

# Hitachi Dynamic Link Manager (for Windows®) 8.7.0-01 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.....	7
Known problems.....	8
Installation precautions .....	9
Usage precautions.....	10
Documentation .....	14
Appendix A .....	14
Copyrights and licenses .....	41

## About this document

This document (RN-00HS272-49, December 2019) provides late-breaking information about Dynamic Link Manager (for Windows®) 8.7.0-01. 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 Windows®).

## 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](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](https://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 is a major release that adds new features and resolves multiple known problems.

## Product package contents

Medium	CD-ROM	Revision	Release Type	Prerequisite version of Service Pack
--------	--------	----------	--------------	--------------------------------------

Software	Hitachi Dynamic Link Manager (for Windows)	8.7.0-01	Full Package	-
Documents	Hitachi Command Suite Dynamic Link Manager (for Windows®) User Guide	MK-92DLM129-47		

## New features and important enhancements

### 8.7.0-00 Additional Functions and Modifications

- Hitachi Virtual Storage Platform 5100, 5100H, 5500, 5500H, and HPE XP8 are now supported.

## System requirements

Refer to Chapter 3. Creating an HDLM environment of the Hitachi Command Suite Dynamic Link Manager User Guide for Windows®.

### Host

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

- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3. Creating an HDLM environment - HDLM system requirements - OSs supported by HDLM

Supported OSs in a HAM environment are listed below:

Supported OS
Windows Server 2008 SP2 (x86/x64)
Windows Server 2008 SP1 R2 (x64)
Windows Server 2012 (x64)
Windows Server 2012 R2 (x64)
Windows Server 2016 (x64)

Supported cluster software in a HAM environment is listed below:

OS	Service Pack	Cluster software
Windows Server 2008(x86/x64)	SP2	Microsoft Failover Cluster
Windows Server 2008 R2(x64)	SP1	Microsoft Failover Cluster
Windows Server 2012 (x64)	No service pack	Microsoft Failover Cluster (*1)
Windows Server 2012 R2 (x64)	No service pack	Microsoft Failover Cluster (*1)
Windows Server 2016 (x64)	No service pack	Microsoft Failover Cluster (*1)

\*1: A Cluster Shared Volume (CSV) is not supported.

## 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, refer to the following manual:

- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® 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 and Hitachi SMS 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
  - HPE XP24000/XP20000
  - HPE P9500
  - HUS 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
		60-07-11-XX/XX or later (*1)	
Virtual Storage Platform	FC I/F	70-01-42-XX/XX or later	X: voluntary number
		70-03-00-XX/XX or later (*1)	
XP24000/XP20000	FC I/F	60-06-10-XX/XX or later	X: voluntary number
		60-07-11-XX/XX or later (*1)	
P9500	FC I/F	70-01-42-XX/XX or later	X: voluntary number
		70-03-00-XX/XX or later (*1)	
HUS VM	FC I/F	73-03-0X-XX/XX or later	X: voluntary number

\*1: When you use the HAM functionality with Microsoft Failover Cluster, use this version.

## Operating Systems Requirements

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

- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3.  
Creating an HDLM environment - HDLM system requirements - OSs supported by HDLM

## Prerequisite Programs

None.

## Related Programs

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

- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3.  
Creating an HDLM environment - HDLM system requirements - Cluster software supported by HDLM
- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3.  
Creating an HDLM environment - HDLM system requirements - Volume managers supported by HDLM

Supported Oracle RAC version:

OS	Version	DB File
Windows 2008 (x86) SP2	11.1.0.7.0	ASM/Raw
	11.2.0.3 (*1)	ASM
Windows 2008 (x64) SP2	11.1.0.7.0	ASM
	11.2.0.1.0	ASM/ OCFS
	11.2.0.3.0 (*1)	ASM
	11.2.0.4 (*1)	ASM
Windows 2008 (x64) R2 SP1	10.2.0.2.0	ASM
	11.2.0.1.0	ASM
Windows 2012 (x64) noSP	11.2.0.4.0 (*1)	ASM
	12.1.0.2 (*1)	ASM
Windows 2012 (x64) R2 noSP	11.2.0.4.0 (*1)	ASM
	12.1.0.2 (*1)	ASM
Windows 2016 (x64)	12.2.0.1 (*1)	ASM
	18.3.0.0 (*1) (*2)	ASM
	19.3.0.0 (*1) (*2)	ASM

\*1: It is recommended that you use external redundancy for ASM disk groups. To use normal or high redundancy, contact the Oracle Corporation.

Note:

- 1) A configuration where Oracle RAC is installed on OCFS to share Oracle is not supported.
- 2) Change the values of MISSCOUNT and DISKTIMEOUT to the setting values of Oracle RAC 12c referring to the following manual: Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3. Creating an HDLM environment - Notes on creating an HDLM environment - Notes on related software.

## Memory and Disk Space Requirements

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

- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® 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 space requirements, refer to the following manual:

- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3. Creating an HDLM environment - HDLM system requirements - Number of LUs and paths that are supported in HDLM

## Resolved problems

[8.7.0-01 Modifications]

The following problem has been corrected:

- 1) The following vulnerabilities related to the JRE that comes with HDLM.

CVE-2019-2894, CVE-2019-2933, CVE-2019-2945, CVE-2019-2949, CVE-2019-2958, CVE-2019-2962, CVE-2019-2964, CVE-2019-2973, CVE-2019-2975, CVE-2019-2977, CVE-2019-2978, CVE-2019-2981, CVE-2019-2983, CVE-2019-2987, CVE-2019-2988, CVE-2019-2989, CVE-2019-2992, CVE-2019-2999

[8.7.0-00 Modifications]

The following problem has been corrected:

- 1) The following vulnerabilities related to the JRE that comes with HDLM.

