Virtual Storage Console, VASA Provider, and Storage Replication Adapter for VMware® vSphere

Deployment and Setup Guide

For 9.6 Release

April 2020 | 215-13886_2020-04_en-us
doccomments@netapp.com

NetApp®

Contents

Overview of the virtual appliance for VSC, VASA Provider, and SRA

The virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) provides end-to-end life cycle management for virtual machines in VMware environments that use NetApp storage systems. It simplifies storage and data management for VMware environments by enabling administrators to directly manage storage within the vCenter Server.

With vSphere 6.5, VMware introduced a new HTML5-based client called vSphere Client. The 9.6 release of the virtual appliance for VSC, VASA Provider, and SRA supports only the vSphere Client. The virtual appliance for VSC, VASA Provider, and SRA integrates with the vSphere Client and enables you to use single sign-on (SSO) services. In an environment with multiple vCenter Server instances, each vCenter Server instance that you want to manage must have its own registered instance of VSC.

Each component in the virtual appliance provides capabilities to help manage your storage more efficiently.

Virtual Storage Console (VSC)

VSC enables you to perform the following tasks:

- Add storage controllers, assign credentials, and set up permissions for storage controllers to VSC that both SRA and VASA Provider can leverage
- Provision datastores
- Monitor the performance of the datastores and virtual machines in your vCenter Server environment
- Control administrator access to the vCenter Server objects by using role-based access control (RBAC) at two levels:
  - vSphere objects, such as virtual machines and datastores
    These objects are managed by using the vCenter Server RBAC.
  - ONTAP storage
    The storage systems are managed by using ONTAP RBAC.
- View and update the host settings of the ESXi hosts that are connected to NetApp storage

VSC provisioning operations benefit from using the NFS Plug-in for VMware VAAI. The NFS Plug-in for VMware vStorage APIs for Array Integration (VAAI) is a software library that integrates the VMware Virtual Disk Libraries that are installed on the ESXi host. The VMware VAAI package enables the offloading of certain tasks from the physical hosts to the storage array. You can perform tasks such as thin provisioning and hardware acceleration at the array level to reduce the workload on the ESXi hosts. The copy offload feature and space reservation feature improve the performance of VSC operations.

The NetApp NFS Plug-in for VAAI is not shipped with VSC. You can download the plug-in installation package and obtain the instructions for installing the plug-in from the NetApp Support Site.

VASA Provider

VASA Provider for ONTAP uses VMware vSphere APIs for Storage Awareness (VASA) to send information about storage used by VMware vSphere to the vCenter Server. In the 9.6 release of the virtual appliance for VSC, VASA Provider, and SRA, VASA Provider is integrated with VSC.

VASA Provider enables you to perform the following tasks:

- Provision virtual volume (VVol) datastores
- Create and use storage capability profiles that define different storage service level objectives (SLOs) for your environment
- Verify for compliance between the datastores and the storage capability profiles
- Set alarms to warn you when volumes and aggregates are approaching the threshold limits
- Monitor the performance of virtual machine disks (VMDKs) and the virtual machines that are created on VVol datastores

VASA Provider communicates with the vCenter Server by using VASA APIs and communicates with ONTAP by using NetApp APIs called ZAPIs. To view the VASA Provider dashboard, you must have installed and registered OnCommand API Services with your vCenter Server.

Note: VASA Provider requires a dedicated instance of OnCommand API Services. One instance of OnCommand API Services cannot be shared with multiple VASA Provider instances.

Storage Replication Adapter (SRA)

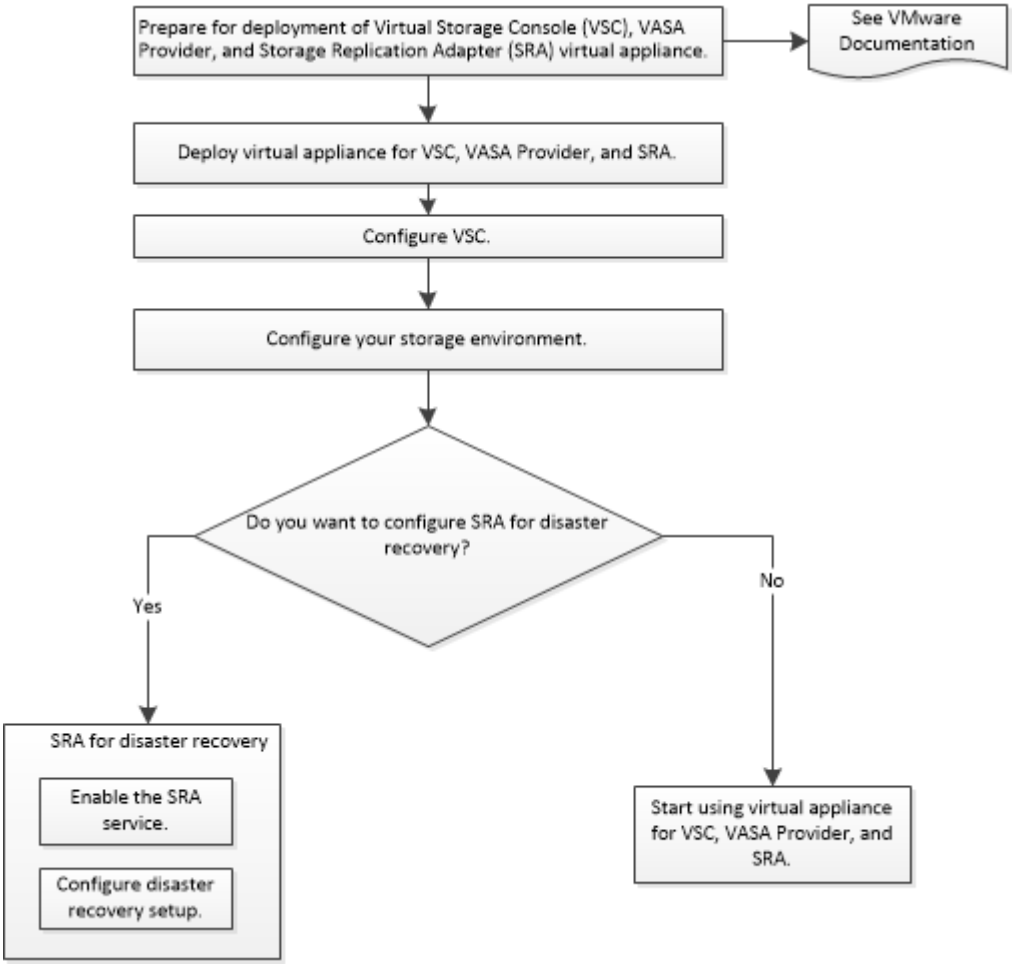
When SRA is enabled and used in conjunction with VMware Site Recovery Manager (SRM), you can recover the vCenter Server datastores and virtual machines in the event of a failure. SRA enables you to configure protected sites and recovery sites in your environment for disaster recovery in the event of a failure.

Related information

NetApp Documentation: OnCommand API Services
NetApp Documentation: NetApp NFS Plug-in for VMware VAAI
NetApp Support

Deployment workflow for new users of VSC, VASA Provider, and SRA virtual appliance

If you are new to VMware and have never used a NetApp VSC product, you need to configure your vCenter Server and setup an ESXi host, before you deploy and configure the virtual appliance for VSC, VASA Provider, and SRA.



Deployment workflow for existing users of VSC, VASA Provider, and SRA

The 7.x releases of virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) support in-place upgrade to the latest version.

The earlier releases of individual applications like VSC, VASA Provider, and SRA use a different upgrade process. If you have VSC or VASA Provider or SRA installed in your setup, then you should perform the following operations:

1. Deploy the latest version of the virtual appliance for VSC, VASA Provider, and SRA
2. Migrate any existing configuration data.
   The configuration data includes storage system credentials, as well as preferences found in the `kaminoprefs.xml` and `vscPreferences.xml` files.

Configuring the VSC preferences files on page 27

In many cases, you might not need to migrate configuration data. However, if you have customized the preferences files earlier, you might want to review them and make similar changes to the newly deployed virtual appliance. You can perform one of the following:

- Use NetApp utility to migrate storage system credentials from VSC 6.X and SRA 4.X to the new deployment
- Add the storage systems to the newly deployed virtual appliance and specify the credentials as you add them

If you are upgrading from VASA Provider 6.X, you should unregister VASA Provider before upgrading. See the documentation for your current release for more details.

If you are also upgrading from SRA 4.0 or earlier:

- If you are using SRA 4.0, you can perform an in-place upgrade of the SRA server (the `.ova` file installed as a VM) to the latest version.
  Upgrading to the 9.6 virtual appliance for VSC, VASA Provider, and SRA on page 19
- If you are using SRA 2.1 or 3.0, you should first make note of existing site configuration details. See *Installation and Setup Guide for Storage Replication Adapter 4.0 for ONTAP* for detailed instructions under "Upgrade Overview". These SRA releases also use the VASA Provider, so you must unregister VASA Provider and then deploy the latest version of the virtual appliance for VSC, VASA Provider, and SRA. The previous release server (`.ova`) can be removed when the upgrade is complete.

For any SRA upgrade, the SRA software (the adapter on the Site Recovery Manager server, installed by `.msi` file) should be removed from the Site Recovery Manager server. You can use the Windows system control panel to uninstall the software and then install the latest SRA software on the SRA server using the `.msi` file.

If you have the VASA Provider deployment, then after the upgrade from existing setup, you must configure the memory size for your virtual appliance to be 12GB using the `Edit Settings` option. You must also modify the virtual memory reservation. The virtual machine must be powered off to modify the memory size.

If you are going to deploy the latest version of the virtual appliance, you must see the “Requirements for deploying the virtual appliance for VSC, VASA Provider, and SRA” topic. Upgrading to the 9.6 virtual appliance for VSC, VASA Provider, and SRA topic has information on performing an in-place upgrade.

Related concepts

Requirements for deploying the virtual appliance for VSC, VASA Provider, and SRA on page 9

Related tasks

Upgrading to the 9.6 virtual appliance for VSC, VASA Provider, and SRA on page 19

Related information

NetApp ToolChest: NetApp Import Utility for SnapCenter and Virtual Storage Console
Installing and setting up SnapCenter

Requirements for deploying the virtual appliance for VSC, VASA Provider, and SRA

You should be aware of the deployment requirements before deploying the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA), and you should decide the tasks that you want to perform. Based on your tasks, you can choose the deployment model for deploying the virtual appliance for VSC, VASA Provider, and SRA.

Port requirements for VSC

By default, Virtual Storage Console (VSC) uses designated ports to enable communication between its components, which include storage systems and the VMware vCenter Server. If you have firewalls enabled, you must ensure that the firewalls are set to allow exceptions.

For firewalls other than Windows, you should manually grant access to specific ports that VSC uses. If you do not grant access to these ports, an error message such as the following is displayed.

Unable to communicate with the server

VSC uses the following default bidirectional TCP ports:

Default port number	Description
9083	When enabled, both VASA Provider and Storage Replication Adapter (SRA) use this port to communicate with the vCenter Server. This port is also required for obtaining the TCP/IP settings.
443	Depending on how you have configured your credentials, the VMware vCenter Server and the storage systems listen for secure communications on this port.
8143	VSC listens for secure communications on this port.
7	VSC sends an echo request to ONTAP to verify reachability and is required only when adding storage system and can be disabled later.

Note: You should have enabled Internet Control Message Protocol (ICMP) before deploying the virtual appliance for VSC, VASA Provider, and SRA.

If ICMP is disabled, then the initial configuration of the virtual appliance for VSC, VASA Provider, and SRA fails, and VSC cannot start the VSC and VASA Provider services after deployment. You must manually enable the VSC and VASA Provider services after deployment.

