

IBM Spectrum Virtualize Family Storage  
Replication Adapter  
Version 3.5.0

*User Guide*



**Note**

Before using this document and the product it supports, read the information in [“Notices” on page 31](#).

**Edition notice**

Publication number: SC27-4231-15. This edition applies to version 3.5.0 of the IBM Spectrum Virtualize Family Storage Replication Adapter and to all subsequent releases and modifications until otherwise indicated in a newer publication.

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# About this guide

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This guide describes how to install, configure, and use the IBM Spectrum Virtualize Family Storage Replication Adapter.

## Who should use this guide

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This guide is intended for system administrators or others who install and use the VMware Site Recovery Manager with the supported storage systems.

It is important to have an understanding of the following systems:

- Storage area networks (SANs)
- SAN Volume Controller Metro/Global-Mirror Copy Services (for more information, see [“Related information and publications”](#) on page vii)
- SAN Volume Controller Stretched Cluster
- IBM HyperSwap function
- The capabilities of your storage system

## Conventions used in this guide

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The notices that are used in this publication highlight key information.

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**Note:** These notices provide important tips, guidance, or advice.

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**Important:** These notices provide information or advice that might help you avoid inconvenient or difficult situations.

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**Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice appears before the instruction or situation in which damage can occur.

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## Related information and publications

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You can find additional information and publications related to the IBM Spectrum Virtualize Family Storage Replication Adapter at the following websites:

- [IBM Storwize® V3700 on IBM Knowledge Center](http://ibm.com/support/knowledgecenter/STLM5A) (ibm.com/support/knowledgecenter/STLM5A)
- [IBM Storwize V5000 on IBM Knowledge Center](http://ibm.com/support/knowledgecenter/STHGJ) (ibm.com/support/knowledgecenter/STHGJ)
- [IBM Storwize V7000 on IBM Knowledge Center](http://ibm.com/support/knowledgecenter/ST3FR7) (ibm.com/support/knowledgecenter/ST3FR7)
- [IBM Storwize V7000 Unified on IBM Knowledge Center](http://ibm.com/support/knowledgecenter/ST5Q4U) (/support/knowledgecenter/ST5Q4U)
- [IBM SAN Volume Controller on IBM Knowledge Center](http://ibm.com/support/knowledgecenter/STPVGU) (ibm.com/support/knowledgecenter/STPVGU)
- [IBM FlashSystem® V9000 on IBM Knowledge Center](http://ibm.com/support/knowledgecenter/STKMQV) (ibm.com/support/knowledgecenter/STKMQV)
- [IBM FlashSystem 9100 on IBM Knowledge Center](http://ibm.com/support/knowledgecenter/STSLR9) (ibm.com/support/knowledgecenter/STSLR9)
- [IBM Spectrum Virtualize on IBM Knowledge Center](http://ibm.com/support/knowledgecenter/STVLF4) (ibm.com/support/knowledgecenter/STVLF4)
- [SAN Volume Controller V4.3.0 Advanced Copy Services](http://redbooks.ibm.com/redbooks/pdfs/sg247574.pdf) (redbooks.ibm.com/redbooks/pdfs/sg247574.pdf)
- [SAN Volume Controller Best Practices and Performance Guidelines](http://redbooks.ibm.com/redbooks/pdfs/sg247521.pdf) (redbooks.ibm.com/redbooks/pdfs/sg247521.pdf)
- [VMware Documentation](http://vmware.com/support/pubs) (vmware.com/support/pubs)

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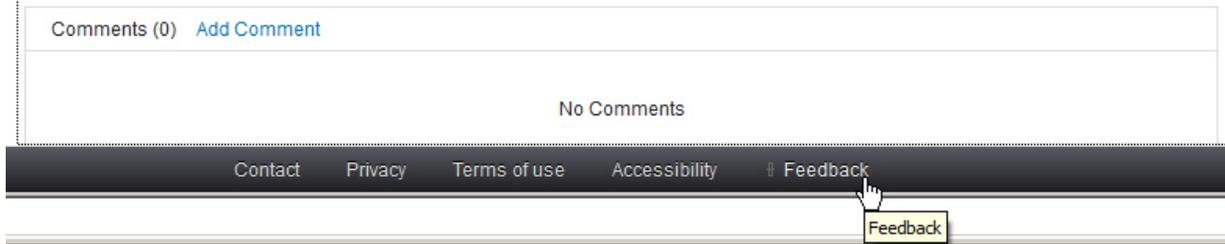
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# Chapter 1. Introduction

The IBM Spectrum Virtualize Family Storage Replication Adapter (SRA) is a software add-on that integrates with the VMware vCenter Site Recovery Manager (SRM) solution to run failovers together with supported storage systems.

The IBM Spectrum Virtualize Family SRA extends SRM capabilities and uses replication and mirroring as part of the SRM comprehensive Disaster Recovery Planning (DRP) solution.

VMware administrators can automate the failover of storage systems at the protected (primary) SRM site to a recovery (secondary) SRM site. Immediately upon a failover, the VMware ESX/ESXi servers at the recovery SRM site initiate the replicated datastores on the mirrored volumes of the recovery storage system.

When the protected site is back online, you can run failback from the recovery site to the protected site by clicking **Reprotect** in the SRM.

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**Note:** The supported storage systems for the Spectrum Virtualize Family SRA are listed in the release notes, and are referred throughout the documentation as "Spectrum Virtualize Family," "storage systems," or "Spectrum Virtualize software."

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## Concept diagram

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Spectrum Virtualize Family can use the IBM Spectrum Virtualize Family SRA add-on that works with each instance of VMware vCenter SRM (protected or recovery).

[Figure 1 on page 2](#) shows how an IBM SAN Volume Controller is integrated in a typical VMware SRM disaster recovery solution.

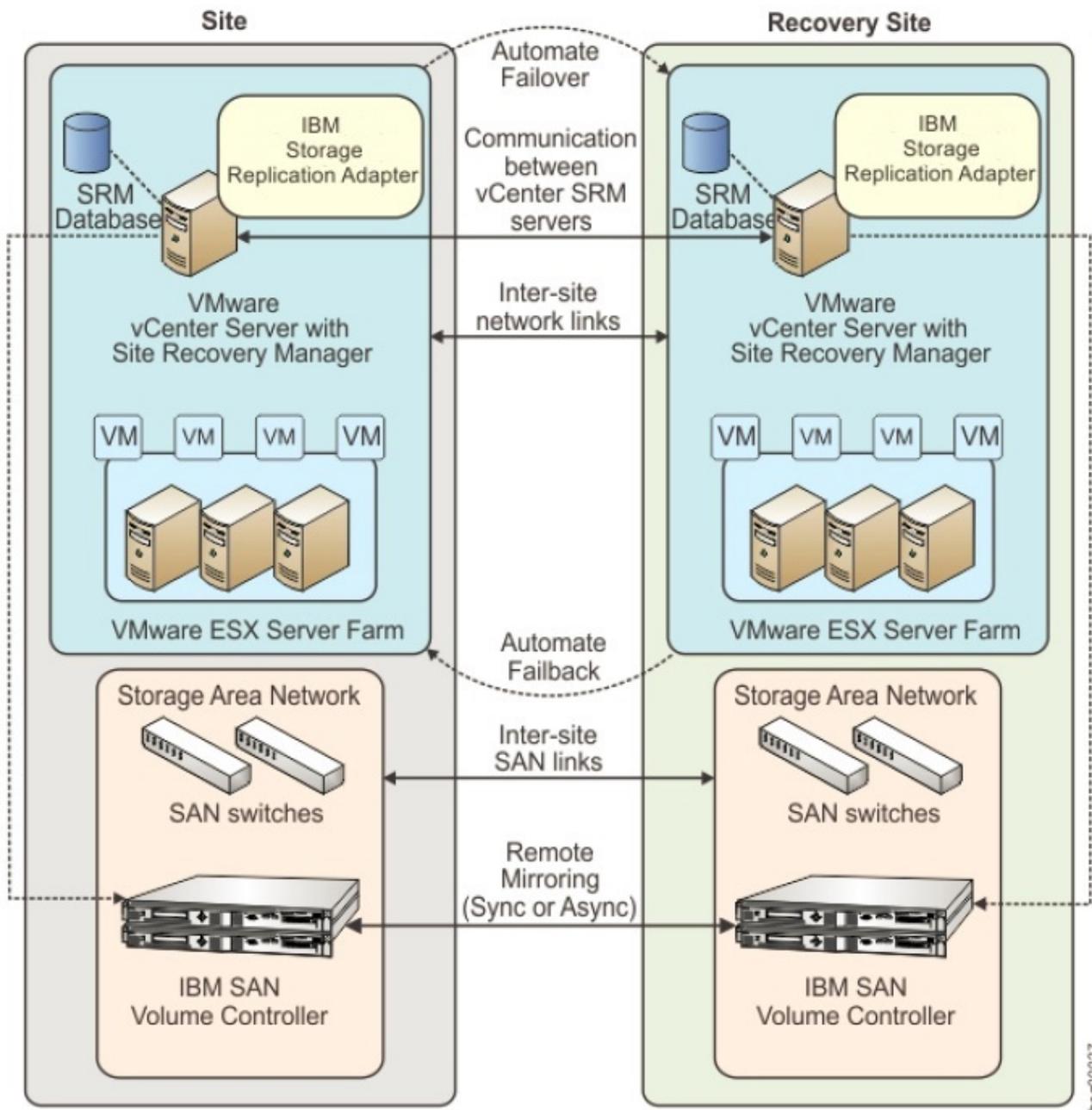


Figure 1. Concept diagram

## Compatibility and requirements

For up-to-date information about the compatibility and requirements of the IBM Spectrum Virtualize Family SRA, see the latest release notes.

You can obtain the latest release notes on the [IBM Knowledge Center](http://ibm.com/support/knowledgecenter) (ibm.com/support/knowledgecenter).

**Note:** Refer to the relevant VMware documentation for information about how to install the compatible versions of vCenter Server, Site Recovery Manager, and vSphere Web Client. Also, refer to the latest installation and configuration instructions for VMware ESX and ESXi servers.

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## Chapter 2. Preparation

Depending on your specific site configuration, preparation is required as described in the following topics.

- [“Preparing the SRA environment” on page 3](#)
- [“Verifying the mirroring configuration” on page 3](#)
- [“Verifying the VMware vCenter Site Recovery Manager installation” on page 5](#)

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### Preparing the SRA environment

Before you install the IBM Spectrum Virtualize Family SRA, you must prepare the storage environment.

#### Procedure

1. Verify that the supported storage system microcode version is used (for information, refer to the release notes).
2. Create appropriate-sized target volumes on the recovery (secondary) site Spectrum Virtualize Family. If you are using the IBM SAN Volume Controller, create Metro/Global-Mirror relationships between the source and target volumes and add the relationships to consistency groups, as needed. If you are using IBM SVC Stretched Cluster, create appropriate-sized stretched volumes as needed. If you are running IBM HyperSwap, create appropriate-sized hyperswap volumes as needed.

