

Hitachi Dynamic Link Manager (for Linux®) 8.8.4-01 Release Notes

Contents

About this document.....	1
Intended audience	2
Getting help.....	2
Accessing product downloads	2
About this release.....	2
Product package contents	2
New features and important enhancements	3
System requirements.....	3
Resolved problems.....	5
Known problems.....	6
Installation precautions.....	12
Usage precautions.....	12
Documentation	17
Appendix A.....	18
Copyrights and licenses	51

About this document

This document (RN-00HS284-95, February 2023) provides late-breaking information about Hitachi Dynamic Link Manager for Linux v8.8.4-01. 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 Vantara partners who license and use Hitachi Dynamic Link Manager (for Linux).

Getting help

Hitachi Vantara Support Connect is the destination for technical support of products and solutions sold by Hitachi Vantara. To contact technical support, log on to Hitachi Vantara Support Connect for contact information:

https://support.hitachivantara.com/en_us/contact-us.html.

Hitachi Vantara Community is a global online community for customers, partners, independent software vendors, employees, and prospects. It is the destination to get answers, discover insights, and make connections. **Join the conversation today!** Go to community.hitachivantara.com, register, and complete your profile.

Accessing product downloads

Product software, drivers, and firmware downloads are available on Hitachi Vantara Support Connect: <https://support.hitachivantara.com/>.

Log in and select Product Downloads to access the most current downloads, including important updates that may have been made after the release of the product.

About this release

This release resolves multiple known problems.

Product package contents

Medium	CD-ROM	Revision	Release Type
Software	Hitachi Dynamic Link Manager (for Linux)	8.8.4-01	Full Package

New features and important enhancements

8.8.4-00 Additional Functions and Modifications

- The following distributions are supported:
 - 4.18.0-372.9.1.el8.x86_64 kernel version of Red Hat Enterprise Linux 8 for EM64T/AMD64
 - 5.3.18-59.40-default kernel version of SUSE LINUX Enterprise Server 15 for EM64T/AMD64.
- The Red Hat Enterprise Linux 8.6 RHCM (Pacemaker) is now supported.

System requirements

For general information on system requirements, see the *Hitachi Dynamic Link Manager (for Linux®) User Guide* > Chapter 3. Creating an HDLM environment.

Host

For details on supported hosts, see the *Hitachi Dynamic Link Manager (for Linux®) User Guide* > Chapter 3. Creating an HDLM environment > HDLM System Requirements > Hosts and OSs Supported by HDLM.

HAM environments support Red Hat Enterprise Linux 6 (x86/x64).

Host Bus Adapter (HBA)

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

Storage

For details on supported storage systems, see the *Hitachi Dynamic Link Manager (for Linux®) User Guide* > Chapter 3. Creating an HDLM environment > HDLM System Requirements > Storage Systems Supported by HDLM.

Virtualization

HDLM supports the following virtualization environments:

- Hitachi Virtualization Manager (Hitachi Compute Blade with Itanium 2 server modules)
- Xen (Virtualization) in SUSE LINUX Enterprise Server 11 SP4, 12, 12 SP1 - SP5, 15, 15 SP1 - SP3
- KVM (Virtualization):
 - Red Hat Enterprise Linux 6 - 6.10, 7 - 7.9, 8.1 - 8.4, 8.6
 - Oracle Linux 6.5 - 6.10, 7 - 7.9, 8.1 - 8.4
 - Oracle Unbreakable Enterprise Kernel 6.2 - 6.10, 7 - 7.9, 8.2 - 8.4

Operating systems requirements

For details on supported operating systems, see the *Hitachi Dynamic Link Manager (for Linux®) User Guide* > Chapter 3. Creating an HDLM environment > HDLM System Requirements > Hosts and OSs Supported by HDLM.

Prerequisite programs

None.

Related programs

For details on related programs, see the *Hitachi Dynamic Link Manager (for Linux®) User Guide* > Chapter 3. Creating an HDLM environment > HDLM System Requirements.

Memory and disk space requirements

For details on memory and disk space requirements, see the *Hitachi Dynamic Link Manager (for Linux®) User Guide* > Chapter 3. Creating an HDLM environment > HDLM System Requirements > Memory and disk capacity requirements.

HDLM supported configurations

For details on supported HDLM configuration and space requirements, see the *Hitachi Dynamic Link Manager (for Linux®) User Guide* > Chapter 3. Creating an HDLM environment > Number of LUs and Paths that are supported in HDLM.

Resolved problems

8.8.4-01 Modifications

	Corrected Problems	Applicable products	Applicable OS
1	<p>The following lists the vulnerabilities related to the Java version that comes with HDLM:</p> <p>Vulnerabilities:</p> <p>CVE-2022-21540, CVE-2022-21541, CVE-2022-34169, CVE-2022-21628, CVE-2022-21626, CVE-2022-39399, CVE-2022-21624, CVE-2022-21619</p>	<p>A security problem might occur if a malicious user attacks Hitachi Command Suite Common Agent by taking advantage of the vulnerabilities.</p>	<p>Red Hat Enterprise Linux 7 and 8</p> <p>SUSE Linux Enterprise Server 12 and 15</p> <p>Oracle Linux 7 and 8</p> <p>Oracle Unbreakable Enterprise Kernel 7 and 8</p>

8.8.4-00 Modifications

The following problems have been corrected in HDLM for Linux:

	Corrected Problems	Applicable products	Applicable OS
1	<p>When the dlmbootstart utility or the dracut command is run, the dracut command might result in an error, or the following error message might be displayed:</p> <pre>dracut: FAILED: /usr/lib/dracut/dracut-install -D /var/tmp/dracut.u8SjHe/initramfs -a /bin/mkdir /bin/awk /bin/basename /bin/chmod /bin/rm /bin/cat /bin/uname /usr/bin/cut /bin/readlink /bin/grep /bin/echo /bin/mv /bin/cp /bin/mknod /bin/sed /bin/sort /usr/bin/wc /usr/bin/seq /usr/bin/expr /bin/mount /bin/umount /sbin/modprobe /sbin/lsmmod /sbin/dlmcfgmgr /etc/opt/DynamicLinkManager/hdlm_kernel_version /etc/.DynamicLinkManager/Path00 /sbin/udevadm /sbin/pvs /usr/bin/tail /usr/bin/tr /usr/bin/head /bin/find /etc/redhat-release /etc/modprobe.d/dlmdrvopt.conf</pre>	<p>HDLM for Linux 8.1.4-00 to 8.8.3-02</p>	<p>Red Hat Enterprise Linux 6, 7, and 8</p> <p>SUSE Linux Enterprise Server 12 and 15</p> <p>Oracle Linux 6, 7 and 8</p> <p>Oracle Unbreakable Enterprise Kernel 6, 7, and 8</p>

2	<p>The file systems (xfs and ext4) might issue the read command, related to the look-ahead functionality, to the storage system.</p> <p>However, if an error occurs with this read command, HDLM for Linux identifies the situation as a path failure. Therefore, if the error occurs while one path is disconnected, all paths are placed offline. In an environment where an HDLM device is used as a boot disk, the system stops.</p>	HDLM for Linux 6.5.2-00 to 8.8.3-02	<p>Red Hat Enterprise Linux 6 and 7</p> <p>SUSE Linux Enterprise Server 11, 12, and 15</p> <p>Oracle Linux 6 and 7</p> <p>Oracle Unbreakable Enterprise Kernel 6, 7, and 8</p>
3	<p>The following lists the vulnerabilities related to the Java version that comes with HDLM:</p> <p>CVE-2022-21434, CVE-2022-21443, CVE-2022-21476, CVE-2022-21496</p>	<p>A security problem might occur if a malicious user takes advantage of the vulnerabilities and attacks the Hitachi Command Suite Common Agent.</p>	<p>Red Hat Enterprise Linux 7 and 8</p> <p>SUSE Linux Enterprise Server 12 and 15</p> <p>Oracle Linux 7 and 8</p> <p>Oracle Unbreakable Enterprise Kernel 7 and 8</p>

Known problems

- Storage systems with the following functionality are no longer supported:
 - Dynamic load balance control
 - High Availability Manager
 - Virtual ID for storage migration

However, the parameters for these functions are displayed for the set and view HDLM commands when you run command help. For example, the following is displayed when you run `view -sys:`

```
Dynamic I/O Path Control
```

- During an unattended HDLM installation, if all keys that can be defined in the [ENVIRONMENT_SETTINGS] section are specified at the same time, the following message is displayed, and the installation fails:

```
KAPL09234-W A folder or file specified by the installation information settings file does not exist. Name = aa...aa
```

```
aa...aa: Name of the folder or file that does not exist.
```

Therefore, do not modify the keys that are commented out in the [ENVIRONMENT_SETTINGS] section of the sample file (sample_installhdlm.conf). If you want to change these settings, install HDLM first and then specify the new settings by using the `dlmkmgr set` command.

- If you specify multiple arguments for the `-prsup` parameter by using the `dlmsetopt` utility, the following messages are displayed, and the HDLM driver options are incorrectly set so that HDLM will not link with clusters that support persistent reservations (`-prsup off`).

```
# /opt/DynamicLinkManager/bin/dlmsetopt -prsup on off
KAPL12554-I The utility for setting HDLM driver option has started.
/opt/DynamicLinkManager/bin/dlmsetopt: line 1156: [: too many
arguments
```

Specify the correct argument (either `on` or `off`) for the `-prsup` parameter, and then run the `dlmsetopt` utility again.

```
KAPL12555-I The utility for setting HDLM driver option completed
normally.
KAPL12558-I Please restart the computer so that the option settings
take effect.
```

- If HDLM is installed on the boot disk and when the server starts it triggers a module with a hyphen (-) in the name to also start, even if the module successfully loads, you might see a console message and an entry the `/etc/opt/DynamicLinkManager/hdlmboot.log` file that says the module failed to load.

In this case, after the server starts, run the `lsmod` command. If the hyphens in module names are changed and displayed as underscores (`_`), then there are no problems, and the action for the KAPL12324-E message provided in the *Hitachi Dynamic Link Manager (for Linux®) User Guide* is not required. The following is a message output example (of an error occurring for `dm-region-hash`):

```
# vi /etc/opt/DynamicLinkManager/hdlmboot.log
:
```

```

KAPL12323-I The insertion of the module was started. Module name =
dm-log
KAPL12323-I The insertion of the module was started. Module name =
dm-region-hash
KAPL12324-E The module could not be inserted. Module name = dm-
region-hash
KAPL12323-I The insertion of the module was started. Module name =
dm-mirror
:
#

```

The following is an example of using `lsmod` to confirm that there are no problems (confirming the information displayed for `dm_region_hash`):

```

# lsmod
:
dm_mirror                14003  0
dm_region_hash          12200  1 dm_mirror
dm_log                   10088  2 dm_mirror,dm_region_hash
:
#

```

- Issues when all paths are disconnected during intermittent error monitoring:

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

- Error messages when running the `"rpm -V HDLM"` command

When running the `"rpm -V HDLM"` command on the following operating systems, an error message is generated, but HDLM operations are not affected:

- OS

Red Hat Enterprise Linux 6 (IA32) - 6.10
Oracle Linux 6.5 (IA32) - 6.10

Oracle Unbreakable Enterprise Kernel 6.2 (IA32) - 6.8

Message:

missing /etc/opt/DynamicLinkManager/dlmmgr_e.xml

- OS

- Red Hat Enterprise Linux 6 (EM64T/AMD64) - 6.10

- Red Hat Enterprise Linux 7 (EM64T/AMD64) - 7.9

- Oracle Linux 6.5 (EM64T/AMD64) - 6.10

- Oracle Linux 7 (EM64T/AMD64) - 7.9

- Oracle Unbreakable Enterprise Kernel 6.2 (EM64T/AMD64) - 6.10

- Oracle Unbreakable Enterprise Kernel 7 (EM64T/AMD64) - 7.9

Message:

missing /etc/opt/DynamicLinkManager/dlmmgr_e.xml

missing /opt/DynamicLinkManager/lib/libdlm.so_32

missing /opt/DynamicLinkManager/lib/libdlmogui_jni.so_32

missing /opt/DynamicLinkManager/lib/libhdlmhcc-x.x.x.so_32 (*)

missing /opt/DynamicLinkManager/lib/libhdlmhccmp-x.x.x.so_32 (*)

