



Get started

SnapCenter Plug-in for VMware vSphere

NetApp
April 07, 2022

This PDF was generated from https://docs.netapp.com/us-en/sc-plugin-vmware-vsphere/scpivs44_get_started_overview.html on April 07, 2022. Always check docs.netapp.com for the latest.

Table of Contents

- Get started 1
 - Deployment Overview 1
 - Deployment workflow for existing users 1
 - Requirements for deploying SCV 2
 - Download the SnapCenter Plug-in for VMware vSphere OVA (Open Virtual Appliance) 10
 - Deploy SnapCenter Plug-in for VMware vSphere 10
 - Post deployment required operations and issues 14
 - Log in to the SnapCenter VMware vSphere Web Client 16

Get started

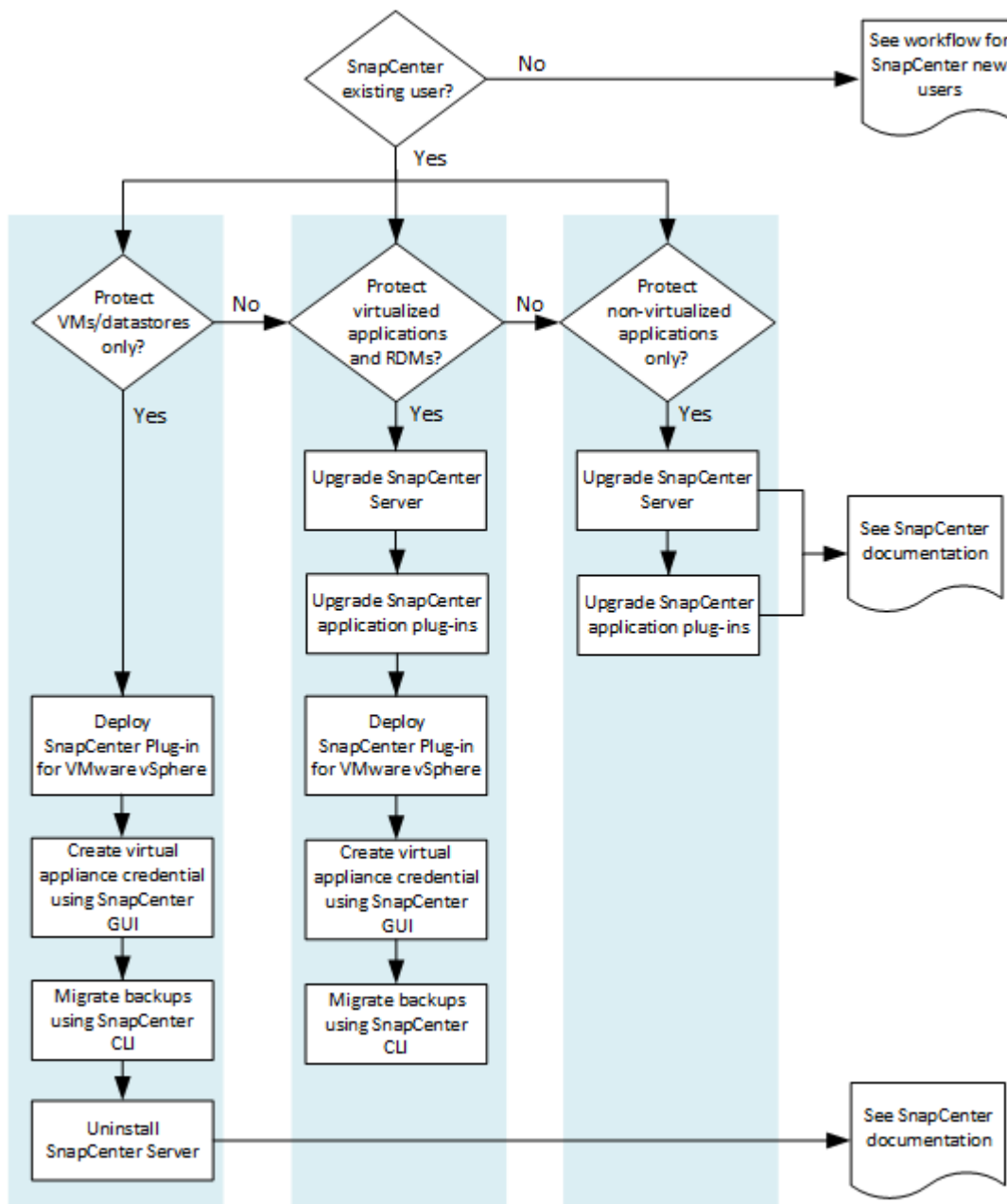
Deployment Overview

To use SnapCenter features to protect VMs, datastores, and application-consistent databases on virtualized machines, you must deploy SnapCenter Plug-in for VMware vSphere.

