## Lenovo

# How to Deploy Azure Stack HCI clusters via Microsoft Windows Admin Center

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Provides instructions to deploy ThinkAgile MX solutions via WAC wizard Applies to Azure Stack HCI and Windows Server operating systems

Includes post-deployment configuration guidance

Includes comprehensive list of Lenovo and Microsoft reference links

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## 1 Abstract

This document provides step-by-step instructions for deploying an Azure Stack HCl cluster on Lenovo ThinkAgile MX Certified Nodes and Appliances using the Microsoft Windows Admin Center (WAC) deployment wizard. It guides the reader through the wizard, explaining each step and providing real world examples from our labs. After completing the wizard, additional configuration steps are presented to ensure readiness of this HCl solution for production use.

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## 2 Introduction

Deploying hyperconverged infrastructure has become the de-facto standard for organizations looking to modernize their aging infrastructure. Large storage deployments are increasingly being replaced by HCI-based solutions for most general-purpose workloads. HCI has proven to deliver better efficiency and price performance in the datacenter. Additionally, customers have been choosing a hybrid approach, migrating certain workloads to the cloud, while keeping other workloads on-premises.

Azure Stack HCI operating system is Microsoft's HCI solution for customers who wish to run workloads onpremises and extend easily to Microsoft Azure for hybrid capabilities such as back-up, site recovery, storage, cloud-based monitoring and more. Whether you prefer to deploy the Azure Stack HCI operating system or Windows Server, Lenovo® ThinkAgile<sup>™</sup> MX solutions provide hardware that is certified for use in both scenarios.

The benefits of Lenovo HCI solutions include:

- Highly available and scale-on-demand compute/storage integrated solutions
- Easy to provision new IT services and reduce deployment time
- Better performance and lower Total Cost of Ownership (TCO)
- Flexible infrastructure and data centers

Lenovo has worked closely with Microsoft for many years to ensure our products perform smoothly and reliably with Microsoft operating systems and software. We have created Lenovo ThinkAgile MX Certified Node and Appliance solutions that contain only servers and server components that have been certified under the Microsoft Azure Stack HCI Program to run Microsoft Storage Spaces Direct (S2D) properly. These solutions provide a solid foundation for customers looking to consolidate both storage and compute capabilities on a single hardware platform. They provide outstanding performance, high availability protection and effortless scale-out growth potential to accommodate evolving business needs. ThinkAgile MX Series platforms offer the choice of Azure Stack HCI Appliances (called "Integrated Systems" by Microsoft) or Azure Stack HCI Certified Nodes (called "Validated Nodes" by Microsoft). These validated platforms help modernize on-premises infrastructure with pre-tested, pre-configured, and easy-to-order configurations, with seamless Azure integration.

This document provides step-by-step instructions for deploying an Azure Stack HCI cluster on Lenovo ThinkAgile MX Certified Nodes and Appliances using the WAC deployment wizard. It guides the reader through the wizard, explaining each step and providing real world examples. After completing the deployment wizard, additional configuration steps are presented to ensure readiness of this HCI solution for production use.

Other Azure Stack HCI deployment methods are available. Our Lenovo Press companion document, *Microsoft Storage Spaces Direct (S2D) Deployment Guide*, covers several deployment scenarios, as well as background discussions of the Microsoft Azure Stack HCI Certification Program. This document focuses on using PowerShell commands and scripting for deployment, rather than the WAC deployment wizard. You can find this document at the following URL:

https://lenovopress.com/lp0064

## 2.1 Architectural overview

Azure Stack HCI provides a hyperconverged infrastructure in which there is no separation between the resource pools for compute and storage. Instead, each server node provides hardware resources to support the running of VMs under Hyper-V, as well as the allocation of its internal storage to contribute to the cluster storage pool.

Figure demonstrates this all-in-one configuration for a four-node hyperconverged solution. When it comes to growth, each additional node added to the environment will mean both compute and storage resources are increased together. Perhaps workload metrics dictate that a specific resource increase is sufficient to cure a bottleneck (e.g., CPU resources). Nevertheless, any scaling will mean the addition of both compute and storage resources.



Figure 1. Azure Stack HCI block diagram

Azure Stack HCI functionality relies on Remote Direct Memory Access (RDMA) networking for storage (East-West) traffic inside the cluster. The two main implementations of RDMA that can be used for Azure Stack HCI are RDMA over Converged Ethernet version 2 (RoCEv2) and iWARP. Which implementation is chosen is primarily a personal preference. The key difference, in terms of the Azure Stack HCI deployment process, is that a RoCE implementation requires configuration of the network switches (if used) to enable Data Center Bridging (DCB), while iWARP does not require any special network switch configuration.

In Lenovo ThinkAgile MX solutions, Mellanox network adapters have been certified to carry RoCE storage traffic, while Marvell (Cavium/QLogic) network adapters have been certified to carry iWARP storage traffic. Although other network adapters can be used for North-South traffic into and out of the cluster (Microsoft refers to this as "management" traffic), only Mellanox or Marvell network adapters should be used for East-West storage traffic.

## **3 Solution deployment**

Multiple methods can be used to deploy an Azure Stack HCI failover cluster, including GUI-based approaches, PowerShell methods, and via the WAC deployment wizard. If running the Azure Stack HCI operating system (or the Core version of Windows Server), GUI-based deployment is not possible since there is no GUI with which to work.

Although using PowerShell to deploy an HCI cluster is the most flexible method, Microsoft has built a cluster deployment wizard into WAC that simplifies the entire process. This document focuses on using the WAC deployment wizard to build and configure an HCI cluster. It also addresses several post-deployment steps that might be required for particular environments or to adhere to general best practices.

### 3.1 Deployment considerations

Before deployment of an Azure Stack HCI failover cluster can be initiated, the servers that will become cluster nodes must be prepared. In addition, if RoCEv2 is preferred for storage traffic, any network switches that will be used to carry this traffic must also be prepared. Switch configuration is outside the scope of this document. If you will be using existing Lenovo RackSwitch network switches to carry storage traffic, please refer to our companion document, *Microsoft Storage Spaces Direct (S2D) Deployment Guide* for details related to configuring Lenovo switches to carry storage traffic via RoCEv2.

There are several deployment scenarios available which are based on the implementation of RDMA being used (previously discussed), the total number of nodes to be added to the HCI cluster, and whether network switches will be used to carry East-West storage traffic. HCI cluster deployment via the WAC deployment wizard is very similar for all scenarios after initial system configuration is complete. The examples shown in this document are based on a 4-node HCI cluster deployment that uses a dual-port 25GbE Mellanox network adapter for RoCEv2 East-West (storage) traffic and two 10GbE LAN On Motherboard (LOM) ports configured in a team to carry North-South traffic into and out of the cluster (referred to as "management" traffic by WAC).

Although the WAC deployment wizard covers multiple HCI deployment scenarios, it does not handle certain situations, such as using one dual-port network adapter on each node to carry all traffic (that is, both East-West traffic and North-South traffic). If the WAC deployment wizard does not seem to support the desired deployment scenario, refer to our companion document *Microsoft Storage Spaces Direct (S2D) Deployment Guide*, at the following URL:

#### https://lenovopress.com/lp0064

The examples found in this document are based on creating a 4-node Azure Stack HCI cluster using Lenovo ThinkAgile MX3520-H Appliance nodes that are configured with a dual-port 25GbE Mellanox ConnectX-4 network adapter and two 10GbE LOM ports. Use of these four network interfaces present in our lab systems is shown in Figure 2 below.



Figure 2. Network interfaces used in examples

As you can see from the above diagram, two SET teams will be created during HCI cluster deployment. The team on the left is built from two RDMA-capable network interfaces (using a dual-port 25GbE Mellanox NIC in our case) and is used for East-West storage traffic. The team on the right is built from two LOM ports and is used for North-South management and compute traffic.

### 3.2 General hardware preparation

Lenovo ThinkAgile MX solutions are built on top of multiple ThinkSystem rack servers, including the SR650, SR630 V2, and SR650 V2 rack servers. In addition, our ThinkAgile MX1020 Appliances and MX1021 Certified Nodes are based on the ThinkSystem SE350 edge server. For SE350-based solutions, we do not recommend using the WAC deployment wizard to build an HCI cluster due to the unusual network adapters (for example, the Wireless Network Module) that might not be recognized properly by the wizard. For detailed instructions on deploying HCI clusters based on the SE350 edge server, refer to our *ThinkAgile MX1021 on SE350 Azure Stack HCI (S2D) Deployment Guide* which can be found at the following URL:

#### https://lenovopress.com/lp1298

Before launching the WAC deployment wizard, all systems must be configured identically, including system settings, storage devices, and physical network adapters. We need to change a couple of system settings to optimize system performance and also to ensure that unneeded network interfaces do not cause any issues with cluster validation and creation later.

### 3.2.1 Operating Mode

The system Operating Mode should be changed to Maximum Performance to optimize system performance for its intended role as an Azure Stack HCI cluster node. To modify this system setting, follow these steps:

- 1. Reboot the server if necessary and enter the UEFI menu screen by pressing the F1 key when prompted at the bottom of the screen.
  - a. If using the graphical system setup, navigate to UEFI Setup > System Settings and then select Operating Modes. Ensure that Choose Operating Mode is set to Maximum

Performance. Once this setting change has been made, click the Save icon on the right, and then click Back to return to the System Settings screen. Proceed with Step 2 below.

Clarity Provisioning Manager	ThinkAgile MX Certified Node -[7Z200	CTO1WW]-	ŝ	0	Ð
{ Exit UEFI Setup	Choose Operating Mode	Maximum Performance	•	d.	← Back
System Information	Memory Speed	Max Performance		11	
System Settings	Memory Power Management	Disabled	 • •	L	Save
Date and Time	CPU P-state Control	None	 ▼		
Start Options	C1 Enhanced Mode	Disable	~		Discard

b. If using the text-based system setup, navigate to System Settings > Operating Modes.
 Ensure that Choose Operating Mode is set to Maximum Performance. If it is not, press Enter and use the arrow keys to select "Maximum Performance" before pressing Enter again. Once the setting change has been made, press the Esc key to return to the System Settings screen, and then proceed with Step 2 below.

	Operating Modes	
Choose Operating Mode Memory Speed Memory Power Management CPU P-state Control C1 Enhanced Mode UPI Link Frequency UPI Link Disable C-States Power/Performance Bias Platform Controlled Type Page Policy MONITOR/MWAIT UPI Power Management	[Maximum Performance] [Disabled] [None] [Disable] [Max Performance] [Enable All Links] [Disable] [Platform Controlled] [Maximum Performance] [Adaptive] [Disable]	Select the operating mode based on your preference. Power savings and performance are also highly dependent on hardware and software running on the system.
	<pre><fnter>=Select Entru</fnter></pre>	<esc>=Backwards</esc>

 Once the Operating Mode has been set to Maximum Performance, continue with the next steps to disable unneeded network adapter ports in UEFI if necessary. If all installed network adapter ports will be used by Azure Stack HCI, exit System Setup, saving any changes made and reboot the system. Then proceed with the *Network preparation* section.

#### 3.2.2 Disable unneeded network ports in UEFI

Lenovo ThinkSystem rack servers can be configured with network ports that are not associated with a conventional PCIe network adapter. For ThinkSystem SR630 and SR650 rack servers, these network ports are referred to as LAN on Motherboard (LOM) ports, which are backed by various Intel network adapters. None of these network adapters have been certified to carry storage (East-West) traffic, but all of them can be used for management (North-South) traffic.

However, ThinkSystem SR630 V2 and SR650 V2 rack servers can be configured with OCP network adapters, which are physically located in the same place as previous LOM ports. OCP network adapters for these servers include the Intel network adapters mentioned above, as well as OCP versions of both Mellanox and Marvell (Cavium/QLogic) network adapters.

The point to be made here is that any network ports that will not be used in the HCI cluster should not be visible to the operating system (or WAC) in order to avoid misconfiguration of the network adapters. For example, if a 4-port LOM/OCP network adapter is present in the system, but only 2 ports will be used by the HCI cluster, the other 2 ports should be disabled in system UEFI so they are not visible to WAC.

To disable unneeded LOM/OCP ports in system UEFI, follow these steps:

- 1. From the System Setup screen, follow the instructions below based on whether you are using the graphical or text-based system setup.
  - a. If using the graphical system setup, in the main System Settings pane, navigate to Devices and I/O Ports > Enable/Disable Onboard Device(s) and scroll to the bottom of the device list.
  - b. Disable either Onboard LAN to disable all ports, or disable each unneeded port individually, as necessary. The example below shows the configuration settings for using two ports from a 4-port LOM adapter. Once this setting change has been made, click the Save icon on the right, and then click Exit UEFI Setup to reboot the system.

XClarity Provisioning Manager	ThinkAgile MX Certified Node -[7Z20CT	'01WW]-	⊕ \$	0 ⊡
( Exit UEFI Setup	Slot 6	Enable	•	<b>←</b>
System Information	Slot 7	Enable		DALK
System Settings	Slot 8	Enable		Save
Date and Time	Onboard LAN	Enable	<b>v</b>	Save
Start Options	NVMe Bay 8	Enable	•	√_) Discard
Boot Manager	NVMe Bay 9	Enable	•	
BMC Settings	NVMe Bay 10	Enable	•	Default
System Event Logs	NVMe Bay 11	Enable	•	
User Security	Onboard LAN Port 1	Enable	•	
	Onboard LAN Port 2	Enable	•	
	Onboard LAN Port 3	Disable	•	
	Onboard LAN Port 4	Disable	•	

c. If using the text-based system setup, from the System Settings page, navigate to Devices and I/O Ports > Enable/Disable Onboard Device(s). Ensure that unneeded LOM/OCP ports are disabled. The example below shows the configuration settings for using two ports from a 4-port LOM adapter. Once this setting change has been made, press the Esc key repeatedly until prompted to save the new settings. Press the 'Y' key to save the settings and reboot the system.

	Enable ∕ Disable Onboard	Device(s)
Onboard Video Onboard SATA Slot 1 Slot 2 Slot 2 Slot 3 Slot 4 Slot 5 Slot 6 Slot 7 Slot 8 Onboard LAN NVME Bay 8 NVME Bay 10 NVME Bay 11 Onboard LAN Port 1 Onboard LAN Port 3 Onboard LAN Port 4	<pre>[Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Enable] [Disable]</pre>	Disabling this entry will disable all Onboard LAN Ports and greyout all Onboard LAN Ports.
†↓=Move Highlight	<enter>=Select Entry</enter>	<esc>=Backwards</esc>

2. Once all system setting changes have been made, exit System Setup, saving changes when prompted. The system will reboot.

**Note**: Our instructions and example screen captures above are based on SR650 LOM ports, but disabling OCP ports in the SR650 V2 server is similar. For a V2 server, go to System Settings > Network > *First Port of OCP Adapter* > Port Enablement. If you do not see the Port Enablement option, you likely are not looking at the *first* port. Once in the Port Enablement option, press Enter and find an appropriate option, such as "Disable ports 3 & 4". The example screenshot below shows how to disable Ports 3 and 4 in a 4-port OCP network adapter.



Once unneeded LOM/OCP ports have been disabled, proceed to the next section.