- OS

- Red Hat Enterprise Linux 8.1 (EM64T/AMD64) - 8.4, 8.6

- Oracle Linux 8.1 (EM64T/AMD64) - 8.4

- Oracle Unbreakable Enterprise Kernel 8.2 (EM64T/AMD64) - 8.4

Message:

missing /etc/opt/DynamicLinkManager/dlmmgr_e.xml

missing /opt/DynamicLinkManager/lib/libdlm.so_32

missing /opt/DynamicLinkManager/lib/libdlmogui_jni.so_32

missing /opt/DynamicLinkManager/lib/libhdlmhcc-x.x.x.so_32 (*)

missing /opt/DynamicLinkManager/lib/libhdlmhccmp-x.x.x.so_32 (*)

- OS: SUSE LINUX Enterprise Server 11 (IA32)

Message:

missing /etc/opt/DynamicLinkManager/dlmmgr_e.xml

- OS: SUSE LINUX Enterprise Server 11 (EM64T/AMD64)

Message:

```
missing /etc/opt/DynamicLinkManager/dlmmgr_e.xml
missing /opt/DynamicLinkManager/lib/libdmlm.so_32
missing /opt/DynamicLinkManager/lib/libdmlmgui_jni.so_32
missing /opt/DynamicLinkManager/lib/libhdlmhcc-x.x.x.so_32 (*1)
missing /opt/DynamicLinkManager/lib/libhdlmhccmp-x.x.x.so_32 (*1)
```

- OS: SUSE LINUX Enterprise Server 12 (EM64T/AMD64) and 15

Message:

```
missing /etc/opt/DynamicLinkManager/dlmmgr_e.xml
missing /opt/DynamicLinkManager/lib64/libdmlm.so_64
missing /opt/DynamicLinkManager/lib64/libdmlmgui_jni.so_64
```

Notes:

* voluntary number

- Do not interrupt the HDLM installation or removal process (for example, do not press the **Ctrl+C** keys).
- If an operation is performed with the following procedure, the status returns to what it was before the refresh operation was run. As a result, make sure that you run the refresh command again after restarting the host and recovering from a path failure.
 - 1) The `dlmkmgr` command is used to perform a refresh.
 - 2) Path errors occur for some or all of the paths, and a path status becomes Offline(E).
 - 3) The host is restarted before the path failure is recovered.
- The partition numbers that can be used for HDLM management targets are from 1 to 15. A partition number of 16 or higher can be assigned in UEFI; however, an SCSI device with a partition number of 16 or higher cannot be used as an HDLM management target.
- If you want to run either of the following utilities in an environment where the language is Japanese or a language other than English, change the language to English (LANG=C), and then run the utility:
 - `dmlmsetopt` utility
 - `dmlmkinitrd` utility

Example:

- a) Check the current setting and then back up the LANG information:

```
# echo $LANG
zh_CN.gbk
#
# bk_LANG=$LANG
# echo $bk_LANG
zh_CN.gbk
#
```

b) Change the setting of LANG to C (English):

```
# export LANG=C
#
```

c) Run the dlmsetopt utility:

```
# /opt/DynamicLinkManager/bin/dlmsetopt -r -1
KAPL12554-I The utility for setting HDLM driver option has
started.
KAPL12555-I The utility for setting HDLM driver option
completed normally.
KAPL12558-I Please restart the computer so that the option
settings take effect.
#
```

d) Return the LANG setting to the original language:

```
# export LANG=$bk_LANG
#
# echo $LANG
zh_CN.gbk
#
```

Closing known problems

None.

Installation precautions

For Hitachi Dynamic Link Manager 6.5.0 and later, the HDLM installation media is a DVD-ROM. Additionally, the directory structure of the media has changed.

Refer to Contents_list.txt on the HDLM installation media, and then replace the descriptions regarding the HDLM installation media directories in the *Hitachi Dynamic Link Manager (for Linux®) User Guide*.

For details on HDLM installation, see the *Hitachi Dynamic Link Manager (for Linux®) User Guide* > Chapter 3. Creating an HDLM environment > Installing HDLM.

Upgrading HDLM precautions

For details on upgrading HDLM, see the *Hitachi Dynamic Link Manager (for Linux®) User Guide* > Chapter 3. Creating an HDLM environment > Upgrading HDLM.

Removing precautions

For details on removing HDLM, see the *Hitachi Dynamic Link Manager (for Linux®) User Guide* > Chapter 3. Creating an HDLM environment > Removing HDLM.

Usage precautions

For details on usage precautions when using HDLM, see the *Hitachi Dynamic Link Manager (for Linux®) User Guide*.

Additional Usage Precautions

- When using an Emulex HBA driver, if you run the HDLM-configuration definition utility (`dlnmcfgmgr -v`), a hyphen (-) might be displayed in the Device column of the results.

To change to a status that does not display a hyphen, run the `dlnmcfgmgr` utility with the `-u` parameter specified. For details on the `dlnmcfgmgr` utility, see the *Hitachi Dynamic Link Manager (for Linux®) User Guide* > Chapter 7. Utility reference > `dlnmcfgmgr` Utility for Managing the HDLM Configuration.

- The settings of the OS and other programs that were changed when installing HDLM must be restored to the original settings after removing HDLM.

- After this version of HDLM is installed, the version numbers are displayed as follows:

Function	Item	Version number
HDLM command (dlnkmgr)	HDLM Version	8.8.4-01
	HDLM Manager	8.8.4-01
	HDLM Alert Driver	8.8.4-01
	HDLM Driver	8.8.4-01

The following example shows the text that is displayed when you run `dlnkmgr view -sys`:

```
# /opt/DynamicLinkManager/bin/dlnkmgr view -sys
HDLM Version           : 8.8.4-01
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)
Reservation Status     :
Intermittent Error Monitor : off
Dynamic I/O Path Control : off(10)
HDLM Manager Ver      WakeupTime
Alive                 8.8.4-01   yyyy/mm/dd hh:mm:ss
HDLM Alert Driver Ver  WakeupTime           ElogMem Size
Alive                 8.8.4-01   yyyy/mm/dd hh:mm:ss   1000
HDLM Driver Ver       WakeupTime
Alive                 8.8.4-01   yyyy/mm/dd hh:mm:ss
License Type Expiration
Temporary             yyyy/mm/dd (2days after)
KAPL01001-I The HDLM command completed normally. Operation name =
view, completion time = yyyy/mm/dd hh:mm:ss
```

- This version of HDLM does not support the virtualization (the Xen function) provided by the following:
 - Red Hat Enterprise Linux 6 - 6.10, 7 - 7.9
 - Oracle Linux 6.5 - 6.10, 7 - 7.9
- HDLM cannot be used in domain 0 or domain U of in a virtualized environment (the Xen function).
- HDLM cannot be installed on an unsupported OS. Even if the installation is successful, the software usage cannot be guaranteed.
- If HDLM is used with LifeKeeper for Linux, the following message may be displayed; however, there is no effect on HDLM:

```
quickCheck: The daemon "dlmmgr" was restarted by quickCheck.
quickCheck: The daemon "dlmmgr" does not appear to be running and
could not be restarted.
Path failures may not be correctly handled without this daemon.
```

- Run the following command to verify whether the HDLM manager is running:

```
# /opt/DynamicLinkManager/bin/dlnkmgr view -sys -msrv
HDLM Manager Ver      WakeupTime
Alive                 8.8.4-01 yyyy/mm/dd hh:mm:ss
KAPL01001-I The HDLM command ended successfully. (operation name =
view, end time = yyyy/mm/dd hh:mm:ss)
```

If you restart the host, the route information changes and an increased number of offline (E) paths per LU might be displayed. If the number of online paths per LU is the same as before the host restarted, remove the unnecessary offline (E) paths by using `dlmcfgmgr -u {HDLM device}`.

- In Red Hat Enterprise Linux 6, 7, and 8, Oracle Unbreakable Enterprise Kernel 6, 7, and 8, Oracle Linux 7 and 8, SUSE LINUX Enterprise Server 11, 12, and 15:
 - If you run the `dlmcfgmgr -u` utility (`dlmcfgmgr -u`), the path information is deleted when a path failure occurs. The path information is deleted even if a hyphen (-) is not displayed for an SCSI device name in the device row that is displayed as a result of running the `dlmcfgmgr` utility or the HDLM command `view` operation (specifying `-lu` or `-drv`).
 - If the path information is deleted, run `dlmcfgmgr -r` after recovering the failed path to ensure that the recovered path is discovered by HDLM, and then confirm that the path status is online.
- HDLM for Linux does not support cluster software in a HAM environment.

- When displaying LU information, the HAM information is not displayed by specifying the "all" parameter-value for the HDLM command. Instead, specify the "ha" and "hastat" parameter-value.
- If an online operation is performed on an owner path, the path status of a non-owner 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 status is Online. If the non-owner path 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 for HDLM management, make sure that the host recognizes paths to the MCU (Primary VOL) and RCU (Secondary VOL) after the HAM pair is created.

Run the `dlnkmgr view -lu -item hastat` command. If `ha` is not displayed in the `HaStat` column, then the corresponding LU is not recognized as a HAM configuration.

If the host recognizes the paths to the MCU and RCU before the HAM pair is created, restart the host after creating the HAM pair.

- 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 must 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 is recognized as a volume other than an MCU volume. If this occurs, restart the host after the HAM pair is re-created.

- Run the `dlnkmgr view -lu -item hastat` command, and then confirm that `ha` is displayed in the `HaStat` column.
 - When the path health check provided by HDLM is enabled (on), if a HAM pair is released, the status of the paths (non-owner paths) connected to the RCU might become Offline(E) or Online(E). After creating (recovering) a HAM pair, return the status of the paths to Online using the HDLM command `online` operation.
- Do not use an XFS or a btrfs file system for a system partition in any of the following environments:
 - Red Hat Enterprise Linux 6.2 (EM64T/AMD64) - 6.10
 - Oracle Unbreakable Enterprise Kernel 6.5 (EM64T/AMD64) - 6.10
 - SUSE LINUX Enterprise Server 11 SP4 (EM64T/AMD64)

- If you are using SLES 11 SP4 (IA32), do not specify the `inode64` option when mounting an XFS file system.
- If you are using btrfs file systems in SLES 11 SP4 (IA32), do not create more than 232 files in a single file system.
- If the KAPL12451-E error message is displayed using HDLM 8.5.4-00 or later, perform the following steps:
 - 1) Verify whether `write_cache_state=0` is specified in the `/etc/lvm/lvm.conf` file. Specify `write_cache_state=0` if it is not specified.
 - 2) Run `/sbin/vgscan`.
 - 3) Verify whether the following files exist. If either or both of the files exist, delete them.

```
/etc/lvm/.cache
/etc/lvm/cache/.cache
```

- 4) In an environment where a logical volume (LVM2) on an HDLM device is used as the boot disk, re-create the initial RAM disk image file for HDLM by performing step 9 of the procedure in the *Hitachi Dynamic Link Manager (for Linux®) User Guide* > Chapter 3. Creating an HDLM environment > Installing HDLM for managing boot disks > Settings for a multipath boot disk environment on page 3-148.
- If there are 1025 or more paths, including those with a status other than Online. Running the `dlmchname` utility might take some time to finish.
 - In Red Hat Enterprise Linux 6, 7, and 8, Oracle Unbreakable Enterprise Kernel 6, 7, and 8, Oracle Linux 7 and 8, SUSE LINUX Enterprise Server 11, 12, and 15, if the HDLM manager does not start after an attempt to reinstall, upgrade, or remove HDLM for Linux fails and the KAPL09013-E message is output, perform any of the following procedures:
 - Restart the host.
 - Run the following command to start the HDLM manager:

```
# /opt/DynamicLinkManager/bin/dlmmanager start
```

- In Oracle Linux 8.4 or Oracle Unbreakable Enterprise Kernel 8.4, if one of the following operations is performed, the following message is displayed; however, there is no actual problem. For details, see Oracle® Linux 8 Release Notes for Oracle Linux 8.4.

```
"/sbin/ldconfig: /etc/ld.so.conf.d/kernel-5.4.17-
2102.201.3.el8uek.x86_64.conf:6: hwcap directive ignored"
```

- Installing HDLM
- Removing HDLM
- Running the dercut command
- Running the dlmbotstrat utility

Documentation

Available documents

Document name	Document number	Issue date
Hitachi Dynamic Link Manager (for Linux®) User Guide	MK-92DLM113-58	August 2022

Appendix A

HBA Driver Support Matrix

Fibre Channel I/F adapters

Use the Fibre Channel I/F adapters listed in the following table. When using two or more adapters, use the same type of adapter. If you combine different types of HBA, then HDLM may not be able to switch a path when an error occurs.