---

**Note:** For more information about Metro/Global Mirror Copy Services, [click here](#). For more information about IBM SVC Stretched Cluster, [click here](#). For more information about IBM HyperSwap, [click here](#).

3. Create a user on the Spectrum Virtualize Family with the appropriate privileges for the Spectrum Virtualize Family SRA.

For SRA non-preconfigured settings, a user with "Administrator" or higher privilege is needed. For SRA preconfigured settings, a user with "CopyOperator" or higher privilege is needed.

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**Important:** Use the same user name and password on both the protected (primary) and the recovery site.

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**Note:** SRA only supports non-preconfigured settings for IBM SVC Stretched Cluster and IBM HyperSwap.

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### Verifying the mirroring configuration

All storage systems, volumes, and VMware ESX hosts at both sites must be properly connected to their remote counterparts and configured for site mirroring.

Before you install the IBM Spectrum Virtualize Family SRA, verify that the following prerequisites are completed:

- Your local Spectrum Virtualize Family at the protected (primary) site has mirroring connectivity with the target Spectrum Virtualize Family at the recovery (secondary) site. For IBM SVC Stretched Cluster, stretched volumes are created, and both copies of a stretched volume are online. For IBM HyperSwap, hyperswap volumes are created, and both the master volume and aux volume of a hyperswap volume are online.
- The name of each Spectrum Virtualize Family is unique at both the protected and the recovery sites.
- The target name of any target Spectrum Virtualize Family (remote copy system) is identical to the predefined System Name of that same remote Spectrum Virtualize Family.

- The storage pools that contain the replicated volumes at both the protected and recovery sites are sufficient for creating the snapshots of all replicated volumes concurrently.
- For non pre-configured environments, an extra space for Test Failover and Failover is necessary. Ensure that enough space is available in the pool for it.
- Remote copying is defined for all Spectrum Virtualize Family-based volumes that you intend to protect as part of your Disaster Recovery Plan (DRP). For IBM SVC Stretched Cluster, stretched volumes are created, and both copies of a stretched volume are online. For IBM Hyperswap, hyperswap volumes are created, and both the master volume and aux volume of a hyperswap volume are online. For more information, [click here](#).
- Protected volumes are mapped to the protected VMware ESX hosts. For Stretched Cluster, the stretched volumes are mapped to both the protected and recovery VMware ESX hosts. For IBM Hyperswap, the master volume of a hyperswap is mapped to both the protected and recovery VMware ESX hosts.
- For non-preconfigured environments, the recovery Spectrum Virtualize Family-based volumes remain unmapped.
- The recovery VMware ESX/ESXi hosts are defined as Spectrum Virtualize Family hosts at the recovery site. For IBM Stretched Cluster and IBM HyperSwap, the recovery VMware ESX/ESXi hosts are defined as storage hosts in SVC.
- Recovery VMware ESX/ESXi host ports are FC-zoned with the storage system at the recovery site, and are visible by that storage system.



**Attention:** Confirm with your storage administrator that all the requirements are met.

---

## Supported iSCSI configurations for mirroring

Single session or multi-session iSCSI configurations are supported for mirroring.

### Single-session configuration

The following single-session configurations are supported:

- A VMware ESX server with one NIC port and a single IPv4 address space configured on it. At the same time, the Spectrum Virtualize Family has a single target IPv4 address space configured on an Ethernet port. This configuration results in a single path from the VMware ESX server to each iSCSI LUN.
- A VMware ESX server with one NIC port and a single IPv4 address space configured on it. At the same time, the Spectrum Virtualize Family has two target IPv4 address spaces configured on Ethernet ports, one on each node. This configuration results in two paths visible from the VMware ESX server to each iSCSI LUN.

### Multi-session configuration

A maximum of four sessions are supported between a VMware ESXi Server and a Spectrum Virtualize Family node (canister). Therefore, a maximum of eight paths are available to the disk/LUN. For example, four paths or sessions are available to each Spectrum Virtualize Family node (canister) from the iSCSI Qualified Name (IQN) of each iSCSI initiator.

---

**Note:** For more information about iSCSI host attachment of VMware hosts, see [Guidelines for the Attachment of VMware iSCSI Hosts to SAN Volume Controller and Storwize V7000 – Errata](#).

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## Verifying the VMware vCenter Site Recovery Manager installation

Before you start to run the IBM Spectrum Virtualize Family SRA container, you must ensure that the VMware SRM is already installed and accessible at the protected (primary) site as well as the recovery (secondary) site.

### Procedure

1. Log in to the VMware vSphere Web Client.

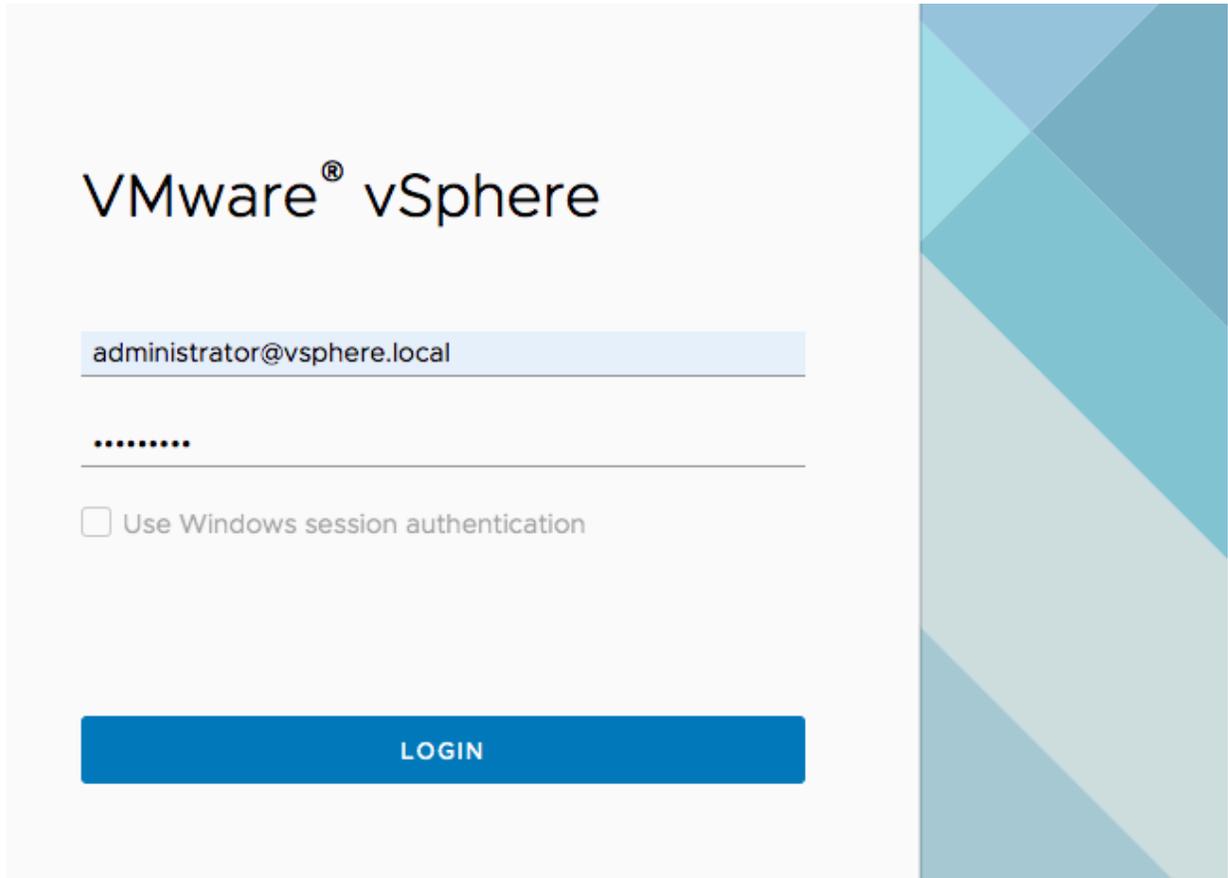


Figure 2. VMware vSphere Web Client login screen

2. Go to the Web Client home page and verify that the **Site Recovery** icon is displayed under Inventories, as shown in [Figure 3 on page 6](#).



Figure 3. VMware vSphere Web Client home page – Site Recovery icon

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**Note:** For more information on how to install VMware Virtual Center Server and the Site Recovery Manager virtual application, refer to the *VMware Virtual Center installation and administration guide*.

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## Chapter 3. Installation

After you finish the required preparation, you can run the IBM Spectrum Virtualize Family SRA container. Refer to the following sections for more information.

- [“Downloading the SRA” on page 7](#)
- [“Running the SRA container” on page 7](#)
- [“Deleting an SRA” on page 9](#)

---

### Downloading the SRA

You can download the IBM Spectrum Virtualize Family SRA from the VMware website.

<http://www.vmware.com/go/download-srm>

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### Running the SRA container

Once you have downloaded the IBM Spectrum Virtualize Family SRA from the VMware website, use the VMware SRM Appliance Management interface to run it on the SRM server.

#### Before you begin

It is suggested that you stop your currently installed version of the SRA container before running a different version. You must satisfy all of the prerequisites that are listed in [Chapter 2, “Preparation,” on page 3](#) before you run the SRA container.

#### Procedure

Complete the following steps to run the IBM Spectrum Virtualize Family SRA container on the SRM server.

1. Log in to the VMware SRM Appliance Management interface as admin.

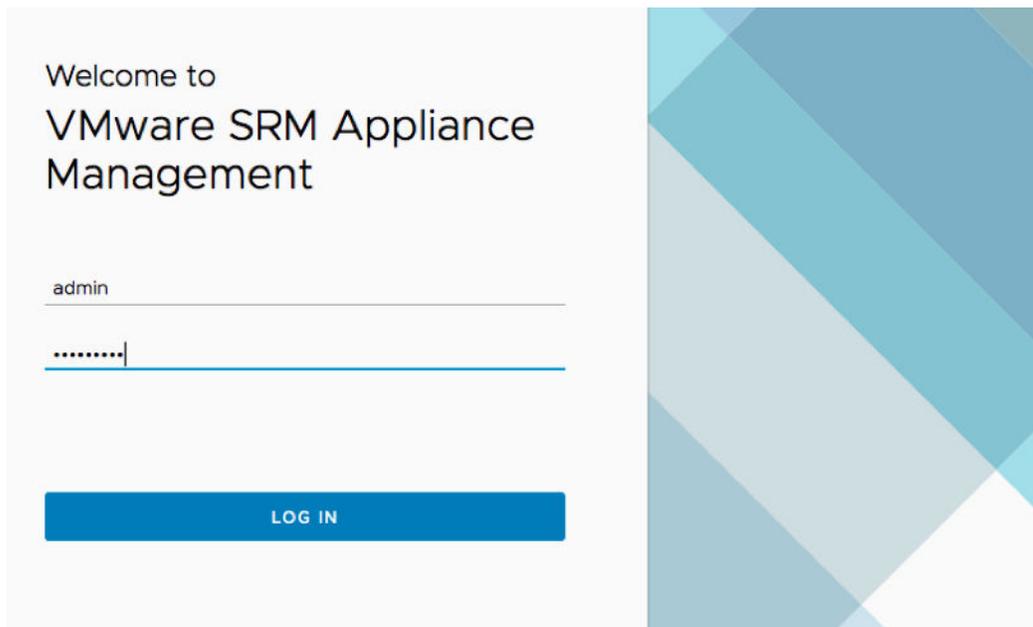


Figure 4. VMware SRM Appliance Management interface login screen

2. In the **SRM Appliance Management** interface, click **Storage Replication Adapters > NEW ADAPTER**, as shown in [Figure 5 on page 8](#).