Existing SnapCenter users must use a different deployment workflow from new SnapCenter users.

Deployment workflow for existing users

If you are a SnapCenter user and have SnapCenter backups, then use the following workflow to get started.



Requirements for deploying SCV

Deployment planning and requirements

You should be aware of the deployment requirements before you deploy the virtual appliance. The deployment requirements are listed in the following five tables.

Host requirements

Before you begin deployment of SnapCenter Plug-in for VMware vSphere, you should be familiar with the host requirements.

- You must deploy the SnapCenter VMware plug-in as a Linux VM.

The SnapCenter VMware plug-in is deployed as a Linux VM regardless of whether you use the plug-in to protect data on Windows systems or Linux systems.

- You should deploy the SnapCenter VMware plug-in on the vCenter Server.

Backup schedules are executed in the time zone in which the SnapCenter VMware plug-in is deployed. vCenter reports data in the time zone in which the vCenter is located. Therefore, if the SnapCenter VMware plug-in and vCenter are in different time zones, data in the SnapCenter VMware plug-in Dashboard might not be the same as the data in the reports.

- You must not deploy the SnapCenter VMware plug-in in a folder that has a name with special characters.

The folder name should not contain the following special characters: `!@#%^&()_+{}';,.*?"<>|`

- You must deploy and register a separate, unique instance of the SnapCenter VMware plug-in for each vCenter Server.
 - Each vCenter Server, whether or not it is in Linked Mode, must be paired with a separate instance of the SnapCenter VMware plug-in.
 - Each instance of the SnapCenter VMware plug-in must be deployed as a separate Linux VM.

For example, if you want to perform backups from six different instances of the vCenter Server, then you must deploy the SnapCenter VMware plug-in on six hosts and each vCenter Server must be paired with a unique instance of the SnapCenter VMware plug-in.

- To protect vVol VMs (VMs on VMware vVol datastores), you must first deploy ONTAP Tools for VMware vSphere. ONTAP Tools provisions and configures storage for vVols on ONTAP and on the VMware web client.

For more information, see [ONTAP Tools for VMware vSphere](#)

For the latest information about supported versions of ONTAP Tools, see the [NetApp Interoperability Matrix Tool](#).

- The SnapCenter VMware plug-in provides limited support of shared PCI or PCIe devices (for example, NVIDIA Grid GPU) due to a limitation of the virtual machines in supporting Storage vMotion. For more information, see the vendor's document Deployment Guide for VMware.
 - What is supported:

Creating resource groups

Creating backups without VM consistency

Restoring a complete VM when all the VMDKs are on an NFS datastore and the plug-in does not need to use Storage vMotion

Attaching and detaching VMDKs

Mounting and unmounting datastores

Guest file restores

- What is not supported:

Creating backups with VM consistency

Restoring a complete VM when one or more VMDKs are on a VMFS datastore.

- For a detailed list of the SnapCenter VMware plug-in limitations, see the [SnapCenter Plug-in for VMware vSphere Release Notes](#).

License requirements

You must provide licenses for...	License requirement
ONTAP	One of these: SnapMirror or SnapVault (for secondary data protection regardless of the type of relationship)
Additional products	vSphere Standard, Enterprise, or Enterprise Plus A vSphere license is required to perform restore operations, which use Storage vMotion. vSphere Essentials or Essentials Plus licenses do not include Storage vMotion.
Primary destinations	SnapCenter Standard: required to perform application-based protection over VMware SnapRestore: required to perform restore operations for VMware VMs and datastores only FlexClone: used for mount and attach operations on VMware VMs and datastores only
Secondary destinations	SnapCenter Standard: used for failover operations for application-based protection over VMware FlexClone: used for mount and attach operations on VMware VMs and datastores only

Software support

Item	Supported versions
vCenter vSphere	HTML5 client: 6.5U2/U3, 6.7x, 7.0, 7.0U1, 7.0U2, 7.0U3 Flex client is not supported.
ESXi	6.5U2 and later
IP addresses	IPv4, IPv6

Item	Supported versions
VMware TLS	1.2
TLS on the SnapCenter Server	TLSv1.1 and later The SnapCenter Server uses this to communicate with the SnapCenter VMware plug-in for application over VMDK data protection operations.
VMware application vStorage API for Array Integration (VAAI)	SnapCenter Plug-in for VMware vSphere uses this to improve performance for restore operations. It also improves performance in NFS environments.
ONTAP Tools for VMware	SnapCenter Plug-in for VMware vSphere uses this to manage vVol datastores (VMware virtual volumes). For supported versions, see the NetApp Interoperability Matrix Tool.

