

# Hitachi Dynamic Link Manager (for Windows®) 8.8.1-00 Release Notes

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## About this document

This document (RN-00HS272-60, February 2022) provides late-breaking information about Dynamic Link Manager (for Windows®) 8.8.1-00. It includes information that was not available at the time the technical documentation for this product was published, as well as a list of known problems and solutions.

# Intended audience

This document is intended for customers and Hitachi 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
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Software	Hitachi Dynamic Link Manager (for Windows®)	8.8.1-00	Full Package	-
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## New features and important enhancements

[8.8.1-00 Additional Functions and Modifications]

- 1) Hitachi Virtual Storage Platform 5200, 5200H, 5600 and 5600H are now supported.
- 2) Hitachi Virtual Storage Platform E1090 and E1090H are now supported.

## System requirements

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

### Host

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

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

Supported OSs in a HAM environment are listed as follows:

Supported OS
Windows Server 2012 (x64)
Windows Server 2012 R2 (x64)

Supported cluster software in a HAM environment is listed as follows:

OS	Service Pack	Cluster software
Windows Server 2012 (x64)	No service pack	Microsoft Failover Cluster (*1)
Windows Server 2012 R2 (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 systems, refer to the following manual:

- Hitachi Dynamic Link Manager (for Windows®) User Guide Chapter 3. Creating an HDLM environment - HDLM system requirements - Storage systems supported by HDLM

Requirements to use a HAM environment are as follows:

- HDLM supports the HAM functionality of the following storage system:
  - HUS VM

The required microprogram versions are listed as follows:

Storage system	Interface	Microprogram version	Remark
HUS VM	FC I/F	73-03-0X-XX/XX or later	X: voluntary number

## Operating Systems Requirements

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

- Hitachi Dynamic Link Manager (for Windows®) User Guide 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 Dynamic Link Manager (for Windows®) User Guide Chapter 3. Creating an HDLM environment - HDLM system requirements - Cluster software supported by HDLM

Supported Oracle RAC version:

OS	Version	DB File
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)	ASM
	19.3.0.0 (*1)	ASM
Windows 2019 (x64)	19.3.0.0 (*1)	ASM
	19.10.0.0 (*1)	ASM

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

## Memory and Disk Space Requirements

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

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

# Resolved problems

[8.8.1-00 Modifications]

none.

# Known problems

- 1) In VSP 5100, 5100H, 5200, 5200H, 5500, 5500H, 5600, 5600H VSP E590, E590H, E790, E790H, E990, E1090, E1090H, VSP G200, G350, G370, G400, G600, G700, G800, G900, G1000, G1500, VSP F350, F370, F400, F600, F700, F800, F900, F1500, VSP N400, N600, N800, XP7, XP8, 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 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 the refresh operation of the HDLM command is performed, instead of "ConfigurationAccess", "Authentication" is set in the audit event category for the KAPL15121-I or KAPL15122-W message, which is output to the audit log.

# Closing known problems

[8.8.1-00 Modifications]

none.

# Installation precautions

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

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

## Remove precautions

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

- Hitachi Dynamic Link Manager (for Windows®) User Guide 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 Dynamic Link Manager (for Windows®) User Guide 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 Dynamic Link Manager (for Windows®) User Guide Chapter 3. Creating an HDLM Environment - HDLM system requirements - Number of LUs and paths that are supported in HDLM
- Hitachi Dynamic Link Manager (for Windows®) User Guide Chapter 3. Creating an HDLM environment - Notes on creating an HDLM environment
- Hitachi Dynamic Link Manager (for Windows®) User Guide 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 Dynamic Link Manager (for Windows®) User Guide Chapter 2. HDLM functions - Performing failovers and failbacks using path switching - Path status transition - Status transitions of a path
- Hitachi Dynamic Link Manager (for Windows®) User Guide Chapter 2. HDLM functions - Monitoring intermittent errors(functionality when automatic failback is used) - Intermittent error monitoring actions
- Hitachi Dynamic Link Manager (for Windows®) User Guide Chapter 3. Creating an HDLM environment - Removing HDLM - Clearing the persistent reservation
- Hitachi Dynamic Link Manager (for Windows®) User Guide Chapter 4. HDLM operation - Notes on using HDLM
- Hitachi Dynamic Link Manager (for Windows®) User Guide Chapter 4. HDLM operation - HDLM operations using the HDLM GUI - Notes on using the HDLM GUI
- Hitachi Dynamic Link Manager (for Windows®) User Guide Chapter 4. HDLM operation - Using commands for HDLM operations - Notes on using commands
- Hitachi Dynamic Link Manager (for Windows®) User Guide Chapter 4. HDLM operation - Reconfiguring the HDLM operating environment
- Hitachi Dynamic Link Manager (for Windows®) User Guide Chapter 5. Troubleshooting - Checking error information in messages
- Hitachi Dynamic Link Manager (for Windows®) User Guide Chapter 6. Command reference - view (displays information)
- Hitachi Dynamic Link Manager GUI Help Section 3.1 HDLM operations using the HDLM GUI
- Hitachi 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	8.8.1-00
	Service Pack Version	Blank
	HDLM Manager	8.8.0-00
	HDLM Alert Driver	8.7.6-02
	HDLM Driver	8.7.6-02
HDLM GUI	HDLM version	8.8.1-00
Registry(*1)	TechnicalVersion	8.8.1-00