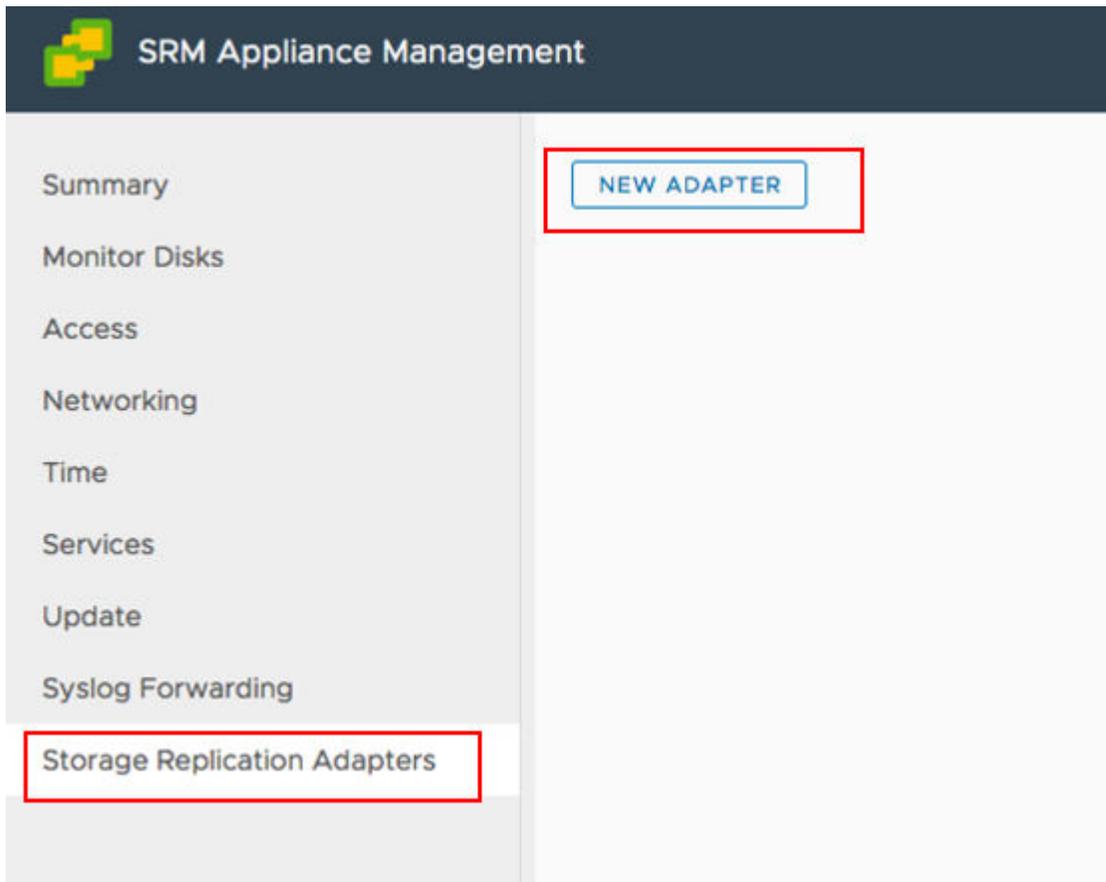


Figure 5. NEW ADAPTER button on Storage Replication Adapters view in SRM Appliance Management interface

3. Click **Upload**, navigate to the directory where you saved the SRA file, and double-click it.

The SRA upload process begins.

4. When the upload process finishes, click **Close**.

The SRA card is displayed on the Storage Replication Adapters view, as shown in [Figure 6 on page 8](#).

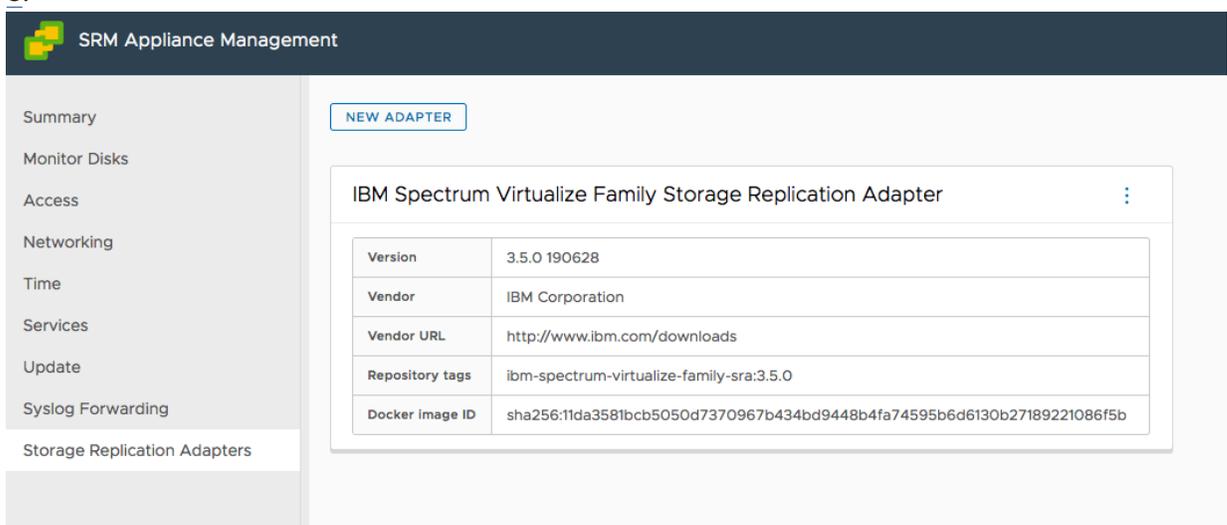
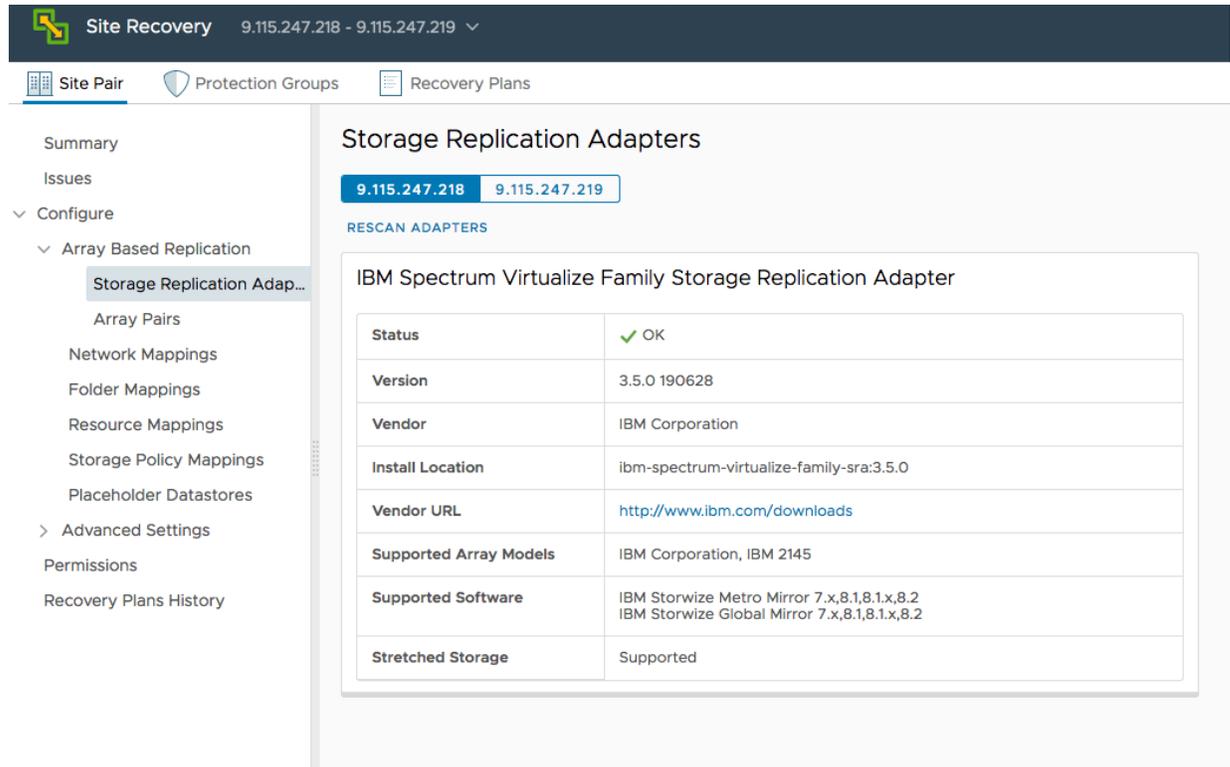


Figure 6. Card for new SRA displayed on Storage Replication Adapters view

5. Log in to the vSphere Web Client.
6. Click **Site Recovery** > **Open Site Recovery**, select a site pair, and click **View Details**.

7. On the **Site Pair** tab, click **Configure > Array Based Replication > Storage Replication Adapters > RESCAN ADAPTERS**.

Once the rescan is complete, the **Status** field value is updated to OK.



The screenshot shows the Site Recovery console interface. The top navigation bar includes 'Site Recovery' and IP addresses. The left sidebar has a menu with 'Storage Replication Adap...' selected. The main content area is titled 'Storage Replication Adapters' and shows a table for 'RESCAN ADAPTERS'.