CVE-2019-2745, CVE-2019-2762, CVE-2019-2766, CVE-2019-2769, CVE-2019-2786, CVE-2019-2816, CVE-2019-2842, CVE-2019-7317

## Known problems

- 1) In VSP 5100, 5100H, 5500, 5500H, VSP G200, G350, G370, G400, G600, G700, G800, G900, G1000, G1500, VSP F350, F370, F400, F600, F700, F800, F900, F1500, VSP N400, N600, N800, VSP, USP V/VM, XP7, XP8, P9500, XP24000/20000, and Hitachi Unified Storage VM, LUN 0 to 2047 can be assigned, but the support range for HDLM is from 0 to 255. Therefore, HDLM cannot recognize LUs of 256 to 2047.
- 2) The Emulex FC Port Driver cannot be used.
- 3) In Windows 2008 (x64), Windows 2012, Windows 2016 and Windows 2019 environment, the output function of performance information using Windows performance monitor console is not supported.
- 4) HDLM does not support the Microsoft Cluster Service and Microsoft Failover Cluster in an environment where Veritas Storage Foundation 5.1 for Windows is used.
- 5) When executing the DLMgetras (utility for collecting error information), specify an output directory which contains only alphanumeric characters. If it contains characters other than an alphanumeric character, the collected information may be outputted to a wrong directory. And when changing the output directory of DLMgetras utility executed from the Windows Start menu, do not enclose the output directory name in double quotation marks ("").
- 6) When HDLM performance information is outputted in counter log of Windows performance monitor, counter log file with binary format is not supported. If counter log file with binary format is created, the following phenomenon may occur.
  - a) There are cases where counter "0" is displayed in counter list of HDLM object when counter log file created with binary format is specified as "Data source" and "Add counter" is done. This counter "0" cannot be specified as display item of performance information. Even if counter "0" is displayed, it does not affect performance information of instance and other counters obtained.
  - b) There are cases where "Disk Write Bytes/Sec" of performance counter offered by HDLM is displayed after substitution by index numbers managed by Windows. At such times it is possible to confirm performance information of "Disk Write Bytes/Sec" by selecting these substituted index numbers as counter.
- 7) When HDLM performance information is outputted using system monitor, a value outputted at first record in the system monitor can be a value different from the actual value. Further the same phenomenon may occur when counter log with CSV format is specified. When it occurs, ignore the first record.
- 8) When the path exists that has an I/O count value or an I/O error count value is 231 (2147483648) or more, the value becomes a negative value. As a result, a path that

includes a negative value will not be displayed correctly in the Path List view of the HDLM GUI. In this case, confirm that the correct value of the I/O count or the I/O error count by either of the following methods:

- Display the path information by using the view operation of the HDLM command.
- Calculate the correct value by using the following formula:

$$m = 232 (4294967296) + n$$

m: The correct value of the I/O count or the I/O error count

n: The negative value displayed in the Path List view of the HDLM GUI

- 9) When HDLM is installed on Windows 2008, the following event may be output to the application event log. However, it does not affect the system or HDLM operations.

Faulting application setup.exe\_InstallShield, version 15.0.0.498, time stamp 0xNNNNNNNN, faulting module ole32.dll, version N.N.NNNN.NNNNNN, time stamp 0xNNNNNNNN, exception code 0xc0000005, fault offset 0xNNNNNNNN, process id 0xNNN, application start time 0xNNNNNNNNNNNNNNNNNN.

Log Name: Application

Source: Application Error

Event ID: 1000

Level: Error

\*1: N is a Number or Character.

## Installation precautions

For details on HDLM installation, refer to the following manual:

- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3. Creating an HDLM environment - Notes on creating an HDLM environment
- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3. Creating an HDLM environment - Installing HDLM

## Additional Precautions

- 1) When you remove HDLM 5.8.0 to 5.9.1, use the user account used to install HDLM. If HiCommand Device Manager (HDvM) Agent 5.0.0 to 5.8.0 was installed before HDLM 5.8.0 to 5.9.1 was installed, remove.

## Updating installation of HDLM precautions

For details on updating HDLM, refer to the following manual:

- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3. Creating an HDLM environment - Notes on creating an HDLM environment
- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3. Creating an HDLM environment - Installing HDLM

## Remove precautions

For details on HDLM remove, refer to the following manual:

- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3. Creating an HDLM environment - Removing HDLM

## Usage precautions

### Notes on compatibility between versions of HDLM

For details on compatibility between versions of HDLM, refer to the following manual:

- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Appendixes A Functional differences between versions of HDLM

### Notes on Environment Settings

For details on usage precautions when setting HDLM environment, refer to the following manual:

- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3. Creating an HDLM Environment - HDLM system requirements - Number of LUs and paths that are supported in HDLM
- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3. Creating an HDLM environment - Notes on creating an HDLM environment
- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3. Creating an HDLM environment - Setting up HDLM

## Notes on General procedures

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

- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 2. HDLM functions - Performing failovers and failbacks using path switching - Path status transition - Status transitions of a path
- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 2. HDLM functions - Monitoring intermittent errors(functionality when automatic failback is used) - Intermittent error monitoring actions
- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 3. Creating an HDLM environment - Removing HDLM - Clearing the persistent reservation
- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 4. HDLM operation - Notes on using HDLM
- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 4. HDLM operation - HDLM operations using the HDLM GUI - Notes on using the HDLM GUI
- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 4. HDLM operation - Using commands for HDLM operations - Notes on using commands
- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 4. HDLM operation - Reconfiguring the HDLM operating environment
- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 5. Troubleshooting - Checking error information in messages
- Hitachi Command Suite Dynamic Link Manager User Guide for Windows® Chapter 6. Command reference - view (displays information)
- Hitachi Command Suite Dynamic Link Manager GUI Help Section 3.1 HDLM operations using the HDLM GUI
- Hitachi Command Suite Dynamic Link Manager GUI Help Section 5.2 Path Management window

## Additional Usage Precautions

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

Function	Item	Version number
HDLM command (dlnkmgr)	HDLM Version	8.7.0-01
	Service Pack Version	Blank
	HDLM Manager	8.7.0-01

	HDLM Alert Driver	8.6.5-00
	HDLM Driver	8.6.5-00
HDLM GUI	HDLM version	8.7.0-01
Registry(*1)	TechnicalVersion	8.7.0-01

\*1:Version numbers are stored in the following registry key.