#### 3.2.3 Firmware and driver updates

All ThinkAgile MX solutions make use of "Best Recipes" that define a set of firmware and device driver versions that have been tested as a unit and validated for use by Azure Stack HCI. For the latest set of ThinkAgile MX Best Recipes, refer to the following URL:

#### https://support.lenovo.com/us/en/solutions/HT507406

Firmware and device drivers must be identical between HCI cluster nodes. To make the process of updating firmware and drivers easy, the Lenovo XClarity Integrator (LXCI) for WAC can be used by the WAC deployment wizard to make appropriate updates during the deployment process. LXCI for WAC is a plug-in that integrates functions for managing, monitoring, and updating Lenovo ThinkAgile MX servers and their

components directly from the WAC user interface. For more information regarding LXCI for WAC, refer to the following URL:

#### https://support.lenovo.com/us/en/solutions/ht507549

For more information on installing LXCI for WAC, see section "Lenovo XClarity Integrator (LXCI) for Windows Admin Center." If you do not install LXCI for WAC prior to HCI cluster deployment, you will need to ensure that all firmware and device drivers on all nodes are identical before launching the WAC deployment process.

### 3.3 Network preparation

Network switch configuration is outside the scope of this document. If you will be using existing Lenovo RackSwitch network switches to carry storage traffic, please refer to our companion document, <u>Microsoft</u>. <u>Storage Spaces Direct (S2D) Deployment Guide</u> for details related to configuring Lenovo switches to carry storage traffic via RoCEv2.

**Note**: Although Lenovo network switches are no longer being offered, our companion deployment guide includes Lenovo switch configuration details to aid customers who already own these network switches.

It might be desirable to create a small HCI cluster (2-3 nodes) without using high-speed network switches to carry storage traffic. That is, each node is directly connected to every other node in the cluster to carry storage traffic. In this deployment scenario, network switches are needed only to carry North-South (management) traffic into and out of the cluster. Since network switches are not touched by WAC, its deployment wizard supports both direct-connected clusters and clusters that use network switches to carry storage traffic.

In all deployment scenarios, network adapters need to be at least partially configured before WAC is able to connect to the systems that will become nodes in the Azure Stack HCI cluster. This applies to the network adapter port(s) that will be used for management (North-South) traffic. Ports that will be used exclusively to carry storage (East-West) traffic do not need to be configured in advance.

#### 3.3.1 Marvell network port configuration

Lenovo has certified QLogic/Cavium/Marvell QL41262 and QL41232 network adapters for use in ThinkAgile MX solutions to carry iWARP RDMA storage traffic. Although these network adapters support both iWARP and RoCEv2 implementations of RDMA, they are shipped with the RoCEv2 mode active by default. Since these network adapters have NOT been certified for RoCEv2 use, they must be configured to enable iWARP RDMA mode.

Making this change is a two-part process. First, a UEFI setting must be changed in System Setup and then PowerShell is leveraged to make the required advanced network adapter property change. These changes must be made on all systems that will become HCI cluster nodes. To configure the NIC for iWARP in server UEFI, follow these steps:

- 1. Reboot the server if necessary and enter the UEFI menu screen by pressing the F1 key when prompted at the bottom of the screen.
  - a. If using the graphical system setup, navigate to UEFI Setup > System Settings > Network .
     Click on the item in the Network Device List that represents Port 1 on the QLogic QL41262

25Gb Ethernet adapter, and then click on Port Level Configuration. Change RDMA Operational Mode at the bottom of the center pane to iWARP.

- b. Click Back twice to return to the Global Network Settings page and then click on the item in the Network Device List that represents Port 2 on the same network adapter. Repeat the setting change for this port. Repeat this step for both ports on the second QLogic QL41262 25Gb Ethernet adapter if it exists.
- c. Once all ports on all Cavium/QLogic network adapters are configured for iWARP, click the Save icon on the right side of the page, and then click Exit UEFI Setup. Click to confirm and reboot the system. Proceed to Step 1 in the second part of this process below.

U 10.241.83.204 / USERID			L Active	e Users(1)
🖒 Power 📀 Media 🧿 Recording 🖼	Keyboard 🕒 Mouse 🎛 Screen Mode			
XClarity Provisioning Manager	ThinkSystem SR650 - [7Z20CTO1WW] -		⊕ \$	0 E
🌔 Exit UEFI Setup	Link Speed	SmartAN		<del>~</del>
System Information	FEC Mode	None		Back
System Settings	Boot Mode	PYE		B
Date and Time	DCBX Protocol	Disabled	• •	Save
Start Options	RoCE Priority	0		<b>N</b> iccord
Boot Manager	PXE VLAN Mode	Disabled	<b>T</b>	Discard
BMC Settings	RDMA Operational Mode	iWARP	<b>•</b>	0
System Event Logs				Default
User Security				

- a. If using the text-based system setup, navigate to System Settings > Network and then select the item from the Network Device List that represents Port 1 on the QLogic QL41262 25Gb Ethernet adapter. Select Port Level Configuration and change RDMA Operational Mode to iWARP.
- b. Press the ESC key twice to return to the Global Network Settings page and then select the item from the Network Device List that represents Port 2 on the same network adapter. Repeat the setting change for this port. Repeat this step for both ports on the second QLogic QL41262 25Gb Ethernet adapter if it exists.
- c. Once all ports on all Cavium/QLogic network adapters are configured for iWARP, press the Esc key repeatedly to exit system settings, saving the changes that were made. The system will reboot. Proceed to Step 1 in the second part of this process below.



Once the RDMA Operational Mode has been set to iWARP in system UEFI and the system has rebooted, continue with the second part of this process to finish configuring the Cavium/QLogic NIC ports for iWARP in the operating system using PowerShell.

- 1. Log in to the Azure Stack HCI operating system on the server that will become the first HCI cluster node. This will launch SConfig, which is the main user interface for the OS.
- 2. Type 15 and press Enter to exit SConfig and open a PowerShell prompt.
- 3. Run the PowerShell commands shown in the example below to enable iWARP RDMA mode for each port on each network adapter. Make sure to change the network interface name shown in each command to the correct value for your system.

```
Set-NetAdapterAdvancedProperty -Name "Slot1 Port1" -DisplayName "NetworkDirect Technology"
-DisplayValue "iWarp"
Set-NetAdapterAdvancedProperty -Name "Slot1 Port2" -DisplayName "NetworkDirect Technology"
-DisplayValue "iWarp"
```

Once complete, repeat the steps in this entire section (both parts) for each of the systems that will become HCI cluster nodes.

#### 3.3.2 Management network port configuration

After disabling any LOM/OCP ports in UEFI that will not be used (see *Disable unneeded network ports in UEFI* above for more information), the remaining enabled ports need to have appropriate IP configurations applied. In our example deployment, we use two LOM ports in an SR650 server to carry management traffic.

To configure these network interfaces, follow these steps:

- 1. Log in to the Azure Stack HCI operating system on the server that will become the first HCI cluster node. This will launch SConfig, which is the main user interface for the OS.
- 2. Type 8 and press Enter to see the Network settings screen.
- 3. Find the first network interface that needs to be configured in the Network settings screen, type the Index # for this network adapter and then press Enter.



4. Type 1 and press Enter to change the IP address for the network interface.

	Network Adapter Settings
NIC index: 4	
Description: Inte	el(R) Ethernet Connection X722 for 10GbE SFP+
IP address: 169	.254.61.27,
fe8	0::ec74:238c:8eb3:3d1b
Subnet mask: 255	.255.0.0
DHCP enabled: Iru	
Default gateway: Preferred DNS serv Alternate DNS serv	fe80::a68c:dbff:febc:8801 fe80::a68c:dbff:febc:7f01 ver: ver:
<ol> <li>Set network a</li> <li>Set DNS server</li> <li>Clear DNS server</li> </ol>	adapter address ers rver settings
Enter selection (	Blank=Cancel): 1

5. Select the appropriate entries and type the desired IP settings, including IP address, subnet mask, and default gateway (for static IP configuration). After entering the default gateway, press Enter again to begin IP configuration. Status is displayed as the configuration is applied. Once complete, press Enter to continue.

```
_____
                         Network Adapter Settings
NIC index:
            4
Description: Intel(R) Ethernet Connection X722 for 10GbE SFP+
IP address: 169.254.61.27,
            fe80::ec74:238c:8eb3:3d1b
Subnet mask: 255.255.0.0
DHCP enabled: True
Default gateway:
                    fe80::a68c:dbff:febc:8801 fe80::a68c:dbff:febc:7f01
Preferred DNS server:
Alternate DNS server:

    Set network adapter address

 2) Set DNS servers
 3) Clear DNS server settings
Enter selection (Blank=Cancel): 1
Select (D)HCP or (S)tatic IP address (Blank=Cancel): S
Enter static IP address (Blank=Cancel): 10.10.11.11
Enter subnet mask (Blank=255.255.255.0): 255.255.255.0
Enter default gateway (Blank=Cancel): 10.10.11.1
Setting NIC to static IP...
Successfully released DHCP lease.
Successfully enabled static addressing. DHCP for this network adapter is disabled.
Successfully set gateway.
Successfuly set network adapter address.
(Press ENTER to continue):
```

6. Back in SConfig, use a similar sequence to set DNS server(s) for this network interface.

```
_____
                      Network Adapter Settings
NIC index:
           4
Description: Intel(R) Ethernet Connection X722 for 10GbE SFP+
IP address: 10.10.11.11,
           fe80::ec74:238c:8eb3:3d1b
Subnet mask: 255.255.255.0
DHCP enabled: False
Default gateway: 10.10.11.1 fe80::a68c:dbff:febc:8801 fe80::a68c:dbff:febc:7f01
Preferred DNS server:
Alternate DNS server:
 1) Set network adapter address
 2) Set DNS servers
 3) Clear DNS server settings
Enter selection (Blank=Cancel): 2
Enter new preferred DNS server (Blank=Cancel): 10.10.11.9
Enter alternate DNS server (Blank=None):
Successfully assigned DNS server(s).
(Press ENTER to continue):
```

- 7. Once back in SConfig on the server that will become the first node in the HCI cluster, use Steps 1-6 above to configure the first management network interface on each of the other nodes.
- Once the first management network interface has been configured on all systems that will become HCI cluster nodes, repeat Steps 1-7 above to configure the second management network interface on all nodes if desired. Our example deployment uses two LOM ports to carry management traffic.

With initial system configuration complete, we now turn our attention to WAC and its HCI failover cluster deployment wizard.

### 3.4 Windows Admin Center (WAC)

To get the most out of WAC and its HCI cluster deployment wizard, we highly recommend installing the Lenovo XClarity Integrator (LXCI) for WAC. With this WAC extension, firmware and device driver updates can be installed on all servers that will become nodes in the HCI cluster directly from the deployment wizard. Proceed to the next section to learn more about LXCI for WAC, including how to install it.

**Note**: The examples and screenshots contained in this document were generated using the following software versions: HCI operating system "20H2", WAC 1.3.2105, and LXCI v3.2.3.

#### 3.4.1 Lenovo XClarity Integrator (LXCI) for Windows Admin Center

LXCI for WAC is a plug-in that integrates functions for managing, monitoring, and updating the Lenovo servers and their components with Windows OS or software application management system. It supports viewing Lenovo server hardware and firmware inventory, events, alerts, and health status, performing cluster-aware rolling updates of firmware and device drivers for Windows failover cluster nodes, displaying Lenovo ThinkAgile MX server topology views, and facilitating storage pool operations through wizards. Lenovo

XClarity Administrator (LXCA), which is optional, streamlines the Lenovo server management job, especially for large-scale deployments.

LXCI for WAC is installed as an extension to WAC using either the WAC feed, or a local shared folder containing the installation package. For additional details on LXCI for WAC, including how to install the extension via a local shared folder, see the following URL:

https://sysmgt.lenovofiles.com/help/index.jsp?topic=%2Fcom.lenovo.lxci\_wac.doc%2Fwac\_welcome.html

To install LXCI for WAC using the WAC feed, follow these steps:

- 1. Log in to WAC.
- 2. Click the settings icon 🔯 in the top right corner. The Settings page is displayed.
- 3. On the Settings page, click Extensions in the left navigation pane. The Extensions pane is displayed.
- 4. In the Extensions pane, click the Feeds tab.
- 5. On the Feeds tab, click Add. The Add package source pane is displayed on the right.
- 6. In the Add package source pane, either select the feed "https://aka.ms/sme-extension-feed" if it is already listed or click Add and enter the feed URL and then click Add.
- 7. Return to the Extensions pane and click the Available extensions tab.
- 8. On the Available extensions tab, select Lenovo XClarity Integrator from the list. License information will be displayed.
- 9. Read the license information. If you accept the license information, click Install.
- 10. When the "Install this extension?" window is displayed, click Confirm to continue. Installation confirmation will be displayed once the extension is installed.

11. Click the Installed extensions tab and scroll down to locate Lenovo XClarity Integrator to confirm that LXCI for WAC is now available for use.

ndows Admin Center   Setting	is 🗸	Microsoft		≻ Q	©
Settings					
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👸 Language / Region	Admin Center.		,	, one doing the interaction of the	
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☐ Suggestions	Available extensions Inst	alled extensions Feeds			
Development	🗐 Uninstall 🕤 Updat	e	47 items	Search	
¢g Advanced	Name A	Version	Created by	Status	-
Performance Profile	Lenovo XClarity Integrator	3.2.3	Lenovo	Installed	
Gateway	Local users & groups	1.88.0	Microsoft	Installed	
& Access	Network Controller tools and SD	N 1.13.0	Microsoft	Installed	
	Networks	1.100.0	Microsoft	Installed	
21 Diagnostic & feedback	Packet monitoring	1.85.0	Microsoft	Installed	
	Performance Monitor	0.103.0	Microsoft	Installed	
Extensions	PowerShell	1.109.0	Microsoft	Installed	
Internet Access	PowerShell	1.109.0	Microsoft	Installed	
¢ <sub>₫</sub> Proxy					
Shared Connections	Details - Lenovo XC	larity Integrator			
2 Updates					
	Description				
	By installing this extension y	ou accept the terms detai	iled in below EULA link. The Lenov	o XClarity Integrator for	_
	Microsoft Windows Admin (	Center provides IT adminis	strators with the ability to integrate	e the management features of	
	Windows Admin Center ma	nagement capabilities by i	integrating Lenovo ThinkAglie Azure	agement functionality.	
	providing affordable, basic r	management, provisioning	g functions of physical and virtual (	environments and network	
	topology to reduce the time	and effort required for ro	outine system administration. Supp	ported Windows Admin Center	r
	version: 2103.2. For more in	formation about Lenovo X	Clarity Integrator offerings for Len	iovo XClarity Integrator and fo	r
	links to online documentation	Sh, see the Lenovo website	<i>c</i> .		

With the LXCI for WAC extension installed, we can proceed to the WAC cluster deployment wizard.

### 3.5 HCI cluster deployment

Once the above preparation has been completed, the process to deploy an Azure Stack HCI failover cluster is quite straight forward using the WAC deployment wizard. To deploy an HCI cluster via WAC, follow these steps:

- 1. Log in to WAC.
- 2. From the All connections view, click Add. The Add or create resources panel opens.

3. In the Server clusters box, click Create new.



4. On the Cluster Creation page, select the Azure Stack HCI option. Our examples use the default All server in one site option. Once options have been selected, click Create. The Deploy an Azure Stack HCI cluster wizard opens.