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

[Key]

- When using Windows 2012, Windows 2016 or Windows 2019

HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\HITACHI\DynamicLinkM  
anager

## Notes on HAM functionality support

- 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 `dlnkmgr 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 Dynamic Link Manager (for Windows®) User Guide	MK-92DLM129-53	October 2021

### Documentation errata

none.

## Appendix A

### Host Bus Adapter (HBA) Support Matrix

Use the iSCSI I/F adapter or Fibre Channel I/F adapters listed as follows. 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 2012 with no service Pack)

OS	HBA		Driver
Windows 2012 (x64)	Fibre Channel	Emulex	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
			STOR Miniport 12.4.243.4
			STOR Miniport 12.6.165.0
			STOR Miniport 12.8.334.6

			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
		QLogic	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	
			STOR Miniport 9.2.9.23	
			STOR Miniport 9.4.1.20 (*2)	
		Hitachi Compute Blade	Bundle (*1)	
		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		Bundle	
			STOR Miniport 3.0.2.21	
			STOR Miniport 3.1.0.1	
			STOR Miniport 3.2.4.0	
			STOR Miniport 3.2.5.0	
	iSCSI	Microsoft	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	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

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

OS	HBA		Driver
Windows 2012 R2 (x64)	Fibre Channel	Emulex	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
			STOR Miniport 12.4.243.4
			STOR Miniport 12.6.165.0
			STOR Miniport 12.8.334.6
		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
			STOR Miniport 9.4.1.20 (*2)
		Hitachi Compute Blade	Bundle (*1)
			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 3.2.5.0		
	iSCSI	Microsoft	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

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

OS	HBA		Driver
Windows 2016 (x64)	Fibre Channel	Emulex	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
			STOR Miniport 12.4.243.4
			STOR Miniport 12.6.165.0
			STOR Miniport 12.8.334.6
			STOR Miniport 12.8.351.7
		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
			STOR Miniport 9.4.1.20 (*2)
			STOR Miniport 9.4.2.20 (*2)
			STOR Miniport 9.4.5.20 (*2)
		Hitachi Compute Blade	Bundle (*1)
		HPE	STOR Miniport 9.1.17.25
			STOR Miniport 9.2.4.21
			STOR Miniport 11.1.145.16
		iSCSI	Microsoft
	Emulex		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	Bundle
			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
			STOR Miniport 3.1.0.11
			STOR Miniport 3.2.0.14

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

OS	HBA		Driver
Windows 2019 (x64)	Fibre Channel	Emulex	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
			STOR Miniport 12.4.243.4
			STOR Miniport 12.6.165.0
			STOR Miniport 12.8.334.6
		STOR Miniport 12.8.351.7	
		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
			STOR Miniport 9.4.1.20 (*2)
			STOR Miniport 9.4.2.20 (*2)
			STOR Miniport 9.4.5.20 (*2)

	iSCSI	Microsoft	Bundle
	Fibre Channel over Ethernet	Emulex	Bundle
			STOR Miniport 11.0.247.8000
		QLogic	Bundle
			STOR Miniport 7.14.15.2

Notes:

\*1: All drivers applied to Hitachi HBA cards for Hitachi Compute Blade are supported.

\*2: For 2700 series adapters and 2800 series adapters, when a failed path is recovered while the server is stopped, and the host is restarted, a disconnection error might occur. A server restart is required to recover the path.

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