[Key]

- When using Windows 2008 (x86)

HKEY\_LOCAL\_MACHINE\SOFTWARE\HITACHI\DynamicLinkManager

- When using Windows 2008 (x64), Windows 2012, Windows 2016 or Windows 2019

HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\HITACHI\DynamicLinkManager

## Notes on HAM functionalitysupport

- 1) 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 theha and hastat parameter-value instead.
- 2) 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.
- 3) 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.

- 4) 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 the MCU volume. If this occurs, restart the host after the HAM pair is re-created.

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

- 5) If you release a HAM pair to recover the system after a HAM volume failure, do not disconnect or reconnect paths to the RCU while the HAM pair is released.

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

- 6) If all the non-owner paths to RCU fail when the status of the owner paths that are connected to MCU is `Online(S)`, a large amount of the following event is output to the system event log.

Source: `mpio`

Type: `Error`

Event ID: `32`

Description: `HDLM Device-Specific Module failed to return a Path to \Device\MPIODiskN.`

(`N` is a number.)

When the status of owner paths is `Online(S)`, do not disconnect the non-owner paths which are connected to the RCU.

- 7) When you configure a cluster in an HAM environment, all cluster nodes need to be connected to both the MCU and RCU.

If a path error occurs in a cluster node, do not restart the node before the problem is resolved and the paths recover from the error.

## Notes on Using the HDLM GUI

- 1) If you manage HDLM by using HGLM, do not set the HDLM operating environment in the Options windows. If you set the operating environment in the Option windows, the load balancing algorithm and the path use times for individual LUs, which were set by using HGLM, will become invalid, and the system value displayed in the Option windows will be applied to the settings for the individual LUs.

# Documentation

<https://knowledge.hitachivantara.com/Documents>

## Available documents

Document name	Document number	Issue date
Hitachi Command Suite Dynamic Link Manager (for Windows®) User Guide	MK-92DLM129-47	October, 2019

## Documentation errata

None.

## Appendix A

### Host Bus Adapter (HBA) Support Matrix

Use the iSCSI I/F adapter or Fibre Channel I/F adapters listed below. If plural adapters are to be used, all of them must be same type. If it is using mixed types of HBA, that might cause a path switch problem.

- 1) For Hitachi storage system (Windows 2008 SP2)

OS	HBA		Driver
Windows 2008 SP2 (x86)	Fibre Channel	Emulex (*1)	STOR Miniport 2.01a4
			STOR Miniport 2.10a7
			STOR Miniport 2.20.006
			STOR Miniport 2.30.020
			STOR Miniport 2.32.002
			STOR Miniport 2.33.008
			STOR Miniport 2.41.002

			STOR Miniport 2.41.003
			STOR Miniport 2.50.007
			STOR Miniport 2.74.014.001
			STOR Miniport 2.76.003.001
			STOR Miniport 10.0.720.0
			STOR Miniport 10.2.370.8
			STOR Miniport 10.4.246.0
			STOR Miniport 10.6.114.0
			STOR Miniport 11.0.247.0
			STOR Miniport 11.1.145.16
			STOR Miniport 11.2.124.0
		QLogic	STOR Miniport 3.2.4.0
			STOR Miniport 9.1.8.17
			STOR Miniport 9.1.8.25
			STOR Miniport 9.1.9.25
			STOR Miniport 9.1.9.49
			STOR Miniport 9.1.10.27
			STOR Miniport 9.1.11.20
			STOR Miniport 9.1.11.24
			STOR Miniport 9.1.11.28
			STOR Miniport 9.1.12.21
			STOR Miniport 9.1.13.20
			STOR Miniport 9.1.15.21
			STOR Miniport 9.1.17.21

			STOR Miniport 9.1.17.25	
			STOR Miniport 9.2.1.20	
			STOR Miniport 9.2.3.20	
		Hitachi Compute Blade	Bundled (*3)	
		HPE	STOR Miniport 2.74.014.001	
			STOR Miniport 9.1.8.27	
			STOR Miniport 9.1.8.28	
			STOR Miniport 9.1.17.21	
			STOR Miniport 9.1.17.25	
			STOR Miniport 11.1.145.16	
		IBM	STOR Miniport 9.1.7.55	
			STOR Miniport 9.1.9.25	
		Brocade	STOR Miniport 1.0.0-06	
			STOR Miniport 1.1.0.1	
			STOR Miniport 2.2.0.0	
			STOR Miniport 3.2.4.0	
		iSCSI	Microsoft	Bundled
			Emulex	STOR Miniport 4.1.334.0
	STOR Miniport 4.9.160.0			
	STOR Miniport 10.0.732.0			
	STOR Miniport 10.2.370.9			
	STOR Miniport 10.2.421.0			
	STOR Miniport 10.4.245.0			