For the latest information about supported versions, see the [NetApp Interoperability Matrix Tool](#).

Space and sizing requirements

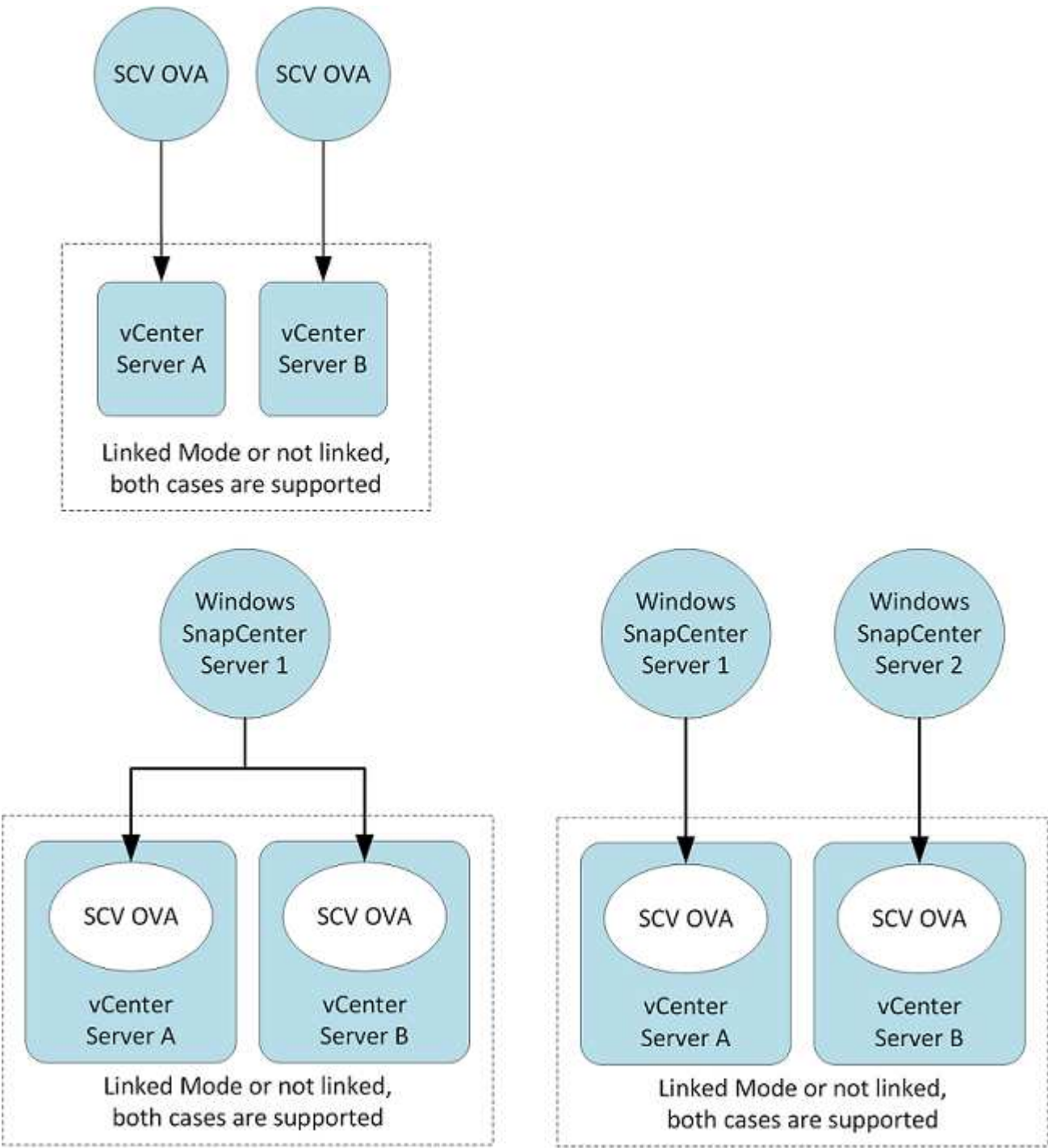
Item	Requirements
Operating system	Linux
Minimum CPU count	4 cores
Minimum RAM	Minimum: 12 GB Recommended: 16 GB
Minimum hard drive space for the SnapCenter Plug-in for VMware vSphere, logs, and MySQL database	100 GB

Connection and port requirements

Type of port	Preconfigured port
SnapCenter Plug-in for VMware vSphere port	8144 (HTTPS), bidirectional The port is used for communications from the VMware vSphere web client and from the SnapCenter Server. 8080 bidirectional This port is used to manage the virtual appliance. Note: You cannot modify the port configuration.
VMware vSphere vCenter Server port	You must use port 443 if you are protecting vVol VMs.
Storage cluster or storage VM port	443 (HTTPS), bidirectional 80 (HTTP), bidirectional The port is used for communication between the virtual appliance and the storage VM or the cluster that contains the storage VM.

