

IBM DS8000 Storage Replication Adapter
Version 2.4.1

User Guide



Note

Before using this document and the product it supports, read the information in [“Notices” on page 43.](#)

Edition notice

Publication number: SC27-4232-09. This publication applies to version 2.4.1 of the IBM DS8000® Storage Replication Adapter and to all subsequent releases and modifications until otherwise indicated in a newer publication.

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About this guide

This guide describes how to install, configure, and use the IBM DS8000 Storage Replication Adapter.

Note: Procedures in this guide include steps and screen captures that apply when using VMware vSphere Client. If you are using VMware vSphere Web Client, similar steps are applicable, except the step of logging in to vSphere Client. Procedures to which this note applies include:

- [Verifying the VMware vCenter Site Recovery Manager installation](#)
 - [Adding an Array Manager to the VMware Site Recovery](#)
 - [Filtering volumes by name](#)
-

Who should use this guide

This guide is intended for system administrators or others who install and use the IBM DS8000 Storage Replication Adapter.

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

- Storage area networks (SANs)
- DS8000 Metro Mirror/Global Mirror/Metro-Global Mirror Copy Services (for more information, see [“Related information and publications”](#) on page vii)
- The capabilities of your storage system

Conventions used in this guide

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

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

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



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.

Related information and publications

You can find additional information and publications related to the IBM DS8000 Storage Replication Adapter at the following websites:

- [IBM Knowledge Center](#)
- [IBM DS8000 Copy Services for Open Systems](#)
- [VMware vCenter Site Recovery Manager Documentation](#)
- [VMware Technical Resource Center](#)
- [VMware Knowledge Center](#)

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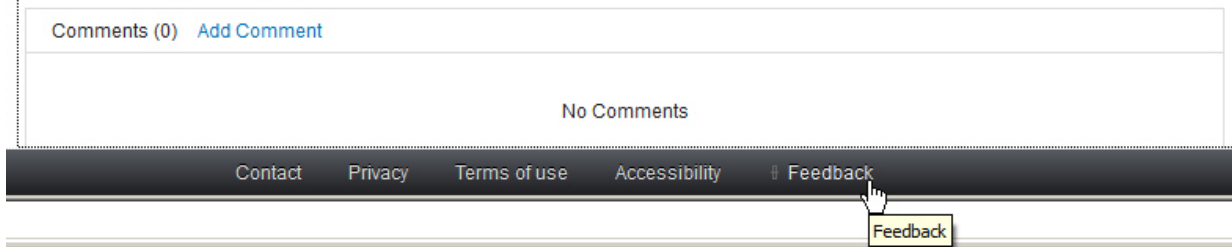
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Chapter 1. Introduction

The IBM DS8000 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 IBM DS8000 storage systems.

The IBM DS8000 SRA extends SRM capabilities to employ DS8000 replication and mirroring as part of the SRM comprehensive Disaster Recovery Planning (DRP) solution.

VMware administrators can automate the failover of a DS8000 system at the protected (primary) SRM site to a DS8000 system at a recovery (secondary) SRM site. Immediately upon failover, the VMware ESX/ESXi servers at the recovery SRM site initiate the replicated datastores on the mirrored volumes of the recovery DS8000 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.

Concept diagram

The IBM DS8000 storage system can use the IBM DS8000 SRA add-on that works with each instance of VMware vCenter SRM (protected or recovery).

Figure 1 on page 1 shows how the IBM DS8000 Storage Replication Adapter is integrated in a typical VMware SRM disaster recovery solution.

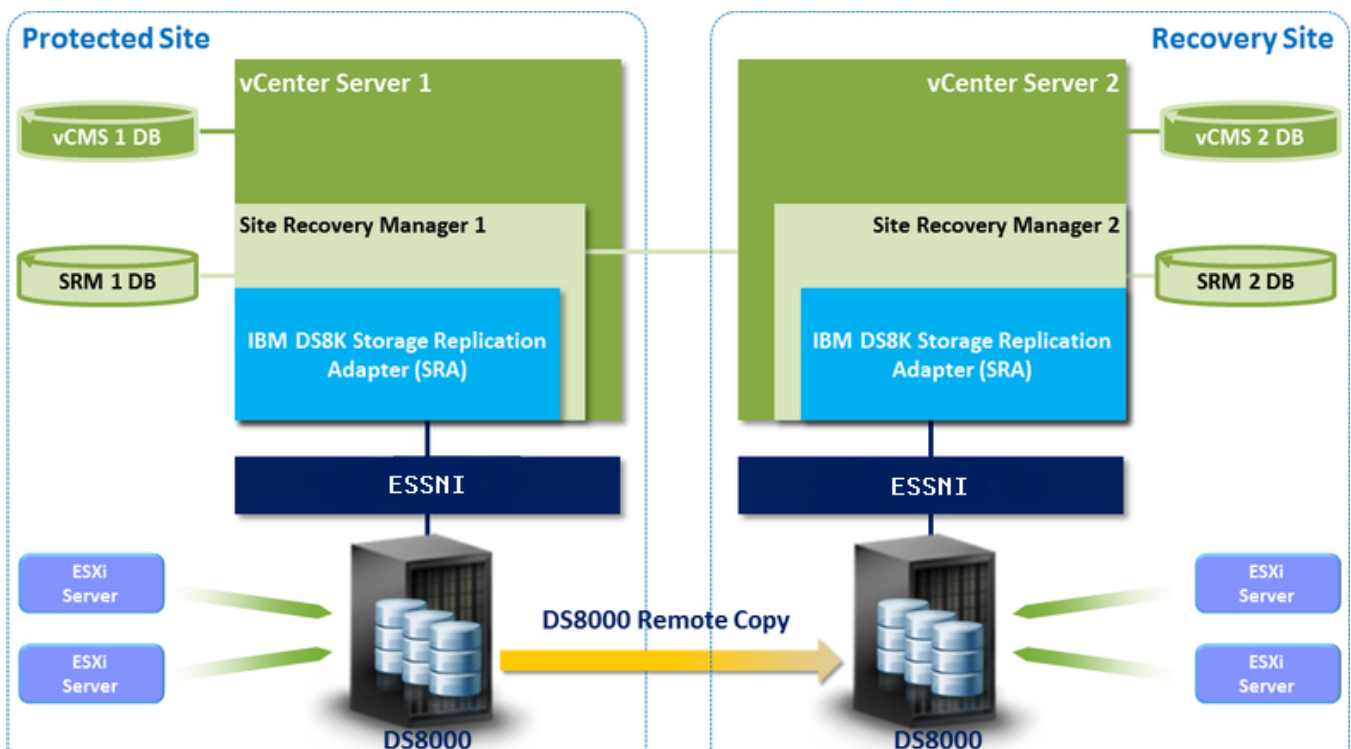


Figure 1. IBM DS8000 Storage Replication Adapter and VMware SRM disaster recovery

System requirements

Your system must have the listed prerequisites before you install the IBM DS8000 SRA.

For complete and up-to-date information about the IBM DS8000 SRA compatibility and requirements, see the latest release notes.

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

Prerequisites:

- Uninstall any previous versions of the DS8000 SRA. See “[Deleting an SRA](#)” on page 10.
- Feature licenses for DS8000s with FlashCopy® and Metro Mirror/Global Mirror must be activated at both the protected and recovery sites.
- The DS8000 storage must run on microcode version 7.5 and later (DS8870).
- The space-efficient (SE) volumes feature must be enabled on the DS8000, if you want DS8000 SRA to use SE volumes during test failover operations and backup in failover operations.
- The user name and password for both protected and recovery site DS8000 device's Hardware Management Console (HMC) must be the same.
- VMware vSphere Virtual Center Server v6.0 or later with Site Recovery Manager 6.x or later plug-in must be installed.
- Ensure that the system firewall is not blocking the Enterprise Storage Server® Network Interface (ESSNI) port 1750 and port 1755. Otherwise, SRA fails with an "Invalid Array ID" message.
- A Fibre Channel (FC) connection must be configured between the VMware ESX server and the DS8000 storage system.

Note:

1. For information about installing the VMware vCenter Server and Site Recovery Manager plug-in, refer to the *VMware Site Recovery Manager Installation and Configuration Guide*.
 2. See the relevant VMware documentation for information about how to install the compatible versions of vCenter Server, Site Recovery Manager, and vSphere Client. Also, refer to the latest installation and configuration instructions for VMware ESX and ESXi servers.
-

Chapter 2. Preparation

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

Preparing the DS8000 software environment

Before you install the DS8000 SRA, verify the software implementation.

Procedure

Complete the following steps to prepare the DS8000 storage environment:

1. Verify that the supported storage system microcode version is used. See [“System requirements” on page 2](#).
2. Create appropriate-sized target volumes on the recovery (secondary) site DS8000. Create Metro/Global Mirror relationships between the source and target volumes.
3. Create a user on the DS8000 with the appropriate privileges for the DS8000 SRA. For non-preconfigured settings, a user with "Physical Operator" or higher privilege is needed. For preconfigured settings, a user with "Copy Services Operator" or higher privilege is needed.

Note: For information about user privileges, see [“Setting user privileges for SRA configurations” on page 25](#).

Verify the mirroring configuration

All DS8000 storage systems, volumes, and VMware ESX hosts at both the protected (primary) and recovery (secondary) sites must be properly connected to their remote counterparts. The DS8000 systems, volumes, and VMware ESX hosts must then be configured for site mirroring.

Before you install the IBM DS8000 SRA, verify that the following prerequisites are completed:

- The local DS8000 system at the protected (primary) site has mirroring connectivity with the target DS8000 system at the recovery (secondary) site.
- The recovery VMware ESX/ESXi hosts are defined as DS8000 hosts at the recovery site.
- The recovery VMware ESX/ESXi host ports are FC-zoned (Fibre Channel) with the DS8000 storage system at the recovery site and are visible by that DS8000 storage system.
- The name of each DS8000 storage system is unique on both the protected and recovery sites.
- The storage extent pools that contain the replicated volumes at both sites have sufficient free capacity for creating the snapshots of all replicated volumes concurrently.
- Remote mirroring is defined for all DS8000-based volumes that you intend to protect as part of your Disaster Recovery Plan.
- Your protected volumes are mapped to the protected VMware ESX hosts.

Note: Set **HostType** to VMWare when you configure host connect on DS8000. For example:

```
mkhostconnect -wwname 12341234000A000F -hosttype VMWare host_1_port_1
```



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

Verifying the VMware vCenter SRM installation

Before you start to run the IBM DS8000 Storage Replication Adapter (SRA), you must ensure that the VMware SRM is already installed and accessible at the protected (primary) site as well as the recovery (secondary) site.

About this task

The following procedure includes steps and screen captures that apply when using VMware vSphere Web Client. If you are using VMware vSphere Client, similar steps are applicable, except the step of logging in to vSphere Web Client.