Space and sizing requirements for the virtual appliance for VSC, VASA Provider, and SRA

Before deploying the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA), you should be familiar with the space requirements for the deployment package and some basic host system requirements.

Installation package space requirements

- 2.1 GB for thin provisioned installations

- 54.0 GB for thick provisioned installations

Host system sizing requirements

- ESXi 6.5U2 or later
- Recommended memory: 12 GB RAM
- Recommended CPUs: 2

Supported storage system, licensing, and applications for the virtual appliance for VSC, VASA Provider, and SRA

You should be aware of the basic storage system requirements, application requirements, and license requirements before you begin deploying the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA).

The Interoperability Matrix Tool (IMT) contains the latest information about supported versions of ONTAP, vCenter Server, ESXi hosts, plug-in applications, and Site Recovery Manager (SRM).

- *Interoperability Matrix Tool: VSC 9.6*
- *Interoperability Matrix Tool: VASA Provider 9.6*
- *Interoperability Matrix Tool: SRA 9.6*

You must enable the FlexClone license for performing virtual machine snapshot operations and clone operations for virtual volume (VVol) datastores.

Storage Replication Adapter (SRA) requires the following licenses:

- SnapMirror license
  You must enable the SnapMirror license for performing failover operations for SRA.
- FlexClone license
  You must enable the FlexClone license for performing test failover operations for SRA.

To view the IOPS for a datastore, you must either enable Storage I/O control or uncheck the disable Storage I/O statistics collection checkbox in the Storage I/O control configuration. You can enable the Storage I/O control only if you have the Enterprise Plus license from VMware.

- *VMware KB article 1022091: Troubleshooting Storage I/O Control*
- *VMware vSphere Documentation: Storage I/O Control Requirements*

Considerations and requirements for deploying the virtual appliance for VSC, VASA Provider, and SRA

Before you deploy the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA), it is good practice to plan your deployment and to decide how you want to configure VSC, VASA Provider, and SRA in your environment.

The following table presents a high-level overview of what you should consider before you deploy the virtual appliance for VSC, VASA Provider, and SRA.

Considerations	Description
First-time deployment of the virtual appliance for VSC, VASA Provider, and SRA	The deployment of the virtual appliance for VSC, VASA Provider, and SRA automatically installs the VSC features. *Deploying or upgrading VSC, VASA Provider, and SRA* on page 13 *Deployment workflow for new users of VSC, VASA Provider, and SRA virtual appliance* on page 7
Upgrading from an existing deployment of VSC	The upgrade procedure from an existing deployment of VSC to the virtual appliance for VSC, VASA Provider, and SRA depends on the version of VSC, and whether you have deployed VASA Provider and SRA. The deployment workflows and upgrade section has more information. *Deployment workflow for existing users of VSC, VASA Provider, and SRA* on page 7 Best practices before an upgrade: • You should record information about the storage systems that are being used and their credentials. After the upgrade, you should verify that all of the storage systems were automatically discovered and that they have the correct credentials. • If you modified any of the standard VSC roles, you should copy those roles to save your changes. VSC overwrites the standard roles with the current defaults each time you restart the VSC service.
Regenerating an SSL certificate for VSC	The SSL certificate is automatically generated when you deploy the virtual appliance for VSC, VASA Provider, and SRA. You might have to regenerate the SSL certificate to create a site-specific certificate. *Regenerating an SSL certificate for Virtual Storage Console* on page 26
Setting ESXi server values	Although most of your ESXi server values are set by default, it is a good practice to check the values. These values are based on internal testing. Depending on your environment, you might have to change some of the values to improve performance. • *Configuring ESXi server multipathing and timeout settings* on page 21 • *ESXi host values set by VSC for VMware vSphere* on page 22
Guest operating system timeout values	The guest operating system (guest OS) timeout scripts set the SCSI I/O timeout values for supported Linux, Solaris, and Windows guest operating systems to provide correct failover behavior.

The following table presents a high-level overview of what you require to configure the virtual appliance for VSC, VASA Provider, and SRA.

Considerations	Description
Requirements of role-based access control (RBAC)	VSC supports both vCenter Server RBAC and ONTAP RBAC. If you plan to run VSC as an administrator, you must have all of the required permissions and privileges for all of the tasks. If your company requires that you restrict access to vSphere objects, you can assign standard VSC roles to users to meet the vCenter Server requirements. You can create the recommended ONTAP roles by using the RBAC User Creator for ONTAP tool, which is available from the NetApp ToolChest. If a user attempts to perform a task without the correct privileges and permissions, the task options are grayed out. • *Standard roles packaged with the virtual appliance for VSC, VASA Provider, and SRA* on page 40 • *Recommended ONTAP roles when using VSC for VMware vSphere* on page 43
ONTAP version	Your storage systems must be running ONTAP 9.1, 9.3, 9.4, 9.5, or 9.6.
Storage capability profiles	To use storage capability profiles or to set up alarms, you must enable VASA Provider for ONTAP. After you enable VASA Provider, you can configure virtual volume (VVol) datastores, and you can create and manage storage capability profiles and alarms. The alarms warn you when a volume or an aggregate is at nearly full capacity or when a datastore is no longer in compliance with the associated storage capability profile.

Deploying or upgrading VSC, VASA Provider, and SRA

You must download and deploy the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) in your VMware vSphere, and then configure the required applications based on the tasks you want to perform using VSC, VASA Provider, and SRA.

Related tasks

Enabling VASA Provider for configuring virtual datastores on page 16

Downloading the virtual appliance for VSC, VASA Provider, and SRA

You can download the `.ova` file for the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) from the NetApp Support Site.

About this task

The `.ova` file includes VSC, VASA Provider, and SRA. When the deployment is complete, all the three products are installed in your environment. By default, VSC starts working as soon as you decide on the subsequent deployment model and choose whether to enable VASA Provider and SRA based on your requirements.

You can download the virtual appliance for VSC, VASA Provider, and SRA from the NetApp Support Site by using any of the following software download pages depending on your requirement:

- **Virtual Storage Console**
- **NetApp VASA Provider**
- **Storage Replication Adapter**

If you want to enable SRA in your deployment of the virtual appliance for VSC, VASA Provider, and SRA, then you must have installed the SRA plug-in on the Site Recovery Manager (SRM) server. You can download the installation file for the SRA adapter plug-in from the **Storage Replication Adapter for ONTAP** menu in the Software Downloads section.

Steps

1. Log in to the NetApp Support Site, and click the **Downloads** tab.
2. On the **Downloads** page, select **Software**.
3. From the list of products, select **Virtual Storage Console**, **NetApp VASA Provider**, or **Storage Replication Adapter**, depending on your requirement.
4. Select the appropriate version of the software to download, and then click **View & Download**.
5. Follow the instructions on the product description page until you reach the download page.
6. Download the `.ova` file to a vSphere Client system and deploy the OVF template from there.

Deploying the virtual appliance for VSC, VASA Provider, and SRA

You should deploy the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) in your environment and specify the required parameters to be able to use the appliance.

Before you begin

- You must be running a supported version of vCenter Server.

  Note: The virtual appliance for VSC, VASA Provider, and SRA can be deployed on either a Windows deployment of vCenter Server or a VMware vCenter Server Virtual Appliance (vCSA) deployment.

  Interoperability Matrix Tool: VSC 9.6

- You must have configured and set up your vCenter Server environment.
- You must have set up an ESXi host for your virtual machine.
- You must have downloaded the `.ova` file.
- You must have the administrator login credentials for your vCenter Server instance.
- You must have logged out of and closed all of the browser sessions of vSphere Client, and deleted the browser cache to avoid any browser cache issue during the deployment of the virtual appliance for VSC, VASA Provider, and SRA.

  Cleaning the vSphere cached downloaded plug-in packages on page 49

- You must have enabled ICMP.

  If ICMP is disabled, then the initial configuration of the virtual appliance for VSC, VASA Provider, and SRA fails, and VSC cannot start the VSC and VASA Provider services after deployment. You must manually enable the VSC and VASA Provider services after deployment.

About this task

If you are deploying a fresh installation of the virtual appliance for VSC, VASA Provider, and SRA, then VASA Provider is enabled by default. But in case of an upgrade from an earlier version of the virtual appliance, the state of VASA Provider is retained and you might need to enable VASA Provider manually.

Enabling VASA Provider for configuring virtual datastores on page 16

Steps

1. Log in to the vSphere Client.
2. Select **Home > Host & Clusters**.
3. Right-click the required datacenter, and then click **Deploy OVA template**.
4. Select the applicable method to provide the deployment file for VSC, VASA Provider, and SRA, and then click **Next**.

Location	Action
URL	Provide the URL for the `.ova` file for the virtual appliance for VSC, VASA Provider, and SRA.

Location	Action
Folder	Select the `.ova` file for the virtual appliance for VSC, VASA Provider, and SRA from the saved location.

5. Enter the following details to customize the deployment wizard:

   - Name for your deployment
   - Destination datacenter to apply permissions
   - Host on which the virtual appliance for VSC, VASA Provider, and SRA is to be deployed
   - Virtual disk format, VM Storage Policies, storage location, and network
   - Administrator user name and password

     Note:

     - You can set the administrator credentials for the vCenter Server while deploying the virtual appliance for VSC, VASA Provider, and SRA.
       If the password for the vCenter Server changes, then you can update the password for the administrator by using the following URL: `https://<IP>:8143/Register.html`, where the IP address is of the virtual appliance for VSC, VASA Provider, and SRA that you provide during deployment.
     - You must not use any spaces in the administrator password.
     - You must access the maintenance console by using the “maint” user name
       The password is set to “admin123” by default.
     - If you are not using DHCP, specify a valid DNS hostname (unqualified) as well as the static IP address for the virtual appliance and the other network parameters. All of these parameters are required for proper installation and operation.

   - The IP address (IPv4 or IPv6) of the vCenter Server instance to which you want to register the virtual appliance for VSC, VASA Provider, and SRA.
     The type of VSC and VASA certificates generated depends on the IP address (IPv4 or IPv6) that you have provided during deployment. While deploying the virtual appliance for VSC, VASA Provider, and SRA, if you have not entered any static IP details and your DHCP network provides both IPv4 and IPv6 addresses:

     - The virtual appliance for VSC, VASA Provider, and SRA IP address used to register with vCenter Server depends on the type of vCenter Server IP address (IPv4 or IPv6) entered in the OVA deployment wizard.
     - Both the VSC and VASA certificates will be generated using the same type of IP address used during vCenter Server registration.
     - You can use the Application Configuration menu of the maintenance console of your virtual appliance for VSC, VASA Provider, and SRA to change the password.
       Accessing the maintenance console options of the virtual appliance for VSC, VASA Provider, and SRA on page 29

     Important: IPv6 is supported only with vCenter Server 6.7 and later.

6. Review the configuration data, and then click **Next** to finish deployment.

   As you wait for deployment to finish, you can view the progress of the deployment from the Tasks tab.

7. Power on the virtual appliance virtual machine, and then open a console of the virtual machine running the virtual appliance.
8. When prompted on the appliance console, return to the vCenter Server.
9. In the **Summary** tab of the appliance virtual machine, select **Install/Upgrade VMware Tools**, and then click **Mount**.

   VMware Tools will automatically be installed. Follow the instructions in the appliance console to disconnect the Tools ISO when the installation complete.
10. If the virtual appliance for VSC, VASA Provider, and SRA is not registered with any vCenter Server, use `https://appliance_ip:8143/Register.html` to register the VSC instance.
11. Log out and re-login to the vSphere Client to view the deployed virtual appliance for VSC, VASA Provider, and SRA.
    a. Log out from your existing vSphere Client and close the browser.
    b. Log in to the vSphere Client.

       It might take a few minutes for the plug-in to be updated in the vSphere Client.

