

StarWind Virtual HCI Appliance: Configuration Guide for Proxmox Virtual Environment

2026

TECHNICAL PAPERS



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About StarWind

StarWind is a pioneer in virtualization and a company that participated in the development of this technology from its earliest days. Now the company is among the leading vendors of software and hardware hyper-converged solutions. The company's core product is the years-proven StarWind Virtual SAN, which allows SMB and ROBO to benefit from cost-efficient hyperconverged IT infrastructure. Having earned a reputation of reliability, StarWind created a hardware product line and is actively tapping into hyperconverged and storage appliances market. In 2016, Gartner named StarWind “Cool Vendor for Compute Platforms” following the success and popularity of StarWind HyperConverged Appliance. StarWind partners with world-known companies: Microsoft, VMware, Veeam, Intel, Dell, Mellanox, Citrix, Western Digital, etc.

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Annotation

Relevant products

StarWind Virtual HCI Appliance (VHCA)

Purpose

This document outlines how to configure a StarWind Virtual HCI Appliance (VHCA) based on Proxmox Virtual Environment, with VSAN running as a Controller Virtual Machine (CVM). The guide includes steps to prepare Proxmox VE hosts for clustering, configure physical and virtual networking, and set up the Virtual SAN Controller Virtual Machine.

Audience

This technical guide is intended for storage and virtualization architects, system administrators, and partners designing virtualized environments using StarWind Virtual HCI Appliance (VHCA).

Expected result

The end result of following this guide will be a fully configured high-availability StarWind Virtual HCI Appliance (VHCA) powered by Microsoft Windows Server that includes virtual machine shared storage provided by StarWind VSAN.

Prerequisites

Prior to configuring StarWind Virtual HCI Appliance (VHCA), please make sure that the system meets the requirements, which are available via the following link:

<https://www.starwindsoftware.com/system-requirements>

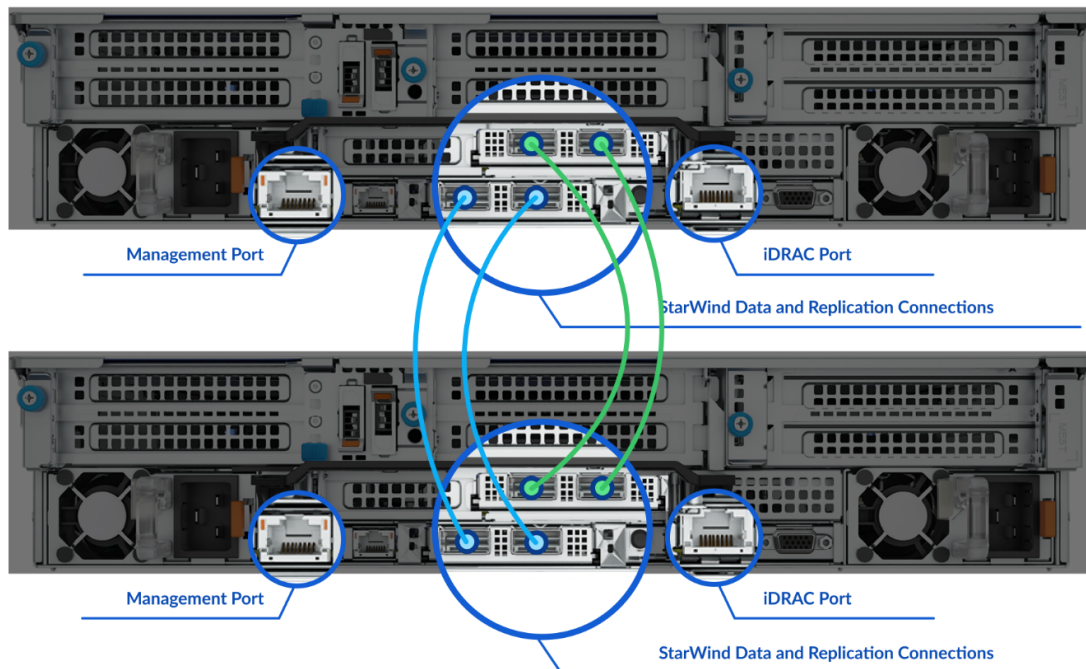
Recommended RAID settings for HDD and SSD disks:

<https://knowledgebase.starwindsoftware.com/guidance/recommended-raid-settings-for-hdd-and-ssd-disks/>

Please read StarWind Virtual SAN Best Practices document for additional information:

<https://www.starwindsoftware.com/resource-library/starwind-virtual-san-best-practices>

Solution Diagram:



Prerequisites:

1. 2 servers with local storage, which have direct network connections for Synchronization and iSCSI/StarWind heartbeat traffic.
2. Servers should have local storage available for Microsoft Windows Server and StarWind VSAN Controller Virtual Machine. CVM utilizes local storage to create replicated shared storage connected to Proxmox VE nodes via iSCSI.
3. StarWind HA devices require at least 2 separate network links between the nodes. The first one is used for iSCSI traffic, the second one is used for Synchronization traffic.

NOTE. The network interfaces on each node for Synchronization and iSCSI/StarWind heartbeat interfaces should be in different subnets and connected directly according to the network diagram above. Here, the 172.16.10.x subnet is used for the iSCSI/StarWind heartbeat traffic, while the 172.16.20.x subnet is used for the Synchronization traffic.

4. 2-nodes cluster requires quorum. iSCSI/SMB/NFS cannot be used for this purposes.

QDevice-Net package must be installed on 3rd Linux server, which will act as a witness.

https://pve.proxmox.com/wiki/Cluster_Manager#_corosync_external_vote_support

Hardware Configuration

Access the BIOS on each server:

1. Change "Boot mode select" to [UEFI]

System BIOS Settings • Boot Settings

Boot Mode ☐ BIOS ☒ UEFI
 Boot Sequence Retry ☐ Enabled ☒ Disabled ☐ Reset

2. Enable AC Power Recovery to On;

AC Power Recovery ☐ Last ☒ On ☐ Off

3. Set System Profile Settings to Performance;

System BIOS Settings • System Profile Settings

System Profile Performance

4. Disable Patrol Read in case of SSD disks;

RAID Controller in Slot 6: Dell PERC H750 Adapter Configuration Utility

Dashboard View • Main Menu • Patrol Read

Start

Suspend

Resume

Stop

State Stopped

Iterations 8

Mode ☐ Auto ☐ Manual ☒ Disabled

Apply Changes

5. Enable SR-IOV for network cards;

Integrated NIC 1 Port 1: Mellanox ConnectX-4 LX 25GbE SFP Rack NDC - 0C:42:A1:F3:FA:50

Main Configuration Page • Device Level Configuration

Virtualization Mode ☐ None ☒ SR-IOV

PCI Virtual Functions Advertised 8

6. Configure the storage for OS and for data, or single RAID for OS and Data according to Supported RAID configurations [here](#).

Settings for OS RAID1:

Virtual disk name: OS

Disk cache policy: Default (enabled by default)

Write policy: Write Through

Read policy: No read ahead

Stripe Size: 64K

BOSS-S1 Configuration Utility • Create RAID Configuration Menu • Create Virtual Disk

RAID Level	☒ RAID1
Stripe Size	☒ 64K
Virtual Disk Size	223GB
Quick Initialization	☐ No ☒ Yes
Name	OS
Would you like to create this virtual disk?	☐ No ☒ Yes

[\[Next\]](#)

Storage for data:

Supported RAID configurations for main data storage you can find [here](#).

Dashboard View • Main Menu • Virtual Disk Management

Virtual Disk 239: SSD-RAID5, RAID5, 8.729TB, Ready

Deploying Proxmox Ve

1. Download Proxmox VE:

<https://www.proxmox.com/en/downloads>

2. Boot from the downloaded ISO.

3. Press I agree to accept EULA.



END USER LICENSE AGREEMENT (EULA)

END USER LICENSE AGREEMENT (EULA) FOR PROXMOX VIRTUAL ENVIRONMENT (PROXMOX VE)

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3. Limitation of Liability. To the maximum extent permitted under applicable law, under no

Abort

Previous

I agree

4. Choose harddisk for PVE installation. Click Next



Proxmox Virtual Environment (PVE)

The Proxmox Installer automatically partitions your hard disk. It installs all required packages and makes the system bootable from the hard disk. All existing partitions and data will be lost.

Press the Next button to continue the installation.

- **Please verify the installation target**
The displayed hard disk will be used for the installation.
Warning: All existing partitions and data will be lost.
- **Automatic hardware detection**
The installer automatically configures your hardware.
- **Graphical user interface**
Final configuration will be done on the graphical user interface, via a web browser.

Target Harddisk /dev/sda (200.00GiB, Virtual disk) ▼

Options

Abort

Previous

Next

5. Choose Time Zone. Click Next



Location and Time Zone selection

The Proxmox Installer automatically makes location-based optimizations, like choosing the nearest mirror to download files from. Also make sure to select the correct time zone and keyboard layout.

Press the Next button to continue the installation.

- **Country:** The selected country is used to choose nearby mirror servers. This will speed up downloads and make updates more reliable.
- **Time Zone:** Automatically adjust daylight saving time.
- **Keyboard Layout:** Choose your keyboard layout.

A screenshot of the Proxmox VE Installer configuration screen. It has a light gray background. In the center, there are three rows of configuration options. The first row is 'Country' with a text input field containing 'United States'. The second row is 'Time zone' with a dropdown menu showing 'America/New_York'. The third row is 'Keyboard Layout' with a dropdown menu showing 'U.S. English'. At the bottom left is an 'Abort' button. At the bottom right are 'Previous' and 'Next' buttons.

6. Set Administration Password and Email Address. Click Next



Administration Password and Email Address

Proxmox Virtual Environment is a full featured, highly secure GNU/Linux system, based on Debian.

In this step, please provide the *root* password.

- **Password:** Please use a strong password. It should be at least 8 characters long, and contain a combination of letters, numbers, and symbols.
- **Email:** Enter a valid email address. Your Proxmox VE server will send important alert notifications to this email account (such as backup failures, high availability events, etc.).

Press the Next button to continue the installation.

Password:
 Confirm:
 Email:

7. Configure Management Network. Click Next



Management Network Configuration

Please verify the displayed network configuration. You will need a valid network configuration to access the management interface after installing.

After you have finished, press the Next button. You will be shown a list of the options that you chose during the previous steps.

- **IP address (CIDR):** Set the main IP address and netmask for your server in CIDR notation.
- **Gateway:** IP address of your gateway or firewall.
- **DNS Server:** IP address of your DNS server.

Management Interface:

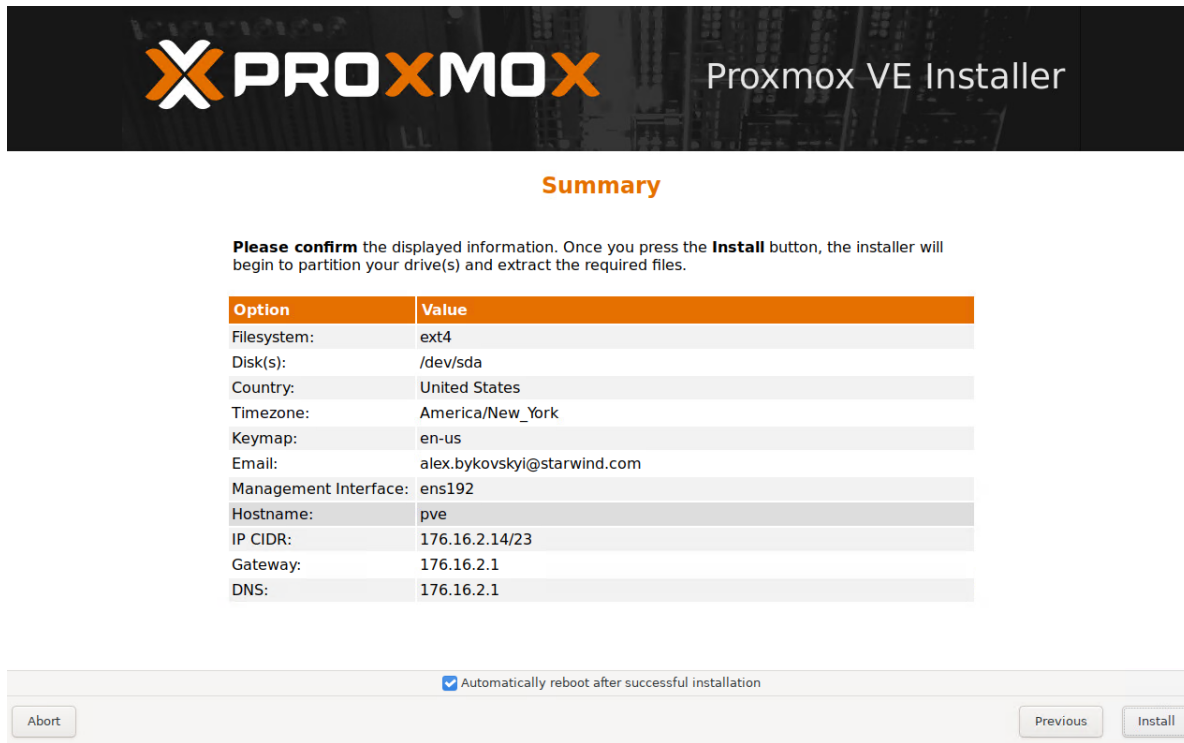
Hostname (FQDN):

IP Address (CIDR): /

Gateway:

DNS Server:

8. Verify settings. Click Install



The image shows the Proxmox VE Installer Summary screen. At the top, there is a header with the Proxmox logo and the text "Proxmox VE Installer". Below the header, the word "Summary" is centered. A message states: "Please confirm the displayed information. Once you press the **Install** button, the installer will begin to partition your drive(s) and extract the required files." Below this message is a table with two columns: "Option" and "Value". The table contains the following data:

Option	Value
Filesystem:	ext4
Disk(s):	/dev/sda
Country:	United States
Timezone:	America/New_York
Keymap:	en-us
Email:	alex.bykovskiy@starwind.com
Management Interface:	ens192
Hostname:	pve
IP CIDR:	176.16.2.14/23
Gateway:	176.16.2.1
DNS:	176.16.2.1

At the bottom of the screen, there is a checkbox labeled "Automatically reboot after successful installation" which is checked. Below the checkbox are three buttons: "Abort", "Previous", and "Install".

Preconfiguring Proxmox Ve Hosts

1. ProxMox cluster should be created before deploying any virtual machines.
2. 2-nodes cluster requires quorum. iSCSI/SMB/NFS cannot be used for this purposes. QDevice-Net package must be installed on 3rd Linux server, which will act as a witness.

https://pve.proxmox.com/wiki/Cluster_Manager#_corosync_external_vote_support

3. Install qdevice on witness server:

```
ubuntu# apt install corosync-qnetd
```

4. Install qdevice on both cluster nodes:

```
pve# apt install corosync-qdevice
```

5. Configure quorum running the following command on one of the Proxmox node (change IP address)

```
pve# pvecm qdevice setup %IP_Address_Of_Qdevice%
```

6. Configure network interfaces on each node to make sure that Synchronization and iSCSI/StarWind heartbeat interfaces are in different subnets and connected according to the network diagram above. In this document, 172.16.10.x subnet is used for iSCSI/StarWind heartbeat traffic, while 172.16.20.x subnet is used for the Synchronization traffic. Choose node and open System -> Network page.

The screenshot shows the Proxmox Virtual Environment 8.1.4 interface. On the left, the 'Server View' sidebar shows a datacenter named 'sw-demo-cluster' with two nodes: 'sw-demo-node-01' and 'sw-demo-node-02'. The 'sw-demo-node-01' node is selected, and its configuration is shown in the main panel. The 'Network' tab is active, displaying a table of network interfaces.

Name ↑	Type	Active	Autostart	VLAN a...	Por
eno1	Network Device	No	No	No	
eno2	Network Device	No	No	No	
eno3	Network Device	Yes	No	No	
eno4	Network Device	No	No	No	
ens1f0np0	Network Device	Yes	No	No	
ens1f1np1	Network Device	Yes	No	No	

7. Click Create. Choose Linux Bridge.

The screenshot shows the Proxmox Virtual Environment 8.1.4 interface, similar to the previous one, but with the 'Create' dropdown menu open. The menu lists several options: 'Linux Bridge', 'Linux Bond', 'Linux VLAN', 'OVS Bridge', 'OVS Bond', 'OVS IntPort', and 'ens1f1np1'. The 'Linux Bridge' option is highlighted.

8. Create Linux Bridge and set IP address. Set MTU to 9000. Click Create.

Create: Linux Bridge

Name:	vbr1	Autostart:	☒
IPv4/CIDR:	172.16.10.1/24	VLAN aware:	☐
Gateway (IPv4):		Bridge ports:	ens10np0
IPv6/CIDR:		Comment:	
Gateway (IPv6):			

MTU:

Help
Advanced ☒
Create

9. Repeat step 8 for all network adapters, which will be used for Synchronization and iSCSI/StarWind heartbeat traffic.

10. Verify network configuration in `/etc/network/interfaces` file. Login to the node via SSH and check the contents of the file.

```

auto lo
iface lo inet loopback

iface enp1s0 inet manual

iface enp7s0 inet manual
    mtu 9000
iface enp8s0 inet manual
    mtu 9000
auto vmbr0
iface vmbr0 inet static
    address 172.16.2.37/24
    gateway 172.16.2.1
    bridge-ports enp1s0
    bridge-stp off
    bridge-fd 0

auto vmbr1
iface vmbr1 inet static
    address 172.16.10.1/24
    bridge-ports enp7s0
    bridge-stp off
    bridge-fd 0
    mtu 9000

auto vmbr2
iface vmbr2 inet static
    address 172.16.20.1/24
    bridge-ports enp8s0
    bridge-stp off
    bridge-fd 0
    mtu 9000
-- INSERT --

```

11. Enable IOMMU support in kernel, if PCIe passthrough will be used to pass RAID Controller, HBA or NVMe drives to the VM. Update grub configuration file.

For Intel CPU:

Add “intel_iommu=on iommu=pt” to GRUB_CMDLINE_LINUX_DEFAULT line in /etc/default/grub file.

For AMD CPU:

Add “iommu=pt” to GRUB_CMDLINE_LINUX_DEFAULT line in /etc/default/grub file.

```

root@sw-demo-node-01:~# cat /etc/default/grub
# If you change this file, run 'update-grub' afterwards to update
# /boot/grub/grub.cfg.
# For full documentation of the options in this file, see:
#   info -f grub -n 'Simple configuration'

GRUB_DEFAULT=0
GRUB_TIMEOUT=5
GRUB_DISTRIBUTOR=`lsb_release -i -s 2> /dev/null || echo Debian`
GRUB_CMDLINE_LINUX_DEFAULT="quiet intel_iommu=on iommu=pt"
GRUB_CMDLINE_LINUX=""

# If your computer has multiple operating systems installed, then you
# probably want to run os-prober. However, if your computer is a host
# for guest OSes installed via LVM or raw disk devices, running
# os-prober can cause damage to those guest OSes as it mounts
# filesystems to look for things.
#GRUB_DISABLE_OS_PROBER=false

# Uncomment to enable BadRAM filtering, modify to suit your needs
# This works with Linux (no patch required) and with any kernel that obtains
# the memory map information from GRUB (GNU Mach, kernel of FreeBSD ...)
#GRUB_BADRAM="0x01234567,0xfefefefe,0x89abcdef,0xefefefef"

# Uncomment to disable graphical terminal
#GRUB_TERMINAL=console

# The resolution used on graphical terminal
# note that you can use only modes which your graphic card supports via VBE
# you can see them in real GRUB with the command `vbeinfo'
#GRUB_GFXMODE=640x480

# Uncomment if you don't want GRUB to pass "root=UUID=xxx" parameter to Linux
#GRUB_DISABLE_LINUX_UUID=true

# Uncomment to disable generation of recovery mode menu entries
#GRUB_DISABLE_RECOVERY="true"

# Uncomment to get a beep at grub start
#GRUB_INIT_TUNE="480 440 1"
root@sw-demo-node-01:~# █

```

12. Reboot the host.

13. Repeat steps 6-12 an all nodes.

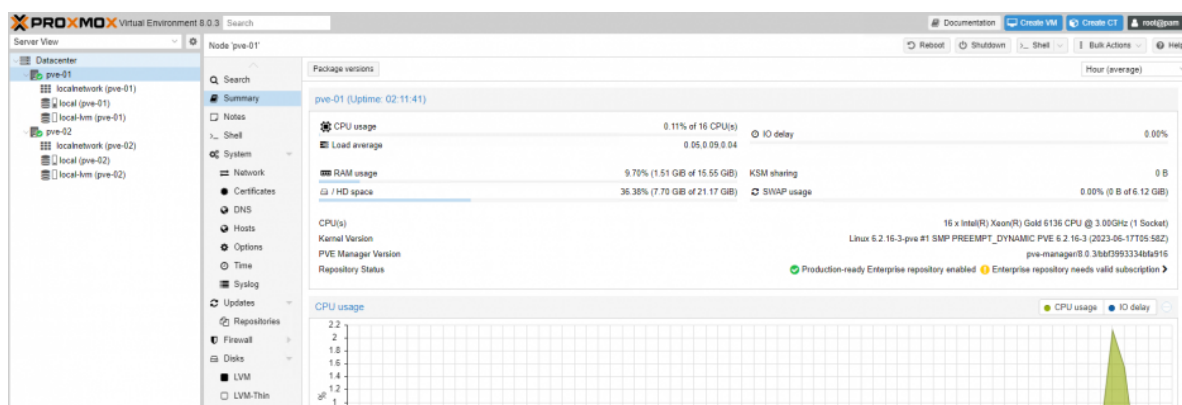
Deploying Starwind Vsan Controller Vm

1. Download StarWind VSAN CVM KVM: [VSAN by StarWind: Overview](#)
2. Extract the VM CVM.qcow2 file from the downloaded archive.