Procedure

1. Log in to VMware vSphere Web Client.

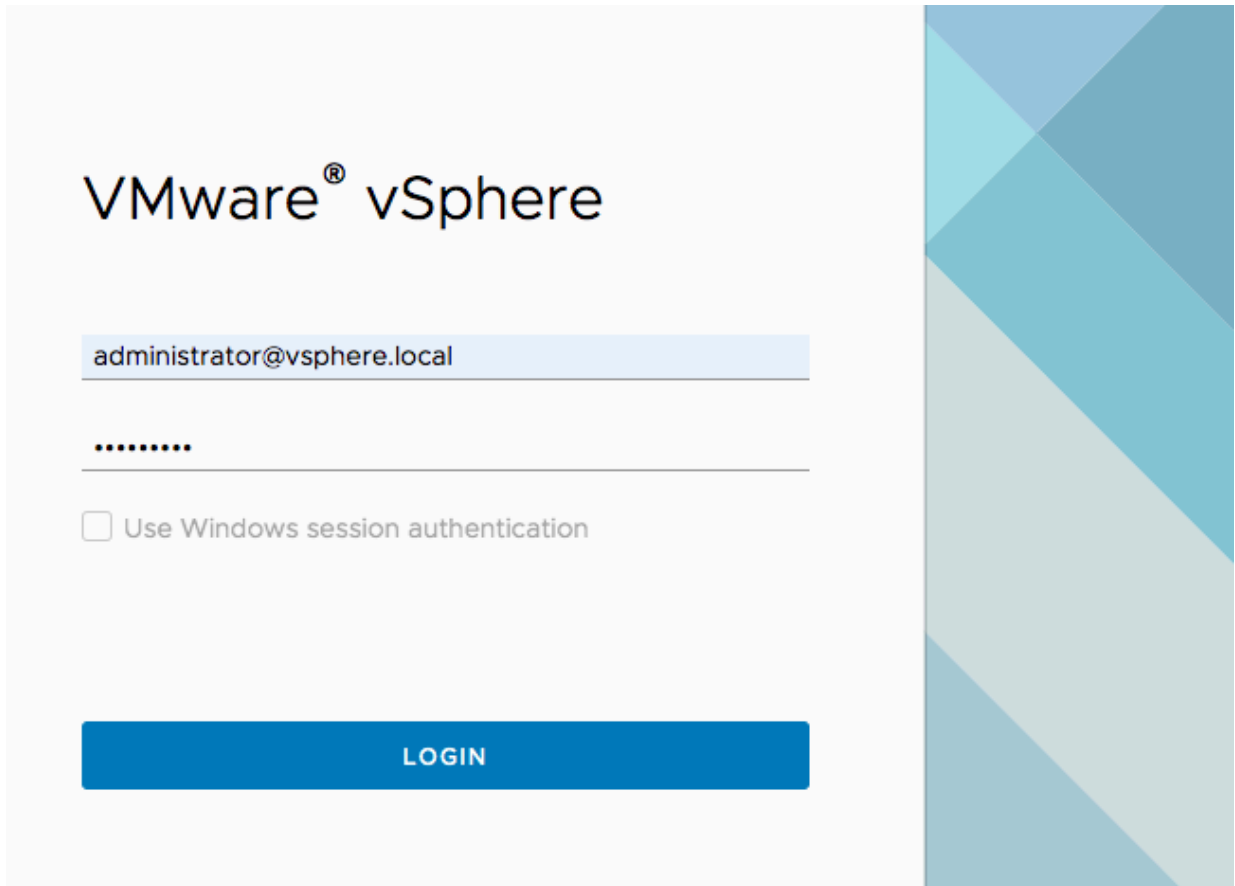


Figure 2. VMware vSphere Web Client login screen

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 5.

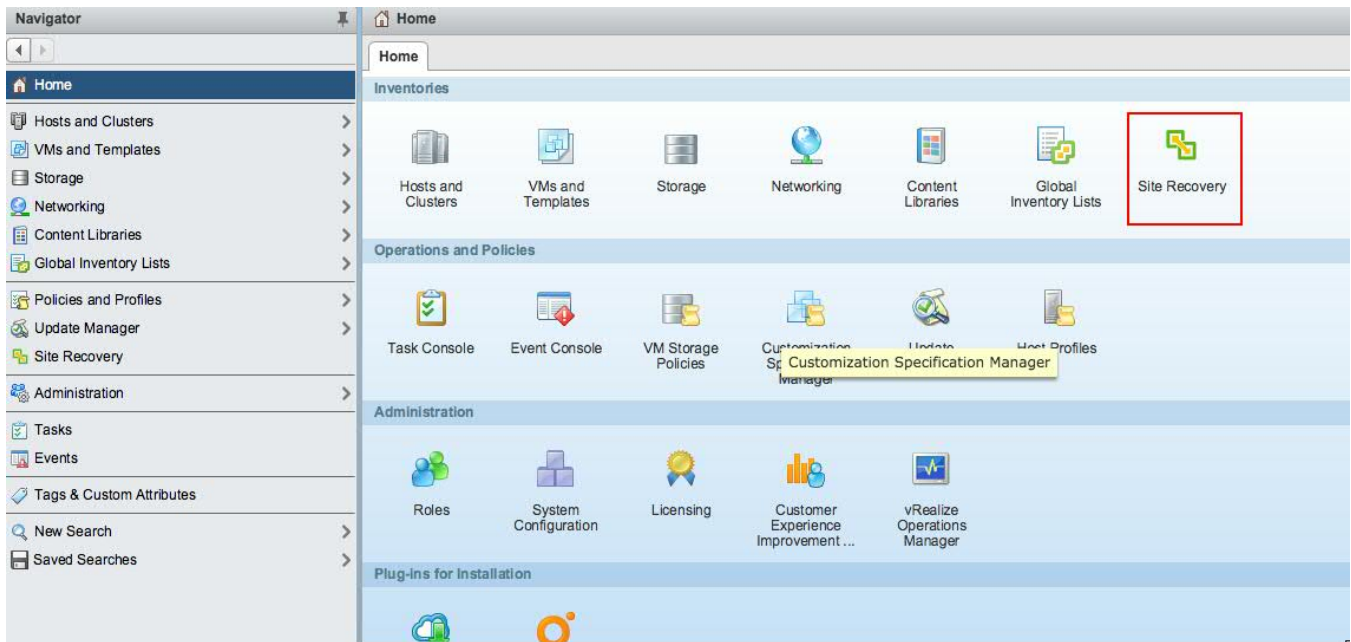


Figure 3. VMware vSphere Web Client home page - Site Recovery icon

Note: For Metro-Global Mirror storage configuration, SRA does not support failover to the intermediate site. Install VMware vCenter SRM on the local and remote sites.

Chapter 3. Installation

After you complete the required preparation, you can run the DS8000 Site Replication Adapter (SRA) container.

Running the SRA container

Once you have downloaded IBM DS8000 Storage Replication Adapter (SRA), 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. In addition, you must satisfy all of the prerequisites that are listed in [“System requirements”](#) on page 2.

Procedure

Complete the following steps to run IBM DS8000 SRA on the SRM server:

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

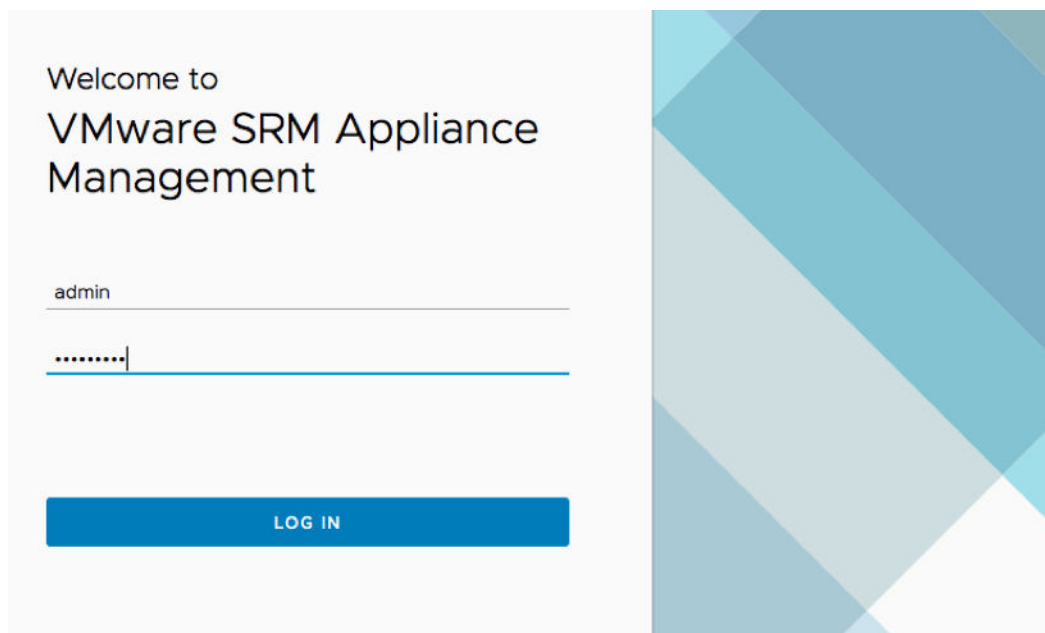


Figure 4. VMware SRM Appliance Management interface login screen

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

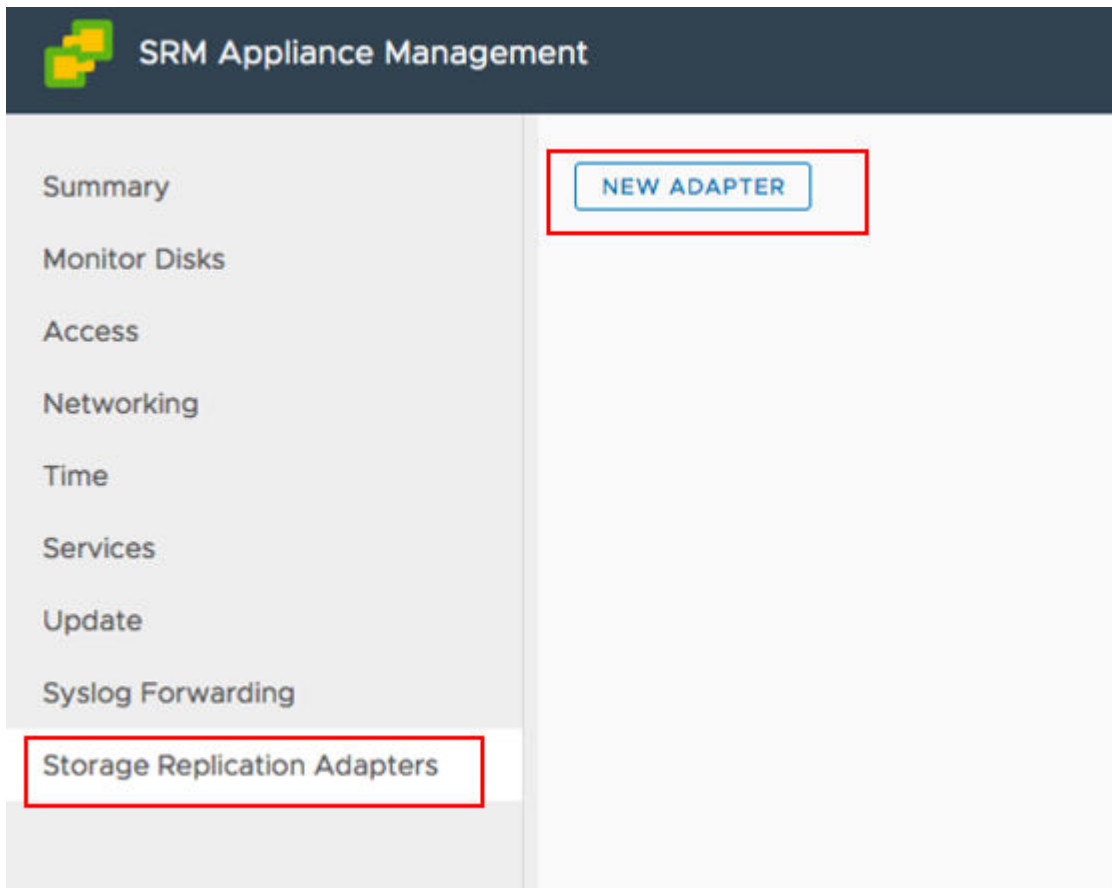


Figure 5. NEW ADAPTER button on Storage Replication Adapters view in SRM Appliance Management interface

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 process finishes, click **Close**.
The SRA card is displayed on the Storage Replication Adapters view, as shown in [Figure 6 on page 9](#).

