

NetApp® FAS/V-Series Storage Replication Adapter 2.0

For use with VMware® vCenter Site Recovery Manager

Installation and Administration Guide

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Storage concepts related to Storage Replication Adapter

You must be familiar with basic storage concepts, terms, and technologies when using Storage Replication Adapter with Site Recovery Manager.

Aggregate	In NetApp FAS system, an aggregate is a collection of many physical disks that are collected into RAID groups to provide performance and disk redundancy. In NetApp V-Series system, an aggregate is a collection of LUNs that have been provisioned on a supported third-party storage platform to provide storage for the NetApp system.
FlexVol volume	A FlexVol volume is provisioned from the available storage in an aggregate. FlexVol volumes are flexible and can be increased or decreased in size dynamically without impacting or disrupting the environment. A single aggregate can contain many FlexVol volumes. A FlexVol volume is not tied to any specific set of disks in the aggregate and is striped across all the disks in the aggregate.
FlexClone volume	FlexClone volumes are writable, point-in-time copies of a parent FlexVol volume. FlexClone volumes and their parent volumes share the same disk space for any common data. This means that creating a FlexClone volume is instantaneous and requires no additional disk space until changes are made to the FlexClone volume or its parent. When performing a test recovery in VMware vCenter Site Recovery Manager, FlexClone volumes are created in the testing environment and these FlexClone volumes are removed when testing is complete.
LUN	A LUN is a block-based storage object provisioned within a FlexVol volume. LUNs are presented to ESX or ESXi host through the iSCSI or FC protocol. A LUN can be formatted with the VMFS file system to be used as a VMware datastore to contain virtual machines, or it can be configured as an RDM device and formatted with the appropriate guest OS file system.
Initiator	An initiator is a port that is used to connect to a LUN. It can be on an FC or an iSCSI software or hardware adapter in a host.
Initiator group (igroup)	An igroup provides LUN masking capability to the storage system. An igroup contains one or more LUNs with their defined LUN IDs and the host initiators that are allowed to access those LUNs.
Qtree	A qtree is a sub unit of a FlexVol volume. From a client perspective (CIFS or NFS), a qtree appears as a folder or directory. Qtrees can be used to organize data or to apply different security styles.
NFS export	NFS export is a FlexVol volume or individual qtree that has been shared for use as a NAS datastore by the ESX or ESXi hosts.

Snapshot copy	A point-in-time, read-only image of the storage system volume.
SnapMirror	Replication software that performs automated file system replication of a volume onto a separate disk or storage system for disaster recovery. SnapMirror runs as part of the Data ONTAP operating system on the storage controllers. SnapMirror replication can be configured at the FlexVol level or at the qtree level. Volume SnapMirror can run in synchronous or asynchronous mode; qtree SnapMirror can run in asynchronous mode only.
SnapMirror relationship	Pairing of a source FlexVol volume to a destination FlexVol volume or the pairing of a source qtree to a destination qtree.
SnapMirror operations	• SnapMirror initialize: The initial baseline transfer of data from a source volume or qtree to a destination. • SnapMirror update: A manual update of the SnapMirror destination. • SnapMirror quiesce/break: SnapMirror quiesce/break is performed on the SnapMirror destination to convert the destination to a writable volume or qtree. SnapMirror quiesce operation stabilizes the contents of a destination by allowing active SnapMirror transfers to finish and temporarily preventing new transfers. SnapMirror break operation breaks the SnapMirror relationship between the source and destination. • SnapMirror resync: After a SnapMirror destination is made writable, the SnapMirror resync operation reestablishes the SnapMirror relationship. The operation also resynchronizes the contents of the source and destination volumes or qtrees, without repeating the initial transfer. SnapMirror resync is also used to reverse the direction of a SnapMirror relationship.

What Storage Replication Adapter is

NetApp FAS/V-Series Storage Replication Adapter is a storage vendor specific plug-in to VMware vCenter Site Recovery Manager that enables interaction between Site Recovery Manager and the storage controller.

The adapter interacts with the storage controller on behalf of Site Recovery Manager to discover storage arrays and replicated datastores, and to fail over or test failover the replicated datastores on which the virtual machines reside.

For more information about the new and enhanced features of Site Recovery Manager, see the Site Recovery Manager documentation.

What Site Recovery Manager does

Site Recovery Manager uses Storage Replication Adapter supported by NetApp to discover arrays and replicated and exported datastores, and to fail over or test failover of datastores.

Site Recovery Manager leverages virtualization to provide end-to-end disaster recovery management and automation across the entire data center. Site Recovery Manager leverages VMware Infrastructure to build, automate, and test disaster recovery plans for the data center. Site Recovery Manager integrates with vSphere and provides a seamless view of your environment that includes both virtual infrastructure and disaster recovery management.

Related concepts

[*Components of a disaster recovery environment*](#) on page 10

What Site Recovery Manager supports using Storage Replication Adapter

Using Storage Replication Adapter, Site Recovery Manager supports SAN storage environments, VMFS (iSCSI and FC) and RDM (iSCSI and FC); and NAS storage environments, NFS and HA pair.

For more information about Site Recovery Manager, see the Site Recovery Manager documentation on the VMware site.

SnapMirror modes supported by Storage Replication Adapter

Storage Replication Adapter supports asynchronous qtree SnapMirror, asynchronous volume SnapMirror, and synchronous SnapMirror.

For asynchronous volume SnapMirror, the destination system must use a Data ONTAP version that is the same as or later than that of the source system if the source and destination systems belong to different Data ONTAP release families. Data ONTAP 7.3 and Data ONTAP 8.0 are examples of different release families.