3. Upload CVM.qcow2 file to the Proxmox Host via any SFTP client (e.g. WinSCP) to /root/ directory.

/root/					
Name	Size	Changed	Rights	Owner	
..		2/26/2024 8:35:01 AM	rw-r--r--	root	
CVM-0.qcow2	10,614,3...	3/18/2024 6:13:02 AM	rw-r--r--	root	

4. Create a VM without OS. Login to Proxmox host via Web GUI. Click Create VM.



5. Choose node to create VM. Enable Start at boot checkbox and set Start/Shutdown order to 1. Click Next.

Create: Virtual Machine

General

OS

System

Disks

CPU

Memory

Network

Confirm

Node:

sw-demo-node-01

Resource Pool:

VM ID:

100

Name:

CVM01

Start at boot:

☒

Start/Shutdown order:

1

Startup delay:

default

Shutdown timeout:

default

Tags

No Tags +

Help

Advanced ☒

Back

Next

6. Choose Do not use any media and choose Guest OS Linux. Click Next.

Create: Virtual Machine

General
OS
System
Disks
CPU
Memory
Network
Confirm

☐ Use CD/DVD disc image file (iso)

Storage: local

ISO image:

Guest OS:

Type: Linux

Version: 6.x - 2.6 Kernel

☐ Use physical CD/DVD Drive

☒ Do not use any media

Advanced
Back
Next

7. Specify system options. Choose Machine type q35 and check the Qemu Agent box. Click Next.

Create: Virtual Machine

General
OS
System
Disks
CPU
Memory
Network
Confirm

Graphic card: Default

SCSI Controller: VirtIO SCSI single

Machine: q35

Qemu Agent: ☒

Firmware

BIOS: Default (SeaBIOS)

Add TPM: ☐

? Help

Advanced ☒
Back
Next

8. Remove all disks from the VM. Click Next.

Create: Virtual Machine
ⓧ

General
OS
System
Disks
CPU
Memory
Network
Confirm

No Disks

+ Add

Advanced ☐
Back
Next

9. Assign 8 cores to the VM and choose Host CPU type. Click Next.

Create: Virtual Machine

General
OS
System
Disks
CPU
Memory
Network
Confirm

Sockets:
1

Cores:
8

Type:
host

Total cores:
8

Help
Advanced
Back
Next

10. Assign at least 8GB of RAM to the VM. Click Next.

Create: Virtual Machine

General

OS

System

Disks

CPU

Memory

Network

Confirm

Memory (MiB):

8192

?

 Help

Advanced ☐

Back

Next

11. Configure Management network for the VM. Click Next.

Create: Virtual Machine

General
OS
System
Disks
CPU
Memory
Network
Confirm

☐ No network device

Bridge:
vmbr0

VLAN Tag:
no VLAN

Firewall:
☒

Model:
VirtIO (paravirtualized)

MAC address:
auto

? Help
Advanced ☐
Back
Next

12. Confirm settings. Click Finish.

Create: Virtual Machine

General
OS
System
Disks
CPU
Memory
Network
Confirm

Key ↑	Value
agent	1
cores	8
cpu	host
ide2	none,media=cdrom
machine	q35
memory	8192
name	CVM01
net0	virtio,bridge=vmbr0,firewall=1
nodename	sw-demo-node-01
numa	0
onboot	1
ostype	l26
scsihw	virtio-scsi-single
sockets	1

☐ Start after created

Advanced ☐
Back
Finish

13. Connect to Proxmox host via SSH. Attach StarWindAppliance.qcow2 file to the VM.

```
qm importdisk 100 /root/StarWindAppliance.qcow2 local-lvm
```

14. Open VM and go to Hardware page. Add unused SCSI disk to the VM.

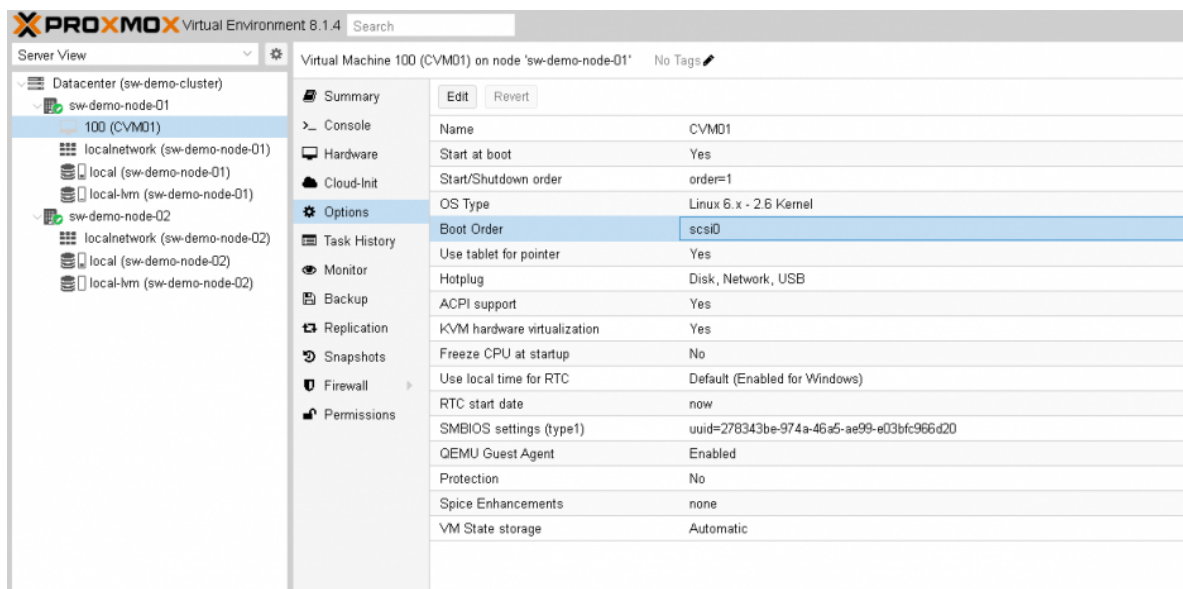
15. Attach Network interfaces for Synchronization and iSCSI/Heartbeat traffic.

Add: Network Device

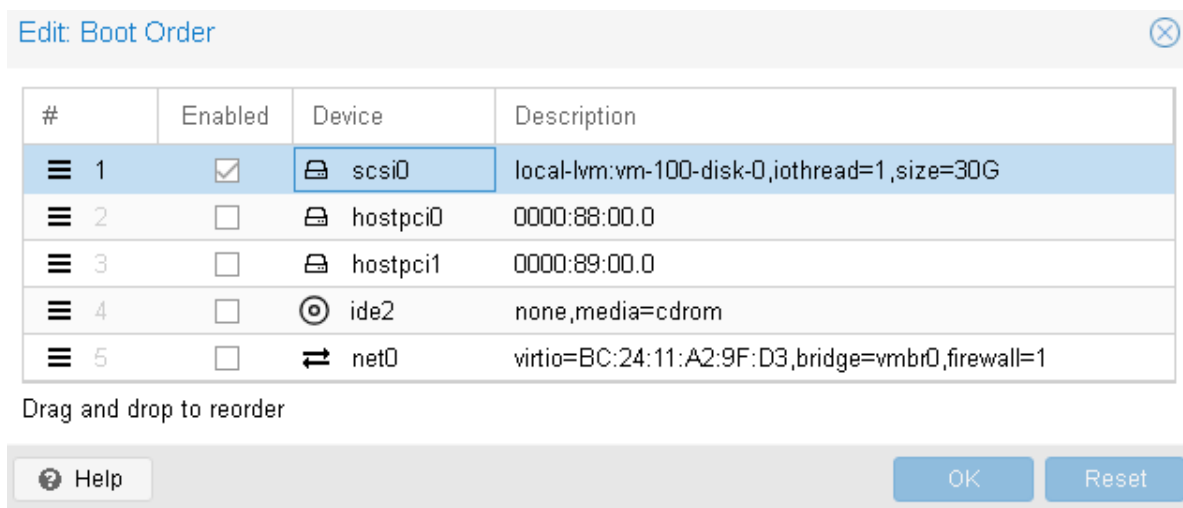
Bridge:
vmbr2
Model:
VirtIO (paravirtualized)
VLAN Tag:
no VLAN
MAC address:
auto
Firewall:
☒

? Help
Advanced ☐
Add

16. Open Options page of the VM. Select Boot Order and click Edit.



17. Move scsi0 device as #1 to boot from.



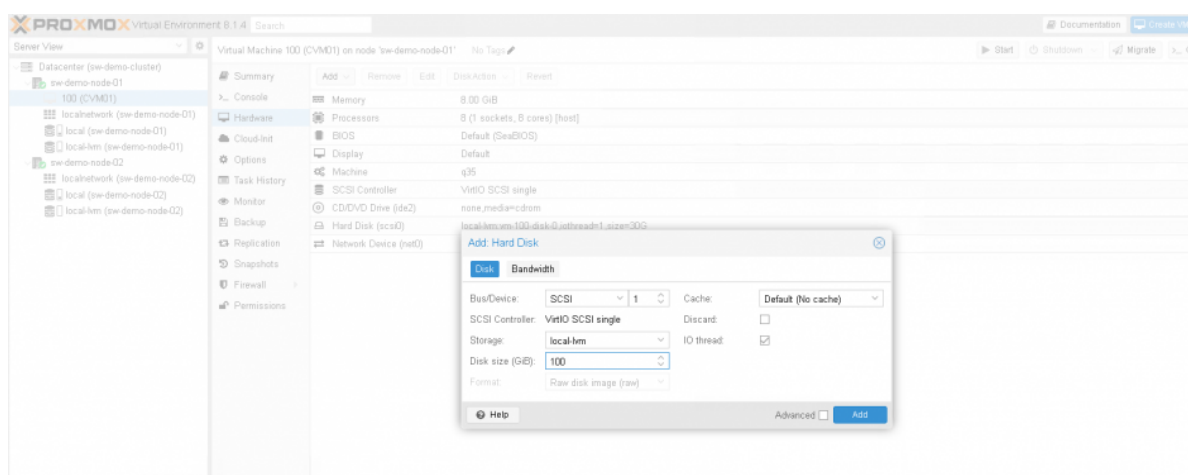
18. Repeat all the steps from this section on other Proxmox hosts.

Attaching Storage Starwind Virtual San Cvm

Please follow the steps below to attach desired storage type to the CVM

Attaching Virtual Disk

1. Open VM Hardware page in Proxmox and add drive to the VM, which going to be used by StarWind service. Specify size of the Virtual disk and click OK.

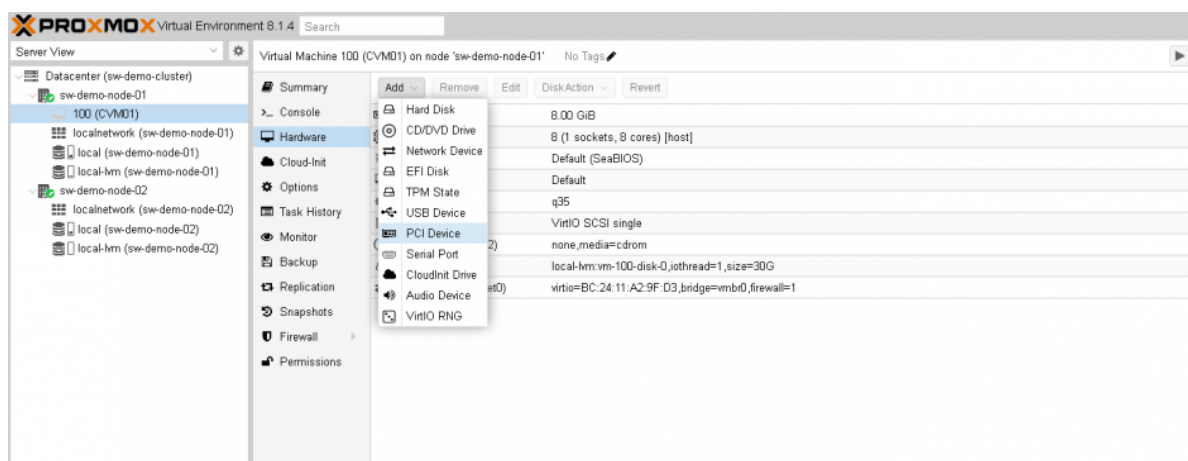


NOTE. It is recommended to use VirtIO SCSI single controller for better performance. If multiple virtual disks are needed to be used in a software RAID inside of the CVM, VirtIO SCSI controller should be used.

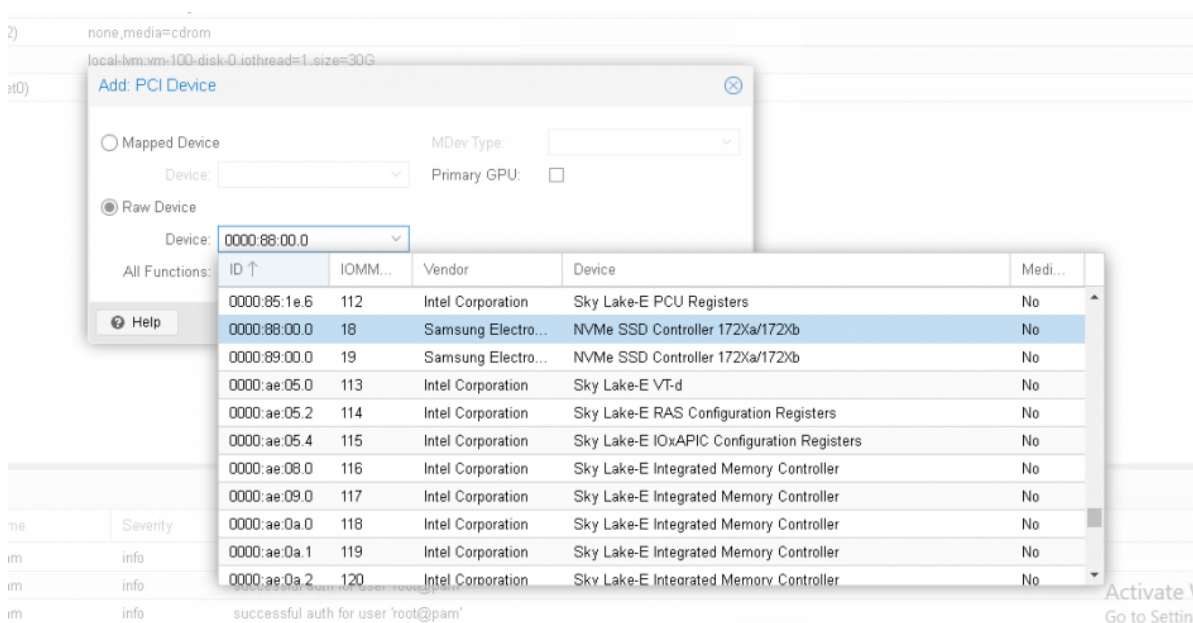
2. Repeat step 1 to attach additional Virtual Disks.
3. Start VM.
4. Repeat steps 1-2 on all nodes

Attaching Pcie Device

1. Shutdown StarWind VSAN CVM.
2. Open VM Hardware page in Proxmox and click Add -> PCI Device.



3. Choose PCI Device from drop-down list.



4. Click Add.

Add: PCI Device

☐ Mapped Device

MDev Type:

Device:

☒ Raw Device

Device: 0000:88:00.0

All Functions:

☐ Primary GPU:

☐ Advanced

5. Edit Memory. Uncheck Ballooning Device. Click OK.

Edit: Memory

Memory (MiB): 8192

Minimum memory (MiB): 8192

Shares: Default (1000)

Ballooning Device:

☒ Advanced

6. Start VM.

7. Repeat steps 1-6 on all nodes.

Initial Configuration Wizard

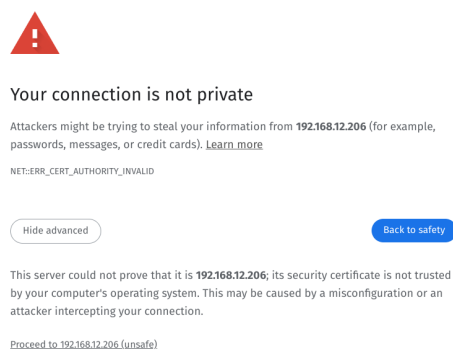
1. Start the StarWind Virtual SAN Controller Virtual Machine.

2. Launch the VM console to view the VM boot process and obtain the IPv4 address of the Management network interface.

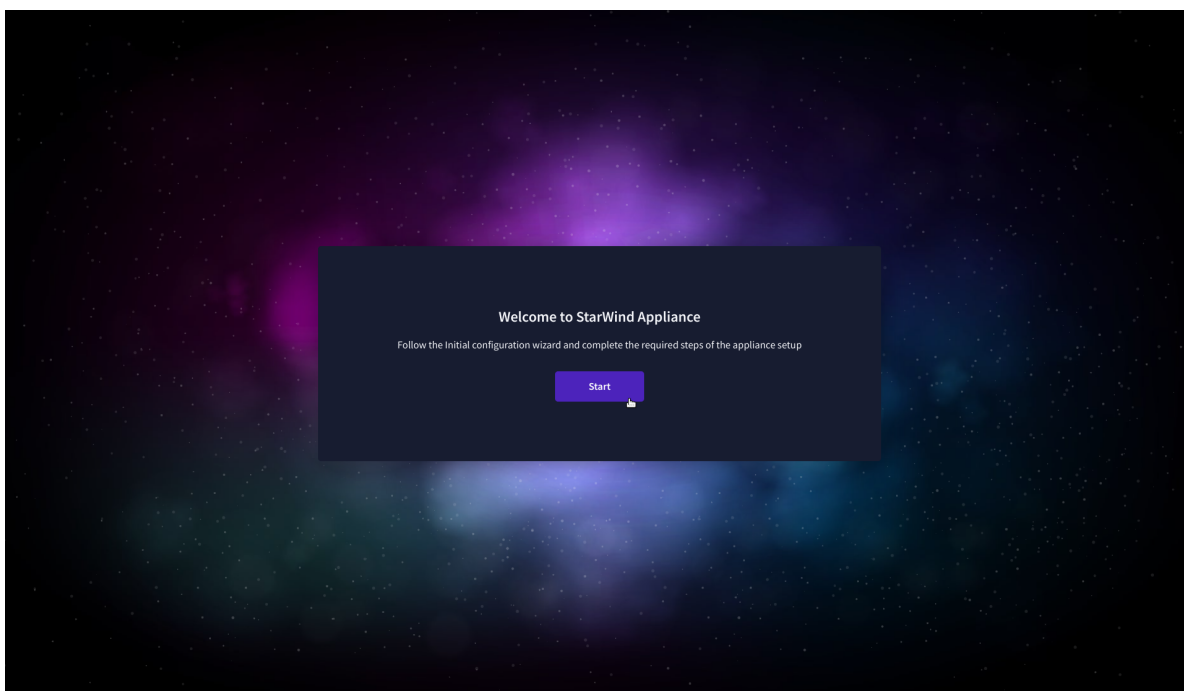
NOTE: If the VM does not acquire an IPv4 address from a DHCP server, use the Text-based User Interface (TUI) to set up the Management network manually.