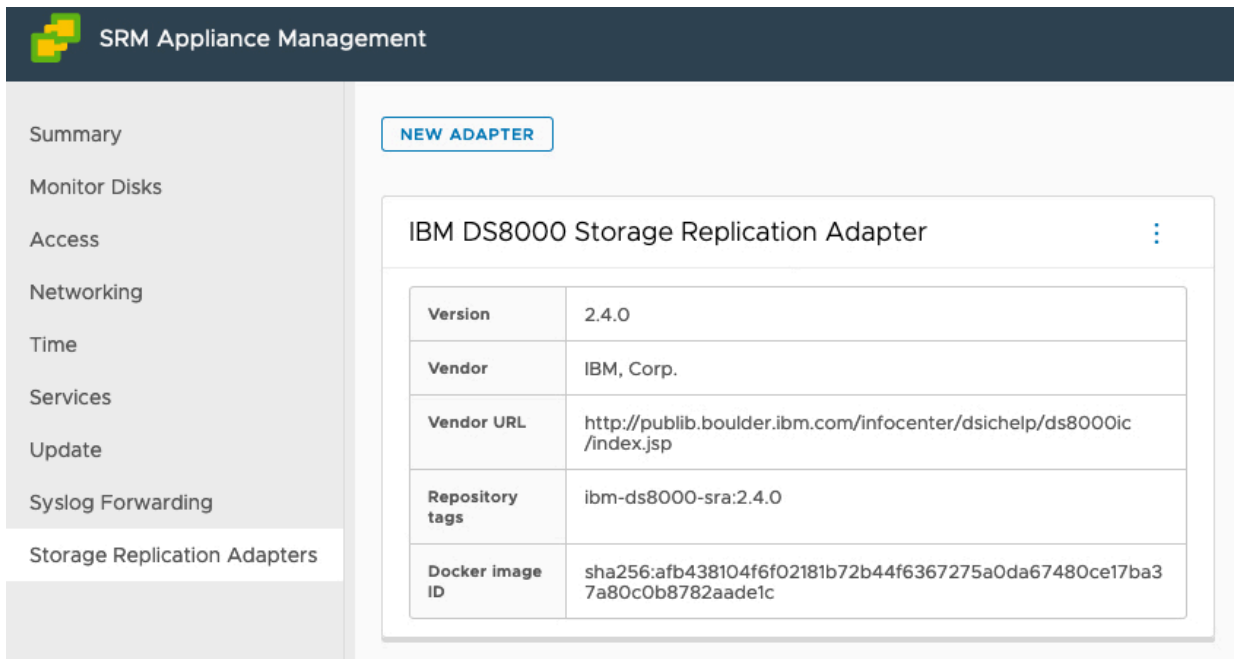


Figure 6. Card for new SRA displayed on Storage Replication Adapters view

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**, as shown in [Figure 7](#) on page [10](#).

The screenshot shows the 'Storage Replication Adapters' configuration page in the Site Recovery console. The left sidebar contains a navigation menu with options like 'Summary', 'Issues', 'Configure', 'Array Based Replication', 'Storage Replication Adapters', 'Array Pairs', 'Network Mappings', 'Folder Mappings', 'Resource Mappings', 'Storage Policy Mappings', 'Placeholder Datastores', 'Advanced Settings', 'Permissions', and 'Recovery Plans History'. The main content area displays the details for an 'IBM DS8000 Storage Replication Adapter' with the following information:

IBM DS8000 Storage Replication Adapter	
Status	✓ OK
Version	2.4.0
Vendor	IBM Corporation
Install Location	ibm-ds8000-sra:2.4.0
Vendor URL	http://publib.boulder.ibm.com/infocenter/dsichelp/ds8000ic/index.jsp
Supported Array Models	IBM Corporation, IBM DS8000
Supported Software	IBM DS8000 Storage Replication Adapter 2.4.0 IBM DS8000 Remote Mirroring
Stretched Storage	Not Supported

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

Deleting an SRA

To delete an IBM DS8000 Storage Replication Adapter (SRA) from the SRM Server, use the VMware SRM Appliance Management interface.

Procedure

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

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

IBM DS8000 SRA works with Metro Mirror, Global Mirror (with or without master and subordinate), Metro-Global Mirror, and IBM Copy Services Manager Coexistence.

For information about how to perform various related configuration tasks, refer to the following sections.

- [“Updating the SRA configuration file” on page 11](#)
- [“Configuring DS8000 command timeout” on page 13.](#)
- [“About preconfigured and non-preconfigured environments” on page 14](#)
- [“Configuration of DS8000 Remote Copy for SRA” on page 14.](#)
- [“About preconfigured and non-preconfigured environments” on page 14](#)
- [“SRA Configuration for Metro Mirror and Global Mirror ” on page 16.](#)
- [“SRA configuration for M–N Metro Mirror” on page 18.](#)
- [“SRA Configuration for Metro-Global Mirror” on page 20.](#)
- [“SRA Configuration for Master Subordinate DS8000s” on page 21.](#)
- [“VMware SRM/IBM DS8000 SRA and Copy Services Manager for Replication Coexistence” on page 23.](#)
- [“Setting user privileges for SRA configurations” on page 25.](#)

Updating the SRA configuration file

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 12](#)

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

Updating the SRA configuration file from the SRA container volume on both the protected (primary) site and the recovery (secondary) site SRM VA is the preferred method. To use this method, complete the following steps on each server.

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 `IBMDS8KSRA`.
4. Run the `docker` command to verify the result:
`docker exec <Container_ID> cat /srm/sra/conf/IBMDS8KSRA/sra.settings`

Updating the SRA configuration file from the SRM Appliance Management Interface

Complete the following steps to update the SRA configuration file on the SRM Server from the SRM Appliance Management Interface at both the protected (primary) site and the recovery (secondary) site.

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](#).

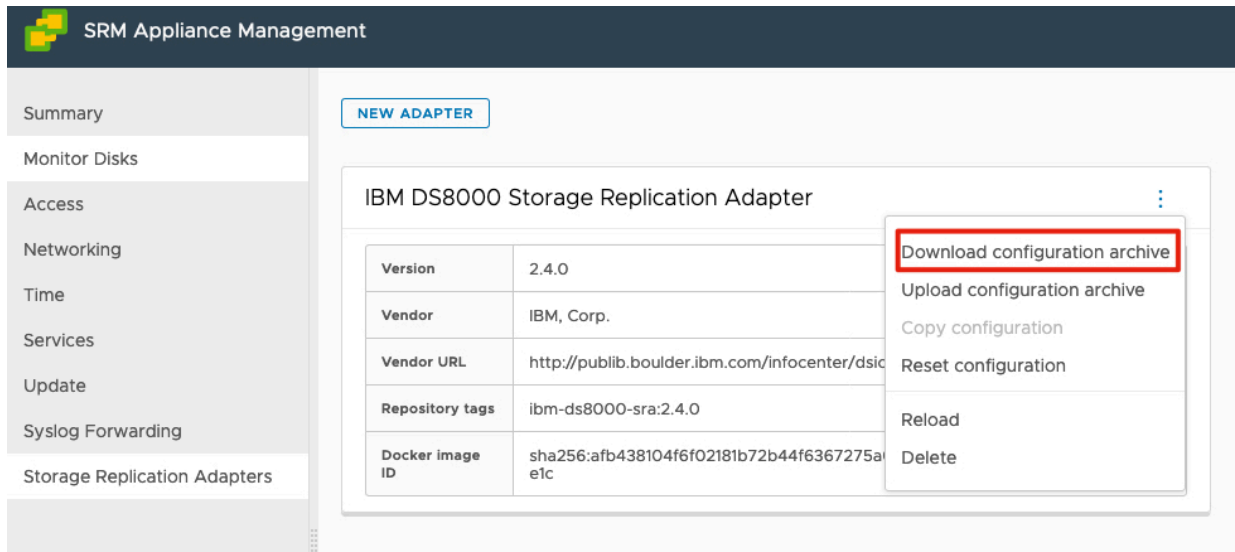


Figure 8. Downloading the configuration archive

4. Extract the archive and modify the SRA configuration file `sra.settings` under the directory `IBMDS8KSRA`.

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

```
$ tar -pzxvf ibm-ds8000-family-sra-2~4~0.tar.gz
x ./
x ./sra-configuration-version.txt
x ./IBMDS8KSRA/
x ./IBMDS8KSRA/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-ds8000-family-sra-2~4~0.tar.gz
IBMDS8KSRA sra-configuration-version.txt
a IBMDS8KSRA/
a IBMDS8KSRA/sra.settings
a IBMDS8KSRA/ibm-ds8000-sra-2~4~0.tar.gz
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](#).

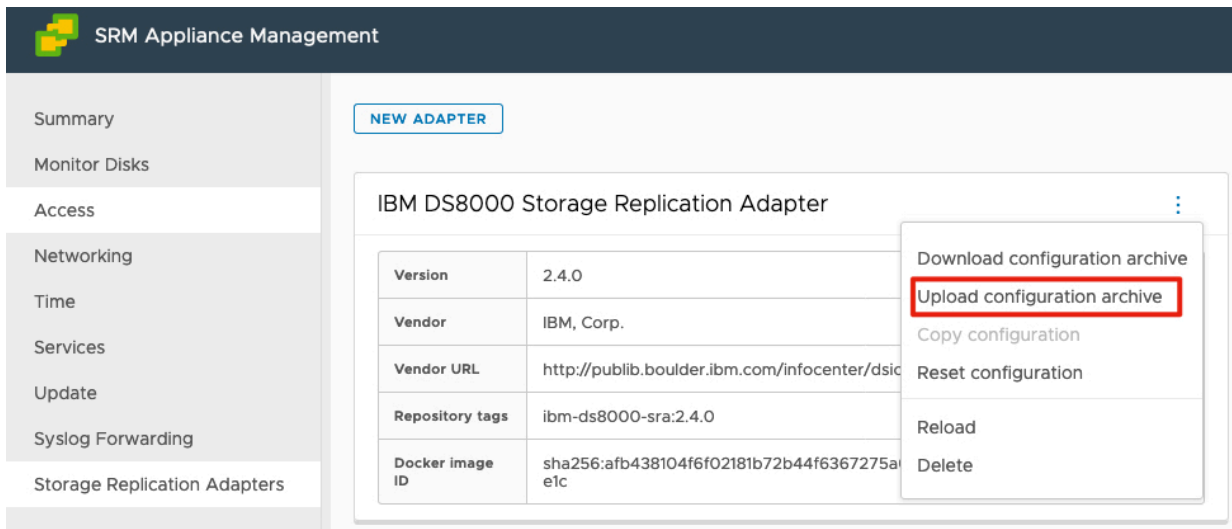


Figure 9. Uploading the configuration archive

7. Run the `docker exec` command to verify the result:

```
docker exec <Container_ID> cat /srm/sra/conf/IBMDS8KSRA/sra.settings
```

Configuring DS8000 command timeout

The DS8000 command timeout specifies the maximum time, in seconds, to wait for a required state of volume, command results, FlashCopy, or remote copy. The timeout period can be modified as desired in the SRA configuration file.

The wait period the time applies to is after certain DS8000 commands run or for command results. For example:

- SRA waits for the volume initialization to be completed before it establishes a FlashCopy relationship.
- After a Metro Mirror copy relationship is resumed, SRA waits for the secondary full duplex state.
- During a reprotect process of Global Mirror, SRA waits for the first pass completion of the remote copy that is established by SRA.
- When ESSNI functional code does not accept the command due to being busy, SRA waits and resubmits the command.

If the time that SRA waited exceeds the configured maximum timeout setting, SRA fails due to a timeout exception. If the value is empty or 0, SRA waits until the required state is met or the command result is returned. The default value is 0.

To modify the command timeout value (in seconds), update the SRA configuration file, `sra.settings`. To learn how, see “Updating the SRA configuration file” on page 11. Set the **StorageCommandTimeoutSecs** parameter to the desired value in seconds, as in this example, where it is set to 10 seconds: `StorageCommandTimeoutSecs: 10`.

Then save the `sra.settings` file and run the `docker exec` command to verify the result:

```
docker exec <Container_ID> cat
/srm/sra/conf/IBMDS8KSRA/sra.settings
```

For information about additional DS8000 SRA configuration fields, see “Configuration of DS8000 Remote Copy for SRA” on page 14.

About preconfigured and non-preconfigured environments

The IBM DS8000 Storage Replication Adapter (SRA) environment can be a preconfigured environment or a non-preconfigured environment. A preconfigured environment is one that requires storage admin to create the backup target volumes and map the volumes to the VMware ESX servers at the recovery site in advance. A non-preconfigured environment is one where the SRA automatically creates and maps snapshot volumes during test failover and backup target volume operations.

Note: If preconfigured/non-preconfigured are switched from the configuration file, rescan SRA in SRM on both the protected (primary) and the recovery (secondary) site.

Configuration of DS8000 Remote Copy for SRA

Along with the regular remote copy configuration on DS8000, some special configuration is required for the SRA defined mode.

Setting up preconfigured environments for DS8000 Remote Copy for SRA

In the Pre-Configured mode, SRA does not create a volume or FlashCopy. SRA also does not attach or detach the volume to or from the host.

Before you begin

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

Procedure

1. Create an equal number of FlashCopy (target) volumes on both the protected (primary) and the recovery (secondary) site DS8000.
2. Complete this step according to the scenario:
 - For a Metro Mirror scenario, create the following items:
 - a. A background copy and the incremental FlashCopy maps (with the volumes that were created in step “1” on page 14 as the FlashCopy target volume).
 - b. The Metro Mirror copy source and target volumes, as the FlashCopy source volumes.

Note: See the flow chart in [Figure 10 on page 14](#) that shows how a preconfigured Metro Mirror scenario is configured.

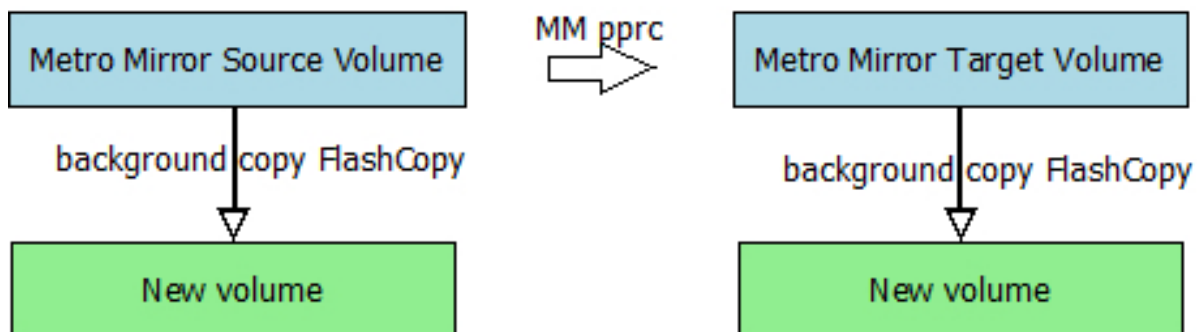


Figure 10. Preconfigured Metro Mirror scenario

- For the Global Mirror scenario, create the following items:
 - a. A background copy FlashCopy map (with the volumes that were created in step “1” on page 14 as the FlashCopy target volume).

- b. The Global Mirror source and target volumes as the FlashCopy source volumes.
- c. The Global Mirror FlashCopy between the Remote Mirror source volume and the newly-created FlashCopy target volume.

Note: See the flow chart in [Figure 11 on page 15](#) showing how a preconfigured Global Mirror scenario is configured.

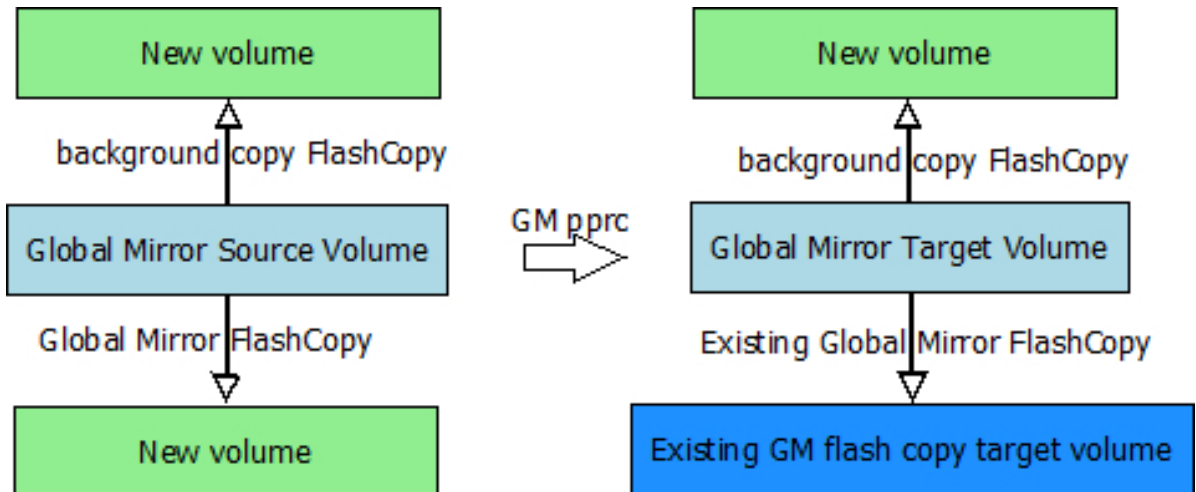


Figure 11. Preconfigured Global Mirror scenario

3. Map the Remote Copy target and the FlashCopy target volumes to the VMware ESX servers. The newly-created FlashCopy target volumes are used as test volumes during the test procedure. The RemoteCopy target volumes are used as the production volumes during the failover procedure.

Note: The preconfigured FlashCopy relationship is synchronized by reestablishing the original FlashCopy relationship. Four FlashCopy options can be restored during the reestablishment process:

- persistent
- record
- nocopy
- tgtse

Important: For Global Mirror in a preconfigured environment, create the same session ID and add the target volume in the session on the target DS8000.

Setting up non-preconfigured environments for DS8000 Remote Copy for SRA

In the non-preconfigured mode, SRA creates volumes and FlashCopy and can attach or detach volumes to or from the host.

Before you set up a non-preconfigured environment, make sure that the remote copy target volume is unmapped from VMware ESX servers for the initial state.

SRA creates volumes and FlashCopy, and can attach volumes to or from the host when test failover is run. SRA detaches the volumes that are created during test failover from the host, and deletes the FlashCopy and the volumes during test failover clean-up.

Important:

- If Global Mirror/Metro-Global Mirror is picked in a non-preconfigured environment, make sure that no session or Global Mirror exists on the LSS of the Global Mirror target volume for the initial state.
 - If Metro-Global Mirror is picked for the non-preconfigured environment, make sure that no session or Global Mirror exists on the LSS of the Metro Mirror source volume for the initial state.
 - Reserve the session ID, used by the LSS of the remote copy source volume, on the target DS8000.
-

SRA Configuration for Metro Mirror and Global Mirror

VMware SRM provides two kinds of recoveries:

- Planned failover
- Disaster recovery

In both recovery scenarios, the user can opt to back up the remote copy target volumes. If **preconfiguredEnv** is False, set **BackupTargetVolume** and set the appropriate **BackupExtPoolID**. The ID instructs the SRA to create FlashCopy backups of the remote copy target volumes.

SupportType

SupportType specifies the types of relationships that the SRA operates on. The default value is Both Metro Mirror and Global Mirror, which means the SRA discovers all the Metro Mirror and Global Mirror relationships between the protected site and the recovery site.

Note:

- SRA creates volumes by using the extent pool of the remote copy target volume when any of the following situations are true:
 - Test extent pool parity is inconsistent with the LSS of remote copy target volume.
 - Backup extent pool parity is inconsistent with the LSS of remote copy target volume.
 - Test or backup extent pool parity is empty.
 - If the SRA does not back up the target volumes, check the backups on the storage or check the messages in the SRM log file.
-

Related concepts

[“Setting user privileges for SRA configurations” on page 25](#)

Setting the user privileges for SRA differs, depending on whether you have a preconfigured environment or a non-preconfigured environment.

Setting up preconfigured environments for Metro Mirror and Global Mirror

If **preconfiguredEnv** is set to True in the SRA configuration file, `sra.settings`, some additional configuration is needed before SRA can function properly.

About this task

To configure needed settings for the SRA running in 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`:

SupportType

Set according to user requirement.

TPCR

Set to True if you use SRA integrated with CSM.

Note:

- The **TestExtPoolID**, **BackupTargetVolume**, **BackupExtPoolID**, and **VolumeType** parameters will not be used when **preconfiguredEnv** is set to True.
 - The **StorageCommandTimeOutSecs** parameter determines how long you want the process to run.
-

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

```
docker exec <Container_ID> cat
/srm/sra/conf/IBMDS8KSRA/sra.settings
```

Note: FlashCopy (target) volumes are resynchronized during failover when the **TPCR** parameter is set to False.

Setting up non-preconfigured environments for Metro Mirror and Global Mirror

If **preconfiguredEnv** is set to False in the SRA configuration file, `sra.settings`, some additional configuration is needed before SRA can function properly.

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`:

TestExtPoolID

Specifies which Extent Pool ID on the DS8000 site is used to create FlashCopy (target) volumes during the test recovery operation. The format of input value is Px, for example, P1.

BackupTargetVolume

Instructs SRA to back up the target volume during recovery. **BackupExtPoolID** must be set if this parameter is set to True.

BackupExtPoolID

If **BackupTargetVolume** is set to True, this parameter must be set for SRA to create the FlashCopy (target) volume to back up the remote copy target volume. The format of input value is Px, for example, P1.

VolumeType

Instructs SRA to create a specific type of volume during test failover or backup target volume process. If needed, it also instructs SRA to create a specific type of volume as the GM flashcopy target volume in SRM reprotect operation.

Note:

- If **BackupTargetVolume** is set to True, you must remove the FlashCopy after the copy progress finishes. Otherwise it causes the second test failover, or failover on the same site failure because of an extra preconfigured FlashCopy in a non-preconfigured environment.
 - The **StorageCommandTimeOutSecs** parameter determines how long you want the process to run.
-

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