			STOR Miniport 10.6.116.0	
			STOR Miniport 11.0.271.0	
			STOR Miniport 11.1.185.0	
			STOR Miniport 11.2.1099.0	
		QLogic	STOR Miniport 2.1.6.10	
	Fibre Channel over Ethernet	Emulex		STOR Miniport 2.32.002
				STOR Miniport 2.70.018
				STOR Miniport 2.76.003.001
				STOR Miniport 10.0.720.0
				STOR Miniport 10.2.370.8
				STOR Miniport 10.4.246.0
				STOR Miniport 10.6.114.0
				STOR Miniport 11.0.247.0
				STOR Miniport 11.1.145.16
			STOR Miniport 11.2.1120.0	
		QLogic		STOR Miniport 9.1.9.15
				STOR Miniport 9.1.11.16
				STOR Miniport 9.1.12.10
				STOR Miniport 9.1.13.10
		HPE		STOR Miniport 10.4.246.0
			STOR Miniport 11.1.145.16	
Brocade		STOR Miniport 2.2.0.0		
Cisco		STOR Miniport 2.1.0.11		
Windows 2008 SP2	Fibre Channel	Emulex (*1)	STOR Miniport 2.01a4	

(x64)			STOR Miniport 2.10a7
			STOR Miniport 2.20.006
			STOR Miniport 2.30.020
			STOR Miniport 2.32.002
			STOR Miniport 2.33.008
			STOR Miniport 2.41.002
			STOR Miniport 2.41.003
			STOR Miniport 2.50.007
			STOR Miniport 2.70.014
			STOR Miniport 2.70.018
			STOR Miniport 2.70.019
			STOR Miniport 2.72.012.001
			STOR Miniport 2.74.009.001
			STOR Miniport 2.74.014.001
			STOR Miniport 2.76.003.001
			STOR Miniport 10.0.720.0
			STOR Miniport 10.2.261.4
			STOR Miniport 10.2.370.8
			STOR Miniport 10.4.246.0
			STOR Miniport 10.6.114.0
		STOR Miniport 10.7.110.20	
		STOR Miniport 11.0.247.0	
		STOR Miniport 11.1.145.16	
		STOR Miniport 11.2.124.0	

			STOR Miniport 9.1.7.18
			STOR Miniport 9.1.8.16
			STOR Miniport 9.1.8.17
			STOR Miniport 9.1.8.25
			STOR Miniport 9.1.9.25
			STOR Miniport 9.1.9.26
			STOR Miniport 9.1.9.27
			STOR Miniport 9.1.9.47
			STOR Miniport 9.1.9.49
			STOR Miniport 9.1.10.26
		QLogic	STOR Miniport 9.1.11.20
			STOR Miniport 9.1.11.28
			STOR Miniport 9.1.12.21
			STOR Miniport 9.1.13.20
			STOR Miniport 9.1.15.21
			STOR Miniport 9.1.17.21
			STOR Miniport 9.1.17.25
			STOR Miniport 9.1.18.20
			STOR Miniport 9.2.1.20
			STOR Miniport 9.2.3.20
		Hitachi Compute Blade	Bundle (*3)
		HPE	STOR Miniport 2.70.018
			STOR Miniport 2.70.019

			STOR Miniport 2.74.009.001	
			STOR Miniport 2.74.014.001	
			STOR Miniport 9.1.7.17	
			STOR Miniport 9.1.8.17	
			STOR Miniport 9.1.8.19	
			STOR Miniport 9.1.9.25	
			STOR Miniport 9.1.9.26	
			STOR Miniport 9.1.9.49	
			STOR Miniport 9.1.11.20	
			STOR Miniport 9.1.17.21	
			STOR Miniport 9.1.17.25	
			STOR Miniport 10.7.110.20	
			STOR Miniport 11.1.145.16	
			IBM	STOR Miniport 9.1.7.55
				STOR Miniport 9.1.8.25
				STOR Miniport 9.1.9.49
			Brocade	STOR Miniport 1.0.0-06
				STOR Miniport 1.1.0.1
				STOR Miniport 2.2.0.0
		iSCSI	Microsoft (*2)	Bundle
			Emulex	STOR Miniport 4.1.334.0
				STOR Miniport 4.9.160.0
				STOR Miniport 10.0.732.0
		STOR Miniport 10.2.370.9		

			STOR Miniport 10.2.421.0	
			STOR Miniport 10.4.245.0	
			STOR Miniport 10.6.116.0	
			STOR Miniport 11.0.271.0	
			STOR Miniport 11.1.185.0	
			STOR Miniport 11.2.1099.0	
		QLogic	STOR Miniport 2.1.6.10	
	Fibre Channel over Ethernet	Emulex		STOR Miniport 2.32.002
				STOR Miniport 2.50.007
				STOR Miniport 2.70.018
				STOR Miniport 2.76.003.001
				STOR Miniport 10.0.720.0
				STOR Miniport 10.2.261.4
				STOR Miniport 10.2.370.8
				STOR Miniport 10.4.246.0
				STOR Miniport 10.6.114.0
				STOR Miniport 10.7.110.20
				STOR Miniport 11.0.247.0
				STOR Miniport 11.1.145.16
				STOR Miniport 11.2.1120.0
			QLogic	STOR Miniport 9.1.8.26
	QLogic	STOR Miniport 9.1.9.15		
	QLogic	STOR Miniport 9.1.11.16		
	QLogic	STOR Miniport 9.1.12.10		

			STOR Miniport 9.1.13.10
		HPE	STOR Miniport 2.33.008
			STOR Miniport 2.42.002
			STOR Miniport 2.50.007
			STOR Miniport 2.76.003.001
			STOR Miniport 7.13.4.0
			STOR Miniport 7.14.0.0 or later
			STOR Miniport 10.2.261.4
			STOR Miniport 10.4.246.0
			STOR Miniport 10.7.110.20
			STOR Miniport 11.1.145.16
		Brocade	STOR Miniport 2.2.0.0
		Cisco	STOR Miniport 2.1.0.25

2) For Hitachi storage system (Windows 2008 R2 SP1)

