

# Configuring Hitachi Dynamic Link Manager on VMware ESXi using ESXCLI Command and vCenter

v1.0

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## Implementation Guide

This guide shows how to configure Hitachi Dynamic Link Manager (HDLM) with VMware ESXi on a Hitachi Virtual Storage Platform (VSP) storage system using vCenter and VMware ESXCLI commands.

Hitachi Vantara

December 2024

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# Preface

## About this document

This document shows how to configure Hitachi Dynamic Link Manager (HDLM) with VMware ESXi on a Hitachi Virtual Storage Platform (VSP) storage system using vCenter and VMware ESXCLI commands.

To use this document, you must have a basic understanding of VMware ESXi systems, Hitachi VSP storage systems, and HDLM.

## Revision History

Revision	Changes	Date
v1.0	Initial Release	December 2024

## Accessing product documentation

Product user documentation is available on the Hitachi Vantara Support Site: <https://docs.hitachivantara.com/>. Check this site for the most current documentation, including important updates that may have been made after the release of the product. For more information on the operating system, see the operating system documentation. For the product support matrix, see the Product Compatibility Guide: <https://compatibility.hitachivantara.com/>

For OS support, please check their support site:  
VMware ESXi: <https://techdocs.broadcom.com/>

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# Introduction

## Purpose

Configuring the Hitachi Dynamic Link Manager (HDLM) on VMware ESXi ensures efficient multipathing by managing I/O paths between the host and the Hitachi storage system. HDLM allows administrators to monitor path health, implement load balancing, and set failover policies for high availability. Both the ESXCLI command and the vCenter graphical interface help to verify and configure the Path Selection Policy (PSP) and Storage Array Type Plugin (SATP) settings, ensuring optimal performance. In addition, HDLM enables troubleshooting of path failures and fine-tuning of path selection policies for enhanced reliability. Overall, HDLM ensures uninterrupted access to the storage system, improving performance and fault tolerance.

## Hitachi DLM Overview

HDLM is a multipathing software solution developed by Hitachi Vantara to improve data availability and system resilience by managing paths and failover mechanisms in a heterogeneous storage environment, with Hitachi and non-Hitachi storage systems. By efficiently managing multiple paths, HDLM optimizes connectivity and availability between storage systems and host servers, such as VMware ESXi. HDLM provides high availability and dynamic load balancing for connected storage, ensuring continuous access to data. When integrated with VMware ESXi, HDLM intelligently manages paths between VMs and storage infrastructure. This document includes HDLM installation on ESXi, highlighting the benefits, features, and architecture.

## Key Features of HDLM

The following lists the key features of HDLM:

- **Automatic Path Failover:** Automatically switches to alternate paths during a failure to ensure continuous access and performs fallback when paths recover.
- **Load Balancing:** Balances I/O traffic across all available paths, optimizing performance and reducing system bottlenecks.
- **Path Health Monitoring:** Continuously monitors path health and proactively switches to healthier paths before issues impact operations.
- **Centralized Management:** Simplifies management by offering centralized control over paths, making administration of large environments easier.

## Connectivity Diagram

The ESXi server where HDLM is installed is connected to the Hitachi VSP storage system through two SAN switches, as shown in the following figure:

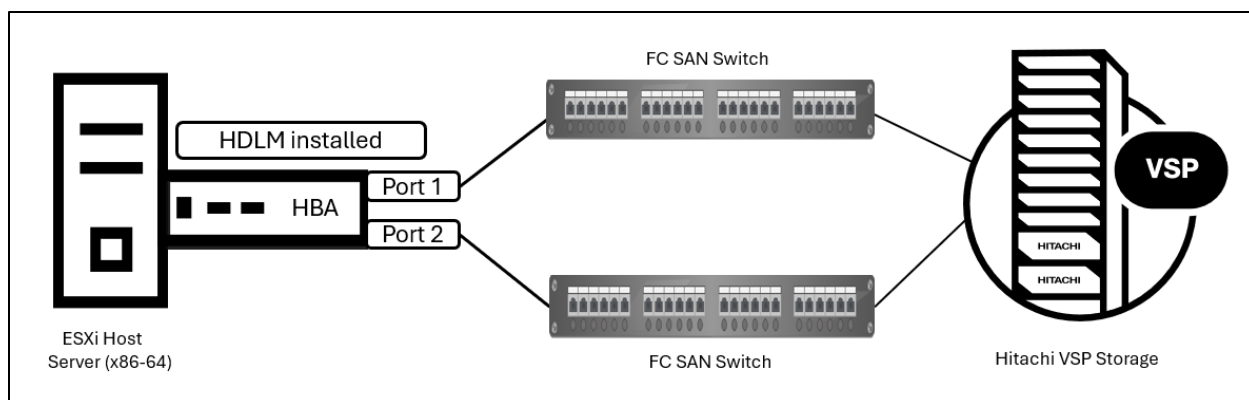


Figure 1: Connectivity of the ESXi Host (with HDLM) to the Hitachi VSP storage system through two FC SAN switches

## Hardware Requirements

The following lists the hardware devices used for this implementation:

- Host system: HPE ProLiant DL380 Gen10 Server
- Host HBA: QLogic QLE2742SR Dual Port 16Gb Fiber Channel Adapter
- Switches: Brocade G620 Fabric Switch and Brocade G630 Fabric Switch
- Storage system: Hitachi VSP 5600H

## Software Requirements

The following lists the software used for this implementation setup:

- OS install media: ESXi 8.0U1
- vSphere Client version: 8.0.0.10000
- Multipath: HDLM 8.9.0-01

## How HDLM Works with ESXi

HDLM integrates with VMware ESXi to manage paths between ESXi hosts and storage systems. The Native Multipathing Plugin (NMP) of VMware ESXi manages the routing of I/O operations across available physical paths. HDLM can replace or work alongside VMware NMP by installing as a third-party Multipathing Plugin (MPP) to provide advanced path management capabilities, such as load balancing and failover, specifically optimized for Hitachi storage environments.