```
docker exec <Container_ID> cat
/srm/sra/conf/IBMDS8KSRA/sra.settings
```

SRA configuration for M–N Metro Mirror

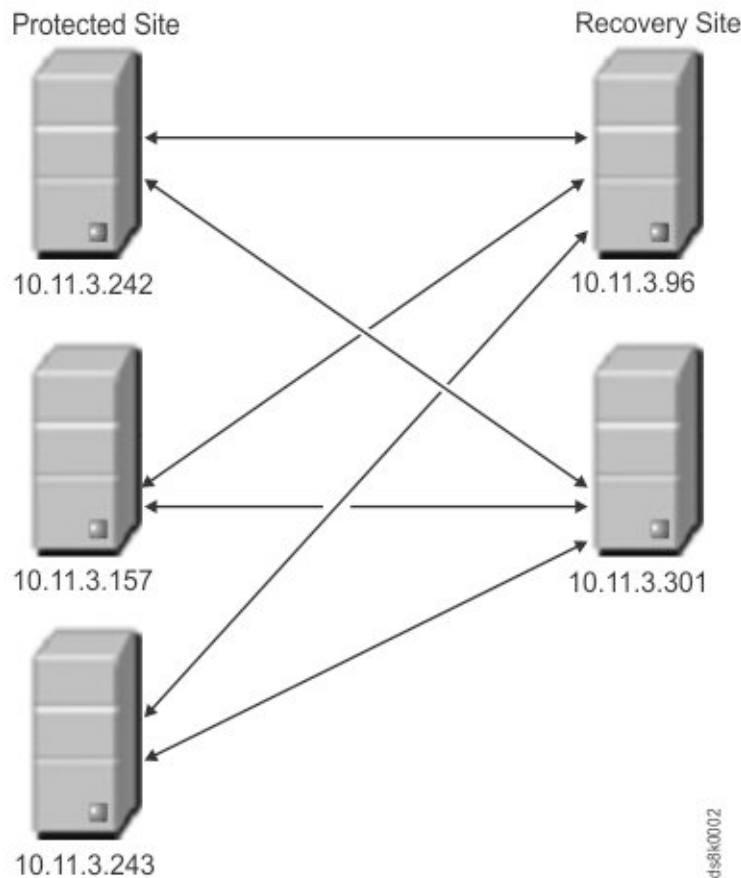
M–N Metro Mirror enables peer-to-peer remote copy (PPRC) connections from a protected (primary) DS8000 SRA to more than one recovery (secondary) DS8000.

Each PPRC connection is stand-alone. Therefore, a volume on a protected DS8000 having a PPRC with a recovery DS8000 can also have a PPRC from a different volume to a different recovery DS8000.

M–N Metro Mirror also enables connections from a recovery DS8000 SRA to more than one protected DS8000 SRA.

Note: The term *M–N* refers to the number of DS8000s on the protected site (*M*) and recovery site (*N*). No calculations are derived from this term. M–N is only used to denote the replication process.

The SRA processes the PPRC connections separately, and each PPRC connection can be reversed.



Note:

- Peer storage access information is required on both the protected and recovery SRA.
- The user name and password for every peer SRA must be identical.
- Before you use M–N Metro Mirror replication, register each peer DS8000 SRA, using the SRA configuration file, `sra.settings`.
- In addition, set the **PeerArrays** parameter in the configuration file with a value formatted like `IBM.2107-5837254/193.168.12.14`, where `IBM.2107-5837254` is the serial number of the DS8000 and `193.168.12.14` is the IP address.
- To learn how to update the `sra.settings` file, see [“Updating the SRA configuration file”](#) on page 11.

Adding Array Managers for M–N Metro Mirror

If you use M–N Metro Mirror when adding array managers, enter the IP addresses for the DS8000s in a specific order.

Because you can have more than one recovery (secondary) DS8000 with the same protected (primary) DS8000, you must enter the array manager information carefully.

First Management IP Address/Hostname

Enter the IP address of the protected site DS8000 device's Hardware Management Console (HMC). For example,

192.168.1.1

The address can either be an IP address or a fully qualified domain name.

Second Management IP Address/Hostname

Enter the IP address of the recovery site array's HMC. For example,

192.168.1.3

The address can either be an IP address or a fully-qualified domain name.

Add Array Pair

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

Local array manager ✕

ⓘ Array managers allow Site Recovery Manager to communicate with array based replication storage systems.

Enter a name for the array manager on "9.11.110.194": _____

DS8000 System

DS8000 system connection parameters

First Management IP Address / Hostname: 192.168.1.1
Enter the first management IP Address / Hostname

Second Management IP Address / Hostname: 192.168.1.3
Enter the second management IP Address / Hostname

Name Filter: _____
Leave empty for full discovery. Enter comma separated list of volume name or session id prefix for specific discovery.(ex: cnLun,10,usLun). Note: Use \, to represent comma in name.(ex: cn\Lun,10,us\Lun)

Username: _____

CANCEL BACK NEXT

Figure 12. Adding the protected site in the First position, and the recovery site in the Second position

If you have another protected DS8000 to connect with the recovery DS8000 in the **Second Management IP Address/Hostname** space, add another array manager and use the same DS8000 IP address in the **Second Management IP Address/Hostname**. For example:

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 "arcluster10-26.tuc.stglabs.ibm.com": _____

DS8000 System

DS8000 system connection parameters

First Management IP Address / Hostname	192.168.1.2
Hostname	Enter the first management IP Address / Hostname
Second Management IP Address / Hostname	192.168.1.3
Hostname	Enter the second management IP Address / Hostname
Name Filter	
	Leave empty for full discovery. Enter comma separated list of volume name or session id prefix for specific discovery.(ex: cnLun,10,usLun). Note: Use \, to represent comma in name.(ex: cn\Lun,10,us\Lun)
Username	

CANCEL
BACK
NEXT

Figure 13. Adding an additional protected site to the First position with the same recovery site in the Second position

SRA Configuration for Metro-Global Mirror

SRA supports only the non-preconfigured setting for Metro-Global Mirror.

If the remote copy relationship is configured as Metro-Global Mirror, you must provide information about the intermediate DS8000 site.

Notes about Metro-Global Mirror:

- SRA does not support failover to the intermediate site.
- The initial direction is **Site A (protected site) > Site B (intermediate site) > Site C (recovery site)**. After the first reprotect procedure to the initial direction, the direction changes to Global Mirror: **Site C (protected site) > Site A (recovery site)**. After the second reprotect procedure, the direction returns to Metro-Global Mirror: **Site A > Site B > Site C**.

To register the intermediate DS8000

Set appropriate values for **intermediateSiteIp**, **intermediateSiteUserName**, and **intermediateSitePassword** in the SRA configuration file, `sra.settings`, on both the protected (primary) site and the recovery (secondary) site SRM VA to register the intermediate DS8000. To learn how, see [“Updating the SRA configuration file” on page 11](#).

To unregister the intermediate DS8000

Remove the values for **intermediateSiteIp**, **intermediateSiteUserName**, and **intermediateSitePassword** in the SRA configuration file, `sra.settings`, on both the protected (primary) site and the recovery (secondary) site SRM VA to unregister the intermediate DS8000. To learn how, see [“Updating the SRA configuration file” on page 11](#).

Setting up non-preconfigured environments for Metro-Global Mirror

Configure non-preconfigured environments for Metro-Global Mirroring.

About this task

To configure non-preconfigured environments for Metro-Global Mirroring, 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`:

TestExtPoolID

Specifies which Extent Pool ID on the DS8000 site is used to create FlashCopy (target) volumes during the test recovery operation. The format of input value is Px, for example, P1.

BackupTargetVolume

Instructs SRA to back up the target volume during recovery. **BackupExtPoolID** must be set if this parameter is set to `True`.

BackupExtPoolID

If **BackupTargetVolume** is set to `True`, this parameter must be set for SRA to create the FlashCopy (target) volume to back up the remote copy target volume. The format of input value is Px, for example, P1.

VolumeType

Instructs SRA to create a specific type of volume during test failover or backup target volume process. If needed, it also instructs SRA to create a specific type of volume as the GM flashcopy target volume in SRM reprotect operation.

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

```
docker exec <Container_ID> cat
/srm/sra/conf/IBMDS8KSRM/sra.settings
```

Note:

- Metro-Global Mirror is a special configuration to Metro Mirror and Global Mirror, so the **SupportType** parameter will not be used for this case.
- SRA does not support CSM for Metro-Global Mirror.
- If **BackupTargetVolume** is set to `True`, you must remove the FlashCopy after the copy progress finishes. Otherwise, it causes the second test failover or failover on the same site failure because of an extra preconfigured FlashCopy in a non-preconfigured environment.
- The **StorageCommandTimeoutSecs** parameter determines how long you want the process to run.

SRA Configuration for Master Subordinate DS8000s

SRA supports the Global Mirror session, which crosses DS8000s. The subordinate DS8000s must be registered into SRA. The DS8000s' information, which is entered in SRM, is "master DS8000" on the protected (primary) site and the recovery (secondary) site. The authentication information for all master and subordinate DS8000s must be the same for SRA.

To register local or peer subordinate DS8000s

Set appropriate values for **Subs** and **PeerSubs** in the SRA configuration file, `sra.settings`, on both the protected (primary) site and the recovery (secondary) site SRM VA to register the local or peer subordinate DS8000. To learn how, see [“Updating the SRA configuration file” on page 11](#).

To unregister local or peer subordinate DS8000s

Remove the values for **Subs** and **PeerSubs** in the SRA configuration file, `sra.settings`, on both the protected (primary) site and the recovery (secondary) site SRM VA to unregister the local or peer subordinate DS8000. To learn how, see [“Updating the SRA configuration file”](#) on page 11.

Setting up preconfigured environments for Master Subordinate DS8000

If **preconfiguredEnv** is set to `True` in the SRA configuration file, `sra.settings`, some additional configuration is needed before SRA can function properly.

Procedure

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

TPCR

Set to `True` if you use SRA integrated with CSM.

Note:

- The **TestExtPoolID**, **BackupTargetVolume**, **BackupExtPoolID**, and **VolumeType** parameters will not be used when **preconfiguredEnv** is set to `True`.
- FlashCopy (target) volumes are resynchronized during failover when **TPCR** is set to `False`.
- If you set the Master Subordinate DS8000, the **SupportType** parameter will not be used.
- The **StorageCommandTimeOutSecs** parameter determines how long you want the process to run.

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

```
docker exec <Container_ID> cat
/srm/sra/conf/IBMD58K5RA/sra.settings
```

Setting up non-preconfigured environments for Master Subordinate DS8000

If **preconfiguredEnv** is set to `False` in the SRA configuration file, `sra.settings`, some additional configuration is needed before SRA can function properly.

Procedure

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

TestExtPoolID

Specifies which Extent Pool ID on the DS8000 site is used to create FlashCopy (target) volumes during the test recovery operation. The format of input value is `Px`, for example, `P1`. This setting applies for all the subordinate storage. Ensure that there is enough space in the extent pool.

BackupTargetVolume

Instructs SRA to back up the target volume during recovery. **BackupExtPoolID** must be set if this parameter is set to `True`.

BackupExtPoolID

If **BackupTargetVolume** is set to `True`, this parameter must be set for SRA to create the FlashCopy (target) volume to back up the remote copy target volume. The format of input value is `Px`, for example, `P1`.

VolumeType

Instructs SRA to create a specific type of volume during test failover or backup target volume process. If needed, it also instructs SRA to create a specific type of volume as the GM flashcopy target volume in SRM reprotect operation.

StorageCommandTimeOutSecs

Determines how long you want the process to run.

Note:

- If **BackupTargetVolume** is set to `True`, you must remove the FlashCopy after the copy progress finishes. Otherwise it causes the second test failover, or failover on the same site failure because of an extra preconfigured FlashCopy in a non-preconfigured environment.
- If you configured both intermediate storage and subordinate storage in `sra.settings`, SRA treats it as Metro-Global Mirror only.

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