RESCAN ADAPTERS	
IBM Spectrum Virtualize Family Storage Replication Adapter	
Status	✓ OK
Version	3.5.0 190628
Vendor	IBM Corporation
Install Location	ibm-spectrum-virtualize-family-sra:3.5.0
Vendor URL	<a href="http://www.ibm.com/downloads">http://www.ibm.com/downloads</a>
Supported Array Models	IBM Corporation, IBM 2145
Supported Software	IBM Storwize Metro Mirror 7.x,8.1,8.1.x,8.2 IBM Storwize Global Mirror 7.x,8.1,8.1.x,8.2
Stretched Storage	Supported

Figure 7. After running RESCAN ADAPTERS on the Site Pair tab on the Site Recovery view

## Deleting an SRA

To delete an IBM Spectrum Virtualize Family Storage Replication Adapter from the SRM Server, use the VMware SRM Appliance Management interface.

### Procedure

Complete the following steps to delete an SRA from the SRM Server.

**Note:** If you delete an SRA, any currently running operations involving storage arrays controlled by this adapter are interrupted, including, but not limited to, Recover, Test, Cleanup, and Reprotect.

1. Log in to the VMware SRM Appliance Management interface as admin.
2. Click **Storage Replication Adapters**.
3. Find the appropriate SRA card, open its drop-down menu, and select **Delete**.
4. Confirm that you are aware of the results of deleting the adapter and click **Delete**.  
The SRA is deleted.



---

## Chapter 4. Configuration

After the Spectrum Virtualize Family SRA files have been uploaded to the SRM Server via the SRM Appliance Management interface, and the SRA container is running on the SRM VA, various configuration tasks can be performed, as described in the following sections.

- [“Updating the SRA configuration file” on page 11](#)
- [“Configuring source and target volume backup settings” on page 13](#)
- [“Configuring preconfigured environments” on page 14.](#)
- [“Configuring non-preconfigured environments” on page 14.](#)
- [“Setting SRA user privileges” on page 15.](#)

### Updating the SRA configuration file

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There are two methods you can use to update the SRA configuration file settings on an SRM Server, as described in the following subsections.

---

**Important:** The SRA configuration file must be updated on both the protected (primary) site and the recovery (secondary) site SRM VA. The **preConfiguredEnv** setting must be consistent for both sites.

---

- [“Updating the SRA configuration file from the SRA container volume \(preferred method\)” on page 11](#)
- [“Updating the SRA configuration file from the SRM Appliance Management Interface” on page 11](#)

### Updating the SRA configuration file from the SRA container volume (preferred method)

Updating the SRA configuration file on an SRM Server from the SRA container volume is the preferred method. To use this method, complete the following steps.

#### Procedure

1. Switch to the SRA configuration volume directory located on the SRM VA server:  
`/var/lib/docker/volumes/<Docker_Image_ID>-v/_data`
2. For detail, please check the mount information by using the following command:  
`docker inspect <Container_ID>`
3. Modify the SRA configuration file `sra.settings` under the directory `IBMSpectrumVirtualizeFamilySRA`.
4. Run the `docker` command to verify the result:  
`docker exec <Container_ID> cat /srm/sra/conf/IBMSpectrumVirtualizeFamilySRA/sra.settings`

### Updating the SRA configuration file from the SRM Appliance Management Interface

Complete the following steps to updating the SRA configuration file on an SRM Server from the SRM Appliance Management Interface.

#### Procedure

1. Log in to the **VMware SRM Appliance Management Interface**.
2. Click **Storage Replication Adapters**.
3. Click the drop-down menu within the SRA card on the **Storage Replication Adapters** pane and select **Download configuration archive**, as shown in [Figure 8 on page 12](#).

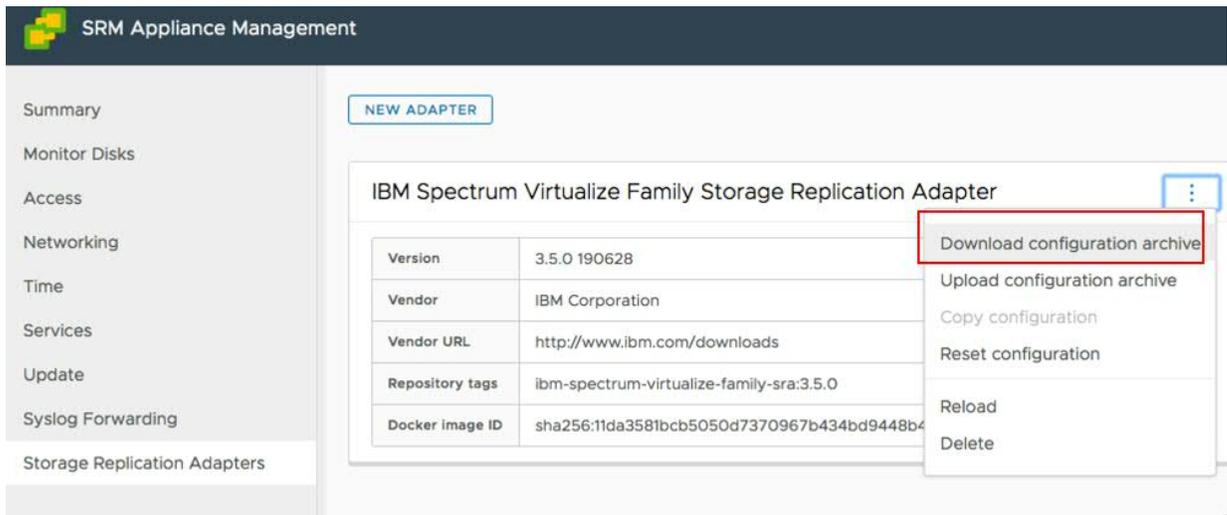


Figure 8. Downloading the configuration archive

4. Extract the archive and modify the SRA configuration file `sra.settings` under the directory `IBMSpectrumVirtualizeFamilySRA`.

For example, uncompress the archive with the command `tar -pzxvf`:

```
$ tar -pzxvf ibm-spectrum-virtualize-family-sra_3_5_0.tar.gz
x ./
x ./sra-configuration-version.txt
x ./IBMSpectrumVirtualizeFamilySRA/
x ./IBMSpectrumVirtualizeFamilySRA/sra.settings
```

**Important:** Don't modify the file `sra-configuration-version.txt`. SRM would use this file to match the digest of the current configuration. If the two hashes don't match, the change would be rejected.

5. Compress the SRA configuration files as a `tar.gz`.

For example, compress the archive with the command `tar -pzcvf`:

```
$ tar -pzcvf ibm-spectrum-virtualize-family-sra_3_5_0.tar.gz
  IBMSpectrumVirtualizeFamilySRA sra-configuration-version.txt
a ./IBMSpectrumVirtualizeFamilySRA/
a ./IBMSpectrumVirtualizeFamilySRA/sra.settings
a ./sra-configuration-version.txt
```

6. Back on the **Storage Replication Adapters** pane in the SRM Appliance Management interface, click the drop-down menu within the SRA card and select **Upload configuration archive**, as shown in [Figure 9](#) on page 13.

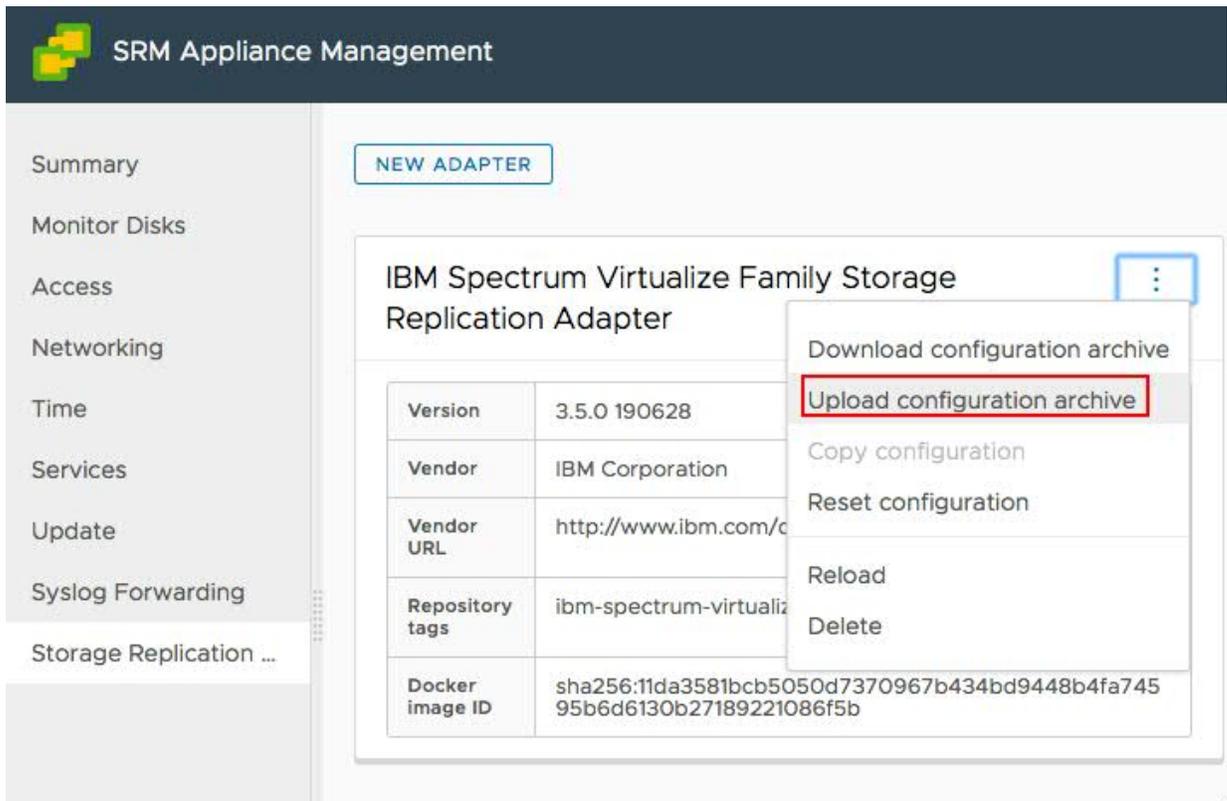


Figure 9. Uploading the configuration archive

7. Run the docker command to verify the result:

```
docker exec <Container_ID> cat /srm/sra/conf/IBMSpectrumVirtualizeFamilySRA/sra.settings
```

## Configuring source and target volume backup settings

Source and target volume backup settings must be configured for the following recovery scenarios provided by VMware SRM version 5.0 and later:

- Planned failover
- Disaster recovery

To do this, configure Spectrum Virtualize Family SRA to create FlashCopy backups of the remote copy source and target volumes by setting **protectSource** and **protectTarget** to True in `sra.settings`. (To learn how to update `sra.settings`, see “Updating the SRA configuration file” on page 11.)

**Note:** For IBM SVC Stretched Cluster and IBM HyperSwap, a stretched volume or a hyperswap volume does not have source or target, so the SRA will not create FlashCopy backups even if **protectSource** and **protectTarget** are set to True.