5. Review the Check the prerequisites panel to ensure that all prerequisites have been met and then click Next.

- 6. On the Add servers page, enter the credentials of an administrator account that will be used to connect to each of the servers that will become HCI cluster nodes.
- 7. Enter the IP address of the first server. Once the server is found, click Add. This will begin a short validation check and then add the server to the list.

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1.4 Install features	Username* 🛈	Administrator			
1.6 Install hardware updates 1.7 Restart servers	Password *	••••••			
	Enter the computer name, IPv4 add	dress, or fully qualified domain name of each server.			
	10.10.11.11	Add			
	C Refresh				
	Server name	Status Operating system Model			
	No records found				
<					
Back Next	eploy an Azure Stack HCI cluster Get started Check the prerequisites Add servers Add serve				

8. Repeat Step 7 for each of the remaining servers to be added to the cluster. Once all servers have been added to the list, click Next.

Indows Admin Center Cluster Creation >     Indows Admin Center Cluster Creation >     Indows Admin Center Cluster Stack HCL cluster     Indows Admin Center Indows Admin Azure Stack HCL cluster     Indows Admin Center Indows Admin Azure Stack HCL cluster     Indows Admin Center Indows Admin Azure Stack HCL cluster     Indows Admin Center Indows Admin Administrator     Indows Admin Center Indows Administrator account to use Indows Administrator     Inter the computer name, IPV4 address, or fully qualified domain name of each server.     Inter the computer name, IPV4 address, or fully qualified domain name of each server.     Inter the computer name, IPV4 address, or fully qualified domain name of each server.     Inter the computer name, IPV4 address, or fully qualified domain name of each server.     Inter the computer name, IPV4 address, or fully qualified domain name of each server.     Inter the computer name, IPV4 address, or fully qualified domain name of each server. </th <th>٢</th> <th>?</th>	٢	?							
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14. Install features   15. Install updates   16. Install hardware updates   17. Restart servers   Password *   Inter the computer name, IPv4 address, or fully qualified domain name of each server.   Server.example.domain.com   Image: Computer name   Image: C	1.3 Join a domain	when connecting to server	s.	Ø					
1.5 Install updates         1.6 Install hardware updates         1.7 Restart servers         Password*         Enter the computer name, IPv4 address, or fully qualified domain name of each server.         server.example.domain.com         Add         C Refresh         Server name       Status         10.10.11.11 (WIN-T0HOFRR1U)       Ready         Azure Stack HCI       Lenovo ThinkAgile MX Certified Node - [7220cm]         10.10.11.12 (WIN-H2DHOWLARSIVT)       Ready         10.10.11.13 (WIN-E7PABQLBXTK)       Ready         10.10.11.14 (WIN-B0HWUARSIVT)       Ready         2       When you're ready, select Next.	1.4 Install features	Username* ①		++					
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9. On the Join a domain page, enter the domain name and credentials for a domain account to use to join the servers to the domain specified. You can also change the computer name of each server if desired. Since we are working with servers that use the default random computer names generated

by Windows, we provide a new computer name for each server. Once all input is complete, click Apply changes. Progress will be shown as each server is added to the domain.

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1 Get started (2) Networking (	3 Clustering 4 Storage	5 SDN					
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1.2 Add servers       Enter the Active Directory domain to join:         1.3 Join a domain       Domain*         1.4 Install features       Domain*         1.5 Install updates       Enter the domain account to use:         1.6 Install hardware updates       Domain username*         1.7 Restart servers       Domain password*							
1.4 Install features	Domain	contoso.com					
1.5 Install updates	Enter the domain account to	o use:					
1.6 Install hardware updates	Domain username*						
1.7 Restart servers		contoso\HCIA	dmin				
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	Enter the new name for eac	h server after it joins the	domain:				
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	Name	Workgroup / existing d	New name	New domain	Status		
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	10.10.11.13		hci-node03	contoso.com	😌 Changes per	nding	
	10.10.11.14		hci-node04	contoso.com	😂 Changes per	nding	
6	<ul> <li>The domain user account</li> <li>The server names can be carried to the server names can be carried to the server names can be carried to the server names carried to the server name</li></ul>	nt will be added to the lo	ocal Administrators <u>o</u> g them to the new o	group on each server. Iomain.			
Back Next					E	xit	

10. Once all servers have been added to the domain, click Next.

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1.5 Install updates	Enter the domain a	ccount to use:					
1.6 Install hardware updates	Domain username* contoso\HCIAdmin						
1.7 Restart servers	contoso\HCIAdmin						
	Domain paceword *						
	Domain passwora	•••••					
	Enter the new name	e for each server after it joir	is the domain:				
	🕐 Refresh						
	Name	Workgroup / existing	New name	New domain	Status		
	10.10.11.12	contoso.com	hci-node02	-	🥑 Joi	ined domai	in
	10.10.11.13	contoso.com	hci-node03	-	🥑 Joi	ined domai	in
	10.10.11.14	contoso.com	hci-node04	-	🥑 Joi	ined domai	in
	10.10.11.11	contoso.com	hci-node01	-	🥑 Joi	ined domai	in
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	📀 When you're rea	ady, select Next.					
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Back Next						Exit	
Duck						LAIL	

11. On the Install features page, if any servers show Status of "Not installed" click Install features.

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Deploy an Azure Stack HCI cl	uster					
1 Get started (2) Networking (	3) Clustering (4) Storage (5) SDN					
<ul><li>1.1 Check the prerequisites</li><li>1.2 Add servers</li><li>1.3 Join a domain</li></ul>	Install required features We'll install any features that are required for this type of cluster.					
1.4 Install features	🖔 Refresh					
<ul><li>1.5 Install updates</li><li>1.6 Install hardware updates</li><li>1.7 Restart servers</li></ul>	Features           > 10.10.11.12 (hci-node02.contoso.com)           > 10.10.11.13 (hci-node03.contoso.com)           > 10.10.11.14 (hci-node04.contoso.com)           > 10.10.11.11 (hci-node01.contoso.com)           > 10.10.11.11 (hci-node01.contoso.com)	Status          Image: Status				
Back Next				E	xit	

12. Once all required features have been installed on all servers, click Next.

Windows Admin Center   Cluster Creati	n 🗸 📑 Microsoft		≻	Q	٢	?
Deploy an Azure Stack HCI cl	uster					
1 Get started 2 Networking (	3) Clustering (4) Storage (5) SDN					
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1.4 Install features	💍 Refresh					
<ul><li>1.5 Install updates</li><li>1.6 Install hardware updates</li><li>1.7 Restart servers</li></ul>	Features         > 10.10.11.12 (hci-node02.contoso.com)         > 10.10.11.13 (hci-node03.contoso.com)         > 10.10.11.14 (hci-node04.contoso.com)         > 10.10.11.11 (hci-node01.contoso.com)         > All required features are installed. When you're ready,	Status  Status Status  Status  Status Status Status  Status St				
Back Next			[		Exit	

13. On the Install updates page, wait for the page to finish checking for updates. If the Server status column shows "Updates available" for any of the servers, click Install updates.

Windows Admin Center   Cluster Creation	n 🗸 📕 Microsoft			≻_	Q	٢	?
Deploy an Azure Stack HCI cl	ıster						
1 Get started (2) Networking (	3) Clustering (4) Storage (5) SDN						
<ul><li>1.1 Check the prerequisites</li><li>1.2 Add servers</li><li>1.3 Join a domain</li><li>1.4 Install features</li></ul>	Optionally install operating syste We'll install the latest security and quality upda C Refresh	em updates ates available.					
1.5 Install updates	Server name	Server status	Update status				
<ul><li>1.6 Install hardware updates</li><li>1.7 Restart servers</li></ul>	<ul> <li>&gt; 10.10.11.12 (hci-node02.contoso.com)</li> <li>&gt; 10.10.11.13 (hci-node03.contoso.com)</li> <li>&gt; 10.10.11.14 (hci-node04.contoso.com)</li> <li>&gt; 10.10.11.11 (hci-node01.contoso.com)</li> <li>Install updates</li> </ul>	Updates available     Updates available     Updates available     Updates available     Updates available					
Back Next					E	xit	

14. The wizard will provide status until all updates are complete. Once the Server status changes to

"Ready" for all servers, click Next.

Windows Admin Center   Cluster Creation	on 🗸 🗧 Microsoft			≻	¢	٢	?
Deploy an Azure Stack HCI cl	uster						
1 Get started (2) Networking (	3) Clustering (4) Storage (5) SDN						
<ul><li>1.1 Check the prerequisites</li><li>1.2 Add servers</li><li>1.3 Join a domain</li><li>1.4 Install features</li></ul>	Optionally install operating sys We'll install the latest security and quality up O Refresh	s <b>tem updates</b> pdates available.					
<ul> <li>1.5 Install updates</li> <li>1.6 Install hardware updates</li> <li>1.7 Restart servers</li> </ul>	Server name         > 10.10.11.12 (hci-node02.contoso.com)         > 10.10.11.13 (hci-node03.contoso.com)         > 10.10.11.14 (hci-node04.contoso.com)         > 10.10.11.11 (hci-node01.contoso.com)         Install updates         O Some long-running updates are still in continue installing in the background.	Server status          Image: Ready         Image: Ready	Update status	d these u	updates	s will	
Back Next					E	xit	

Opening the alert panel in WAC () will show actual update installation status, showing "Installing updates" for each node until each has completed, as shown in the following screen capture.

Windows Admin Center   Cluster Creation	on 🗸 🗧 Mic	rosoft	≻	Û	٢	?
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				Cle	ar All	
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<ul><li>1.3 Join a domain</li><li>1.4 Install features</li></ul>	C Refresh	Successfully installed updates Successfully finished installing updates on 10.10.11.12 10.10.11.12		11	1:57:02 A	м
<ul><li>1.5 Install updates</li><li>1.6 Install hardware updates</li></ul>	Server name > 10.10.11.12 (hci-node02.cont	Successfully installed updates Successfully finished installing updates on 10.10.11.13 10.10.11.13		11	I:57:00 A	м
1.7 Restart servers	<ul> <li>&gt; 10.10.11.13 (hci-node03.cont</li> <li>&gt; 10.10.11.14 (hci-node04.cont</li> </ul>	Successfully installed updates Successfully finished installing updates on 10.10.11.14 10.10.11.14		11	1:56:59 A	м
	> 10.10.11.11 (hci-node01.cont					
	Some long-running update will continue installing in th					
Back Next				C	ose	

15. On the Install hardware updates page, wait for the "Checking a few things..." message to clear and then click Get updates.

Windows Admin Center   Cluster Creation	n V 💾 Microsoft	≻	¢	٢	?
Deploy an Azure Stack HCI cl	uster				
1 Get started 2 Networking (	3) Clustering (4) Storage (5) SDN				
<ul> <li>1.1 Check the prerequisites</li> <li>1.2 Add servers</li> <li>1.3 Join a domain</li> <li>1.4 Install features</li> <li>1.5 Install updates</li> <li>1.6 Install hardware updates</li> <li>1.7 Restart servers</li> </ul>	Optionally install hardware updates         Lenovo       Microsoft         This Azure Stack HCI solution was engineered in partnership by Lenovo and Microsoft and driver and firmware updates.         You can check and review the available updates before installing.	l provid	es inte	grated	
<     Back Next	Get updates Skip		E	xit	

16. This portion of the process is handled by LXCI for WAC and will ensure that firmware and device drivers on all servers will be updated according to the current ThinkAgile MX Best Recipe. Before proceeding, Native OS Management must be enabled in LXCI for WAC. To do this, click on the ellipsis (...) in the upper right corner of the Lenovo XClarity Integrator panel.



17. Next, click Settings.

Vindows Admin Center   Cluster Creatio	n 🗸 💾 Microsof	ft	≻	Q	ø	?
Deploy an Azure Stack HCI clu	ıster					
1 Get started (2) Networking (3	Clustering (4) Storage (5) SDN					
1.1 Check the prerequisites	Optionally install hardware updates					
1.2 Add servers	Lenovo, XClarity					
1.3 Join a domain		System Updates Repository 📑		>		
1.4 Install reatures	You must choose a management met	Lenovo Forum 🗖		>		
1.5 Install updates	Native OS Management	Submit an Idea 🖃		>		
.7 Restart servers	Native OS management is done by	Contact Us ロ		>		
	Lenovo XClarity Administrator	Documentation 🗖		>		
		Collect Service Data		>		
	managed by any connected Lenov	About Lenovo XClarity Integrator		>		
		License Terms for Lenovo XClarity Integrator 🗖		>		
		Privacy Statement 🖃		>		
		3rd Party Software Notice 🖃		>		
		Settings		>		
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18. In the Settings panel, click Native OS Management in the left column, select the Yes radio button, click Apply, and then click Close.

.enc	Settings		
′ou mus⊧	Menu <	Native OS Management	^
Nativ Nativ T: Leno ▲ A man	<ul> <li>✿ Internet Access</li> <li>☑ Log Configuration</li> <li>◯ Update</li> <li>△ Privacy</li> <li>☑ Native OS Management</li> </ul>	<ul> <li>Enable native OS management for servers enabled with Storage Spaces Direct</li> <li>Lenovo XClarity Administrator is available. To use this function, Please log in to the XCC Web GUI and enable IPMI over KCS Access, Ethernet Over USB and REST/CIM Over HTTPS.</li> <li>Native OS management is inapplicable to ThinkServer or ThinkSystem SR635/SR655 servers.</li> <li>By default, servers enabled with Storage Spaces Direct do not support native OS management. Would you like to enable it for servers enabled with Storage Spaces Direct?</li> <li>Yes</li> <li>No, thanks</li> </ul>	
		Set valid period of inventory cache data	~

19. Back in the Lenovo XClarity panel, select the Native OS Management radio button and the click Take me there.

Windows Admin Center   Cluster Creati	ion > 🗧 Microsoft > 🔶 Q 🛞 ?
Deploy an Azure Stack HCI c	luster
1 Get started (2) Networking (	3 Clustering 4 Storage 5 SDN
11 Charlette managemeister	Optionally install hardware updates
1.2 Add servers	Lenovo. XClarity Integrator
<ul><li>1.3 Join a domain</li><li>1.4 Install features</li><li>1.5 Install updates</li><li>1.6 Install hardware updates</li></ul>	You must choose a management method to continue.  Native OS Management Native OS management is done by connecting to the OS with an administrative account. Take me there > ③ How does it work
1.7 Restart servers	<ul> <li>Lenovo XClarity Administrator</li> <li>Attention: The server 10.10.11.11, 10.10.11.12, 10.10.11.13, 10.10.11.14 are currently not identified to be managed by any connected Lenovo XClarity Administrator.</li> </ul>
<	
Back Next	Skip

20. In the window that appears, select the Do not show this dialog in the future checkbox if desired, and then click OK.



21. Wait for background activity to complete until the LXCI Method Selection panel is fully displayed and then select the Update with Best Recipe (firmware/driver) radio button.