QLogic¹

OS	Kernel	Driver
Red Hat Enterprise Linux 6 (IA32)	2.6.32-71.el6.i686	8.03.01.05.06.0-k8 ^{3,4}
Red Hat Enterprise Linux 6 (EM64T/AMD64)	2.6.32-71.el6.x86_64	8.03.01.05.06.0-k8 ^{3,4}
Red Hat Enterprise Linux 6.1 (IA32)	2.6.32-131.0.15.el6.i686	8.03.07.03.06.1-k ^{3,4} 8.03.07.13.06.0-k
Red Hat Enterprise Linux 6.1 (EM64T/AMD64)	2.6.32-131.0.15.el6.x86_64	8.03.07.03.06.1-k ^{3,4} 8.03.07.13.06.0-k
Red Hat Enterprise Linux 6.2 (IA32)	2.6.32-220.el6.i686	8.03.07.05.06.2-k ^{3,4} 8.03.07.13.06.0-k 8.04.00.06.06.0-k 8.06.00.10.06.0-k
Red Hat Enterprise Linux 6.2 (EM64T/AMD64)	2.6.32-220.el6.x86_64	8.03.07.05.06.2-k ^{3,4} 8.03.07.13.06.0-k 8.04.00.06.06.0-k 8.06.00.10.06.0-k
Red Hat Enterprise Linux 6.3 (IA32)	2.6.32-279.el6.i686	8.04.00.04.06.3-k ^{3,4} 8.05.00.03.06.0-k 8.06.00.10.06.0-k

Red Hat Enterprise Linux 6.3 (EM64T/AMD64)	2.6.32-279.el6.x86_64	8.04.00.04.06.3-k ^{3,4} 8.05.00.03.06.0-k 8.06.00.10.06.0-k
Red Hat Enterprise Linux 6.4 (IA32)	2.6.32-358.el6.i686	8.04.00.08.06.4-k ^{3,4} 8.05.00.03.06.0-k 8.06.00.10.06.0-k 8.07.00.08.06.0-k
Red Hat Enterprise Linux 6.4 (EM64T/AMD64)	2.6.32-358.el6.x86_64 2.6.32-358.87.1.el6.x86_64	8.04.00.08.06.4-k ^{3,4} 8.05.00.03.06.0-k 8.06.00.10.06.0-k 8.07.00.08.06.0-k
Red Hat Enterprise Linux 6.5 (IA32)	2.6.32-431.el6.i686	8.05.00.03.06.5-k ^{2,3,4} 8.07.00.08.06.0-k
Red Hat Enterprise Linux 6.5 (EM64T/AMD64)	2.6.32-431.el6.x86_64 2.6.32-431.87.1.el6.x86_64	8.05.00.03.06.5-k ^{2,3,4} 8.07.00.08.06.0-k
Red Hat Enterprise Linux 6.6 (IA32)	2.6.32-504.el6.i686	8.07.00.08.06.6-k ^{1,3,4}
Red Hat Enterprise Linux 6.6 (EM64T/AMD64)	2.6.32-504.el6.x86_64 2.6.32-504.66.1.el6.x86_64	8.07.00.08.06.6-k ^{1,3,4}
Red Hat Enterprise Linux 6.7 (IA32)	2.6.32-573.el6.i686 2.6.32-573.53.1.el6.i686	8.07.00.16.06.7-k ^{3,4}
Red Hat Enterprise Linux 6.7 (EM64T/AMD64)	2.6.32-573.el6.x86_64 2.6.32-573.53.1.el6.x86_64	8.07.00.16.06.7-k ^{3,4}
Red Hat Enterprise Linux 6.8 (IA32)	2.6.32-642.el6.i686	8.07.00.26.06.8-k ^{3,4}
Red Hat Enterprise Linux 6.8 (EM64T/AMD64)	2.6.32-642.el6.x86_64	8.07.00.26.06.8-k ^{3,4}
Red Hat Enterprise Linux 6.9 (IA32)	2.6.32-696.el6.i686 2.6.32-696.23.1.el6.i686	8.07.00.26.06.8-k ^{3,4}
	2.6.32-696.el6.x86_64	8.07.00.26.06.8-k ^{3,4}

Red Hat Enterprise Linux 6.9 (EM64T/AMD64)	2.6.32-696.23.1.el6.x86_64	8.07.00.50.06.0-k4 ⁴
		8.08.00.07.06.0-k1 ⁴
Red Hat Enterprise Linux 6.10 (IA32)	2.6.32-754.el6.i686	8.07.00.26.06.8-k ^{3,4}
Red Hat Enterprise Linux 6.10 (EM64T/AMD64)	2.6.32-754.el6.x86_64	8.07.00.26.06.8-k ^{3,4}
Red Hat Enterprise Linux 7 (EM64T/AMD64)	3.10.0-123.el7.x86_64	8.06.00.08.07.0-k2 ^{3,4}
		8.06.00.08.07.0-k3 ^{3,4,10}
Red Hat Enterprise Linux 7.1 (EM64T/AMD64)	3.10.0-229.el7.x86_64	8.07.00.08.07.1-k2 ^{3,4}
		8.07.00.39.07.0-k
Red Hat Enterprise Linux 7.2 (EM64T/AMD64)	3.10.0-327.el7.x86_64	8.07.00.18.07.2-k ^{3,4}
	3.10.0-327.64.4.el7.x86_64	8.07.00.39.07.0-k
Red Hat Enterprise Linux 7.3 (EM64T/AMD64)	3.10.0-514.el7.x86_64 3.10.0-514.44.1.el7.x86_64	8.07.00.33.07.3-k1 ^{3,4}
		8.07.00.39.07.0-k
		8.07.00.50.07.0-k4 ⁴
Red Hat Enterprise Linux 7.4 (EM64T/AMD64)	3.10.0-693.el7.x86_64 3.10.0-693.21.1.el7.x86_64	8.07.00.38.07.4-k1 ^{3,4}
		8.07.00.50.07.0-k4 ⁴
		8.08.00.07.07.0-k1 ⁴
Red Hat Enterprise Linux 7.5 (EM64T/AMD64)	3.10.0-862.el7.x86_64	8.08.00.07.07.5-k1 ⁴
		9.00.00.00.07.5-k1 ^{3,4}
Red Hat Enterprise Linux 7.6 (EM64T/AMD64)	3.10.0-957.el7.x86_64	10.00.00.06.07.6-k ^{3,4}
		10.01.00.33.07.6-k2 ⁴
Red Hat Enterprise Linux 7.7 (EM64T/AMD64)	3.10.0-1062.el7.x86_64	10.00.00.12.07.7-k ^{3,4}
		10.01.00.64.07.6-k1a ^{4,11}
Red Hat Enterprise Linux 7.8 (EM64T/AMD64)	3.10.0-1127.el7.x86_64	10.01.00.20.07.8-k ^{3,4}
		10.01.00.64.07.6-k1a ^{4,11}

		10.02.01.00.a14-k1 ^{4,11}
Red Hat Enterprise Linux 7.9 (EM64T/AMD64)	3.10.0-1160.el7.x86_64	10.01.00.22.07.9-k ^{3,4} 10.02.01.00.a14-k1 ^{4,11}
Red Hat Enterprise Linux 8.1 (EM64T/AMD64)	4.18.0-147.el8.x86_64	10.01.00.64.08.0-k1 ^{4,11}
Red Hat Enterprise Linux 8.2 (EM64T/AMD64)	4.18.0-193.el8.x86_64	10.01.00.21.08.2-k ^{3,4} 10.01.00.64.08.0-k1 ^{4,11} 10.02.01.00.a14-k1 ^{4,11}
Red Hat Enterprise Linux 8.3 (EM64T/AMD64)	4.18.0-240.el8.x86_64	10.01.00.25.08.3-k ^{3,4} 10.02.01.00.a14-k1 ^{4,11}
Red Hat Enterprise Linux 8.4 (EM64T/AMD64)	4.18.0-305.el8.x86_64	10.02.00.104-k ^{3,4} 10.02.01.01.a2-k1 ^{4,11}
Red Hat Enterprise Linux 8.6 (EM64T/AMD64)	4.18.0-372.9.1.el8.x86_64	10.02.06.200-k ^{3,4}
SUSE LINUX Enterprise Server 11 (IA32)	3.0.101-63.1-default 3.0.101-63.1-pae	8.07.00.18-k ^{3,4}
	3.0.101-108.21-default 3.0.101-108.21-pae	8.07.00.18-k ^{3,4}
	3.0.101-108.68-default 3.0.101-108.68-pae	8.07.00.18-k ^{3,4}
SUSE LINUX Enterprise Server 11 (EM64T/AMD64)	3.0.101-63.1-default 3.0.101-63.1-xen	8.07.00.18-k ^{3,4}
	3.0.101-108.21-default 3.0.101-108.21-xen	8.07.00.18-k ^{3,4}
	3.0.101-108.68-default 3.0.101-108.68-xen	8.07.00.18-k ^{3,4}
	3.12.28-4-default	8.07.00.08.12.0-k ^{3,4}

SUSE LINUX Enterprise Server 12 (EM64T/AMD64)	3.12.28-4-xen	8.07.00.08.12.0-k ^{3,4}
	3.12.59-60.45-default	8.07.00.18-k ^{3,4}
	3.12.74-60.64.40-default	8.07.00.18-k ^{3,4}
	3.12.59-60.45-xen	8.07.00.18-k ^{3,4}
	3.12.74-60.64.40-xen	8.07.00.18-k ^{3,4}
	4.4.21-69-default	8.07.00.33-k ^{3,4}
	4.4.103-6.33-default	9.00.00.00-k ^{3,4}
	4.4.114-94.14-default	9.00.00.00-k ^{3,4}
	4.12.14-94.41-default	10.00.00.11-k ^{3,4}
	4.12.14-120-default	10.01.00.18-k ^{3,4}
SUSE LINUX Enterprise Server 15 (EM64T/AMD64)	4.12.14-23-default	10.00.00.06-k ^{3,4}
	4.12.14-195-default	10.00.00.13-k ^{3,4}
	5.3.18-22-default	10.01.00.25-k ^{3,4}
	5.3.18-59.40-default	10.02.07.100-k ^{3,4}
Oracle Linux 6.5 (IA32)	2.6.32-431.el6.i686	8.05.00.03.06.5-k2 ^{3,4}
Oracle Linux 6.5 (EM64T/AMD64)	2.6.32-431.el6.x86_64	8.05.00.03.06.5-k2 ^{3,4}
Oracle Linux 6.6 (IA32)	2.6.32-504.el6.i686	8.07.00.08.06.6-k1 ^{3,4}
Oracle Linux 6.6 (EM64T/AMD64)	2.6.32-504.el6.x86_64	8.07.00.08.06.6-k1 ^{3,4}
Oracle Linux 6.7 (IA32)	2.6.32-573.el6.i686	8.07.00.16.06.7-k ^{3,4}
Oracle Linux 6.7 (EM64T/AMD64)	2.6.32-573.el6.x86_64	8.07.00.16.06.7-k ^{3,4}
Oracle Linux 6.8 (IA32)	2.6.32-642.el6.i686	8.07.00.26.06.8-k ^{3,4}
Oracle Linux 6.8 (EM64T/AMD64)	2.6.32-642.el6.x86_64	8.07.00.26.06.8-k ^{3,4}
Oracle Linux 6.9 (IA32)	2.6.32-696.el6.i686	8.07.00.26.06.8-k ^{3,4}
Oracle Linux 6.9 (EM64T/AMD64)	2.6.32-696.el6.x86_64	8.07.00.26.06.8-k ^{3,4}