Default credentials for TUI: user/rds123RDS

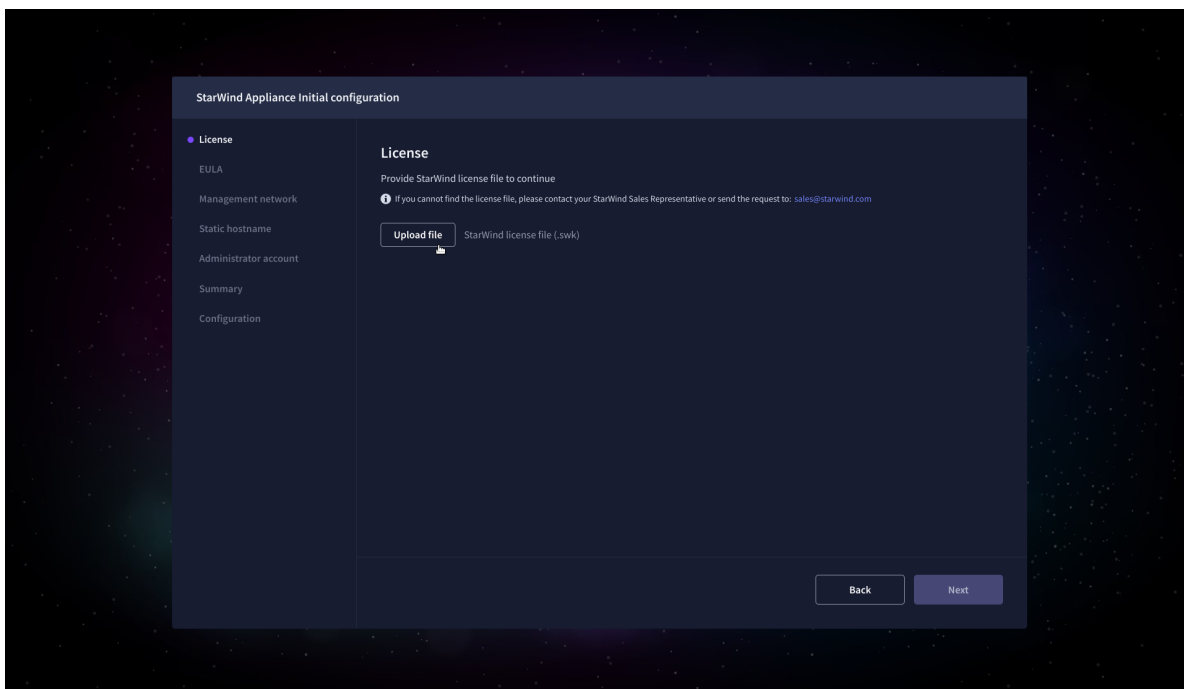
3. Using a web browser, open a new tab and enter the VM's IPv4 address to access the StarWind VSAN Web Interface. On the Your connection is not private screen, click Advanced and then select Continue to...



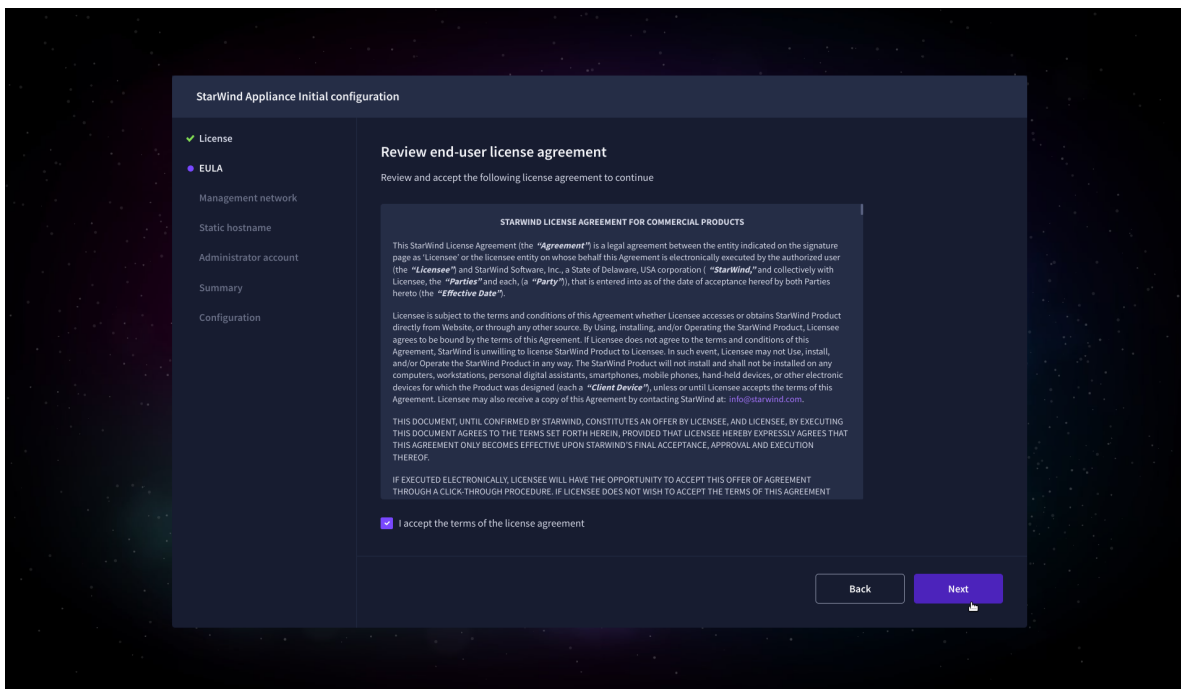
4. On the Welcome to StarWind Appliance screen, click Start to launch the Initial Configuration Wizard.



5. On the License step, upload the StarWind Virtual SAN license file.

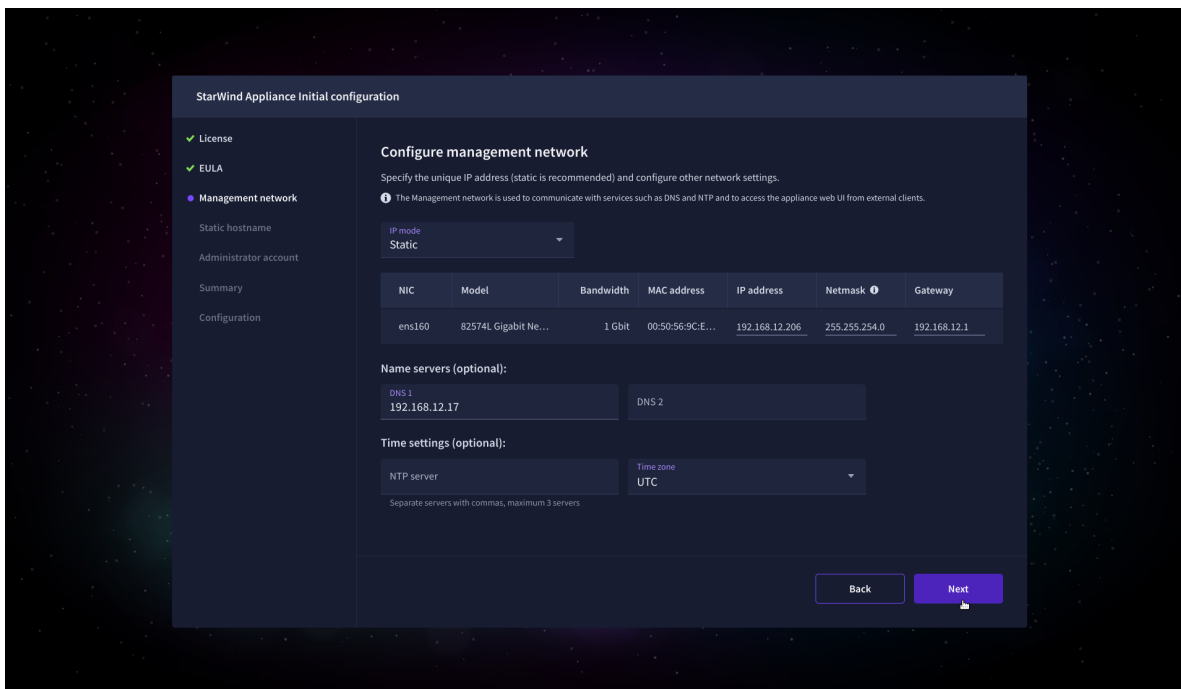


6. On the EULA step, read and accept the End User License Agreement to continue.

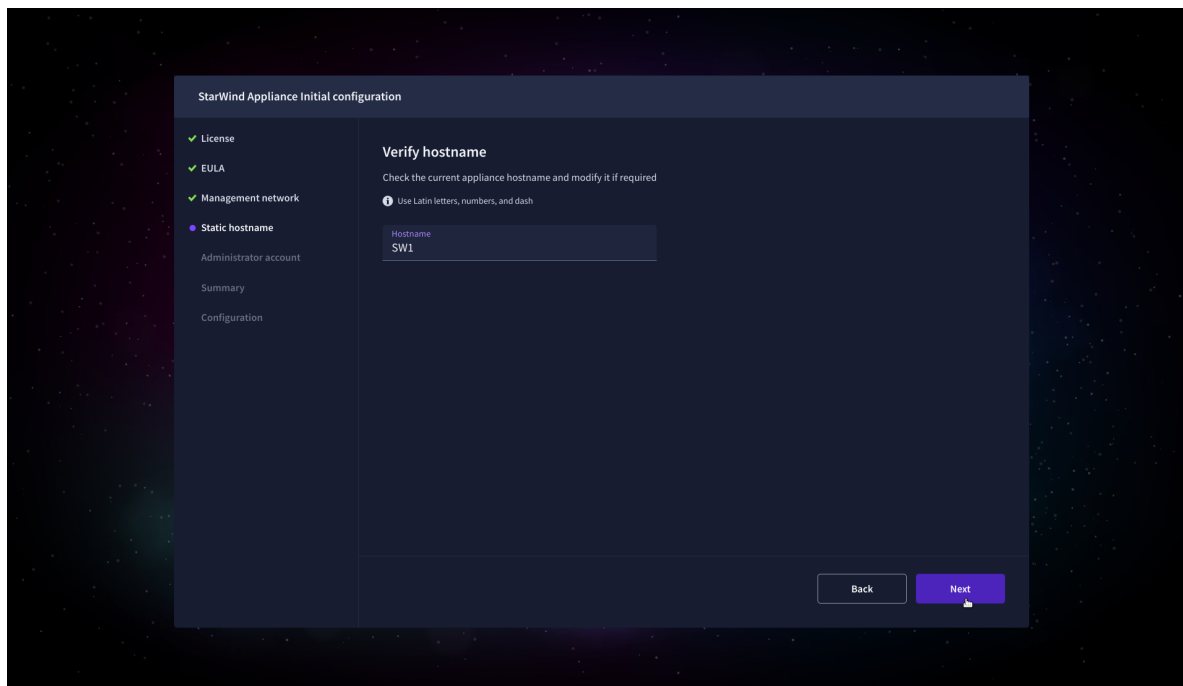


7. On the Management network step, review or edit the network settings and click Next.

IMPORTANT: The use of Static IP mode is highly recommended.

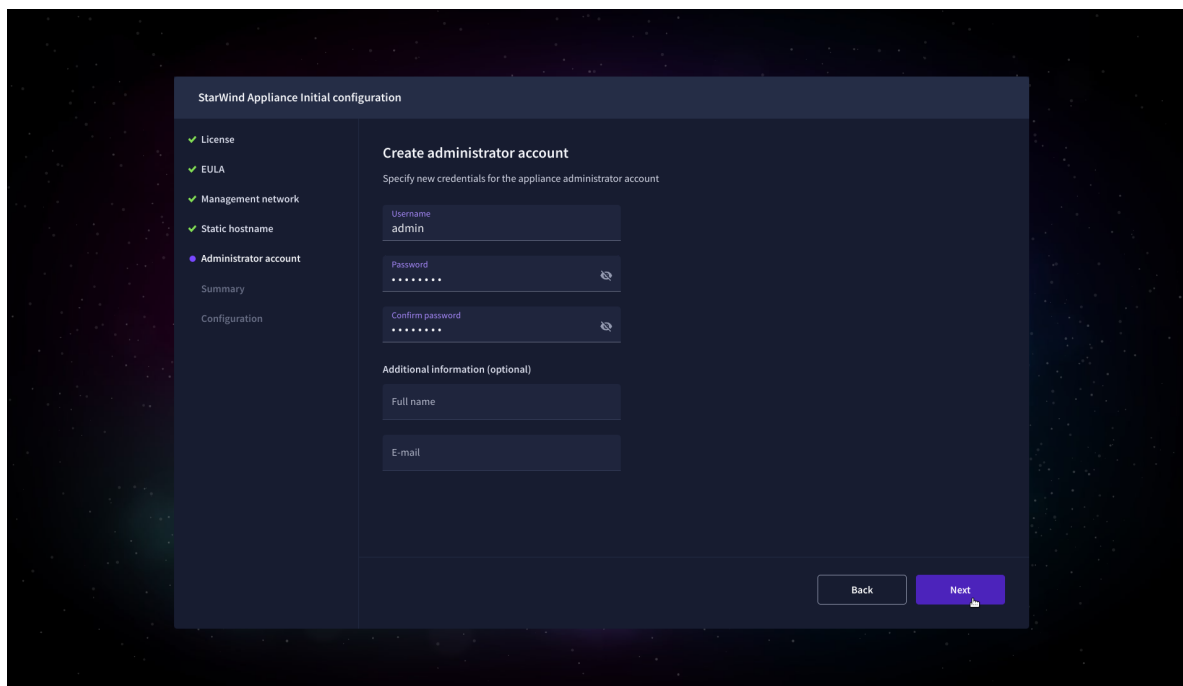


8. On the Static hostname, specify the hostname for the virtual machine and click Next.



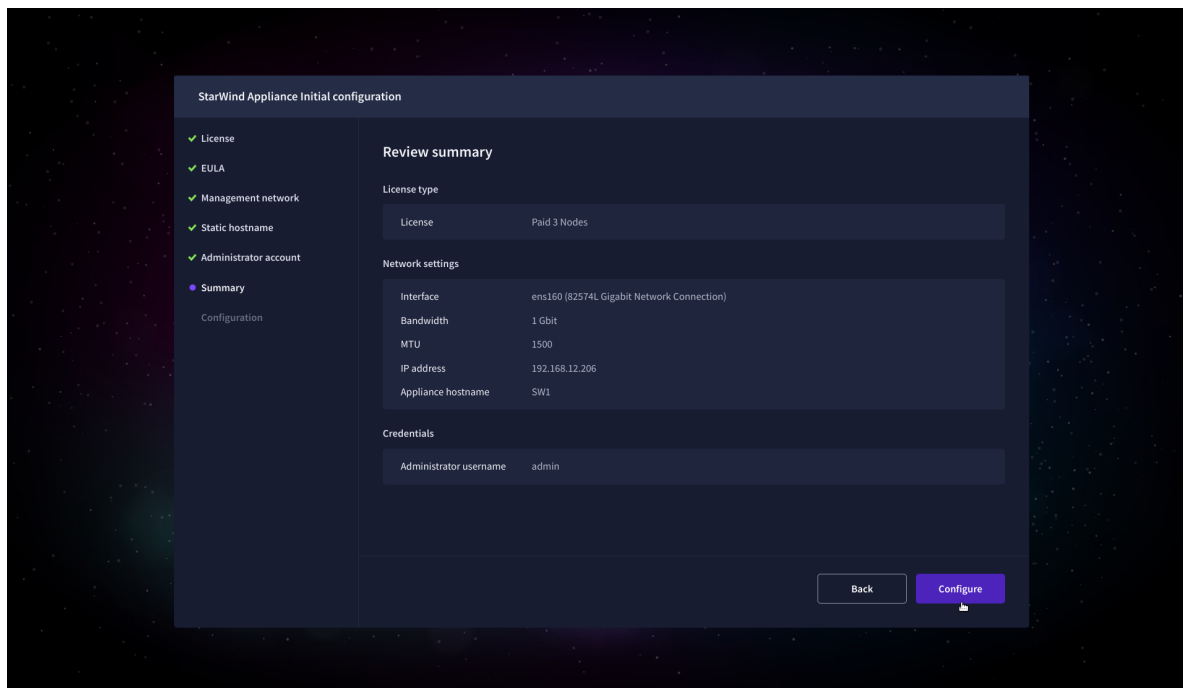
The screenshot shows the 'StarWind Appliance Initial configuration' window. On the left sidebar, the steps are: License (checked), EULA (checked), Management network (checked), Static hostname (selected), Administrator account, Summary, and Configuration. The main panel is titled 'Verify hostname' and contains the instruction 'Check the current appliance hostname and modify it if required'. Below this is a note: 'Use Latin letters, numbers, and dash'. A text input field labeled 'Hostname' contains the value 'SW1'. At the bottom right, there are 'Back' and 'Next' buttons.

9. On the Administrator account step, specify the credentials for the new StarWind Virtual SAN administrator account and click Next.

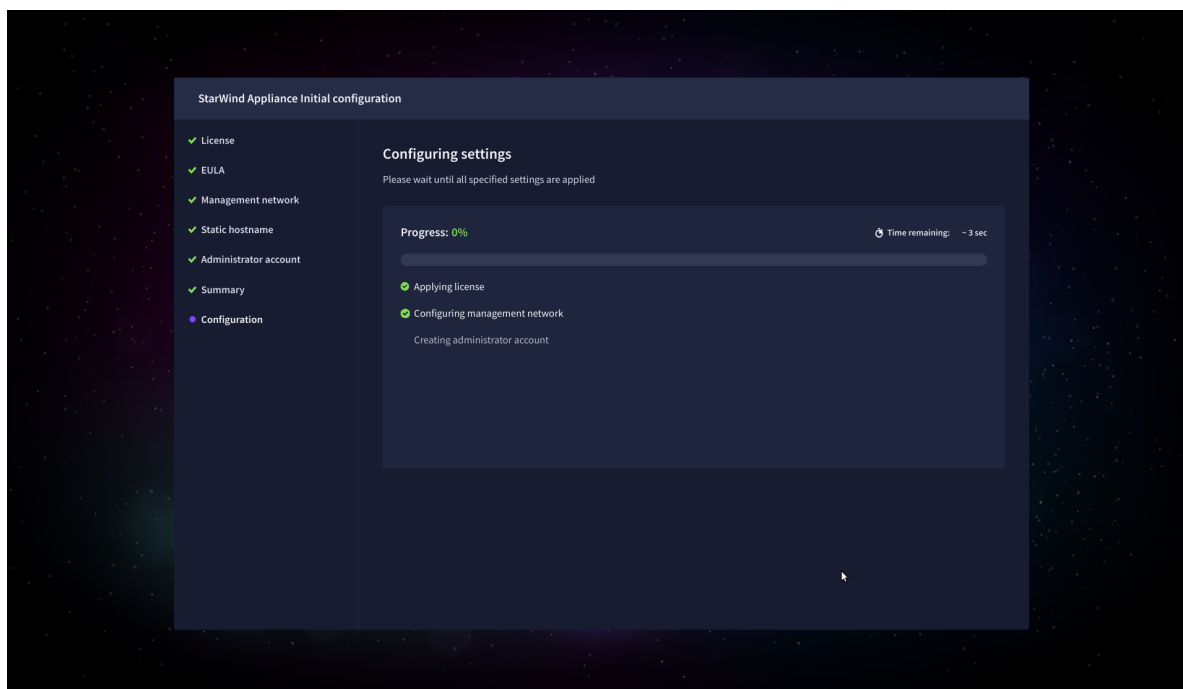


The screenshot shows the 'StarWind Appliance Initial configuration' window. On the left sidebar, the steps are: License (checked), EULA (checked), Management network (checked), Static hostname (checked), Administrator account (selected), Summary, and Configuration. The main panel is titled 'Create administrator account' and contains the instruction 'Specify new credentials for the appliance administrator account'. It features three input fields: 'Username' with the value 'admin', 'Password' (masked with dots), and 'Confirm password' (masked with dots). Below these is a section for 'Additional information (optional)' with fields for 'Full name' and 'E-mail'. At the bottom right, there are 'Back' and 'Next' buttons.