       Troubleshooting: If you cannot view the plug-in even after logging in, you must clean the vSphere Client cache.

       Cleaning the vSphere cached downloaded plug-in packages on page 49

After you finish

Note: If you want to view the VASA Provider for ONTAP dashboard, then you must download and install OnCommand API Services.

Registering OnCommand API Services with the virtual appliance for VSC, VASA Provider, and SRA on page 17

Enabling VASA Provider for configuring virtual datastores

The virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) has the VASA Provider capability enabled by default. You can configure VVol datastores with required storage capability profiles for each VVol datastore.

Before you begin

- You must have set up your vCenter Server instance and configured ESXi.
- You must have deployed the virtual appliance for VSC, VASA Provider, and SRA.

About this task

If the VASA Provider capability is disabled before upgrading to the 9.6 release of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA), the VASA Provider capability remains disabled after the upgrade.

Steps

1. Log in to the web user interface of VMware vSphere.
2. From the vSphere Client, click **Menu > Virtual Storage Console**.
3. Click **Settings**.

4. Click **Manage Capabilities** in the **Administrative Settings** tab.
5. In the **Manage Capabilities** dialog box, select the VASA Provider extension to enable.
6. Enter the IP address of the virtual appliance for VSC, VASA Provider, and SRA and the administrator password, and then click **Apply**.

Registering OnCommand API Services with the virtual appliance for VSC, VASA Provider, and SRA

The VVol dashboard can display the details of virtual volume (VVol) datastores and virtual machines only if you have registered OnCommand API Services for VASA Provider. OnCommand API Services is also required to obtain data for the VVol VM and datastore reports.

Before you begin

You must have downloaded OnCommand API Services 2.1 or later from the NetApp Support Site.

Note: The VVol dashboard displays performance metrics only when the VVol datastores and virtual machines are configured using ONTAP 9.3 or later.

Steps

1. From the Virtual Storage Console (VSC) **Home** page, click **Settings**.
2. Click **Manage Extension** in the **Administrative Settings** tab.
3. Use the **Register OnCommand API Services** slider to enable OnCommand API Services.
4. Enter the IP address, service port, and credentials for OnCommand API Services.

   You can also use the Manage VASA Provider Extensions dialog box for the following modifications:

   - To update OnCommand API Services registration when there is any change to the credentials.
   - To unregister OnCommand API Services when you no longer require the VASA Provider dashboard.

     You must clear the Register OnCommand API Services checkbox to remove the OnCommand API Services registration for VASA Provider.
5. Click **Apply**.

   The VVol dashboard displays the metrics only after the registration of OnCommand API Services is complete.

Related information

NetApp Support

Enabling Storage Replication Adapter

The virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) provides the option to enable the SRA capability to be used with VSC to configure disaster recovery.

Before you begin

- You must have set up your vCenter Server instance and configured ESXi.

- You must have downloaded the `.msi` file for the SRA plug-in only if you want to configure the Site Recovery Manager (SRM) disaster recovery solution.
- You must have deployed the virtual appliance for VSC, VASA Provider, and SRA.

About this task

The flexibility to enable VASA Provider and SRA capabilities enables you to execute only the workflows that you require for your enterprise.

Steps

1. Log in to the web user interface of VMware vSphere.
2. From the vSphere Client, click **Menu > Virtual Storage Console**.
3. Click **Settings**.
4. Click **Manage Capabilities** in the **Administrative Settings** tab.
5. In the **Manage Capabilities** dialog box, select the SRA extension want to enable.
6. Enter the IP address of the virtual appliance for VSC, VASA Provider, and SRA and the administrator password, and then click **Apply**.
7. On the Windows SRM server, double-click the downloaded `.msi` installer for the SRA plug-in, and follow the on-screen instructions.
8. To complete the installation of the SRA plug-in on the SRM server, enter the IP address and password of your deployed virtual appliance.

   You must log out of the vSphere Web Client, and then log in again to verify that your selected extension is available for configuration.

Related concepts

Configuring Storage Replication Adapter for disaster recovery on page 46

Installing the NFS VAAI plug-in

You can install the NetApp NFS Plug-in for VMware vStorage APIs for Array Integration (VAAI) using the GUI of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA).

Before you begin

- You must have downloaded the installation package for the NFS Plug-in for VAAI (`.vib`) from the NetApp Support Site.
  NetApp Support
- You must have installed ESXi host 6.5 or later and ONTAP 9.1 or later.
- You must have powered on the ESXi host and mounted an NFS datastore.
- You must have set the values of the `DataMover.HardwareAcceleratedMove`, `DataMover.HardwareAcceleratedInit`, and `VMFS3.HardwareAcceleratedLocking` host settings to “1”.
  These values are set by VSC host settings.
- You must have enabled the vstorage option on the storage virtual machine (SVM) by using the `vserver nfs modify -vserver vserver_name -vstorage enabled` command.

Steps

1. Rename the `.vib` file that you downloaded from the NetApp Support Site to `NetAppNasPlugin.vib` to match the predefined name that VSC uses.
2. Click **Settings** in the VSC home page.
3. Click **NFS VAAI Tools** tab.
4. Click **Change** in the **Existing version** section.
5. Browse and select the renamed `.vib` file, and then click **Upload** to upload the file to the virtual appliance.
6. In the **Install on ESXi Hosts** section, select the ESXi host on which you want to install the NFS VAAI plug-in, and then click **Install**.

   You should follow the on-screen instructions to complete the installation. You can monitor the installation progress in the Tasks section of vSphere Web Client.
7. Reboot the ESXi host after the installation finishes.

   When you reboot the ESXi host, VSC automatically detects the NFS VAAI plug-in. You do not have to perform additional steps to enable the plug-in.

Upgrading to the 9.6 virtual appliance for VSC, VASA Provider, and SRA

You can perform an in-place upgrade to the version 9.6 virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) from your existing setup using the instructions provided here.

Before you begin

- You must have downloaded the `.iso` file for the version 9.6 of the virtual appliance for VSC, VASA Provider, and SRA.
- You must have reserved at least 12 GB of RAM for the virtual appliance for VSC, VASA Provider, and SRA to work optimally after the upgrade.
- You must clean the vSphere Client browser cache.
  Cleaning the vSphere cached downloaded plug-in packages on page 49

About this task

The status of VASA Provider from the existing deployment is retained after upgrade. You should manually enable or disable VASA Provider based on your requirement post upgrade. However, NetApp recommends enabling the VASA Provider even if VVols are not in use, as it enables storage capability profiles for traditional datastore provisioning, and storage alarms.

Note: You can perform an in-place upgrade to the version 9.6 of the virtual appliance only from your existing version 7.x of virtual appliance for VSC, VASA Provider, and SRA.

Steps

1. Mount the downloaded `.iso` file to the virtual appliance:
   a. Click **Edit Settings** > **DVD/CD-ROM Drive**.
   b. Select **Datastore ISO** file from the drop-down list.

c. Browse to and select the downloaded `.iso` file, and then select the **Connect at power on** checkbox.

2. Access the **Summary** tab of your deployed virtual appliance.
3. Click  to start the maintenance console.
4. At the Main Menu prompt, enter option **2** for **System Configuration**, and then enter option **8** for **Upgrade**.

   After the upgrade finishes, the virtual appliance restarts. The virtual appliance for VSC, VASA Provider, and SRA is registered to the vCenter Server with the same IP address as before the upgrade.
5. If you want the virtual appliance for VSC, VASA Provider, and SRA to be registered with the vCenter Server with the IPv6 address, then you must perform the following:

   a. Unregister the virtual appliance for VSC, VASA Provider, and SRA.

   b. Register the IPv6 address of the virtual appliance for VSC, VASA Provider, and SRA to vCenter Server using the **Register** page.

   c. Regenerate VSC and VASA Provider certificates after the registration.

   Important: IPv6 is supported only with vCenter Server 6.7 and later.
6. Log out and re-login to the vSphere Client to view the deployed virtual appliance for VSC, VASA Provider, and SRA.

   a. Log out from your existing vSphere web client or vSphere Client and close the window.

   b. Log in to the vSphere Client.

      It might take a few minutes for the plug-in to be updated in the vSphere Client.

Related tasks

Enabling VASA Provider for configuring virtual datastores on page 16

Configuring your Virtual Storage Console for VMware vSphere environment

Virtual Storage Console (VSC) supports numerous environments. Some of the features in these environments might require additional configuration.

You might have to perform some of the following tasks to configure your ESXi hosts, guest operating systems, and VSC:

- Verifying your ESXi host settings, including the UNMAP settings
- Adding timeout values for guest operating systems
- Regenerating the VSC SSL certificate
- Creating storage capability profiles and threshold alarms
- Modifying the preferences file to enable the mounting of datastores across different subnets

Configuring ESXi server multipathing and timeout settings

Virtual Storage Console for VMware vSphere checks and sets the ESXi host multipathing settings and HBA timeout settings that work best with NetApp storage systems.

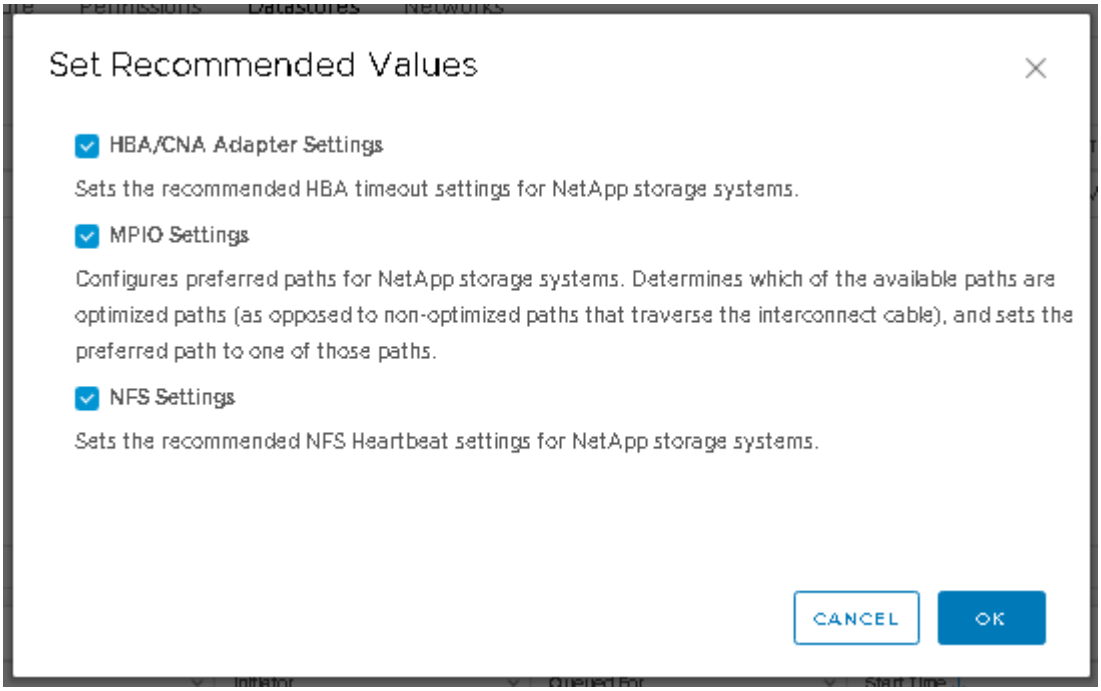
About this task

This process might take a long time, depending on your configuration and system load. The task progress is displayed in the Recent Tasks panel. As the tasks are completed, the host status Alert icon is replaced by the Normal icon or the Pending Reboot icon.

Steps

1. From the VMware vSphere Web Client **Home** page, click **vCenter > Hosts**.
2. Right-click a host, and then select **Actions > NetApp VSC > Set Recommended Values**.
3. In the **NetApp Recommended Settings** dialog box, select the values that work best with your system.

