify a directory under an NFS mount point as an output destination and then execute DLMgetras utility, an empty directory named "DLMgetras_tmpdir.xxxx/the_specified_directory_name" may be created for the output destination directory ("xxx" is an optional numeric value).

When the empty directory exists after executing DLMgetras utility, delete the directory.

The dynamic LU deletion function cannot be used in a configuration that uses Solaris Cluster.

Notes on environments in which SCSI-2 Reserve is issued:

In an environment in which SCSI-2 Reserve is issued, if the path status is changed and owner and non-owner paths are switched, an I/O is issued to a non-owner path even though the status of the owner path is Online. By performing Offline processing, an I/O for an owner path can be issued to a non-owner path.

Known problems

Notes on executing dlmsetconf (the utility for creating the HDLM driver configuration definition file):

The following operation is not supported: Changing the configuration by specifying the `-r` parameter in an environment in which the boot disk was created on a ZFS file system. A boot disk is excluded from HDLM management when you execute the operation by specifying the `-r` parameter.

Notes on booting the OS while a path is disconnected in Solaris 10:

When OS is booted (including reboot) while the specific paths (*2) are disconnected in Solaris 10 (*1), all paths managed by HDLM are in Online (E) or Offline (E) status. The paths are not recovered until reboot after the paths are connected.

*1: The following shows minor versions for the target Solaris10

- Solaris 10 (January, 2015)
- Solaris 10 3/05 (March, 2005)
- Solaris 10 1/06 (January, 2006)
- Solaris 10 11/06 (November, 2006)
- Solaris 10 8/07 (August, 2007)
- Solaris 10 5/08 (May, 2008)
- Solaris 10 10/08 (October, 2008)
- Solaris 10 5/09 (May, 2009)

*2: The first path recovered by OS is corresponded. This phenomenon does not occur even if OS is booted while the other paths are disconnected. To check the first path discovered by OS, use the following commands:

The first path displayed by `dnkmgr view - path (lu)`

```
# dnkmgr view -path
```

```
Paths:000022 OnlinePaths:000022
```

```
PathStatus IO-Count IO-Errors
```

```
Online      72          0
```

```
PathID PathName          DskName          iLU
ChaPort Status   Type IO-Count IO-Errors  DNum HDevName
000000 0000.0000.0000000000461800.0000 HITACHI .DF600F      .85011299
0000      0A   Online   Own      13      0   -
c13t50060E8010253330d0
000001 0000.0000.0000000000461C00.0000 HITACHI .DF600F      .85011299
0000      1A   Online   Own       0      0   -
c13t50060E8010253330d0
```

Installation precautions

```
000002 0000.0000.0000000000461800.0001 HITACHI .DF600F      .85011299
0001      0A   Online   Own      13      0   -
c13t50060E8010253330d1

000003 0000.0000.0000000000461C00.0001 HITACHI .DF600F      .85011299
0001      1A   Online   Own      0       0   -
c13t50060E8010253330d1

. . .

#
```

Installation precautions

For details on HDLM installation, refer to the following:

- "Installing HDLM" in "Chapter 3. Creating an HDLM Environment" in the manual Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris)

Usage precautions

For details on usage precautions when using HDLM, refer to the following:

- "Notes on Creating an HDLM Environment" in "Chapter 3. Creating an HDLM Environment" in the manual Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris)
- "Notes on Using the Hitachi Network Objectplaza Trace Library" in "Setting up Integrated Traces" in "Chapter 3. Creating an HDLM Environment" in the manual Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris)
- "Notes on Using HDLM" in "Chapter 4. HDLM Operation" in the manual Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris)
- "Notes on Using Commands" in "HDLM Operations Using Commands" in "Chapter 4. HDLM Operation" in the manual Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris)
- "Precautions Regarding Changes to the Configuration of an HDLM Operating Environment" in "Changing the Configuration of the HDLM Operating Environment" in "Chapter 4. HDLM Operation" in the manual Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris)

Usage precautions

Additional Usage Precautions

Version numbers are displayed as follows after this version of HDLM is installed.