In addition, set the appropriate MDisk group IDs for **sourceMDiskGroupID** and **recoveryMDiskGroupID** within `sra.settings` before completing the update process. Also, be sure to set the appropriate **testMDiskGroupID** in `sra.settings` before promoting target volumes to the VMware ESX server and recovering VMs on them.

**Note:** If the Spectrum Virtualize Family SRA fails to back up the source or target volumes, no warning message is displayed. Check the backups on the storage system or check the messages in the SRM log files.

## Configuring preconfigured environments

---

If the **preconfiguredEnv** option is set to `True` in the SRA configuration file `sra.settings`, some additional steps must be completed before Spectrum Virtualize Family SRA can function properly.

### About this task

To complete these tasks you must use the storage system GUI or tools that are part of the storage system that you use.

---

**Note:** IBM Spectrum Virtualize Family SRA does not support preconfigured mode for IBM SVC Stretched Cluster or IBM HyperSwap.

---

### Procedure

1. Create an equal number of FlashCopy (target) volumes as the Remote Copy target volumes on the recovery (secondary) site storage system.
2. Create a background copy and incremental FlashCopy mapping between Remote Copy target volumes and the previously created FlashCopy target volumes on the recovery site storage system.
3. If the remote copies are in a consistency group, create a corresponding FlashCopy consistency group and configure the corresponding FlashCopy to the FlashCopy consistency group.
4. Map the Remote Copy target and FlashCopy target volumes to the recovery site vSphere servers.
5. Create an equal number of FlashCopy (target) volumes as the Remote Copy source volumes on the protected (primary) site storage system.
6. Create a background copy and incremental FlashCopy mapping between Remote Copy source volumes and the previously created FlashCopy target volumes on the protected site storage system.
7. If the remote copies are in a consistency group, create a corresponding FlashCopy consistency group and configure the corresponding FlashCopy to the FlashCopy consistency group.
8. Map the Remote Copy source and FlashCopy target volumes to the protected site vSphere servers.

---

### Note:

- FlashCopy configuration on the protected site is for the test recovery and recovery operations, after the **reprotect** operation on the recovery site.
  - FlashCopy (target) volumes are resynchronized during recovery.
- 

## Configuring non-preconfigured environments

---

If the **preconfiguredEnv** option is set to `False` in the SRA configuration file `sra.settings`, IBM Spectrum Virtualize Family SRA runs in non-preconfigured mode, creates volumes and FlashCopy, and attaches and detaches volumes to and from the host. But in order for the SRA to function correctly in this mode, some additional configuration is required.

### About this task

To configure needed settings for the SRA running in non-preconfigured mode, you must update the SRA configuration file, `sra.settings`. To learn how, see [“Updating the SRA configuration file” on page 11](#).

### Procedure

1. Set appropriate values for the following parameters in `sra.settings`:

#### **testMDiskGroupID**

Instructs Spectrum Virtualize Family SRA on which MDisk group on the recovery site storage system creates the FlashCopy (target) volumes during test recovery operations.

### volumeType

Set the volume type as Standard, Thin Provisioned (Space Efficient), or Compressed Volume depending on your requirement. Spectrum Virtualize Family SRA creates the same type of volume during test recovery or recovery.

---

**Note:** If you back up remote copy source or target volumes during recovery, the **sourceMDiskGroupID** must be an MDisk group ID on the protected (primary) Spectrum Virtualize Family cluster. Likewise, on the recovery (secondary) site Spectrum Virtualize Family, the **recoveryMDiskGroupID** must also be an MDisk group ID.

---

2. Save the `sra.settings` file and run the `docker` command to verify the result:

```
docker exec <Container_ID> cat
/srm/sra/conf/IBMSpectrumVirtualizeFamilySRA/sra.settings
```

## Setting SRA user privileges

---

Setting Spectrum Virtualize Family SRA user privileges differs depending on whether you have a preconfigured environment or a non-preconfigured environment.

Refer to the following guidelines for each case.

### Preconfigured environment

If **preconfiguredEnv** is set to `True` in the SRA configuration file `sra.settings`, a **CopyOperator** privilege is enough if you first create the needed volumes and map them to the recovery site VMware ESX servers.

### Non-preconfigured environment

If **preconfiguredEnv** is set to `False` in the SRA configuration file `sra.settings`, an **Administrator** privilege is necessary for Spectrum Virtualize Family SRA to complete the following tasks:

- Create snapshot volumes and map them to the VMware ESX servers at the recovery site.
- Run test recovery operations.

---

**Note:** If the replicated targets are pre-mapped to the recovery site VMware ESX servers, a **CopyOperator** privilege is enough for recovery operations.

---

## Checking the configuration

---

The SRA Check Configuration tool is not supported in this release of IBM Spectrum Virtualize Family Storage Replication Adapter. It is planned to be supported in the next release.



---

## Chapter 5. Usage

Use the IBM Spectrum Virtualize Family SRA to run dependable Disaster Recovery Planning (DRP). The Spectrum Virtualize Family SRA also protects VMware sites with their storage system-based datastores.

This includes:

- [“Creating the Target Volumes and Metro/Global Mirror Relationships” on page 17](#)
- [“Adding an array pair to the VMware Site Recovery Manager” on page 17](#)
- [“Running a Test procedure” on page 25](#)
- [“Running a failover procedure” on page 26](#)

---

### Creating the Target Volumes and Metro/Global Mirror Relationships

You must create an equal number of target VDisks (for Metro/Global Mirror targets) and source VDisks on the recovery site Spectrum Virtualize Family.

---

#### Important:

- Create Metro/Global Mirror relationships between the source and target VDisks and add them to consistency groups, as explained in [“Preparing the SRA environment” on page 3](#).
  - Before you use the Spectrum Virtualize Family SRA, make sure that the Metro/Global Mirror relationships and consistency groups are in a consistent synchronized state.
  - For Stretched Cluster, make sure that the two copies of a stretched volume reside in different sites and that both copies are online.
  - For IBM HyperSwap, make sure that the master volume and aux volume of a hyperswap volume are online.
- 

---

### Adding an array pair to the VMware Site Recovery Manager

To add an array pair to VMware Site Recovery Manager, complete the following steps.

#### Procedure

1. In the VMware vSphere Web Client, click **Site Recovery > Open Site Recovery > NEW SITE PAIR**.
2. Enter the Remote Virtual Center host name, user name, and password when prompted and click **NEXT**.
3. Click one of the sites you want to pair and click **Next**.
4. Confirm the connection by clicking **CONNECT**.
5. Review your selected settings and click **FINISH**.
6. Click **VIEW DETAILS** to verify the information on the Summary pane, as shown in [Figure 10 on page 18](#).

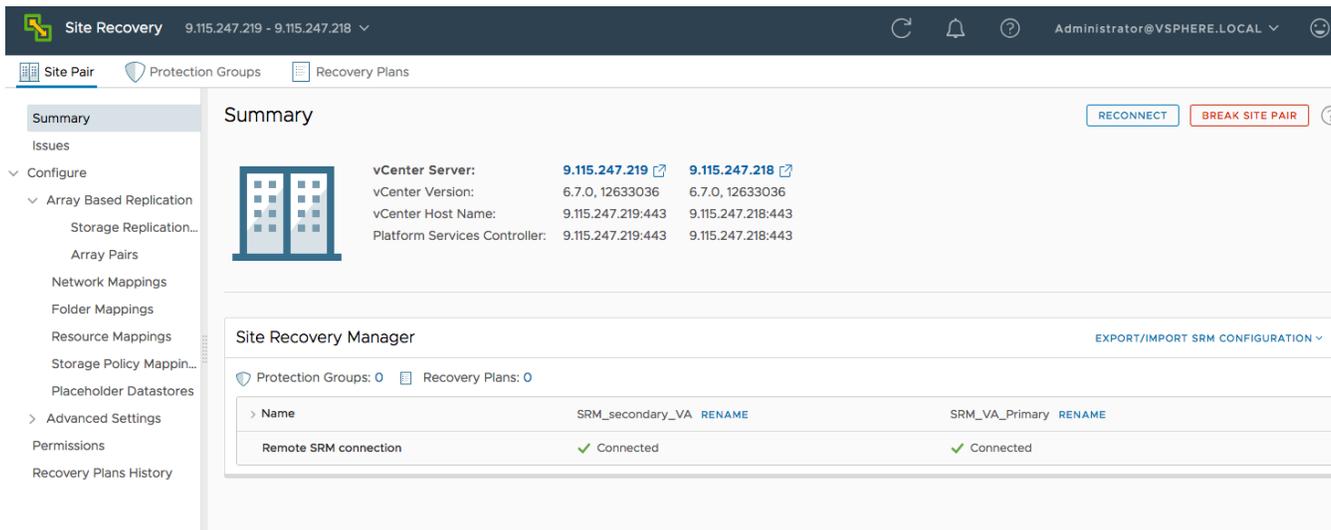


Figure 10. Summary pane showing connection between local site and paired site

- On the **Site Pair** tab, click **Configure > Array Based Replication > Array Pairs** to open the Array Pairs pane, as shown in Figure 11 on page 18.

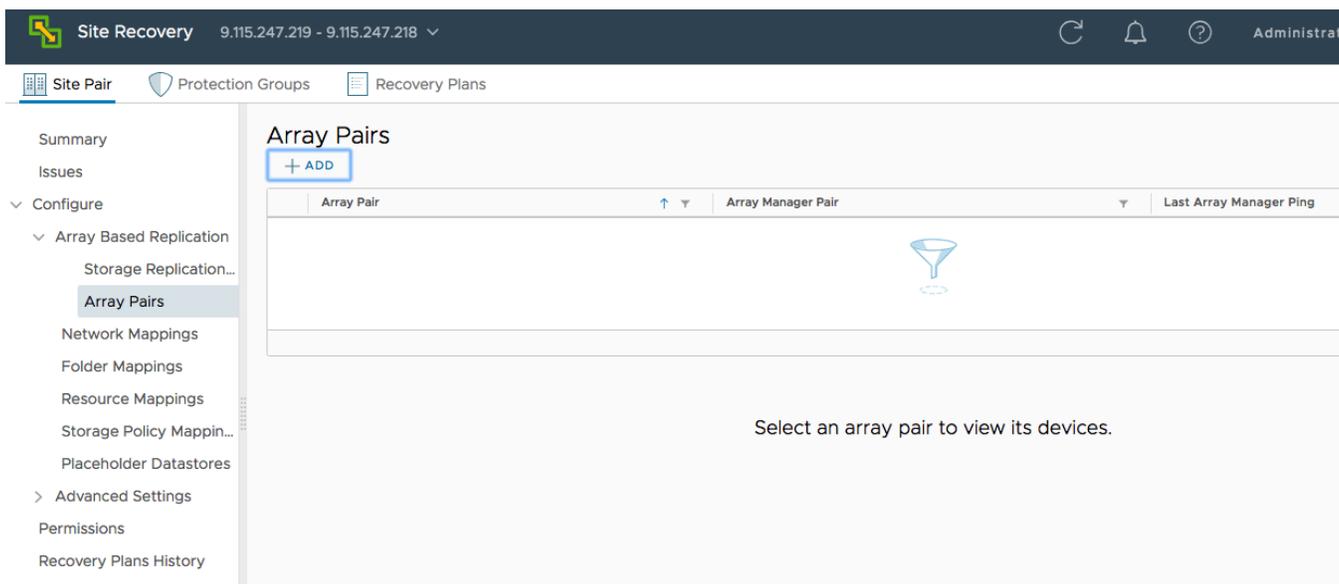


Figure 11. Array Pairs pane

- Click **+ ADD** to add an array manager.
- On the **Add Array Pair - Storage replication adapter** pane, select **IBM Spectrum Virtualize Family Storage Replication Adapter** and click **NEXT**, as shown in Figure 12 on page 19.