# Integrating HDLM with VMware ESXi

This section shows the detailed view of integrating HDLM with VMware ESXi.

## HDLM on a VMware ESXi Host

The following diagram shows a VMware virtualization environment that involves an ESXi host managed by a VMware vCenter server. The host is connected to storage controllers through a network of SAN switches.

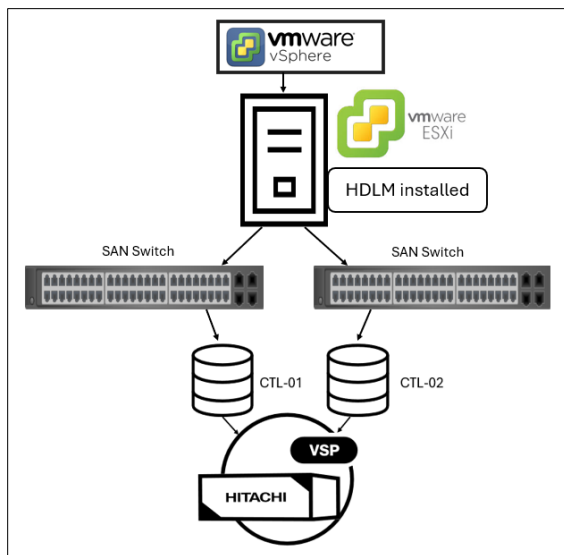


Figure 2: ESXi Host Connectivity

## Components and Their Interactions in the Environment

The following lists the components and their interactions in the environment:

- **VMware vCenter:** The central management utility for VMware environments, offering a unified platform to control multiple ESXi hosts and enabling advanced features such as vMotion, DRS, and centralized monitoring.
- **VMware ESXi Host:** A hypervisor that runs directly on hardware, managing virtual machines and providing virtualization services to guest operating systems.
- **HDLM Path Management:** Used for path management in storage environments, improving fault tolerance and load balancing to optimize access to storage resources.
- **SAN Switch:** Connects VMware hosts to storage controllers, managing the FC network for high-speed data transfer and ensuring redundant connectivity.



- **Storage Controller A and B:** Dual storage controllers configured for high availability, where each controller manages a separate set of disks and can take over the other controller workloads if one fails.

# Workflow for Configuring HDLM with ESXi

Configuring HDLM involves several steps to ensure proper path management and optimal performance in your storage environment. The following is a typical workflow for HDLM configuration:

Start

- |
- | +--> Verify compatibility with ESXi OS version.
- |
- | +--> Backup the ESXi host configuration data.
- |
- | +--> Optionally, schedule downtime.
- |
- | +--> Download the HDLM software from the [Hitachi Vantara support site](#).
- |
- | +--> Upload the HDLM package to the ESXi datastore.
- |
- | +--> Install HDLM.
  - | |
  - | | +--> Navigate to the HDLM Package Directory.
  - | |
  - | | +--> Run the installation.
- |
- | +--> Restart the ESXi host.
- |
- | +--> Verify the installation.
  - | |
  - | | +--> Verify the HDLM status.
  - | |
  - | | +--> Ensure that the paths are managed by HDLM.

End

# Installing HDLM on ESXi

Installing HDLM on VMware involves several steps to ensure proper integration and functionality for managing multiple paths to Hitachi storage systems.

## Prerequisites

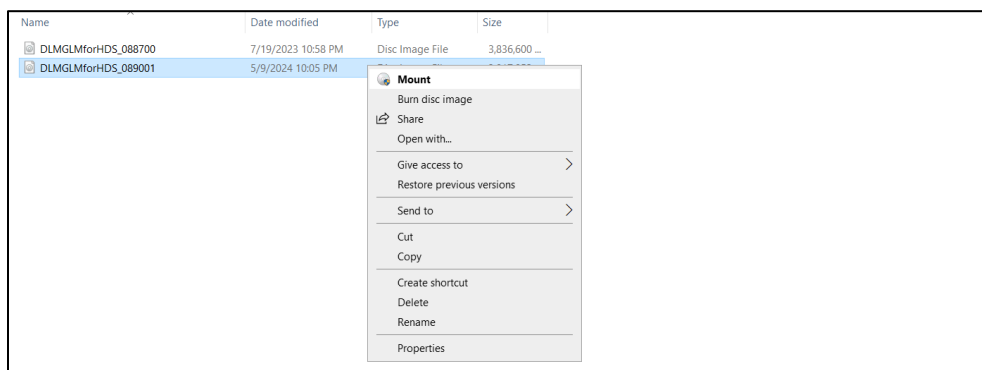
- Ensure compatibility between the VMware ESXi version and the HDLM software. Check the compatibility matrix provided by Hitachi Vantara: [Product Compatibility Guide](#)
- Download the HDLM software: [HDLM Download](#)
- Confirm that the ESXi host is connected to the Hitachi VSP storage system through Fiber Channel (FC) or iSCSI.
- Verify the availability of the Host Bus Adapters (HBAs) and Network Adapter (NIC/CNA) for redundancy.
- If the Windows version of HDLM is already installed on the machine for use as the remote management client, remove it before proceeding. The VMware and Windows versions of HDLM cannot coexist on the same remote management client.
- A license key is required if you install HDLM for the first time or upgrade HDLM after the license has expired. Keep the license key before proceeding with the upgrade or installation.