Function	Item	Version number
HDLM command (dlnkmgr)	HDLM Version	8.1.2-00
	HDLM Manager	8.1.2-00
	HDLM Alert Driver	8.1.2-00
	HDLM Driver	8.1.2-00
"pkginfo -l" command (Solaris 10 or earlier)	HDLM Version	08.1.2.0000
"pkg info" command (Solaris 11)	HDLM Version	8.1.2.0

The following example shows the text displayed when `dlnkmgr view -sys` is executed.

```
# /opt/DynamicLinkManager/bin/dlnkmgr view -sys
HDLM Version                : 8.1.2-00
Service Pack Version        :
Load Balance                 : on(extended lio)
Support Cluster              :
Elog Level                   : 3
Elog File Size (KB)         : 9900
Number Of Elog Files        : 2
Trace Level                  : 0
Trace File Size (KB)        : 1000
Number Of Trace Files       : 4
Path Health Checking        : on(30)
Auto Failback                : on(1)
Intermittent Error Monitor   : off
Dynamic I/O Path Control    : off(10)
HDLM Manager Ver            WakeupTime
Alive      8.1.2-00    2015/01/14 16:34:36
HDLM Alert Driver Ver       WakeupTime           ElogMem Size
Alive      8.1.2-00    2015/01/14 16:34:26 4096
HDLM Driver Ver             WakeupTime
Alive      8.1.2-00    2015/01/14 16:34:25
License Type Expiration
Permanent      -
KAPL01001-I The HDLM command completed normally. Operation name = view,
completion time = 2015/01/14 16:34:43
```

Usage precautions

And the following example shows the displayed text when `pkginfo` command is executed for Solaris 10 or earlier.

```
# pkginfo -l
  PKGINST:  DLManager
  NAME:     Dynamic Link Manager
  CATEGORY: system
  ARCH:    sparc
  VERSION: 08.1.2.0000
  BASEDIR: /
  VENDOR:

... ..
```

The following example shows the displayed text when `pkg info` command is executed for Solaris 11.

```
# pkg info DLManager
  Name: DLManager
  Summary: Dynamic Link Manager
  State: Installed
  Publisher: Hitachi
  Version: 8.1.2.0
  Build Release: 5.11
  Branch: 0
  Packaging Date: Fri Jan 09 05:29:00 2015
  Size: 22.81 MB
  FMRI: pkg://Hitachi/DLManager@8.1.2.0,5.11-0:20150109T052900Z
```

The default value of load balancing algorithm

- In HDLM 8.1.2-00, the load balancing function is on and algorithm is Extended Least I/Os.

Notes on HAM environments

- HAM does not support cluster software.
- In the case of displaying the LU information, the HAM information is not output by specifying the "all" parameter-value for the HDLM command. Specify the "ha" and "hastat" parameter-value instead of it.

Usage precautions

- An online operation is performed on an owner path, a non-owner path's status may change to Offline(E). After performing an online operation on an owner path, use the HDLM command to make sure that the non-owner path's status is Online. If the non-owner path's status is Offline(E), change the status of HAM pairs to PAIR, and then perform an online operation on the Offline(E) path again.

- When you set up a HAM pair to be managed by HDLM, make sure that the host recognizes paths to the MCU (Primary VOL) and RCU (Secondary VOL) after the HAM pair is created.

Execute the `dlmkmgr view -lu -item hastat` operation. If `ha` is not displayed in the `HaStat` column, then the corresponding LU is not recognized as being in a HAM configuration.

If the host recognizes the paths to the MCU and RCU before the HAM pair is created, restart the host after the HAM pair is created. Execute the `dlmsetconf` utility after the HAM pair is created, and then restart the host with the reconfiguration option specified.