Lenio	<b>XC</b>	larity <sup>-</sup> Integra	ator			C 🛛 💷	
System L Update firmwar	<b>Ipdate</b> e and/or drivers o	on the managed device.					
Menu	<	Method Select Select a method to instal	tion II firmware and drivers for servers.				
<ul> <li>⊘ Method</li> <li>Image: Weight of the second s</li></ul>	Selection Selection Download	Update with Be Assign a Think/ update.	<b>est Recipe (firmware/driver)</b> Agile MX best recipe for firmware/driver update.	. This method does no	ot allow users to select par	t of components for	
ー ·	lential	Select a best recipe:	Best Recipe for ThinkAgile MX, version 2107	<ul> <li>View the selection</li> <li>items</li> </ul>	ected best recipe detail	Refresh Best Recipe	
≣≸ Summa	ry	Device	Туре	Installed Version	Target Version	Compliance	
		> HCI-Nod	de01-XCC (assigned: Best Re			\land Not Compliant	
		> HCI-Nod	Je02-XCC (assigned: Best Re			A Not Compliant	
		> HCI-Nod	Je03-XCC (assigned: Best Re			A Not Compliant	
		> HCI-Nod	Je04-XCC (assigned: Best Re			🛆 Not Compliant	
		O Update without	t Policy	asch component			

22. Wait for the panel to become fully available, which might take a few minutes, and then use the Select a best recipe dropdown list to select the latest Best Recipe shown in the list. Once the current Best Recipe has been selected, click Next (you might need to scroll down).

System Upc Update firmware and	late d/or drivers on	the managed device.					
Menu	<	Method Selection Select a method to install firmware	and drivers for servers.				
E Update Sele ↓ Update Dov & OS Credent	ection wnload ial	Update with Best Recip Assign a ThinkAgile MX update. Select a best recipe: Best I	e (firmware/driver) best recipe for firmware/driver updat Recipe for ThinkAgile MX, version 210	e. This method does no View the sele items	ot allow users to select par ected best recipe detail	t of components fo Refresh Bes Recipe	or t
≣≸ Summary		Device	Туре	Installed Version	Target Version	Compliance	
		> HCI-Node01-XCC	(assigned: Best Re			A Not Compliant	
		> HCI-Node03-XCC	(assigned: Best Re			A Not Compliant	
		> HCI-Node04-XCC (	(assigned: Best Re			🛆 Not Compliant	
		O Update without Policy Manually select firmwar	re version from the local repository fo	r each component.			

23. In the LXCI Update Selection panel, review the current and target firmware and driver versions if desired. You can click the "<" or ">" icons to show more or less of a panel or sub-panel. Once finished reviewing the pending updates, click Next.

Menu       ✓       Update Selection         ✓       Update Selection       Select Items         ✓       Update Selection       ✓       XCC (Primary)       Select Items         ✓       ✓       XCC (Primary)       ✓       Select Items         ✓       ✓       ✓       Select Items       Device       Installed Version         ✓       ✓       ✓       Select Items       Device       Installed Version       Target Version         ✓       ✓       ✓       Select Items       Device       Installed Version       Target Version         ✓       ✓       ✓       Select Items       Device       Installed Version       Target Version         ✓       ✓       ✓       Select Items       Device       Installed Version       Target Version         ✓       ✓       ✓       Sool (vel37       Firm       2021-06-0       Non Not do       Version       Version       Target Version         ✓       ✓       ✓       2.04 (PDL1       Firm       2021-06-1       Non Not do       Dr.VLN       1.90 (PDL326C)       2.04 (PDL2       Toro of the target Version       Dr.VLN       1.90 (PDL326C)       2.04 (PDL3       Dr.VLN       1.90 (PDL326C)       2.04 (PDL3	System Updat	te										
Select Items         Select Items         Update Selection       Name       Typ       Instal       Release D       Reboot       Pa       Preview         Update Download       OS Credential       CC (Primary)       Select Items       Device       Installed Version       Target Version         Summary       UEFI (Primary)       UEFI (Primary)       2021-06-0       No       Not do       VCC (Primary)       4.20 (CDB32T)       6.60 (cd37       G.60 (cd37       Firm       2021-06-0       Yes       Not do       VCC (Primary)       2.60 (tVE156K)       3.00 (VE1       Firm       2021-06-1       No       Not do       VCC (Primary)       2.60 (tVE156K)       3.00 (VE1       Firm       2021-06-1       No       Not do       VCC (Primary)       2.60 (tVE156K)       3.00 (VE1       Firm       2021-06-1       No       Not do       VCC (Primary)       2.60 (tVE156K)       3.00 (VE1       Firm       2021-06-1       No       Not do       VCC (Primary)       2.60 (tVE156K)       3.00 (VE1       Firm       2021-06-1       No       Not do       VCC (Primary)       2.60 (tVE156K)       3.00 (VE1       Firm       2021-06-1       No       Not do       VCC (Primary)       2.60 (tVE156K)       3.0	Update firmware and/or	< UF	odate Se	ection								
Image: Typ:       Typ:       Instal.       Release D       Reboot       Pa       Preview         Update Download	Ø Method Select	tion Sel	ect Items									
L       Update Download         OS Credential       Set 6.60 (cdi37 Firm       2021-07-0 No       Not do         Summary       Summary       UEFI (Primary)       2.00 (VE1 Firm       2021-06-0 Yes       Not do         Summary       Set 2.04 (PDL1 Firm       2021-06-1 No       Not do       Not do       UEFI (Primary)       2.60 (VE156K)       3.00 (VE1 Firm)         Set 2.04 (PDL2 Firm       2021-06-1 No       Not do       Not do       DRVLN       1.90 (PDL226C)       2.04 (PDL3 Firm)         Set 2.04 (PDL2 Firm       2021-06-1 No       Not do       Not do       Set 6.0       Set 6.0       Set 6.0	≣ Update Select	ion		Name	Тур	Instal	Release D	Reboot	Pa	Preview		
→       6.60 (cdi37 Firm       2021-07-0 No       Not do       →       →       CC (Primary)       6.60 (cdi37 Firm       2021-07-0 No       Not do       ×       →       CC (Primary)       6.60 (cdi37 Firm       6.60 (cdi37 Firm       2021-06-0 Yes       Not do       ×       ×       CC (Primary)       4.20 (CDI352T)       6.60 (cdi37 Firm       6.60 (cdi37 Firm       2021-06-0 Yes       Not do       UEFI (Primary)       2.60 (VE156K)       3.00 (VE1       5.00 (VE1 Firm       2021-06-1 No       Not do       UEFI (Primary)       2.60 (VE156K)       3.00 (VE1       5.00 (VE1	↓ Update Down	load	~ 🗸	XCC (Primary)					^	Device	Installed Version	Target Versic
VEFI (Primary)       VUEFI (Primary)       4.20 (CDI352T)       6.60 (cdi37)         VEFI (Primary)       3.00 (VE1       Firm       2021-06-0       Yes       Not do         VEFI (Primary)       2.60 (VE156K)       3.00 (VE1       Firm       2021-06-1       Not do         VEFI (Primary)       2.60 (VE156K)       3.00 (VE1       Firm       2021-06-1       Not do       UEFI (Primary)       2.60 (VE156K)       3.00 (VE1         VEFI (Primary)       2.04 (PDL1       Firm       2021-06-1       No       Not do       DRVLN       1.90 (PDL326C)       2.04 (PDL3         VEFI (Primary)       2.04 (PDL2       Firm       2021-06-1       No       Not do       DRVLN       1.90 (PDL326C)       2.04 (PDL326C)       2.0	S OS Credential		> 🗸	6.60 (cdi37	Firm		2021-07-0	No	Not do	V HCI-Node01-XCC (10	0.10.1)	
Image: Summary       > 3.00 (VE1       Firm       2021-06-0       Yes       Not do       UEFI (Primary)       2.60 (VE156K)       3.00 (VE1       Solution (VE1 <td></td> <td></td> <td>~ 🗸</td> <td>UEFI (Primary)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>XCC (Primary)</td> <td>4.20 (CDI352T)</td> <td>6.60 (cdi376:</td>			~ 🗸	UEFI (Primary)						XCC (Primary)	4.20 (CDI352T)	6.60 (cdi376:
✓       LXPM       1.90 (PDL126H)       2.04 (PDL1       Firm       2021-06-1       No       Not do       DRVLN       1.90 (PDL126C)       2.04 (PDL2         ✓       DRVLN       2021-06-1       No       Not do       DRVLN       1.90 (PDL326C)       2.04 (PDL32	≣≸ Summary		$\rightarrow$	3.00 (IVE1	Firm		2021-06-0	Yes	Not do	UEFI (Primary)	2.60 (IVE156K)	3.00 (IVE172
>       2.04 (PDL1       Firm       2021-06-1       No       Not do       DRVLN       1.90 (PDL226C)       2.04 (PDL3         >       2.04 (PDL2       Firm       2021-06-1       No       Not do       1.90 (PDL326C)       2.04 (PDL3			~ 🗸	LXPM						LXPM	1.90 (PDL126H)	2.04 (PDL134
V         DRVLN         DRVWN         1.90 (PDL326C)         2.04 (			$\rightarrow$	2.04 (PDL1	Firm		2021-06-1	No	Not do	DRVLN	1.90 (PDL226C)	2.04 (PDL234
> 🜌 2.04 (PDL2 Firm 2021-06-1 No Not do M			$\sim$	DRVLN						DRVWN	1.90 (PDL326C)	2.04 (PDL334
			$\rightarrow$	2.04 (PDL2	Firm		2021-06-1	No	Not do 🗡			********
				2.04 (PDL2	Firm		2021-06-1	No	Not do ¥	DRVWN	1.90 (PDL326C)	

24. In the LXCI Update Download panel, click Download to begin downloading all firmware and driver update packages.

11	Optionally install hardware	updates			. í
1.2	Lenovo. XCI	arity Integrator			
1.3 1.4	System Update Update firmware and/or drivers on				
1.5 <b>1.6</b>	Menu <	Update Download Download update packages for those have not been downloaded.			
1.7	Method Selection     Update Selection	<u>Download</u> <u>import</u> System Update	Selected by	Status	
	↓ Update Download	lnvgy_fw_xcc_cdi376s-6.60_anyos_noarch	User	Not downloaded	
	ん OS Credential	Invgy_fw_uefi_ive172f-3.00_anyos_32-64	User	🛞 Not downloaded	
	≡€ Summary	Invgy_fw_lxpm_pdl134e-2.04_anyos_noarch	User	Not downloaded	
	_, bannary	Invgy_fw_drvIn_pdl234b-2.04_anyos_noarch	User	Not downloaded	
	≡ Summary	lnvgy_fw_drvwn_pdl334a-2.04_anyos_noarch	User	Not downloaded	
		intc-Invgy_dd_chipset_inteldp-10.1.18661.8255_windows_x86-64	User	<ul> <li>Not downloaded</li> </ul>	
		intc-Invgy_fw_nic_net-8.15-5.10-1.2890.0-all-14_windows_x86-64	User	<ul> <li>Not downloaded</li> </ul>	
		intc-Invgy_dd_nic_net-25.3.1_windows_x86-64	User	<ul> <li>Not downloaded</li> </ul>	
		mlnx-lnvgy_fw_nic_cx-5.1-2.5.8.0.2_windows_x86-64	User	Not downloaded	
>				Back Next	
	Back Next	Skip		Exit	

25. Depending on network bandwidth, it might take a few minutes to download all the update packages. Once the LXCI Update Download panel updates to indicate that all update packages have been downloaded, click Next.

Lenovo. 701	any integrator		
System Update Update firmware and/or drivers on	the managed device.		
Menu <	Update Download Download update packages for those have not been downloaded.		
Ø Method Selection			
IE Update Selection	System Update	Selected by	Status
	Invgy_fw_xcc_cdi376s-6.60_anyos_noarch	User	Ø Downloaded
P₀ OS Credential	Invgy_fw_uefi_ive172f-3.00_anyos_32-64	User	Ownloaded
	Invgy_fw_lxpm_pdl134e-2.04_anyos_noarch	User	O Downloaded
≡s Summary	Invgy_fw_drvIn_pdl234b-2.04_anyos_noarch	User	O Downloaded
	Invgy_fw_drvwn_pdI334a-2.04_anyos_noarch	User	Ownloaded
	intc-Invgy_dd_chipset_inteldp-10.1.18661.8255_windows_x86-64	User	Ownloaded
	intc-Invgy_fw_nic_net-8.15-5.10-1.2890.0-all-14_windows_x86-64	User	Ø Downloaded
	intc-Invgy_dd_nic_net-25.3.1_windows_x86-64	User	Ø Downloaded
	mlnx-lnvgy_fw_nic_cx-5.1-2.5.8.0.2_windows_x86-64	User	Ownloaded
			Back Next

26. In the LXCI OS Credential panel, click on each Credential Needed link to enter appropriate

credentials for each server.

11	Optionally install hardware	updates						~
1.1	Lenovo. XCI	arity <sup>-</sup> Integrat	or					<i>i</i> ≣ ····
1.3	System Update Update firmware and/or drivers on	the managed device.						^
1.4 1.5 <b>1.6</b> 1.7	Menu ⊘ Method Selection键 Update Selection↓ Update Download	OS Credential Designate a local administra OS credentials are needed if • VM migration • Driver update • Firmware update in nativ • CAU-based update and p	tors account or Don one or more of the ve OS management preference for cachin	nain Admins account f following operations a mode ng update files on the	or copying files, install driver a re required: cluster nodes (managed serve	and firmware updates or m	nigrate virtual machines.	
	✤ OS Credential	Name d	Install driver	Install Firmwara	Hosteama (OC)	Pup Ac (OS)	Validation Status	
	≣ Summary	10.10.11.11 10.10.11.12 10.10.11.13	Yes Yes Yes	Yes Yes Yes	HCI-Node01 HCI-Node02 HCI-Node03	Credential Needed Credential Needed Credential Needed		
>		0.10.11.14				Eccurioal Needed	Validation Status Validation Status Validation Status Needed Needed Back Next	
	Back Next	Skip						Exit

27. For each server that will be added to the cluster, enter an appropriate Username and Password and then click Submit.

11	Optionally install hardware	updates					
1.1	Lenovo. XCI	arity <sup>-</sup> Integra	tor		Set Run As Accou	nt	
1.3	System Update Update firmware and/or drivers on	the managed device.			Username* ()		
1.4 1.5	Menu <	OS Credential Designate a local administ	rators account or Do	omain Admins account for co	contoso\ICMT		
1.6	<ul> <li>Method Selection</li> </ul>	OS credentials are needed • VM migration • Driver update	if one or more of th	e following operations are re	Password *		
1.7	E Update Selection	<ul> <li>Firmware update in na</li> <li>CAU-based update and</li> </ul>	tive OS managemen I preference for cacl	t mode hing update files on the clust	•••••		
		8 Run As			10.10.11.11 (HCI-Node01)		
	℅ OS Credential	□ Name ↑	Install driver	Install Firmware			
	≣ Summary	✓ 10.10.11.11	Yes	Yes			
		10.10.11.12	Yes	Yes			
		10.10.11.13	Yes	Yes			
		10.10.11.14	Yes	Yes			
						Submit	Close
>							
	Back Next	Skip					Exit

28. Once the credentials are tested against the system, click Submit and ignore errors.

Lenovo. XC	larity <sup>®</sup> Integra	ator		Set Run As Account		
System Update Update firmware and/or drivers of	n the managed device.			Username * ()		
Menu <	OS Credential	OS Credential Designate a local administrators account or Domain Admins account for co		contoso\ICMT		
Ø Method Selection	OS credentials are neede • VM migration • Driver update	d if one or more of th	e following operations are re	Password*		
E Update Selection	<ul> <li>Firmware update in n</li> <li>CAU-based update ar</li> </ul>	ative OS management of preference for cach	t mode ning update files on the clust	••••••		
↓ Update Download	용 Run As			① 10.10.11.11		
℅ OS Credential	□ Name ↑	Install driver	Install Firmware H	Non-ClusterNode		
≣≸ Summary	✓ 10.10.11.11	Yes	Yes			
	10.10.11.12	Yes	Yes			
	10.10.11.13	Yes	Yes			
	10.10.11.14	Yes	Yes			
				Submit and ignore errors Close		

29. Once credentials have been entered for all systems, click Next.

11	Optionally install hardware	updates						^
1.1	Lenovo. XCI	larity Integra	tor					ﷺ …
1.3	System Update	the managed device.						^
1.4 1.5 <b>1.6</b> 1.7	1.3       Update firmware and/or drivers on the managed device.         1.4       1.5       Menu       C         1.6							
	名 OS Credential		Install driver	Install Firmware	Hostname (OS)	Run As (OS)	Validation Status	
	≣ Summary	10.10.11.11	es y Integrator  y Integrator					
		10.10.11.13	Yes	Yes Yes	HCI-Node03	Contoso\ICMT Contoso\ICMT	Passed Passed	
>						Ba	ıck Next	,
	Back Next	Skip					[	Exit

30. Review the Summary panel to ensure that all is as expected, and then click Submit.

11	Optionally install hardware	updates		· · · · · · · · · · · · · · · · · · ·
1.1	Lenovo. XCla	arity <sup>-</sup> Integrator		□ /言 …
1.3 1.4	System Update Update firmware and/or drivers on	the managed device.		
1.5	Menu <	Summary Summary of the system update configuration		
1.7	Ø Method Selection	Update selected		
	E Update Selection	Device Target Version	Туре	Reboot
		> S2D-Node01-XCC (10.10.11.11)	Server	Yes
	冷 OS Credential	> S2D-Node02-XCC (10.10.11.12)	Server	Yes
	≡ Summary	> S2D-Node03-XCC (10.10.11.13)	Server	Yes
		<b>Assigned Best Recipe Name</b> Best Recipe for ThinkAgile MX, version 2107		Back
>				
	Back Next	Skip		Exit

- 31. Click Yes in the Warning dialog that opens to begin the system update job.
- 32. In the System Update Progress panel you can watch the progress of the system update job. To get additional details, click the twisty next to any system in either column.