## Preparing Installation Files in vCenter Server

To configure HDLM on ESXi hosts, complete the following steps:

1. Mount the downloaded HDLM iso file in a Windows client machine to extract the HDLM folder.

Name	Date modified	Type	Size
DLMGLMforHDS_088700	7/19/2023 10:58 PM	Disc Image File	3,836,600 ...
DLMGLMforHDS_089001	5/9/2024 10:05 PM	Disc Image File	3,817,852 ...



2. Navigate to the 'Contents\_list' file and verify the VMware HDLM software version for installing HDLM 8.9.0-01.

HDLM_AIX	1/24/2024 12:18 AM	File folder	
HDLM_Linux	9/20/2023 12:20 AM	File folder	
HDLM_Solaris	1/9/2023 4:48 PM	File folder	
HDLM_Tools	1/6/2015 3:59 AM	File folder	
HDLM_VMware	1/10/2024 6:32 PM	File folder	
HDLM_Windows	12/15/2023 12:39 PM	File folder	
HGLM	1/11/2024 8:54 AM	File folder	
ancillary	3/24/2014 12:19 AM	Text Document	652 KB
Contents_list	1/16/2024 8:20 PM	Text Document	1 KB
hcmdslicense2	10/5/2011 10:49 PM	File	71 KB
installux.sh	12/6/2012 2:49 AM	SH File	8 KB
Readme_HDLM_HGLM	1/20/2022 5:00 PM	Text Document	3 KB

Contents\_list - Notepad

File Edit Format View Help

Hitachi Dynamic Link Manager Software 8.9.0-01

Contents List

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Contents List

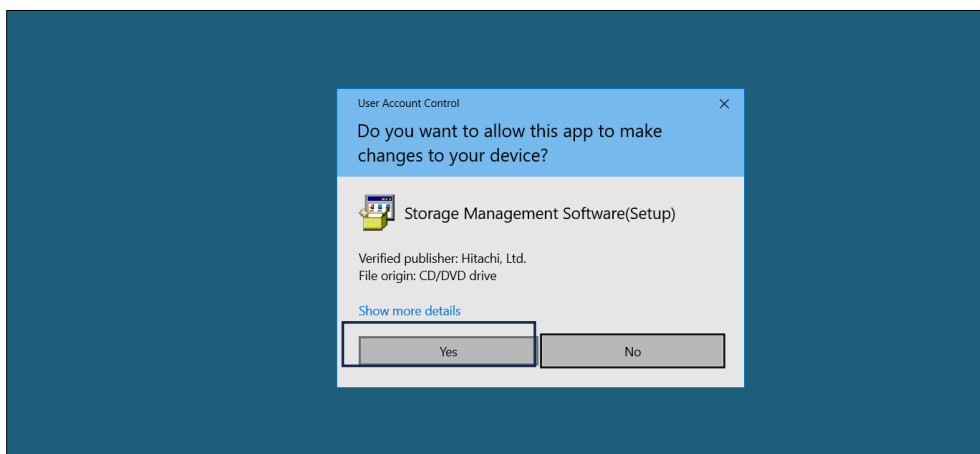
Directory	Product Name	Version
HDLM_AIX	Hitachi Dynamic Link Manager Software(for AIX)	8.8.5-03
HDLM_Linux	Hitachi Dynamic Link Manager Software(for Linux)	8.9.0-01
HDLM_Solaris	Hitachi Dynamic Link Manager Software(for Solaris)	8.8.3-07
HDLM_Windows	Hitachi Dynamic Link Manager Software(for Windows)	8.8.3-07
HDLM_Vmware	Hitachi Dynamic Link Manager Software(for VMware)	8.8.7-03
HGLM	Hitachi Global Link Manager Software	8.8.7-03

- End of document -

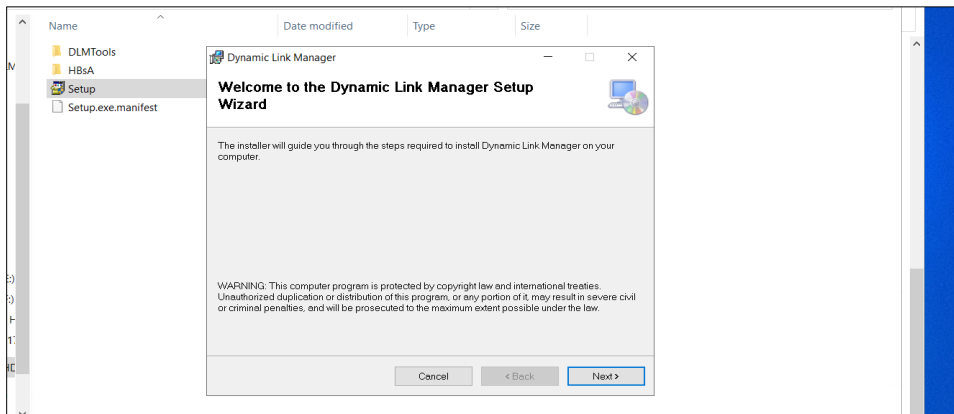
3. Navigate to the HDLM\_VMware directory with the executable setup file.