There is no version requirement if the source and destination systems belong to the same Data ONTAP release family. Data ONTAP 7.3 and Data ONTAP 7.3.3 are examples of the same release family. For example, SnapMirror volume replication is possible from a source system using Data ONTAP 7.3.2 to a destination system using Data ONTAP 7.3.1.

For synchronous or semi-synchronous volume SnapMirror, Data ONTAP version must be the same on the source and destination systems.

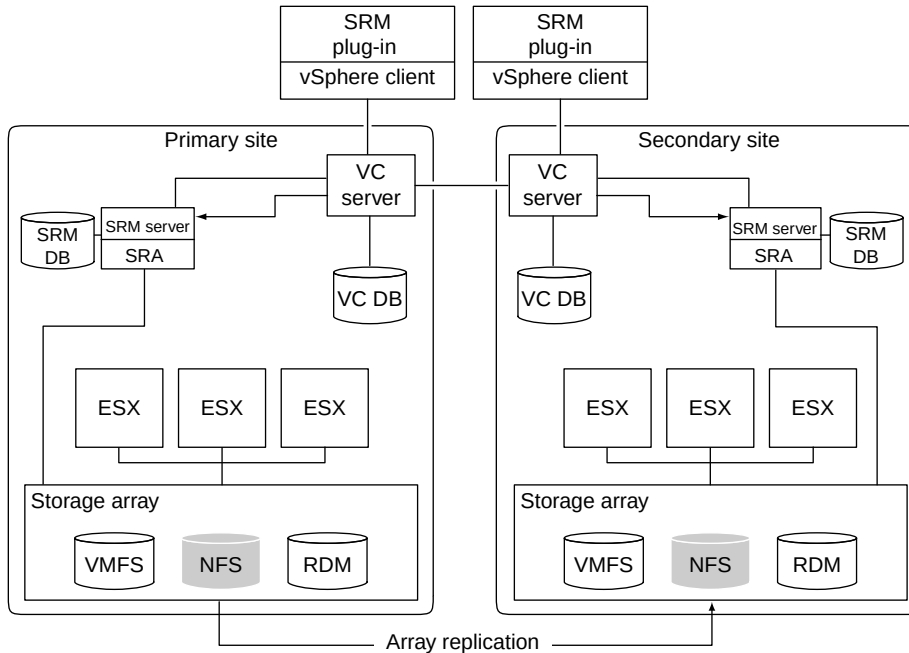
There is no version requirement for qtree SnapMirror.

For more information about SnapMirror modes, see the *Data ONTAP 7-Mode Data Protection Online Backup and Recovery Guide*.

Components of a disaster recovery environment

A disaster recovery environment consists of the storage array, ESX or ESXi servers, virtual machines, Site Recovery Manager, vSphere Client, and Storage Replication Adapter.

The following illustration shows the components of a disaster recovery environment.



Role of Storage Replication Adapter in a disaster recovery environment

Storage Replication Adapter provides array-specific support for Site Recovery Manager by following the input specifications from Site Recovery Manager.

The adapter enables Site Recovery Manager to execute the following workflows:

- Discovery of arrays and replicated devices
- Test recovery
- Recovery
- Reprotect

Discovery of arrays and replicated devices

Storage Replication Adapter discovers pairs of storage arrays that replicate data between the protected and recovery sites. It also discovers the storage devices that are replicated. You can select these devices (datastores) as part of the Site Recovery Manager recovery policy.

The discovery operation identifies the source and destination array ID, name and version of the replication software, and model and vendor of the storage array. The operation also discovers all the replicated devices in a pair of storage arrays along with their destination export path or LUN path and device ID. However, if you want Storage Replication Adapter to discover specific volumes, you can

specify that in the `Volume include list/Volume exclude list` of **Array Manager** in Site Recovery Manager.

- For storage in a NAS environment, the array ID is the host name of the storage system and the device ID is the export path.
- For storage in a SAN environment, the array ID is the host name of the storage system and the device ID is the FC WWN or the iSCSI IQN.

To discover an exported volume or qtree in a NAS environment, you should export the volume or qtree to a vmkernel IP address and replicate the volume or qtree by using the SnapMirror technology. The operation discovers the devices that are exported and then checks the devices that are replicated.

To discover a LUN in a SAN environment, you should map the LUN to an igroup of OS type *vmware* and replicate the LUN by using the SnapMirror technology. The operation discovers the devices that are mapped and then checks the devices that are replicated.

Test recovery

You can test a recovery plan to ensure that it works during a disaster or a planned migration. Test recovery operation does not affect the ongoing SnapMirror replication.

During test recovery operation, Storage Replication Adapter creates a FlexClone volume from the latest Snapshot copy of the SnapMirror destination volume and displays the cloned export path or LUN path to Site Recovery Manager.

The test recovery operation creates a cloned volume on the secondary storage system with the prefix `testfailoverClone_nss_v10745371_`, followed by the parent volume name. For example, the cloned volume that is created for the *secondary_volume* is named `testfailoverClone_nss_v10745371_secondary_volume`.

Note:

- At the end of test recovery operation, the FlexClone volume is destroyed. You must ensure that you do not have user-created volumes with names prefixed with `testfailoverClone_nss_v10745371_`. You can verify the names of the volumes in the secondary storage system by running the `vol status` command.
- By default, Storage Replication Adapter creates a cloned volume with no space guarantee because the cloned volume is not used during actual recovery and is destroyed.

In a NAS environment, the test recovery operation exports the path of the FlexClone volume by adding the vmkernel IP addresses to the `/etc/exports` file. Now, a clone of the mirrored datastore is ready for discovery. The operation displays the cloned export path to Site Recovery Manager.