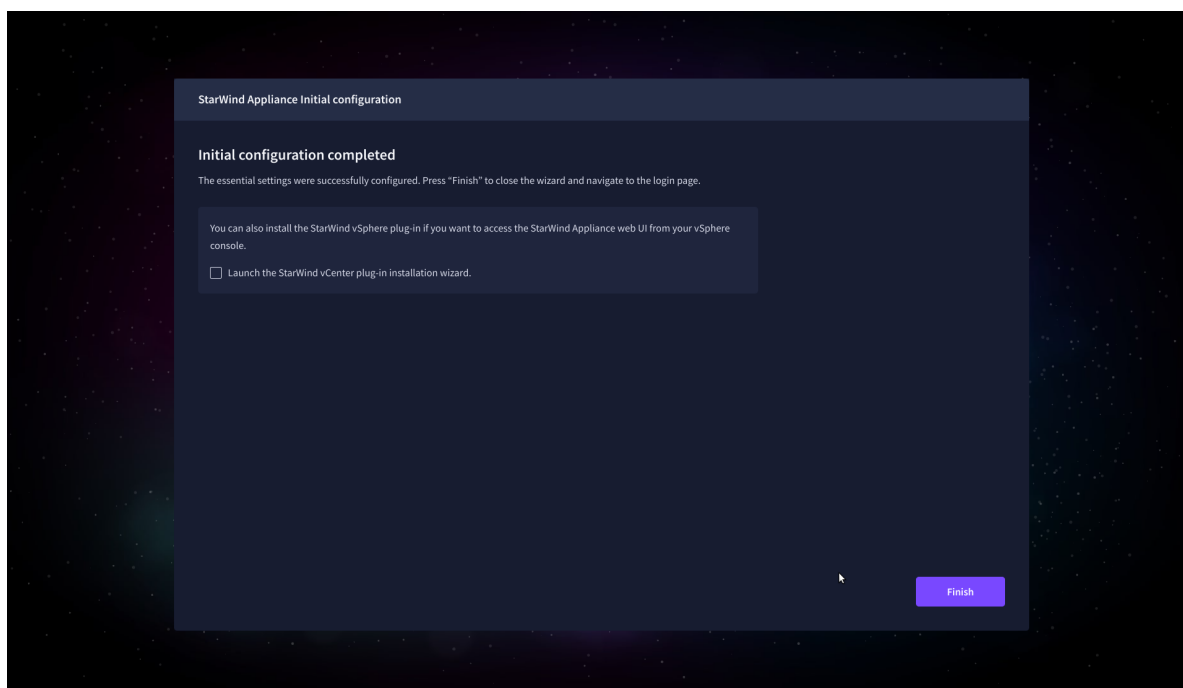
10. Wait until the Initial Configuration Wizard configures StarWind Virtual SAN for you.



11. Please standby until the Initial Configuration Wizard configures StarWind VSAN for you.



12. After the configuration process is completed, click Finish to install the StarWind vCenter Plugin immediately, or uncheck the checkbox to skip this step and proceed to the Login page.

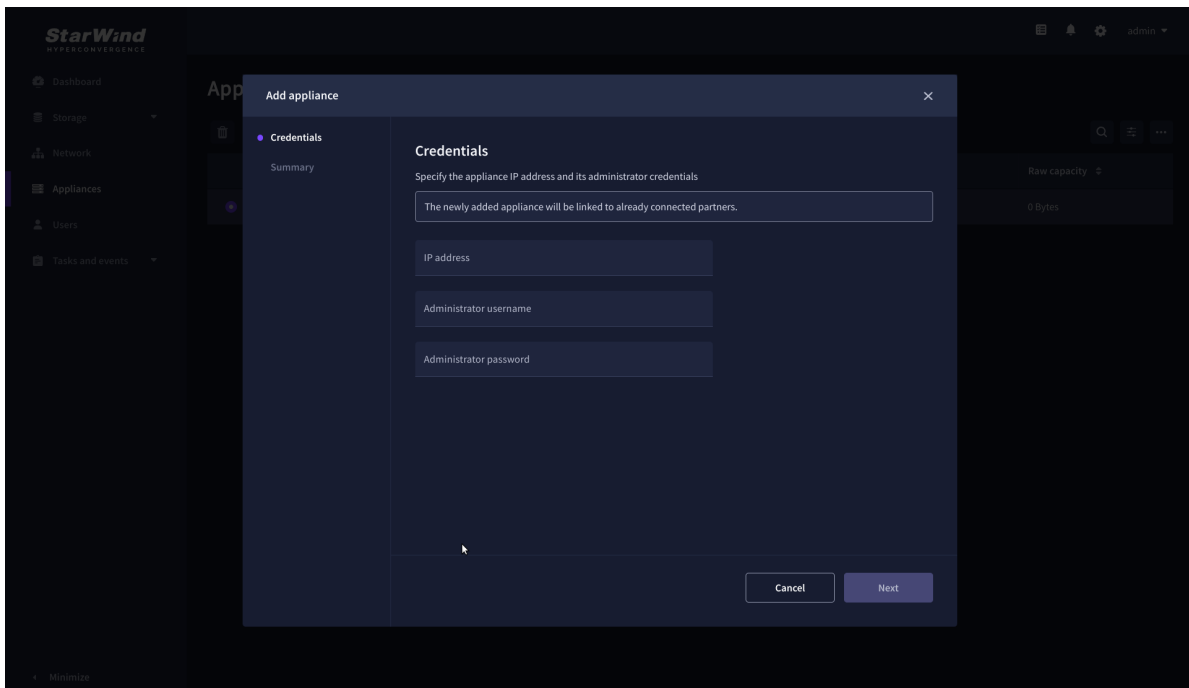


13. Repeat steps 1 through 12 on each Windows Server host.

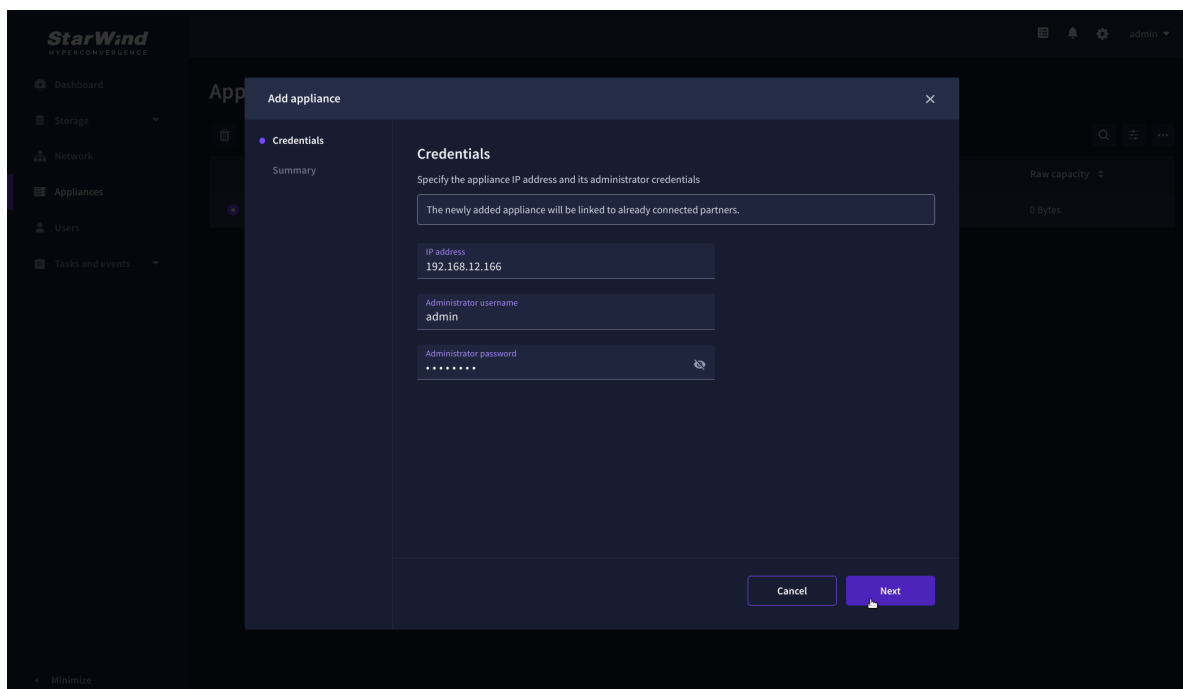
Add Appliance

To create replicated, highly available storage, add partner appliances that use the same StarWind Virtual SAN license key.

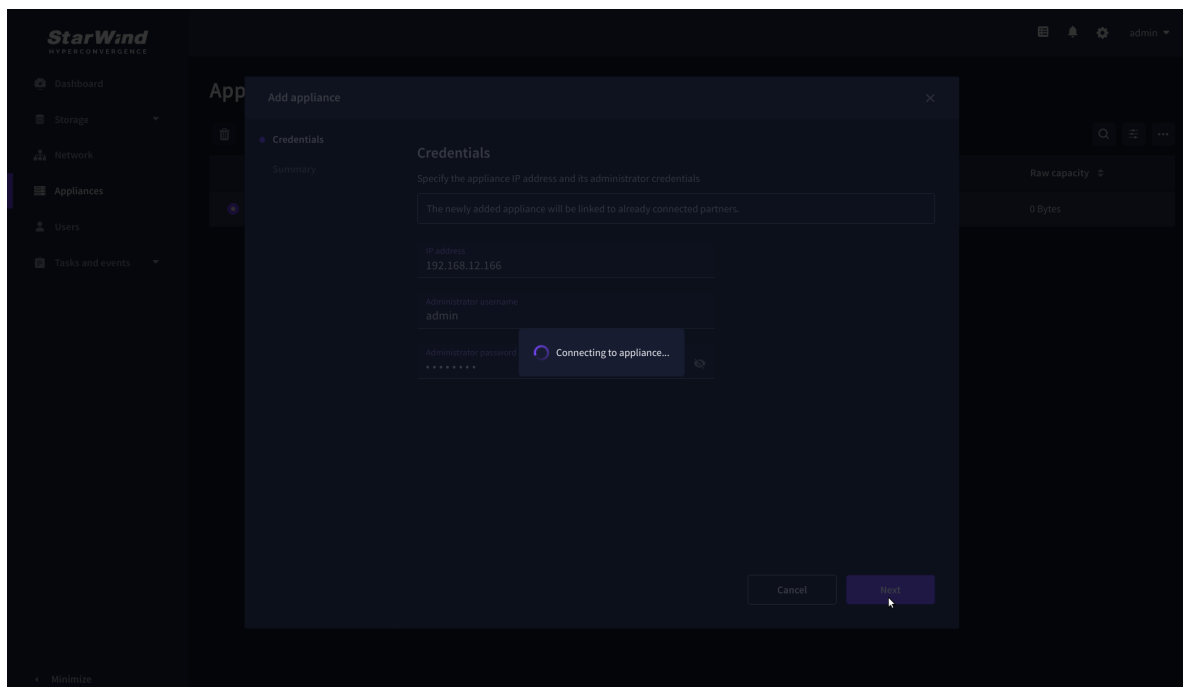
1. Navigate to the Appliances page and click Add to open the Add appliance wizard.
2. On the Credentials step, enter the IP address and credentials for the partner StarWind Virtual SAN appliance, then click Next.



3. Provide credentials of partner appliance.

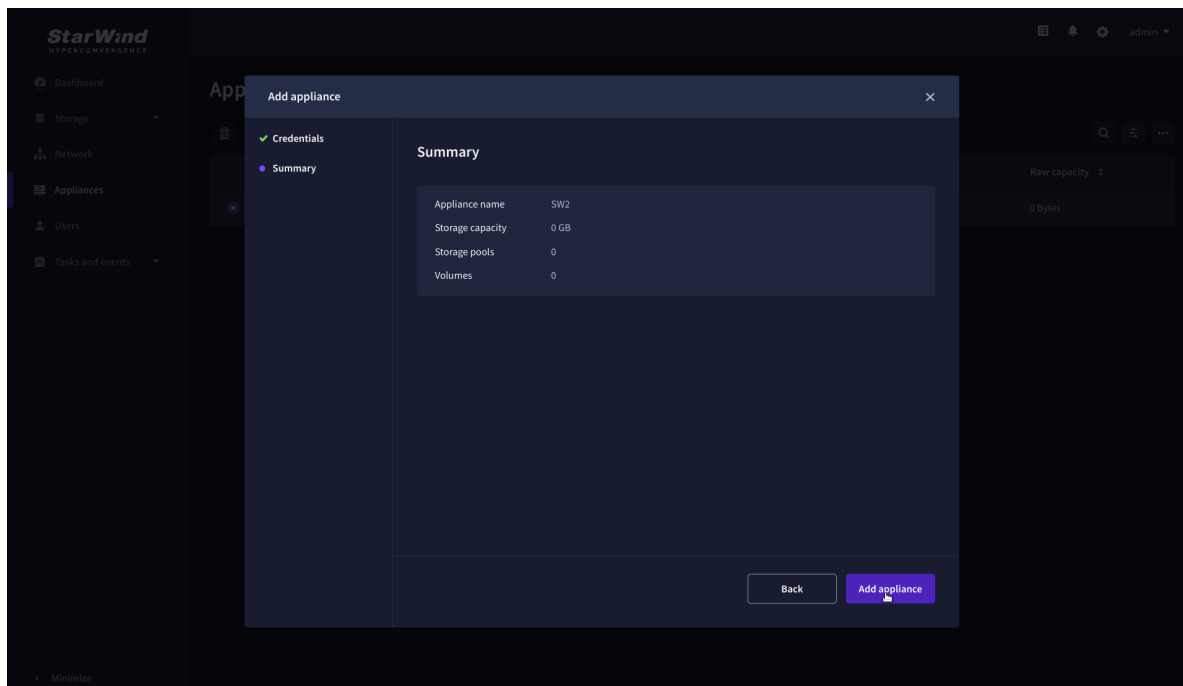


4. Wait for the connection to be established and the settings to be validated



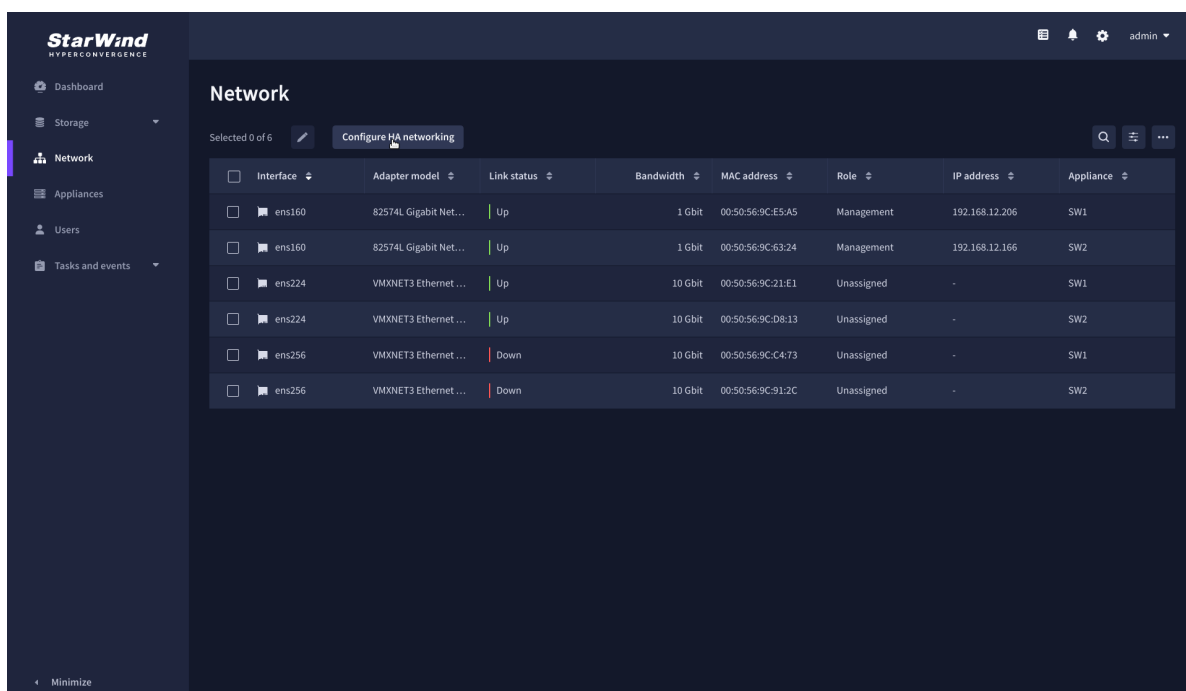
5. On the Summary step, review the properties of the partner appliance, then click Add

Appliance.



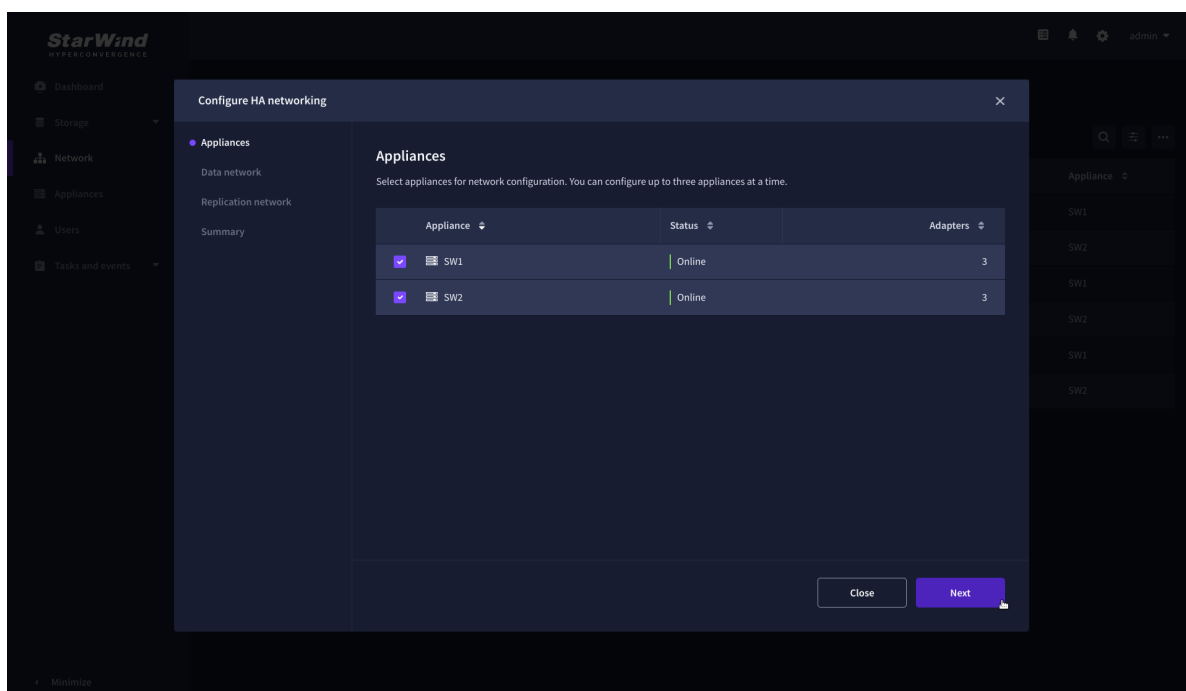
Configure Ha Networking

1. Navigate to the Network page and open Configure HA networking wizard.



2. On the Appliances step, select either 2 partner appliances to configure two-way replication, or 3 appliances for three-way replication, then click Next.

NOTE: The number of appliances in the cluster is limited by your StarWind Virtual SAN license.