- If you release a HAM pair to recover the system after a HAM volume failure, do not restart a host that is connected to the MCU and RCU while the HAM pair is released.

If you need to restart the host while the HAM pair is released, disconnect all paths to the MCU and RCU, restart the host, re-create the HAM pair, and then reconnect the paths.

If you restart a host that is connected to the MCU and RCU while the HAM pair is released, the RCU volume will be recognized as a volume other than an MCU volume. If this occurs, restart the host after the HAM pair is re-created.

Execute the `dlmkmgr view -lu -item hastat` operation, and then confirm that `ha` is displayed in the `HaStat` column.

- When HDLM installed and operated, the server must have 2GB or more physical memory.

- When a HAM environment, if HDLM is configured, a HAM pair is released, and then the system is restarted, the path status of the S-VOL will change to Offline(E).

If you want to continue using the LUs that made up the HAM pair, reconfigure the HAM pair, and then execute the online command to change the S-VOL status to Online.

If you do not want to continue using the LUs that made up the HAM pair, execute the `dlmsetconf` command, and then restart the affected host.

- Follow the Installing Software section in the High Availability Manager User's Guide to install HDLM. For this procedure, use the HDLM User's Guide up to the section Make sure that the logical device file of the `sd` or `ssd` device is backed up. Also, make sure that the host OS (Solaris) can recognize the HAM pair before executing the `dlmsetconf` utility (explained in the following section):

After the host OS recognizes the HAM pair, follow the section that starts with executing the `dlmsetconf` utility.

Usage precautions

- If all of the following conditions are met and the `dladm online -hapath` command is executed, a path status will change to `Online(S)`, instead of `Online`:

- The status of the HAM P-VOL is `PSUS`.
- The status of the HAM S-VOL is `SSWS`.
- The path statuses are `Online(S)`, and a physical failure is recovered from.

- If you execute the `-zpool import` command to collect information about disks that can be imported into a ZFS file system, the secondary volume (S-VOL) in the HAM environment might enter the `Offline(E)` or the `Online(E)` status.

In addition, if you mistakenly use a command such as the `dd` command or the `mount` command to assign a slice that has no allocated area, the secondary volume (S-VOL) in the HAM environment might enter the `Offline(E)` or the `Online(E)` status. If either of the above problems occurs, execute the `dladm online` command to restore the path status to `Online`.

If the primary volume (P-VOL) is suspended, I/O is processed even if the path is not restored to the `Online` status. However, if you continue operation in such conditions, the system cannot operate as a multipath environment.

Documentation

Available documents

Manual Name	Manual No.	Issue Date
Hitachi Command Suite Dynamic Link Manager User Guide (for Solaris)	MK-92DLM114-31	February 2015

Documentation errata

None.

Appendix A

HBA Driver Support Matrix

Use the HBA drivers listed below. When HDLM manages the path of a boot disk, use HBA driver indicated by [bootable].

Note the following points in constitution or setting of HBA.

- When using two or more HBA adapters in one server, use the same type of HBA adapter.
- When using a cluster system or an SDS (SVM) shared diskset function, use the same type of adapter in all the nodes. If you combine different types of HBA, HDLM may not be able to switch a path when an error occurs and a failover of operating program may not be able to be performed between nodes.
- Before installation of HDLM, you must set the binding between the target ID and storage port in HBA where such settings are possible (e.g. TID-WWPN, TID-WWNN, etc.). This is to prevent HDLM from incorrectly detecting a target ID value of an sd or ssd device, for the target ID value change when booting a server or host. In HBA documentation, this is called the "Binding" or "Persistent Binding" feature.
- When HDLM manages the path of a boot disk, refer to the following documents for how to acquire the name of a boot device that is specified in the setting of HBA and boot command.
 - When using HBA of Oracle:
Refer to the manual "Hitachi Dynamic Link Manager User's Guide for Solaris™ Systems Chapter 3. Creating an HDLM Environment - Configuring a Boot Disk Environment".
 - When using HBA other than that of Oracle:
Refer to the manual of used HBA.
- When the constitution change related to HBA is performed, the constitution change of HDLM may be required. For details, refer to the manual "Hitachi Dynamic Link Manager User's Guide for Solaris™ Systems Chapter4. HDLM Operation - Changing the configuration of the HDLM operating environment".