Configurations supported

Each plug-in instance supports only one vCenter Server. vCenters in linked mode are supported. Multiple plug-in instances can support the same SnapCenter Server as shown in the following figure.



RBAC privileges required

The vCenter administrator account must have the required vCenter privileges, as listed in the following table.

To do this operation...	You must have these vCenter privileges...
Deploy and register the SnapCenter Plug-in for VMware vSphere in vCenter	Extension: Register extension
Upgrade or remove the SnapCenter Plug-in for VMware vSphere	Extension <ul style="list-style-type: none"> • Update extension • Unregister extension
Allow the vCenter Credential user account registered in SnapCenter to validate user access to the SnapCenter Plug-in for VMware vSphere	sessions.validate.session
Allow users to access the SnapCenter Plug-in for VMware vSphere	SCV Administrator SCV Backup SCV Guest File Restore SCV Restore SCV View The privilege must be assigned at the vCenter root.

AutoSupport

The SnapCenter Plug-in for VMware vSphere provides a minimum of information for tracking its usage, including the plug-in URL. AutoSupport includes a table of installed plug-ins that is displayed by the AutoSupport viewer.

Minimum ONTAP privileges required

The minimum ONTAP privileges that are required vary according to the SnapCenter plug-ins you are using for data protection.

All SnapCenter plug-ins require the following minimum privileges.

All-access commands: Minimum privileges required for ONTAP 8.3 and later
event generate-autosupport-log
job history show job stop

All-access commands: Minimum privileges required for ONTAP 8.3 and later

lun
lun create
lun delete
lun igroup add
lun igroup create
lun igroup delete
lun igroup rename
lun igroup show
lun mapping add-reporting-nodes
lun mapping create
lun mapping delete
lun mapping remove-reporting-nodes
lun mapping show
lun modify
lun move-in-volume
lun offline
lun online
lun persistent-reservation clear
lun resize
lun serial
lun show

snapmirror list-destinations
snapmirror policy add-rule
snapmirror policy modify-rule
snapmirror policy remove-rule
snapmirror policy show
snapmirror restore
snapmirror show
snapmirror show-history
snapmirror update
snapmirror update-ls-set

Version

All-access commands: Minimum privileges required for ONTAP 8.3 and later

volume clone create
volume clone show
volume clone split start
volume clone split stop
volume create
volume destroy
volume file clone create
volume file show-disk-usage
volume offline
volume online
volume modify
volume qtree create
volume qtree delete
volume qtree modify
volume qtree show
volume restrict
volume show
volume snapshot create
volume snapshot delete
volume snapshot modify
volume snapshot rename
volume snapshot restore
volume snapshot restore-file
volume snapshot show
volume unmount

vserver cifs
vserver cifs share create
vserver cifs share delete
vserver cifs shadowcopy show
vserver cifs share show
vserver cifs show
vserver export-policy
vserver export-policy create
vserver export-policy delete
vserver export-policy rule create
vserver export-policy rule show
vserver export-policy show
vserver iscsi
vserver iscsi connection show
vserver show
network interface
network interface failover-groups
network interface show

Read-only Commands: Minimum Privileges Required for ONTAP 8.3 and Later

vserver

Additional ONTAP information

- If you are running ONTAP 8.2.x:

You must login as `vsadmin` on the storage VM to have the appropriate privileges for SnapCenter Plug-in for VMware vSphere operations.

- If you are running ONTAP 8.3 and later:

You must login as `vsadmin` or with a role that has the minimum privileges listed in the tables above.

Minimum vCenter privileges required

Before you begin deployment of SnapCenter Plug-in for VMware vSphere, you should make sure you have the minimum required vCenter privileges.