Oracle Linux 6.10 (IA32)	2.6.32-754.el6.i686	8.07.00.26.06.8-k ^{3,4}
Oracle Linux 6.10 (EM64T/AMD64)	2.6.32-754.el6.x86_64	8.07.00.26.06.8-k ^{3,4}
Oracle Linux 7 (EM64T/AMD64)	3.10.0-123.el7.x86_64	8.06.00.08.07.0-k ^{3,4}
Oracle Linux 7.1 (EM64T/AMD64)	3.10.0-229.el7.x86_64	8.07.00.08.07.1-k ^{3,4}
Oracle Linux 7.2 (EM64T/AMD64)	3.10.0-327.el7.x86_64	8.07.00.18.07.2-k ^{3,4}
Oracle Linux 7.3 (EM64T/AMD64)	3.10.0-514.el7.x86_64	8.07.00.33.07.3-k1 ^{3,4}
Oracle Linux 7.4 (EM64T/AMD64)	3.10.0-693.el7.x86_64 3.10.0-693.11.6.el7.x86_64	8.07.00.38.07.4-k1 ^{3,4}
Oracle Linux 7.5 (EM64T/AMD64)	3.10.0-862.el7.x86_64	9.00.00.00.07.5-k1 ^{3,4}
Oracle Linux 7.6 (EM64T/AMD64)	3.10.0-957.el7.x86_64	10.00.00.06.07.6-k ^{3,4}
Oracle Linux 7.7 (EM64T/AMD64)	3.10.0-1062.el7.x86_64	10.00.00.12.07.7-k ^{3,4}
Oracle Linux 7.8 (EM64T/AMD64)	3.10.0-1127.el7.x86_64	10.01.00.20.07.8-k ^{3,4}
Oracle Linux 7.9 (EM64T/AMD64)	3.10.0-1160.el7.x86_64	10.01.00.22.07.9-k ^{3,4}
Oracle Linux 8.2 (EM64T/AMD64)	4.18.0-193.el8.x86_64	10.01.00.21.08.2-k ^{3,4}
Oracle Linux 8.3 (EM64T/AMD64)	4.18.0-240.el8.x86_64	10.01.00.25.08.3-k ^{3,4}
Oracle Linux 8.4 (EM64T/AMD64)	4.18.0-305.el8.x86_64	10.02.00.104-k ^{3,4}
Oracle Linux 8.6 (EM64T/AMD64)	4.18.0-372.9.1.el8.x86_64	10.02.06.200-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.2 (IA32)	2.6.39-200.29.1.el6uek.686	8.04.00.03.39.0-k ^{3,4}
	2.6.39-200.29.2.el6uek.686	8.04.00.03.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.2 (EM64T/AMD64)	2.6.39-200.29.1.el6uek.x86_64	8.04.00.03.39.0-k ^{3,4}
	2.6.39-200.29.2.el6uek.x86_64	8.04.00.03.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.3 (IA32)	2.6.39-200.24.1.el6uek.686	8.04.00.03.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.3 (EM64T/AMD64)	2.6.39-200.24.1.el6uek.x86_64	8.04.00.03.39.0-k ^{3,4}

Oracle Unbreakable Enterprise Kernel 6.4 (IA32)	2.6.39-400.211.1.el6uek.686	8.05.00.03.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.4 (EM64T/AMD64)	2.6.39-400.211.1.el6uek.x86_64 2.6.39-400.264.1.el6uek.x86_64	8.05.00.03.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.5 (IA32)	2.6.39-400.211.1.el6uek.686	8.05.00.03.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.5 (EM64T/AMD64)	3.8.13-16.2.1.el6uek.x86_64	8.05.00.03.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.5 (EM64T/AMD64)	3.8.13-44.el6uek.x86_64	8.07.00.08.39.0-k1 ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.6 (IA32)	2.6.39-400.215.10.el6uek.686	8.05.00.03.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.6 (EM64T/AMD64)	3.8.13-44.1.1.el6uek.x86_64	8.07.00.08.39.0-k1 ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.6 (EM64T/AMD64)	3.8.13-68.el6uek.x86_64 3.8.13-68.1.3.el6uek.x86_64	8.07.00.16.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.7 (IA32)	2.6.39-400.250.7.el6uek.686	8.05.00.03.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.7 (EM64T/AMD64)	3.8.13-68.3.4.el6uek.x86_64	8.07.00.16.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.8 (IA32)	2.6.39-400.278.2.el6uek.686	8.05.00.03.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.8 (EM64T/AMD64)	4.1.12-37.4.1.el6uek.x86_64	8.07.00.33.40.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.9 (EM64T/AMD64)	4.1.12-61.1.28.el6uek.x86_64 4.1.12-94.2.1.el6uek.x86_64	8.07.00.38.40.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 6.10 (EM64T/AMD64)	4.1.12-124.16.4.el6uek.x86_64	9.00.00.00.40.0-k1 ^{3,4}
	4.1.12-124.45.6.el6uek.x86_64	9.00.00.00.42.0-k1-v3 ^{3,4}
Oracle Unbreakable Enterprise Kernel 7 (EM64T/AMD64)	3.8.13-44.el7uek.x86_64	8.07.00.08.39.0-k1 ^{3,4}

Oracle Unbreakable Enterprise Kernel 7.1 (EM64T/AMD64)	3.8.13-55.1.6.el7uek.x86_64 3.8.13-68.el7uek.x86_64 3.8.13-68.2.2.el7uek.x86_64	8.07.00.16.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 7.2 (EM64T/AMD64)	3.8.13-98.7.1.el7uek.x86_64	8.07.00.18.39.0-k ^{3,4}
	3.8.13-118.10.2.el7uek.x86_64	8.07.00.26.39.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 7.3 (EM64T/AMD64)	4.1.12-61.1.18.el7uek.x86_64 4.1.12-61.1.28.el7uek.x86_64	8.07.00.38.40.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 7.4 (EM64T/AMD64)	4.1.12-94.3.9.el7uek.x86_64	8.07.00.38.40.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 7.5 (EM64T/AMD64)	4.1.12-112.16.4.el7uek.x86_64 4.1.12-124.16.4.el7uek.x86_64 4.1.12-124.30.1.el7uek.x86_64	9.00.00.00.40.0-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 7.6 (EM64T/AMD64)	4.14.35-1818.3.3.el7uek.x86_64	10.00.00.07-k ^{1,3,4}
Oracle Unbreakable Enterprise Kernel 7.7 (EM64T/AMD64)	4.14.35-1902.3.2.el7uek.x86_64	10.00.00.13-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 7.8 (EM64T/AMD64)	4.14.35-1902.300.11.el7uek.x86_64 4.14.35-1902.301.1.el7uek.x86_64	10.00.00.13-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 7.9 (EM64T/AMD64)	5.4.17-2011.6.2.el7uek.x86_64	10.01.00.25-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 8.2 (EM64T/AMD64)	5.4.17-2011.5.3.el8uek.x86_64	10.01.00.25-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 8.3 (EM64T/AMD64)	5.4.17-2011.7.4.el8uek.x86_64	10.01.00.25-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 8.4 (EM64T/AMD64)	5.4.17-2102.201.3.el8uek.x86_64	10.02.00.103-k ^{3,4}
Oracle Unbreakable Enterprise Kernel 8.6 (EM64T/AMD64)	5.4.17-2136.307.3.1.el8uek.x86_64	10.02.00.106-k ^{3,4}
Notes:		

1. Do not use the HBA driver failover function.
Check the settings for the failover function as follows:
For Red Hat Enterprise Linux 6 - 6.10, 7 - 7.9, 8.1 - 8.4, and 8.6, Oracle Linux 6.5 - 6.10, 7-7.9, 8.2, and 8.4, Oracle Unbreakable Enterprise Kernel 6.2 - 6.10, 7 - 7.9, 8.2 - 8.4, and SUSE LINUX Enterprise Server 11:

- a. To check the version of the driver, run the following command:

```
# cat /sys/class/scsi_host/hostn/driver_version  
n: the instance number of the HBA port
```

- b. Check the output result to see whether the characters "fo" are added to the version notation.

- When the failover function is enabled:

```
8.01.07-k1-fo
```

- When the failover function is disabled:

```
8.01.07-k1
```

2. The drivers mentioned in the page of "Hitachi Vantara - HBA Approved Software" in the QLogic website are supported. Get the drivers from the following URL:

http://support.qlogic.com/support/oem_detail_hds.asp?oemid=84&classid=237

This URL may change without notice. If the URL changes, search for the "Hitachi Vantara - HBA Approved Software" page in the QLogic website.

3. Use the driver bundled with the kernel.
4. Using an HDLM device as the boot disk is supported.
5. HDLM also supports the environments where 32-bit kernel packages are installed on a system using an AMD Opteron processor.
6. Because the failover function is set to Enable by default, change it to Disable. For changing the setting of the failover function to Disable, set the following in `/etc/modprobe.conf` file.

Example: When the driver version is 8.01.01.

```
options qla2xxx ql2xfailover=0
```

See the HBA attachment document for details on changing the failover function setting.

7. EM64T indicates the environments where 64-bit kernel packages are installed on a system using an Intel EM64T processor.
8. AMD64 indicates the environments where 64-bit kernel packages are installed on a system using an AMD Opteron processor.
9. Supported by Kernel 2.6.32.24-0.2.1 or later.
10. Supported by Kernel 3.10.0-123.13.2 or later.
11. HP HBA drivers are supported.

Emulex

OS	Kernel	Driver
Red Hat Enterprise Linux 6 (IA32)	2.6.32-71.el6.i686	8.3.5.17 ^{2,3}
Red Hat Enterprise Linux 6 (EM64T/AMD64)	2.6.32-71.el6.x86_64	8.3.5.17 ^{2,3}
Red Hat Enterprise Linux 6.1 (IA32)	2.6.32-131.0.15.el6.i686	8.3.5.30.1p ^{2,3}
Red Hat Enterprise Linux 6.1 (EM64T/AMD64)	2.6.32-131.0.15.el6.x86_64	8.3.5.30.1p ^{2,3} 8.3.7.18-1
Red Hat Enterprise Linux 6.2 (IA32)	2.6.32-220.el6.i686	8.3.5.45.4p ^{2,3}
Red Hat Enterprise Linux 6.2(EM64T/AMD64)	2.6.32-220.el6.x86_64	8.3.5.45.4p ^{2,3} 8.3.7.18-1
Red Hat Enterprise Linux 6.3 (IA32)	2.6.32-279.el6.i686	8.3.5.68.5p ^{2,3}
Red Hat Enterprise Linux 6.3(EM64T/AMD64)	2.6.32-279.el6.x86_64	8.3.5.68.5p ^{2,3} 8.3.7.18-1
Red Hat Enterprise Linux 6.4 (IA32)	2.6.32-358.el6.i686	8.3.5.86.1p ^{2,3}
Red Hat Enterprise Linux 6.4(EM64T/AMD64)	2.6.32-358.el6.x86_64 2.6.32-358.87.1.el6.x86_64	8.3.5.86.1p ^{2,3} 8.3.7.18-1 ³
Red Hat Enterprise Linux 6.5 (IA32)	2.6.32-431.el6.i686	8.3.7.21.4p ^{2,3}
Red Hat Enterprise Linux 6.5(EM64T/AMD64)	2.6.32-431.el6.x86_64 2.6.32-431.87.1.el6.x86_64	8.3.7.21.4p ^{2,3} 8.3.7.39 10.2.340.16 10.6.144.21 ³ 11.0.240.0
Red Hat Enterprise Linux 6.6 (IA32)	2.6.32-504.el6.i686	10.2.802.1 ^{2,3} 10.2.469.0
Red Hat Enterprise Linux 6.6(EM64T/AMD64)	2.6.32-504.el6.x86_64 2.6.32-504.66.1.el6.x86_64	10.2.802.1 ^{2,3} 10.2.469.0