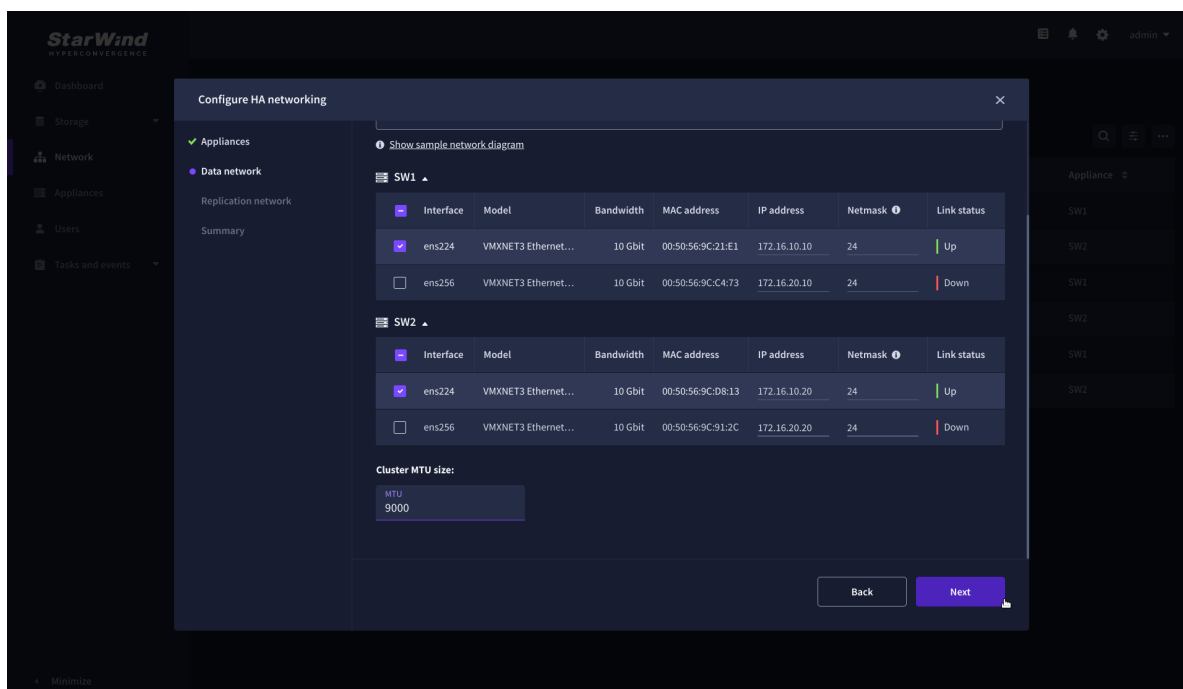
3. On the Data Network step, select the network interfaces designated to carry iSCSI or NVMe-oF storage traffic. Assign and configure at least one interface on each appliance (in our example: 172.16.10.10 and 172.16.10.20) with a static IP address in a unique network (subnet), specify the subnet mask and Cluster MTU size.

IMPORTANT: For a redundant, high-availability configuration, configure at least 2 network interfaces on each appliance. Ensure that the Data Network interfaces are interconnected between appliances through multiple direct links or via redundant switches.

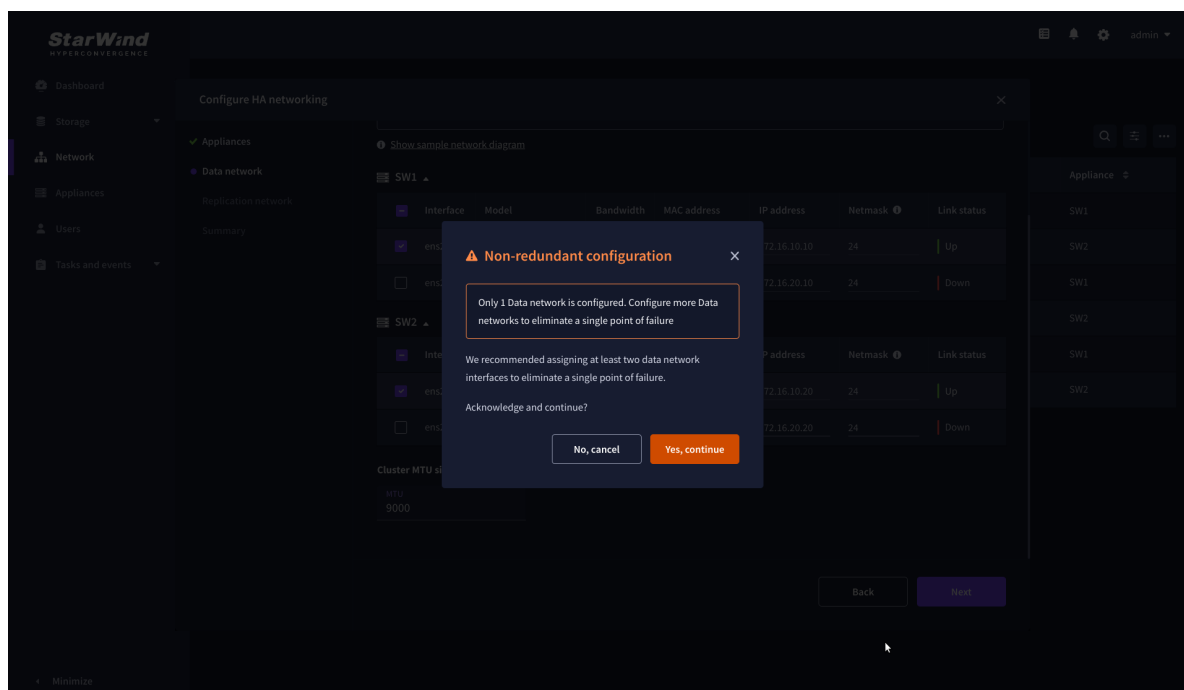
4. Assign MTU value on all selected network adapters, e.g. 1500 or 9000 bytes. If you are using network switches with the selected Data Network adapters, ensure that they are configured with the same MTU size value. In case of MTU settings mismatch, stability and performance issues might occur on the whole setup.

NOTE: Setting MTU to 9000 bytes on some physical adapters (like Intel Ethernet Network Adapter X710, Broadcom network adapters, etc.) might cause stability and performance issues depending on the installed network driver. To avoid them, use 1500 bytes MTU size or install the stable version of the driver.

5. Once configured, click Next to validate network settings.



6. The warning might appear if a single data interface is configured. Click Yes, continue to proceed with the configuration.



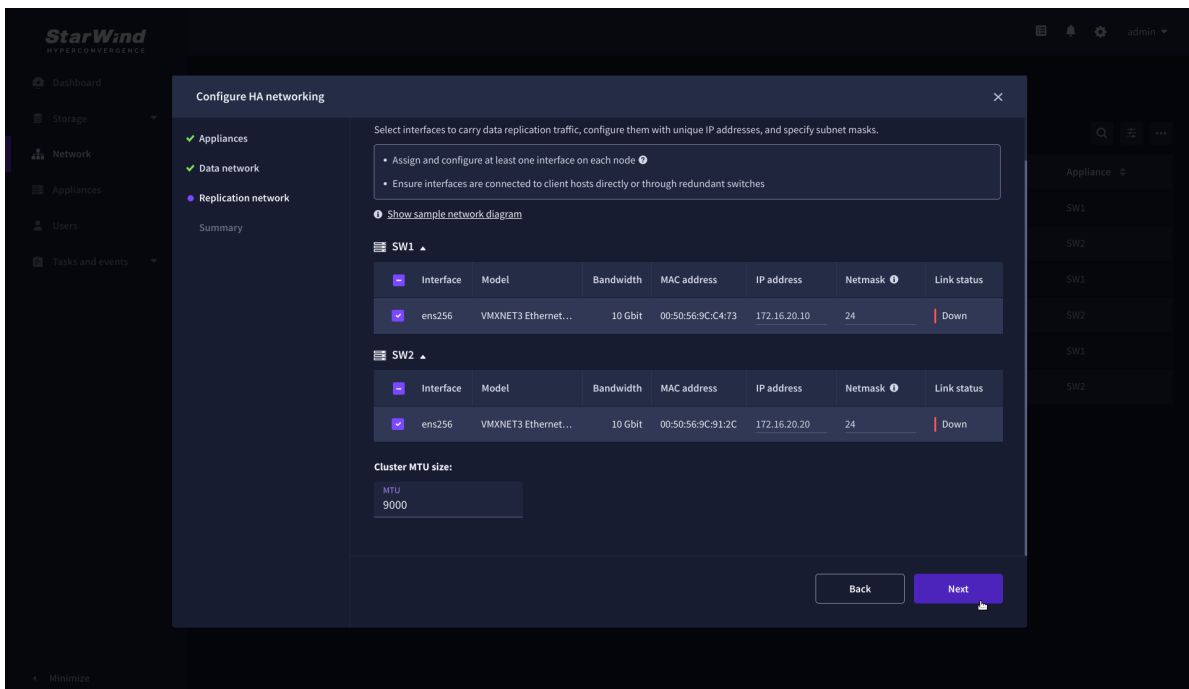
7. On the Replication Network step, select the network interfaces designated to carry the traffic for synchronous replication. Assign and configure at least one interface on each appliance with a static IP address in a unique network (subnet), specify the subnet mask and Cluster MTU size.

IMPORTANT: For a redundant, high-availability configuration, configure at least 2 network interfaces on each appliance. Ensure that the Replication Network interfaces are interconnected between appliances through multiple direct links or via redundant switches.

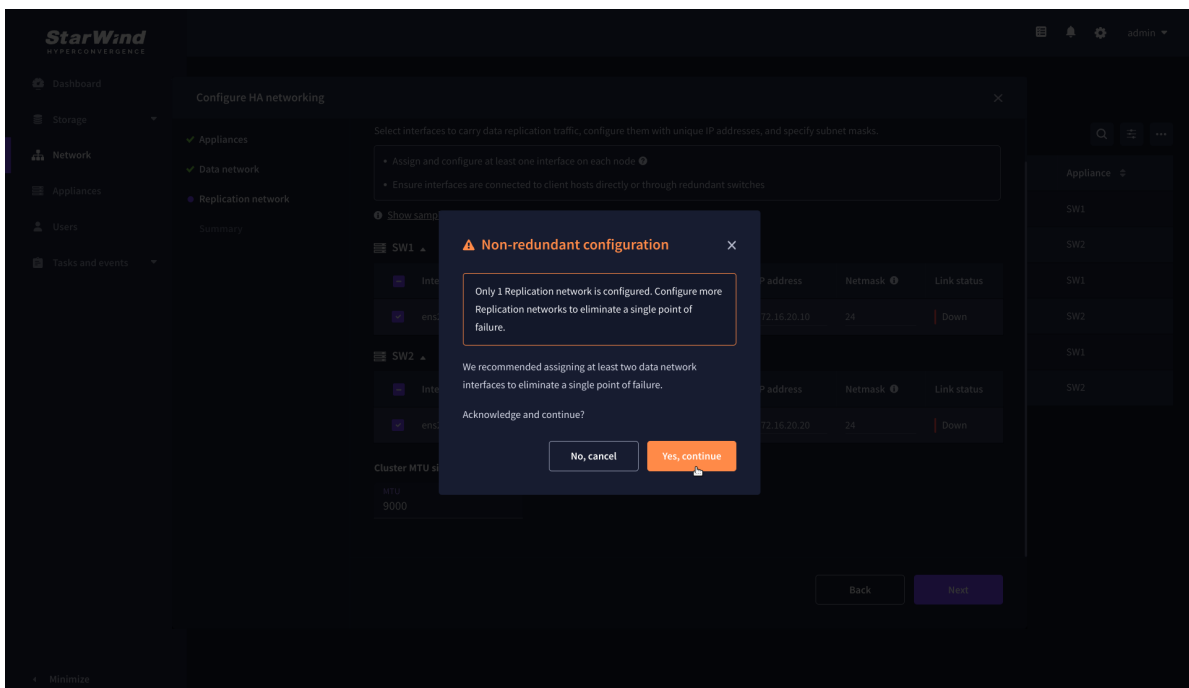
8. Assign MTU value on all selected network adapters, e.g. 1500 or 9000 bytes. If you are using network switches with the selected Replication Network adapters, ensure that they are configured with the same MTU size value. In case of MTU settings mismatch, stability and performance issues might occur on the whole setup.

NOTE: Setting MTU to 9000 bytes on some physical adapters (like Intel Ethernet Network Adapter X710, Broadcom network adapters, etc.) might cause stability and performance issues depending on the installed network driver. To avoid them, use 1500 bytes MTU size or install the stable version of the driver.

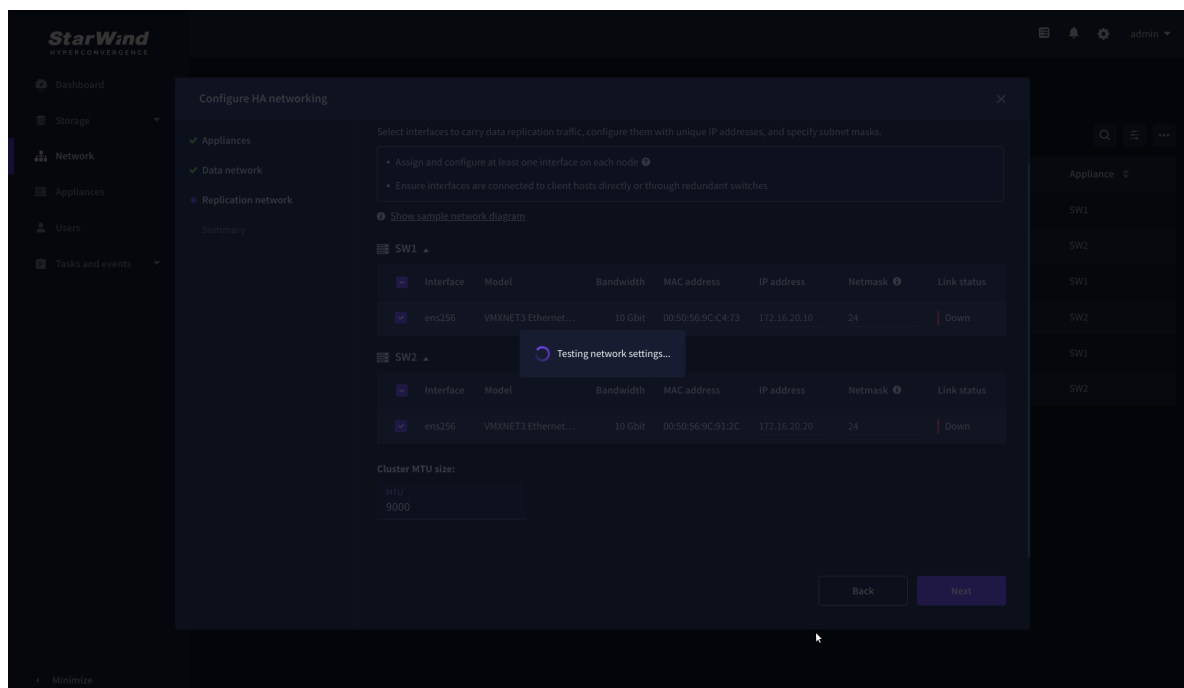
9. Once configured, click Next to validate network settings.



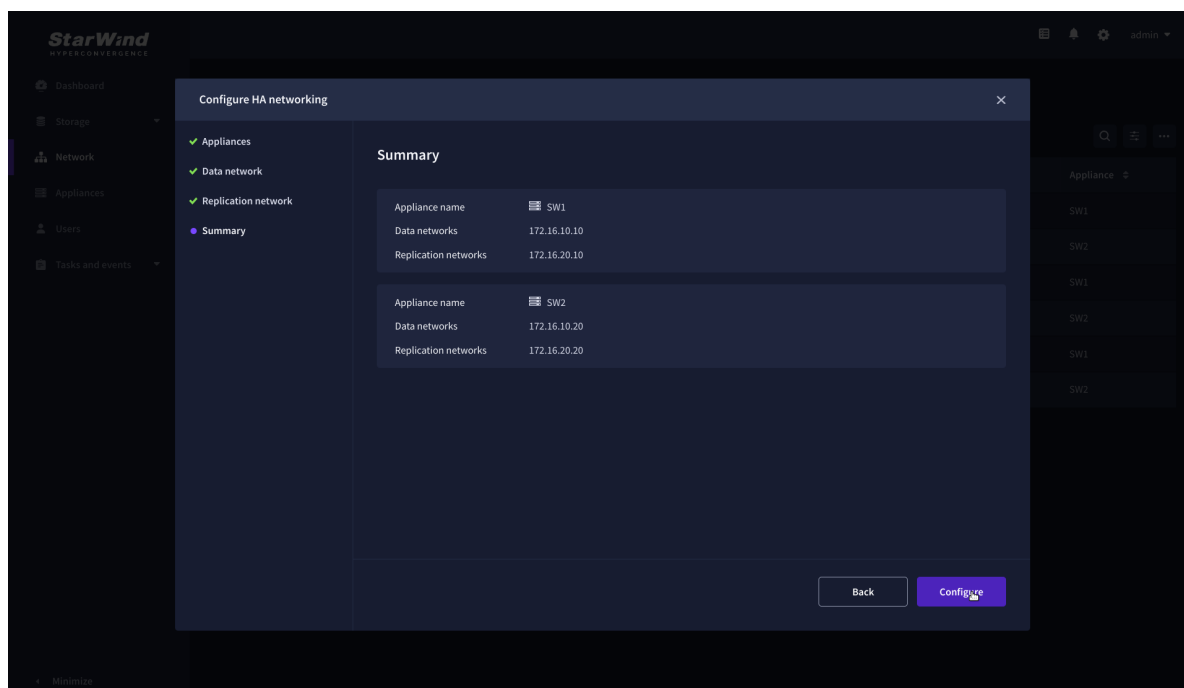
10. If only one Replication Network interface is configured on each partner appliance, a warning message will pop up. Click Yes, continue to acknowledge the warning and proceed.



11. Wait for the configuration completion.



12. On the Summary step, review the specified network settings and click Configure to apply the changes.



Add Physical Disks

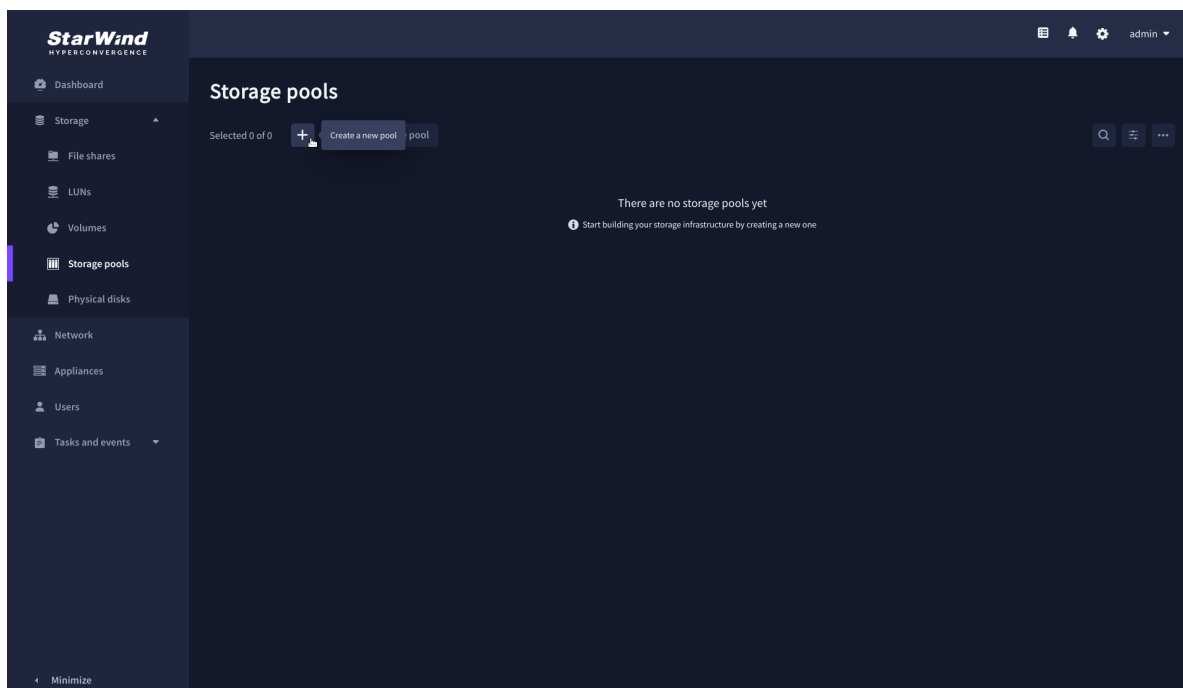
Attach physical storage to StarWind Virtual SAN Controller VM:

- Ensure that all physical drives are connected through an HBA or RAID controller.
- To get the optimal storage performance, add HBA, RAID controllers, or NVMe SSD drives to StarWind CVM via a passthrough device.