DVD Drive (H:) HDLM_HDS_089001 > HDLM_VMware >				
Name	Date modified	Type	Size	
-----				
DLMTools	1/10/2024 6:32 PM	File folder		
HBsA	1/10/2024 6:32 PM	File folder		
Setup	1/9/2024 4:25 PM	Application	214,583 KB	
Setup.exe.manifest	12/21/2016 9:39 PM	MANIFEST File	2 KB	

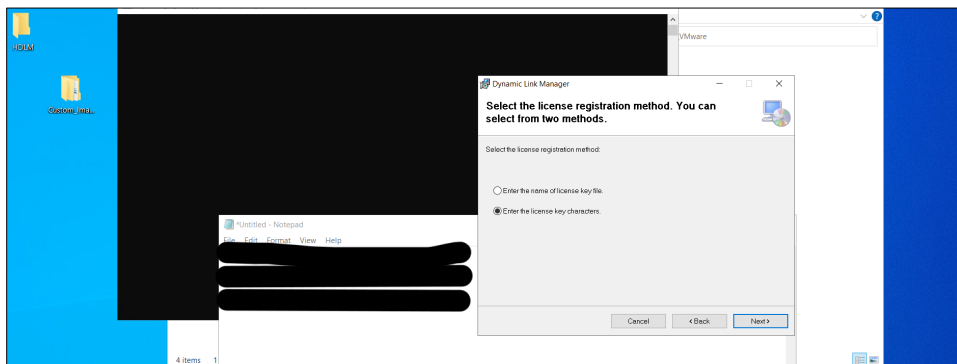
4. Run the Setup file and then click **Yes**.



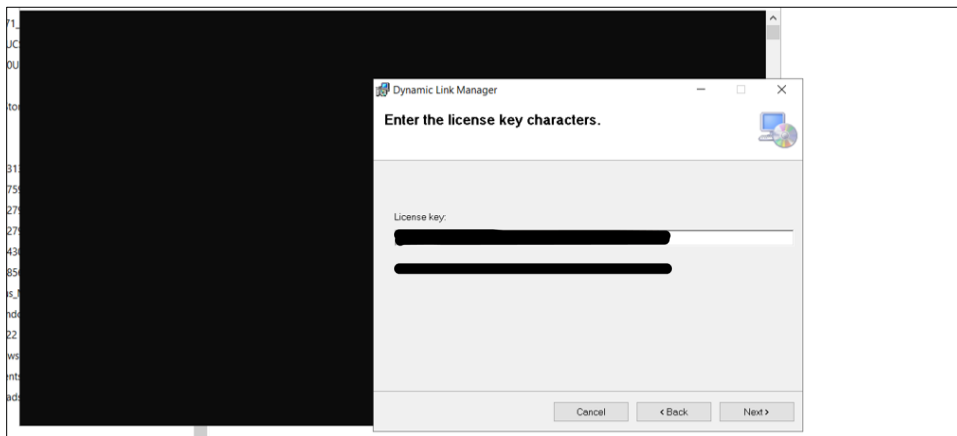
5. When the Dynamic Link Manager setup wizard appears, click **Next**.



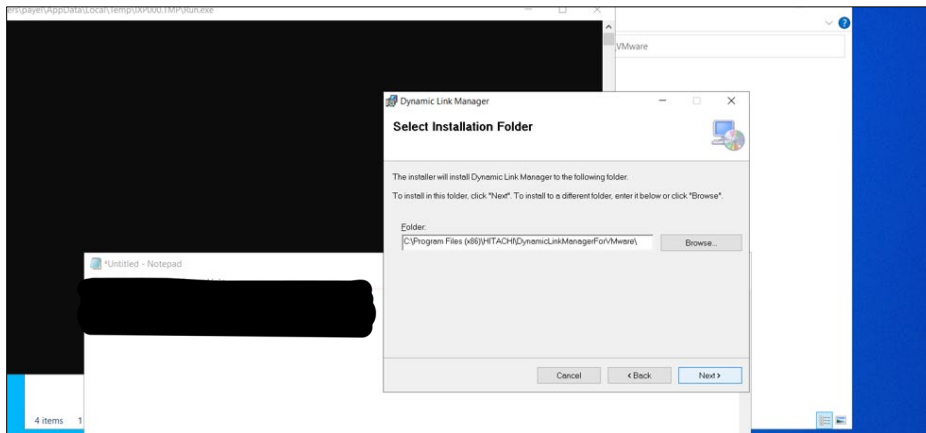
6. Select the license registration method with 'license key characters' and click **Next**.



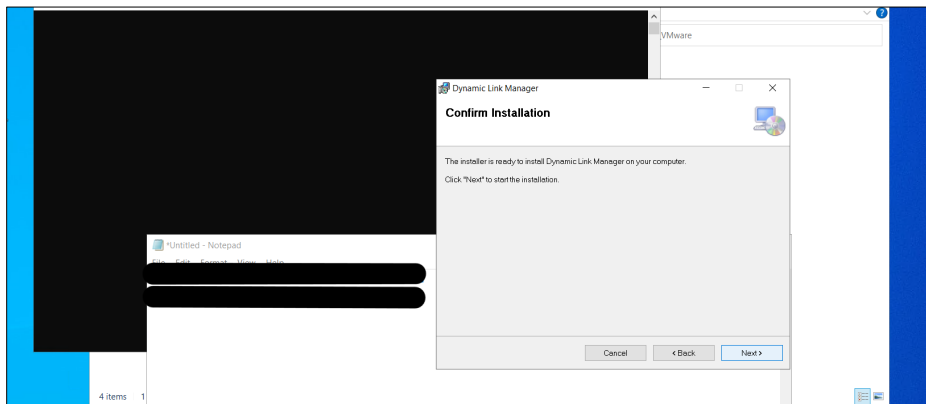
7. Enter the license key and click **Next**.