		10.6.144.21 ³
Red Hat Enterprise Linux 6.7 (IA32)	2.6.32-573.el6.i686 2.6.32-573.53.1.el6.i686	10.6.0.20 ^{2,3}
Red Hat Enterprise Linux 6.7(EM64T/AMD64)	2.6.32-573.el6.x86_64 2.6.32-573.53.1.el6.x86_64	10.6.0.20 ^{2,3} 10.6.144.21 ³ 11.1.38.64 11.1.172.22 ³
Red Hat Enterprise Linux 6.8 (IA32)	2.6.32-642.el6.i686	11.0.0.4 ^{2,3}
Red Hat Enterprise Linux 6.8(EM64T/AMD64)	2.6.32-642.el6.x86_64	11.0.0.4 ^{2,3}
Red Hat Enterprise Linux 6.9 (IA32)	2.6.32-696.el6.i686 2.6.32-696.21.1.el6.i686	11.0.0.5 ^{2,3}
Red Hat Enterprise Linux 6.9(EM64T/AMD64)	2.6.32-696.el6.x86_64 2.6.32-696.21.1.el6.x86_64	11.0.0.5 ^{2,3} 11.2.156.18 ³ 11.2.307.13 ^{3,6} 11.4.142.26
Red Hat Enterprise Linux 6.10 (IA32)	2.6.32-754.el6.i686	11.0.1.6 ^{2,3}
Red Hat Enterprise Linux 6.10(EM64T/AMD64)	2.6.32-754.el6.x86_64	11.0.1.6 ^{2,3}
Red Hat Enterprise Linux 7 (EM64T/AMD64)	3.10.0-123.el7.x86_64	8.3.7.31.1p ^{2,3}
Red Hat Enterprise Linux 7.1 (EM64T/AMD64)	3.10.0-229.el7.x86_64	10.2.8021.1 ^{2,3} 10.16.193.12 ³ 11.1.172.22 ³
Red Hat Enterprise Linux 7.2 (EM64T/AMD64)	3.10.0-327.el7.x86_64 3.10.0-327.64.1.el7.x86_64	10.7.0.1 ^{2,3} 10.16.193.21 ³ 11.1.172.22 ³
Red Hat Enterprise Linux 7.3 (EM64T/AMD64)	3.10.0-514.el7.x86_64 3.10.0-514.44.1.el7.x86_64	11.1.0.2 ^{2,3} 11.2.307.13 ^{3,6}

Red Hat Enterprise Linux 7.4 (EM64T/AMD64)	3.10.0-693.el7.x86_64 3.10.0-693.21.1.el7.x86_64	11.2.0.6 ^{2,3} 11.2.307.13 ^{3,6} 11.4.334.26 ^{3,6}
Red Hat Enterprise Linux 7.5 (EM64T/AMD64)	3.10.0-862.el7.x86_64	11.4.0.4 ^{2,3} 11.4.334.26 ^{3,6}
Red Hat Enterprise Linux 7.6 (EM64T/AMD64)	3.10.0-957.el7.x86_64	12.0.0.5 ^{2,3} 12.0.346.15 ^{3,6} 12.0.384.0.4fts ³ 12.4.270.3 ^{3,6}
Red Hat Enterprise Linux 7.7 (EM64T/AMD64)	3.10.0-1062.el7.x86_64	12.0.0.10 ^{2,3} 12.4.270.3 ^{3,6}
Red Hat Enterprise Linux 7.8 (EM64T/AMD64)	3.10.0-1127.el7.x86_64	12.0.0.13 ^{2,3} 12.6.275.14 ^{3,6} 12.8.352.11 ^{3,6} 12.8.528.7 ^{3,6}
Red Hat Enterprise Linux 7.9 (EM64T/AMD64)	3.10.0-1160.el7.x86_64	12.0.0.13 ^{2,3} 12.8.352.11 ^{3,6} 12.8.528.7 ^{3,6}
Red Hat Enterprise Linux 8.1 (EM64T/AMD64)	4.18.0-147.el8.x86_64	12.2.0.3 ^{2,3} 12.6.275.14 ^{3,6}
Red Hat Enterprise Linux 8.2 (EM64T/AMD64)	4.18.0-193.el8.x86_64	12.6.0.2 ^{2,3} 12.6.275.14 ^{3,6} 12.8.352.11 ^{3,6}
Red Hat Enterprise Linux 8.3 (EM64T/AMD64)	4.18.0-240.el8.x86_64	12.8.0.1 ^{2,3} 12.8.352.11 ^{3,6} 12.8.528.7 ^{3,6}
Red Hat Enterprise Linux 8.4 (EM64T/AMD64)	4.18.0-305.el8.x86_64	12.8.0.5 ^{2,3} 12.8.528.7 ^{3,6}

Red Hat Enterprise Linux 8.6 (EM64T/AMD64)	4.18.0-372.9.1.el8.x86_64	14.0.0.4 ^{2,3}
SUSE LINUX Enterprise Server 11 (IA32)	3.0.101-63.1-default 3.0.101-63.1-pae	10.4.8000.0 ^{2,3}
	3.0.101-108.21-default 3.0.101-108.21-pae	10.4.8000.0 ^{2,3}
	3.0.101-108.68-default 3.0.101-108.68-pae	10.4.8000.0 ^{2,3}
SUSE LINUX Enterprise Server 11 (EM64T/AMD64)	3.0.101-63.1-default 3.0.101-63.1-xen	10.4.8000.0 ^{2,3} 11.2.216.8 ³
	3.0.101-108.21-default 3.0.101-108.21-xen	10.4.8000.0 ^{2,3} 11.2.216.8 ³
	3.0.101-108.68-default 3.0.101-108.68-xen	10.4.8000.0 ^{2,3} 11.2.216.8 ³
SUSE LINUX Enterprise Server 12 (EM64T/AMD64)	3.12.28-4-default	10.2.8040.1 ²
	3.12.28-4-xen	10.2.8040.1 ²
	3.12.59-60.45-default	10.5.0.2 ²³ 11.2.216.8 ³
	3.12.59-60.45-xen	10.5.0.2 ²³ 11.2.216.8 ³
	3.12.74-60.64.40-default	10.5.0.2 ²³ 11.2.216.8 ³
	3.12.74-60.64.40-xen	10.5.0.2 ²³ 11.2.216.8 ³
	4.4.21-69-default	11.1.0.1 ²³
	4.4.103-6.33-default	11.4.0.5 ²³
	4.4.114-94.14-default	11.4.0.5 ²³

	4.12.14-94.41-default	12.0.0.6 ²³
	4.12.14-120-default	12.4.0.0 ²³
SUSE LINUX Enterprise Server 15 (EM64T/AMD64)	4.12.14-23-default	12.0.0.1 ²³
	4.12.14-195-default	12.2.0.0 ²³
	5.3.18-22-default	12.8.0.0 ²³
	5.3.18-59.40-default	14.0.0.3 ²³
Oracle Linux 6.5 (IA32)	2.6.32-431.el6.i686	8.3.7.21.4p ^{2,3}
Oracle Linux 6.5 (EM64T/AMD64)	2.6.32-431.el6.x86_64	8.3.7.21.4p ^{2,3}
Oracle Linux 6.6 (IA32)	2.6.32-504.el6.i686	10.2.802.1 ^{2,3}
Oracle Linux 6.6 (EM64T/AMD64)	2.6.32-504.el6.x86_64	10.2.802.1 ^{2,3}
Oracle Linux 6.7 (IA32)	2.6.32-573.el6.i686	10.6.0.20 ^{2,3}
Oracle Linux 6.7 (EM64T/AMD64)	2.6.32-573.el6.x86_64	10.6.0.20 ^{2,3}
Oracle Linux 6.8 (IA32)	2.6.32-642.el6.i686	11.0.0.4 ^{2,3}
Oracle Linux 6.8 (EM64T/AMD64)	2.6.32-642.el6.x86_64	11.0.0.4 ^{2,3}
Oracle Linux 6.9 (IA32)	2.6.32-696.el6.i686	11.0.0.5 ^{2,3}
Oracle Linux 6.9 (EM64T/AMD64)	2.6.32-696.el6.x86_64	11.0.0.5 ^{2,3}
Oracle Linux 6.10 (IA32)	2.6.32-754.el6.i686	11.0.1.6 ^{2,3}
Oracle Linux 6.10 (EM64T/AMD64)	2.6.32-754.el6.x86_64	11.0.1.6 ^{2,3}
Oracle Linux 7 (EM64T/AMD64)	3.10.0-123.el7.x86_64	8.3.7.34.3p ^{2,3}
Oracle Linux 7.1 (EM64T/AMD64)	3.10.0-229.el7.x86_64	10.2.8021.1 ^{2,3}
Oracle Linux 7.2 (EM64T/AMD64)	3.10.0-327.el7.x86_64	10.7.0.1 ^{2,3}
Oracle Linux 7.3 (EM64T/AMD64)	3.10.0-514.el7.x86_64	11.1.0.2 ^{2,3}
Oracle Linux 7.4 (EM64T/AMD64)	3.10.0-693.el7.x86_64 3.10.0-693.11.6.el7.x86_64	11.2.0.6 ^{2,3}

Oracle Linux 7.5 (EM64T/AMD64)	3.10.0-862.el7.x86_64	11.4.0.4 ^{2,3}
Oracle Linux 7.6 (EM64T/AMD64)	3.10.0-957.el7.x86_64	12.0.0.5 ^{2,3}
Oracle Linux 7.7 (EM64T/AMD64)	3.10.0-1062.el7.x86_64	12.0.0.10 ^{2,3}
Oracle Linux 7.8 (EM64T/AMD64)	3.10.0-1127.el7.x86_64	12.0.0.13 ^{2,3}
Oracle Linux 7.9 (EM64T/AMD64)	3.10.0-1160.el7.x86_64	12.0.0.13 ^{2,3}
Oracle Linux 8.1 (EM64T/AMD64)	4.18.0-147.el8.x86_64	12.2.0.3 ^{2,3}
Oracle Linux 8.2 (EM64T/AMD64)	4.18.0-193.el8.x86_64	12.6.0.2 ^{2,3}
Oracle Linux 8.3 (EM64T/AMD64)	4.18.0-240.el8.x86_64	12.8.0.1 ^{2,3}
Oracle Linux 8.4 (EM64T/AMD64)	4.18.0-305.el8.x86_64	12.8.0.5 ^{2,3}
Oracle Linux 8.6 (EM64T/AMD64)	4.18.0-372.9.1.el8.x86_64	14.0.0.4 ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.2 (IA32)	2.6.39-200.29.1.el6uek.i686	8.3.5.68.6p ^{2,3}
	2.6.39-200.29.2.el6uek.i686	8.3.5.68.6p ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.2 (EM64T/AMD64)	2.6.39-200.29.1.el6uek.x86_64	8.3.5.68.6p ^{2,3}
	2.6.39-200.29.2.el6uek.x86_64	8.3.5.68.6p ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.3 (IA32)	2.6.39-200.24.1.el6uek.i686	8.3.5.68.6p ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.3 (EM64T/AMD64)	2.6.39-200.24.1.el6uek.x86_64	8.3.5.68.6p ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.4 (IA32)	2.6.39-400.211.1.el6uek.i686	8.3.7.26.3p ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.4 (EM64T/AMD64)	2.6.39-400.211.1.el6uek.x86_64	8.3.7.26.3p ^{2,3}
	2.6.39-400.264.1.el6uek.x86_64	
Oracle Unbreakable Enterprise Kernel 6.5 (IA32)	2.6.39-400.211.1.el6uek.i686	8.3.7.26.3p ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.5 (EM64T/AMD64)	3.8.13-16.2.1.el6uek.x86_64	8.3.7.26.2p ^{2,3}