   The standard, recommended values are set by default.



4. Click **OK**.

ESXi host values set by VSC for VMware vSphere

Virtual Storage Console for VMware vSphere sets ESXi host timeouts and other values to ensure best performance and successful failover. The values that Virtual Storage Console (VSC) sets are based on internal NetApp testing.

VSC sets the following values on an ESXi host:

ESXi advanced configuration

VMFS3.HardwareAcceleratedLocking

You should set this value to 1.

VMFS3.EnableBlockDelete

You should set this value to 0.

NFS settings

Net.TcpipHeapSize

You should set this value to 32.

For all other NFS configurations, you should set this value to 30.

Net.TcpipHeapMax

If you are using vSphere 6.0 or later, you should set this value to 1536.

If you are using vSphere 5.5, you should set this value to 512.

If you are using vSphere 5.0 or 5.1, you should set this value to 128

If you are using vSphere 5.0 or earlier, you should set this value to 120.

NFS.MaxVolumes

If you are using vSphere 5.0 or later, you should set this value to 256.

For all other NFS configurations, you should set this value to 64.

NFS41.MaxVolumes

If you are using vSphere 6.0 or later, you should set this value to 256.

NFS.MaxQueueDepth

If you are using the vSphere 6.0 or later version of ESXi host, then you should set this value to 128 or higher to avoid queuing bottlenecks.

For vSphere versions prior to 6.0, you should set this value to 64.

NFS.HeartbeatMaxFailures

You should set this value to 10 for all NFS configurations.

NFS.HeartbeatFrequency

You should set this value to 12 for all NFS configurations.

NFS.HeartbeatTimeout

You should set this value to 5 for all NFS configurations.

FC/FCoE settings

Path selection policy

You should set this value to “RR” (round robin) when FC paths with ALUA are used.

You should set this value to “FIXED” for all other configurations.

Setting this value to “RR” helps to provide load balancing across all of the active/optimized paths. The value “FIXED” is used for older, non-ALUA configurations and helps to prevent proxy I/O. In other words, it helps to keep I/O from going to the other node of a high-availability (HA) pair in an environment that has Data ONTAP operating in 7-Mode.

Disk.QFullSampleSize

You should set this value to 32 for all configurations. Setting this value helps to prevent I/O errors.

Disk.QFullThreshold

You should set this value to 8 for all configurations. Setting this value helps prevent I/O errors.

Emulex FC HBA timeouts

Use the default value.

QLogic FC HBA timeouts

Use the default value.

iSCSI settings

Path selection policy

You should set this value to “RR” for all iSCSI paths.

Setting this value to “RR” helps to provide load balancing across all of the active/optimized paths.

Disk.QFullSampleSize

You should set this value to 32 for all configurations. Setting this value helps to prevent I/O errors.

Disk.QFullThreshold

You should set this value to 8 for all configurations. Setting this value helps prevent I/O errors.

Configuring guest operating system scripts

The ISO images of the guest operating system (OS) scripts are mounted on the Virtual Storage Console for VMware vSphereVirtual Storage Console server. To use the guest OS scripts to set the storage timeouts for virtual machines, you must mount the scripts from the vSphere Client.

Table 1: ISO locations for Guest Operating Systems

Operating System Type	60-second timeout settings	190-second timeout settings
Linux	`https://<appliance_ip>:8143/vsc/public/writable/linux_gos_timeout-install.iso`	`https://<appliance_ip>:8143/vsc/public/writable/linux_gos_timeout_190-install.iso`
Windows	`https://<appliance_ip>:8143/vsc/public/writable/windows_gos_timeout.iso`	`https://<appliance_ip>:8143/vsc/public/writable/windows_gos_timeout_190.iso`
Solaris	`https://<appliance_ip>:8143/vsc/public/writable/solaris_gos_timeout-install.iso`	`https://<appliance_ip>:8143/vsc/public/writable/solaris_gos_timeout_190-install.iso`

You should install the script from the copy of the VSC instance that is registered to the vCenter Server that manages the virtual machine. If your environment includes multiple vCenter Servers, you should select the server that contains the virtual machine for which you want to set the storage timeout values.

You should log in to the virtual machine, and then run the script to set the storage timeout values.

Setting timeout values for Windows guest operating systems

The guest operating system (OS) timeout scripts set the SCSI I/O timeout settings for Windows guest operating systems. You can specify either a 60-second timeout or a 190-second timeout. You must reboot the Windows guest OS for the settings to take effect.

Before you begin

You must have mounted the ISO image containing the Windows script.

Steps

1. Access the console of the Windows virtual machine, and log in to an account with Administrator privileges.
2. If the script does not automatically start, open the CD drive, and then run the `windows_gos_timeout.reg` script.

   The Registry Editor dialog is displayed.
3. Click **Yes** to continue.

   The following message is displayed: `The keys and values contained in D:\windows_gos_timeout.reg have been successfully added to the registry.`

4. Reboot the Windows guest OS.
5. Unmount the ISO image.

Setting timeout values for Solaris guest operating systems

The guest operating system (OS) timeout scripts set the SCSI I/O timeout settings for Solaris 10. You can specify either a 60-second timeout or a 190-second timeout.

Before you begin

You must have mounted the ISO image containing the Solaris script.

Steps

1. Access the console of the Solaris virtual machine, and log in to an account with root privileges.
2. Run the `solaris_gos_timeout-install.sh` script.

   For Solaris 10, a message similar to the following is displayed:

   ```
   Setting I/O Timeout for /dev/s–a - SUCCESS!
   ```

3. Unmount the ISO image.

Setting timeout values for Linux guest operating systems

The guest operating system (OS) timeout scripts set the SCSI I/O timeout settings for versions 4, 5, 6, and 7 of Red Hat Enterprise Linux and versions 9, 10, and 11 of SUSE Linux Enterprise Server. You can specify either a 60-second timeout or a 190-second timeout. You must run the script each time you upgrade to a new version of Linux.

Before you begin

You must have mounted the ISO image containing the Linux script.

Steps

1. Access the console of the Linux virtual machine, and log in to an account with root privileges.
2. Run the `linux_gos_timeout-install.sh` script.

   For Red Hat Enterprise Linux 4 or SUSE Linux Enterprise Server 9, a message similar to the following is displayed:

   ```
   Restarting udev... this may take a few seconds.
   ```

   ```
   Setting I/O Timeout (60s) for /dev/sda - SUCCESS!
   ```

   For Red Hat Enterprise Linux 5, Red Hat Enterprise Linux 6, and Red Hat Enterprise Linux 7 a message similar to the following is displayed:

   ```
   patching file /etc/udev/rules.d/50-udev.rules
   ```

   ```
   Hunk #1 succeeded at 333 (offset 13 lines).
   ```

   ```
   Restarting udev... this may take a few seconds.
   ```

```
Starting udev: [ OK ]
```

```
Setting I/O Timeout (60s) for /dev/sda - SUCCESS!
```

For SUSE Linux Enterprise Server 10 or SUSE Linux Enterprise Server 11, a message similar to the following is displayed:

```
patching file /etc/udev/rules.d/50-udev-default.rules
```

```
Hunk #1 succeeded at 114 (offset 1 line).
```

```
Restarting udev ...this may take a few seconds.
```

```
Updating all available device nodes in /dev:   done
```

3. Unmount the ISO image.

Regenerating an SSL certificate for Virtual Storage Console

The SSL certificate is generated when you install Virtual Storage Console (VSC). The distinguished name (DN) that is generated for the SSL certificate might not be a common name (CN) that the client machines recognize. By changing the keystore and private key passwords, you can regenerate the certificate and create a site-specific certificate.

About this task

You can enable remote diagnostic using the maintenance console and generate site-specific certificate.

NetApp Knowledgebase Answer 1075654: Virtual Storage Console 7.x: Implementing CA signed certificates

Steps

1. Log in to the maintenance console.
2. Enter **1** to access the `Application Configuration` menu.
3. In the `Application Configuration` menu, enter **3** to stop the VSC service.
4. Enter **7** to regenerate SSL certificate.

Requirements for registering VSC in multiple vCenter Servers environment

If you are using Virtual Storage Console for VMware vSphere in an environment where a single VMware vSphere Web Client is managing multiple vCenter Server instances, you must register an instance of VSC with each vCenter Server so that there is a 1:1 pairing between VSC and the vCenter

Server. Doing this enables you to manage all of the servers running vCenter 6.0 or later in both linked mode and non-linked mode from a single vSphere Web Client.

Note: If you want to use VSC with a vCenter Server, then you must have set up or registered one VSC instance for every vCenter Server instance that you want to manage. Each registered VSC instance must be of the same version.

Linked mode is installed automatically during the vCenter Server deployment. Linked mode uses Microsoft Active Directory Application Mode (ADAM) to store and synchronize data across multiple vCenter Server systems.

Using the vSphere Web Client to perform VSC tasks across multiple vCenter Servers requires the following:

- Each vCenter Server in the VMware inventory that you want to manage must have a single VSC server registered with it in a unique 1:1 pairing.

  For example, you can have VSC server A registered to vCenter Server A, VSC server B registered to vCenter Server B, VSC server C registered to vCenter Server C, and so on.

  You **cannot** have VSC server A registered to both vCenter Server A and vCenter Server B.

  Also, if the VMware inventory includes one vCenter Server that does not have a VSC server registered to it, you will not be able to see any instances of VSC, even though the VMware inventory has one or more vCenter Servers that are registered with VSC.

- You must have the VSC-specific View privilege for each vCenter Server that is registered to the single sign-on (SSO).

  You must also have the correct RBAC permissions.

When you are performing a task that requires you to specify a vCenter Server, the **vCenter Server** drop-down box displays the available vCenter Servers in alphanumeric order. The default vCenter Server is always the first server in the drop-down list.

If the location of the storage is known (for example, when you use the Provisioning wizard and the datastore is on a host managed by a specific vCenter Server), the vCenter Server list is displayed as a read-only option. This happens only when you use the right-click option to select an item in the vSphere Web Client.

VSC warns you when you attempt to select an object that it does not manage.

You can filter storage systems based on a specific vCenter Server from the VSC summary page. A summary page appears for every VSC instance that is registered with a vCenter Server. You can manage the storage systems that are associated with a specific VSC instance and vCenter Server, but you should keep the registration information for each storage system separate if you are running multiple instances of VSC.

Configuring the VSC preferences files

The preferences files contain settings that control Virtual Storage Console for VMware vSphere operations. Under most circumstances, you do not have to modify the settings in these files. It is helpful to know which preference files Virtual Storage Console (VSC) uses.

VSC has several preference files. These files include entry keys and values that determine how VSC performs various operations. The following are some of the preference files that VSC uses:

`/opt/netapp/vscserver/etc/kamino/kaminoprefs.xml`

`/opt/netapp/vscserver/etc/vsc/vscPreferences.xml`

You might have to modify the preferences files in certain situations. For example, if you use iSCSI or NFS and the subnet is different between your ESXi hosts and your storage system, you have to modify the preferences files. If you do not modify the settings in the preferences file, datastore provisioning fails because VSC cannot mount the datastore.

Setting IPv4 or IPv6

There is a new option added to the preference file `kaminoprefs.xml` that you can set to enable support for IPv4 or IPv6 for all storage systems added to VSC.

- The `default.override.option.provision.mount.datastore.address.family` parameter has been added to the `kaminoprefs.xml` preference file to set a preferred data LIF protocol for datastore provisioning.
  This preference is applicable for all of the storage systems added to VSC.
- The values for the new option are `IPv4`, `IPv6`, and `NONE`.
- By default the value is set to `NONE`.