OS	HBA		Driver
Windows 2008 R2 SP1 (x64)	Fibre Channel	Emulex (*1)	STOR Miniport 2.20.006
			STOR Miniport 2.30.018
			STOR Miniport 2.30.020
			STOR Miniport 2.32.002
			STOR Miniport 2.40.005
			STOR Miniport 2.41.002
			STOR Miniport 2.41.003
			STOR Miniport 2.50.007

			STOR Miniport 2.70.018
			STOR Miniport 2.74.009.001
			STOR Miniport 2.74.014.001
			STOR Miniport 2.74.016.001
			STOR Miniport 2.76.003.001
			STOR Miniport 10.0.720.0
			STOR Miniport 10.2.261.4
			STOR Miniport 10.2.370.8
			STOR Miniport 10.4.246.0
			STOR Miniport 10.6.114.0
			STOR Miniport 10.7.110.20
			STOR Miniport 11.0.247.0
			STOR Miniport 11.1.145.16
			STOR Miniport 11.2.124.0
		QLogic	STOR Miniport 3.2.3.0
			STOR Miniport 3.2.5.0
			STOR Miniport 3.2.6.0
			STOR Miniport 9.1.8.19
			STOR Miniport 9.1.8.25
			STOR Miniport 9.1.8.27
			STOR Miniport 9.1.9.25
			STOR Miniport 9.1.9.26
			STOR Miniport 9.1.9.27
			STOR Miniport 9.1.9.47

			STOR Miniport 9.1.9.49
			STOR Miniport 9.1.10.26
			STOR Miniport 9.1.10.27
			STOR Miniport 9.1.10.28
			STOR Miniport 9.1.11.20
			STOR Miniport 9.1.11.24
			STOR Miniport 9.1.11.26
			STOR Miniport 9.1.11.28
			STOR Miniport 9.1.12.21
			STOR Miniport 9.1.13.20
			STOR Miniport 9.1.15.20
			STOR Miniport 9.1.15.21
			STOR Miniport 9.1.17.21
			STOR Miniport 9.1.17.22
			STOR Miniport 9.1.17.25
			STOR Miniport 9.1.18.20
			STOR Miniport 9.2.1.20
			STOR Miniport 9.2.2.20
			STOR Miniport 9.2.3.20
		Hitachi Compute Blade	Bundle (*3)
		HPE	STOR Miniport 2.33.005
			STOR Miniport 2.50.007
			STOR Miniport 2.70.018

			STOR Miniport 2.70.019
			STOR Miniport 2.74.009.001
			STOR Miniport 2.74.014.001
			STOR Miniport 3.0.0.0
			STOR Miniport 9.1.8.25
			STOR Miniport 9.1.9.26
			STOR Miniport 9.1.9.45
			STOR Miniport 9.1.9.49
			STOR Miniport 9.1.10.26
			STOR Miniport 9.1.10.27
			STOR Miniport 9.1.11.20
			STOR Miniport 9.1.11.28
			STOR Miniport 9.1.12.22
			STOR Miniport 9.1.14.22
			STOR Miniport 9.1.15.21
			STOR Miniport 9.1.17.21
			STOR Miniport 9.1.17.22
			STOR Miniport 9.1.17.25
			STOR Miniport 10.4.246.0
			STOR Miniport 10.7.110.20
			STOR Miniport 11.1.145.16
		IBM	STOR Miniport 2.70.018
			STOR Miniport 9.1.9.25
			STOR Miniport 9.1.9.27

			STOR Miniport 9.1.9.49
			STOR Miniport 9.1.10.26
			STOR Miniport 9.1.11.24
		Brocade	STOR Miniport 2.1.0.0
			STOR Miniport 2.2.0.0
			STOR Miniport 2.3.0.2
			STOR Miniport 3.0.0.0
			STOR Miniport 3.1.0.0
			STOR Miniport 3.1.0.1
			STOR Miniport 3.2.0.0
			STOR Miniport 3.2.3.0
			STOR Miniport 3.2.4.0
			STOR Miniport 3.2.4.1
	STOR Miniport 3.2.5.0		
	STOR Miniport 3.2.6.0		
	iSCSI	Microsoft (*2)	Bundle
		Emulex	STOR Miniport 4.1.334.0
			STOR Miniport 4.9.160.0
			STOR Miniport 10.0.732.0
			STOR Miniport 10.2.370.9
STOR Miniport 10.2.421.0			
STOR Miniport 10.4.245.0			
STOR Miniport 10.6.116.0			
STOR Miniport 11.0.271.0			

			STOR Miniport 11.1.185.0	
			STOR Miniport 11.2.1099.0	
		QLogic	STOR Miniport 2.1.6.10	
		HPE	STOR Miniport 4.1.334.0	
	Fibre Channel over Ethernet	Emulex		STOR Miniport 2.50.007
				STOR Miniport 2.70.018
				STOR Miniport 2.76.003.001
				STOR Miniport 10.0.720.0
				STOR Miniport 10.2.261.4
				STOR Miniport 10.2.370.8
				STOR Miniport 10.4.246.0
				STOR Miniport 10.6.114.0
				STOR Miniport 10.7.110.20
				STOR Miniport 11.0.247.0
			STOR Miniport 11.1.145.16	
			STOR Miniport 11.2.1120.0	
		QLogic		STOR Miniport 9.1.11.16
				STOR Miniport 9.1.12.10
				STOR Miniport 9.1.13.10
				STOR Miniport 3.2.5.0
HPE		STOR Miniport 2.50.007		
		STOR Miniport 2.70.018		
		STOR Miniport 2.70.019		
		STOR Miniport 2.74.009.001		