```
docker exec <Container_ID> cat
/srm/sra/conf/IBMDS8KSR/sra.settings
```

VMware SRM/IBM DS8000 SRA and Copy Services Manager for Replication Coexistence

If the environment mandates that you use VMware SRM with Copy Services Manager (CSM), set **preconfiguredEnv** to `True` in the SRA configuration file, `sra.settings`.

When initiated from SRM, the test failover operation (or practice test) works independently of CSM. Therefore, SRA does not try to detect an existing CSM installation in the environment. The test failover task on SRM and practice tests on CSM must be scheduled and run at different times if both software works on the same Global Mirror session. If the environment is set up such that CSM and SRM work on different Global Mirror sessions, then the restriction does not apply.

For a real failover (recovery), if CSM and SRM must co-exist and work on the same Global Mirror session, then CSM recovery must be initiated first. After the user confirms the successful recovery of volumes by CSM, the SRM failover can be initiated.

When **TPCR** is set to `True`, SRA will assume target volumes will be recovered by CSM; CSM operation must be done prior to corresponding SRM operation, otherwise Test/Recovery/Reprotect on SRM will fail.

Note:

- You must set **TPCR** to `True` in `sra.settings` at both sites to run recovery or reprotect operations (only for Metro Mirror with CSM) before corresponding SRM operations; otherwise the SRA actions fail.
- IBM CSM mode does not support reprotect operation for Global Mirror.

SRA can integrate with CSM with either of these two session types:

- **Metro Mirror Failover/Failback. SRA supports recovery and reprotects.** See [Figure 14 on page 24](#).
- **Global Mirror Failover/Failback. SRA supports recovery only.** See [Figure 15 on page 25](#).

Create Session



Hardware type

DS8000, DS6000, ESS 800

Session type

Metro Mirror Failover/Failback

Session name

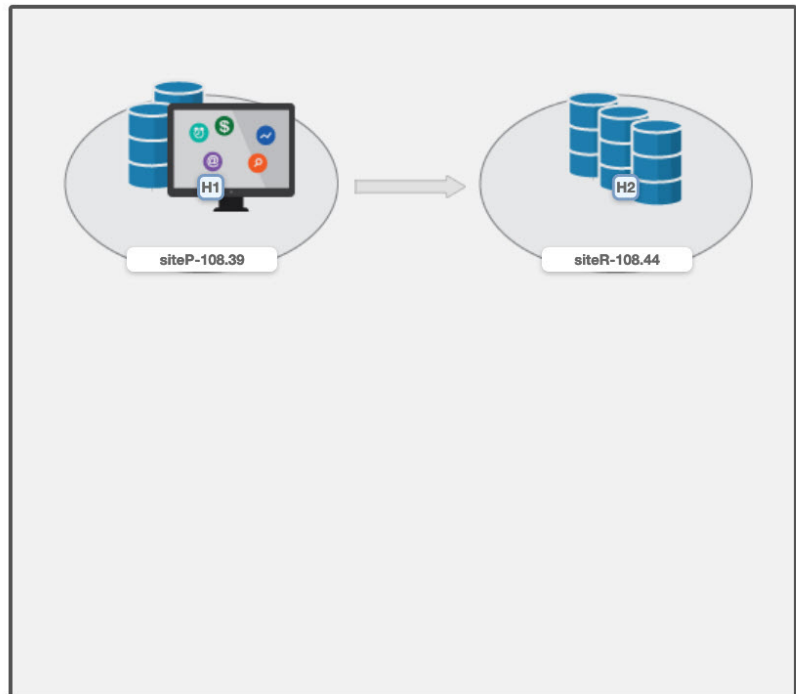
MMsession

Site 1 location

siteP-108.39

Site 2 location

siteR-108.44



OK

Cancel

Figure 14. Metro Mirror Failover/Failback

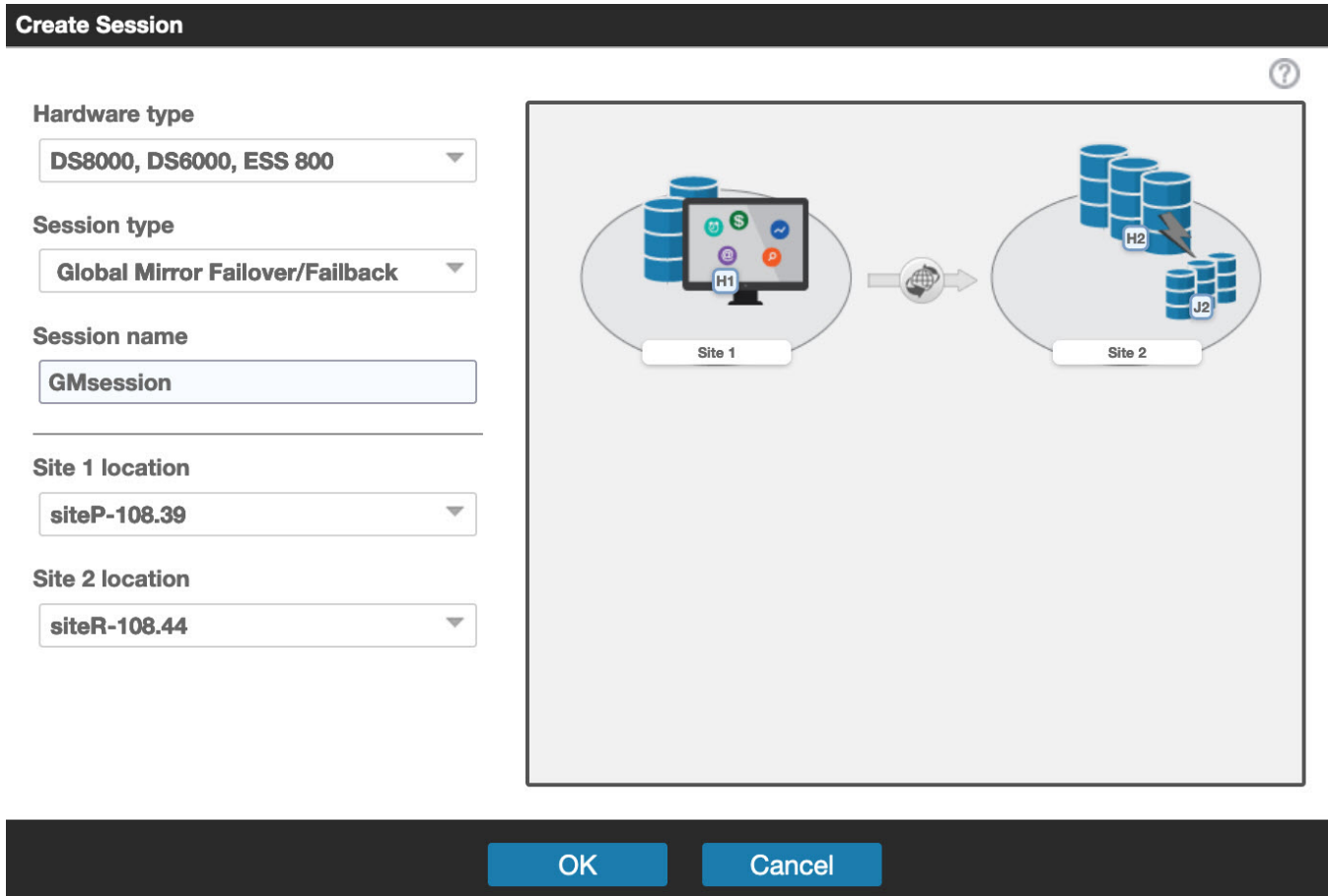


Figure 15. Global Mirror Failover/Failback

Setting user privileges for SRA configurations

Setting the user privileges for SRA differs, depending on whether you have a preconfigured environment or a non-preconfigured environment.

Preconfigured environment

To create the needed volumes and map them to the recovery (secondary) site's VMware ESX servers in advance requires at least **Copy Services Operator** privilege.

Non-preconfigured environment

If **preconfiguredEnv** is set to **False** in the SRA configuration file, `sra.settings`, a Physical Operator or higher privilege is necessary for SRA to complete the following tasks:

- Create the snapshot volumes and map or unmap the volumes to the VMware ESX servers at the recovery (secondary) site.
- Run test recovery operations.

Chapter 5. Usage

Use the IBM DS8000 SRA to run dependable Disaster Recovery Planning and protect VMware sites with their DS8000-based datastores.

Creating the target volumes and Metro/Global Mirror relationships

You must create an equal number of target volumes (for Metro Mirror targets) to source volumes. You must also create an extra set of volumes for FlashCopy targets for Global Mirror setup on the recovery site DS8000, to source volumes.

Procedure

Create Metro/Global Mirror relationships between the source and target volumes.

Do not map the Metro/Global Mirror target volumes to the VMware ESX servers on the recovery (secondary) site in a non-preconfigured environment. The reason is because the mapping process is automated by the SRA for failover and test failover operations. For more information about Metro Mirror/Global Mirror Copy Services, see [IBM DS8000: Copy Services in Open Environments \(PDF\)](#).

Important:

- a. When you create Global Mirror relationships with SE volumes, use ESE as your Global Mirror target volumes, not TSE volumes.
- b. Before you use the DS8000 SRA, ensure that the following configuration settings are in place:
 - The Metro Mirror relationships on the recovery site are in "Target Full Duplex" status
 - For Global Mirror relationships "First Pass" status on a protected (primary) site is "True"
 - Consistency Groups are forming at the set intervals

If SE volume is not enabled for SRA configuration, the SRA creates fully-allocated volumes during test failover operations. Fully-allocated volumes must be initialized before they can be used as FlashCopy targets. This action might take several minutes, depending on the size of the newly created volume. To accommodate the timing, the user must modify the DS8000 Command Timeout (sec) of `IBMDS8000Util.exe` or leave the parameter empty to make SRA wait until the newly created volume is ready.

You might also want to change the "storage.commandTimeout" value of VMware SRM.

Adding array pairs to VMware Site Recovery Manager

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

About this task

The following procedure includes steps and screen captures that apply when using VMware vSphere Web Client. If you are using VMware vSphere Client, similar steps are applicable, except the step of logging in to vSphere Web Client.

Procedure

1. Log in to VMware vSphere Web Client. (See [Figure 2 on page 4](#).)
2. Click **Site Recovery > Open Site Recovery > NEW SITE PAIR**.
3. Enter the Remote Virtual Center host name, username, and password when prompted and then click **NEXT**.

4. Click one of the sites you want to pair and click **Next**.
5. Confirm the connection by clicking **CONNECT**.
6. Review your selected settings and click **FINISH**.
7. Click **VIEW DETAILS** to verify the information on the Summary pane, as shown in [Figure 16 on page 28](#).

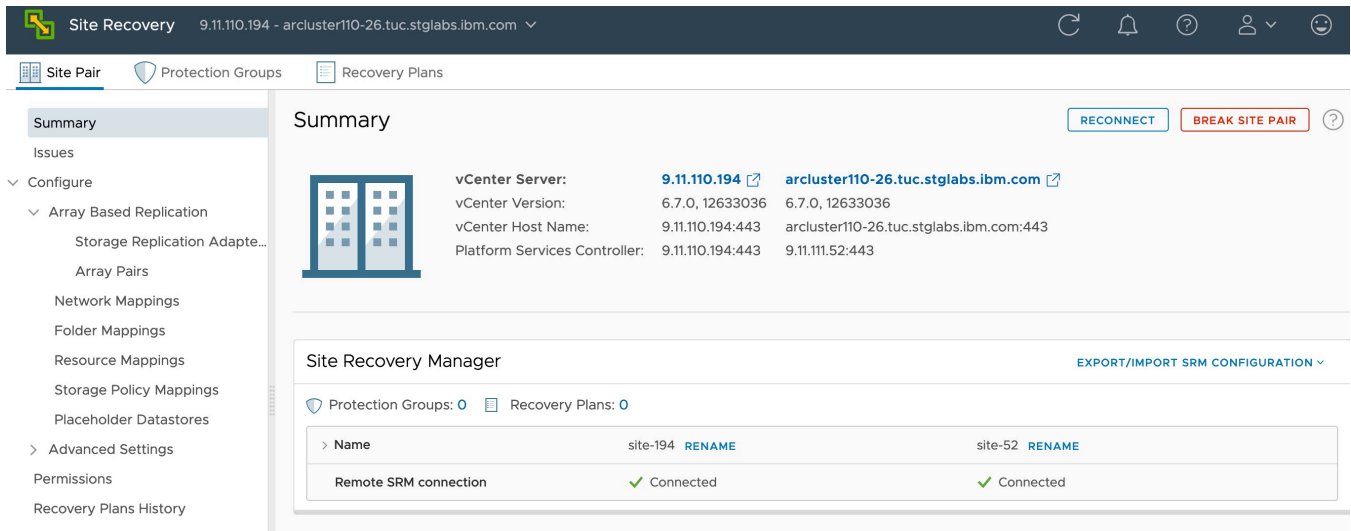


Figure 16. Summary pane showing connection between local site and paired site

8. On the Site Pair tab, click **Configure > Array Based Replication > Array Pairs** to open the Array Pairs pane, as shown in [Figure 17 on page 28](#).

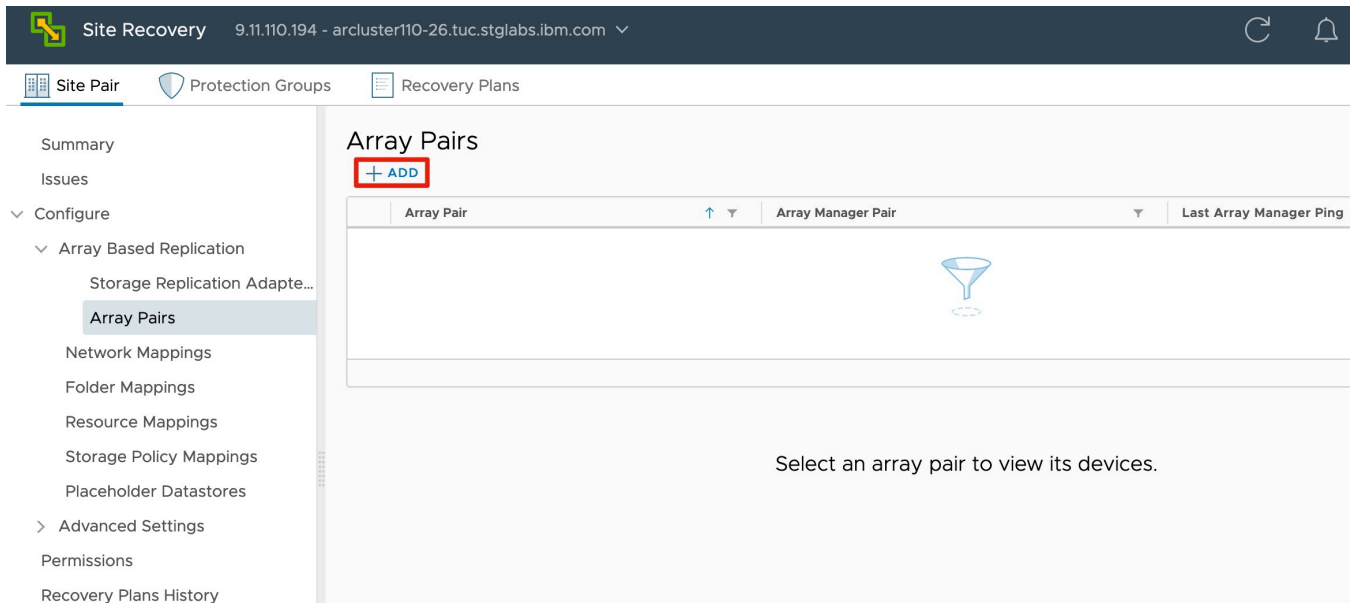


Figure 17. Array Pairs pane

9. Click **+ ADD** to add an array pair.
10. On the **Add Array Pair - Storage replication adapter** pane, select **IBM DS8000 Storage Replication Adapter** and click **NEXT**, as shown in [Figure 18 on page 29](#).

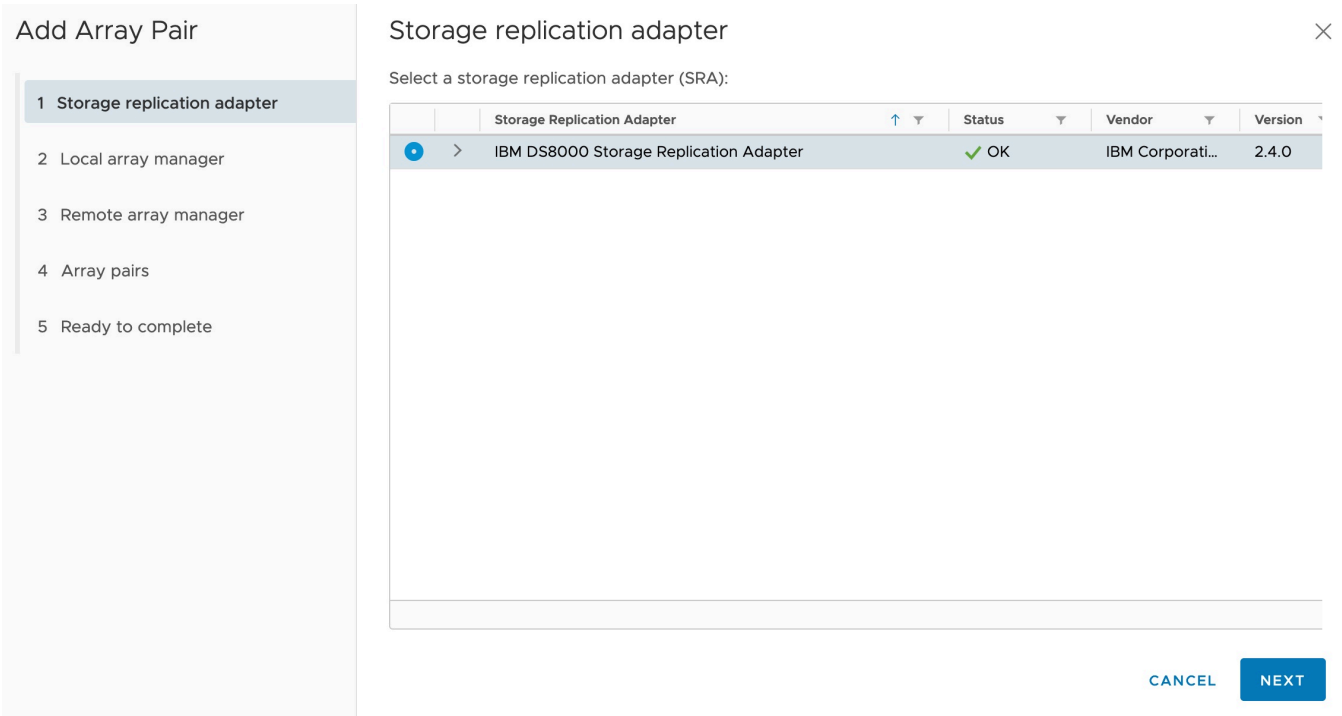


Figure 18. Add Array Pair - Storage replication adapter pane

11. 10. On the **Local array manager** pane, as shown in [Figure 19 on page 29](#), enter the array manager information as detailed after the figure and then click **Next**.

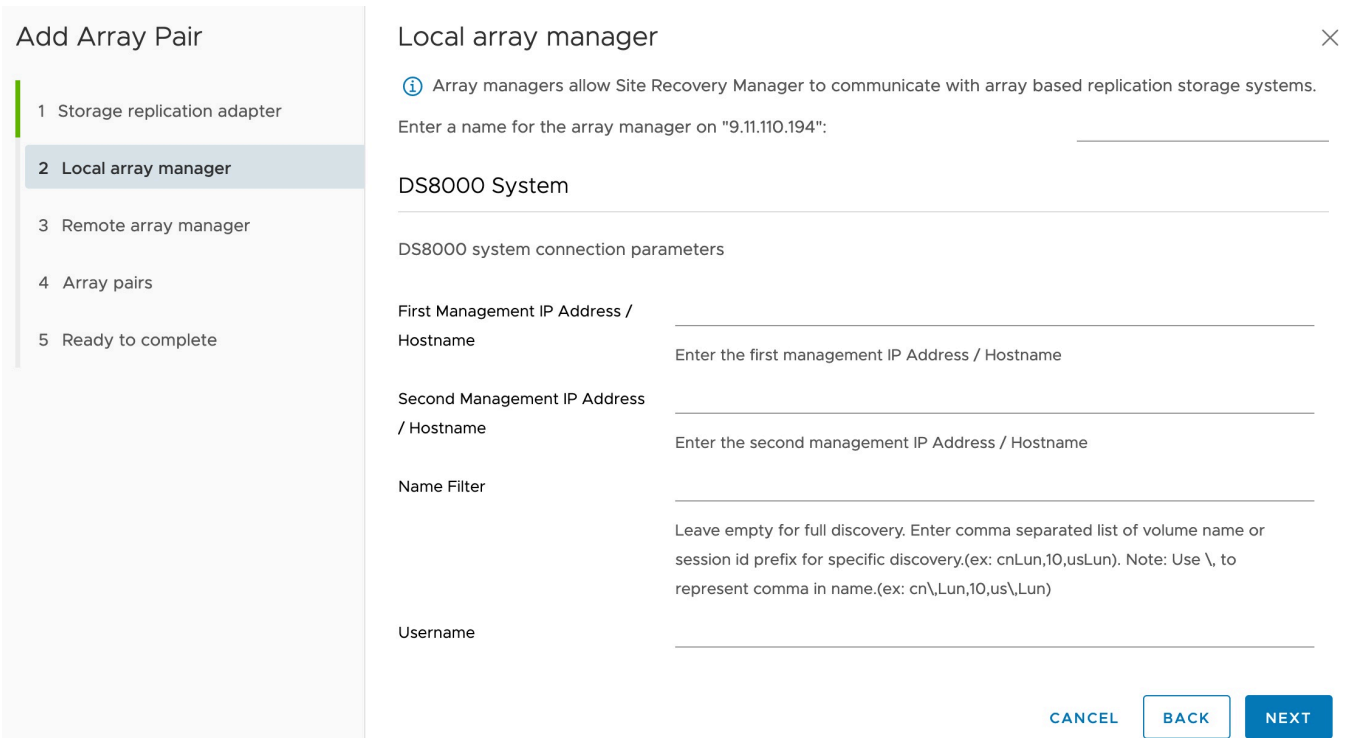


Figure 19. Local array manager pane

First Management IP Address/Hostname

Enter the IP address of the protected (primary) site DS8000 device’s Hardware Management Console (HMC). For example,

192.168.15.3

The address can either be an IP address or a fully-qualified domain name.

Second Management IP Address/Hostname

Enter the IP address of the recovery (secondary) site array's HMC. For example,

192.168.17.2

The address can either be an IP address or a fully-qualified domain name.

Note: IBM DS8000 SRA works with only one of the HMCs (in dual HMC environments).

Name Filter

Enter a comma-separated list of volume names or session ID prefixes for a specific discovery (for example, cnLun, 10, usLun). Leave the parameter empty for full discovery.

Note:

- Use \ to represent the comma in the volume name or session id. For example, cnLun \10\usLun.
- For more information, see “Filtering volumes by name” on page 31.

Username

Enter the username that is configured for DS8000 device's HMC.

Password

Enter the password for the DS8000 device's HMC.

Note: The username and password for the protected and recovery site DS8000 device's HMC must be the same.