Required privileges for vCenter Admin role

System.Anonymous
System.View
System.Read
Datastore.Rename
Datastore.Move
Datastore.Delete
Datastore.Browse
Datastore.FileManagement
Datastore.AllocateSpace
Network.Assign
Host.Config.Storage
Host.Config.AdvancedConfig
Host.Config.Resources
Host.Config.Settings
Host.Local.CreateVM
Host.Local.ReconfigVM
Host.Local.DeleteVM
VirtualMachine.Inventory.Create
VirtualMachine.Inventory.CreateFromExisting
VirtualMachine.Inventory.Register
VirtualMachine.Inventory.Delete
VirtualMachine.Inventory.Unregister
VirtualMachine.Inventory.Move
VirtualMachine.Interact.PowerOn
VirtualMachine.Interact.PowerOff
VirtualMachine.GuestOperations.Query
VirtualMachine.GuestOperations.Modify
VirtualMachine.GuestOperations.Execute
VirtualMachine.Config.AddExistingDisk
VirtualMachine.Config.AddNewDisk
VirtualMachine.Config.RemoveDisk
VirtualMachine.Config.Resource
VirtualMachine.Config.AdvancedConfig
VirtualMachine.Config.ReloadFromPath
VirtualMachine.State.CreateSnapshot
VirtualMachine.State.RevertToSnapshot
VirtualMachine.State.RemoveSnapshot
Resource.AssignVMToPool
Resource.ApplyRecommendation

Resource.HotMigrate
Resource.ColdMigrate
Resource.QueryVMotion
Task.Create
Task.Update
Extension.Register
Extension.Update
Extension.Unregister

Required privileges specific to SnapCenter Plug-in for VMware vCenter

netappSCV.Guest.RestoreFile
netappSCV.Recovery.MountUnMount
netappSCV.Backup.DeleteBackupJob
netappSCV.Configure.ConfigureStorageSystems.Delete
netappSCV.View
netappSCV.Recovery.RecoverVM
netappSCV.Configure.ConfigureStorageSystems.AddUpdate
netappSCV.Backup.BackupNow
netappSCV.Guest.Configure
netappSCV.Configure.ConfigureSnapCenterServer
netappSCV.Backup.BackupScheduled

Download the SnapCenter Plug-in for VMware vSphere OVA (Open Virtual Appliance)

You can download the `.ova` file for SnapCenter Plug-in for VMware vSphere from the NetApp Support Site.

The `.ova` file includes a set of microservices for VM and datastore data protection, which are performed by the SnapCenter VMware plug-in. When the deployment is complete, all components are installed on a Linux VM in your environment.

Steps

1. Log in to the NetApp Support Site (<https://mysupport.netapp.com/products/index.html>).
2. From the list of products, select **SnapCenter Plug-in for VMware vSphere**, then click the **Download Latest Release** button.
3. Download the SnapCenter Plug-in for VMware vSphere `.ova` file to any location.

Deploy SnapCenter Plug-in for VMware vSphere

To use SnapCenter features to protect VMs, datastores, and application-consistent databases on virtualized machines, you must deploy SnapCenter Plug-in for VMware vSphere.

Before you begin

- You must have read the deployment requirements.

The deployment wizard does not verify the space requirement. If you do not have enough space on the datastore, the deployment might look successful, but the virtual appliance will not boot up.

- You must be running a supported version of vCenter Server.
- You must have configured and set up your vCenter Server environment.
- You must have set up an ESXi host for the SnapCenter VMware plug-in VM.
- You must have downloaded the SnapCenter Plug-in for VMware vSphere .ova file.
- You must have the login credentials for your vCenter Server instance.
- You must have logged out of and closed all browser sessions of vSphere Web Client and deleted the browser cache to avoid any browser cache issue during the deployment of the SnapCenter VMware plug-in.
- You must have enabled Transport Layer Security (TLS) in vCenter. Refer to the VMware documentation.
- You can deploy the SnapCenter VMware plug-in in the same vCenter as the virtual appliance for VSC 7.x and later.
- If you plan to perform backups in vCenters other than the one in which the SnapCenter VMware plug-in is deployed, then the ESXi server, the SnapCenter VMware plug-in, and each vCenter must be synchronized to the same time.
- To protect VMs on vVol datastores, you must first deploy ONTAP Tools for VMware vSphere. ONTAP Tools provisions and configures storage on ONTAP and on the VMware web client.

Deploy the SnapCenter VMware plug-in in the same time zone as the vCenter. Backup schedules are executed in the time zone in which the SnapCenter VMware plug-in is deployed. vCenter reports data in the time zone in which the vCenter is located. Therefore, if the SnapCenter VMware plug-in and vCenter are in different time zones, data in the SnapCenter VMware plug-in Dashboard might not be the same as the data in the reports.