			STOR Miniport 2.76.003.001
			STOR Miniport 7.12.4.0
			STOR Miniport 7.12.41.0
			STOR Miniport 7.13.4.0
			STOR Miniport 7.14.0.0 or later
			STOR Miniport 10.2.261.4
			STOR Miniport 10.4.246.0
			STOR Miniport 10.7.110.20
			STOR Miniport 11.1.145.16
		Brocade	STOR Miniport 3.2.4.0
			STOR Miniport 3.2.5.0
		Cisco	STOR Miniport 2.1.0.11
			STOR Miniport 2.1.0.17
			STOR Miniport 2.1.0.20
			STOR Miniport 2.1.0.25
			STOR Miniport 2.1.0.27
			STOR Miniport 2.1.0.31
		STOR Miniport 9.1.8.27	

3) For Hitachi storage system (Windows 2012 with no service Pack)

OS	HBA		Driver
Windows 2012 (x64)	Fibre Channel	Emulex (*1)	Bundle
			STOR Miniport 2.72.012.001
			STOR Miniport 2.72.205.004

			STOR Miniport 2.74.009.001
			STOR Miniport 2.74.014.001
			STOR Miniport 2.74.016.001
			STOR Miniport 2.76.003.001
			STOR Miniport 10.0.720.0
			STOR Miniport 10.2.261.4
			STOR Miniport 10.2.370.8
			STOR Miniport 10.4.246.0
			STOR Miniport 10.6.114.0
			STOR Miniport 10.7.110.20
			STOR Miniport 11.0.247.0
			STOR Miniport 11.1.145.16
			STOR Miniport 11.2.139.0
			STOR Miniport 11.4.142.11
			STOR Miniport 11.4.204.8
			STOR Miniport 12.0.193.13
			STOR Miniport 12.0.257.9
			STOR Miniport 12.0.367.0
			STOR Miniport 12.2.207.0
			STOR Miniport 12.2.284.0
		QLogic	Bundle
			STOR Miniport 3.2.5.0
			STOR Miniport 9.1.9.205
			STOR Miniport 9.1.10.26

			STOR Miniport 9.1.10.27
			STOR Miniport 9.1.11.20
			STOR Miniport 9.1.11.24
			STOR Miniport 9.1.11.26
			STOR Miniport 9.1.11.28
			STOR Miniport 9.1.12.21
			STOR Miniport 9.1.13.20
			STOR Miniport 9.1.15.20
			STOR Miniport 9.1.15.21
			STOR Miniport 9.1.17.21
			STOR Miniport 9.1.17.22
			STOR Miniport 9.1.17.25
			STOR Miniport 9.1.18.20
			STOR Miniport 9.2.1.20
			STOR Miniport 9.2.2.20
			STOR Miniport 9.2.3.20
			STOR Miniport 9.2.4.21
			STOR Miniport 9.2.4.21
			STOR Miniport 9.2.6.22
			STOR Miniport 9.2.8.20
			STOR Miniport 9.2.9.20
			STOR Miniport 9.2.9.23
		Hitachi Compute Blade	Bundle (*3)

		HPE	STOR Miniport 2.74.009.001
			STOR Miniport 9.1.10.27
			STOR Miniport 9.1.11.20
			STOR Miniport 9.1.11.24
			STOR Miniport 9.1.15.21
			STOR Miniport 9.1.17.21
			STOR Miniport 9.1.17.22
			STOR Miniport 9.1.17.25
			STOR Miniport 9.2.4.21
			STOR Miniport 10.7.110.20
			STOR Miniport 11.1.145.16
			Brocade
	STOR Miniport 3.0.2.21		
	STOR Miniport 3.1.0.1		
	STOR Miniport 3.2.4.0		
	iSCSI	Microsoft (*2)	Bundle
		Emulex	STOR Miniport 4.9.160.0
			STOR Miniport 10.0.732.0
			STOR Miniport 10.2.370.9
			STOR Miniport 10.2.421.0
STOR Miniport 10.4.245.0			
STOR Miniport 10.6.116.0			
STOR Miniport 11.0.271.0			

			STOR Miniport 11.1.185.0	
			STOR Miniport 11.2.1153.23	
			STOR Miniport 11.4.1174.0	
		QLogic	STOR Miniport 2.1.6.10	
	Fibre Channel over Ethernet	Emulex (*1)	Bundle	
			STOR Miniport 2.72.012.001	
			STOR Miniport 2.72.205.004	
			STOR Miniport 2.74.014.001	
			STOR Miniport 2.76.003.001	
			STOR Miniport 10.0.720.0	
			STOR Miniport 10.2.261.4	
			STOR Miniport 10.2.370.8	
			STOR Miniport 10.4.246.0	
			STOR Miniport 10.6.114.0	
			STOR Miniport 10.7.110.20	
			STOR Miniport 11.0.247.0	
			STOR Miniport 11.1.145.16	
			STOR Miniport 11.2.1135.0	
			STOR Miniport 11.4.1162.0	
			QLogic	STOR Miniport 3.2.5.0
STOR Miniport 9.1.10.15				
STOR Miniport 9.1.11.16				
STOR Miniport 9.1.12.10				
STOR Miniport 9.1.13.10				

		HPE	STOR Miniport 2.74.014.001
			STOR Miniport 2.76.003.001
			STOR Miniport 7.13.4.0
			STOR Miniport 7.14.0.0 or later
			STOR Miniport 10.2.261.4
			STOR Miniport 10.4.246.0
			STOR Miniport 10.7.110.20
			STOR Miniport 11.1.145.16
		Brocade	STOR Miniport 3.2.4.0
			STOR Miniport 3.2.5.0
		Cisco	STOR Miniport 2.3.0.12
			STOR Miniport 2.4.0.11
			STOR Miniport 2.4.0.19

4) For Hitachi storage system (Windows 2012 R2 with no service Pack)

OS	HBA		Driver
Windows 2012 R2 (x64)	Fibre Channel	Emulex (*1)	Bundle
			STOR Miniport 2.76.002.001
			STOR Miniport 2.76.003.001
			STOR Miniport 10.0.720.0
			STOR Miniport 10.2.261.4
			STOR Miniport 10.2.370.8
			STOR Miniport 10.4.246.0
			STOR Miniport 10.6.114.0