12. On the **Remote array manager** pane, as shown in , enter the remote array manager information as detailed under step “11” on page 29 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 "arcluster110-26.tuc.stglabs.ibm.com": _____

DS8000 System

DS8000 system connection parameters

First Management IP Address / Hostname _____
Enter the first management IP Address / Hostname

Second Management IP Address / Hostname _____
Enter the second management IP Address / Hostname

Name Filter _____
Leave empty for full discovery. Enter comma separated list of volume name or session id prefix for specific discovery.(ex: cnLun,10,usLun). Note: Use \, to represent comma in name.(ex: cn\Lun,10,us\Lun)

Username _____
Enter the username that is configured for DS8000 device's HMC.

CANCEL BACK NEXT

Figure 20. Remote array manager pane

Note: The IP address is reversed to the peer site.

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

The Array Pairs pane is displayed and displays the newly added and enabled array pair, as shown in [Figure 21 on page 31](#).

The screenshot shows the VMware Site Recovery Manager interface. The top navigation bar includes 'Site Recovery' and the URL '9.11.110.194 - arcluster110-26.tuc.stglabs.ibm.com'. The left sidebar shows a navigation menu with 'Configure' expanded to 'Array Based Replication', and 'Array Pairs' selected. The main content area is titled 'Array Pairs' and contains a table with the following data:

Array Pair	Array Manager Pair	Last Array Manager Ping
IBM.2107-75FBH01 ↔ IBM.2107-13FCL61	108.44 ↔ 108.39	✓ Success, 12/12/19, 2:47:47 PM +0800
IBM.2107-75FBH01 ↔ IBM.2107-75KMV31	108.44 ↔ - -	✓ Success, 12/12/19, 2:47:47 PM +0800
IBM.2107-75FBH01 ↔ IBM.2107-75XK701	108.44 ↔ - -	✓ Success, 12/12/19, 2:47:47 PM +0800

Below the table is a 'DISCOVER DEVICES' section with a table:

Device (9.11.110.194)	Datastore	Status	Device (arcluster110-26.tuc.stglabs.ibm.co...)	Protection Grou
fb_vol_clclchen		→ Forward	fb_vol_clclchen	
fb_vol_clclchen		→ Forward	fb_vol_clclchen	
fb_vol_clclchen		→ Forward	fb_vol_clclchen	
fb_vol_clclchen		→ Forward	fb_vol_clclchen	
fb_vol_clclchen		→ Forward	fb_vol_clclchen	

Figure 21. Array Pairs pane, array pair added and enabled

15. If there are new replicated devices that need to be discovered, click **DISCOVER DEVICES**.

Important: All DS8000-replicated volumes that participate in SRM and belong to the same remote copy consistency group are shown under a single local consistency group in SRM. 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 by name

You can add a name filter to provide replicated device filtering when or after adding a new array pair in the VMware vSphere Web Client.

Note: The following procedure includes steps and a screen capture that apply when using VMware vSphere Web Client. If you are using VMware vSphere Client, similar steps are applicable.

By default, the **discoverDevices** command returns the list of all replicated devices for a pair of replicated storage arrays. This list can be long, so you might want to limit the device discovery to the subset of devices that are managed by SRM.

DS8000 SRA defines one name filter parameter to specify a filter for device discovery that can be configured in the **Name Filter** field for the local array and remote array while adding a new array pair (see [“Adding array pairs to VMware Site Recovery Manager” on page 27](#)) or later through the **Edit Local Array Manager** and **Edit Remote Array Manager** panes in the VMware vSphere Web Client, as shown in [Figure 22 on page 32](#).

Enter a name for the array manager on "9.11.110.194":

108.44

DS8000 System

DS8000 system connection parameters

First Management IP Address /

9.11.108.44

Hostname

Enter the first management IP Address / Hostname

Second Management IP Address

9.11.108.39

/ Hostname

Enter the second management IP Address / Hostname

Name Filter

Leave empty for full discovery. Enter comma separated list of volume name or session id prefix for specific discovery.(ex: cnLun,10,usLun).
Note: Use \, to represent comma in name.(ex: cn\Lun,10,us\Lun)

Username

Enter username for DS8000 system

Password

Enter password for DS8000 system

CANCEL

SAVE

Figure 22. Name Filter parameter on Edit Local Array Manager pane

The parameter can be used to limit the discovery to replicated volumes or session IDs whose names begin with the specified string. It can be a comma-separated list of the prefix of the volume name or session ID for specific discovery (Example: cnLun , 10 , usLun). It filters Metro Mirror remote copies by source or target volume names and filters Global Mirror or Metro-Global Mirror remote copies by session IDs.

Note:

- For full discovery, leave the **Name Filter** field empty.
- Use \ to represent the comma in the volume name or session id.

Example: cnLun\10\usLun.

- If the **preconfiguredEnv** and **TPCR** parameters are set to True in the SRA configuration file, `sra.settings`, check the remote copy session IDs and volume names on the DS8000 storage before you set up the name filter. It is suggested that you leave the **Name Filter** field empty in the CSM scenario.
- Prefixes for session IDs are the same on both the protected (primary) and the recovery (secondary) site. Session ID x can be set up as 0x if x is only one character.

Examples: Session ID 9 can be set up as 09; Session ID E can be set up as 0E.

- Prefixes for the volume name can be different for each site, but the prefixes must be paired on both sites.

Example: The protected site volume name is `pro_volumeA` and on the recovery site it is mapped to `rec_volumeB`. Then, in the **Name Filter** of the protected site, enter prefix `pro`. On the recovery site, enter `rec`.

Running a Test procedure

Depending on the SRA configuration, it might be necessary to perform extra tasks for the Test procedure to work.



Attention: If you encounter a failure during the Test procedure, check to see if the remote copy status is the same as the original state. If NOT, manually restore the remote copy status back to its original state after cleanup procedures.

For troubleshooting information, see [“Test failures” on page 38](#).

Running the Test procedure on a preconfigured environment

The IBM DS8000 SRA completely automates the Test procedure.

The preconfigured FlashCopy target volumes are resynchronized during the test procedure.

Ensure that all of the steps that are outlined in [“Setting up preconfigured environments for DS8000 Remote Copy for SRA” on page 14](#) are completed.

Running the Test procedure on a non-preconfigured environment

The IBM DS8000 SRA completely automates the Test procedure.

During this procedure, the SRA creates SE FlashCopy target volumes if the SE volume support feature is enabled and SE storage is defined on the storage array is specified. If the recovery site DS8000 does not have SE support that is enabled, the SRA creates fully-allocated volumes for test failover operations. The only prerequisite that this procedure needs, from the SRA’s perspective, is enough free capacity available in one of the extent pools to accommodate the FlashCopy target volumes.

During the cleanup procedure, the FlashCopy relationships and FlashCopy target volumes that are created during the test procedure are deleted.

Prerequisites for the SRA Test procedure

- Have enough free space available on the Extent Pool.
- Complete all the steps that are outlined in [“Setting up non-preconfigured environments for DS8000 Remote Copy for SRA” on page 15](#).

Running a Reprotect procedure

The IBM DS8000 SRA completely automates the Reprotect procedure.

Before you run the **Reprotect** action, refresh the **Devices** window of the SRM Array Managers to ensure that no error messages occur.