For detailed instructions, refer to [Microsoft's documentation on DDA](#). Also, find the storage provisioning guidelines in the [KB article](#).

Create Storage Pool

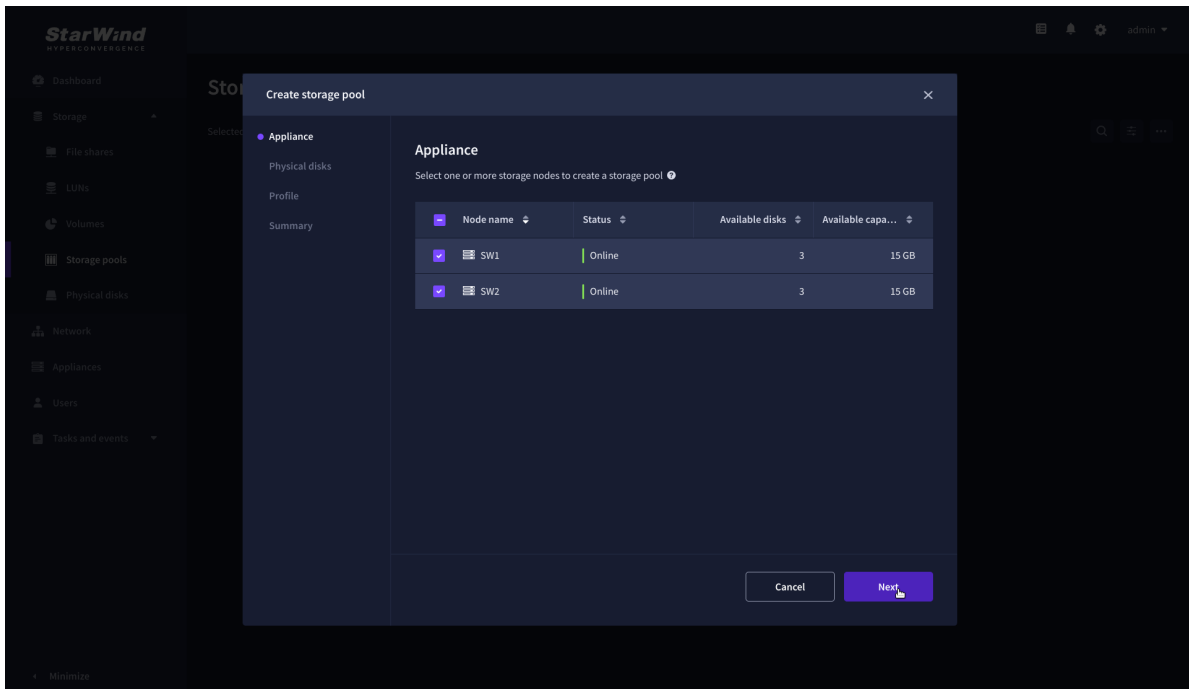
1. Navigate to the Storage pools page and click the + button to open the Create storage pool wizard .



2. On the Appliance step, select partner appliances on which to create new storage pools, then click Next.

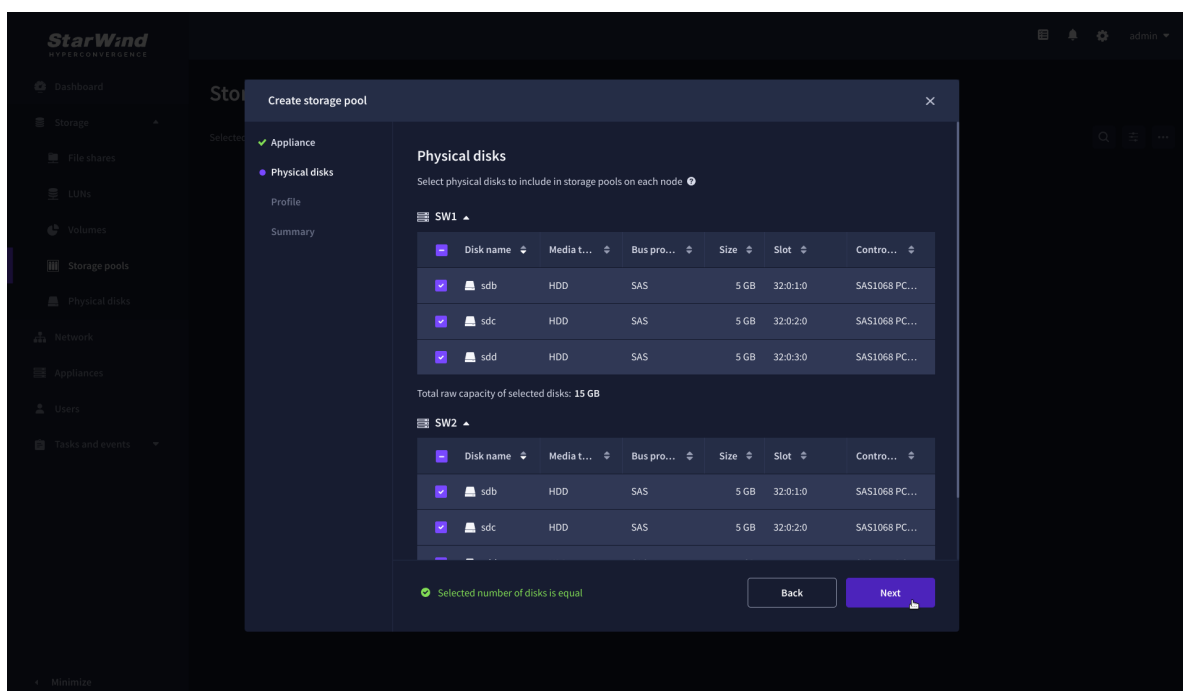
NOTE: Select 2 appliances for configuring storage pools if you are deploying a two-node cluster with two-way replication, or select 3 appliances for configuring a three-node

cluster with a three-way mirror.

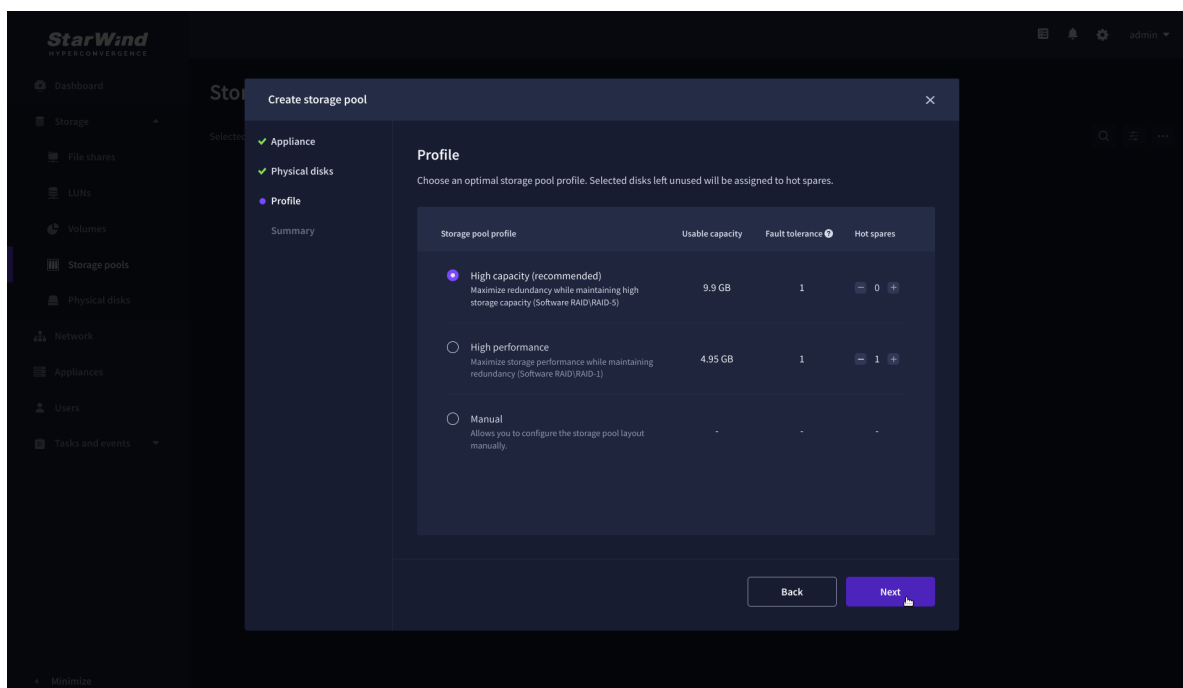


3. On the Physical disks step, select physical disks to be pooled on each node, then click Next.

IMPORTANT: Select an identical type and number of disks on each appliance to create storage pools with a uniform configuration.



4. On the Profile step, select one of the preconfigured storage profiles, or choose Manual to configure the storage pool manually based on your redundancy, capacity, and performance requirements, then click Next.

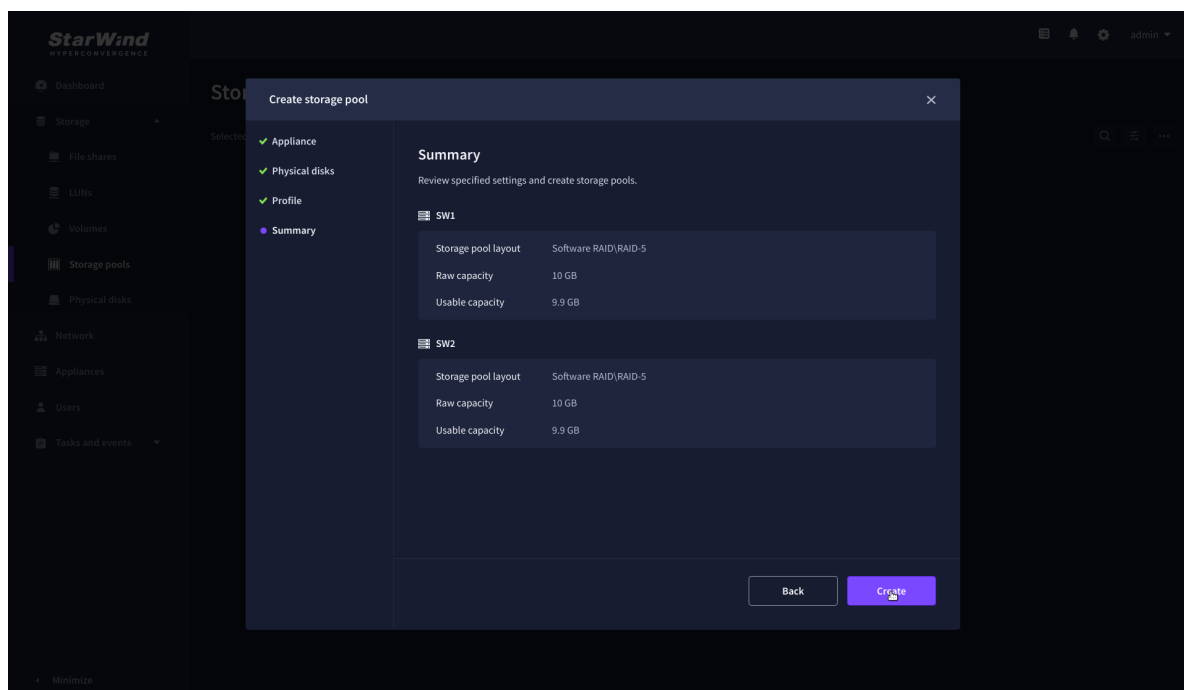


NOTE: Hardware RAID, Linux Software RAID, and ZFS storage pools are supported. To

simplify the configuration of storage pools, preconfigured storage profiles are provided. These profiles recommend a pool type and layout based on the attached storage:

- High capacity – creates Linux Software RAID-5 to maximize storage capacity while maintaining redundancy.
- High performance – creates Linux Software RAID-10 to maximize storage performance while maintaining redundancy.
- Hardware RAID – configures a hardware RAID virtual disk as a storage pool. This option is available only if a hardware RAID controller is passed through to the StarWind Virtual SAN.
- Better redundancy – creates ZFS Striped RAID-Z2 (RAID 60) to maximize redundancy while maintaining high storage capacity.
- Manual – allows users to configure any storage pool type and layout with the attached storage.

5. On the Summary step, review the storage pool settings and click Create to configure new storage pools on the selected appliances.



NOTE: The storage pool configuration may take some time, depending on the type of pooled storage and the total storage capacity. Once the pools are created, a notification will appear in the upper right corner of the Web UI.

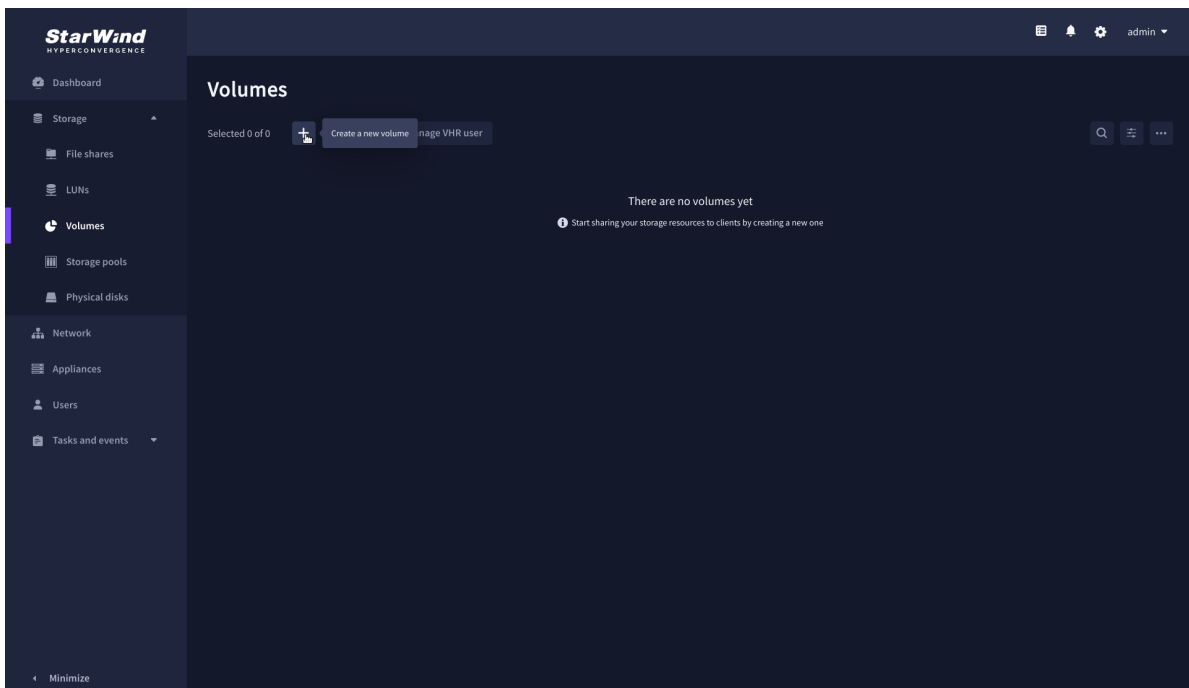
IMPORTANT: In some cases, additional tweaks are required to optimize the storage performance of the disks added to the Controller Virtual Machine. Please follow the steps in this KB to change the scheduler type depending on the disks type:

<https://knowledgebase.starwindsoftware.com/guidance/starwind-vsan-for-vsphere-changi>

[ng-linux-i-o-scheduler-to-optimize-storage-performance/](#)