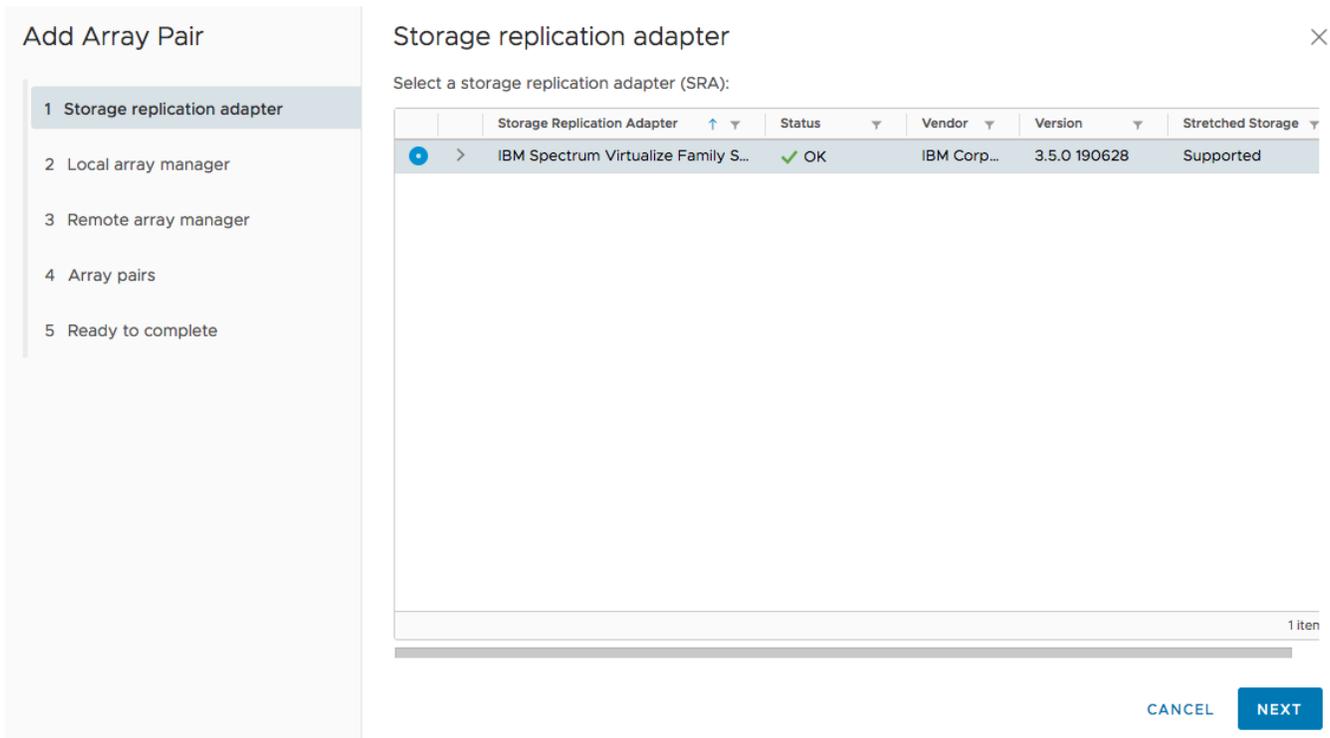


Figure 12. Add Array Pair - Storage replication adapter pane

10. On the **Local array manager** pane, as shown in Figure 13 on page 19, enter the array manager information as detailed after the figure and then click **Next**.

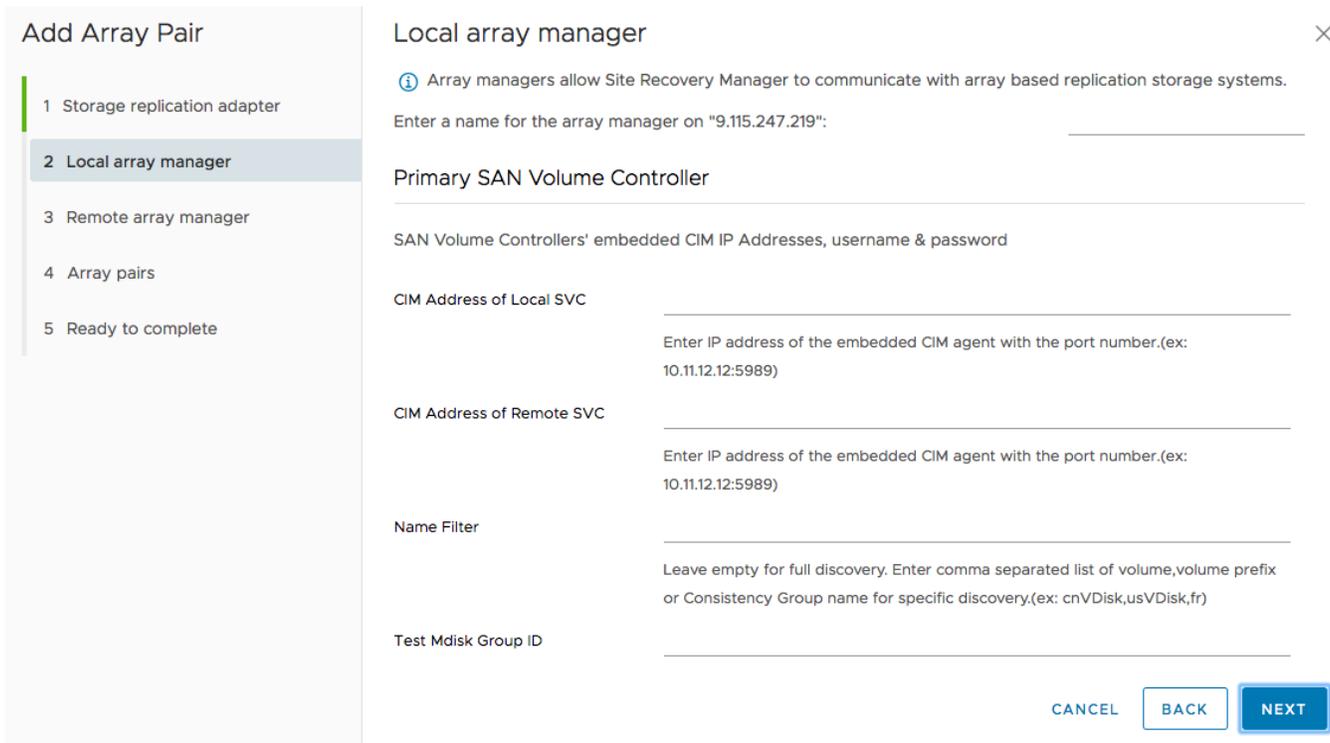


Figure 13. Local array manager pane

**CIM Address of Local SVC**

Enter the CIMOM address and CIM port of the local SAN Volume Controller cluster.

**Note:** SAN Volume Controller SRA supports only port 5989 to connect to CIMOM through https.

**CIM Address of Remote SVC**

Enter the CIMOM address and CIM port of the remote SAN Volume Controller cluster. The addresses can either be IP addresses or fully qualified domain names.

---

**Note:**

- Enter the same CIMOM address and CIM port as the primary SVC, if you are using IBM SVC Stretched Cluster or IBM HyperSwap.
  - If **M:N** topology is being used, enter any one of the SVCs (**N**) on the remote site for the CIM Address of the remote SVC. The term **M:N** refers to the number of SVCs on the local site (**M**) and remote site (**N**). No calculations are derived from this term. **M:N** is only used to denote the replication process.
- 

**Name Filter**

This field is optional. To run a full discovery, keep this field empty. To filter volume names or consistency groups, enter the volume name/prefix or consistency group name/prefix to run the filter operation.

---

**Note:** For more information, see [“Filtering volumes and consistency groups by name” on page 22.](#)

---

**Test Mdisk Group ID**

Input an Mdisk group ID for the local SVC, which will be used to create flash copies in when running the test operation.

---

**Note:** If an Mdisk group ID is set here, SRA will ignore the value of Test Mdisk Group ID set in the SRA Utility.

---

**User name**

Enter the user name that is configured on the CIMOM.

**Password**

Enter the password that is configured on the CIMOM.

---

**Important:** The user name and password for local and remote SAN Volume Controller CIMOMs must be the same.

---

11. On the **Remote array manager** pane, as shown in [Figure 14 on page 21](#), enter the remote array manager information as detailed above and then click **Next**.

### Add Array Pair

- 1 Storage replication adapter
- 2 Local array manager
- 3 Remote array manager
- 4 Array pairs
- 5 Ready to complete

### Remote array manager

Do not create a remote array manager now.

Enter a name for the array manager on "9.115.247.218": \_\_\_\_\_

#### Primary SAN Volume Controller

SAN Volume Controllers' embedded CIM IP Addresses, username & password

CIM Address of Local SVC \_\_\_\_\_  
Enter IP address of the embedded CIM agent with the port number.(ex: 10.11.12.12:5989)

CIM Address of Remote SVC \_\_\_\_\_  
Enter IP address of the embedded CIM agent with the port number.(ex: 10.11.12.12:5989)

Name Filter \_\_\_\_\_  
Leave empty for full discovery. Enter comma separated list of volume,volume prefix or Consistency Group name for specific discovery.(ex: cnVDisk,usVDisk,fr)

Test Mdisk Group ID \_\_\_\_\_

CANCEL
BACK
NEXT

Figure 14. Remote array manager pane

12. On the **Array pairs** pane, enable the array pairs and then click **Next**.
13. On the **Ready to complete** pane, click **Finish**.

The Array Pairs pane is displayed, as shown in Figure 15 on page 21. If there are new replicated devices that need to be discovered, click **Refresh**.