	20% Instal	ling firmware	
Name	System Update	Name	Status
✓ 10.10.11.11	^	10.10.11.11	Running
XCC (Primary)	lnvgy_fw_xcc_cdi376s-6.60_anyos_noarch	Validate input	Completed
UEFI (Primary)	Invgy_fw_uefi_ive172f-3.00_anyos_32-64	Validate server	Completed
LXPM	Invgy_fw_lxpm_pdl134e-2.04_anyos_noar	Download payloads	Completed
DRVLN	Invgy_fw_drvIn_pdl234b-2.04_anyos_noa	Suspend server	▷   Skipped
DRVWN	Invgy_fw_drvwn_pdl334a-2.04_anyos_no	└─ Install firmware	Running
Intel Chipset Driver	intc-Invgy_dd_chipset_inteldp-10.1.18661	Create PowerShell session	Completed
Intel X722 LOM	intc-Invgy_fw_nic_net-8.15-5.10-1.2890.0	Copy files	Completed
Intel X722 LOM	intc-Invgy_dd_nic_net-25.3.1_windows_x8	Scan	Completed
Mellanox ConnectX-4 Lx PCIe 2	5Gb 2 mlnx-lnvgy_fw_nic_cx-5.1-2.5.8.0.2_wind	Query	Completed
Mellanox ConnectX-4 Lx PCIe 2	5Gb 2 mlnx-lnvgy_dd_nic_cx.winof2-2.50.51000	Compare	Completed
ThinkSystem 430-16i SAS/SATA	12Gb Invgy_dd_storehba_mpt3.5-2.61.19.00-2	Flash	Running
ThinkSystem 430-16i SAS/SATA	12Gb Invgy_fw_storehba_mpt3.5.430-16.09.00	Invgy_fw_bootstor_sata-2.3.10.1	110 🗸 Completed

33. Once the system update process completes, click Next.

Windows Admin Center   Cluster Creation	n 🗸 🕌 Microsoft	≿ 🗳 🚳 ?
Deploy an Azure Stack HCI clu	Ister	
1 Get started (2) Networking	3) Clustering (4) Storage (5) SDN	
1.1 Check the prerequisites	Optionally install hardware updates	^
1.2 Add servers	Lenovo. XClarity Integrator	5 10 10 10 10 10 10 10 10 10 10 10 10 10
1.3 Join a domain	System Update Progress	
1.4 Install features	100% Successfully completed	
1.6 Install hardware updates	Name System Update Name	Status
1.7 Restart servers	> 10.10.11.11 > 10.10.11.11	✓ Completed
	> 10.10.11.12 > 10.10.11.12	✓ Completed
	> 10.10.11.13 > 10.10.11.13	✓ Completed
	> 10.10.11.14 > 10.10.11.14	Completed
<		Complete
Back Next		Exit

34. On the Restart servers page, click Restart servers.

Windows Admin Center   Cluster Crea	ation 🗸 🗧 Microsoft	≻ ಧ @ ?
Deploy an Azure Stack HCI	cluster	
1 Get started 2 Networking	(3) Clustering (4) Storage (5) SDN	
<ul><li>1.1 Check the prerequisites</li><li>1.2 Add servers</li><li>1.3 Join a domain</li><li>1.4 Install features</li></ul>	Restart servers You may need to restart the servers to finish installing features and applyin O Refresh	ng updates. This may take a few minutes.
1.5 Install updates 1.6 Install hardware updates	Server name Status	test peopled
1.7 Restart servers	10.10.11.13 (hci-node04.contoso.com)	tart needed
	10.10.11.11 (hci-node01.contoso.com)	tart needed
	Restart servers	
Back Next: Networking		Exit

35. After the servers have been rebooted and their Status shows "Ready" click Next: Networking.

Windows Admin Center   Cluster Creati	on 🗸 📑 Microsoft		≻	Q	٢	?
Deploy an Azure Stack HCI c	uster					
1 Get started (2) Networking (	3 Clustering (4) Storage (5) SDN					
<ol> <li>1.1 Check the prerequisites</li> <li>1.2 Add servers</li> <li>1.3 Join a domain</li> <li>1.4 Install features</li> </ol>	Restart servers You may need to restart the servers to finish installing features ar O Refresh	nd applying updates. This may ta	ıke a few	/ minut	es.	
1.5 Install updates 1.6 Install hardware updates	Server name	Status				
1.7 Restart servers	10.10.11.13 (hci-node03.contoso.com)	<ul> <li>Ready</li> </ul>				
	10.10.11.14 (hci-node04.contoso.com) 10.10.11.11 (hci-node01.contoso.com)	<ul> <li>Ready</li> <li>Ready</li> </ul>				
<	Restart servers         It servers are ready. When you're ready, select Next.					
Back Next: Networking				E	Exit	

36. In the Check the network adapters panel, we disable the LAN Over USB interface on each node to avoid issues later (this interface will be automatically enabled when needed and then disabled when

no longer needed). For each node, select the "IBM USB Remote NDIS Network Device" and then click Disable. Once this interface has been disabled on all nodes, click Next.

Get started 2 Networking 3	Clustering (4) Storage (5) SDN					
1 Check network adapters	Intel(R) Ethernet Connection X722 for	10 Gbps	7C-D3-0A-DE-3B-98	em1	🕑 Up	
2 Select management adapters	Intel(R) Ethernet Connection X722 for	10 Gbps	7C-D3-0A-DE-3B-99	em2	🕑 Up	
	IBM USB Remote NDIS Network Device	426.0 Mbps	7E-D3-0A-DE-3B-9F	Ethernet	🗴 Disabled	
3 Virtual switch	✓ hci-node02.contoso.com (4)					
4 RDMA	Mellanox ConnectX-4 Lx 2x25GbE PCI	25 Gbps	50-6B-4B-43-B7-56	Slot6 Port 1	🕑 Up	
5 Define networks	Mellanox ConnectX-4 Lx 2x25GbE PCI	25 Gbps	50-6B-4B-43-B7-57	Slot6 Port 2	🕑 Up	
	Intel(R) Ethernet Connection X722 for	10 Gbps	38-68-DD-0E-6C-58	em1	🕑 Up	
	Intel(R) Ethernet Connection X722 for	10 Gbps	38-68-DD-0E-6C-59	em2	🕑 Up	
	IBM USB Remote NDIS Network Device	426.0 Mbps	3A-68-DD-0E-6C-5F	Ethernet	🗴 Disabled	
	✓ hci-node03.contoso.com (4)					
	Mellanox ConnectX-4 Lx 2x25GbE PCI	25 Gbps	24-8A-07-B3-0E-F6	Slot6 Port 1	🕑 Up	
	Mellanox ConnectX-4 Lx 2x25GbE PCI	25 Gbps	24-8A-07-B3-0E-F7	Slot6 Port 2	🕑 Up	
	Intel(R) Ethernet Connection X722 for	10 Gbps	7C-D3-0A-DE-44-D0	em1	🕑 Up	
	Intel(R) Ethernet Connection X722 for	10 Gbps	7C-D3-0A-DE-44-D1	em2	🕑 Up	
	IBM USB Remote NDIS Network Device	426.0 Mbps	7E-D3-0A-DE-44-D7	Ethernet	😣 Disabled	
	$\scriptstyle{lash}$ hci-node04.contoso.com (4)					
	Mellanox ConnectX-4 Lx 2x25GbE PCI	25 Gbps	24-8A-07-B3-0F-12	Slot6 Port 1	🕑 Up	
	Mellanox ConnectX-4 Lx 2x25GbE PCI	25 Gbps	24-8A-07-B3-0F-13	Slot6 Port 2	🕑 Up	
	Intel(R) Ethernet Connection X722 for	10 Gbps	7C-D3-0A-DE-43-50	em1	🕑 Up	
	Intel(R) Ethernet Connection X722 for	10 Gbps	7C-D3-0A-DE-43-51	em2	🕑 Up	
	IBM USB Remote NDIS Network Device	426.0 Mbps	7E-D3-0A-DE-43-57	Ethernet	🔀 Disabled	

37. In the Select the adapters to use for management panel, choose the appropriate model at the top of the panel. As previously noted, we have configured two LOM ports in each server to carry management traffic in our example deployment. Once all management interfaces have been selected for all nodes, click Apply and test.

Windows Admin Center   Cluster Creation	✓ 💾 Microsoft		≻_0 @ ?
Deploy an Azure Stack HCL du	ter		
Get started 2 Networking	) Clustering (4) Storage (5) SDN		
2.1 Check network adapters	Select the adapters to use for mana	gement	ŕ
2.2 Select management adapters	We'll name the adapters "Management" for easy id	lentification and use them during cluster creatior	and for low-bandwidth
2.3 Virtual switch	management traffic.		
2.4 RDMA			
2.5 Define networks	One physical network adapter for managemen	t Two physical network adapters management	teamed for
	Server: hci-node01.contoso.com           Description         Speed         MAC           Mellanox ConnectX-4 Lx 2x25Gbi         24-88	address Name -07-83-0E-FA Slotf Port 1	Status
	Intel(R) Ethernet Connection X72 10 Gbps 70-00	-07-DD-0C-FB 51000 Port 2	Changes pending
	✓ Intel(R) Ethernet Connection X72 10 Gbps 7C-D:	I-0A-DE-3B-99 em2	Changes pending
	Server: hci-node02.contoso.com         Description       Speed       MAC         Mellanox ConnectX-4 Lx 2x25Gb 25 Gbps       50-66         Mellanox ConnectX-4 Lx 2x25Gb 25 Gbps       50-66         Intel(R) Ethermet Connection X72 10 Gbps       38-68         Intel(R) Ethermet Connection X72 10 Gbps       38-68         The selected network adapters will be renamed       Select "em1" to ensure connectivity during clust         Server: hci-node03.contoso.com       Description       Speed       MAC	address     Name       -48-43-87-56     Slot6 Port 1       -48-43-87-57     Slot6 Port 2       -DD-0E-6C-58     em1       -DD-0E-6C-59     em2       d"Management Physical 1", "Management Physical ster creation. This is required to resolve the server	Status Changes pending Changes pending Changes pending al 2". r by DNS name. Status
	Mellanox ConnectX-41x 2x25Gbi 25 Gbps 24-86	-07-B3-0E-F7 Slot6 Port 2	
	✓ Intel(R) Ethernet Connection X72 10 Gbps 7C-D:	-0A-DE-44-D0 em1	Changes pending
	✓ Intel(R) Ethernet Connection X72 10 Gbps 7C-D	-0A-DE-44-D1 em2	Changes pending
	The selected network adapters will be rename:     Select "em1" to ensure connectivity during clu      Server: hci-node04.contoso.com      Description Speed MAC      Mellanox ConnectX-4 Lx 2x25Gbi 25 Gbps 24-84      Mellanox ConnectX-4 Lx 2x2	d "Management Physical 1", "Management Physical Ster creation. This is required to resolve the server address Name -07-83-0F-12 Slot6 Port 1 -07-83-0F-13 Slot6 Port 2 -0A-DE-43-50 em1 +0A-DE-43-51 em2 d "Management Physical 1", "Management Physic	al 2". r by DNS name. Status Changes pending Changes pending Changes pending cal 2".
<	Select "em1" to ensure connectivity during clu           Apply and test	ster creation. This is required to resolve the serve	r by DNS name.
Back Next			Exit

- 38. Click Yes in the Confirm creation of teamed adapter dialog that opens to begin the process to create the team and test connectivity.
- 39. Status will be updated in WAC as the required changes are made and connectivity between the systems is verified.