Value	Description
NONE	• Provisioning happens using the same IPv6 or IPv4 address type of data LIF as the type of cluster or SVM management LIF used for adding the storage. • If the same IPv6 or IPv4 address type of data LIF is not present in the SVM, then the provisioning happens through the other type of data LIF, if available.
IPv4	• Provisioning happens using the IPv4 data LIF in the selected SVM. • If the SVM does not have an IPv4 data LIF, then the provisioning happens through the IPv6 data LIF, if it is available in the SVM.
IPv6	• Provisioning happens using the IPv6 data LIF in the selected SVM. • If the SVM does not have an IPv6 data LIF, then the provisioning happens through the IPv4 data LIF, if it is available in the SVM.

Enabling datastore mounting across different subnets

If you use iSCSI or NFS and the subnet is different between your ESXi hosts and your storage system, you have to modify the Virtual Storage Console for VMware vSphere preferences files. If you do not modify the preferences file, then datastore provisioning fails because Virtual Storage Console (VSC) cannot mount the datastore.

About this task

When datastore provisioning fails, VSC logs the following error messages:

```
Unable to continue. No ip addresses found when cross-referencing kernel ip
addresses and addresses on the controller.
```

```
Unable to find a matching network to NFS mount volume to these hosts.
```

Steps

1. Log in to your vCenter Server instance.
2. Launch the maintenance console using your unified appliance virtual machine.

   Accessing the maintenance console options of the virtual appliance for VSC, VASA Provider, and SRA on page 29
3. Enter **4** to access the **Support and Diagnostics** option.
4. Enter **2** to access the **Access Diagnostic Shell** option.
5. Enter **`vi /opt/netapp/vscserver/etc/kamino/kaminoprefs.xml`** to update the `kaminoprefs.xml` file.
6. Update the `kaminoprefs.xml` file.

If you use...	Do this...
iSCSI	Change the value of the entry key `default.allow.iscsi.mount.networks` from ALL to the value of your ESXi host networks.
NFS	Change the value of the entry key `default.allow.nfs.mount.networks` from ALL to the value of your ESXi host networks.

   The preferences file includes sample values for these entry keys.

   Note: The value “ALL” does not mean all networks. “ALL” value enables all of the matching networks, between the host and the storage system, to be used for mounting datastores. When you specify host networks, then you can enable mounting only across the specified subnets.
7. Save and close the `kaminoprefs.xml` file.

Accessing the maintenance console options of the virtual appliance for VSC, VASA Provider, and SRA

You can manage your application, system, and network configurations by using the maintenance console of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA). You can change your administrator password and maintenance password. You can also generate support bundles, set different log levels, view and manage TLS configurations, and start remote diagnostics.

Before you begin

You must have installed VMware tools after deploying the virtual appliance for VSC, VASA Provider, and SRA.

About this task

- You must use “maint” as the user name and “admin123” as the password to log in to the maintenance console of the virtual appliance for VSC, VASA Provider, and SRA.
- You must set a password for the “diag” user while enabling remote diagnostics.

Steps

1. Access the **Summary** tab of your deployed virtual appliance.

2. Click  to start the maintenance console.

   You can access the following maintenance console options:

   Application Configuration

   The following options are available:

   - Display server status summary
   - Start Virtual Storage Console service
   - Stop Virtual Storage Console service
   - Start VASA Provider and SRA service
   - Stop VASA Provider and SRA service
   - Change 'administrator' user password
   - Re-generate certificates
   - Hard reset keystore and certificates
   - Hard reset database
   - Change LOG level for Virtual Storage Console service
   - Change LOG level for VASA Provider and SRA service
   - Display TLS configuration
   - Enable TLS protocol
   - Disable TLS protocol

   System Configuration

   The following options are available:

   - Reboot virtual machine
   - Shutdown virtual machine
   - Change 'maint' user password
   - Change time zone
   - Change NTP server
     You can provide an IPv6 address for your NTP server.
   - Enable/Disable SSH Access
   - Increase jail disk size (/jail)
   - Upgrade
   - Install VMware Tools

   Network Configuration

   The following options are available:

   - Display IP address settings
   - Change IP address settings
     You can use this option to change the IP address post deployment to IPv6.

- Display domain name search settings
- Change domain name search settings
- Display static routes
- Change static routes
  You can use this option to add an IPv6 route.
- Commit changes
- Ping a host
  You can use this option to ping to an IPv6 host.
- Restore default settings

Support and Diagnostics

The following options are available:

- Generate support bundle
- Access diagnostic shell
- Enable remote diagnostic access

Related concepts

Virtual Storage Console and VASA Provider log files on page 50

Accessing the web CLI and changing the administrator password

You can access the web CLI of the virtual appliance for VSC, VASA Provider, and SRA, and change the administrator password post deployment.

Steps

1. Access the web command-line interface CLI using `https://<IP>:9083`.

   The IP address is that of the virtual appliance for VSC, VASA Provider, and SRA that you provide during deployment.

2. Log into the web CLI by using the administrator user name and password that you provide during deployment.
3. Create a password with minimum eight characters and maximum 63 characters.

Configuring high availability for virtual appliance for VSC, VASA Provider, and SRA

The virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) supports a high-availability (HA) configuration to help provide uninterrupted functionality of VSC, VASA Provider, and SRA.

The virtual appliance for VSC, VASA Provider, and SRA relies on the VMware vSphere High-availability (HA) feature and vSphere fault tolerance (FT) feature to provide high availability. The high-availability (HA) solution provides for rapid recovery from outages caused by:

- Host failure

- Network failure
- Virtual machine failure (Guest OS failure)
- Application (VSC, VASA Provider, and SRA) crash

No additional configuration is required on the virtual appliance to provide high availability. Only the vCenter Server and the ESXi hosts must be configured with the VMware vSphere HA feature or the vSphere FT feature based on their requirements. Both HA and FT require clustered hosts together with shared storage. FT has additional requirements and limitations.

In addition to the VMware vSphere HA solution and vSphere FT solution, the virtual appliance also helps keep the VSC, VASA Provider, and SRA services running at all times. The virtual appliance watchdog process periodically monitors all three services, and restarts them automatically when any kind of failure is detected. This helps to prevent application failures.

VMware vSphere HA

You can configure your vSphere environment where the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) is deployed for high availability (HA). The VMware HA feature provides failover protection from hardware failures and operating system failures in virtual environments.

The VMware HA feature monitors virtual machines to detect operating system failures and hardware failures. When a failure is detected, the VMware HA feature restarts the virtual machines on the other physical servers in the resource pool. Manual intervention is not required when a server failure is detected.

The procedure to configure VMware HA depend on the version of your vCenter Server. For example, you can use the following reference link and select the required vCenter Server version to view the steps to configure VMware HA.

VMware vSphere Documentation: Creating and Using vSphere HA Clusters

VMware vSphere Fault Tolerance

The VMware vSphere Fault Tolerance (FT) feature provides high availability (HA) at a higher level and enables you to protect virtual machines without any loss of data or connections. You must enable or disable vSphere FT for the virtual appliance for VSC, VASA Provider, and SRA from your vCenter Server.

Ensure your vSphere license supports FT with the number of vCPUs needed for the virtual appliance in your environment (at least 2 vCPUs; 4 vCPUs for large scale environments).

vSphere FT enables virtual machines to operate continuously even during server failures. When vSphere FT is enabled on a virtual machine, a copy of the primary virtual machine is automatically created on another host (the secondary virtual machine) that is selected by Distributed Resource Scheduler (DRS). If DRS is not enabled, the target host is selected from the available hosts. vSphere FT operates the primary virtual machine and secondary virtual machine in lockstep mode, with each mirroring the execution state of the primary virtual machine to the secondary virtual machine.

When there is a hardware failure that causes the primary virtual machine to fail, the secondary virtual machine immediately picks up where the primary virtual machine stopped. The secondary virtual machine continues to run without any loss of network connections, transactions, or data.

Your system must meet the CPU requirements, virtual machine limit requirements, and licensing requirements for configuring vSphere FT for your vCenter Server instance.

The procedure to configure HA depend on the version of your vCenter Server. For example, you can use the following reference link and select the required vCenter Server version to view the steps to configure HA.

VMware vSphere Documentation: Fault Tolerance Requirements, Limits, and Licensing

MetroCluster configurations supported by the virtual appliance for VSC, VASA Provider, and SRA

The virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) supports environments that use MetroCluster configurations for ONTAP. Most of this support is automatic; however, you might notice a few differences when you use a MetroCluster environment with VSC and VASA Provider.

MetroCluster configurations and VSC

You must ensure that VSC discovers the storage system controllers at the primary site and the secondary site. Normally, VSC automatically discovers storage controllers. If you are using a cluster management LIF, it is a good practice to verify that VSC discovered the clusters at both sites. Otherwise, you can manually add the storage controllers to VSC. You can also modify the user name and password pairs that VSC uses to connect to the storage controllers.

When a switchover occurs, the SVMs on the secondary site take over. These SVMs have the “-mc” suffix appended to their names. If you are performing certain operations such as provisioning, when a switchover operation occurs, the name of the SVM where the datastore resides is changed to include the “-mc” suffix. This suffix is dropped when the switchback occurs, and the SVMs on the primary site resume control.

Note: If you have added direct SVMs with MetroCluster configuration to VSC, then after switchover, the change in the SVM name (the addition of the "-mc" suffix) is not reflected. All other switchover operations continue to execute normally.

When a switchover or switchback occurs, VSC might take a few minutes to automatically detect and discover the clusters. If this happens while you are performing a VSC operation such as provisioning a datastore, you might experience a delay.

MetroCluster configurations and VASA Provider

VASA Provider automatically supports environments that use MetroCluster configurations. The switchover is transparent in VASA Provider environments. You cannot add direct SVMs to VASA Provider.

Note: VASA Provider does not append the “-mc” suffix to the names of the SVMs on the secondary site after a switchover.

MetroCluster configurations and SRA

SRA does not support MetrroCluster configurations.

Configuring your storage system environment

Virtual Storage Console for VMware vSphere provides a single mechanism to discover storage systems and to set the storage credentials. The credentials provide the ONTAP permissions that are required to enable Virtual Storage Console (VSC) users to perform tasks by using the storage systems.

Before VSC can display and manage storage resources, VSC must discover the storage systems. As part of the discovery process, you must supply ONTAP credentials for your storage systems. These are the privileges (or roles) that are associated with the user name and password pair that is assigned to each storage system. These user name and password pairs use ONTAP role-based access control (RBAC) and must be set up from within ONTAP. You cannot change these credentials from within VSC. You can define ONTAP RBAC roles by using a tool such as RBAC User Creator for ONTAP.You cannot change these credentials from within VSC.

Note: If you log in as an administrator, you automatically have all of the privileges for that storage system.

When you add a storage system to VSC, you must supply an IP address for the storage system and the user name and password pair that is associated with that system. You can set up default credentials that VSC will use during the storage system discovery process, or you can manually enter credentials when the storage system is discovered. The details of the storage system that is added to VSC are automatically pushed to the extensions that you enable in your deployment. So, you do not have to manually add storage to VASA Provider and Storage Replication Adapter (SRA). Both VSC and SRA support the addition of credentials at the cluster level and storage virtual machine (SVM) level. VASA Provider supports only cluster-level credentials for adding storage systems.

If your environment includes multiple vCenter Server instances, when you add a storage system to VSC from the Storage Systems page, the **Add Storage System** dialog box displays a **vCenter Server** box where you can specify to which vCenter Server instance the storage system is to be added. If you add a storage system by right-clicking a datacenter name, you do not have the option to specify a vCenter Server instance because the server is already associated with that datacenter.

Discovery happens in one of the following ways. In each case, you must supply credentials for any newly discovered storage system.