Array Pair	Array Manager Pair	Last Array Manager Ping
✓ SRA_V7K_103 ↔ SVC114	9.115.246.103_P ↔ 9.115.246.114_R	✓ Success, 4/29/19, 2:08:10 PM +0800

Device (9.115.247.218)	Datastore	Status	Device (9.115.247.219)	Protection Group	Local Consistency Group
linda_SRA_test		← Reverse	linda_SRA_test_secondary		
linda_test_MM_primary		→ Forward	linda_test_MM_secondary		
ixia_103_CGa0		← Reverse	ixia_114_CGa0		ixia_CGa
ixia_103_CGa1		← Reverse	ixia_114_CGa1		ixia_CGa
ixia_103_CGa2		← Reverse	ixia_114_CGa2		ixia_CGa
ixia_103_MMO		→ Forward	ixia_114_MMO		

Figure 15. Array Pairs pane, array pair added and enabled.



**Attention:** All Spectrum Virtualize Family-replicated VDisks that participate in SRM and belong to the same remote copy consistency group are shown under a single local consistency group. To avoid data inconsistencies, when adding replicated VDisks to the same VM or datastore, all VDisks used by a single VM or application must be added to the same consistency group.

## Filtering volumes and consistency groups by name

Use the **Name Filter** option if you only want to see SRM managed replicated volumes.

### Before you begin

**Note:** Use of the **Name Filter** field is optional. It can be left empty to enable full discovery, as shown in Figure 15 on page 21.

### Procedure

1. On the Array Pairs pane in the VMware vSphere Web Client, select an array pair and then select **Edit Local Array Manager** from the **ARRAY MANAGER PAIR** drop-down menu to open the **Edit Array Manager** pane, as shown in Figure 16 on page 22.

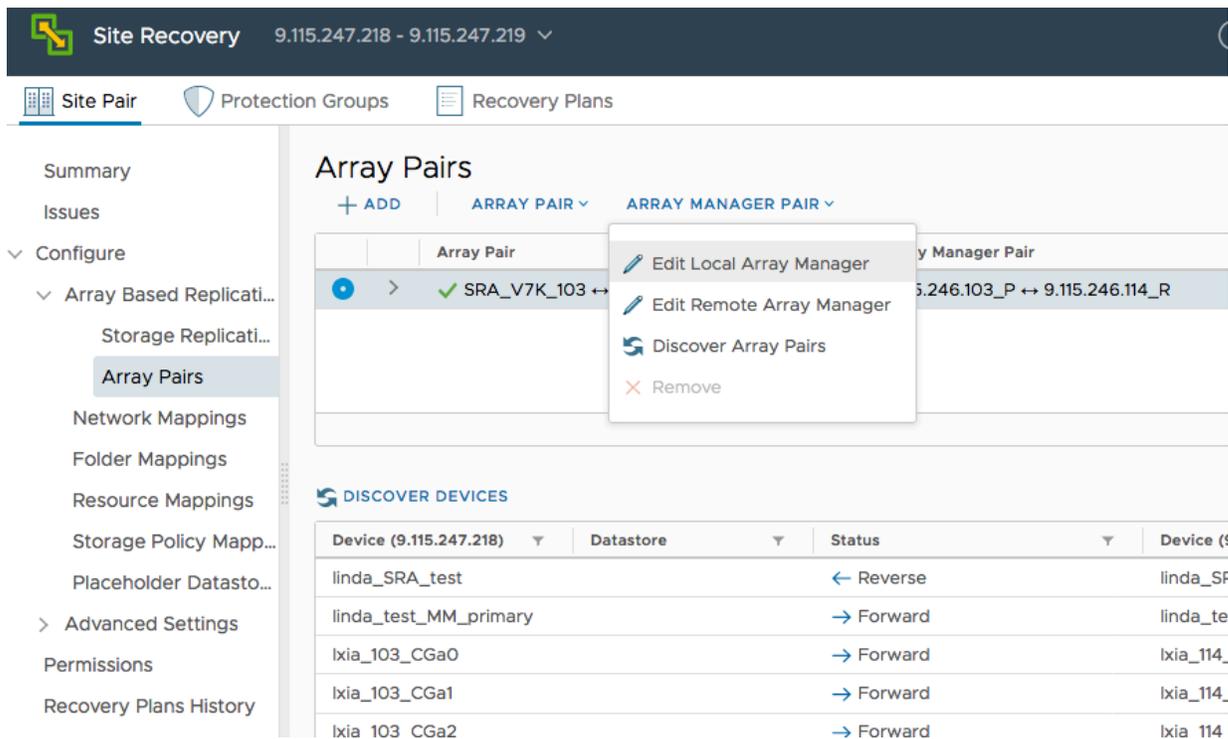


Figure 16. Edit Local Array Manager selection

2. Enter the consistency group name or prefix and volume name or volume name prefix in the **Name Filter** field on the **Edit Local Array Manager** pane, as shown in Figure 17 on page 23.

## Edit Local Array Manager



### Primary SAN Volume Controller

SAN Volume Controllers' embedded CIM IP Addresses, username & password

CIM Address of Local SVC	9.115.246.103:5989
	Enter IP address of the embedded CIM agent with the port number.(ex: 10.11.12.12:5989)
CIM Address of Remote SVC	9.115.246.114:5989
	Enter IP address of the embedded CIM agent with the port number.(ex: 10.11.12.12:5989)
Name Filter	linda
	Leave empty for full discovery. Enter comma separated list of volume,volume prefix or Consistency Group name for specific discovery.(ex: cnVDisk,usVDisk,fr)
Test Mdisk Group ID	
	Input a test mdisk group ID for local SVC
Username	
	Enter username to connect to CIM
Password	
	Enter password to connect to CIM

CANCEL

SAVE

Figure 17. Edit Local Array Manager pane with Name Filter information entered

**Note:** You can enter multiple volume names or volume prefixes, multiple consistency group names, or prefixes, or both.

3. Fill in the **Username** and **Password** fields.
4. Click **Save**.

The name filter is added to the local array and is displayed on the Array Pairs pane.

**Note:** An error is issued if you enter the volume names on the local site and a matching remote site volume name is not found, as shown in [Figure 18 on page 23](#).

Site Recovery 9.115.247.218 - 9.115.247.219

Site Pair Protection Groups Recovery Plans

Summary  
Issues  
Configure  
Array Based Replication  
Storage Replication Adap...  
Array Pairs  
Network Mappings  
Folder Mappings  
Resource Mappings  
Storage Policy Mappings  
Placeholder Datastores  
Advanced Settings  
Permissions  
Recovery Plans History

### Array Pairs

+ ADD ARRAY PAIR ARRAY MANAGER PAIR

Array Pair	Array Manager Pair	Last Array Manager Ping
✓ SRA_V7K_103 ↔ SVC114	9.115.246.103_P ↔ 9.115.246.114_R	✓ Success, 5/5/19, 2:58:08 PM +0800

Unable to find a matching consistency group at the local site for the remote consistency group 'ixia\_CGb'.  
Unable to find a matching device at the local site for the remote device 'zz\_svc114\_v1'.  
Unable to find a matching device at the local site for the remote device 'ixia\_114\_MM0'.

View all (6) issues

DISCOVER DEVICES

Device (9.115.247.218)	Datastore	Status	Device (9.115.247.219)	Protection Group	Local
linda_SRA_test		← Reverse	linda_SRA_test_secondary		
linda_test_MM_primary		→ Forward	linda_test_MM_secondary		

Figure 18. Array Pairs pane after adding name filter to local array

5. Select **Edit Remote Array Manager** from the **ARRAY MANAGER PAIR** drop-down menu to open the **Edit Array Manager** pane.

6. Enter the consistency group name or prefix and volume name or volume name prefix in the **Name Filter** field on the **Edit Remote Array Manager** pane.

**Note:** You can enter multiple volume names or volume prefixes, multiple consistency group names, or prefixes, or both.

**Note:** Prefixes for the volume name can be different for each site, but prefixes must be paired with the remote site array manager. For example, if the local site volume name is Pri\_WinXP, and on the remote site it is mapped to Rec\_WinXP, then you could enter the prefix Pri in the **Name Filter** field for the local site and the prefix Rec on the remote site. To use the name filter for the consistency group, enter the same names and prefixes at both the local and remote sites.

7. Fill in the **Username** and **Password** fields.
8. Click **Save**.

The name filter is added to the remote array and is displayed on the Array Pairs pane, as shown in Figure 19 on page 24.

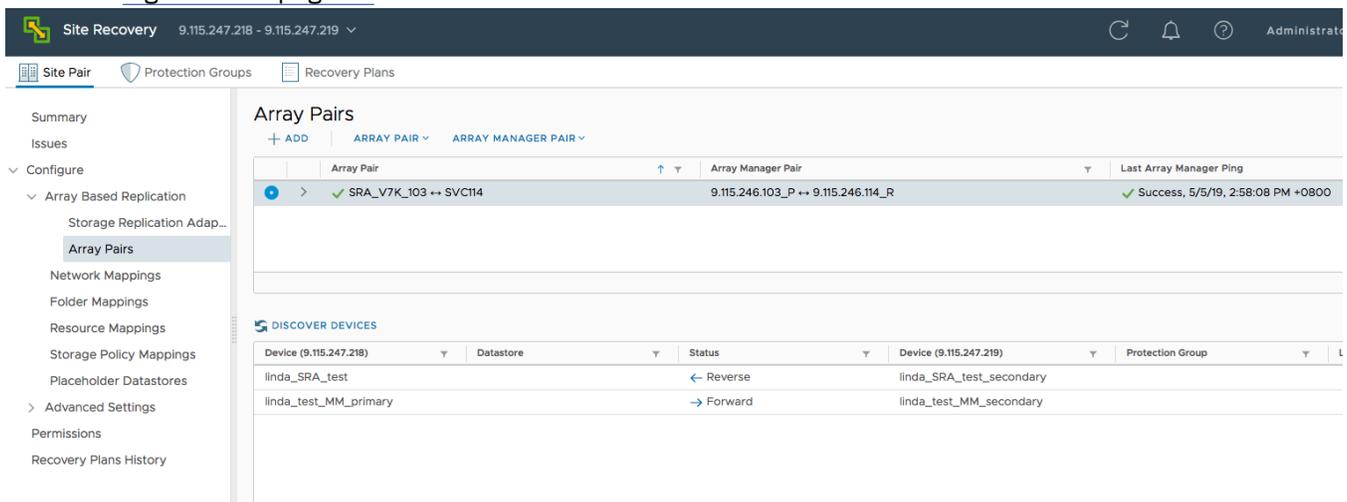


Figure 19. Array Pairs pane after adding name filter to remote array

## Filtering different consistency groups and volumes

When the **Name Filter** shows the volumes that belong to any consistency group, it shows volumes only if the prefix matches to all volumes in that consistency group.

As shown in the Storwize V7000 management GUI in Figure 20 on page 25, if you enter the name or prefix and it does not match all of the names in the consistency group, it ignores other volumes of that consistency group. For more information, see [Table 1 on page 25](#).