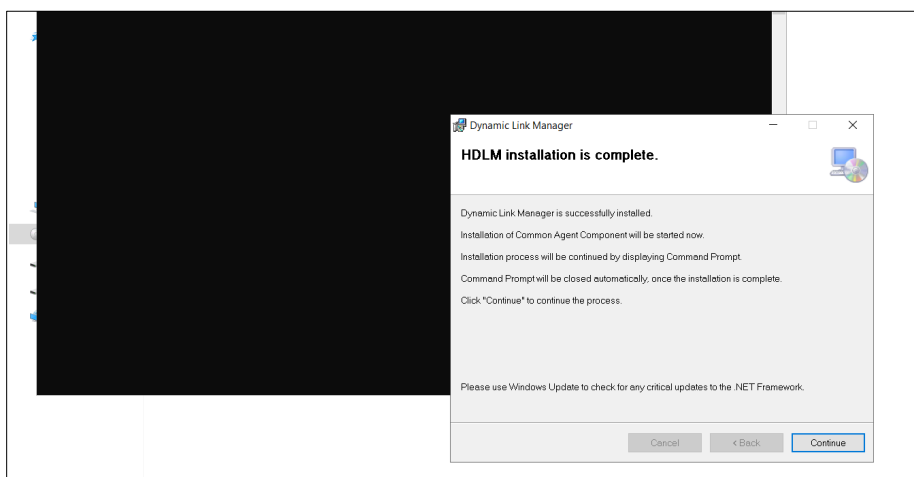
8. Select the installation folder and click **Next**.



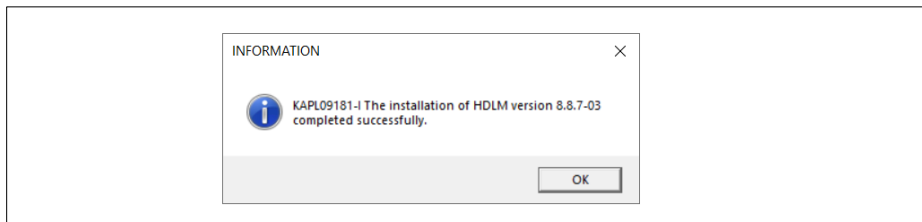
9. When the installation is ready, click **Next**.



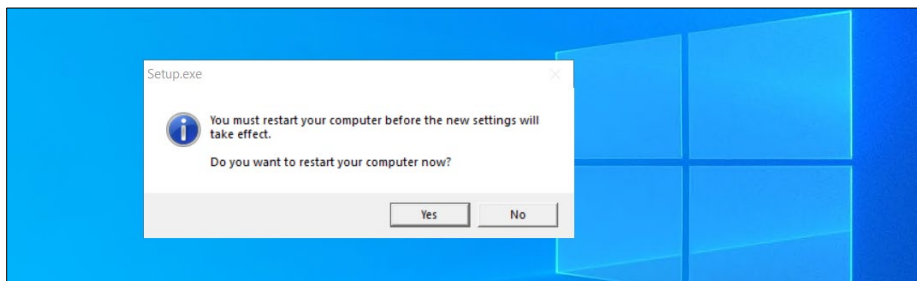
10. When the HDLM installation is completed, click **Continue**.



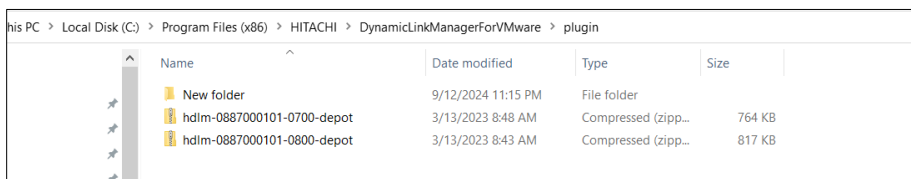
11. The installation is completed successfully with the HDLM version:



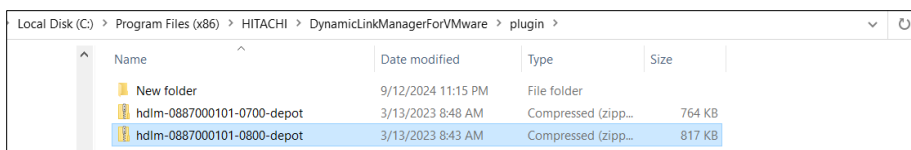
12. To reflect the HDLM version installation on the local system, restart the system.



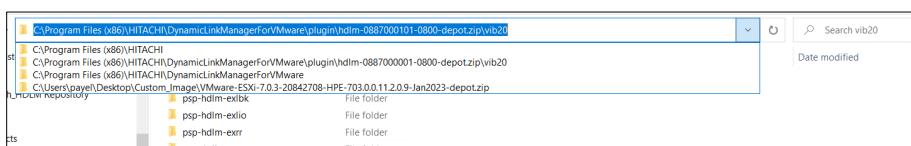
13. To verify the .zip HDLM depot folders to be copied to the testing ESXi server, navigate to the path as shown in the following screenshot after the local windows system comes online.