Oracle Unbreakable Enterprise Kernel 6.5 (EM64T/AMD64)	3.8.13-44.el6uek.x86_64	8.3.7.34.4p ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.6 (IA32)	2.6.39-400.215.10.el6uek.i686	8.3.7.26.3p ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.6 (EM64T/AMD64)	3.8.13-44.1.1.el6uek.x86_64	8.3.7.34.4p ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.6 (EM64T/AMD64)	3.8.13-68.el6uek.x86_64 3.8.13-68.2.2.el6uek.x86_64	10.6.61.0 ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.7 (IA32)	2.6.39-400.250.7.el6uek.i686	8.3.7.26.3p ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.7 (EM64T/AMD64)	3.8.13-68.3.4.el6uek.x86_64	10.6.61.0 ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.8 (IA32)	2.6.39-400.278.2.el6uek.i686	8.3.7.26.3p ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.8 (EM64T/AMD64)	4.1.12-37.4.1.el6uek.x86_64	11.0.0.13 ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.9 (EM64T/AMD64)	4.1.12-61.1.28.el6uek.x86_64	11.1.0.4 ^{2,3}
	4.1.12-94.2.1.el6uek.x86_64	11.2.0.5 ^{2,3}
Oracle Unbreakable Enterprise Kernel 6.10 (EM64T/AMD64)	4.1.12-124.16.4.el6uek.x86_64	11.4.0.7 ^{2,3}
	4.1.12-124.45.6.el6uek.x86_64	11.4.0.8 ^{2,3}
Oracle Unbreakable Enterprise Kernel 7 (EM64T/AMD64)	3.8.13-44.el7uek.x86_64	8.3.7.34.4p ^{2,3}
Oracle Unbreakable Enterprise Kernel 7.1 (EM64T/AMD64)	3.8.13-55.1.6.el7uek.x86_64	10.2.8061.0 ^{2,3}
Oracle Unbreakable Enterprise Kernel 7.1 (EM64T/AMD64)	3.8.13-68.el7uek.x86_64 3.8.13-68.2.2.el7uek.x86_64	10.6.61.0 ^{2,3}
Oracle Unbreakable Enterprise Kernel 7.2 (EM64T/AMD64)	3.8.13-98.7.1.el7uek.x86_64	10.6.61.0 ^{2,3}
	3.8.13-118.10.2.el7uek.x86_64	11.0.0.1 ^{2,3}

Oracle Unbreakable Enterprise Kernel 7.3 (EM64T/AMD64)	4.1.12-61.1.18.el7uek.x86_64 4.1.12-61.1.28.el7uek.x86_64	11.1.0.4 ^{2,3}
Oracle Unbreakable Enterprise Kernel 7.4 (EM64T/AMD64)	4.1.12-94.3.9.el7uek.x86_64	11.2.0.5 ^{2,3}
Oracle Unbreakable Enterprise Kernel 7.5 (EM64T/AMD64)	4.1.12-112.16.4.el7uek.x86_64 4.1.12-124.16.4.el7uek.x86_64 4.1.12-124.30.1.el7uek.x86_64	11.2.0.5 ^{2,3}
Oracle Unbreakable Enterprise Kernel 7.6 (EM64T/AMD64)	4.14.35-1818.3.3.el7uek.x86_64	12.0.0.5 ^{2,3}
Oracle Unbreakable Enterprise Kernel 7.7 (EM64T/AMD64)	4.14.35-1902.3.2.el7uek.x86_64	12.0.0.10 ^{2,3}
Oracle Unbreakable Enterprise Kernel 7.8 (EM64T/AMD64)	4.14.35-1902.300.11.el7uek.x86_64 4.14.35-1902.301.1.el7uek.x86_64	12.0.0.13 ^{2,3}
Oracle Unbreakable Enterprise Kernel 7.9 (EM64T/AMD64)	5.4.17-2011.6.2.el7uek.x86_64	12.6.0.3 ^{2,3}
Oracle Unbreakable Enterprise Kernel 8.2 (EM64T/AMD64)	5.4.17-2011.5.3.el8uek.x86_64	12.6.0.3 ^{2,3}
Oracle Unbreakable Enterprise Kernel 8.3 (EM64T/AMD64)	5.4.17-2011.7.4.el8uek.x86_64	12.6.0.3 ^{2,3}
Oracle Unbreakable Enterprise Kernel 8.4 (EM64T/AMD64)	5.4.17-2102.201.3.el8uek.x86_64	12.8.0.5 ^{2,3}
Oracle Unbreakable Enterprise Kernel 8.6 (EM64T/AMD64)	5.4.17-2102.310.7.el8uek.x86_64	12.8.0.11 ^{2,3}

Notes:

1. AMD64 indicates the environments where 64-bit kernel packages are installed on a system using an AMD Opteron processor.
2. Use the driver bundled with the kernel.
3. Using an HDLM device as the boot disk is supported.
4. HDLM also supports environments where 32-bit kernel packages are installed on a system using an AMD Opteron processor.
5. EM64T indicates environments where 64-bit kernel packages are installed on a system using an Intel EM64T processor.

6. HP HBA drivers are supported.
7. Supported by Kernel 2.6.32.36-0.5.2 or later.

Hitachi

Hitachi HBA supports the environment combined with Hitachi Compute Blade only.
All drivers applied to Hitachi HBA cards for Hitachi Compute Blade are supported.

IBM

OS	Kernel	Driver
Red Hat Enterprise Linux 6.4 (IA32)	2.6.32-358.el6.i686	8.3.7.29-1
Red Hat Enterprise Linux 6.4 (EM64T/AMD64)	2.6.32-358.el6.x86_64 2.6.32-358.87.1.el6.x86_64	8.3.7.29-1

Notes:

1. QLogic HBA drivers are supported.
2. HDLM also supports environments where 32-bit kernel packages are installed on a system using an AMD Opteron processor.
3. Because the failover function is set to Enable by default, change it to Disable. For changing the setting of the failover function to Disable, set the following in `/etc/modprobe.conf` file:

Example: When the driver version is 8.01.01.

```
options qla2xxx ql2xfailover=0
```

See the HBA attachment document for details on changing the failover function setting.

4. The drivers mentioned in the page of "Hitachi Vantara - HBA Approved Software" in the QLogic website are supported. Get the drivers from the following URL:

http://support.qlogic.com/support/oem_detail_hds.asp?oemid=84&classid=237

This URL may change without notice. If the URL changes, search for the "Hitachi Vantara - HBA Approved Software" page in the QLogic website.

5. Emulex HBA drivers are supported.
6. The supported combination of IBM model and Bus I/F are as follows:

44X1945

7. Using an HDLM device as boot disk is supported.

HP

OS	Kernel	Driver
Red Hat Enterprise Linux 6.2(EM64T/AMD64)	2.6.32-220.el6.x86_64	8.04.00.09.06.0-k ³
Red Hat Enterprise Linux 6.4(EM64T/AMD64)	2.6.32-358.el6.x86_64 2.6.32-358.87.1.el6.x86_64	8.04.00.12.06.0-k2 8.07.00.08.06.0-k ³
Red Hat Enterprise Linux 6.5(EM64T/AMD64)	2.6.32-431.el6.x86_64 2.6.32-431.87.1.el6.x86_64	8.07.00.23.06.0-k2
Red Hat Enterprise Linux 6.6(EM64T/AMD64)	2.6.32-504.el6.x86_64 2.6.32-504.66.1.el6.x86_64	8.07.00.28.06.0-k1
Red Hat Enterprise Linux 6.7(EM64T/AMD64)	2.6.32-573.el6.x86_64 2.6.32-573.53.1.el6.x86_64	8.07.00.28.06.0-k1 8.07.00.42.06.0-k1
Red Hat Enterprise Linux 6.8(EM64T/AMD64)	2.6.32-642.el6.x86_64	8.07.00.34.06.0-k1
Red Hat Enterprise Linux 6.9(EM64T/AMD64)	2.6.32-696.el6.x86_64 2.6.32-696.23.1.el6.x86_64	8.07.00.50.06.0-k7 ³ 8.08.00.08.06.0-k1 ³
Red Hat Enterprise Linux 6.10(EM64T/AMD64)	2.6.32-754.el6.x86_64	8.08.00.08.06.0-k1 ³
Red Hat Enterprise Linux 7(EM64T/AMD64)	3.10.0-123.el7.x86_64	8.07.00.28.07.0_k1
Red Hat Enterprise Linux 7.1(EM64T/AMD64)	3.10.0-229.el7.x86_64	8.07.00.28.07.0_k1
Red Hat Enterprise Linux 7.2(EM64T/AMD64)	3.10.0-327.el7.x86_64 3.10.0-327.64.1.el7.x86_64	8.07.00.28.07.0_k1 8.07.00.34.07.0-k1 8.07.00.50.07.0-k3
Red Hat Enterprise Linux 7.3(EM64T/AMD64)	3.10.0-514.el7.x86_64 3.10.0-514.44.1.el7.x86_64	8.07.00.42.07.0_k1 8.07.00.50.07.0-k7 ³ 11.4.142.26 ³

Red Hat Enterprise Linux 7.4(EM64T/AMD64)	3.10.0-693.el7.x86_64 3.10.0-693.21.1.el7.x86_64	8.07.00.50.07.0-k6 ³ 8.07.00.50.07.0-k7 ³ 8.08.00.08.07.0-k1 ³
Red Hat Enterprise Linux 7.5(EM64T/AMD64)	3.10.0-862.el7.x86_64	8.08.00.08.07.5-k1 ³
Red Hat Enterprise Linux 7.6(EM64T/AMD64)	3.10.0-957.el7.x86_64	10.01.00.57.07.6-k1 ³ 10.01.00.64.07.6-k1a ³
Red Hat Enterprise Linux 7.7(EM64T/AMD64)	3.10.0-1062.el7.x86_64	10.01.00.57.07.6-k1 ³

Notes:

1. QLogic HBA drivers are supported.
2. Use the driver bundled with the kernel.
3. Using an HDLM device as the boot disk is supported.
4. Because the failover function is set to Enable by default, change it to Disable. For changing the setting of the failover function to Disable, set the following in the `/etc/modprobe.conf` file:

Example: When the driver version is 8.01.01.

```
options qla2xxx ql2xfailover=0
```

See the HBA attachment document for details on changing the failover function setting.

5. The drivers mentioned in the page of "Hitachi Vantara - HBA Approved Software" in the QLogic website are supported. Get the drivers from the following URL:

http://support.qlogic.com/support/oem_detail_hds.asp?oemid=84&classid=237

This URL may change without notice. If the URL changes, search for the "Hitachi Vantara - HBA Approved Software" page in the QLogic website.

6. The supported combinations of HP models and Bus I/Fs are as follows:
FC2143, FC2243, FC2142SR, FC2242SR
7. HDLM also supports environments where 32-bit kernel packages are installed on a system using an AMD Opteron processor.
8. The supported combinations of HP models and Bus I/Fs are as follows:
403621-B21
9. Emulex HBA drivers are supported.

Brocade

OS	Kernel	Driver
Red Hat Enterprise Linux 6 (IA32)	2.6.32-71.el6.i686	2.3.0.0*
Red Hat Enterprise Linux 6 (EM64T/AMD64)	2.6.32-71.el6.x86_64	2.3.0.0*
Red Hat Enterprise Linux 6.1 (IA32)	2.6.32-131.0.15.el6.i686	3.0.0.0*
Red Hat Enterprise Linux 6.1(EM64T/AMD64)	2.6.32-131.0.15.el6.x86_64	3.0.0.0*

* Using an HDLM device as the boot disk is supported.