Windows Admin Center   Cluster Creatio	on ~	📒 Mic	rosoft		≻_ Q @ ?
Deploy an Azure Stack HCI clu	uster				
Get started 2 Networking	3 Clustering (4) Storage	e (5) SDN			
	nyper-v virtual cinemet	Adapter To Gops	00-30-00-00-00-00	venemer (wanagement)	resung connectivity
2.1 Check network adapters					
2.2 Select management adapters	Server: hci-node03.cont	toso.com			
2.3 Virtual switch	Description	Speed	MAC address	Name	Status
2.4 RDMA	Mellanox ConnectX-4 Lx 2	2x25Gbi 25 Gbps	24-8A-07-B3-0E-F6	Slot6 Port 1	
2.5 Define networks	Mellanox ConnectX-4 Lx 2	2x25Gbi 25 Gbps	24-8A-07-B3-0E-F7	Slot6 Port 2	
	<ul> <li>Intel(R) Ethernet Connecti</li> </ul>	ion X72 10 Gbps	7C-D3-0A-DE-44-D0	em1	Applying changes
	✓ Intel(R) Ethernet Connect	ion X72 10 Gbps	7C-D3-0A-DE-44-D1	em2	Applying changes
	Hyper-V Virtual Ethernet	Adapter 10 Gbps	00-15-5D-0B-0D-06	vEthernet (Management)	Testing connectivity
	Server: hci-node04.cont	toso.com			
	Description	Speed	MAC address	Name	Status
	Mellanox ConnectX-4 Lx	2x25Gb 25 Gbps	24-8A-07-B3-0F-12	Slot6 Port 1	
	Mellanox ConnectX-4 Lx 2	2x25Gb  25 Gbps	24-8A-07-B3-0F-13	Slot6 Port 2	
	✓ Intel(R) Ethernet Connect	ion X72 10 Gbps	7C-D3-0A-DE-43-50	em1	Applying changes
	✓ Intel(R) Ethernet Connect	ion X72 10 Gbps	7C-D3-0A-DE-43-51	em2	Applying changes
	Hyper-V Virtual Ethernet	Adapter 10 Gbps	00-15-5D-0B-0E-05	vEthernet (Management)	Testing connectivity
	<ol> <li>Polling server connect</li> </ol>	tivity, please hang	g on! This could take up t	o 10 minutes.	
	Apply and test				
	Apply and test				
<					
Back Next					Exit

40. Once all systems show Status of "Changes applied" click Next.

indows Admin Center   Cluster Creati	ion 🗸 🗧 M	crosoft		>_ Q 🕸	?
Deploy an Azure Stack HCI c	luster				
Get started 2 Networking	3 Clustering 4 Storage 5 SDN				
	Hyper-V Virtual Ethernet Adapter To Obps	00-10-00-00-00-00	venemer (wanagemenr)	Changes applied	
2.1 Check network adapters					
2.2 Select management adapters	Server: hci-node03.contoso.com				
2.3 Virtual switch	Description Speed	MAC address	Name	Status	
2.4 RDMA	Mellanox ConnectX-4 Lx 2x25Gbl 25 Gbps	24-8A-07-B3-0E-F6	Slot6 Port 1		
2.5 Define networks	Mellanox ConnectX-4 Lx 2x25Gbi 25 Gbps	24-8A-07-B3-0E-F7	Slot6 Port 2		
	Intel(R) Ethernet Connection X72 10 Gbps	7C-D3-0A-DE-44-D0	Management Physical 1		
	Intel(R) Ethernet Connection X72 10 Gbps	7C-D3-0A-DE-44-D1	Management Physical 2		
	Huper-V Virtual Ethernet Adapter, 10 Ghpr	00-15-5D-0B-0D-06	vEthernet (Management)	Changes applied	
	Server: hei-node04 conters com				
	Server: hci-node04.contoso.com	MAC address	Name	Status	
	Server: hci-node04.contoso.com           Description         Speed           Mellanox ConnectX-4 Lx 2x25Gbl 25 Gbps	MAC address 24-8A-07-B3-0F-12	Name Slot6 Port 1	Status	
	Description         Speed           Mellanox ConnectX-4 Lx 2x25Gbi         25 Gbps	MAC address 24-8A-07-83-0F-12 24-8A-07-83-0F-13	Name Slotő Port 1 Slotő Port 2	Status	
	Description         Speed           Mellanox ConnectX-4 Lx 2x25Gbl         25 Gbps           Mellanox ConnectX-4 Lx 2x25Gbl         25 Gbps           Intel(R) Ethernet Connection X72         10 Gbps	MAC address 24-8A-07-83-0F-12 24-8A-07-83-0F-13 7C-D3-0A-DE-43-50	Name Slot6 Port 1 Slot6 Port 2 Management Physical 1	Status	
	Description         Speed           Mellanox ConnectX-4 Lx 2x25Gbi         25 Gbps           Intel(R) Ethernet Connection X72         10 Gbps	MAC address 24-8A-07-83-0F-12 24-8A-07-83-0F-13 7C-D3-0A-DE-43-50 7C-D3-0A-DE-43-51	Name Slot6 Port 1 Slot6 Port 2 Management Physical 1 Management Physical 2	Status	

- 41. In the Virtual switch panel, select your preferred configuration from the available options. For our example, using a single dual-port Mellanox NIC in each server results in a single available configuration.
- 42. Once a configuration is selected, work through the panel, selecting each network interface that will carry East-West storage traffic. Near the bottom of the panel, open the Advanced twisty if desired to change additional settings. We recommend leaving all the defaults except for the Virtual switch name, which can be changed to something more recognizable in your environment (we leave the default switch name of "ConvergedSwitch" in our example deployment).

Windows Admin Center   Cluster Creation	on V	📑 Mie	crosoft			≻_	Q	@	?
Deploy an Azure Stack HCI cl	uster								
1 Get started 2 Networking	3 Clustering 4 Storag	ge (5) SDN							
21 Check network adapters	Virtual switch								^
2.2 Select management adapters									
2.3 Virtual switch	Skip Virtual switch creatio	n							
2.4 RDMA	Please choose your prefe	rred configuration	1:						
2.5 Define networks	Create one virtual swi together	tch for compute a	and storage 💿	Create one virt					
	66			66 68 68 68					
	Create two virtual swi	tches.							
	Server: hci-node01.	Speed	Name Slot6 Port 1	IP address	Subnet mask	VLAN ID			
	Mellanox ConnectX.	25 Gbps	Slot6 Port 2	169.254.132.199	16	0			
	Server: hci-node02.	contoso.com							
	Description	Speed	Name	IP address	Subnet mask	VLAN ID			
	Mellanox ConnectX.	25 Gbps	Slot6 Port 1	169.254.137.162	16	0			
	Mellanox ConnectX.	25 Gbps	Slot6 Port 2	169.254.230.156	16	0			
	Server: hci-node03.	contoso.com							
	Description	Speed	Name	IP address	Subnet mask	VLAN ID			
	Mellanox ConnectX.	25 Gbps	Slot6 Port 1	169.254.19.102	16	0			
	Mellanox ConnectX.	25 Gbps	Slot6 Port 2	169.254.168.127	16	0			
	Server: hci-node04.	contoso.com							
	Description	Speed	Name	IP address	Subnet mask	VLAN ID			
	Mellanox ConnectX.	25 Gbps	Slot6 Port 1	169.254.227.26	16	0			
	Mellanox ConnectX.	25 Gbps	Slot6 Port 2	169.254.63.227	16	0			
	Advanced								
	Virtual switch name *								
	ConvergedSwitch								
	Load balancing algorithm								
	Hyper-V port (recon	nmended)		$\sim$					
	les suitch-amboddod +	ming (I)							
	Ura SP 10V in the vict of	witch ()							
	Use SR-IOV in the virtual s								
	Use VIVINUQ (recommended	u) (U) 🗸 🗸	I						
	Queue pairs () 8								
<<									~
Back Next							Ð	cit	

43. In the Optionally configure RDMA panel, select the Configure RDMA (Recommended) checkbox. If desired, open the Advanced twisty to expose Quality of Service (QoS) settings. Make any changes required for your environment and then click Apply changes.

Windows Admin Center   Cluster Creation	on V	Microsoft	≻	Q	٢	?
Deploy an Azure Stack HCI cl	uster					
1 Get started 2 Networking	3 Clustering 4 Storage 5	SDN				
2.1 Check network adapters 2.2 Select management adapters 2.3 Virtual switch	Optionally configure RI	DMA w, though you can configure it later via PowerShell. <u>Learn more</u> 📑				^
2.4 RDMA	Configure RDMA (Recommended) ①					
2.5 Define networks	Туре	RoCEv2				
	Advanced					
	Traffic priorities and bandwidth	n reservations (DCB)				
	Use Data Center Bridging (DCB) ①	$\checkmark$				
	Cluster heartbeat					
	Priority ①	7	$\sim$			
	Bandwidth reservation (%)	1				
	Storage					
	Priority ①	3	~			
	Bandwidth reservation (%) ①	50				
	Apply changes					
<	A You must also configure your	network switches to match these settings-contact your switch vendo	r for help			~
Back Next				E	xit	

**Note**: If using the RoCEv2 implementation of RDMA, it is important to ensure that the QoS settings configured for RDMA on the network interfaces match the DCB settings on the network switches that will carry storage traffic. For more information, refer to the topic **RoCE: 2-16 nodes with network switches** in our companion document, *Microsoft Storage Spaces Direct (S2D) Deployment Guide*, found at the following URL:

https://lenovopress.com/lp0064

44. Once RDMA configuration is complete, click Next.

Windows Admin Center   Cluster Creati	on V 💾 Microsoft	≻	Û	٢	?
Deploy an Azure Stack HCI c	uster				
1 Get started 2 Networking	3 Clustering 4 Storage 5 SDN				
<ul><li>2.1 Check network adapters</li><li>2.2 Select management adapters</li><li>2.3 Virtual switch</li></ul>	Optionally configure RDMA It's easiest to configure RDMA now, though you can configure it later via PowerShell. Learn more				
2.4 RDMA	Configure RDMA (Recommended) 🕐 🗸				
2.5 Define networks	Type       RoCEv2         Advanced       Apply changes         Successfully configured RDMA. When you're ready, select Next.         You must also configure your network switches to match these settings—contact your switch vendor for	help.			
Back Next			E	xit	

45. In the Define networks panel, Modify IP settings for IP address, subnet mask, and VLAN ID based on your environment. Note that for storage network interfaces, no default gateway should be specified. Settings will be checked briefly as they are specified, with obvious misconfigurations highlighted by the wizard, but full testing does not take place until Apply and test is clicked. Open the Advanced

twisty to expose settings for jumbo packet size and encapsulation overhead. Make any changes required for your environment and then click Apply and test.

Vindows Admin Center   Cluster Creation	~			Microsoft					≻	Q	٢	?
Deploy an Azure Stack HCI clust	ter											
1 Get started 2 Networking 3	Clustering	4) Storag	ge (5) 9	SDN								
2.1 Check network adapters	Descripti	Speed	MAC a	Name	IP address	Subn	VLAN ID	Default gateway		Status		
2 Select management adapters	Mellanox	25 Gbps	24-8A-0	Slot6 Port 1	10.10.12.13	24	12 🗘			🚺 Chi	anges pe	r
2. Victual quitab	Mellanox	25 Gbps	24-8A-0	Slot6 Port 2	10.10.12.23	24	12 🗘			🚺 Cha	anges pe	1
2.4 KDMA 2.5 Define networks	Server: hci-no	de04.con	toso.com									
	Descrip	Speed	MAC a	Name	IP address	Subn	VLAN ID	Default gateway		Status		
	Mellanox	25 Gbps	24-8A-0	Slot6 Port 1	10.10.12.14	24	12 🗘			1 Ch	anges pe	1
	Mellanox	25 Gbps	24-8A-0	Slot6 Port 2	10.10.12.24	24	12 🗘			🕕 Chi	anges pe	1
	Advanced	anges wil	l be applie	d to every non-m	nanagement netv	vork adap	oter.					
	Jumbo packet	size (in byte	s) 🕕									
	1514					$\sim$						
	Encapsulation	overhead (ir	n bytes) 🕕									
	0					$\sim$						
	<ol> <li>Adapte</li> </ol>	r properti	es will be s	et to the defaults	s. To view the pro	perties, u	ise Get-NetA	dapterAdvanced	Prope	erty.		
<	Apply and te	st Ret	ry connec	tivity test Do	wnload report							
Deale Name Chartering									Г		wit	

46. All specified network interface changes will be applied and connectivity between the interfaces is tested. You might see a prompt to Specify your credentials. If so, choose the appropriate radio button and enter appropriate credentials if necessary. If you choose to use an account with Domain Admin

privileges, check the Use these credentials for all connections checkbox. Once credentials have been entered, click Continue.

Window	vs Admin Center   Cluste	er Creation	~		Hicrosoft	≻ ¢ @ ?
Depl	oy an Azure Stack	HCI clus	ter			Specify your credentials
1 G	et started 2 Netwo	rking (3	) Clustering (	4 Storage 5	SDN	Specify the administrator account to use when connecting to 10.10.11.14.
2.1	Description	Speed	MAC address	Name	IP address	Use another account for this connection
2.2	Mellanox ConnectX	25 Gbps	24-8A-07-B3-0	Slot6 Port 1	10.10.11.31	Username "
2.3	Mellanox ConnectX	25 Gbps	24-8A-07-B3-0	Slot6 Port 2	10.10.11.41	Contoso\ICMT
2.4						Password *
2.5	Server: hci-node02.co	ontoso.com	ı			••••••
	Description	Speed	MAC addr	Name	IP address	Use these credentials for all connections.
	Mellanox ConnectX Mellanox ConnectX	25 Gbps 25 Gbps	50-6B-4B-4 50-6B-4B-4	Slot6 Port 1 Slot6 Port 2	10.10.11.32	To perform a single sign-in using your Windows account, you might need to set up Kerberos constrained delegation.
>						
	Back Next: Cluste	ering				Continue Cancel

47. You can watch the configuration and connectivity test progress in the Status column. If you see a

pop-up message asking to enable CredSSP, click Yes to proceed.

Credential Security Service Provider (CredSSP)					
The current management operation has requested that CredSSP be enabled. To improve security, disable CredSSP as soon as you're finished.					
<u>CVE-2018-0886</u>					
Are you sure you want to continue the current management operation and enable CredSSP?					
Yes No					

48. Once all testing shows a Status of Passed, choose Download report if desired before clicking Next: Clustering.

Gets	started 2 Net	tworking	3 Clustering	4 Storage	5) SDN					
	Server: hci-node0	2.contoso.	.com							
	Description	Speed	MAC addre	Name	IP address	Subnet m	VLAN ID	Default gateway	Status	
	Mellanox Con	25 Gbps	50-6B-4B-4	Slot6 Port 1	10.10.12.12	24	12		Passed	1
	Mellanox Con	25 Gbps	50-6B-4B-4	Slot6 Port 2	10.10.12.22	24	12 🗘		Passed	
	Server: bci-node0	13 contoso	com							
	Server, nor-nouco	5.0011050.	com							
	Description	Speed	MAC addre	Name	IP address	Subnet m	VLAN ID	Default gateway	Status	
	Mellanox Conn	25 Gbps	24-8A-07-B3	Slot6 Port 1	10.10.12.13	24	12 🗘		Passed	
	Mellanox Conn	25 Gbps	24-8A-07-B3	Slot6 Port 2	10.10.12.23	24	12 🗘		Passed	
	Server: hci-node0	4.contoso.	.com							
	Description	Speed	MAC addre	Name	IP address	Subnet ma	VLAN ID	Detault gateway	Status	1
	Mellanox Con	25 Gbps	24-8A-07-B3	Sloto Port 1	10.10.12.14	24	12 ~		Passed	
	Mellanox Con	25 Gbps	24-8A-07-B3	SIOLO POLL 2	10.10.12.24	24	12 v		V Passed	
	✓ Advanced									
1.1	Annalyzed Area	Potry co	nnectivity test	Download report						

49. Once the Validate the cluster page becomes fully active, click Validate.

Windows Admin Center   Cluster Creat	pn 🗸 🗧 Microsoft	≻	Q	٥	?
Deploy an Azure Stack HCI o	uster				
1 Get started 🔗 Networking	3 Clustering (4) Storage (5) SDN				
3.1 Validate cluster	Validate the cluster				
3.2 Create cluster	Cluster validation verifies that a set of servers have consistent configuration and are sui	table for clu	ustering	].	
	Validate				
<					
Back Next			E	xit	

50. After completing the cluster validation process, a summary is shown as well as the option to download the Validation Report. If there are any Warnings or Errors, click Download report to gain additional information.