In this scenario, 0800-depot is selected as the host OS of the testing server ESXi 8.0U1:



14. Navigate to the selected depot folder and verify the list of HDLMs found in the /vib20 folder within the depot folder that will be installed on the server.



15. To review the list of HDLMs in the /vib20 directory for installation, copy the depot.zip file to the datastore of the testing server and extract the file.

Local Disk (C:) > Program Files (x86) > HITACHI > DynamicLinkManagerForVMware > plugin > hdlm-0887000101-0800-depot > vib20 >						
Name	Type	Compressed size	Password p...	Size	Ratio	
hex-hdlm-dlnkmgr	File folder					
psp-hdlm-exlbnk	File folder					
psp-hdlm-exlio	File folder					
psp-hdlm-exrr	File folder					
satp-hdlm	File folder					

```
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20] ls
hex-hdlm-dlnkmgr  psp-hdlm-exlbnk  psp-hdlm-exlio  psp-hdlm-exrr  satp-hdlm
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20]
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20]
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20]
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20]
```

## Installing HDLM Drivers on an ESXi Host using the ESXCLI Command

To install HDLM drivers on an ESXi Host using the ESXCLI command, complete the following steps:

1. Before installing HDLM, verify the path policies of the server by running the following command:

```
esxcli storage nmp device list
```

```
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20] esxcli storage nmp device list
naa.60060e8008773500005077350000b1a
Device Display Name: HITACHI Fibre Channel Disk (naa.60060e8008773500005077350000b1a)
Storage Array Type: VMW_SATP_DEFAULT_AA
Storage Array Type Device Config: (action_OnRetryErrors=off)
Path Selection Policy: VMW_PSP_RR
Path Selection Policy Device Config: (policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=0; NumOfPending=0,numBytesPending=0)
Working Paths: vmhba2:c0:t0:l0
Is USB: false
naa.60060e8008773500005077350000b1b
Device Display Name: HITACHI Fibre Channel Disk (naa.60060e8008773500005077350000b1b)
Storage Array Type: VMW_SATP_DEFAULT_AA
Storage Array Type Device Config: (action_OnRetryErrors=off)
Path Selection Policy: VMW_PSP_RR
Path Selection Policy Device Config: (policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=0; NumOfPending=0,numBytesPending=0)
Working Paths: vmhba2:c0:t0:l1
Is USB: false
naa.60060e8008773500005077350000b1c
Device Display Name: HITACHI Fibre Channel Disk (naa.60060e8008773500005077350000b1c)
Storage Array Type: VMW_SATP_DEFAULT_AA
Storage Array Type Device Config: (action_OnRetryErrors=off)
Path Selection Policy: VMW_PSP_RR
Path Selection Policy Device Config: (policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=0; NumOfPending=0,numBytesPending=0)
Working Paths: vmhba2:c0:t0:l2
Is USB: false
naa.60060e8008773500005077350000b1d
Device Display Name: HITACHI Fibre Channel Disk (naa.60060e8008773500005077350000b1d)
Storage Array Type: VMW_SATP_DEFAULT_AA
Storage Array Type Device Config: (action_OnRetryErrors=off)
Path Selection Policy: VMW_PSP_RR
Path Selection Policy Device Config: (policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=0; NumOfPending=0,numBytesPending=0)
Working Paths: vmhba2:c0:t0:l3
Is USB: false
naa.60060e8008773500005077350000b1e
Device Display Name: HITACHI Fibre Channel Disk (naa.60060e8008773500005077350000b1e)
Storage Array Type: VMW_SATP_DEFAULT_AA
Storage Array Type Device Config: (action_OnRetryErrors=off)
Path Selection Policy: VMW_PSP_RR
Path Selection Policy Device Config: (policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=0; NumOfPending=0,numBytesPending=0)
Working Paths: vmhba2:c0:t0:l4
Is USB: false
```

2. Navigate to the hex-hdlm-dlnkmgr directory and locate the .vib file.

```
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20] ls
hex-hdlm-dlnkmgr  psp-hdlm-exlbnk  psp-hdlm-exlio  psp-hdlm-exrr  satp-hdlm
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20]
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20] cd hex-hdlm-dlnkmgr
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/hex-hdlm-dlnkmgr] ls
HTI_bootbank_hex-hdlm-dlnkmgr_08.8.7-00.0800.vib
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/hex-hdlm-dlnkmgr]
```

3. Install the .vib file in the hex-hdlm-dlnkmgr directory.

```
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/hex-hdlm-dlnkmgr] esxcli software vib install -v /vmfs/volumes/Boot_57_143_PrimaryHost/Vib20/hex-hdlm-dlnkmgr/HTI_bootbank_hex-hdlm-dlnkmgr_08.8.7-00.0800.vib
Installation Result:
  Message: Operation finished successfully.
  VIBs Installed: HTI_bootbank_hex-hdlm-dlnkmgr_08.8.7-00.0800
  VIBs Removed:
  VIBs Skipped:
  Reboot Required: false
  DFG Results:
```



4. Navigate to the psp-hdlm-exlbn directory and locate the .vib file.

```
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20] cd psp-hdlm-exlbn/
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exlbn] ls
HTI_bootbank_psp-hdlm-exlbn_08.8.0-00.0700.vib
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exlbn]
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exlbn]
```

5. Install the .vib file in the psp-hdlm-exlbn directory.

```
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exlbn] esxcli software vib install -v /vmfs/volumes/Boot_57_143_PrimaryHost/vib20/psp-hdlm-exlbn/HTI_bootbank_psp-hdlm-exlbn_08.8.0-00.0700.vib
Installation Result
  Message: Operation finished successfully.
  VIBs Installed: HTI_bootbank_psp-hdlm-exlbn_08.8.0-00.0700
  VIBs Removed:
  VIBs Skipped:
  Reboot Required: false
  CPU Results:
```