Vendor (Driver)	Applicable OS and HBA driver			
	Solaris 8	Solaris 9	Solaris 10	Solaris 11

Appendix A

Vendor (Driver)	Applicable OS and HBA driver			
Oracle (FC/IF) (*1)	SFS 4.2 SFS 4.4 SFS 4.4.2 SFS 4.4.4 SFS 4.4.11 [bootable] SFS 4.4.12 [bootable] SFS 4.4.13 [bootable] Sun Bundle(*12)	SFS 4.2 SFS 4.4 SFS 4.4.2 SFS 4.4.4 SFS 4.4.11 [bootable] SFS 4.4.12 [bootable] SFS 4.4.13 [bootable] SFS 4.4.14 [bootable] SFS 4.4.15 [bootable]	Solaris attachment driver [bootable] (*7)(*10)	Solaris attachment driver [bootable] (*7)
Oracle (FCoE IF) (*1)	-	-	Solaris attachment driver [bootable] (*7)(*10)(*11)	-
AMCC (FC I/F) (*2)(*3)(*4)	2.5.18 2.5.8.HIT.07 2.5.8.HIT.07.01 2.5.9 2.6.7 2.6.9 4.1.1 4.1.1.1 4.1.1.14.1.3 4.1.1.b.4 4.1.3 5.1 5.1.0.HIT.M01 5.1.1 5.1.1.HIT.M02 5.2 5.3.0.11 5.3.0.11.HIT.M08	2.6.12 4.1.3 5.3 5.3.0.11 5.3.0.11.HIT.M08	-	-
Emulex (FC I/F) (*5)	4.10g 5.02d 6.00g 6.01c 6.02f 6.02h [bootable] 6.11c [bootable] 6.11cx2 [bootable]	5.01e 5.02d 6.00g 6.02f 6.02h [bootable] 6.11c [bootable] 6.11cx2 [bootable] 6.21g [bootable]	6.02f 6.02h [bootable] 6.11c [bootable] 6.11cx2 [bootable] 6.21g [bootable]	-

Appendix A

Vendor (Driver)	Applicable OS and HBA driver			
QLogic (FC I/F)	3.08 3.16 4.06 (*6) 4.08 (*6) 4.13.01 (*6) 5.03 [bootable] (*6) 5.04 [bootable] (*6)	4.08 (*6) 4.13.01 (*6) 5.03 [bootable] (*6) 5.04 [bootable] (*6)	5.03 [bootable] (*6) 5.04 [bootable] (*6)	-
Fujitsu (FC I/F)	2.2 + Patch from 910936-07 to 910936-15 2.2.1 2.2.1 Update2 3.0 3.0 Update1	2.2.1 + Patch 912069-02 2.2.1 2.2.1 Update2 3.0 3.0 Update1	3.0 Update1 4.0 [bootable] (*9) 4.0 Update1 [bootable] (*9) 4.0 Update2 [bootable] (*9)	-
Brocade (FC I/F)	-	-	bfa 1.1.0.4 (*1) (*8) bfa 2.1.0.1 (*1) (*8)	-
Brocade (FCoE IF)	-	-	bfa 2.3.0.6(*1)(*8)	-

Note:

- *1: If the server is started with a disconnected path, and then the path is connected and recovered, execute "cfgadm -c configure" command before entering the "dladm online" command in order for Solaris to recognize the storage. In a Solaris 10 environment, even when "cfgadm -c configure" command is executed, there are cases when the host cannot recognize the storage. If this happens, after the path is recovered, reboot the host so that it recognizes the storage.
- *2: When using AMCC FC64-1063, edit and set the "/kernel/drv/fcaw.conf" file as follows:
 - When connecting storages either directly or via an FC HUB (Loop):
fca_nport=0
 - When connecting storages via an FC Switching HUB (Fabric): fca_nport=1
 Use an optional value for the other parameters.
- *3: When using AMCC FCI-1063, edit and set the "/kernel/drv/fca-pci.conf" file as follows:
 - When connecting storages either directly or via an FC HUB (Loop):
fca_nport=0
 - When connecting storages via an FC Switching HUB (Fabric): fca_nport=1
 Use the optional value for the other parameters.

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*4: When using AMCC HBA except FC64-1063 and FCI-1063, edit and set the `"/kernel/drv/jnic.conf"` file or the `"/kernel/drv/jnic146x.conf"` file as follows:

FailoverDelay: Set an optional value other than "0".

*5: Edit and set the `"/kernel/drv/lpfc.conf"` file as follows:

- `no-device-delay=0`
- `nodev-holdio=0`
- `nodev-tmo`: Set the default value (30) or more.
- When connecting to storages either directly or via an FC HUB (Loop mode only): `topology=4`
- When connecting to storages via an FC Switching HUB (point-to-point mode only): `topology=2`

Use an optional value for the other parameters.

*6: Edit and set the `"/kernel/drv/qla2200.conf"` file or the `"/kernel/drv/qla2300.conf"` file as follows:

- `hbaX-link-down-error=1`
- `hbaX-fast-error-reporting=1` (Set only for HBA driver version supported this parameter)

"X" is the instance number of the HBA driver.

*7: HBA driver is bundled in Solaris installation media.

*8: Apply the following patches:

119130-33 or later, SunOS 5.10: Sun Fibre Channel Device Drivers

119974-09 or later, SunOS 5.10: fp plug-in for cfgadm

120346-09 or later, SunOS 5.10: Common Fibre Channel HBA API and Host Bus Adapter Libraries

*9: Edit and set the `"/kernel/drv/fjpfca.conf"` file as follows:

- `failover_function=1`

*10: Apply the following patches:

HBA models	Applicable patches
	The latest revisions of successor patches are recommended.
following Sun HBAs: - X6727A, X6748A, X6757A, X6799A, SG-XPCI1FC-QF2<X6767A>, SG-XPCI2FC-QF2<X6768A>, SG-XPCI2FC-QF2-Z, SG-XPCI1FC-QL2, SG-XPCI1FC-QF4, SG-XPCI2FC-QF4, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4	119130-22 or later, SunOS 5.10: Sun Fibre Channel Device Drivers 119974-04 or later, SunOS 5.10: fp plug-in for cfgadm 120182-02 or later, SunOS 5.10: Sun Fibre Channel Host Bus Adapter Library 120346-04 or later, SunOS 5.10: Common Fibre Channel HBA API Library If patch 119130-22 or later is not applied, the