In a SAN environment, the test recovery operation maps the LUNs of the FlexClone volume to an igroup of OS type *vmware*. The operation checks if an igroup is present for the specific initiator type and ID. If an igroup is present, the cloned LUN is mapped to that igroup. If an igroup does not exist for a particular initiator, Storage Replication Adapter automatically creates an igroup for that initiator and maps the cloned LUN to that igroup. The operation displays the cloned LUN path to Site Recovery Manager.

Automatically created igroups have names prefixed with *srmtest_v10745371*, followed by access group name and initiator type received from Site Recovery Manager input. For example, an igroup created for an FC initiator of access group *host-group-A* has the name *srmtest_v10745371_host-group-A_FC_random_string*.

Recovery

You can execute recovery operation for planned migration of services or for unplanned disaster recovery.

Disaster recovery

During disaster recovery, Storage Replication Adapter aborts any ongoing transfers to the SnapMirror destination, quiesces the destination and breaks the SnapMirror relationship. When the SnapMirror relationship is broken, the destination volume is ready for read/write operations.

Planned migration

During planned migration, the recovery operation shuts down the virtual machines at the protected site. Storage Replication Adapter performs a SnapMirror update to synchronize the storage systems, quiesces the destination, and breaks the SnapMirror relationship. When the SnapMirror relationship is broken, the destination volume is ready for read/write operations.

In a NAS environment, the recovery operation exports the input paths by adding the vmkernel IP address to the */etc/exports* file. In a SAN environment, the operation maps the input LUN paths to the igroups of OS type *vmware*. If an igroup does not exist for a specific initiator type and ID, Storage Replication Adapter automatically creates an igroup for that initiator and maps that LUN to that igroup. The operation then brings the datastores online and displays the failed-over datastores to Site Recovery Manager.

Automatically created igroups have names in the format *access-group_initiator-type_random-string*. For example, an igroup created for an FC initiator of access group *host-group-A* has the name *host-group-A_FC_random_string*.

Reprotect

After a recovery operation, you can execute the reprotect operation to replicate the changes made at the recovery site to the original protected site.

During reprotect operation, Storage Replication Adapter reverses the direction of the existing SnapMirror relationships and starts replicating the changes made at the recovery site to the original protected site. You must take into account the SnapMirror version requirements when running the reprotect operation.

Note: By default, reprotect operation imports the SnapMirror settings at the original recovery site to the desired recovery site. However, compression and wsize (window size) settings are not imported and those settings must be updated manually in the */etc/snapmirror.conf* file of the storage controller at the desired recovery site.

Failback (using reprotect and recovery workflows)

Failback procedure enables you to restore the original protected and recovery sites after a recovery operation.

To perform failback after recovery, you must execute the following workflows:

1. Reprotect

Reverses the replication direction of the existing SnapMirror relationships from the recovery site to the protected site.

If the devices and the SnapMirror relationships do not exist after a disaster, you should create new devices at the protected site and initialize the SnapMirror relationship from the recovery site to the original protected site.

2. Planned migration

Migrates virtual machines from the recovery site back to the protected site.

3. Reprotect

Reverses the replication direction from the protected site to the recovery site, thus restoring the original direction of replication between the protected and recovery sites.

Storage Replication Adapter installation and configuration

You should ensure that you meet the system requirements to install Storage Replication Adapter. You can use the adapter configuration file to customize some of the disaster recovery behaviors.

System requirements for using Storage Replication Adapter

Before you run Storage Replication Adapter, you must meet certain Data ONTAP and Site Recovery Manager requirements.

The system requirements include the following:

- Data ONTAP 7.2.4 or later is installed on the storage system.
When configuring MultiStore vFiler units as storage arrays, you must ensure that your storage system is running Data ONTAP 7.3.2 or later.
For information about NetApp platforms supported in VMware environment, see the NetApp-VMware platform compatibility matrix on the VMware site.
- FlexClone license is enabled to test recovery.
- SnapMirror license is enabled on the storage system.
- In a NAS environment, NFS services are running.
- In a SAN environment, iSCSI, FC, or both services are running.
- Site Recovery Manager 5.0 is installed on Windows.
Site Recovery Manager supports VMFS (iSCSI and FC), RDM (iSCSI and FC), and NFS storage environments.
- Storage Replication Adapter 2.0 is installed on Site Recovery Manager server at the protected and recovery sites.
- Perl 5.8.8 is installed on the system on which Site Recovery Manager is installed.
Note: If the Site Recovery Manager installation does not include Perl 5.8.8, you can install Perl separately with the default configuration. For more information about downloading Perl, see the Perl download page.
- If you want to use secureHTTP, you must set up SecureAdmin and ensure that SSL or SSH is running.
For more information about installing SSL on Perl, see the NetApp KB article 54012 on the NetApp Support Site.
By default, Storage Replication Adapter calls the Data ONTAP API over HTTP.
Note: SecureAdmin does not require a license.
- To keep the corresponding port open, the firewall (if any) between Data ONTAP and Site Recovery Manager must be configured because SOAP, HTTP, or SSL is used.

Related information

[Perl script download page](#)
support.netapp.com
[KB 54012](#)

Features not supported in Storage Replication Adapter

Certain features and functions are not supported in Storage Replication Adapter.