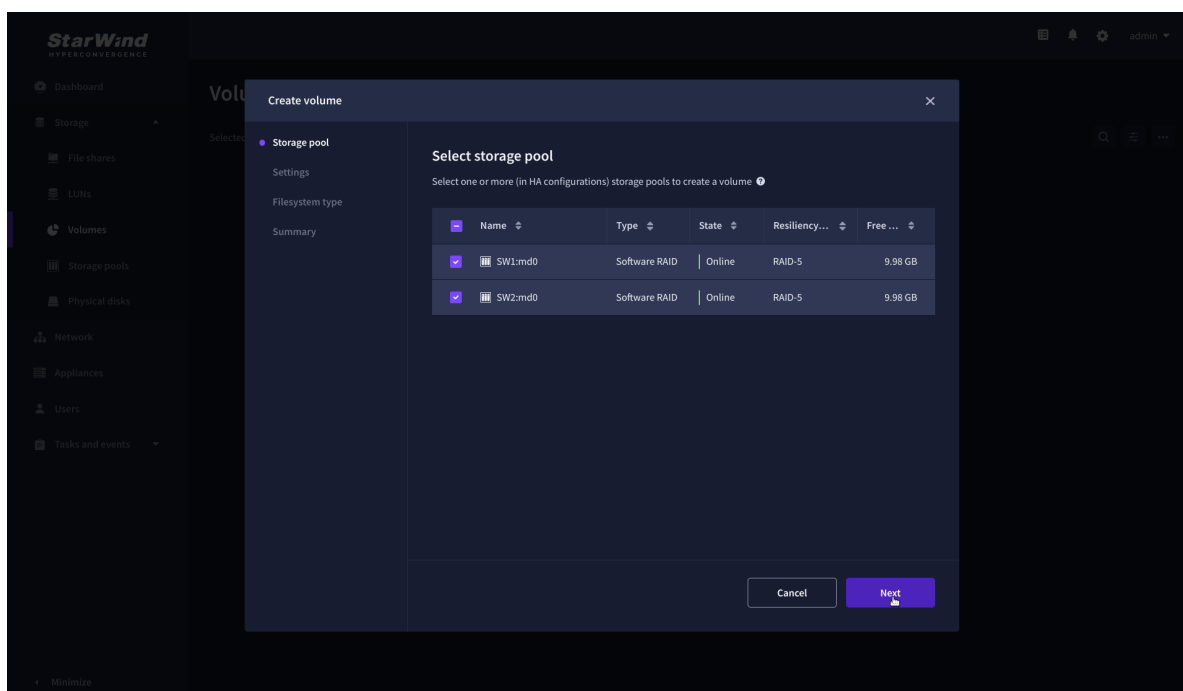
Create Volume

1. Navigate to the Volumes page and click the + button to open the Create volume wizard.

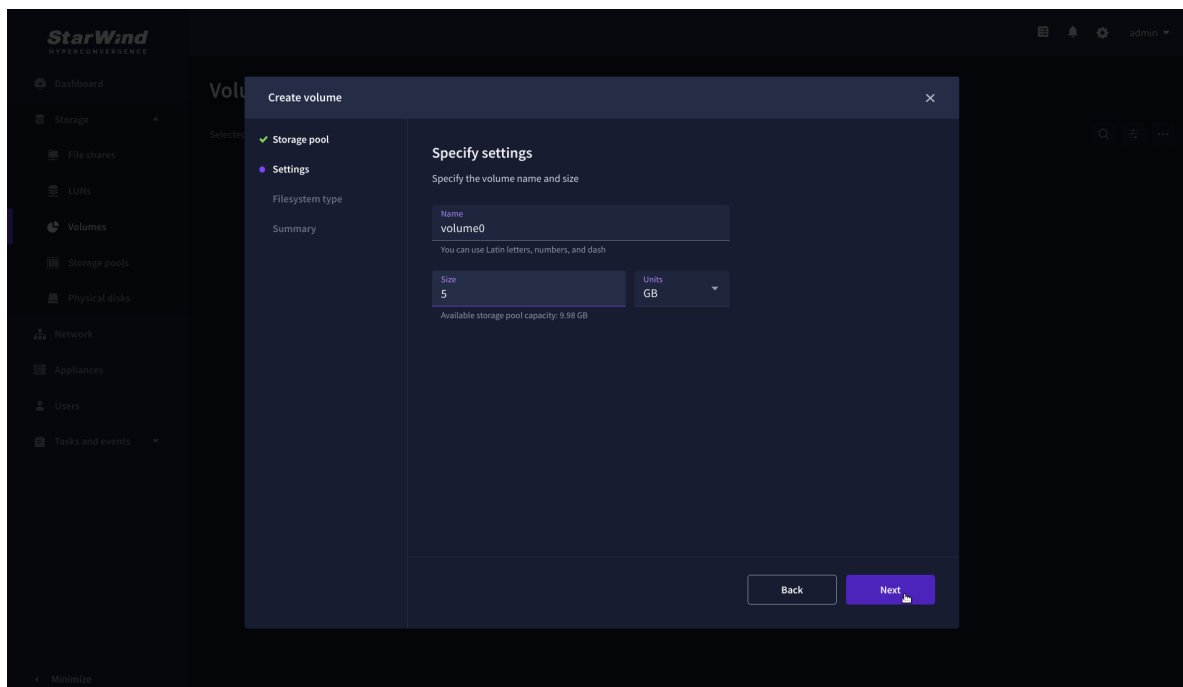


2. On the Storage pool step, select partner appliances on which to create new volumes, then click Next.

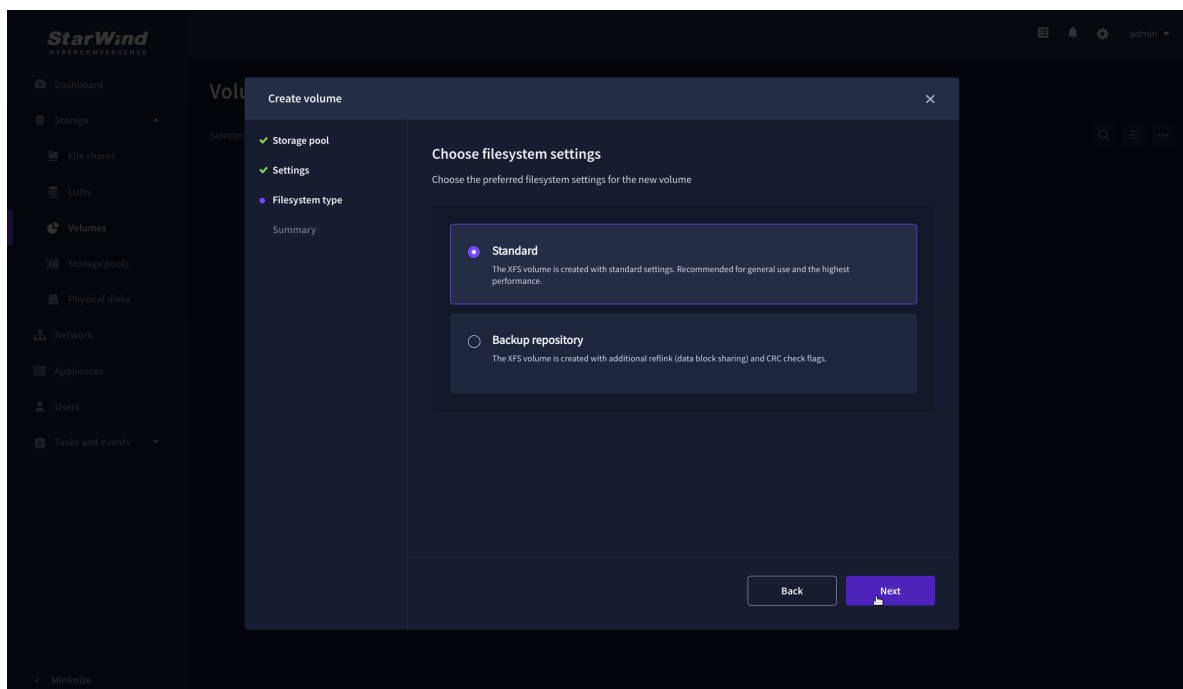
NOTE: Select 2 appliances for configuring volumes if you are deploying a two-node cluster with two-way replication, or select 3 appliances for configuring a three-node cluster with a three-way mirror.



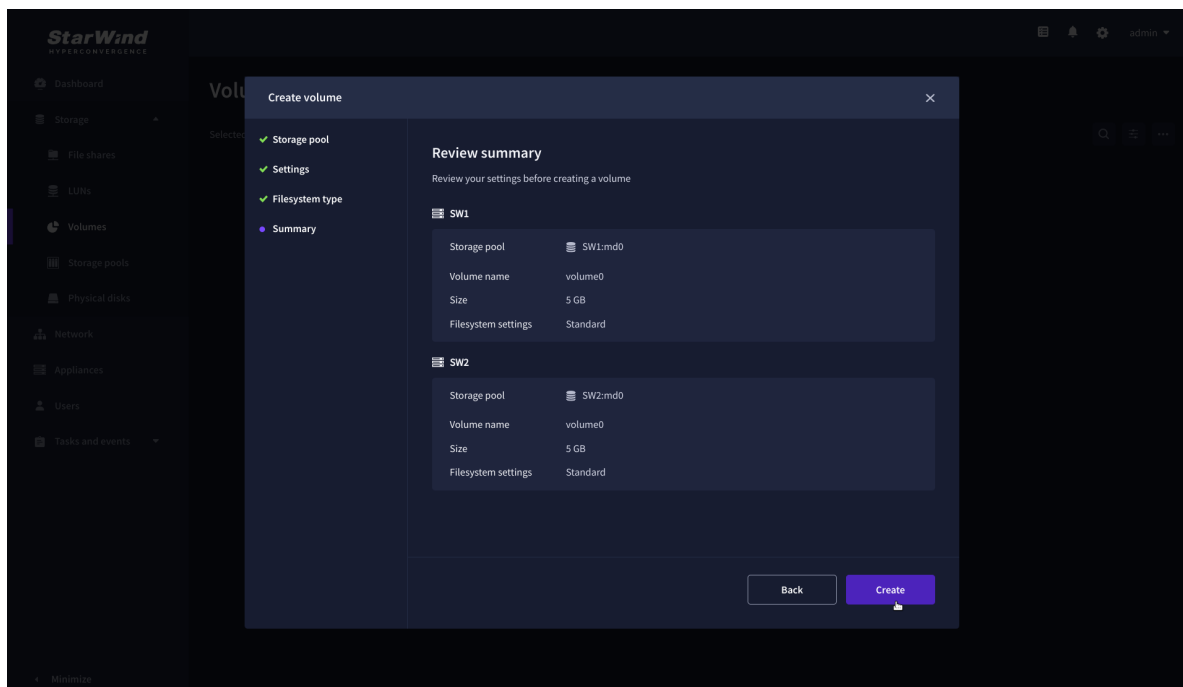
3. On the Settings step, specify the volume name and size, then click Next.



4. On the Filesystem type step, select Standard, then click Next.



5. Review Summary and click the Create button to create the pool.

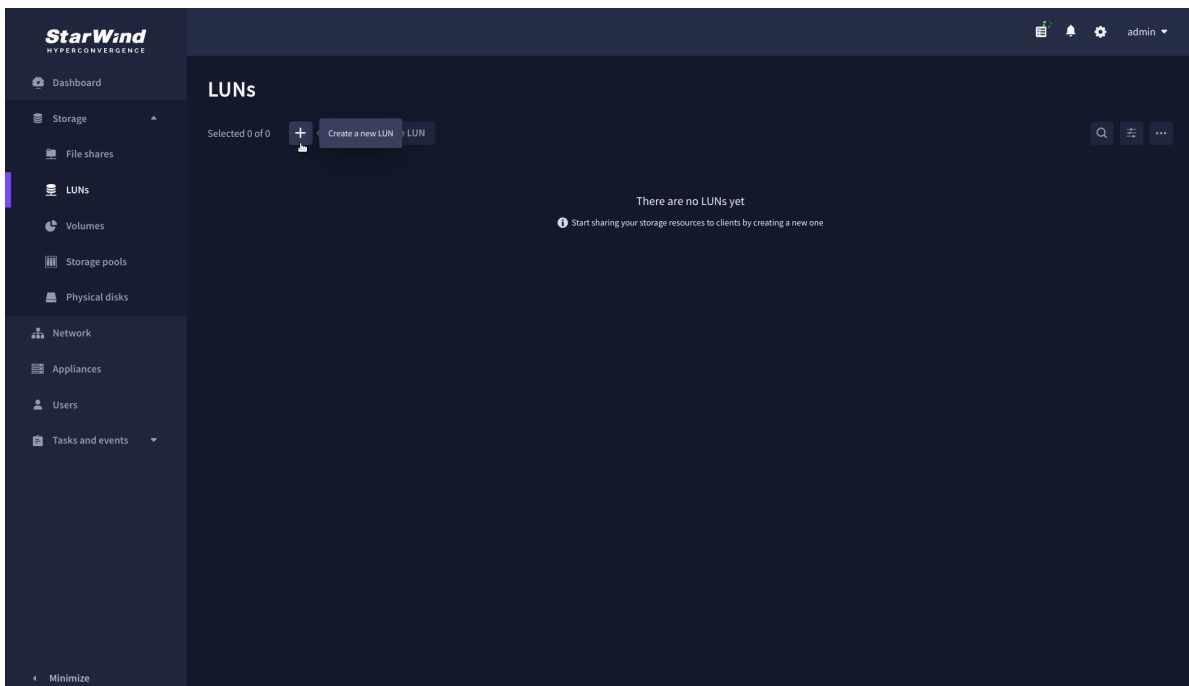


Create Ha Lun Using Webui

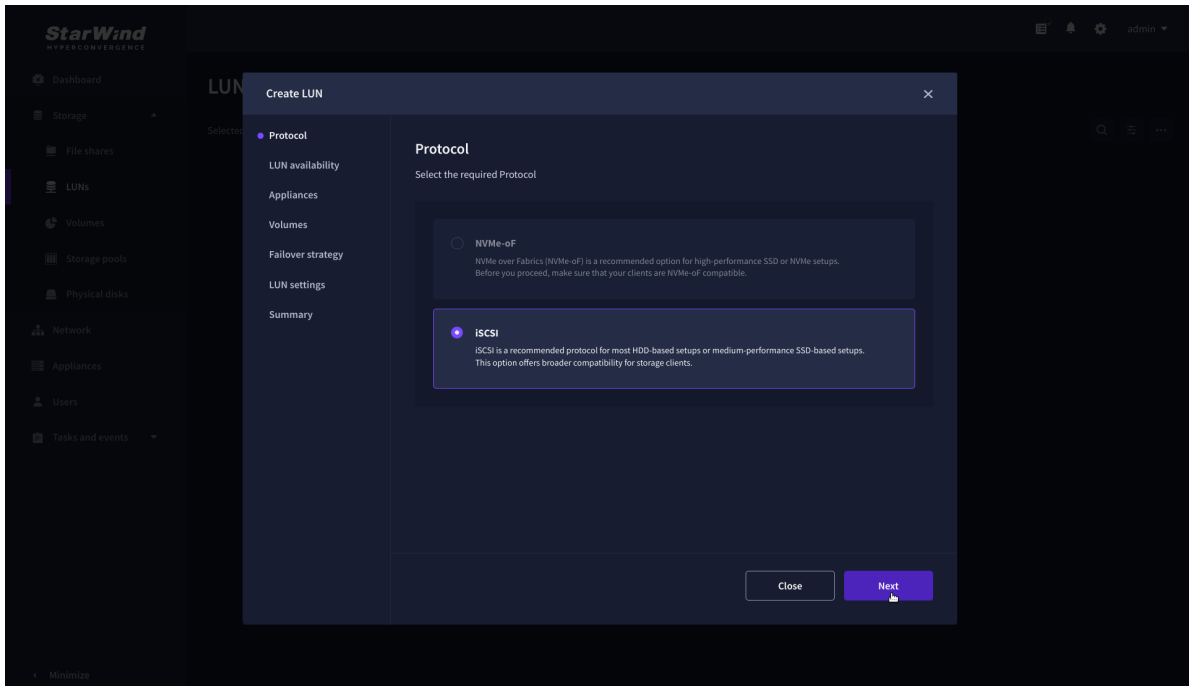
This section describes how to create LUN in Web UI. This option is available for the setups with Commercial, Trial, and NFR licenses applied.

For setups with a Free license applied, the PowerShell script should be used to create the LUN – please follow the steps described in the section: Create StarWind HA LUNs using PowerShell

1. Navigate to the LUNs page and click the + button to open the Create LUN wizard.



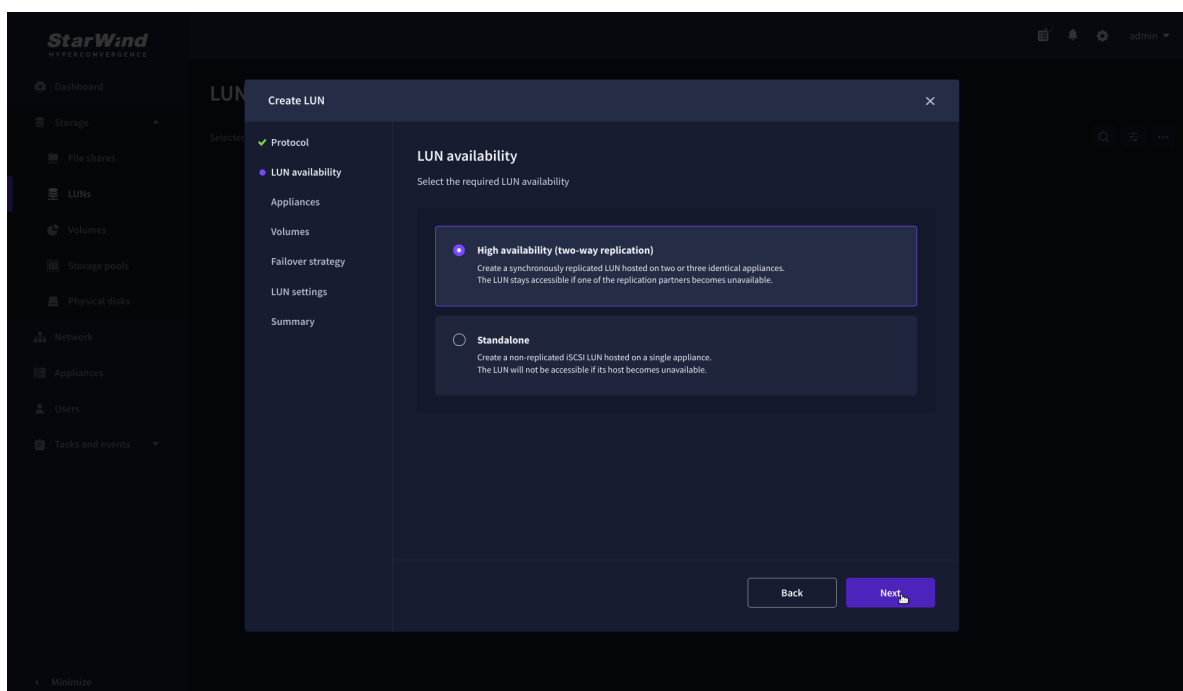
2. On the Protocols step, select the preferred storage protocol and click Next.



3. On the LUN availability step, select the High availability and click Next.

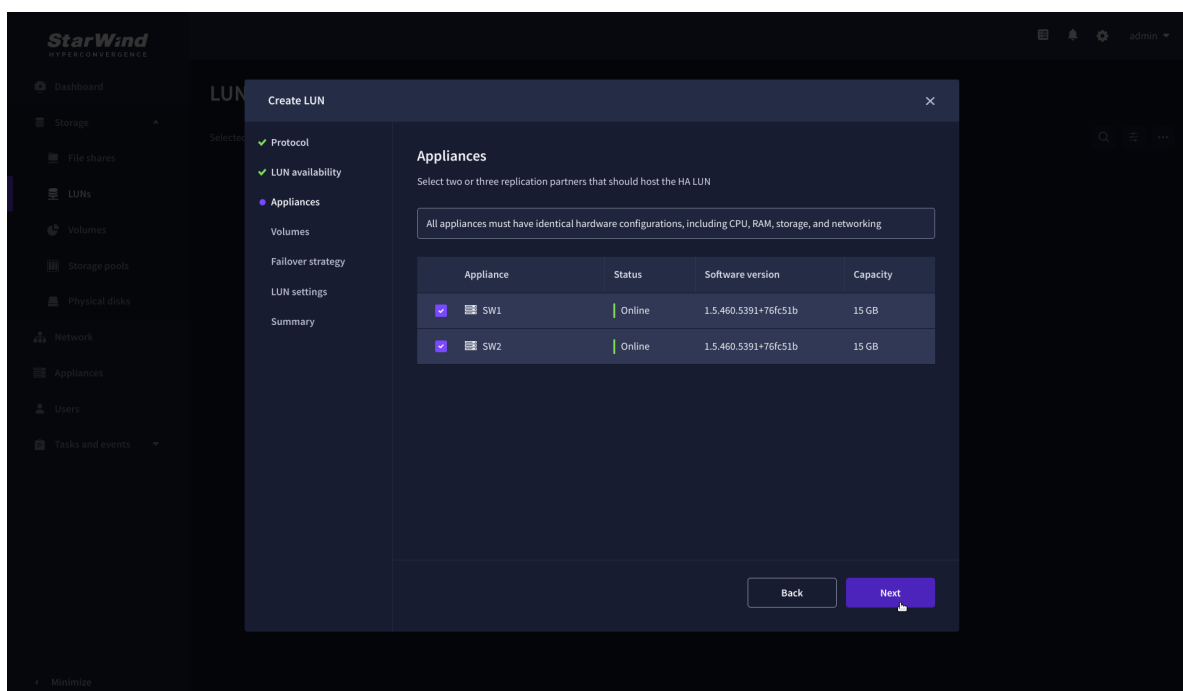
NOTE: The availability options for a LUN can be Standalone (without replication) or High Availability (with 2-way or 3-way replication), and are determined by the StarWind Virtual SAN license.

Below are the steps for creating a high-availability iSCSI LUN.



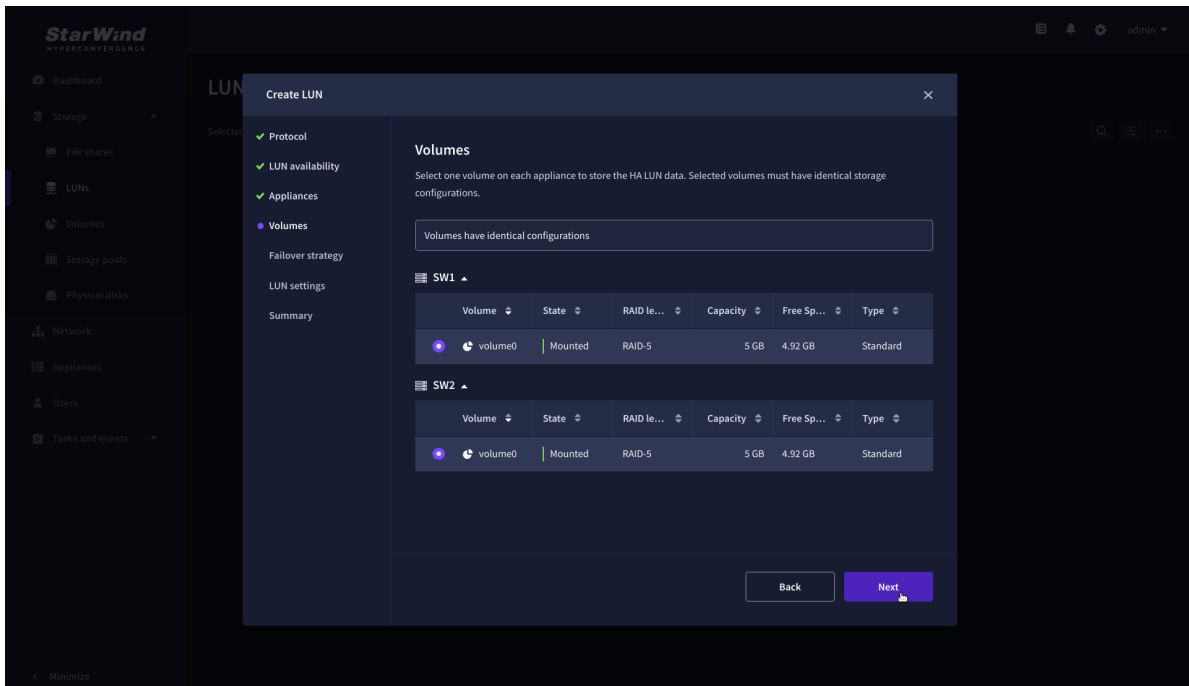
4. On the Appliances step, select partner appliances that will host new LUNs and click Next.

IMPORTANT: Selected partner appliances must have identical hardware configurations, including CPU, RAM, storage, and networking.