Appendix A

<p>following QLogic HBAs</p> <ul style="list-style-type: none"> - QLA2300F, QLA2310F, QLA2332, QLA2340, QLA2342, QLA2344, QLA2460, QLA2462, QLE2460, QLE2462, QLE2464, QCP2332, QCP2330, QCP2340, QCP2342 	<p>following problems may occur:</p> <ul style="list-style-type: none"> - I/O process stops without a failover of a path, when a path error occurs. - The problem that is indicated in Sun Alert ID 102130.
<p>following Sun HBAs:</p> <ul style="list-style-type: none"> - SG-XPCI1FC-EM2, SG-XPCI2FC-EM2, SG-XPCI1FC-EM4-Z, SG-XPCI2FC-EM4-Z, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4 <p>following Emulex HBAs</p> <ul style="list-style-type: none"> - LP9002, LP9802, LP10000, LP10000DC, LP11000, LP11002, LPe11000, LPe11002 	<p>119130-22 or later, SunOS 5.10: Sun Fibre Channel Device Drivers</p> <p>119974-04 or later, SunOS 5.10: fp plug-in for cfgadm</p> <p>120182-02 or later, SunOS 5.10: Sun Fibre Channel Host Bus Adapter Library</p> <p>120222-11 or later, SunOS 5.10: Emulex-Sun LightPulse Fibre Channel Adapter driver</p> <p>120346-04 or later, SunOS 5.10: Common Fibre Channel HBA API Library</p> <p>If patch 119130-22 or later is not applied, the following problems may occur:</p> <ul style="list-style-type: none"> - I/O process stops without a failover of a path, when a path error occurs. - The problem that is indicated in Sun Alert ID 102130.
<p>following Sun HBAs:</p> <ul style="list-style-type: none"> - SG-XPCIE1FC-QF8-Z, SG-XPCIE2FC-QF8-Z, SG-XPCIE2FC-QB4-Z <p>following QLogic HBAs</p> <ul style="list-style-type: none"> - QLE2560, QLE2562, QEM2462 	<p>119130-33 or later, SunOS 5.10: Sun Fibre Channel Device Drivers</p> <p>119974-09 or later, SunOS 5.10: fp plug-in for cfgadm</p> <p>120346-09 or later, SunOS 5.10: Common Fibre Channel HBA API and Host Bus Adapter Libraries</p> <p>125166-10 or later, SunOS 5.10: Qlogic ISP Fibre Channel Device Driver</p>
<p>following Sun HBAs:</p> <ul style="list-style-type: none"> - SG-XPCIE1FC-EM8-Z, SG-XPCIE2FC-EM8-Z, SG-XPCIE2FC-EB4-Z <p>following Emulex HBAs</p> <ul style="list-style-type: none"> - LPe12000, LPe12002 	<p>119130-33 or later, SunOS 5.10: Sun Fibre Channel Device Drivers</p> <p>119974-09 or later, SunOS 5.10: fp plug-in for cfgadm</p> <p>120222-27 or later, SunOS 5.10: Emulex-Sun LightPulse Fibre Channel Adapter driver</p> <p>120346-09 or later, SunOS 5.10: Common Fibre Channel HBA API and Host Bus Adapter Libraries</p>
<p>following Sun HBAs:</p> <ul style="list-style-type: none"> - SG-XPCIE2FCGBE-Q-Z 	<p>119130-33 or later, SunOS 5.10: Sun Fibre Channel Device Drivers</p> <p>119974-09 or later, SunOS 5.10: fp plug-in for cfgadm</p> <p>120346-09 or later, SunOS 5.10: Common Fibre Channel HBA API and Host Bus Adapter Libraries</p> <p>125166-12 or later, SunOS 5.10: Qlogic ISP Fibre</p>

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	Channel Device Driver
following Sun HBAs: - SG-XPICIE2FCGBE-E-Z	119130-33 or later, SunOS 5.10: Sun Fibre Channel Device Drivers 119974-09 or later, SunOS 5.10: fp plug-in for cfgadm 120222-29 or later, SunOS 5.10: Emulex-Sun LightPulse Fibre Channel Adapter driver 120346-09 or later, SunOS 5.10: Common Fibre Channel HBA API and Host Bus Adapter Libraries
following Emulex CNAs: - LP21000 - LP21002 - OCe10102-F - OCe11102	145096-03 (or later) SunOS 5.10: oce driver patch 145098-04 (or later) SunOS 5.10: emlxs driver patch
following Qlogic CNAs: - QLE8140 - QLE8142	143957-05 (or later) SunOS 5.10: qlc patch

*11: Boot disk environment configured with Emulex-CNAs is not supported.

*12: Only supported when using the following HBA models provided by Oracle.

- X6729A
- X6730A

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