- Failover of exports or LUNs that have multiple replication destinations
- Failover of exports or LUNs that have cascading SnapMirror relationships
- Test recovery operation on traditional volumes
Because FlexClone technology is not available for traditional volumes, Storage Replication Adapter does not support test recovery operation on traditional volumes.
- Discovery of exports that are exported as read-only by using `ro` or as read/write to all hosts from the `rw` field
In NAS environment, exports from the storage array must have values in the `rw=` field of export permissions.
- Non-quieted SMVI Snapshot copy recovery
- SyncMirror replication between Site Recovery Manager sites (as in MetroCluster)

Note: A MetroCluster system might be either the source or destination of a SnapMirror relationship; however, Site Recovery Manager does not support management of SyncMirror failover between MetroCluster nodes.

For specific information about recommended configurations and best practices when using different replication modes, see the *Data ONTAP 7-Mode Data Protection Online Backup and Recovery Guide*.

Downloading Storage Replication Adapter

You can download Storage Replication Adapter from the NetApp Support Site.

Steps

1. Log in to the NetApp Support Site as administrator and click the **Downloads** tab.
2. On the Downloads page, select **Software**, and then select Storage Replication Adapter for VMware SRM from the list of products.
3. Download the applicable file directly to your target system.

Alternatively, download it to a PC host and copy it to the target system.

4. After downloading or copying the .zip file to your target system, unzip the file.

Related tasks

[Installing Storage Replication Adapter](#) on page 17

Related information

support.netapp.com

Installing Storage Replication Adapter

You can install Storage Replication Adapter from the location where you downloaded the scripts.

Steps

1. Use Windows Explorer to navigate to the directory to which you unzipped the downloaded file, and then double-click the `setup.msi` file.

The installer finds the installed location of Site Recovery Manager from the registry and copies these scripts to that location.

2. Select the **Complete install** option.

Note: The version of Storage Replication Adapter is available at the following registry location: `HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\NetApp, Inc\NetApp FAS/V-Series Storage Replication Adapter`.

3. Click **Finish**.

Setting up the storage system before running Storage Replication Adapter in a NAS environment

You must set up the system before running Storage Replication Adapter for Site Recovery Manager.

Steps

1. Install Site Recovery Manager.

For information about installing Site Recovery Manager, see the Site Recovery Manager documentation on the VMware site.

2. Install Storage Replication Adapter on Site Recovery Manager server at the protected and recovery sites.
3. Ensure that the datastores at the protected site contain virtual machines that are registered with vCenter Server.
4. Ensure that the ESX or ESXi hosts at the protected site have mounted the NFS exported volumes from the storage controller.

5. Ensure that the valid addresses have been entered in the **NFS Addresses** field when adding arrays to the Site Recovery Manager using the Array Manager wizard.
6. Verify that the ESX or ESXi hosts at the secondary storage system have a VMkernel port that can access the IP addresses used to serve NFS exports from the secondary storage controller or a vFiler unit.

This can be done by using the following command on the ESXi shell or ESX service console of each ESXi or ESX host:

vmkping *nfs_ip_address*

nfs_ip_address is one of the NFS IP addresses on the storage controller or a vFiler unit.

If access to the ESXi shell has been disabled, you can verify by using the following command on the console of the storage controller:

ping *vmkernel_ip_address*

vmkernel_ip_address is one of the IP addresses on the VMkernel port that ESX or ESXi host uses to access the storage controller or a vFiler unit.

7. Ensure that the NFS exports on the primary storage controller are exported to the ESX or ESXi hosts by using the values in the *rw=* field and that the export is contained in the */etc/exports* file.

Note: If the export is created manually and not listed in the */etc/exports* file, the exports will not be discovered with the default export setting of *rw* to all hosts.
8. Ensure that the volume or qtree containing the exports is replicated to the secondary storage system.
9. On the primary storage system, enter the `snapmirror status` command to confirm that the concerned export is involved in only one replication relationship and that the relationship status displays *Source*.
10. On the secondary storage system, enter the `snapmirror status` command to confirm that the relationship state is *snapmirrored*.

For information about managing a SnapMirror relationship, see the *Data ONTAP Data Protection Online Backup and Recovery Guide*.

11. If the `snapmirror status` command on the destination storage system shows the IP address of the source storage array, configure the `use_ip_for_snapmirror_relation` option in the configuration file or reconfigure the SnapMirror relationship to use the host name instead of the IP address.

Setting up the storage system before running Storage Replication Adapter in a SAN environment

You must set up the system before running Storage Replication Adapter for Site Recovery Manager.

Steps

1. Install Site Recovery Manager.

For information about installing Site Recovery Manager, see the Site Recovery Manager documentation on the VMware site.

2. Install Storage Replication Adapter on Site Recovery Manager server at the protected and recovery sites.
3. Ensure that the primary ESX or ESXi hosts are connected to LUNs in the primary storage system.
4. Ensure that the LUNs, either iSCSI, FC, or both, are in igroups of OS type *vmware* on the primary storage system.
5. Ensure that the ESX or ESXi hosts at the recovery site have appropriate FC or iSCSI connectivity to the secondary storage controllers and vFiler units.

This can be done either by verifying that the ESX or ESXi hosts have local LUNs connected on the secondary storage controllers or by using the `fcpl show initiators` or `iscsi show initiators` commands on the secondary storage controllers.

6. Ensure that the volume or qtree containing the LUNs is replicated to the secondary storage system.
7. On the primary storage system, enter the `snapmirror status` command to confirm that the concerned LUN is involved in only one replication relationship and that the relationship status displays Source.
8. On the secondary storage system, enter the `snapmirror status` command to confirm that the relationship state is `snapmirrored`.

For information about managing a SnapMirror relationship, see the *Data ONTAP Data Protection Online Backup and Recovery Guide*.