Steps

1. In your browser, navigate to VMware vSphere vCenter.



For IPv6 HTML web clients, you must use either Chrome or Firefox.

2. On the VMware screen, click **vSphere Web Client (HTML5)**.
3. Log in to the **VMware vCenter Single Sign-On** page.
4. On the Navigator pane, right-click any inventory object that is a valid parent object of a virtual machine, such as a datacenter, cluster, or host, and select **Deploy OVF Template** to start the VMware deploy wizard.
5. On the **Select an OVF template** page, specify the location of the .ova file (as shown in the following table) and click **Next**.

If you downloaded the .ova file to...	Do this...
An internet location	Enter the URL. Supported URL sources are HTTP and HTTPS.
A local file	Click Choose Files and navigate to the .ova file.

6. On the **Select a name and folder** page, enter a unique name for the VM or vApp, and select a deployment location, and then click **Next**.

This step specifies where to import the .ova file into vCenter. The default name for the VM is the same as the name of the selected .ova file. If you change the default name, choose a name that is unique within

each vCenter Server VM folder.

The default deployment location for the VM is the inventory object where you started the wizard.

7. On the **Select a resource** page, select the resource where you want to run the deployed VM template, and click **Next**.
8. On the **Review details** page, verify the .ova template details and click **Next**.
9. On the **License agreements** page, select the checkbox for **I accept all license agreements**.
10. On the **Select storage** page, define where and how to store the files for the deployed OVF template.
 - a. Select the disk format for the VMDKs.
 - b. Select a VM Storage Policy.

This option is available only if storage policies are enabled on the destination resource.

- c. Select a datastore to store the deployed OVA template.

The configuration file and virtual disk files are stored on the datastore.

Select a datastore large enough to accommodate the virtual machine or vApp and all associated virtual disk files.

11. On the **Select networks** page, do the following:

- a. Select a source network and map it to a destination network,

The Source Network column lists all networks that are defined in the OVA template.

- b. In the **IP Allocation Settings** section, select the required IP protocol and then click **Next**.

SnapCenter Plug-in for VMware vSphere supports one network interface. If you need multiple network adapters, you must set that up manually. See the [KB article: How to create additional network adapters](#).

12. On the **Customize template** page, do the following:

- a. In the **Register to existing vCenter** section, enter the vCenter name and the vCenter credentials of the virtual appliance.

In the **vCenter username** field, enter the username in the format `domain\username`.

- b. In the **Create SCV credentials** section, enter the local credentials.

In the **Username** field, enter the local username; do not include the domain details.



Make a note of the username and password that you specify. You need to use these credentials if you want to modify the SnapCenter VMware plug-in configuration later.

- c. In **Setup Network Properties**, enter the host name.
 - i. In **Setup IPv4 Network Properties** section, enter the network information such as IPv4 address, IPv4 Netmask, IPv4 Gateway, IPv4 Primary DNS, IPv4 Secondary DNS, and IPv4 Search Domains.
 - ii. In **Setup IPv6 Network Properties** section, enter the network information such as the IPv6 address, IPv6 Netmask, IPv6 Gateway, IPv6 Primary DNS, IPv6 Secondary DNS, and IPv6 Search

Domains.

Select the IPv4 or IPv6 fields, or both, if appropriate. If you are using both IPv4 and IPv6, then you need to specify the Primary DNS for only one of them.



You can skip these steps and leave the entries blank in the **Setup Network Properties** section, if you want to proceed with DHCP as your network configuration.

d. In **Setup Date and Time**, select the time zone where the vCenter is located.

13. On the **Ready to complete** page, review the page and click **Finish**.

All hosts must be configured with IP addresses (FQDN hostnames are not supported). The deploy operation does not validate your input before deploying.

You can view the progress of the deployment from the Recent Tasks window while you wait for the OVF import and deployment tasks to finish.

When the SnapCenter VMware plug-in is successfully deployed, it is deployed as a Linux VM, registered with vCenter, and a VMware vSphere web client is installed.

14. Navigate to the VM where the SnapCenter VMware plug-in was deployed, then click the **Summary** tab, and then click the **Power On** box to start the virtual appliance.
15. While the SnapCenter VMware plug-in is powering on, right-click the deployed SnapCenter VMware plug-in, select **Guest OS**, and then click **Install VMware tools**.

The VMware Tools is installed on the VM where the SnapCenter VMware plug-in is deployed. For more information on installing VMware Tools, see the VMware documentation.

The deployment might take a few minutes to complete. A successful deployment is indicated when the SnapCenter VMware plug-in is powered on, the VMware tools are installed, and the screen prompts you to log in to the SnapCenter VMware plug-in. You can switch your network configuration from DHCP to static during the first reboot. However, switching from static to DHCP is not supported.