			STOR Miniport 10.7.110.20			
			STOR Miniport 11.0.247.0			
			STOR Miniport 11.1.145.16			
			STOR Miniport 11.2.139.0			
			STOR Miniport 11.4.142.11			
			STOR Miniport 11.4.204.8			
			STOR Miniport 12.0.193.13			
			STOR Miniport 12.0.257.9			
			STOR Miniport 12.0.318.0			
			STOR Miniport 12.0.367.0			
			STOR Miniport 12.2.207.0			
			STOR Miniport 12.2.284.0			
			QLogic			Bundle
						STOR Miniport 3.2.5.0
	STOR Miniport 9.1.11.3					
	STOR Miniport 9.1.11.24					
	STOR Miniport 9.1.11.28					
	STOR Miniport 9.1.12.21					
	STOR Miniport 9.1.13.20					
	STOR Miniport 9.1.15.20					
	STOR Miniport 9.1.15.21					
	STOR Miniport 9.1.17.21					
	STOR Miniport 9.1.17.22					
STOR Miniport 9.1.17.25						

			STOR Miniport 9.1.18.20
			STOR Miniport 9.2.1.20
			STOR Miniport 9.2.2.20
			STOR Miniport 9.2.3.20
			STOR Miniport 9.2.4.21
			STOR Miniport 9.2.5.20
			STOR Miniport 9.2.5.21
			STOR Miniport 9.2.6.20
			STOR Miniport 9.2.6.22
			STOR Miniport 9.2.8.20
			STOR Miniport 9.2.9.20
			STOR Miniport 9.2.9.22
			STOR Miniport 9.2.9.23
		Hitachi Compute Blade	Bundle (*3)
			STOR Miniport 4.4.8.2280
		HPE	STOR Miniport 9.1.11.24
			STOR Miniport 9.1.11.28
			STOR Miniport 9.1.12.22
			STOR Miniport 9.1.14.22
			STOR Miniport 9.1.15.21
			STOR Miniport 9.1.17.22
			STOR Miniport 9.1.17.25
			STOR Miniport 9.2.4.21
			STOR Miniport 10.2.370.8

			STOR Miniport 10.4.246.0
			STOR Miniport 10.6.114.0
			STOR Miniport 10.7.110.20
			STOR Miniport 11.1.145.16
		Brocade	STOR Miniport 3.2.4.0
			STOR Miniport 3.2.5.0
	iSCSI	Microsoft (*2)	Bundle
		Emulex	STOR Miniport 4.9.160.0
			STOR Miniport 10.0.732.0
			STOR Miniport 10.2.370.9
			STOR Miniport 10.2.421.0
			STOR Miniport 10.4.245.0
			STOR Miniport 10.6.116.0
			STOR Miniport 11.0.271.0
			STOR Miniport 11.1.185.0
			STOR Miniport 11.2.1153.23
			STOR Miniport 11.4.1174.0
		QLogic	STOR Miniport 2.1.5.38
	STOR Miniport 2.1.6.10		
	Fibre Channel over Ethernet	Emulex	STOR Miniport 2.76.002.001
STOR Miniport 2.76.003.001			
STOR Miniport 10.0.720.0			
STOR Miniport 10.2.261.4			
STOR Miniport 10.2.370.8			

			STOR Miniport 10.4.246.0
			STOR Miniport 10.6.114.0
			STOR Miniport 10.7.110.20
			STOR Miniport 11.0.247.0
			STOR Miniport 11.1.145.16
			STOR Miniport 11.2.1135.0
			STOR Miniport 11.4.1162.0
		QLogic	STOR Miniport 3.2.5.0
			STOR Miniport 9.1.11.12
			STOR Miniport 9.1.11.16
			STOR Miniport 9.1.12.10
			STOR Miniport 9.1.13.10
		HPE	STOR Miniport 2.76.003.001
			STOR Miniport 7.10.31.0
			STOR Miniport 7.12.41.0
			STOR Miniport 7.13.4.0
			STOR Miniport 7.14.0.0 or later
			STOR Miniport 10.2.261.4
			STOR Miniport 10.4.246.0
			STOR Miniport 10.7.110.20
			STOR Miniport 11.1.145.16
		Brocade	STOR Miniport 3.2.3.1
			STOR Miniport 3.2.4.0
			STOR Miniport 3.2.5.0

		Cisco	STOR Miniport 2.3.0.20
			STOR Miniport 2.4.0.8
			STOR Miniport 2.4.0.9
			STOR Miniport 2.4.0.11
			STOR Miniport 2.4.0.13
			STOR Miniport 2.4.0.19
			STOR Miniport 2.4.0.20

5) For Hitachi storage system (Windows 2016 with no service Pack)

OS	HBA		Driver
Windows 2016 (x64)	Fibre Channel	Emulex (*1)	Bundle
			STOR Miniport 11.0.247.8000
			STOR Miniport 11.1.145.16
			STOR Miniport 11.2.139.0
			STOR Miniport 11.4.142.11
			STOR Miniport 11.4.204.8
			STOR Miniport 11.4.334.7
			STOR Miniport 12.0.193.13
			STOR Miniport 12.0.257.9
			STOR Miniport 12.0.318.0
			STOR Miniport 12.0.367.0
			STOR Miniport 12.2.207.0
		STOR Miniport 12.2.284.0	
		QLogic	Bundle