Windows Admin Center   Cluster Creat	tion 🗸 🗧 Microsoft	≻ 🗘 © ?						
Deploy an Azure Stack HCI o	luster							
1 Get started 🔗 Networking	3 Clustering (4) Storage (5) SDN							
3.1 Validate cluster	Validate the cluster							
3.2 Create cluster	The results indicate the servers are suitable for 8/25/2021, 7:41:12 AM	r clustering, but there are warnings. Validation completed at						
	Name	Status						
	> Inventory	Success: 16						
	> Network	Success: 5						
	System Configuration	🖉 Success: 9 🛕 Warning: 1						
	Validate Active Directory Configuration	Success						
	Validate All Drivers Signed	Success						
	Validate Memory Dump Settings	Success						
	Validate Operating System Edition	Success						
	Validate Operating System Installation Option	Success						
	Validate Operating System Version	Success						
	Validate Required Services	Success						
	Validate Same Processor Architecture	Success						
	Validate Software Update Levels	A Warning						
	Validate System Drive Variable	Success						
<	A The servers are ready for clustering, but there	are warnings you should review. When you're ready, select Next.						
Back Next		Exit						

51. If necessary, review the cluster validation report to ensure that there are no issues that would impact the ability to create the failover cluster. In the example shown, the only warning comes from a missing Microsoft Windows Defender Antivirus definition file on Node 1. Since this will not cause serious issues with the cluster and can be easily resolved after creating the cluster, we can ignore this particular warning.

late Software Update Levels		
Description: Validate that all tested servers have the same software updates installed and if any have a pe	nding reboot to complete installation of updates.	
Start: 8/25/2021 7:40:32 AM.		
Validating that all servers have the same software updates		
	_	
Software Updates missing on 'HCI-Node01.contoso.com':		
KB Article Title	Support	Security B
2267602 Security Intelligence Update for Microsoft Defender Antivirus - KB2267602 (Version 1.347.333.	) https://go.microsoft.com/fwlink/?LinkId=52661	
Software Updates missing on 'hci-node02.contoso.com':		
All software updates present		
Software Updates missing on 'hci-node03.contoso.com':		
All software updates present		
Software Updates missing on 'hci-node04.contoso.com':		
All software updates present		
The cluster validation test has detected that all nodes do not have the same software undates. We recomm	used that all nodes run the same version of the on	erating sve
install the same software updates. If you have verified that all nodes are consistent, you can ignore this wa	ning.	erading syst

52. After resolving any serious issues, click Next to initiate creation of the failover cluster. When prompted, enter the cluster name and IP address that will be used for the Cluster Name Object (CNO) in Active Directory. Unselect the Use network checkbox for the **Storage** subnet if it is shown on this page, but leave the Management subnet selected and verify the IP address shown. For most

deployments, the Advanced configuration options should be left at their recommended settings. Click Create cluster when ready.

Windows Admin Center   Cluster Creation	on V 🗧 Microsoft	≻	¢	۵	?
Deploy an Azure Stack HCI cl	uster				
1 Get started 🔗 Networking	3 Clustering (4) Storage (5) SDN				
3.1 Validate cluster	Create the cluster				
3.2 Create cluster	Cluster name * ①				
	HCI-Cluster01				
	IP address				
	Specify one or more static addresses				
	One or more IP addresses could not be configured automatically. For each network to be used, make sure "Use network" is selected, and then type an address.				
	Use network Network address Cluster IP				
	Advanced				
	Register the cluster with DNS and Active Directory				
	Add all eligible storage to the cluster (recommended)				
	Networks				
	Use all networks (recommended)				
	O Specify one or more networks not to use				
<	Create cluster				
Back Next: Storage			E	xit	

53. Once ready, click Next: Storage.

Windows Admin Center   Cluster Creation	on V Hicrosoft	≻	¢	٢	?
Deploy an Azure Stack HCI cl	uster				
1 Get started 🔗 Networking	3 Clustering (4) Storage (5) SDN				
3.1 Validate cluster	Create the cluster				
3.2 Create cluster	The cluster was successfully created. When you're ready, select Next.				
<					
Back Next: Storage			E	xit	

54. Even though this step is shown as optional, we recommend clicking Erase drives to ensure the drives contain no metadata that could interfere with adding the storage devices to the pool.

Windows Admin Center   Cluster Creat	ion 🗸 🗧 Microsoft	≻ 🗘 💩 ?								
Deploy an Azure Stack HCI cluster										
1 Get started 🔗 Networking	Clustering 4 Storage 5 SDN									
4.1 Clean drives	Optionally erase all existing data									
<ul><li>4.2 Check drives</li><li>4.3 Validate Storage</li><li>4.4 Enable Storage Spaces Direct</li></ul>	If the drives contain a storage pool with data you want to keep, skip this sto Otherwise you can erase all drives that are eligible for pooling, wiping out a Doing so won't erase the operating system drive. Erase drives	ep. any old data and partitions.								
Back Next		Exit								

55. In the pop-up confirmation message that is displayed, click Erase drives.

You're about to erase all existing data								
This permanently erases all data on the operating system drives. It can	on every drive in the clu n't be undone.	ster other than						
	Erase drives	Cancel						

56. Once the process finishes and you see a message stating that all drives have been successfully erased, click Next.



57. After verifying that all drives on all servers show "OK" in the Status column, click Next.

1 Get started 🕢 Networking	✓ Clustering	4 Storage 5 SD	N				
		ATA ST6000NM0115	ZAD09	5.59 TB	LB88	Slot 4	🕑 ОК
1 Clean drives		ATA ST6000NM0115	ZAD09	5.59 TB	LB88	Slot 5	📀 ок
2 Check drives		ATA ST6000NM0115	ZAD09T	5.59 TB	LB88	Slot 7	🕗 ок
3 Validate Storage		ATA ST6000NM0115	ZAD09	5.59 TB	LB88	Slot 8	🕑 ок
4 Enable Storage Spaces Direct		ATA ST6000NM0115	ZAD09	5.59 TB	LB88	Slot 10	📀 ОК
		ATA ST6000NM0115	ZAD09	5.59 TB	LB88	Slot 11	🕗 ОК
	→ hci	-node04.contoso.com (					
	~ s	SD (4)					
		LENOVO HUSMM3216ASS200	4GV08X	1.49 TB	K4J7	Slot 0	📀 ОК
		LENOVO HUSMM3216ASS200	4GV05R	1.49 TB	K4J7	Slot 3	📀 ОК
		LENOVO HUSMM3216ASS200	4GV09K	1.49 TB	K4J7	Slot 6	📀 ОК
		LENOVO HUSMM3216ASS200	4GV08	1.49 TB	K4J7	Slot 9	🕗 ОК
	~ H	IDD (8)					
		ATA ST6000NM0115	ZAD0P	5.59 TB	LB88	Slot 1	🕗 ОК
		ATA ST6000NM0115	ZAD09	5.59 TB	LB88	Slot 2	🕗 ОК
		ATA ST6000NM0115	ZAD09	5.59 TB	LB88	Slot 4	📀 ок
		ATA ST6000NM0115	ZAD0P	5.59 TB	LB88	Slot 5	📀 ОК
		ATA ST6000NM0115	ZAD09	5.59 TB	LB88	Slot 7	📀 ОК
		ATA ST6000NM0115	ZAD09	5.59 TB	LB88	Slot 8	🕗 ОК
		ATA ST6000NM0115	ZAD09	5.59 TB	LB88	Slot 10	📀 ок
		ATA ST6000NM0115	ZAD09	5.59 TB	LB88	Slot 11	🕗 ОК

58. After verifying that all storage validation tests show "Success" in the Result column, click Download report if desired, and the click Next.

Windows Admin Center   Cluster Creation	on 🗸 🗧 Microsoft		≻	Q	٢	?
Deploy an Azure Stack HCI cl	uster					
1 Get started 🔗 Networking	Clustering 4 Storage 5 SDN					
4.1 Clean drives 4.2 Check drives 4.3 Validate Storage	Validate Storage  The results indicate the storage is suitable for 8/25/2021, 3:45:39 PM	Storage Spaces Direct. Valida	ation compl	eted at		
4.4 Enable Storage Spaces Direct	Validate again	Result Success Success Success Success Success Success Success Success Success				
Back Next				E	xit	

59. On the Enable Storage Spaces Direct panel, click Enable.

Windows Admin Center   Cluster Crea	on V 🗧 Microsoft	≻_	Û	©	?
Deploy an Azure Stack HCI	luster				
1 Get started Vetworking	Clustering 4 Storage 5 SDN				
<ul> <li>4.1 Clean drives</li> <li>4.2 Check drives</li> <li>4.3 Validate Storage</li> <li>4.4 Enable Storage Spaces Direct</li> </ul>	Enable Storage Spaces Direct Storage Spaces Direct will provision the storage pool and default storage tier temp Enable	lates aut	tomati	cally.	
Back Next: SDN				Exit	

60. Progress will be shown until S2D has been enabled successfully. At this point, click Download report if desired, and then click Next: SDN.

Windows Admin Center   Cluster Creation	n 🗸 🗧 Microsoft	≻_	Q	٢	?					
Deploy an Azure Stack HCI cluster										
1 Get started Vetworking	Clustering Storage 5 SDN									
<ul> <li>4.1 Clean drives</li> <li>4.2 Check drives</li> <li>4.3 Validate Storage</li> <li>4.4 Enable Storage Spaces Direct</li> </ul>	Enable Storage Spaces Direct         Storage Spaces Direct will provision the storage pool and default storage tier to         Image Spaces Direct was successfully enabled.         Image Download report         Image Spaces Direct Next.	emplates aut	omatio	ally.						
Back Next: SDN			I	xit						

61. Configuring SDN is highly customer-dependent and often not required. For more information, refer to the following Microsoft article:

https://docs.microsoft.com/en-us/azure-stack/hci/concepts/network-controller-overview

62. Determine whether to proceed with this portion of the deployment or skip it, based on your needs. In our example deployment, we click Skip to finish the deployment.

Windows Admin Center   Cluster Creation >	/ Microso	oft	>_	Û	٢	?
Deploy an Azure Stack HCI clust	er					
1 Get started 🔗 Networking 🔗	Clustering 🔗 Storage 🌀	SDN				
5.1 Define the Network Controller cluster	Define the Network Co	ontroller cluster				í
5.2 Deploy the Network Controller	Software Defined Networking (S providing an automated, central workloads. <u>Learn more</u> C	DN) allows you to manage your dat ized way to meet the requirements	acenter network o of your application	ynamica 1s and	ally,	
	Host					
	Domain	contoso.com				
	Network controller cluster name *	ncHCI-Cluster0				
	VHD path * ①			Brows	e	
	Number of cluster VMs * ①					
	3 - Highly available		$\sim$			
	Network					
	VLAN ID* ①	1				
	VM network addressing	DHCP O Static				
	Network controller VMs *	Name	IP address			
		ncHCI-Cluster01	DHCP Assigne	ed		
		ncHCI-Cluster02	DHCP Assigned	ed		
		ncHCI-Cluster03	DHCP Assigne	ed		
	Credentials					
	Credentials used to join VMs to the *	O Contoso\ICMT				
	Password *	•••••				
	VM local admin password * ①	•••••				
	Advanced					
	VM path ①	C:\ProgramData\Microsoft\Wi	ndows\Hyper-V			
	MAC address pool start *	06-EC-00-00-00-01				
	MAC address pool end *	06-EC-00-00-FF-FF				
<						
Back Next	Skip			I	Exit	

63. The Azure Stack HCI cluster has been successfully created. Click Go to connections list to return to the All connections pane.



64. You should now see the new cluster in the All connections pane. If desired, click the cluster object to explore the capabilities of WAC for managing the new cluster.

Windows Admin Center   Clu	ister Manager $  imes $		Microsoft					≻	Û	٢	?
hci-cluster01.conto	oso.com										
Tools	< Da	ashboard							FEEDB/	ACK 🛈	^
Search Tools	<u>م</u>	Alerts (Total 0)			Azure connection						
A Dashboard		There are no alerts			Status		Recomm	ende	d		
Compute					Not yet registered	0	<u>Register</u>	<u>this c</u>	luster	]	
Servers											
Azure Kubernetes Service											
Storage Storage	5	Servers (Total 4)			Drives (Total 48)						
Drives		All servers healthy			All drives healthy						
Storage Replica	I	$\checkmark$									
Virtual switches Tools		/irtual machines (Total	0)		Volumes (Total 1)						
Azure Monitor		Running			All volumes healthy	,					
Updates		0									
Diagnostics											
Performance Monitor     Extensions		CPU usage		0	Memory usage					0	
XC Lenovo XClarity Integrator			Total				Tota				
			0%				10	 .5%	6		
Settings		<b>0%</b> of 100%			<b>10.5%</b> of 1 TB		·				~

Now that the new HCI cluster is ready, we need to register it with Azure in order to run workloads on it. Click the Register this cluster link (seen in the screenshot above) to begin this process. Note that this step is

required by Microsoft, as follows:

"Registering with Azure is required, and your cluster is not fully supported until your registration is active. If you do not register your cluster with Azure upon deployment, or if your cluster is registered but has not connected to Azure for more than 30 days, the system will not allow new virtual machines (VMs) to be created or added."

For additional details, refer to the Microsoft online documentation at the following URL: https://docs.microsoft.com/en-us/azure-stack/hci/deploy/register-with-azure

### 3.6 Post-deployment configuration

There are a few configuration settings that must be made manually after completing the HCI cluster deployment wizard. Some of these steps are required to make Azure Stack HCI work as designed, while others are optional:

- Enable RDMA on vNICs (required)
- Disable LAN Over USB network interface (recommended)
- Disable Flow Control (global pause) on storage interfaces (recommended)
- Disable IPv6 on all network interfaces (optional)

#### 3.6.1 Enable RDMA on vNICs (required)

Currently, the WAC Deployment Wizard fails to enable RDMA on the vNICs that it creates on each node. Since this is a mandatory step for any virtual network interfaces that will be used to carry East-West storage traffic, it must be done via PowerShell after completion of the wizard. To enable RDMA on the SMB vNICs, follow these steps *for each node* in the cluster:

- 1. In WAC, navigate to Server Manager and then select one of the HCI cluster nodes.
- 2. In the Tools pane on the left, select PowerShell. This will launch a remote PowerShell session against the node and request a password.
- 3. To check whether RDMA is enabled on the SMB vNICs, run the PowerShell command shown in Example 1.

**Example 1** PowerShell command to check RDMA enablement on vNIC

```
Get-NetAdapterRdma | ? Name -Like *SMB* | Format-Table Name, Enabled
```

4. The command will likely return something similar to the following, where the Enabled column shows False for both SMB vNICs.

PS C:\>	<pre>Get-NetAdapterRdma   ?</pre>	Name -Like	*SMB*	Format-Table	Name, Enabled
Name	Enabled				
vSMB1	False				
vSMB2	False				

5. If this is the case, run the PowerShell command shown in Example 2 to enable RDMA on the SMB vNICs. If RDMA is already enabled on the SMB vNICs, proceed to the next section.

#### Example 2 PowerShell command to enable RDMA on SMB vNICs

Enable-NetAdapterRdma -Name "vSMB1", "vSMB2"

- 6. Rerunning the command in Example 1 should now return the following:

7. Repeat Steps 1-6 above for each of the remaining HCL cluster nodes.

#### 3.6.2 Disable LAN Over USB network interface (recommended)

Lenovo ThinkSystem rack servers provide a network interface that supports LAN Over USB for inband connections to the XCC management controller. Although this is a useful feature, WAC and the Failover Cluster Manager can become confused by the presence of this network interface. Fortunately, it can be safely disabled in the OS since it gets enabled automatically when needed (for example by Lenovo tools such as OneCLI) and then disabled again when no longer needed. To disable this interface follow these steps:

- 1. In WAC, navigate to Server Manager and then select one of the HCI cluster nodes.
- 2. In the Tools pane on the left, select PowerShell. This will launch a remote PowerShell session against the node and request a password.
- 3. Although this interface is typically identified by Windows Server operating systems as "Ethernet" it is a good idea to verify this before disabling the network interface. To do this, use the command shown in Example 3.