The screen displays the IP address where the SnapCenter VMware plug-in is deployed. Make a note of the IP address. You need to log in to the SnapCenter VMware plug-in management GUI if you want to make changes to the SnapCenter VMware plug-in configuration.

16. Log in to the SnapCenter VMware plug-in management GUI using the IP address displayed on the deployment screen and using the credentials that you provided in the deployment wizard, then verify on the Dashboard that the SnapCenter VMware plug-in is successfully connected to vCenter and is enabled.

Use the format `https://<appliance-IP-address>:8080` to access the management GUI.

By default, the maintenance console username is set to “maint” and the password is set to “admin123”.

If the SnapCenter VMware plug-in is not enabled, then see [Restart the VMware vSphere web client service](#).

If the host name is 'UnifiedVSC/SCV, then restart the appliance. If restarting the appliance does not change the host name to the specified host name, then you must reinstall the appliance.

After you finish

You should complete the required [post deployment operations](#).

Post deployment required operations and issues

Required operations after deployment

If you are a new SnapCenter user, you must add storage VMs to SnapCenter before you can perform any data protection operations. When adding storage VMs, specify the management LIF. You can also add a cluster and specify the cluster management LIF. For information about adding storage, see [Add storage](#).

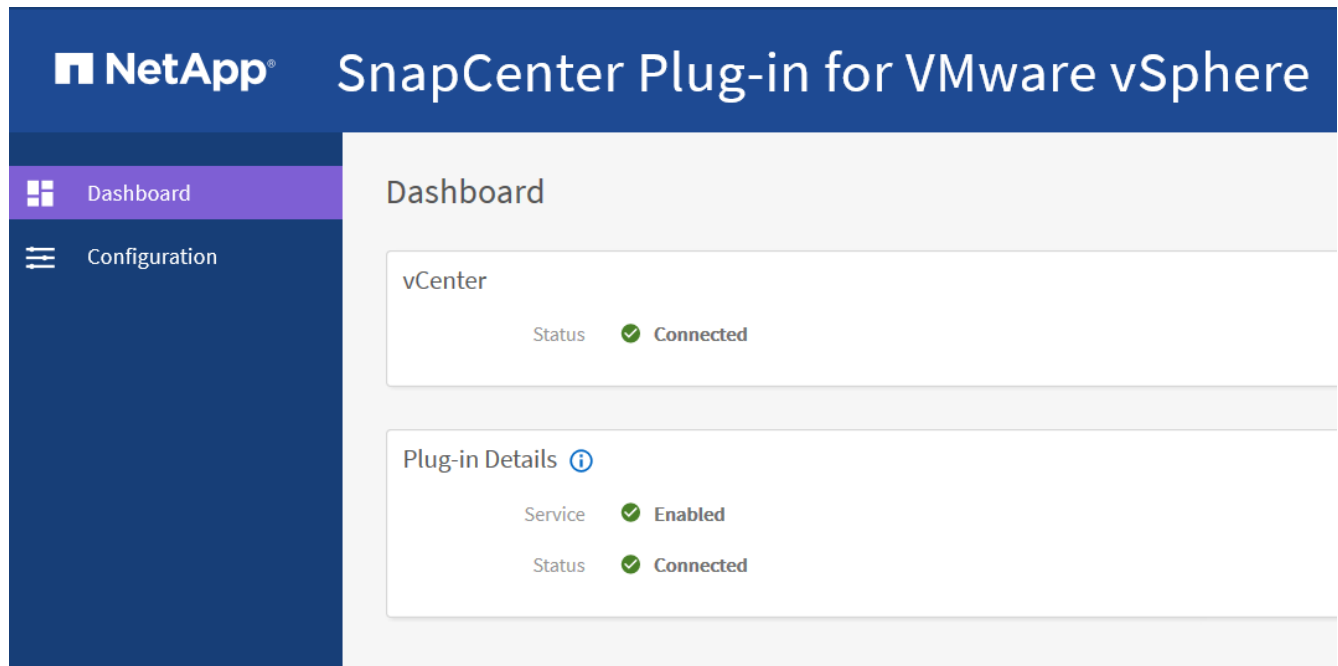
Deployment issues you might encounter

- After deploying the virtual appliance, the **Backup Jobs** tab on the Dashboard might not load in the following scenarios:
 - You are running IPv4 and have two IP addresses for the SnapCenter VMware vSphere host. As a result, the job request is sent to an IP address that is not recognized by the SnapCenter Server. To prevent this issue, add the IP address that you want to use, as follows:
 - a. Navigate to the location where the SnapCenter VMware plug-in is deployed:
`/opt/netapp/scvservice/standalone_aegis/etc`
 - b. Open the file `network- interface.properties`.
 - c. In the `network.interface=10.10.10.10` field, add the IP address that you want to use.
 - You have two NICs.
- After deploying the SnapCenter VMware plug-in, the MOB entry in vCenter for SnapCenter Plug-in for VMware vSphere might still show the old version number. This can occur when other jobs are running in the vCenter. vCenter will eventually update the entry.