			STOR Miniport 9.1.15.1	
			STOR Miniport 9.1.17.25	
			STOR Miniport 9.2.2.20	
			STOR Miniport 9.2.3.20	
			STOR Miniport 9.2.4.21	
			STOR Miniport 9.2.5.20	
			STOR Miniport 9.2.5.21	
			STOR Miniport 9.2.6.20	
			STOR Miniport 9.2.6.22	
			STOR Miniport 9.2.8.20	
			STOR Miniport 9.2.9.20	
			STOR Miniport 9.2.9.22	
			STOR Miniport 9.2.9.23	
		Hitachi Compute Blade	Bundle (*3)	
		HPE	STOR Miniport 9.1.17.25	
			STOR Miniport 9.2.4.21	
			STOR Miniport 11.1.145.16	
		iSCSI	Microsoft (*2)	Bundle
			Emulex (*1)	STOR Miniport 11.1.185.0
				STOR Miniport 11.2.1153.23
	STOR Miniport 11.4.1174.0			
		QLogic	STOR Miniport 2.1.6.10	
	Fibre Channel	Emulex (*1)	Bundle	

	over Ethernet		STOR Miniport 11.0.247.8000
			STOR Miniport 11.1.145.16
			STOR Miniport 11.2.1135.0
			STOR Miniport 11.4.1162.0
		QLogic	Bundle
			STOR Miniport 9.1.11.3
		HPE	STOR Miniport 7.14.0.0 or later
			STOR Miniport 11.1.145.16
		Cisco	STOR Miniport 3.0.0.7
			STOR Miniport 3.0.0.8

6) For Hitachi storage system (Windows 2019 with no service Pack)

OS	HBA		Driver
Windows 2019 (x64)	Fibre Channel	Emulex (*1)	Bundle
			STOR Miniport 11.4.225.8009
			STOR Miniport 12.0.298.0
			STOR Miniport 12.0.318.0
			STOR Miniport 12.0.367.0
			STOR Miniport 12.2.207.0
		QLogic	Bundle
			STOR Miniport 9.1.15.1
			STOR Miniport 9.2.8.21
			STOR Miniport 9.2.9.22
			STOR Miniport 9.2.9.23

	iSCSI	Microsoft (*2)	Bundle
	Fibre Channel over Ethernet	Emulex (*1)	Bundle
			STOR Miniport 11.0.247.8000
		QLogic	Bundle
			STOR Miniport 7.14.15.2

7) For EMC CX Series and HPE EVA Series (Windows 2008)

Check to a storage vendor about connectable HBA and its driver.

Notes:

\*1: The following tables show the values for Emulex Driver.

For EmulexSTORMiniport driver:

Item	Sub Item	Emulex DefaultSetting	HDLM Setting (FC-AL)	HDLM Setting(Fabric)
Driver Parameters	Topology	2	0	1

\*2: Network Interface Card in which Ethernet connection is possible is required.

\*3: All drivers applied to Hitachi HBA cards for Hitachi Compute Blade are supported.

## Copyrights and licenses

© 2019 Hitachi, Ltd. All rights reserved.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including copying and recording, or stored in a database or retrieval system for commercial purposes without the express written permission of Hitachi, Ltd., or Hitachi Vantara Corporation (collectively "Hitachi"). Licensee may make copies of the Materials provided that any such copy is (i) created as an essential step in utilization of the Software as licensed and is used in no other manner; or (ii) used for archival purposes. Licensee may not make any other copies of the Materials. "Materials" mean text, data, photographs, graphics, audio, video and documents.

Hitachi reserves the right to make changes to this Material at any time without notice and assumes no responsibility for its use. The Materials contain the most current information available at the time of publication.

Some of the features described in the Materials might not be currently available. Refer to the most recent product announcement for information about feature and product availability, or contact Hitachi Vantara Corporation at [https://support.hitachivantara.com/en\\_us/contact-us.html](https://support.hitachivantara.com/en_us/contact-us.html).

**Notice:** Hitachi products and services can be ordered only under the terms and conditions of the applicable Hitachi agreements. The use of Hitachi products is governed by the terms of your agreements with Hitachi Vantara Corporation.

By using this software, you agree that you are responsible for:

- 1) Acquiring the relevant consents as may be required under local privacy laws or otherwise from authorized employees and other individuals; and
- 2) Verifying that your data continues to be held, retrieved, deleted, or otherwise processed in accordance with relevant laws.

**Notice on Export Controls.** The technical data and technology inherent in this Document may be subject to U.S. export control laws, including the U.S. Export Administration Act and its associated regulations, and may be subject to export or import regulations in other countries. Reader agrees to comply strictly with all such regulations and acknowledges that Reader has the responsibility to obtain licenses to export, re-export, or import the Document and any Compliant Products.

Hitachi and Lumada are trademarks or registered trademarks of Hitachi, Ltd., in the United States and other countries.

AIX, AS/400e, DB2, Domino, DS6000, DS8000, Enterprise Storage Server, eServer, FICON, FlashCopy, GDPS, HyperSwap, IBM, Lotus, MVS, OS/390, PowerHA, PowerPC, RS/6000, S/390, System z9, System z10, Tivoli, z/OS, z9, z10, z13, z14, z/VM, and z/VSE are registered trademarks or trademarks of International Business Machines Corporation.

Active Directory, ActiveX, Bing, Excel, Hyper-V, Internet Explorer, the Internet Explorer logo, Microsoft, the Microsoft Corporate Logo, MS-DOS, Outlook, PowerPoint, SharePoint, Silverlight, SmartScreen, SQL Server, Visual Basic, Visual C++, Visual Studio, Windows, the Windows logo, Windows Azure, Windows PowerShell, Windows Server, the Windows start button, and Windows Vista are registered trademarks or trademarks of Microsoft Corporation. Microsoft product screen shots are reprinted with permission from Microsoft Corporation.

All other trademarks, service marks, and company names in this document or website are properties of their respective owners.

Copyright and license information for third-party and open source software used in Hitachi Vantara products can be found at <https://www.hitachivantara.com/en-us/company/legal.html>.