- When the VSC service starts, VSC begins its automatic background discovery process.
- You can click the **REDISCOVER All** button in the Storage Systems page. or on a host or datacenter select it from the Actions menu (**Actions > Netapp VSC > Update Host and Storage Data**) or click **DISCOVER** on the Getting Started tab of Overview.

Note: IPv6 addresses are not supported.

All of the VSC features require specific permissions to perform tasks. You can limit what users can do based on the credentials that are associated with the ONTAP role. All of the users that have the same storage system user name and password pair share the same set of storage system credentials and can perform the same operations.

Setting default credentials for storage systems

You can use Virtual Storage Console for VMware vSphere to set default credentials for a storage system in your vCenter Server.

Before you begin

You must have selected the vCenter Server that you want to use for creating default credentials.

About this task

If you set up default credentials for storage systems, Virtual Storage Console (VSC) uses these credentials to log in to a storage system that VSC has just discovered. If the default credentials do not work, you must manually log in to the storage system. VSC and SRA support addition of storage system credentials at the cluster level or the SVM level. But VASA Provider will only work with cluster level credentials.

Steps

1. In the VSC **Home** page, click **Settings > Administrative Settings > Configure Default Credentials for Storage System**.
2. In the **Storage System Default Credentials** dialog box, enter the user name and password for the storage system.

   Storage controller credentials are assigned in ONTAP based on the user name and password pair. The storage controller credentials can be the administrator account or a custom account that uses role-based access control (RBAC).

   You cannot use VSC to change the roles that are associated with the user name and password pair of the storage controller. To change the storage controller credentials, you must use a tool such as RBAC User Creator for ONTAP.
3. Click **OK** to save the default credentials.

After you finish

If you updated the storage system credentials because a storage system reported “Authentication Failure” status, you should click the **REDISCOVER ALL** option available in the Storage Systems page. When you do this, VSC tries to connect to the storage system by using the new credentials.

Adding storage systems to VSC

You can manually add storage system to Virtual Storage Console (VSC). If you have a large number of storage systems, manually adding a new storage system might be faster than using the **REDISCOVER ALL** option to discover the storage system.

About this task

Each time you start Virtual Storage Console (VSC) or select the **REDISCOVER All** option, VSC automatically discovers the available storage systems. Alternatively, you can manually add storage systems to VSC.

Steps

1. Add a storage system to VSC by using the VSC home page:
   - Click **Storage Systems > Add**.
   - Click **Overview > Getting Started**, and then click **ADD** button under Add Storage System.
2. In the **Add Storage System** dialog box, enter the management IP address and credentials for that storage system.

   You can also add storage systems using the IPv6 address of the cluster or SVM. You can also change the defaults for TLS and the port number in this dialog box.

   When you add storage from the VSC Storage System page, you must also specify the vCenter Server instance where the storage will be located. The Add Storage System dialog box provides a

drop-down list of the available vCenter Server instances. VSC does not display this option if you are adding storage to a datacenter that is already associated with a vCenter Server instance.

3. Click **OK** after you have added all of the required information.

Discovering storage systems and hosts

When you first run Virtual Storage Console (VSC) in a vSphere Client, VSC discovers ESXi hosts, their LUNs and NFS exports, and the NetApp storage systems that own those LUNs and exports.

Before you begin

- All of the ESXi hosts must be powered on and connected.
- storage virtual machines (SVMs) to be discovered volume must be running, and each cluster node must have at least one data LIF configured for the storage protocol in use (NFS, iSCSI or FC).

About this task

You can discover new storage systems or update information about existing storage systems to obtain the latest capacity and configuration information at any time. You can also modify the credentials that VSC uses to log in to the storage systems.

While discovering the storage systems, VSC collects information from the ESXi hosts that are managed by the vCenter Server instance.

Steps

1. From the vSphere Client **Home** page, select **Hosts and Clusters**.
2. Right-click the required datacenter, and then select **NetApp VSC > Update Host and Storage Data**.

   VSC displays a Confirm dialog box that informs you that this operation might take a long time.
3. Click **OK**.
4. Select the discovered storage controllers that have the status “Authentication Failure”, and click **ACTIONS > Modify**.
5. Fill in the required information in the **Modify Storage System** dialog box.
6. Repeat steps 4 and 5 for all storage controllers with “Authentication Failure” status.

After you finish

After the discovery process is complete, perform the following:

- Use VSC to configure ESXi host settings for hosts that display the Alert icon in the Adapter Settings column, the MPIO Settings column, or the NFS Settings column.
- Provide the storage system credentials.

Refreshing the storage system display

You can use the update feature that is provided by Virtual Storage Console for VMware vSphere to refresh the information about storage systems and to force Virtual Storage Console (VSC) to discover storage systems.

About this task

The “refresh” option is useful if you changed the default credentials for the storage systems after receiving an authentication error. You should always perform an update operation if you changed the storage system credentials after the storage system reported an “Authentication Failure Status”. During the update operation, VSC tries to connect to the storage system by using the new credentials.

Depending on your system setup, this task can take a long time to complete.

Steps

1. On the VMware vSphere Client **Home** page, click **Storage Systems**.
2. Start the update:

If this location is...	Click...
Virtual Storage Console	The **REDISCOVER ALL** icon.
Datacenter	Right-click the datacenter, and then click **NetApp VSC > Update Host and Storage Data**.

3. In the **Update Host and Storage Data** dialog box, click **OK**.

   The discovery might take few minutes depending on the number of hosts and storage systems in your datacenter. This discovery operation works in the background.

4. Click **OK** in the **Success** dialog box.

vCenter Server role-based access control features in VSC for VMware vSphere

vCenter Server provides role-based access control (RBAC) that enables you to control access to vSphere objects. In Virtual Storage Console for VMware vSphere, vCenter Server RBAC works with ONTAP RBAC to determine which VSC tasks a specific user can perform on objects on a specific storage system.

To successfully complete a task, you must have the appropriate vCenter Server RBAC permissions. During a task, VSC checks a user's vCenter Server permissions before checking the user's ONTAP privileges.

You can set the vCenter Server permissions on the root object (also known as the root folder). You can then refine the security by restricting child entities that do not need those permissions.

Components of vCenter Server permissions

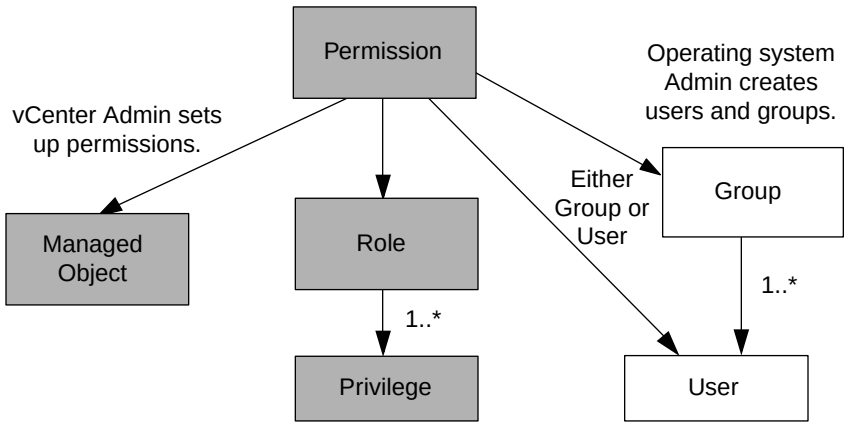
The vCenter Server recognizes permissions, not privileges. Each vCenter Server permission consists of three components.

The vCenter Server has the following components:

- One or more privileges (the role)
  The privileges define the tasks that a user can perform.
- A vSphere object
  The object is the target for the tasks.
- A user or group
  The user or group defines who can perform the task.

As the following diagram illustrates, you must have all three elements in order to have a permission.

Note: In this diagram, the gray boxes indicate components that exist in the vCenter Server, and the white boxes indicate components that exist in the operating system where the vCenter Server is running.



Privileges

Two kinds of privileges are associated with Virtual Storage Console for VMware vSphere:

- Native vCenter Server privileges

These privileges come with the vCenter Server.

- VSC-specific privileges
  These privileges are defined for specific VSC tasks. They are unique to VSC.

VSC tasks require both VSC-specific privileges and vCenter Server native privileges. These privileges constitute the “role” for the user. A permission can have multiple privileges.

Note: To simplify working with vCenter Server RBAC, VSC provides several standard roles that contain all the VSC-specific and native privileges that are required to perform VSC tasks.

If you change the privileges within a permission, the user that is associated with that permission should log out, and then log in to enable the updated permission.

Table 2: VSC privileges

Privilege	Roles	Tasks
NetApp Virtual Storage Console > View	• VSC Administrator • VSC Provision • VSC Read-Only	All the VSC and VASA Provider specific tasks require the View Privilege.
NetApp Virtual Storage Console > Policy Based Management > Management or **privilege.nvpfVSC.VASAGroup.com.netapp.nvpf.label > Management**	VSC Administrator	VSC and VASA Provider tasks related to storage capability profiles and threshold settings.

vSphere objects

Permissions are associated with vSphere objects, such as the vCenter Server, ESXi hosts, virtual machines, datastores, datacenters, and folders. You can assign permissions to any vSphere object. Based on the permission that is assigned to a vSphere object, the vCenter Server determines who can perform which tasks on that object. For VSC specific tasks, permissions are assigned and validated only at the root-folder level (vCenter Server) and not on any other entity. Except for VAAI plugin operation, where permissions are validated against the concerned ESXi .

Users and groups

You can use Active Directory (or the local vCenter Server machine) to set up users and groups of users. You can then use vCenter Server permissions to grant access to these users or groups to enable them to perform specific VSC tasks.

Note: These vCenter Server permissions apply to VSC vCenter users, not to VSC administrators. By default, VSC administrators have full access to the product and do not require permissions assigned to them.

Users and groups do not have roles assigned to them. They gain access to a role by being part of a vCenter Server permission.

Key points about assigning and modifying permissions for vCenter Server

There are several key points to keep in mind when you are working with vCenter Server permissions. Whether a Virtual Storage Console for VMware vSphere task succeeds can depend on where you assigned a permission, or what actions a user took after a permission was modified.

You only need to set up vCenter Server permissions if you want to limit access to vSphere objects and tasks. Otherwise, you can log in as an administrator. This login automatically allows you to access all vSphere objects.

Assigning permissions

Where you assign a permission determines the VSC tasks that a user can perform.

Sometimes, to ensure the completion of a task, you must assign the permission at a higher level, such as the root object. This is the case when a task requires a privilege that does not apply to a specific vSphere object (for example, tracking the task) or when a required privilege applies to a non-vSphere object (for example, a storage system).

In these cases, you can set up a permission so that it is inherited by the child entities. You can also assign other permissions to the child entities. The permission assigned to a child entity always overrides the permission inherited from the parent entity. This means that you can permissions to a child entity as a way to restrict the scope of a permission that was assigned to a root object and inherited by the child entity.

Tip: Unless your company's security policies require more restrictive permissions, it is a good practice to assign permissions to the root object (also referred to as the root folder).

Permissions and non-vSphere objects

The permission that you create are applied to a non-vSphere object. For example, a storage system is not a vSphere object. If a privilege applies to a storage system, you must assign the permission containing that privilege to the VSC root object because there is no vSphere object to which you can assign it.

For example, any permission that includes a privilege such as the VSC privilege "Add/Modify/Skip storage systems" must be assigned at the root object level.

Modifying permissions

You can modify one permission at any time.

If you change the privileges within a permission, the user associated with that permission should log out and then log back in to enable the updated permission.

Standard roles packaged with the virtual appliance for VSC, VASA Provider, and SRA

To simplify working with vCenter Server privileges and role-based access control (RBAC), Virtual Storage Console (VSC) provides standard VSC roles that enable you to perform key VSC tasks. There is also a read-only role that enables you to view VSC information, but not perform any tasks.