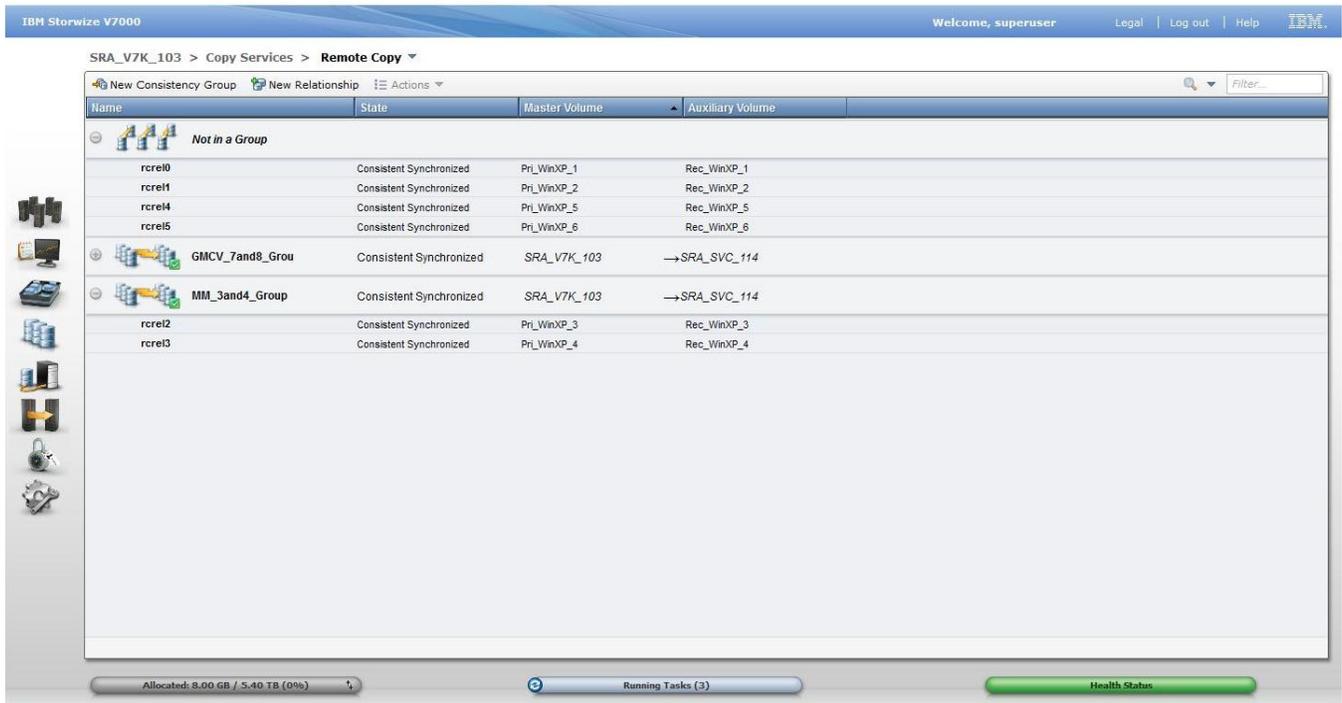


Figure 20. Storwize V7000 management GUI – volumes and consistency groups

Local site: Name Filter value	Remote site: Name Filter value	Devices that are displayed on SRM
GMCV	GMCV	Pri_WinXP_7, Pri_WinXP_8
Pri	Rec	Full Discovery
Pri_WinXP_1, Pri_WinXP_7	Rec_WinXP_1, Rec_WinXP_7	Only Pri_WinXP_1 display.
Pri_WinXP_7, Pri_WinXP_8, Pri_WinXP_3, Pri_WinXP_6	Rec_WinXP_7, Rec_WinXP_8, Rec_WinXP_3, Rec_WinXP_6	All display except Pri_WinXP_3

## Running a Test procedure

Depending on the SRA configuration, you might have to perform extra tasks for the test procedure to work.

For troubleshooting information, see [“Managing Test failure” on page 29](#).

### Running a Test procedure on a preconfigured environment

The Spectrum Virtualize Family SRA completely automates the test procedure.

During the test procedure, the preconfigured FlashCopy target volumes are resynchronized. During the cleanup procedure, the preconfigured FlashCopy target volumes are stopped.

Ensure that all the steps that are outlined in [“Configuring preconfigured environments” on page 14](#) are finished.

### Running a Test procedure on a non-preconfigured environment

The Spectrum Virtualize Family SRA completely automates the test procedure.

During the test procedure, FlashCopy target volumes are created in the MDisk Group that is specified during the configuration. During the cleanup procedure, the FlashCopy target volumes that are created during the test procedure are deleted.

SRA Test procedure prerequisites:

- Ensure that there is enough free space available on the MDisk Group.
- Ensure that all the steps that are outlined in [“Configuring non-preconfigured environments”](#) on page 14 are finished.

## Running a failover procedure

---

The Spectrum Virtualize Family SRA completely automates the failover procedure.

**Note:**

- For IBM SVC Stretched Cluster, the synchronization between the two copies of a stretched volume is managed by SVC stretched cluster, so the active-active replication within a stretched volume is always running, unless one of the copies is offline.
- For IBM HyperSwap, the synchronization between the master volume and the aux volume of a hyperswap volume is managed by the HyperSwap function, so the active-active replication within a hyperswap volume is always running, unless one of the sites is offline.

---

For a planned failover, the Metro Mirror/Global Mirror direction is switched. Global Mirror with Cycling Mode is stopped with the target volume writable.

For an unplanned failover, the Metro Mirror/Global Mirror/Global Mirror with Cycling Mode is stopped with the target volume writable.

The Metro Mirror/Global Mirror/Global Mirror with Cycling Mode target volume is prompted to the vSphere Server as a production volume. During an SRA preconfigured failover procedure, the preconfigured FlashCopy is resynchronized.

SRA Failover procedure prerequisites:

- Ensure that all the steps that are outlined in [“Configuring preconfigured environments”](#) on page 14 are finished.
- Ensure that all the steps that are outlined in [“Configuring non-preconfigured environments”](#) on page 14 are finished.

## Running a Reprotect procedure

---

The Spectrum Virtualize Family SRA completely automates the reprotect procedure.

Before you run the **Reprotect** action, ensure that the status of the Metro Mirror/Global Mirror/Global Mirror with Cycling Mode is not disconnected. Refresh the **SRM Array Managers Devices** pane to ensure that no error messages occur.

The Metro Mirror/Global Mirror/Global Mirror with Cycling mode direction changes from the original recovery site to the original protection site, and the mirroring action resumes.

For SRA with a non-preconfigured setting, the volume of the original protection site is masked from the vSphere Server to avoid any damage to the volume. The original protection site consists of the target volume of the Metro Mirror/Global Mirror/Global Mirror with Cycling Mode.

The following tasks are required for the SRA reprotect procedure:

- Ensure all the steps that are outlined in [“Configuring preconfigured environments”](#) on page 14 are finished.
- Ensure all the steps that are outlined in [“Configuring non-preconfigured environments”](#) on page 14 are finished.

---

## Chapter 6. Best practices

The following guidelines are important to follow while you configure the Spectrum Virtualize Family SRA.

### Managing datastores and consistency groups

---

Follow these best practice guidelines while you manage datastores and consistency groups.

- The datastores of one VM should be in the same consistency group.
- The datastore of the VM and the raw disk in the VM should be in the same consistency group.
- You must have administrator privileges to install the Recovery Manager.
- Set the appropriate timeout and rescan values in SRM for the recovery of many VMs.



---

## Chapter 7. Troubleshooting

When an error occurs, check the status of Spectrum Virtualize Family, VMware ESX servers, vCenter servers, and SANs.

### Managing DiscoverArrays failure

Verify the following items when you encounter a failure during Array Manager operation:

1. Check that the IP address is correct and in the correct format. For example, the format can resemble: 192.168.10.1:5989.
2. Check that the user name and password are correct.
3. Check to see whether the SAN Volume Controllers are paired.

### Managing DiscoverDevices failure

---

**Important:** Relationship and consistency group status typically is `consist_synchronized` or `consistent_copying` for Global Mirror with Cycling Mode.

---

### Managing recovery failure

For environments that are not pre-configured, ensure that the following items are checked or corrected:

1. Recovery, after you switch from pre-config without rescan SRA.
2. CIM user privilege problem, "administrator" required.
3. After disaster recovery, it is necessary to wait a few minutes and then refresh the devices in the SRM Array Managers on both sites. This step is necessary to ensure that there is no error before the plan is reprotected.

For environments that are pre-configured, ensure that the following items are checked or corrected:

1. FlashCopy was not created.
2. Corresponding **fcmap** consistency group was not created.
3. The **Remotecopy** target volume is not mapped to the recovery site.

### Managing Test failure

For environments that are not preconfigured, ensure that the following are checked or corrected:

1. CIM user privilege problem, "administrator" required.
2. Not enough space in the **mdisk** group.
3. Switching from pre-configured without rescan SRA.
4. The **Mdiskgroup** and volume type is not set for Spectrum Virtualize Family SRA.

For environments that are preconfigured, ensure that the following items are checked or corrected:

1. FlashCopy not created.
2. FlashCopy target volume is not mapped to host.
3. Corresponding FlashCopy consistency group not created.
4. FlashCopy target volume that is mapped to the host are shown as Mounted in Hosts and Clusters/Configuration/Storage/Devices.

## Managing SRM procedures

1. Refresh the devices in the SRM array managers. If there are no errors, go to step “3” on page 30. Otherwise, continue to step “2” on page 30.
2. Check all the previously related remote copies in the SRA-STATUS file in the SRA installation directory. For example, C:\Program Files \VMware\VMware vCenter Site Recovery Manager \storage\sra\IBMStorage. The format of the SRA-STATUS file is shown in the following example:

```
[ArrayID] | [LunID]=* [ArrayID] + "|CG;" +  
[RemoteCopyConsistencyGroupName]=*
```

A sample of the content of the SRA-STATUS file can be seen in the following example:

```
000002006E814E66|2=CREATEVOLUME@4;  
60:05:07:68:01:BA:05:39:98:00:00:00:00:00:2C  
TESTFAILOVER@4;  
60:05:07:68:01:BA:05:39:98:00:00:00:00:00:2C
```

This example shows that the standalone remote copy (target volume id:[2]) in the array [000002006E814E66] was in testfailover status. Spectrum Virtualize Family SRA created a FlashCopy for the remote copy target [2] and the FlashCopy target volume id is [4]. The UUID is 60:05:07:68:01:BA:05:39:98:00:00:00:00:00:2C.

3. Refresh the devices in the SRM array managers again to ensure that there are no errors.

## Collect log files

If the problem cannot be resolved by following any of the troubleshooting tips, collect the SRM log files and contact IBM support.

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