9. If the `snapmirror status` command on the destination storage system shows the IP address of the source storage array, configure the `use_ip_for_snapmirror_relation` option in the configuration file or reconfigure the SnapMirror relationship to use the host name instead of the IP address.
10. When using vFiler units as storage arrays in Site Recovery Manager, ensure that the iSCSI service is started on the vFiler units on the secondary storage system.

Storage Replication Adapter configuration file

The Storage Replication Adapter configuration file enables you to customize some of the disaster recovery behaviors, including the security settings during Site Recovery Manager recovery or test recovery. By default, the configuration file is located at `install_dir\Program Files\VMware\VMware vCenter Site Recovery Manager\storage\sra\ONTAP\ontap_config.txt`.

The following are some of the options that can be configured in the adapter configuration file:

- `use_ip_for_snapmirror_relation` (on/off; default value is off)
If you have specified the IP address or the connection name of the storage array for the SnapMirror relationship, you must set this option to on and map the IP addresses/connection names of both the source and destination storage arrays to their host names (*host_name = IP_address/connection_name*) in the `ip_hostname_mapping.txt` file at the protected and recovery sites.
For example, protected site A and recovery site B have storage arrays with host names hostA (IP address: 10.10.0.1) and hostB (IP address: 10.10.0.2) respectively. If you have established a SnapMirror relationship from site A to site B using the IP addresses of the storage arrays, you must have the following entry in the `ip_hostname_mapping.txt` file at both site A and site B.

```
hostA = 10.10.0.1
hostB = 10.10.0.2
```

Entries in `ip_hostname_mapping.txt` file must be same at the protected and recovery sites. Also, the entries are case-sensitive.

`ip_hostname_mapping.txt` file is located at `install_dir\Program Files\VMware\VMware vCenter Site Recovery Manager\storage\sra\ONTAP\ip_hostname_mapping.txt`.

The mapping of the IP address or the connection address to its host name is required because Storage Replication Adapter uses the host name to identify the source and destination storage arrays.

Note: When this option is set to on, Storage Replication Adapter reports only those devices that use IP address or connection address for SnapMirror relationship. When it is set to off, Storage Replication Adapter reports only those devices that use host name for SnapMirror relationship.

- `import_replication_settings` (on/off; default value is on)
The option is used to import the SnapMirror settings at the original recovery site to the desired recovery site during the reprotect operation. However, compression and wsize (window size) settings are not imported and those settings must be updated manually in the `/etc/snapmirror.conf` file.
- `volume_guarantee` (none/file/volume; default value is none)

The option controls the value of the volume guarantee on all volumes created for disaster recovery testing.

Option specific to a SAN environment

- `lun_space_reservation` (yes/no; default value is no)

This is a provisioning management option that checks whether the LUNs recovered for disaster recovery testing are set with space reservations enabled or disabled.

Options specific to a NAS environment

- `root` (yes/no; default value is yes)

By default, the adapter exports all volumes that have root access to the ESX or ESXi hosts. If your environment does not use the `root` field on exports, you can set this option to no, preventing this access. This is useful if you have configured your environment to use a nonroot user to access datastores. You might want to prevent root access to datastores recovered by Site Recovery Manager.

- `nosuid` (yes/no; default value is no)

Specifies whether the adapter exports all volumes with the `nosuid` property.

- `anon` (*anon uid*)

By default, the adapter does not export volumes that are using the `anon` flag. To force volumes to be exported with an anonymous security identifier, you should enter the desired anon user ID.

For example: `anon=0`

- `sec` (default value is `sys`)

Allows you to customize the NFS export security type.

By default, during recovery or test recovery operation, the adapter exports volumes only to those IP addresses directed by Site Recovery Manager. The following three options of `ontap_config.txt` allow some additional customization of export hosts:

- `read-write-hosts`

A comma-separated list of additional hosts to be added to the `rw` field of the NFS exports.

- `read-only-hosts`

A comma-separated list of additional hosts to be added to the `ro` field of the NFS exports.

- `root-hosts`

A comma-separated list of additional hosts to be added to the `root` field of the NFS exports. This option is not dependent on the value of the `root=yes/no` option. This is useful if you need to ensure that an additional host is granted root access for the purpose of virtual disk file management or backup.

Configuring Storage Replication Adapter

You can configure Storage Replication Adapter by using the Array Manager wizard of Site Recover Manager.

Steps

1. In Site Recovery Manager, click **Array Managers** and then click **Add Array Manager**.
2. Enter the following information to describe the array in Site Recovery Manager:
 - a. **Display Name**—Enter a name to identify the storage controller.
 - b. **SRA Type**—Select **NetApp FAS/V-Series Storage Replication Adapter**.
 - c. **IP Address of Storage System**—Enter the management IP address of the storage controller.

Example

10.10.20.54.

- d. **NFS Addresses**—Enter the IP address, host name, or DNS name of the controller that is used to serve NFS to the ESX or ESXi hosts at the site where this controller is located.

Example

192.168.2.100, f3170-192-75

Note: This field is applicable only in NAS environments.

The adapter requires that you enter the addresses that are used by the storage controller to serve NFS to the ESX or ESXi hosts. You can enter multiple addresses, separated by commas. This configuration allows for the use of private storage networks that are separate from the network that is used to administer the controller. If you do not enter any addresses in this field, Site Recovery Manager attempts to mount NFS exports by using the IP addresses entered for managing the storage controller.

- e. **Volume include list**—Enter the volumes to be discovered.

You must enter the source volume at the protected site and the replicated destination volume at the recovery site. You can either enter the full volume name or a string in the volume name.