The standard VSC roles have both the required VSC-specific privileges and the native vCenter Server privileges that are required for users to perform VSC tasks. In addition, the roles are set up so that they have the required privileges across all supported versions of the vCenter Server.

As an administrator, you can assign these roles to users, as required.

Note: When you upgrade VSC to the latest version, the standard roles are automatically upgraded to work with the new version of VSC.

You can view the VSC standard roles by clicking **Roles** on the vSphere Client Home page.

The roles that VSC provides enable you to perform the following tasks:

Role	Description
VSC Administrator	Provides all of the native vCenter Server privileges and VSC-specific privileges that are required to perform all VSC tasks.
VSC Read-only	Provides read-only access to VSC. These users cannot perform any VSC actions that are access-controlled.
VSC Provision	Provides all of the native vCenter Server privileges and VSC-specific privileges that are required to provision storage. You can perform the following tasks: • Create new datastores • Destroy datastores • View information about storage capability profiles

Guidelines for using VSC standard roles

When you work with standard Virtual Storage Console for VMware vSphere roles, there are certain guidelines you should follow.

You should not directly modify the standard roles. If you do, VSC will overwrite your changes each time you upgrade VSC. The installer updates the standard role definitions each time you upgrade VSC. Doing this ensures that the roles are current for your version of VSC as well as for all supported versions of the vCenter Server.

You can, however, use the standard roles to create roles that are tailored to your environment. To do this, you should copy the VSC standard role and then edit the copied role. By creating a new role, you can maintain this role even when you restart or upgrade the VSC Windows service.

Some of the ways that you might use the VSC standard roles include the following:

- Use the standard VSC roles for all VSC tasks.
  In this scenario, the standard roles provide all the privileges a user needs to perform the VSC tasks.
- Combine roles to expand the tasks a user can perform.
  If the standard VSC roles provide too much granularity for your environment, you can expand the roles by creating higher-level groups that contain multiple roles.
  If a user needs to perform other, non-VSC tasks that require additional native vCenter Server privileges, you can create a role that provides those privileges and add it to the group also.
- Create more fine-grained roles.
  If your company requires that you implement roles that are more restrictive than the standard VSC roles, you can use the VSC roles to create new roles.
  In this case, you would clone the necessary VSC roles and then edit the cloned role so that it has only the privileges your user requires.

Privileges required for VSC tasks

Different Virtual Storage Console for VMware vSphere tasks require different combinations of privileges specific to Virtual Storage Console (VSC) and native vCenter Server privileges.

Information about the privileges required for VSC tasks is available in the NetApp Knowledgebase article 1032542.

NetApp Knowledgebase Answer 1032542: How to configure RBAC for Virtual Storage Console

Product-level privilege required by VSC for VMware vSphere

To access the Virtual Storage Console for VMware vSphere GUI, you must have the product-level, VSC-specific View privilege assigned at the correct vSphere object level. If you log in without this privilege, VSC displays an error message when you click the NetApp icon and prevents you from accessing VSC.

The following information describes the VSC product-level View privilege:

Privilege	Description	Assignment level
View	You can access the VSC GUI. This privilege does not enable you to perform tasks within VSC. To perform any VSC tasks, you must have the correct VSC-specific and native vCenter Server privileges for those tasks.	The assignment level determines which portions of the UI you can see. Assigning the View privilege at the root object (folder) enables you to enter VSC by clicking the NetApp icon. You can assign the View privilege to another vSphere object level; however, doing that limits the VSC menus that you can see and use. The root object is the recommended place to assign any permission containing the View privilege.

ONTAP role-based access control for the virtual appliance for VSC, VASA Provider, and SRA

ONTAP role-based access control (RBAC) enables you to control access to specific storage systems and to control the actions that a user can perform on those storage systems. In Virtual Storage Console for VMware vSphere, ONTAP RBAC works with vCenter Server RBAC to determine which Virtual Storage Console (VSC) tasks a specific user can perform on the objects on a specific storage system.

VSC uses the credentials (user name and password) that you set up within VSC to authenticate each storage system and to determine which storage operations can be performed on that storage system. VSC uses one set of credentials for each storage system. These credentials determine which VSC tasks can be performed on that storage system; in other words, the credentials are for VSC, not for an individual VSC user.

ONTAP RBAC applies only to accessing storage systems and performing VSC tasks that are related to storage, such as provisioning virtual machines. If you do not have the appropriate ONTAP RBAC privileges for a specific storage system, you cannot perform any tasks on a vSphere object that is

hosted on that storage system. You can use ONTAP RBAC in conjunction with the VSC-specific privileges to control which VSC tasks a user can perform:

- Monitoring and configuring storage or vCenter Server objects residing on a storage system
- Provisioning vSphere objects residing on a storage system

Using ONTAP RBAC with the VSC-specific privileges provides a storage-oriented layer of security that the storage administrator can manage. As a result, you have more fine-grained access control than what either ONTAP RBAC alone or vCenter Server RBAC alone supports. For example, with vCenter Server RBAC, you can allow vCenterUserB to provision a datastore on NetApp storage while preventing vCenterUserA from provisioning datastores. If the storage system credentials for a specific storage system do not support the creation of storage, then neither vCenterUserB nor vCenterUserA can provision a datastore on that storage system.

When you initiate a VSC task, VSC first verifies whether you have the correct vCenter Server permission for that task. If the vCenter Server permission is not sufficient to allow you to perform the task, VSC does not have to check the ONTAP privileges for that storage system because you did not pass the initial vCenter Server security check. As a result, you cannot access the storage system.

If the vCenter Server permission is sufficient, VSC then checks the ONTAP RBAC privileges (your ONTAP role) that are associated with the storage system credentials (the user name and password) to determine whether you have sufficient privileges to perform the storage operations that are required by that VSC task on that storage system. If you have the correct ONTAP privileges, you can access the storage system and perform the VSC task. The ONTAP roles determine the VSC tasks that you can perform on the storage system.

Each storage system has one set of ONTAP privileges associated with it.

Using both ONTAP RBAC and vCenter Server RBAC provides the following benefits:

- Security
  The administrator can control which users can perform which tasks at a fine-grained vCenter Server object level and at a storage system level.
- Audit information
  In many cases, VSC provides an audit trail on the storage system that enables you to track events back to the vCenter Server user who performed the storage modifications.
- Usability
  You can maintain all of the controller credentials in one place.

Recommended ONTAP roles when using VSC for VMware vSphere

You can set up several recommended ONTAP roles for working with Virtual Storage Console for VMware vSphere and role-based access control (RBAC). These roles contain the ONTAP privileges that are required to perform the required storage operations that are executed by the Virtual Storage Console (VSC) tasks.

To create new user roles, you must log in as an administrator on storage systems running ONTAP. You can create ONTAP roles using the one of the following:

- RBAC User Creator for ONTAP tool
  NetApp Community Document: RBAC User Creator for Data ONTAP
- ONTAP System Manager, which can be downloaded for either a Windows platform or a Linux platform

Each ONTAP role has an associated user name and password pair, which constitute the credentials of the role. If you do not log in by using these credentials, you cannot access the storage operations that are associated with the role. Each ONTAP role that you create is associated with one user name. You

must log in to the storage system by using the appropriate user name and password pair if you want to perform those role-based tasks on the storage system.

As a security measure, the VSC-specific ONTAP roles are ordered hierarchically. This means that the first role is the most restrictive role and has only the privileges that are associated with the most basic set of VSC storage operations. The next role includes both its own privileges and all of the privileges that are associated with the previous role. Each additional role is less restrictive with regard to the supported storage operations.

The following are some of the recommended ONTAP RBAC roles when using VSC. After you create these roles, you can assign the roles to users who have to perform tasks related to storage, such as provisioning virtual machines.

1. Discovery
   This role enables you to add storage systems.
2. Create Storage
   This role enables you to create storage. This role also includes all of the privileges that are associated with the Discovery role.
3. Modify Storage
   This role enables you to modify storage. This role also includes all of the privileges that are associated with the Discovery role and the Create Storage role.
4. Destroy Storage
   This role enables you to destroy storage. This role also includes all of the privileges that are associated with the Discovery role, the Create Storage role, and the Modify Storage role.

If you are using VASA Provider for ONTAP, you should also set up a policy-based management (PBM) role. This role enables you to manage storage by using storage policies. This role requires that you also set up the Discovery role.

How to configure ONTAP role-based access control for VSC for VMware vSphere

You must configure ONTAP role-based access control (RBAC) on the storage system if you want to use role-based access control with Virtual Storage Console for VMware vSphere (VSC). You can create one or more custom user accounts with limited access privileges with the ONTAP RBAC feature.

VSC and SRA can access storage systems at either the cluster level or the SVM level. If you are adding storage systems at the cluster level, then you must provide the credentials of the admin user to provide all of the required capabilities. If you are adding storage systems by directly adding SVM details, you must be aware that the “vsadmin” user does not have all of the required roles and capabilities to perform certain tasks.

VASA Provider can access storage systems only at the cluster level. If VASA Provider is required for a particular storage controller, then the storage system must be added to VSC at the cluster level even if you are using VSC or SRA.

To create a new user and to connect a cluster or SVM to VSC, VASA Provider, and SRA, you should perform the following:

- Create a cluster administrator or SVM administrator role using ONTAP

  Note: You can use the RBAC User Creator for ONTAP tool to create these roles.

  NetApp Community Document: RBAC User Creator for Data ONTAP

- Create users with the role assigned and the appropriate application set using ONTAP
  You require these storage system credentials to configure the storage systems for VSC. You can configure storage systems for VSC by entering the credentials in VSC. Each time you log in to a

storage system with these credentials, you will have permissions to the VSC functions that you had set up in ONTAP while creating the credentials.

- Add the storage system to VSC and provide the credentials of the user that you just created

VSC roles

VSC classifies the ONTAP privileges into the following set of VSC roles:

- Discovery
  Enables the discovery of all of the connected storage controllers.
- Create Storage
  Enables the creation of volumes and logical unit number (LUNs).
- Modify Storage
  Enables the resizing and deduplication of storage systems.
- Destroy Storage
  Enables the destruction of volumes and LUNs.

VASA Provider roles

You can create only Policy Based Management at the cluster level. This role enables policy-based management of storage using storage capabilities profiles.

SRA roles

SRA classifies the ONTAP privileges into a SAN or NAS role at either the cluster level or the SVM level. This enables users to run SRM operations.

Note: You must refer to the NetApp knowledge base articles if you want to manually configure roles and privileges using ONTAP commands.

- *NetApp Knowledgebase Answer 1001058: FAQ: VSC, VASA, and SRA 7.0 ONTAP RBAC Configuration*
- *NetApp Knowledgebase Answer 1001056: FAQ: Roll up of all commands for VSC and SRA for SVM level*

VSC performs an initial privilege validation of ONTAP RBAC roles when you add the cluster to VSC. If you have added a direct SVM storage IP, then VSC does not perform the initial validation. VSC checks and enforces the privileges later in the task workflow.

Configuring Storage Replication Adapter for disaster recovery

If you want to configure your vCenter Server for disaster recovery, you must enable Storage Replication Adapter (SRA) after you deploy the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA). The deployment of the virtual appliance installs VSC by default. You must enable SRA for your vCenter Server after the deployment of the virtual appliance.

Related tasks

Enabling Storage Replication Adapter on page 17

Configuring Storage Replication Adapter for SAN environment

You must set up the storage systems before running Storage Replication Adapter (SRA) for Site Recovery Manager (SRM).

Before you begin

You must have installed the following programs on the protected site and the recovery site:

- SRM
  Documentation about installing SRM is on the VMware site.
  VMware Site Recovery Manager Documentation
- SRA
  The adapter is installed on SRM and the SRA server.