Cisco

OS	Kernel	Driver
Red Hat Enterprise Linux 6.6 (EM64T/AMD64)	2.6.32-504.el6.x86_64 2.6.32-504.66.1.el6.x86_64	1.6.0.12b* 1.6.0.18* 1.6.0.23*
Red Hat Enterprise Linux 7.2 (EM64T/AMD64)	3.10.0-327.el7.x86_64 3.10.0-327.64.1.el7.x86_64	1.6.0.17*
Oracle Unbreakable Enterprise Kernel 7 (EM64T/AMD64)	3.8.13-44.el7uek.x86_64	1.6.0.27*
Oracle Unbreakable Enterprise Kernel 7.1 (EM64T/AMD64)	3.8.13-55.1.6.el7uek.x86_64 3.8.13-68.el7uek.x86_64 3.8.13-68.2.2.el7uek.x86_64	1.6.0.27*
Oracle Unbreakable Enterprise Kernel 7.2 (EM64T/AMD64)	3.8.13-98.7.1.el7uek.x86_64 3.8.13-118.10.2.el7uek.x86_64	1.6.0.27*
Oracle Unbreakable Enterprise Kernel 7.4 (EM64T/AMD64)	4.1.12-94.3.9.el7uek.x86_64	1.6.0.24*

* Using an HDLM device as the boot disk is supported.

Fibre Channel over Ethernet adapters

Use the following Fibre Channel over Ethernet (FCoE) I/F adapters. When using two or more adapters, use the same type of adapter. If you combine different types of HBA, HDLM may not be able to switch paths when an error occurs.

QLogic¹

OS	Kernel	Driver
Red Hat Enterprise Linux 6 (IA32)	2.6.32-71.el6.i686	8.03.04.12.06.0-k0
Red Hat Enterprise Linux 6 (EM64T/AMD64)	2.6.32-71.el6.x86_64	8.03.04.12.06.0-k0
Red Hat Enterprise Linux 6.1 (IA32)	2.6.32-131.0.15.el6.i686	Bundle ^{2,3}
Red Hat Enterprise Linux 6.1 (EM64T/AMD64)	2.6.32-131.0.15.el6.x86_64	Bundle ^{2,3}
Red Hat Enterprise Linux 6.2 (IA32)	2.6.32-220.el6.i686	Bundle ^{2,3}
Red Hat Enterprise Linux 6.2 (EM64T/AMD64)	2.6.32-220.el6.x86_64	Bundle ^{2,3}
Red Hat Enterprise Linux 6.3 (IA32)	2.6.32-279.el6.i686	8.04.00.04.06.3-k
		Bundle ^{2,3}
Red Hat Enterprise Linux 6.3 (EM64T/AMD64)	2.6.32-279.el6.x86_64	8.04.00.04.06.3-k
		Bundle ^{2,3}
Red Hat Enterprise Linux 6.4 (IA32)	2.6.32-358.el6.i686	8.07.00.08.06.0-k
		Bundle ^{2,3}
Red Hat Enterprise Linux 6.4 (EM64T/AMD64)	2.6.32-358.el6.x86_64 2.6.32-358.87.1.el6.x86_64	8.07.00.08.06.0-k
		Bundle ^{2,3}
Red Hat Enterprise Linux 6.5 (IA32)	2.6.32-431.el6.i686	8.07.00.08.06.0-k
		Bundle ^{2,3}
	2.6.32-431.el6.x86_64	8.07.00.08.06.0-k

Red Hat Enterprise Linux 6.5 (EM64T/AMD64)	2.6.32-431.87.1.el6.x86_64	Bundle ^{2,3}
Red Hat Enterprise Linux 6.6 (IA32)	2.6.32-504.el6.i686	Bundle ^{2,3}
Red Hat Enterprise Linux 6.6 (EM64T/AMD64)	2.6.32-504.el6.x86_64 2.6.32-504.66.1.el6.x86_64	Bundle ^{2,3}
Red Hat Enterprise Linux 6.7 (IA32)	2.6.32-573.el6.i686 2.6.32-573.53.1.el6.i686	Bundle ^{2,3}
Red Hat Enterprise Linux 6.7 (EM64T/AMD64)	2.6.32-573.el6.x86_64 2.6.32-573.53.1.el6.x86_64	Bundle ^{2,3}
Red Hat Enterprise Linux 6.8 (IA32)	2.6.32-642.el6.i686	Bundle ^{2,3}
Red Hat Enterprise Linux 6.8 (EM64T/AMD64)	2.6.32-642.el6.x86_64	Bundle ^{2,3}
Red Hat Enterprise Linux 7 (EM64T/AMD64)	3.10.0-123.el7.x86_64	Bundle ^{2,3}
Red Hat Enterprise Linux 7.1 (EM64T/AMD64)	3.10.0-229.el7.x86_64	Bundle ^{2,3}
Red Hat Enterprise Linux 7.2 (EM64T/AMD64)	3.10.0-327.el7.x86_64 3.10.0-327.64.1.el7.x86_64	Bundle ^{2,3}
Red Hat Enterprise Linux 7.3 (EM64T/AMD64)	3.10.0-514.el7.x86_64 3.10.0-514.44.1.el7.x86_64	Bundle ^{2,3}

Notes:

1. Do not use the HBA driver failover function.

Check the setting for the failover function by performing the following procedure:

For Red Hat Enterprise Linux 6, Red Hat Enterprise Linux 6.3, and SUSE LINUX Enterprise Server 11:

- a. Run the following command to check the version of the driver:

```
# cat /sys/class/scsi_host/hostn/driver_version
```

n: the instance number of the HBA port

- b. Check the output result to verify whether the characters "fo" are added to the version notation.

When the failover function is enabled:
8.01.07-k1-fo

When the failover function is disabled:
8.01.07-k1

2. QLogic 8400 Series are supported.
3. Using an HDLM device as the boot disk is supported.

Emulex

OS	Kernel	Driver
Red Hat Enterprise Linux 6 (IA32)	2.6.32-71.el6.i686	8.3.5.65 ¹
Red Hat Enterprise Linux 6 (EM64T/AMD64)	2.6.32-71.el6.x86_64	8.3.5.65 ¹
Red Hat Enterprise Linux 6.1 (IA32)	2.6.32-131.0.15.el6.i686	8.3.5.30.1p 8.3.5.65 ¹
Red Hat Enterprise Linux 6.1(EM64T/AMD64)	2.6.32-131.0.15.el6.x86_64	8.3.5.30.1p 8.3.5.65 ¹
Red Hat Enterprise Linux 6.2 (IA32)	2.6.32-220.el6.i686	8.3.5.65 ¹
Red Hat Enterprise Linux 6.2 (EM64T/AMD64)	2.6.32-220.el6.x86_64	8.3.5.65 ¹
Red Hat Enterprise Linux 6.5 (IA32)	2.6.32-431.el6.i686	10.2.370.12
Red Hat Enterprise Linux 6.5 (EM64T/AMD64)	2.6.32-431.el6.x86_64 2.6.32-431.87.1.el6.x86_64	10.2.370.12
Red Hat Enterprise Linux 6.6 (IA32)	2.6.32-504.el6.i686	10.2.273.0r
Red Hat Enterprise Linux 6.6 (EM64T/AMD64)	2.6.32-504.el6.x86_64 2.6.32-504.66.1.el6.x86_64	10.2.273.0r
Red Hat Enterprise Linux 7.1 (EM64T/AMD64)	3.10.0-229.el7.x86_64	10.2.8021.1
Oracle Unbreakable Enterprise Kernel 6.6 (EM64T/AMD64)	3.8.13-44.1.1.el6uek.x86_64	8.3.7.34.4p ²

Oracle Unbreakable Enterprise Kernel 7.1 (EM64T/AMD64)	3.8.13-55.1.6.el7uek.x86_64	10.2.8061.0 ²
Notes: <ol style="list-style-type: none"> Using an HDLM device as the boot disk is supported. Use the driver bundled with the kernel. 		

Brocade

OS	Kernel	Driver
Red Hat Enterprise Linux 6 (IA32)	2.6.32-71.el6.i686	2.3.0.0*
Red Hat Enterprise Linux 6 (EM64T/AMD64)	2.6.32-71.el6.x86_64	2.3.0.0*
* Using an HDLM device as the boot disk is supported.		

HP

OS	Kernel	Driver
Red Hat Enterprise Linux 6.1 (EM64T/AMD64)	2.6.32-131.0.15.el6.x86_64	8.3.5.77.1p
Red Hat Enterprise Linux 6.2 (EM64T/AMD64)	2.6.32-220.el6.x86_64	8.3.5.77.1p

Cisco

OS	Kernel	Driver
Red Hat Enterprise Linux 6.0 (EM64T/AMD64)	2.6.32-71.el6.x86_64	1.5.0.1 ¹
Red Hat Enterprise Linux 6.1 (EM64T/AMD64)	2.6.32-131.0.15.el6.x86_64	1.5.0.1 ¹
Red Hat Enterprise Linux 6.2 (EM64T/AMD64)	2.6.32-220.el6.x86_64	1.5.0.1 ¹

Red Hat Enterprise Linux 6.4 (EM64T/AMD64)	2.6.32-358.el6.x86_64 2.6.32-358.87.1.el6.x86_64	1.5.0.45 ² 1.6.0.12b ² 1.6.0.18 ²
Red Hat Enterprise Linux 6.5 (EM64T/AMD64)	2.6.32-431.el6.x86_64 2.6.32-431.87.1.el6.x86_64	1.5.0.45 ³
Red Hat Enterprise Linux 6.8 (EM64T/AMD64)	2.6.32-642.el6.x86_64	1.6.0.27 ³
Red Hat Enterprise Linux 7.5 (EM64T/AMD64)	3.10.0-862.el7.x86_64	1.6.0.37 ³
Red Hat Enterprise Linux 7.6 (EM64T/AMD64)	3.10.0-957.el7.x86_64	1.6.0.47 ³
Notes:		
<ol style="list-style-type: none"> 1. Only using an HDLM device as the boot disk is supported. 2. Using an HDLM device as the boot disk is not supported. 3. Using an HDLM device as the boot disk is supported. 		

iSCSI connections

Use the following iSCSI connections. When using two or more adapters, use the same type of adapter. If you combine different types of HBA, HDLM may not be able to switch paths when an error occurs.

Red Hat

OS	Kernel	Driver type	Driver
Red Hat Enterprise Linux 6.1 (IA32)	2.6.32-131.0.15.el6.i686	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 6.1 (EM64T/AMD64)	2.6.32-131.0.15.el6.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 6.2 (IA32)	2.6.32-220.el6.i686	iSCSI Initiator ^{1,2}	Bundle ⁴
Red Hat Enterprise Linux 6.2 (EM64T/AMD64)	2.6.32-220.el6.x86_64	iSCSI Initiator ^{1,2}	Bundle ⁴

Red Hat Enterprise Linux 6.3 (IA32)	2.6.32-279.el6.i686	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 6.3 (EM64T/AMD64)	2.6.32-279.el6.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 6.4 (IA32)	2.6.32-358.el6.i686	iSCSI Initiator ^{1,2}	Bundle ⁴
Red Hat Enterprise Linux 6.4 (EM64T/AMD64)	2.6.32-358.el6.x86_64 2.6.32-358.87.1.el6.x86_64	iSCSI Initiator ^{1,2}	Bundle ⁴
Red Hat Enterprise Linux 6.7 (IA32)	2.6.32-573.el6.i686 2.6.32-573.53.1.el6.i686	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 6.7 (EM64T/AMD64)	2.6.32-573.el6.x86_64 2.6.32-573.53.1.el6.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 6.8 (IA32)	2.6.32-642.el6.i686	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 6.8 (EM64T/AMD64)	2.6.32-642.el6.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 6.9 (IA32)	2.6.32-696.el6.i686 2.6.32-696.23.1.el6.i686	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 6.9 (EM64T/AMD64)	2.6.32-696.el6.x86_64 2.6.32-696.23.1.el6.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 6.10 (IA32)	2.6.32-754.el6.i686	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 6.10 (EM64T/AMD64)	2.6.32-754.el6.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 7 (EM64T/AMD64)	3.10.0-123.el7.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 7.1 (EM64T/AMD64)	3.10.0-229.el7.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 7.2 (EM64T/AMD64)	3.10.0-327.el7.x86_64 3.10.0-327.64.1.el7.x86_64	iSCSI Initiator ^{1,2}	Bundle ³

Red Hat Enterprise Linux 7.3 (EM64T/AMD64)	3.10.0-514.el7.x86_64 3.10.0-514.44.1.el7.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 7.4 (EM64T/AMD64)	3.10.0-693.el7.x86_64 3.10.0-693.21.1.el7.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 7.5 (EM64T/AMD64)	3.10.0-862.el7.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 7.6 (EM64T/AMD64)	3.10.0-957.el7.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 7.7 (EM64T/AMD64)	3.10.0-1062.el7.x86_64	iSCSI Initiator ²	Bundle ³
Red Hat Enterprise Linux 7.8 (EM64T/AMD64)	3.10.0-1127.el7.x86_64	iSCSI Initiator ²	Bundle ³
Red Hat Enterprise Linux 7.9 (EM64T/AMD64)	3.10.0-1160.el7.x86_64	iSCSI Initiator ²	Bundle ³
Red Hat Enterprise Linux 8.1 (EM64T/AMD64)	4.18.0-147.el8.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Red Hat Enterprise Linux 8.2 (EM64T/AMD64)	4.18.0-193.el8.x86_64	iSCSI Initiator ²	Bundle ³
Red Hat Enterprise Linux 8.3 (EM64T/AMD64)	4.18.0-240.el8.x86_64	iSCSI Initiator ²	Bundle ³
Red Hat Enterprise Linux 8.4 (EM64T/AMD64)	4.18.0-305.el8.x86_64	iSCSI Initiator ²	Bundle ³
Red Hat Enterprise Linux 8.6 (EM64T/AMD64)	4.18.0-372.9.1.el8.x86_64	iSCSI Initiator ²	Bundle ³

Notes:

1. 1GbE NIC is supported. 10GbE NIC is not supported.
2. iSCSI HBA/CNA is not supported.
3. Using an HDLM device as the boot disk is not supported.
4. Using an HDLM device as the boot disk is supported.