Example

If you want to discover the volume *Src_vol1* that is in a SnapMirror relationship with volume *Dst_vol1*, you must specify *Src_vol1* in the **Volume include list** at the protected site and *Dst_vol1* in the **Volume include list** at the recovery site.

- f. **Volume exclude list**—Enter the volumes to be excluded from discovery.

You must enter the source volume at the protected site and the replicated destination volume at the recovery site. You can either enter the full volume name or a string in the volume name.

Example

If you want to exclude the volume *Src_vol1* that is in a SnapMirror relationship with volume *Dst_vol1*, you must specify *Src_vol1* in the `Volume exclude list` at the protected site and *Dst_vol1* in the `Volume exclude list` at the recovery site.

- g. Username—Enter the user name of an account with privileges to this storage controller.
- h. Password—Enter the password of the user account.

Note: If the storage system that is being added is in an HA pair, each controller must be added separately as an array.

3. Click **Next**.
4. Verify that the Array is discovered and displayed at the bottom of the **Add Array Manager** window.
5. Click **Finish**.

Guidelines for using Storage Replication Adapter

When you use Storage Replication Adapter with Site Recovery Manager, you must follow certain guidelines.

- In a SAN environment, ensure that the primary and secondary ESX or ESXi servers can discover LUNs on storage systems by using iSCSI, FC, or both.
- In a NAS environment, ensure that the primary and secondary ESX or ESXi servers are connected to exports on the primary and secondary storage systems.
- For successful device discovery, you must export only the devices (volume or qtree) that you want to present to the ESX or ESXi host.
 - If you are exporting a volume, it must not contain any qtrees or LUNs.
 - If you are exporting a qtree, it must not contain any LUNs.
- On the secondary storage system, ensure that the names of the volumes do not match with the name of the volume that the test recovery operation creates.

The test recovery operation might fail if there is a volume with the same name that it tries to create. This step might destroy the existing volume during test recovery cleanup.
- When removing SnapMirror relationships to avoid multiple replication destinations, if you delete the SnapMirror relationship on the secondary storage system, you should also delete the relationship on the primary storage system.
- When adding HA pair systems to the Site Recovery Manager configuration, you must add each NetApp controller as an array in Array Managers.
- In a NAS environment, while adding storage systems to Array Managers, you should use the NFS Addresses field.

In this field, enter the IP address, host name, or DNS name of the storage controller that is used to serve NFS from that controller. If the controller serves NFS to the ESX or ESXi servers on

multiple addresses, you should add multiple array NFS addresses in the field, separated by commas.

Guidelines for using the Data ONTAP API over SecureHTTP

The Data ONTAP API can use either HTTP or SecureHTTP. By default, the Storage Replication Adapter uses the Data ONTAP API over HTTP. However, the editable configuration SSL parameter enables you to use the Data ONTAP API over SecureHTTP.

Setting up Storage Replication Adapter to use the Data ONTAP API over SecureHTTP

You can set up Storage Replication Adapter to use the Data ONTAP API over SecureHTTP.

Steps

1. In the primary and secondary storage systems, set up SecureAdmin and enable the SSL and SSH services.
2. Enter the `secureadmin status` command to confirm that the SSL and SSH services are running.
3. Add the following line to the `ontap_config.txt` file: `ssl=on`
4. In the Perl environment, install the `Net::SSLeay` module.

HTTPS support uses `Net::SSLeay.pm`. `Net::SSLeay` is not part of Perl 5.8.8 that is shipped with Site Recovery Manager. You need to compile `Net::SSLeay.pm` from the source `Net_SSLeay.pm-1.xx.tar.gz` from the Comprehensive Perl Archive Network. For instructions about how to compile and install `Net::SSLeay.pm` from the source, see the Readme file available in `Net_SSLeay.pm-1.xx.tar.gz`.

Related information

www.cpan.org

[KB 54012](#)

Storage Replication Adapter requirements for vFiler support

For Storage Replication Adapter to support vFiler units, you must add each vFiler unit to the adapter as a separate array and your storage system must be running Data ONTAP 7.3.2 or later.

The following are the requirements for vFiler support by the adapter:

- The storage system must be running Data ONTAP 7.3.2 or later.
- You must add each vFiler unit to the adapter as a separate array.
- Both the source and destination vFiler units must be online.
- You must turn on the `httpd.admin.enable` option on the vFiler unit.
- SnapMirror relationships must be defined within the destination vFiler context and not on destination physical vfiler0 context.
- Only iSCSI or NFS connected datastores are supported in vFiler units.
- You must start the iSCSI service on the vFiler unit.

The adapter does not automatically start the iSCSI service.

- In a SAN environment, the recovery site ESX or ESXi hosts must have established iSCSI sessions to the recovery vFiler units before you execute the test recovery or recovery operation.
- A single virtual machine must not have data on multiple vFiler units.
- Before performing a test recovery operation on a vFiler unit, you must turn on the `vfiler.vol_clone_zapi_allow` option on vfiler0.

Error messages in Storage Replication Adapter

You might encounter an error message when using Storage Replication Adapter with Site Recovery Manager.

User interface of Site Recovery Manager displays the error log messages and possible solutions.

You can also use the log files of Site Recovery Manager and the log files of the controller to troubleshoot problems that you might encounter when using Storage Replication Adapter.

Address of the storage array is not reachable

Message	Address of the storage array is not reachable
Cause	Storage array might be down or IP address entered might be incorrect.
Corrective action	Ensure that the storage array is up and running and the IP address of the storage array is reachable through the command line interface.