6. Navigate to the psp-hdlm-exlio directory and locate the .vib file.

```
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20] cd psp-hdlm-exlio/
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exlio]
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exlio]
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exlio]
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exlio] ls
HTI_bootbank_psp-hdlm-exlio_08.8.0-00.0700.vib
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exlio]
```

7. Install the .vib file in the psp-hdlm-exlio directory.

```
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exlio] esxcli software vib install -v /vmfs/volumes/Boot_57_143_PrimaryHost/vib20/psp-hdlm-exlio/HTI_bootbank_psp-hdlm-exlio_08.8.0-00.0700.vib
Installation Result
  Message: Operation finished successfully.
  VIBs Installed: HTI_bootbank_psp-hdlm-exlio_08.8.0-00.0700
  VIBs Removed:
  VIBs Skipped:
  Reboot Required: false
  CPU Results:
```

8. Navigate to the psp-hdlm-exrr directory and locate the .vib file.

```
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20]
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20] cd psp-hdlm-exrr/
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exrr] ls
HTI_bootbank_psp-hdlm-exrr_08.8.0-00.0700.vib
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exrr]
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exrr]
```

9. Install the .vib file in the psp-hdlm-exrr directory.

```
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/psp-hdlm-exrr] esxcli software vib install -v /vmfs/volumes/Boot_57_143_PrimaryHost/vib20/psp-hdlm-exrr/HTI_bootbank_psp-hdlm-exrr_08.8.0-00.0700.vib
Installation Result
  Message: Operation finished successfully.
  VIBs Installed: HTI_bootbank_psp-hdlm-exrr_08.8.0-00.0700
  VIBs Removed:
  VIBs Skipped:
  Reboot Required: false
  CPU Results:
```

10. Navigate to the satp-hdlm directory and locate the .vib file.

```
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20] cd satp-hdlm/
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/satp-hdlm]
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/satp-hdlm]
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/satp-hdlm] ls
HTI_bootbank_satp-hdlm_08.8.7-01.0700.vib
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/satp-hdlm]
```

11. Install the .vib file in the satp-hdlm directory.

```
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/satp-hdlm] esxcli software vib install -v /vmfs/volumes/Root_57_143_PrimaryHost/vib20/satp-hdlm/HTI_bootbank_satp-hdlm_08.8.7-01.0700.vib
Installation Result
Message: Operation finished successfully.
VIBs Installed: HTI_bootbank_satp-hdlm_08.8.7-01.0700
VIBs Removed:
VIBs Skipped:
Reboot Required: false
VMW Result:
[root@DL380G10-143:/vmfs/volumes/66b35c65-955ae542-b526-0090fa8a65b2/vib20/satp-hdlm]
```

12. After installing, verify that all the required files are installed.

```
[root@DL380G10-143:~] esxcli software vib list
```

Name	Version	Vendor	Acceptance Level	Install Date	Platforms
hex-hdlm-dlnmgr	08.8.7-00.0800	HTI	PartnerSupported	2024-09-27	host
psp-hdlm-exlhb	08.8.0-00.0700	HTI	VMwareAccepted	2024-09-27	host
psp-hdlm-exlio	08.8.0-00.0700	HTI	VMwareAccepted	2024-09-27	host
psp-hdlm-exrr	08.8.0-00.0700	HTI	VMwareAccepted	2024-09-27	host
satp-hdlm	08.8.7-01.0700	HTI	VMwareAccepted	2024-09-27	host

## Verifying HDLM Configurations through CLI and vCenter GUI

1. To incorporate multipathing changes, restart the ESXi host and verify the multipathing status. Ensure that the path policy is successfully updated, and that the PSP is changed from **VMW\_PSP\_RR** to **HTI\_PSP\_HDLM\_EXLIO**.

```
[root@DL380G10-143:~] esxcli storage nmp device list
```