Steps

1. Verify that the primary ESXi hosts are connected to the LUNs in the primary storage system on the protected site.
2. Verify that the LUNS are in igroups that have the `ostype` option set to *vmware* on the primary storage system.
3. Verify that the ESXi hosts at the recovery site have appropriate FC or iSCSI connectivity to the storage virtual machine (SVM).

   You can do this either by verifying that the ESXi hosts have local LUNs connected on the SVM or by using the `fcp show initiators` command or the `iscsi show initiators` command on the SVMs.

Configuring Storage Replication Adapter for NAS environment

You must configure the storage systems before running Storage Replication Adapter (SRA) for VMware vCenter Site Recovery Manager (SRM).

Before you begin

You must have installed the following programs on the protected site and the recovery site:

- SRM
  Documentation about installing SRM can be found on the VMware site.
  VMware Site Recovery Manager Documentation
- SRA
  The adapter is installed on SRM and the SRA server.

Steps

1. Verify that the datastores at the protected site contain virtual machines that are registered with vCenter Server.
2. Verify that the ESXi hosts at the protected site have mounted the NFS exports volumes from the storage virtual machine (SVM).
3. Verify that valid addresses such as the IP address, host name, or FQDN on which the NFS exports are present are specified in the **NFS Addresses** field when using the **Array Manager** wizard to add arrays to SRM.
4. Use the `ping` command on each ESXi host at the recovery site to verify that the host has a VMkernel port that can access the IP addresses that are used to serve NFS exports from the SVM.

Related information

NetApp Support

Configuration of Storage Replication Adapter for highly scaled environment

You must configure the storage timeout intervals per the recommended settings for Storage Replication Adapter (SRA) to perform optimally in highly scaled environments.

Storage Provider settings

- You must increase the value of the `StorageProvider.resignatureTimeout` setting from 900 seconds to 12000 seconds.
- You must enable the `StorageProvider.autoResignatureMode` option.

See VMware documentation for more information on modifying Storage Provider settings.

VMware vSphere Documentation: Change Storage Provider Settings

Storage settings

You must set the value of the `storage.commandTimeout` timeout interval for highly scaled environments to 12,000 seconds.

Note: The timeout interval specified is the maximum value. You do not need to wait for the maximum timeout to be reached. Most commands finish within the set maximum timeout interval.

NetApp Knowledgebase Answer 1001111: NetApp Storage Replication Adapter 4.0/7.X for ONTAP Sizing Guide

VMware documentation on modifying SAN Provider settings has more information.

Vmware Site Recovery Manager Documentation: Change Storage Settings

Troubleshooting issues with the virtual appliance for VSC, VASA Provider, and SRA

If you encounter unexpected behavior during the installation or configuration of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA), then you can follow specific troubleshooting procedures to identify and resolve the cause of such issues.

Cleaning the vSphere cached downloaded plug-in packages

If plug-ins are not updated automatically after deploying or upgrading the virtual appliance for VSC, VASA Provider, and SRA, you should clean up the cached download plug-in packages on the browser and on the vCenter Server to resolve vCenter Server plug-in issues.

Steps

1. Logout from your existing vSphere web client or vSphere Client.
2. Remove the browser cache.
3. Remove the vSphere Client cached plug-in packages.

If you are using...	Perform the following...
Windows vCenter server	Remove the following folders com.netapp.vasa.vvol.webclient-x.x.x.xxxx, com.netapp.nvpf.webclient-x.x.x.xxxx, and com.netapp.vsch5-x.x.x.xxxx located at: • vSphere Web Client path: C:\ProgramData\VMware\vCenterServer\cfg\vsphere-client\vc-packages\vsphere-client-serenity • vSphere Client(HTML5) path: C:\ProgramData\VMware\vCenterServer\cfg\vsphere-ui\vc-packages\vsphere-client-serenity

If you are using...	Perform the following...
VCSA	**a.** SSH into the VCSA appliance. **b.** Change directories to the vCenter web client UI extensions directory using `cd /etc/vmware/vsphere-client/vc-packages/vsphere-client-serenity` **c.** Remove the cached plugin packages using the commands: • `rm -rf com.netapp.vasa.vvol.webclient-x.x.x.xxxx` • `rm -rf com.netapp.nvpf.webclient-x.x.x.xxxx` • `rm -rf com.netapp.vsch5-x.x.x.xxxx` **d.** Change directories to the vCenter client(HTML5) UI extensions directory using `cd /etc/vmware/vsphere-ui/vc-packages/vsphere-client-serenity` **e.** Remove the cached plugin packages using the commands: • `rm -rf com.netapp.vasa.vvol.webclient-x.x.x.xxxx` • `rm -rf com.netapp.nvpf.webclient-x.x.x.xxxx` • `rm -rf com.netapp.vsch5-x.x.x.xxxx`

4. Login to vSphere and restart vSphere Web client and vSphere Client services by using the following commands:
   - `service-control --stop vsphere-client vsphere-ui`
   - `service-control --start vsphere-client vsphere-ui`

Uninstall does not remove standard VSC roles

When you uninstall Virtual Storage Console for VMware vSphere (VSC), the standard VSC roles remain intact. This is expected behavior and does not affect the performance of VSC or your ability to upgrade to a new version of VSC. You can manually delete these roles, if required.

While the uninstall operation does not remove the VSC roles, the uninstall operation removes the localized names for the VSC-specific privileges and appends the following prefix to them: "XXX missing privilege". For example, if you open the vSphere Edit Role dialog box after you install VSC, you will see the VSC-specific privileges listed as `XXX missing privilege.<privilege name>.label not found XXX`.

This behavior happens because the vCenter Server does not provide an option to remove privileges.

When you reinstall VSC or upgrade to a newer version of VSC, all of the standard VSC roles and VSC-specific privileges are restored.

Virtual Storage Console and VASA Provider log files

You can check the log files in the `/opt/netapp/vscserver/logs` directory and the `/opt/netapp/vpserver/logs` directory when you encounter errors.

The following two log files can be helpful in identifying problems:

- `cxf.log`, which contains information about API traffic into and out of VASA Provider
- `kamino.log`, which contains information about VSC settings
- `vvolvp.log`, which contains all log information about VASA Provider

The maintenance menu of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) enables you to set different log levels for your requirement. The following log levels are available:

- Info
- Debug
- Error
- Trace

When you set the log levels, the following files are updated:

- VSC server: `kamino.log` and `vvolvp.log`
- VASA Provider server: `vvolvp.log`, `error.log`, and `netapp.log`

In addition, the VASA Provider web command-line interface (CLI) page contains the API calls that were made, the errors that were returned, and several performance-related counters. The web CLI page is located at `https://<IP_address_or_hostname>:9083/stats`.

VSC and VASA Provider services restart in highly scaled environments

Issue

The virtual appliance for VSC, VASA Provider, and SRA might fail to perform optimally in a highly scaled environment, and you might notice issues such as VSC and VASA Provider services frequently restarting.

Corrective action

Modify the RAM and heap memory requirements for the virtual appliance for VSC, VASA Provider, and SRA.

NetApp Knowledgebase Answer 1079321: How to tune memory settings of virtual appliance for VSC, VASA Provider, and SRA for scale and performance

Configuring VASA Provider to work with SSH

You can set up VASA Provider to use SSH for secure access by configuring the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA).

About this task

When you configure SSH, you must log in as the maintenance user. This is because root access to VASA Provider has been disabled. If you use other login credentials, you cannot use SSH to access VASA Provider.

Steps

1. From the vCenter Server, open a console to the virtual appliance for VSC, VASA Provider, and SRA.
2. Log in as the maintenance user.
3. Enter **3** to select **System Configuration**.
4. Enter **6** to select **Enable SSH Access**.
5. Enter **y** in the confirmation dialog box.

Configuring the virtual appliance for VSC, VASA Provider, and SRA to use SSH for remote diag access

You can configure virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) to enable SSH access for the diag user.

Before you begin

The VASA Provider extension must be enabled for your vCenter Server instance.

About this task

Using SSH to access the diag user has the following limitations:

- You are allowed only one login per activation of SSH.
- SSH access to the diag user is disabled when one of the following happens:
  - The time expires.
    The login session remains valid only until midnight the next day.
  - You log in as a diag user again using SSH.

Steps

1. From the vCenter Server, open a console to VASA Provider.
2. Log in as the maint user.
3. Enter **4** to select **Support and Diagnostics**.
4. Enter **3** to select **Enable remote diagnostics access**.
5. Enter **y** in the **Confirmation** dialog box to enable remote diagnostic access.
6. Enter a password for remote diagnostic access.

SRA installation fails with script error

Issue

Storage Replication Adapter (SRA) installation on Windows 2008 R2 fails with an invalid credentials error.

Cause

The error might occur because of different versions of Transport Layer Security (TLS) being enabled on the virtual appliance for VSC, VASA Provider, and SRA and Windows 2008 R2.

Corrective action

If you are trying to install SRA on Windows 2008 R2, then you must enable TLSv1.0 for the virtual appliance for VSC, VASA Provider, and SRA using the following steps in the maintenance console:

1. Login to the maintenance console using the “maint” user credentials.
2. From the main menu, select **1** for the Application configuration menu.
3. Enter **13** in the Application configuration menu to select Enable TLS Protocol from the Application Configuration menu.
4. Select **TLSv1** in the TLS protocol list.
   VSC and VASA Provider services are restarted and TLSv1.0 is enabled.

You can also enable TLSv1.2 on Windows 2008 R2.

SRA fails to perform optimally in a highly scaled environment

Issue

SRA fails to perform optimally in a highly scaled environment, and you notice issues such as a timeout error or a ONTAP timeout.

Corrective action

You must modify the timeout intervals.

Configuration of Storage Replication Adapter for highly scaled environment on page 47

Note: You can also modify the memory settings for scale and performance of your virtual appliance for VSC, VASA Provider, and SRA in highly scaled setups.

NetApp Knowledgebase Answer 1079321: How to tune memory settings of virtual appliance for VSC, VASA Provider, and SRA for scale and performance

Unable to install the SRA plug-in

Issue

During the installation of the Storage Replication Adapter (SRA) plug-in, the system stops at the server IP address and password screen with the following error message: “The credentials you entered are not valid. Please enter a valid hostname and password.”

Cause

The error might occur due to one of the following reasons:

- You entered incorrect administrator credentials.
- The WinHTTP proxy settings are incorrect.

Corrective action

- Verify your administrator credentials.
- The NetApp knowledgebase article has more information about resolving issues with WinHTTP proxy settings.
  NetApp Knowledgebase Answer 1005074: Installing of SRA 4.0P1 client plugin (netapp_sra_4.0P1_ontap_64bit.msi) hangs at the server IP and password screen

Copyright

Trademark

NETAPP, the NETAPP logo, and the marks listed on the NetApp Trademarks page are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.

http://www.netapp.com/us/legal/netapptmlist.aspx

How to send comments about documentation and receive update notifications

You can help us to improve the quality of our documentation by sending us your feedback. You can receive automatic notification when production-level (GA/FCS) documentation is initially released or important changes are made to existing production-level documents.

If you have suggestions for improving this document, send us your comments by email.

doccomments@netapp.com

To help us direct your comments to the correct division, include in the subject line the product name, version, and operating system.

If you want to be notified automatically when production-level documentation is released or important changes are made to existing production-level documents, follow Twitter account @NetAppDoc.

You can also contact us in the following ways:

- NetApp, Inc., 1395 Crossman Ave., Sunnyvale, CA 94089 U.S.
- Telephone: +1 (408) 822-6000
- Fax: +1 (408) 822-4501
- Support telephone: +1 (888) 463-8277