Array ID and peer array ID are the same

Message	Array ID and peer array ID are the same
Cause	SRA does not support this type of configuration.
Corrective action	Ensure that the protected site array and the recovery site array are different.

Authentication failed

Message	Authentication failed
Cause	Invalid user name or password.
Corrective action	Ensure that you provide a valid user name and password.

Creation of a temporary writable copy of the device failed

Message	Creation of a temporary writable copy of the device failed
----------------	--

Cause The FlexClone license might not be enabled for the storage array.

Corrective action Ensure that the FlexClone license is enabled for the storage array.

Device found is neither of the SAN type nor of the NAS type

Message Device found is neither of the SAN type nor of the NAS type.

Cause Device might not exist on the storage array.

Corrective action Ensure that the device exists on the storage array and is of type NAS or SAN.

Device is already tested for recovery

Message Device is already tested for recovery

Cause Test recovery operation is either completed or is already running on the device.

Corrective action If test recovery operation is running, wait for the operation to complete and then clean up the test environment. If the test recovery is already completed, clean up the test environment.

Device is not in the snapmirrored state

Message Device is not in the snapmirrored state

Cause SnapMirror relationship might be broken or uninitialized.

Corrective action Ensure that the replication state of the device is snapmirrored for synchronization to work.

Device is not mapped

Message Device is not mapped

Cause The device might not be exported or mapped correctly.

Corrective action For a NAS device, ensure that it is exported with proper rw rules and vmkernel IP addresses. For a SAN device, ensure that it is mapped to an igroup of OS type *vmware*.

Device is not replicated

Message	Device is not replicated
Cause	The device does not have a SnapMirror relationship configured.
Corrective action	Ensure that the device has a SnapMirror relationship configured.

Device provided in the input does not exist

Message	Device provided in the input does not exist
Cause	The device might not exist on the storage system.
Corrective action	Ensure that the device exists on the storage system.

Device provided in the input is not online

Message	Device provided in the input is not online
Cause	The device might not be online.
Corrective action	Ensure that the device is online. Check the logs for device information.

Device synchronization did not complete properly

Message	Device synchronization did not complete properly
Cause	The device synchronization process might have been disrupted because of network failure.
Corrective action	Ensure that the storage array hosting the device is connected to the network and is accessible to its peer storage array.

Failed to map the SAN device to an igroup of OS type *vmware*

Message	Failed to map the SAN device to an igroup of OS type vmware
----------------	---

- Cause** The device might be mapped to another igroup.
- Corrective action** Ensure that the device is not mapped to an already existing igroup.

FlexClone is not licensed

- Message** FlexClone is not licensed
- Cause** The FlexClone license might not be enabled on the storage system.
- Corrective action** Ensure that the FlexClone license is enabled on the storage system.

Incorrect array ID

- Message** Incorrect array ID
- Cause** Incorrect array ID in the SRM input.
- Corrective action** Verify the SRM logs.

Incorrect synchronization ID received as input from SRM

- Message** Incorrect synchronization ID received as input from SRM
- Cause** Synchronization ID might not be present on the storage system.
- Corrective action** Check the SRM logs to verify the synchronization ID.

Invalid SnapMirror configurations

- Message** Invalid SnapMirror configurations
- Cause** SnapMirror configurations specified in the `/etc/snapmirror.conf` file might be incorrect.
- Corrective action** Ensure that the SnapMirror configurations are valid in the configuration file.

IP to host name mapping information not found

Message	IP to host name mapping information not found
Cause	Host name of the storage system is not mapped to its IP address in the <code>ip_hostname_mapping.txt</code> file.
Corrective action	Map the host names of the storage systems at the protected and recovery sites to its IP addresses in the <code>ip_hostname_mapping.txt</code> file located at the protected and recovery sites.

Location for reverse replication is not source

Message	Location for reverse replication is not source
Cause	Reverse replication might be executed at the recovery site.
Corrective action	Reverse replication is executed at the protected site (original recovery site) to reverse the replication direction after a failover. Check the logs to ensure that it is running on the source.

NFS exports information for volume is not defined

Message	NFS exports information for volume is not defined
Cause	NFS exports might not have a <code>rw</code> rule in the exports file.
Corrective action	Check <code>/etc/exports</code> file and verify NFS exports information.

No device provided in the SRM input

Message	No device provided in the SRM input
Cause	Devices might not be configured on the storage array.
Corrective action	Ensure that the devices are configured properly.

No initiators provided as a part of access group input to SRA

Message	No initiators given as a part of access group input to SRA
Cause	FC and iSCSI adapters and vmkernel IP might not be configured on ESX servers.
Corrective action	Ensure that at least one initiator is configured on the ESX server.

No SnapMirror relationship found

Message	No SnapMirror relationship found
Cause	The SAN or NAS devices might not be mirrored on separate storage arrays.
Corrective action	Ensure that at least one SAN or NAS device is mirrored and the source and destination are on different storage arrays. SRA does not support SnapMirror relationships on a single storage array.

Peer array ID provided in the SRM input is incorrect

Message	Peer array ID provided in the SRM input is incorrect
Cause	SnapMirror relationship might not exist for the peer array ID.
Corrective action	Check the SRM logs to verify the peer array ID.

Recovery of device already completed

Message	Recovery of device already completed
Cause	SnapMirror relationship of the device might be in broken.
Corrective action	Configure the SnapMirror relationship to recover the device.

SAN or NAS device not found

Message	SAN or NAS device not found
Cause	The SAN or NAS device might not be configured properly.
Corrective action	Ensure that the SAN device is configured and mapped to an igroup of OS type <i>vmware</i> and the NAS device is configured and exported with rw rules.