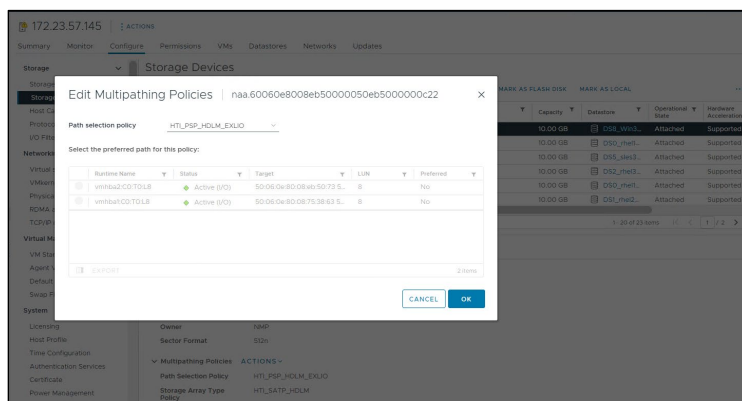
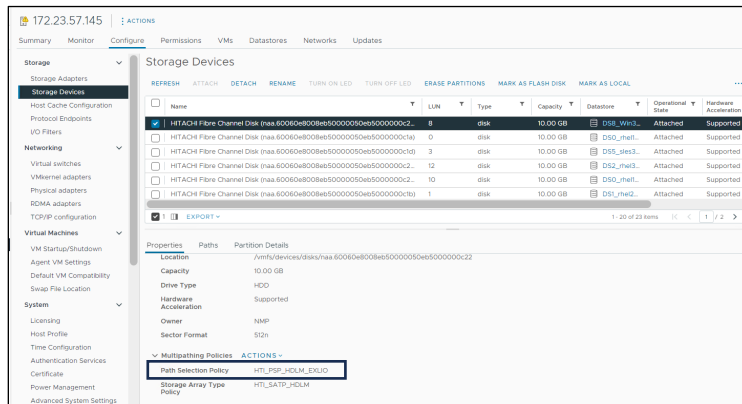
```
naa.60060e8008d902000050d90200000214
  Device Display Name: HITACHI Fibre Channel Disk (naa.60060e8008d902000050d90200000214)
  Storage Array Type: HTI SATP HDLM
  Storage Array Type Device Config: {device config options }
  Path Selection Policy: HTI_PSP_HDLM_EXLIO
  Path Selection Policy Device Config:
  Path Selection Policy Device Custom Config:
  Working Paths: vmhba4:C0:T0:L0
  Is USB: false

naa.60060e8008d902000050d902000000e8
  Device Display Name: HITACHI Fibre Channel Disk (naa.60060e8008d902000050d902000000e8)
  Storage Array Type: HTI SATP HDLM
  Storage Array Type Device Config: {device config options }
  Path Selection Policy: HTI_PSP_HDLM_EXLIO
  Path Selection Policy Device Config:
  Path Selection Policy Device Custom Config:
  Working Paths: vmhba3:C0:T0:L0, vmhba4:C0:T0:L2
  Is USB: false

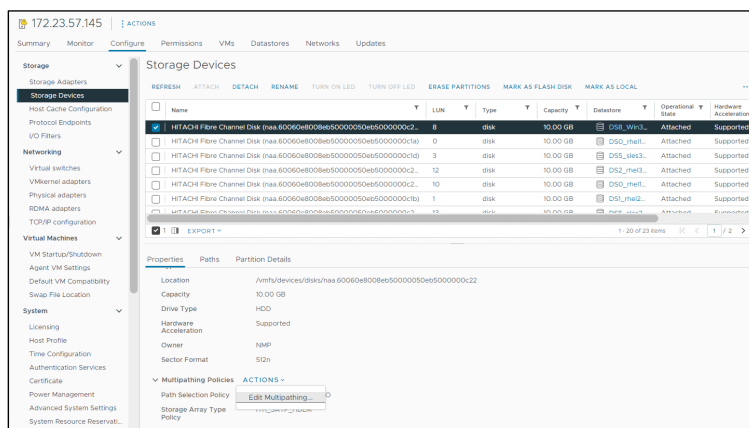
naa.60060e8008d902000050d90200000119
  Device Display Name: HITACHI Fibre Channel Disk (naa.60060e8008d902000050d90200000119)
  Storage Array Type: HTI SATP HDLM
  Storage Array Type Device Config: {device config options }
  Path Selection Policy: HTI_PSP_HDLM_EXLIO
  Path Selection Policy Device Config:
  Path Selection Policy Device Custom Config:
  Working Paths: vmhba3:C0:T0:L253, vmhba4:C0:T0:L253
  Is USB: false

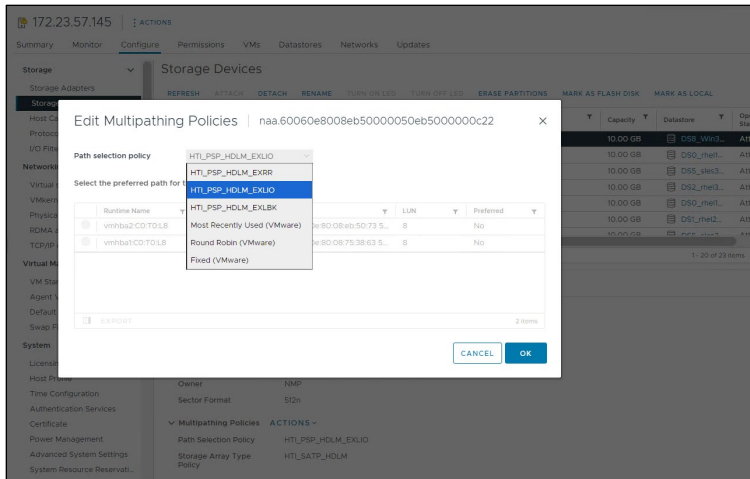
naa.60060e8008d902000050d90200000310
  Device Display Name: HITACHI Fibre Channel Disk (naa.60060e8008d902000050d90200000310)
  Storage Array Type: HTI SATP HDLM
  Storage Array Type Device Config: {device config options }
  Path Selection Policy: HTI_PSP_HDLM_EXLIO
  Path Selection Policy Device Config:
  Path Selection Policy Device Custom Config:
  Working Paths: vmhba3:C0:T0:L1, vmhba4:C0:T0:L3
  Is USB: false
```

2. Additionally, you can verify the PSP from the vCenter.



3. To change the PSP from the selected policy, under Multipathing Policies, select **ACTIONS > Edit Multipathing...** and then select the PSP.





## Summary

Configuring HDLM on VMware ESXi optimizes path management and load balancing between the host and storage systems. This document provides the process verifying compatibility, installing the HDLM VIB file using ESXCLI, and optionally changing the PSP from vCenter. After installation, HDLM ensures automatic load balancing, failover, and improved storage connectivity performance.

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