To correct either of these issues, do the following:

1. Clear the browser cache and then check if the GUI is operating properly.

If the problem persists, then restart the VMware vSphere web client service



2. Log in to vCenter, then click **Menu** in the toolbar, and then select **SnapCenter Plug-in for VMware vSphere**.

Manage authentication errors

If you do not use the Admin credentials, you might receive an authentication error after deploying SnapCenter Plug-in for VMware vSphere or after migrating. If you encounter an authentication error, you must restart the service.

Steps

1. Log on to the SnapCenter VMware plug-in management GUI using the format <https://<appliance-IP-address>:8080>.
2. Restart the service.

Register SnapCenter Plug-in for VMware vSphere with SnapCenter Server

If you want to perform application-over-VMDK workflows in SnapCenter (application-based protection workflows for virtualized databases and file systems), you must register SnapCenter Plug-in for VMware vSphere with the SnapCenter Server.

Before you begin

- You must be running SnapCenter Server 4.2 or later.
- You must have deployed and enabled SnapCenter Plug-in for VMware vSphere.

About this task

- You register SnapCenter Plug-in for VMware vSphere with SnapCenter Server by using the SnapCenter GUI to add a “vsphere” type host.

Port 8144 is predefined for communication within the SnapCenter VMware plug-in.

You can register multiple instances of SnapCenter Plug-in for VMware vSphere on the same SnapCenter Server to support application-based data protection operations on VMs. You cannot register the same

SnapCenter Plug-in for VMware vSphere on multiple SnapCenter Servers.

- For vCenters in Linked Mode, you must register the SnapCenter Plug-in for VMware vSphere for each vCenter.

Steps

1. In the SnapCenter GUI left navigation pane, click **Hosts**.
2. Verify that the **Managed Hosts** tab is selected at the top, then locate the virtual appliance host name and verify that it resolves from the SnapCenter Server.
3. Click **Add** to start the wizard.
4. On the **Add Hosts** dialog box, specify the host you want to add to the SnapCenter Server as listed in the following table:

For this field...	Do this...
Host Type	Select vSphere as the type of host.
Host name	Verify the IP address of the virtual appliance.
Credential	Enter the username and password for the SnapCenter VMware plug-in that was provided during the deployment.

5. Click **Submit**.

When the VM host is successfully added, it is displayed on the Managed Hosts tab.

6. In the left navigation pane, click **Settings**, then click the **Credential** tab, and then click **+ Add** to add credentials for the virtual appliance.
7. Provide the credential information that was specified during the deployment of SnapCenter Plug-in for VMware vSphere.



You must select Linux for the Authentication field.

After you finish

If the SnapCenter Plug-in for VMware vSphere credentials are modified, you must update the registration in SnapCenter Server using the SnapCenter Managed Hosts page.

Log in to the SnapCenter VMware vSphere Web Client

When SnapCenter Plug-in for VMware vSphere is deployed, it installs a VMware vSphere web client on vCenter, which is displayed on the vCenter screen with other vSphere web clients.

Before you begin

Transport Layer Security (TLS) must be enabled in vCenter. Refer to the VMware documentation.

Steps

1. In your browser, navigate to VMware vSphere vCenter.
2. On the VMware screen, click **vSphere Client (HTML5)**.

3. Log in to the **VMware vCenter Single Sign-On** page.



Click the **Login** button. Due to a known VMware issue, do not use the ENTER key to log in. For details, see the VMware documentation on ESXi Embedded Host Client issues.

4. On the **VMware vSphere Web Client** page, click Menu in the toolbar, and then select **SnapCenter Plug-in for VMware vSphere**.

Copyright Information

Copyright © 2022 NetApp, Inc. All rights reserved. Printed in the U.S. No part of this document covered by copyright may be reproduced in any form or by any means-graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system-without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7103 (October 1988) and FAR 52-227-19 (June 1987).

Trademark Information

NETAPP, the NETAPP logo, and the marks listed at <http://www.netapp.com/TM> are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.