Example 3 PowerShell command to verify network interface names

Get-NetAdapter | Format-Table Name, InterfaceDescription, Status

4. The command should return something similar to the following. Find the network interface that shows "IBM USB Remote NDIS Network Device" in the InterfaceDescription column and make note of what is shown in the Name column for this interface (likely "Ethernet").

PS C:\> Get-NetAdapter   Format-Table Name, InterfaceDescription, Status			
Name	InterfaceDescription	Status	
 Management Physical 2	Intel(R) Ethernet Connection X722 for 10GbE SFP+	 Up	
Slot6 Port 2	Mellanox ConnectX-4 Lx 2x25GbE PCIe Adapter	Up	
vEthernet (Management)	Hyper-V Virtual Ethernet Adapter	Up	
vSMB1	Hyper-V Virtual Ethernet Adapter #2	Up	
vSMB2	Hyper-V Virtual Ethernet Adapter #3	Up	
Ethernet	IBM USB Remote NDIS Network Adapter	Up	
Management Physical 1	Intel(R) Ethernet Connection X722 for 10GbE SFP+ #2	Up	
Slot6 Port 1	Mellanox ConnectX-4 Lx 2x25GbE PCIe Adapter #2	Up	

5. After verifying the name of the network interface used for LAN Over USB, use the command shown in Example 4 to disable this network interface (replace "Ethernet" with the appropriate name from your query results if necessary).

Example 4 PowerShell command to disable a network interface

Disable-NetAdapter -Name "Ethernet"

- 6. You will be asked to confirm this action. Press "y" and Enter to confirm.
- 7. Repeat the command shown in Example 3 to verify that the correct network interface has been disabled, as shown below.

PS C:\> Get-NetAdapter   Format-Table Name, InterfaceDescription, Status			
Name	InterfaceDescription	Status	
Management Physical 2	Intel(R) Ethernet Connection X722 for 10GbE SFP+	Up	
Slot6 Port 2	Mellanox ConnectX-4 Lx 2x25GbE PCIe Adapter	Up	
vEthernet (Management)	Hyper-V Virtual Ethernet Adapter	Up	
vSMB1	Hyper-V Virtual Ethernet Adapter #2	Up	
vSMB2	Hyper-V Virtual Ethernet Adapter #3	Up	
Ethernet	IBM USB Remote NDIS Network Adapter	Disabled	
Management Physical 1	Intel(R) Ethernet Connection X722 for 10GbE SFP+ #2	Up	
Slot6 Port 1	Mellanox ConnectX-4 Lx 2x25GbE PCIe Adapter #2	Up	

8. Repeat Steps 1-7 above for each of the remaining HCL cluster nodes.

#### 3.6.3 Disable Flow Control (global pause) on storage interfaces (recommended)

Because of the Quality of Service (QOS) settings applied to the network interfaces in this solution, disabling Flow Control (global pause) is not strictly necessary. However, as a best practice and to avoid confusion during troubleshooting, we explicitly disable Flow Control on the physical NICs that carry storage traffic, since these pNICs should never issue a global pause command in any packet. For the Mellanox NIC used in our example, this is an Advanced Property on the NIC. To make this change, follow these steps:

- 1. In WAC, navigate to Server Manager and then select one of the HCI cluster nodes.
- 2. In the Tools pane on the left, select PowerShell. This will launch a remote PowerShell session against the node and request a password.
- 3. After verifying the appropriate pNIC names in your environment ("Slot6 Port 1" and "Slot6 Port 2" in our examples), use the PowerShell command shown in Example 5 to disable flow control on Mellanox pNIC ports. Make sure to provide the appropriate network interface names in your command.

#### Example 5 PowerShell command to disable Flow Control advanced setting on Mellanox NIC ports

```
Set-NetAdapterAdvancedProperty -Name "Slot6 Port 1","Slot6 Port 2" -RegistryKeyword "*FlowControl" -RegistryValue 0
```

4. To verify that Flow Control has been disabled on the Mellanox pNIC ports, use the PowerShell command shown in Example 6. Again, make sure to provide the appropriate network interface names in the commands you execute.

Example 6 PowerShell command to check advanced properties on Mellanox pNICs

5. You should see in the output from the command shown in Example 6 that Flow Control has been disabled on both ports. The following screen capture from our lab environment shows partial output, including the Flow Control setting for Port 1. Make sure to check that both ports now show the Flow Control setting as Disabled.

<pre>PS C:\&gt; Get-NetAdapterAdvancedProperty -Name "Slot6 Port 1","Slot6 Port 2" -RegistryKeyword "*FlowControl" - RegistryValue 0</pre>				
Name	DisplayName	DisplayValue	RegistryKeyword	RegistryValue
Slot6 Port 1	Encapsulation Overhead	0	*EncapOverhead	{0}
Slot6 Port 1	Encapsulated Task Offload	Enabled	*Encapsulate	{ <b>1</b> }
Slot6 Port 1	NVGRE Encapsulated Task Off	Enabled	*Encapsulate	<b>{1}</b>
Slot6 Port 1	VXLAN Encapsulated Task Off	Enabled	*Encapsulate	<b>{1}</b>
Slot6 Port 1	Flow Control	Disabled	*FlowControl	{0}
Slot6 Port 1	Interrupt Moderation	Enabled	*InterruptMo	<b>{1}</b>
Slot6 Port 1	TDVA Checksum Offload	Ry & Ty Enabled	*TPChecksum0	121

6. Repeat Steps 1-5 above for each of the remaining HCL cluster nodes.

#### 3.6.4 Disable IPv6 (optional)

If you do not use IPv6 in your environment, you can disable it on all network interfaces without impacting the HCI cluster. Since there is currently no way to do this from WAC, we again turn to PowerShell. To disable IPv6 on all network interfaces, follow these steps:

- 1. In WAC, navigate to Server Manager and then select one of the HCI cluster nodes.
- 2. In the Tools pane on the left, select PowerShell. This will launch a remote PowerShell session against the node and request a password.
- 3. To check whether IPv6 is enabled any network interfaces, run the PowerShell command shown in Example 7.

**Example 7** PowerShell command to check IPv6 enablement on all network interfaces

Get-NetAdapterBinding -ComponentID "ms tcpip6"

4. The command will likely return something similar to the following, where the Enabled column shows True for at least some of the network interfaces.

<pre>PS C:\&gt; Get-NetAdapterBinding -ComponentID "ms_tcpip6"</pre>				
Name	DisplayName	ComponentID	Enabled	
Management Physical 2	Internet Protocol Version 6 (TCP/IPv6)	ms_tcpip6	False	
Slot6 Port 2	Internet Protocol Version 6 (TCP/IPv6)	ms_tcpip6	False	
vEthernet (Management)	Internet Protocol Version 6 (TCP/IPv6)	ms_tcpip6	False	
vSMB1	Internet Protocol Version 6 (TCP/IPv6)	ms_tcpip6	True	
vSMB2	Internet Protocol Version 6 (TCP/IPv6)	ms_tcpip6	True	
Ethernet	Internet Protocol Version 6 (TCP/IPv6)	ms_tcpip6	True	
Management Physical 1	Internet Protocol Version 6 (TCP/IPv6)	ms_tcpip6	False	
Slot6 Port 1	Internet Protocol Version 6 (TCP/IPv6)	ms_tcpip6	False	

5. If this is the case, use the PowerShell command shown in Example 8 to disable IPv6 on all network interfaces.

Get-NetAdapter | Disable-NetAdapterBinding -ComponentID "ms\_tcpip6"

6. Rerunning the command in Example 7 should now return the following:

<pre>PS C:\&gt; Get-NetAdapterBinding -ComponentID "ms_tcpip6"</pre>			
Name 	DisplayName 	ComponentID	Enabled
Management Physical 2 Slot6 Port 2 vEthernet (Management) vSMB1 vSMB2 Ethernet Management Physical 1 Slot5 Port 1	Internet Protocol Version 6 (TCP/IPv6) Internet Protocol Version 6 (TCP/IPv6)	ms_tcpip6 ms_tcpip6 ms_tcpip6 ms_tcpip6 ms_tcpip6 ms_tcpip6 ms_tcpip6	False False False False False False False

7. Repeat Steps 1-6 above for each of the remaining HCL cluster nodes.

Post-deployment configuration is now complete.

## 4 Summary

Lenovo has worked closely with Microsoft for many years to ensure our products perform smoothly and reliably with Microsoft operating systems and software. We have created Lenovo ThinkAgile MX Certified Node and Appliance solutions that contain only servers and server components that have been certified under the Microsoft Azure Stack HCI Program to run Microsoft Storage Spaces Direct (S2D) properly. These solutions provide a solid foundation for customers looking to consolidate both storage and compute capabilities on a single hardware platform. They provide outstanding performance, high availability protection and effortless scale-out growth potential to accommodate evolving business needs.

ThinkAgile MX Series platforms offer the choice of Azure Stack HCI Appliance or Azure Stack HCI Certified Node. These validated platforms help modernize on-premises infrastructure with pre-tested, pre-configured, and easy-to-order configurations, with seamless Azure integration. As a direct and indirect Microsoft Cloud Solution Provider (CSP), Lenovo offers cloud services and subscriptions through the Lenovo Cloud Marketplace, which enable Azure Stack HCI use cases with the ThinkAgile MX platforms.

This document has provided step-by-step instructions for deploying an Azure Stack HCI cluster on Lenovo ThinkAgile MX Certified Nodes and Appliances using the WAC deployment wizard. It has guided the reader through the wizard, explaining each step and providing real world examples from our labs. After completing the deployment wizard, additional configuration steps were presented to ensure readiness of this HCI solution for production use.

## Additional resources

The following additional resources might help to provide background information related to Lenovo ThinkAgile MX solutions and Azure Stack HCI functionality.

### **Lenovo Professional Services**

Lenovo offers an extensive range of solutions, from the simple OS-only laden product to much more complex solutions running cluster and cloud technologies. For customers looking for assistance in the form of design, deploy or migrate, Lenovo Professional Services is your go-to partner.

Our worldwide team of IT Specialists and IT Architects can help customers scope and size the right solutions to meet their requirements, and then accelerate the implementation of the solution with our on-site and remote services. For customers also looking to elevate their own skill sets, our Technology Trainers can craft services that encompass solution deployment plus skills transfer, all in a single affordable package.

To inquire about our extensive service offerings and solicit information on how we can assist in your new Storage Spaces Direct implementation, please contact us at <u>x86svcs@lenovo.com</u>.

For more information about our service portfolio, please see our website:

https://www3.lenovo.com/us/en/data-center/services/c/services?menu-id=services

### Lenovo resources

Lenovo ThinkAgile MX Best Recipes

https://datacentersupport.lenovo.com/us/en/solutions/HT507406

ThinkAgile MX Best Recipe Updates Repository

https://thinkagile.lenovo.com/mx

ThinkAgile MX Information Center

https://thinkagile.lenovofiles.com/help/index.jsp?topic=%2Fcom.lenovo.thinkagile.7Z20.doc%2Fmx\_intro.html

- ThinkAgile MX Documents Lenovo Press https://lenovopress.com/servers/thinkagile/mx-series
- Lenovo ThinkAgile MX Certified Configurations for Azure Stack HCI V1 Servers <u>https://lenovopress.com/lp0866</u>
- Lenovo ThinkAgile MX Certified Configurations for Azure Stack HCI V2 Servers https://lenovopress.com/lp1520
- Microsoft Storage Spaces Direct (S2D) Deployment Guide

https://lenovopress.com/lp0064

#### ThinkAgile MX1021 on SE350 Azure Stack HCI (S2D) Deployment Guide https://lenovopress.com/lp1298

Lenovo XClarity Integrator for Windows Admin Center https://support.lenovo.com/eg/en/solutions/HT507549 Lenovo XClarity Administrator Product Guide

https://lenovopress.com/tips1200-lenovo-xclarity-administrator

Lenovo ThinkAgile MX3520-H Appliance and MX Certified Node with Hybrid Storage for Microsoft Azure Stack HCI (Xeon SP Gen 2) Product Guide

https://lenovopress.com/lp1175

Lenovo ThinkAgile MX3520-F Appliance and MX Certified Node with All Flash Storage for Microsoft Azure Stack HCI (Xeon SP Gen 2) Product Guide

https://lenovopress.com/lp1176

- Lenovo ThinkAgile MX1020 Appliance and MX1021 Certified Node for Microsoft Azure Stack HCI Product Guide https://lenovopress.com/lp1296
- ThinkAgile MX3330 and MX3331 1U Appliances and Certified Nodes (Intel Xeon SP Gen 3) Product Guide https://lenovopress.com/lp1511
- ThinkAgile MX3530 and MX3531 2U Appliances and Certified Nodes (Intel Xeon SP Gen 3) Product Guide https://lenovopress.com/lp1512

Lenovo Professional Services

https://www.lenovo.com/us/en/data-center/services/c/services?menu-id=services

#### Lenovo Premier Support Overview, Resources and Tools

https://lenovopub.jiveon.com/docs/DOC-10010

### **Microsoft resources**

#### Microsoft WSSD program

https://docs.microsoft.com/en-us/windows-server/sddc

#### HCI solutions from Microsoft

https://www.microsoft.com/en-us/cloud-platform/software-defined-datacenter

#### Microsoft blog "The technical value of WSSD validated HCI solutions"

https://cloudblogs.microsoft.com/windowsserver/2018/02/20/the-technical-value-of-wssd-validated-hci-solutions-part-1/ https://cloudblogs.microsoft.com/windowsserver/2018/02/21/the-technical-value-of-validated-hci-solutions-part-2/

#### Storage Spaces Direct overview

https://docs.microsoft.com/en-us/windows-server/storage/storage-spaces/storage-spaces-direct-overview

#### Taking a Storage Spaces Direct server offline for maintenance

https://docs.microsoft.com/en-us/windows-server/storage/storage-spaces/maintain-servers

#### Manage HCI with Windows Admin Center

https://docs.microsoft.com/en-us/windows-server/manage/windows-admin-center/use/manage-hyper-converged

#### Mirror-accelerated parity details

https://docs.microsoft.com/en-us/windows-server/storage/refs/mirror-accelerated-parity

#### What's new in Windows Server 2022

https://docs.microsoft.com/en-us/windows-server/get-started/whats-new-in-windows-server-2022

#### What's new in Windows Server 2019

https://docs.microsoft.com/en-us/windows-server/get-started-19/whats-new-19

#### What's new in Storage in Windows Server

https://docs.microsoft.com/en-us/windows-server/storage/whats-new-in-storage

#### Delimit the allocation of volumes in Storage Spaces Direct

https://docs.microsoft.com/en-us/windows-server/storage/storage-spaces/delimit-volume-allocation

## Change history

This is the initial release of this document.

#### Changes in the November 2021 update:

Added steps to enable iWARP RDMA mode on Marvell network adapters before launching the WAC deployment wizard

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