Emulex

OS	Kernel	Driver type	Driver
Red Hat Enterprise Linux 6.2 (IA32)	2.6.32-220.el6.i686	iSCSI HBA/CNA	4.1.334.15 ¹
			4.2.374.0 ^{2,3}
Red Hat Enterprise Linux 6.2 (EM64T/AMD64)	2.6.32-220.el6.x86_64	iSCSI HBA/CNA	4.1.334.15 ¹
			4.2.374.0 ^{2,3}
Red Hat Enterprise Linux 6.4 (IA32)	2.6.32-358.el6.i686	iSCSI HBA/CNA	4.2.374.0 ^{2,3}
Red Hat Enterprise Linux 6.4 (EM64T/AMD64)	2.6.32-358.el6.x86_64 2.6.32-358.87.1.el6.x86_64	iSCSI HBA/CNA	4.2.374.0 ^{2,3}
Red Hat Enterprise Linux 6.5 (IA32)	2.6.32-431.el6.i686	iSCSI HBA/CNA	Bundle ²
Red Hat Enterprise Linux 6.5 (EM64T/AMD64)	2.6.32-431.el6.x86_64 2.6.32-431.87.1.el6.x86_64	iSCSI HBA/CNA	Bundle ²
Red Hat Enterprise Linux 6.6 (IA32)	2.6.32-504.el6.i686	iSCSI HBA/CNA	Bundle ²
Red Hat Enterprise Linux 6.6 (EM64T/AMD64)	2.6.32-504.el6.x86_64 2.6.32-504.66.1.el6.x86_64	iSCSI HBA/CNA	Bundle ²
Red Hat Enterprise Linux 7.1 (EM64T/AMD64)	3.10.0-229.el7.x86_64	iSCSI HBA/CNA	Bundle ²
Red Hat Enterprise Linux 7.2 (EM64T/AMD64)	3.10.0-327.el7.x86_64 3.10.0-327.64.1.el7.x86_64	iSCSI HBA/CNA	Bundle ²
Oracle Unbreakable Enterprise Kernel 6.2 (IA32)	2.6.39-200.29.1.el6uek.686	iSCSI HBA/CNA	Bundle ²
	2.6.39-200.29.2.el6uek.686		
Oracle Unbreakable Enterprise Kernel 6.2 (EM64T/AMD64)	2.6.39-200.29.1.el6uek.x86_64 2.6.39-200.29.2.el6uek.x86_64	iSCSI HBA/CNA	Bundle ²

Oracle Unbreakable Enterprise Kernel 6.3 (IA32)	2.6.39-200.24.1.el6uek.686	iSCSI HBA/CNA	Bundle ²
Oracle Unbreakable Enterprise Kernel 6.3 (EM64T/AMD64)	2.6.39-200.24.1.el6uek.x86_64	iSCSI HBA/CNA	Bundle ²
Oracle Unbreakable Enterprise Kernel 6.4 (IA32)	2.6.39-400.211.1.el6uek.686	iSCSI HBA/CNA	Bundle ²
Oracle Unbreakable Enterprise Kernel 6.4 (EM64T/AMD64)	2.6.39-400.211.1.el6uek.x86_64 2.6.39-400.264.1.el6uek.x86_64	iSCSI HBA/CNA	Bundle ²
Oracle Unbreakable Enterprise Kernel 6.5 (IA32)	2.6.39-400.211.1.el6uek.686	iSCSI HBA/CNA	Bundle ²
Oracle Unbreakable Enterprise Kernel 6.5 (EM64T/AMD64)	3.8.13-16.2.1.el6uek.x86_64 3.8.13-44.el6uek.x86_64	iSCSI HBA/CNA	Bundle ²
Oracle Unbreakable Enterprise Kernel 6.6 (EM64T/AMD64)	3.8.13-44.1.1.el6uek.x86_64	iSCSI HBA/CNA	Bundle ²
Oracle Unbreakable Enterprise Kernel 6.6 (EM64T/AMD64)	3.8.13-68.el6uek.x86_64 3.8.13-68.1.3.el6uek.x86_64	iSCSI HBA/CNA	Bundle ²
Oracle Unbreakable Enterprise Kernel 7.1 (EM64T/AMD64)	3.8.13-55.1.6.el7uek.x86_64 3.8.13-68.el7uek.x86_64 3.8.13-68.2.2.el7uek.x86_64	iSCSI HBA/CNA	Bundle ²

Notes:

1. Using an HDLM device as the boot disk is not supported.
2. Using an HDLM device as the boot disk is supported.
3. CNA F/W 4.2.433.604 or later is required.

Novell

OS	Kernel	Driver type	Driver
	3.0.101-63.1-default	iSCSI Initiator ^{1,2}	Bundle ³

SUSE LINUX Enterprise Server 11 (IA32)	3.0.101-63.1-pae		
	3.0.101-108.21-default		
	3.0.101-108.21-pae		
	3.0.101-108.68-default 3.0.101-108.68-pae		
SUSE LINUX Enterprise Server 11 (EM64T/AMD64)	3.0.101-63.1-default 3.0.101-63.1-xen	iSCSI Initiator ^{1,2}	Bundle ³
	3.0.101-108.21-default 3.0.101-108.21-xen		
	3.0.101-108.68-default 3.0.101-108.68-xen		
SUSE LINUX Enterprise Server 12 (EM64T/AMD64)	3.12.28-4-default	iSCSI Initiator ^{1,2}	Bundle ³
	3.12.28-4-xen		
	3.12.59-60.45-default		
	3.12.59-60.45-xen		
	4.4.21-69-default		
	4.4.103-6.33-default		
	4.4.114-94.14-default		
	4.12.14-94.41-default		
	4.12.14-120-default		
SUSE LINUX Enterprise Server 15 (EM64T/AMD64)	4.12.14-23-default	iSCSI Initiator ^{1,2}	Bundle ³
	4.12.14-195-default		
	5.3.18-22-default		
	5.3.18-59.40-default		
Notes:			

1. 1GbE NIC is supported. 10GbE NIC is not supported.
2. iSCSI HBA/CNA is not supported.
3. Using an HDLM device as the boot disk is not supported.

Oracle

OS	Kernel	Driver type	Driver
Oracle Unbreakable Enterprise Kernel 6.2 (IA32)	2.6.39-200.29.1.el6uek.i686 2.6.39-200.29.2.el6uek.i686	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.2 (EM64T/AMD64)	2.6.39-200.29.1.el6uek.x86_64 2.6.39-200.29.2.el6uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.3 (IA32)	2.6.39-200.24.1.el6uek.i686	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.3 (EM64T/AMD64)	2.6.39-200.24.1.el6uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.4 (IA32)	2.6.39-400.211.1.el6uek.i686	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.4 (EM64T/AMD64)	2.6.39-400.211.1.el6uek.x86_64 2.6.39-400.264.1.el6uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.5 (IA32)	2.6.39-400.211.1.el6uek.i686	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.5 (EM64T/AMD64)	3.8.13-16.2.1.el6uek.x86_64 3.8.13-44.el6uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.6 (IA32)	2.6.39-400.215.10.el6uek.i686	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.6 (EM64T/AMD64)	3.8.13-44.1.el6uek.x86_64 3.8.13-68.el6uek.x86_64 3.8.13-68.1.3.el6uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³

Oracle Unbreakable Enterprise Kernel 6.7 (IA32)	2.6.39-400.250.7.el6uek.i686	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.7 (EM64T/AMD64)	3.8.13-68.3.4.el6uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.8 (IA32)	2.6.39-400.278.2.el6uek.i686	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.8 (EM64T/AMD64)	4.1.12-37.4.1.el6uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.9 (EM64T/AMD64)	4.1.12-61.1.28.el6uek.x86_64 4.1.12-94.2.1.el6uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 6.10 (EM64T/AMD64)	4.1.12-124.16.4.el6uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
	4.1.12-124.45.6.el6uek.x86_64		
Oracle Unbreakable Enterprise Kernel 7 (EM64T/AMD64)	3.8.13-44.el7uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 7.1 (EM64T/AMD64)	3.8.13-55.1.6.el7uek.x86_64 3.8.13-68.el7uek.x86_64 3.8.13-68.2.2.el7uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 7.3 (EM64T/AMD64)	4.1.12-61.1.18.el7uek.x86_64 4.1.12-61.1.28.el7uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 7.4 (EM64T/AMD64)	4.1.12-94.3.9.el7uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 7.5 (EM64T/AMD64)	4.1.12-112.16.4.el7uek.x86_64 4.1.12-124.16.4.el7uek.x86_64 4.1.12-124.30.1.el7uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 7.6 (EM64T/AMD64)	4.14.35-1818.3.3.el7uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³

Oracle Unbreakable Enterprise Kernel 7.7 (EM64T/AMD64)	4.14.35-1902.3.2.el7uek.x86_64	iSCSI Initiator ^{1,2}	Bundle ³
Oracle Unbreakable Enterprise Kernel 7.8 (EM64T/AMD64)	4.14.35-1902.300.11.el7uek.x86_64 4.14.35-1902.301.1.el7uek.x86_64	iSCSI Initiator ²	Bundle ³
Oracle Unbreakable Enterprise Kernel 7.9 (EM64T/AMD64)	5.4.17-2011.6.2.el7uek.x86_64	iSCSI Initiator ²	Bundle ³
Oracle Unbreakable Enterprise Kernel 8.2 (EM64T/AMD64)	5.4.17-2011.5.3.el8uek.x86_64	iSCSI Initiator ²	Bundle ³
Oracle Unbreakable Enterprise Kernel 8.3 (EM64T/AMD64)	5.4.17-2011.7.4.el8uek.x86_64	iSCSI Initiator ²	Bundle ³
Oracle Unbreakable Enterprise Kernel 8.4 (EM64T/AMD64)	5.4.17-2102.201.3.el8uek.x86_64	iSCSI Initiator ²	Bundle ³
Oracle Unbreakable Enterprise Kernel 8.6 (EM64T/AMD64)	5.4.17-2136.310.7.1.el8uek.x86_64	iSCSI Initiator ²	Bundle ³
Notes:			
<ol style="list-style-type: none"> 1Gbe NIC is supported. 10Gbe NIC is not supported. iSCSI HBA/CNA is not supported. Using an HDLM device as the boot disk is not supported. 			

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