SnapMirror replication is in progress

Message	SnapMirror replication is in progress
Cause	Synchronization as part of test recovery, recovery, or reprotect operations might already be running for the device.
Corrective action	Wait for the replication to be completed. Check the status of the SnapMirror by using the <code>snapmirror status</code> command.

SnapMirror resynchronization failed

Message	SnapMirror resynchronization failed
Cause	The devices might not be configured correctly.
Corrective action	Ensure that the devices are configured correctly. Check the log files for more details.

SnapMirror version could not be traced

Message	SnapMirror version could not be traced
Cause	Unable to get the Data ONTAP version of the storage array.
Corrective action	Ensure that the <code>version</code> command on the storage array displays the correct Data ONTAP version.

Storage IP is not defined or valid

Message	Storage IP is not defined or valid
Cause	The IP address provided for the storage system is either null or invalid.
Corrective action	Provide a valid IP address for the storage system.

Storage system configuration error

Message	Storage system configuration error
Cause	FCP, iSCSI, and storage IP might not be configured properly.
Corrective action	Ensure that the storage system has proper configuration of FCP, iSCSI, and storage IP.

System information: host name, model, and vendor not found

Message	System information: host name, model, and vendor not found
Cause	SRA was not able to collect the storage array details.
Corrective action	Ensure that the <code>hostname</code> command displays the host name for the storage array. Also ensure that the model and vendor is defined for the storage array.

The access group initiator information is missing in the SRM input

Message	The access group initiator information is missing in the SRM input
Cause	SRA supports dynamic access restriction. Therefore, it expects SRM to provide the access group information in the input.
Corrective action	Ensure that FC and iSCSI initiators and vmkernel IP addresses are configured on ESX servers. Check SRM logs for more details.

The access group initiator type mentioned in the SRM input is incorrect

Message	The access group initiator type mentioned in the SRM input is incorrect
Cause	The access group initiator type mentioned does not belong to one of the following: FC, iSCSI, or NFS.
Corrective action	Ensure that the access group initiator type is one of the following: FC, iSCSI, or NFS.

The exports file is missing on the storage array

Message	The exports file is missing on the storage array
Cause	The file might not exist on the storage array. If it exists, it might not be in the rw state.
Corrective action	Ensure that the /etc/exports file exists and is in the rw state.

The SnapMirror license is not present

Message	The SnapMirror license is not present
Cause	The SnapMirror license might not be enabled.
Corrective action	Ensure that the SnapMirror license is enabled.

The SRA command issued was not found

Message	The SRA command issued was not found
Cause	Command issued by SRM is not supported by SRA.
Corrective action	Check the command line options and logs.

The temporary device is in improper state

Message	The temporary device is in improper state
Cause	The temporary device might be in restricted state.
Corrective action	Manually make the device offline.

The temporary writable copy created is not consistent

Message	The temporary writable copy created is not consistent
Cause	The temporary writable copy might not be online.
Corrective action	Ensure that the temporary writable copy is in the online state.

The temporary writable copy might not have enough space

Message	The temporary writable copy might not have enough space
Cause	Enough space might not be available for the creation of temporary writable copy.
Corrective action	Ensure that you reserve enough space for creating the temporary writable copy.

The XML input to SRA from SRM is incorrect

Message	The XML input to SRA from SRM is incorrect
Cause	XML input might not be in correct format.
Corrective action	Check the SRM logs for more details.

Unable to add the initiators passed in the SRM input to an initiator group

Message	Unable to add the initiators passed in the SRM input to an initiator group
----------------	--

Cause	The initiators passed in the SRM input might not adhere to the required naming convention.
Corrective action	Ensure that the initiators passed in the SRM input adhere to the required naming convention. For example, ensure that FC has a proper WWPN or WWNN. iSCSI has a proper IQN, and NFS has a proper IPv4 address.

Unable to break the replication relationship of the device as a part of failover

Message	Unable to break the replication relationship of the device as a part of failover
Cause	The SnapMirror relationship for the device might not exist.
Corrective action	Ensure that the SnapMirror relationship exists for the device and that the relationship status is either snapmirrored or quiesced.

Unable to create initiator group on the storage array based on the access group information

Message	Unable to create initiator group on the storage array based on the access group information
Cause	The access group information to the SRA might not contain a proper alphanumeric name.
Corrective action	Check the SRM logs to ensure that a proper alphanumeric name is specified as part of the access group information to the SRA.

Unable to destroy the temporary writable copy

Message	Unable to destroy the temporary writable copy
Cause	The temporary device might be in use.
Corrective action	Ensure that temporary writable copy is not used by other operations.

Unable to determine if the device is read-only or read-write

Message	Unable to determine if the device is read-only or read-write
Cause	The device might not be in online state.
Corrective action	Ensure that the device that participates in the SnapMirror relationship is in the online state.

Unable to export the NAS device

Message	Unable to export the NAS device
Cause	The export rules specified in the <code>ontap_config.txt</code> file might be incorrect.
Corrective action	Ensure that the correct export rules are specified in the <code>ontap_config.txt</code> file.

Unable to fail over the specified device

Message	Unable to fail over the specified device
Cause	Either the device is not in online state or is not mapped properly.
Corrective action	Ensure that the device is in online state and is mapped or exported properly.

Unable to make the device online

Message	Unable to make the device online
Cause	The device might be in inconsistent state.
Corrective action	Use the Data ONTAP commands to make the device online.

Volume is not in proper state

Message	Volume is not in proper state
----------------	-------------------------------

Cause

The volume might not be online.

Corrective action

Ensure that the volume is in the online state.

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