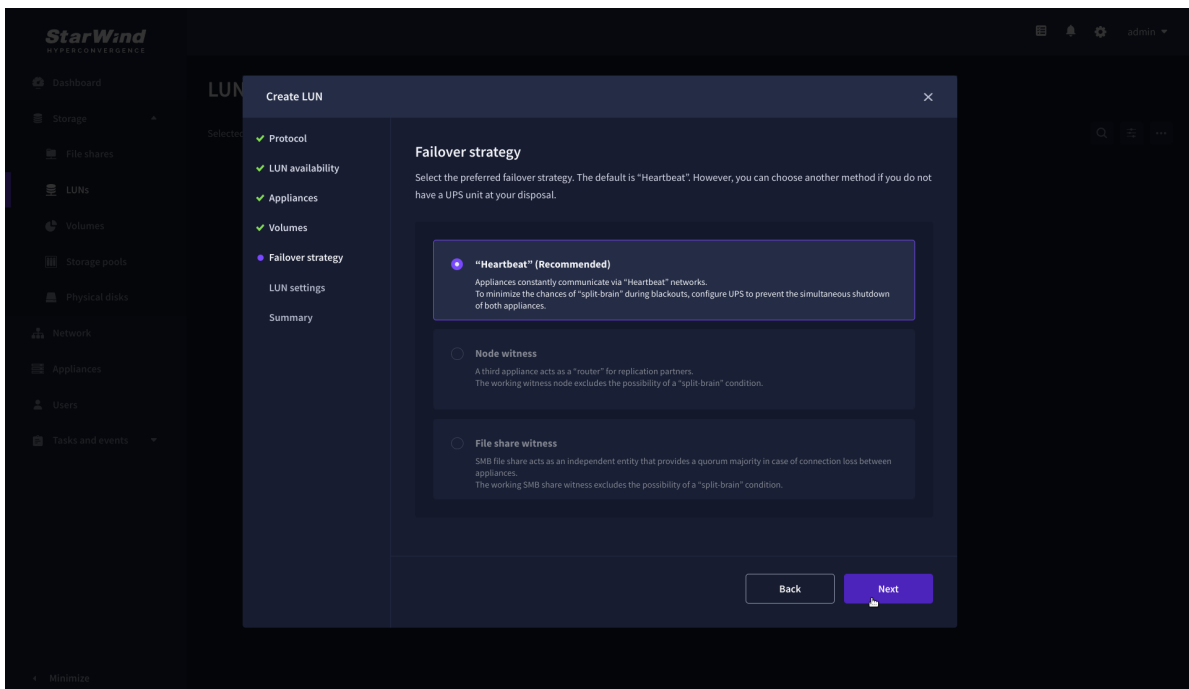
5. On the Volumes step, select the volumes for storing data on the partner appliances and click Next.

IMPORTANT: For optimal performance, the selected volumes must have identical underlying storage configurations.



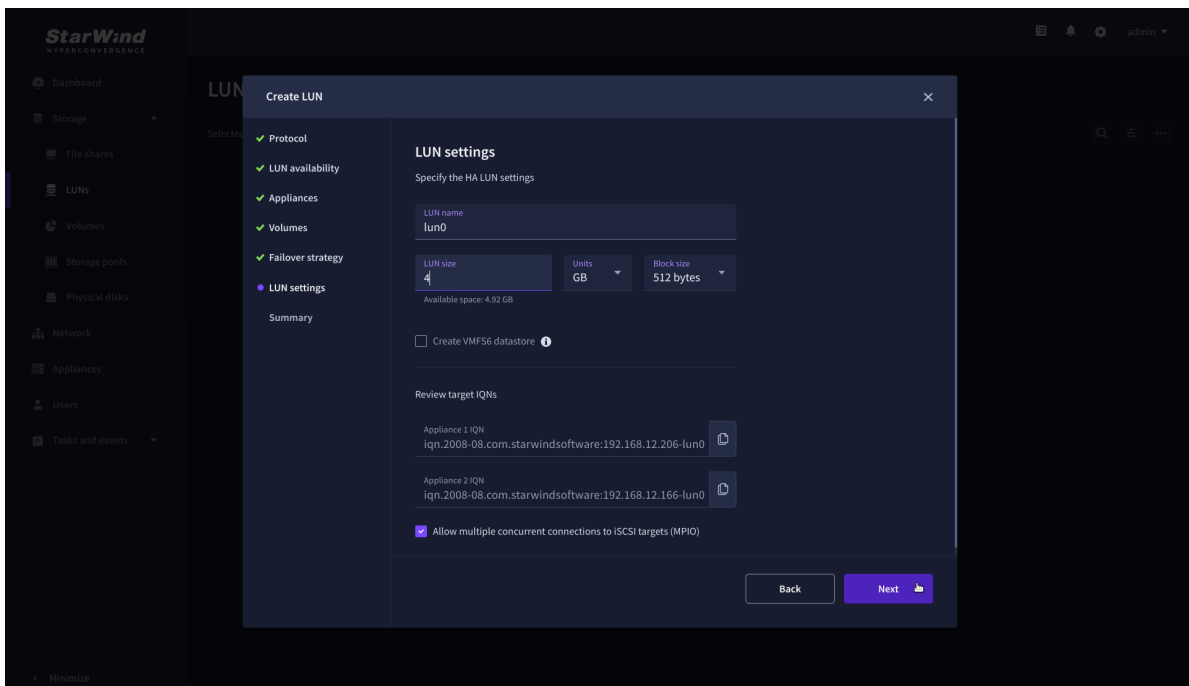
6. On the Failover strategy step, select the preferred failover strategy and click Next.

NOTE: The failover strategies for a LUN can be Heartbeat or Node Majority. In case of 2-nodes setup and None Majority failover strategy, Node witness (requires an additional third witness node), or File share witness (requires an external file share) should be configured. These options are determined by StarWind Virtual SAN license and setup configuration. Below are the steps for configuring the Heartbeat failover strategy in a two-node cluster.

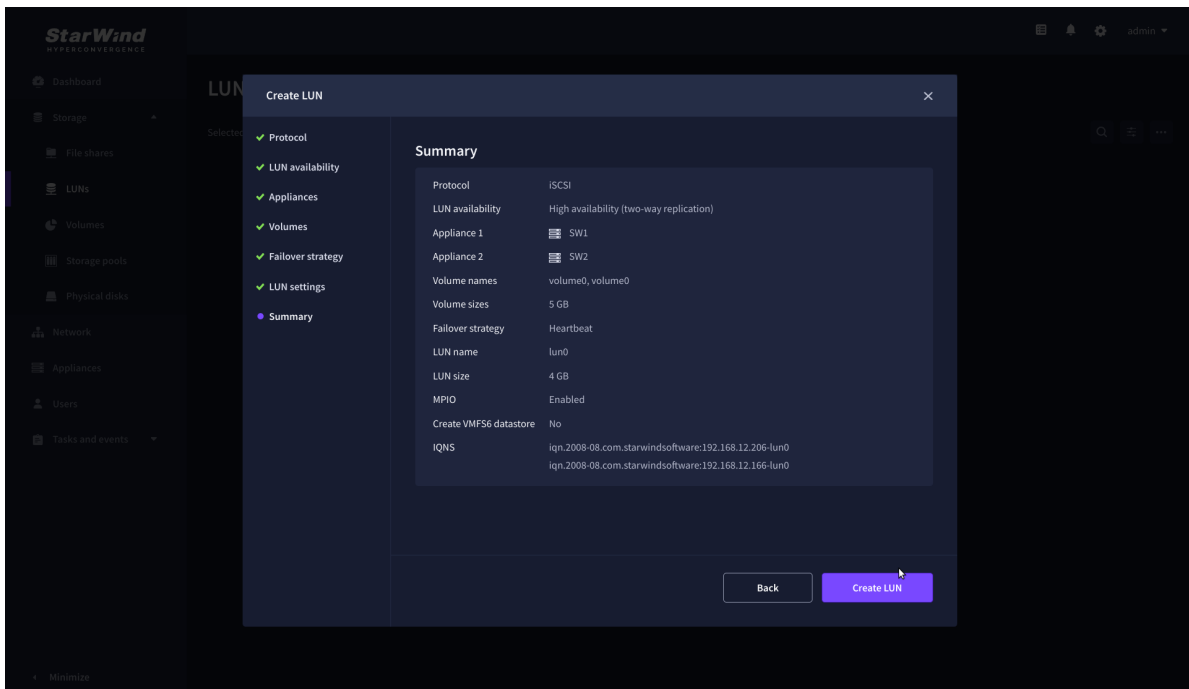


7. On the LUN settings step, specify the LUN name, size, block size, then click Next.

NOTE: For high-availability configurations, ensure that MPIO checkbox is selected.



8. On the Summary step, review the LUN settings and click Create to configure new LUNs on the selected volumes.



Connecting Starwind Ha Storage To Proxmox Hosts

1. Connect to Proxmox host via SSH and install multipathing tools.

```
pve# apt-get install multipath-tools
```

2. Edit nano /etc/iscsi/initiatorname.iscsi setting the initiator name.

```
GNU nano 7.2 /etc/iscsi/initiatorname.iscsi
## DO NOT EDIT OR REMOVE THIS FILE!
## If you remove this file, the iSCSI daemon will not start.
## If you change the InitiatorName, existing access control lists
## may reject this initiator. The InitiatorName must be unique
## for each iSCSI initiator. Do NOT duplicate iSCSI InitiatorNames.
InitiatorName=iqn.1993-08.org.debian:CVMO1
```

3. Edit /etc/iscsi/iscsid.conf setting the following parameters:

```
node.startup = automatic
node.session.timeo.replacement_timeout = 15
node.session.scan = auto
```

NOTE. node.startup = manual is the default parameter, it should be changed to node.startup = automatic.

4. Create file /etc/multipath.conf using the following command:

```
touch /etc/multipath.conf
```

5. Edit /etc/multipath.conf adding the following content:

```
devices{
    device{
        vendor "STARWIND"
        product "STARWIND*"
        path_grouping_policy multibus
        path_checker "tur"
        failback immediate
        path_selector "round-robin 0"
        rr_min_io 3
        rr_weight uniform
        hardware_handler "1 alua"
    }
}
```

```
defaults {  
    polling_interval 2  
    path_selector "round-robin 0"  
    path_grouping_policy multibus  
    uid_attribute ID_SERIAL  
    rr_min_io 100  
    failback immediate  
    user_friendly_names yes  
}
```

6. Run iSCSI discovery on both nodes:

```
pve# iscsiadm -m discovery -t st -p 10.20.1.10 pve# iscsiadm -m  
discovery -t st -p 10.20.1.20
```

7. Connect iSCSI LUNs:

```
pve# iscsiadm -m node -T iqn.2008-08.com.starwindsoftware:sw1-  
ds1 -p 10.20.1.10 -l  
  
pve# iscsiadm -m node -T iqn.2008-08.com.starwindsoftware:sw2-  
ds1 -p 10.20.1.20 -l
```

8. Get WWID of StarWind HA device:

```
/lib/udev/scsi_id -g -u -d /dev/sda
```

9. The wwid must be added to the file '/etc/multipath/wwids'. To do this, run the following command with the appropriate wwid:

```
multipath -a %WWID%
```

10. Restart multipath service.

```
systemctl restart multipath-tools.service
```

11. Check if multipathing is running correctly:

```
pve# multipath -ll
```

12. Repeat steps 1-11 on every Proxmox host.

13. Create LVM PV on multipathing device:

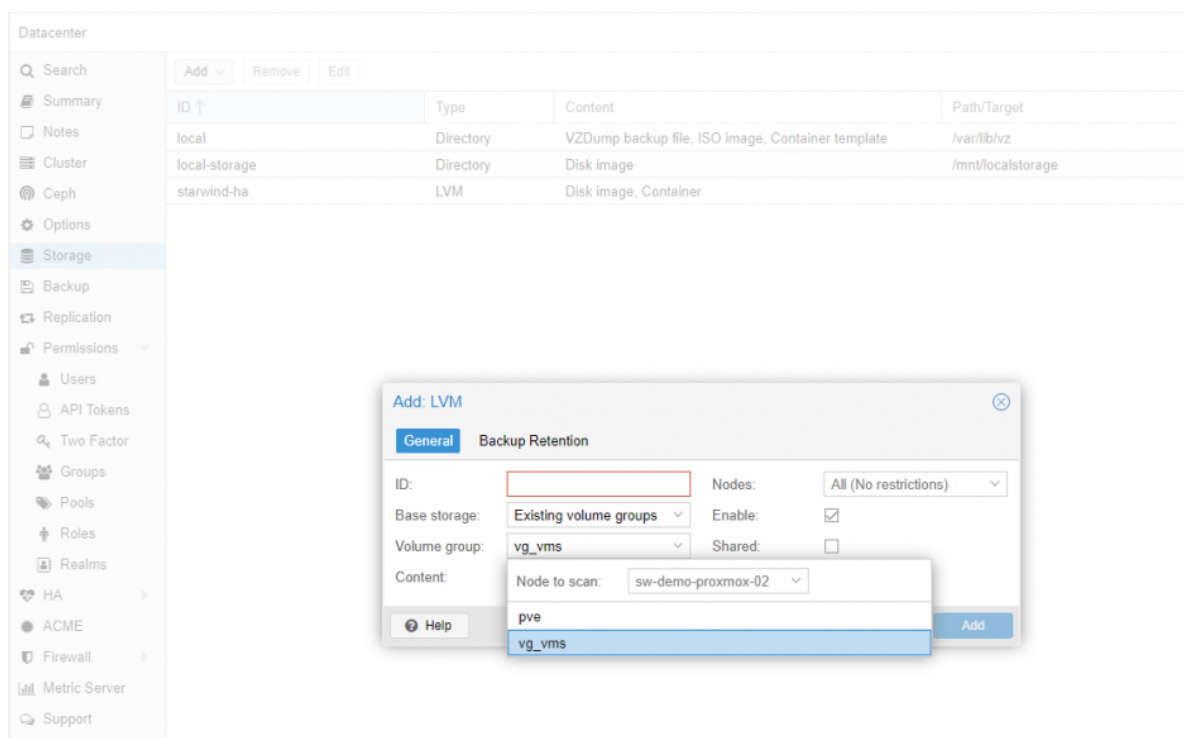
```
pve# pvcreate /dev/mapper/mpatha
```

where mpatha - alias for StarWind LUN

14. Create VG on LVM PV:

```
pve# vgcreate vg-vms /dev/mapper/mpatha
```

15. Login to Proxmox via Web and go to Datacenter -> Storage. Add new LVM storage based on VG created on top of StarWind HA Device. Enable Shared checkbox. Click Add.



16. Login via SSH to all hosts and run the following command:

```
pvscan --cache
```

Configure Storage Rescan

A storage rescan is required so each Proxmox host can detect new or updated iSCSI volumes presented by the StarWind Controller Virtual Machines. It is also necessary to perform a storage rescan after a resynchronization to ensure that all hosts correctly recognize paths to the shared volumes and maintain proper storage connectivity. Please find below the steps on how to create a dedicated system user on each Proxmox host that can only execute a single command. Alternatively, the root user can be used for the storage rescan.

1. Connect to the Proxmox host via SSH.
2. Install the sudo package if it's not already available to configure fine-grained privilege delegation for specific users.

```
apt-get install sudo
```

3. Create a new user named 'rescan'

```
useradd -m -s /bin/bash rescan
```

4. Set a password for the user

```
passwd rescan
```

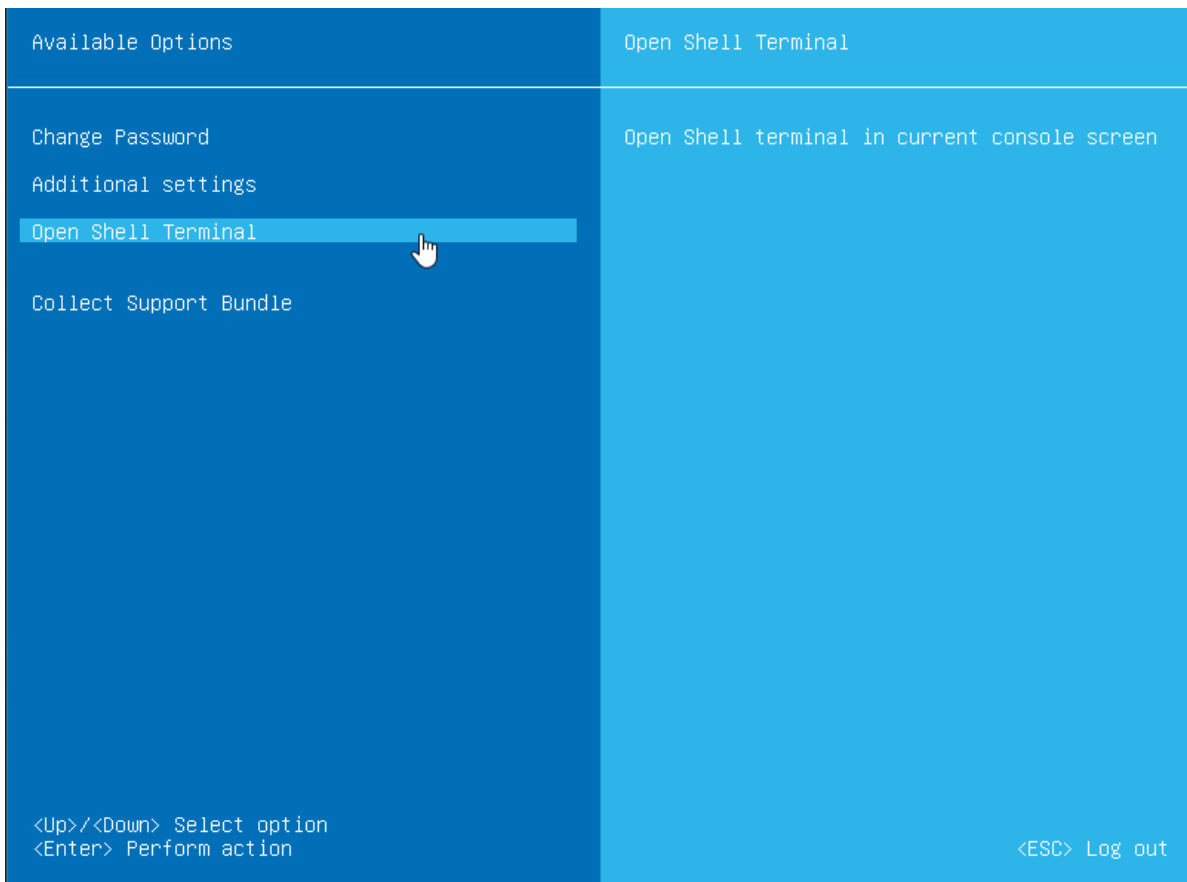
5. Grant command-specific sudo permission. Open the sudoers file safely using 'visudo'.

```
visudo
```

Scroll to the bottom of the file and add the following line below the root entry. Allow 'rescan' to run only the following command as root, without a password:

```
rescan ALL=(root) NOPASSWD: /usr/sbin/iscsiadm -m node -l
```

6. Connect to the appliance via Shell Terminal in a Text-based User Interface (TUI) or using a remote SSH terminal.



7. Edit file `/opt/starwind/starwind-virtual-san/drive_c/starwind/hba_rescan_config.py` with the following command:

```
sudo nano /opt/starwind/starwind-virtual-
san/drive_c/starwind/hba_rescan_config.py
```

8. In the appropriate lines, specify the IP address and login credentials of the single or multiple hosts on which the current StarWind VM is stored and will trigger the storage rescan task:

```
pve_host_list = ['SET_PVE_HOST_IP_1']
pve_username = 'SET_PVE_USER'
pve_password = 'SET_PVE_PASSWORD'
```

9. Search for `pve_command` with `iscsiadm` under PVE block > edit it by setting the script area to:

```
"sudo iscsiadm -m node -l"
```

Conclusion

Following this guide, a StarWind Virtual HCI Appliance (VHCA) powered by Proxmox Virtual Environment was deployed and configured with StarWind Virtual SAN (VSAN) running in a CVM on each host. As a result, a virtual shared storage "pool" accessible by all cluster nodes was created for storing highly available virtual machines.

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Customer Support Portal: <https://www.starwind.com/support>

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