During the **Reprotect** procedure, the Metro/Global Mirror/Metro-Global Mirror direction changes from the original recovery (secondary) site to the original protected (primary) site, and the mirroring action is resumed.

Note:

- Original protected volumes are detached from the host during the Reprotect procedure for non-preconfigured scenarios.
 - For Metro-Global Mirror, the initial direction is **Site A (protected site) > Site B (intermediate site) > Site C (recovery site)**. After the first reprotect procedure to initial direction, the direction is changed to Global Mirror: **Site C (protected site) > Site A (recovery site)**. After the second Reprotect procedure, the direction will be changed back to Metro-Global Mirror: **Site A > Site B > Site C**.
-

Prerequisites for the SRA reprotect procedure

- For non-preconfigured Global Mirror/Metro-Global Mirror, ensure that there is enough free space available on the Extent Pool of the original remote copy source volume.
- For preconfigured environments, complete all the steps that are outlined in [“Setting up preconfigured environments for DS8000 Remote Copy for SRA”](#) on page 14.
- For non-preconfigured environments, complete all the steps that are outlined in [“Setting up non-preconfigured environments for DS8000 Remote Copy for SRA”](#) on page 15.

Running a failover procedure

The IBM DS8000 SRA completely automates the failover procedure.

DS8000 SRA does a failover of the Metro/Global Mirror/Metro-Global Mirror target volumes to the recovery (secondary) site during a failover operation. The Metro/Global Mirror/Metro-Global Mirror target volumes are promoted to the VMware ESX Server as production volumes.

During an SRA preconfigured failover procedure, the preconfigured FlashCopy is resynchronized.

Prerequisites for the SRA Failover procedure

- For preconfigured environments, complete all the steps that are outlined in [“Setting up preconfigured environments for DS8000 Remote Copy for SRA”](#) on page 14.
- For non-preconfigured environments, complete all the steps that are outlined in [“Setting up non-preconfigured environments for DS8000 Remote Copy for SRA”](#) on page 15.

Chapter 6. Best Practices

Follow the best practice guidelines while you configure and use the IBM DS8000 SRA.

Managing datastores and consistency groups

Follow these guidelines while you are working with 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 SRM.
- Set appropriate timeout and rescan values in the SRM for recovery of many VMs.

Chapter 7. Troubleshooting

When an error occurs, check the status of the DS8000s, ESX servers, vCenter servers, and SANs.

DiscoverArrays failures

Verify the following items when you encounter failure during Array Manager operations.

- Check that the IP address is correct and in the correct format. For example, the format can resemble: 192.168.15.3
- Check that the user name and password are correct
- Check to see whether the DS8000s are paired

Example:

Symptom: Unable to update array manager. See [Figure 23](#) on page 37.

The screenshot shows the 'Devices for Enabled Array Pairs' section. Below it, the 'Devices for Array Pair: IBM.2107-75H0301 - IBM.2107-75LH331' section is expanded. It lists the following information:

- Local Array Manager: 28
- Local Array: IBM.2107-75H0301
- Remote Array Manager: 142
- Remote Array: IBM.2107-75LH331
- Errors: ✘ Device '75H03012308' cannot be matched to a remote peer device

Below the error message is a table showing the mapping of local devices to remote devices:

Local Device	Direction	Remote Device	Datastore	Protection Group	Local Consistency Group
75H03012308	→	IBM.2107-75LH331-1094			
75H03012309	→	75LH3311095			10
75H0301A890	→	75LH3317890			a8

Figure 23. Unable to update array manager.

Possible root cause and solution: The IP address, user name, or password is incorrect. Check and correct the IP address, user name, or password.

DiscoverDevices failures

Verify the following items when you encounter failure during Devices for Enabled Array Pairs operation.

- Ensure that the Metro Mirror relationships' status on the recovery (secondary) site are Target Full Duplex.
- Ensure that Global Mirror relationships' **First Pass** status is True on the protected (primary) site and consistency groups are forming at the set intervals.
- Ensure that no volume status items are in the SRA-STATUS file on both the protected and the recovery site for initial state or after you restore a remote mirror environment because of test failover, failover, or reprotect failure.
- Ensure that the **Name Filter** configuration is paired on both the protected and the recovery site.

Note:

- The SRA-STATUS file is in the SRA container directory. To display SRA-STATUS content, run the following command: `docker exec <container_id> cat /srm/sra/lib/SRA-STATUS`
- The content format of volume status' item in the SRA-STATUS file: `[SourceVolumeId:]Target VolumeId@CopyType[@SessionId]:VOLUMESTATUS=VolumeStatus[@SessionId]`

Example:

Symptom: Device 'xxx' cannot be matched to a remote peer device.

The screenshot shows the SRM interface with tabs for Summary, Array Pairs, Devices, and Permissions. The 'Devices' tab is active, displaying 'Devices for Enabled Array Pairs'. A sub-section titled 'Devices for Array Pair: IBM.2107-75H0301 - IBM.2107-75LH331' shows a warning: 'Device '75H03012308' cannot be matched to a remote peer device'. Below this is a table of devices:

Local Device	Direction	Remote Device	Datastore	Protection Group	Local Consistency Group
75H03012308	→	IBM.2107-75LH331-1094			
75H03012309	→	75LH3311095			10
75H0301A890	→	75LH3317890			a8

Figure 24. Device cannot be matched to a remote peer device warning

Possible root cause and solution:

- IP addresses are not correct. Check the IP addresses of DS8000 on both sites and correct if wrong.
- The information that is recorded in the SRA-STATUS file is inconsistent with the DS8000 remote copy status.
- **Name Filter** configuration is not paired on the protected and the recovery site. Check the **Name Filter** configuration on both sites. Correct the configuration in the Array Manager and refresh the devices.

Remove incorrect device information in the SRA-STATUS file and restore the remote copy relationship on DS8000.

Test failures

Verify the following items when you encounter a failure during test operations:

- The user name and password for both the protected (primary) and the recovery (secondary) site DS8000 device's HMC are the same.
- Preconfigured/non-preconfigured is switched without rescanning SRA in SRM on both the protected and the recovery site.
- Make sure that you do not use TSE as the Global Mirror target volumes.

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

- DS8000 user privilege problem, "administrator" required.
- Not enough space in the extent pool.
- No preconfigured flash copies to remote-copy target volumes on the recovery site.

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

- Preconfigured FlashCopy were not created to remote-copy target volumes on the recovery site.

- More than one preconfigured FlashCopy was created.
- The FlashCopy target volume is not mapped to the host.
- The FlashCopy target volumes that are mapped to the host are shown as Mounted in Hosts and Clusters/Configuration/Storage/Devices.

Recovery failures

Verify the following items when you encounter problems during recovery operations.

- The user name and password for both the protected (primary) and the recovery (secondary) site DS8000 device's HMC are the same.
- Preconfigured/non-preconfigured is switched without rescanning SRA in SRM on both the protected and the recovery site.

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

- DS8000 user privilege problem, "administrator" required.
- No preconfigured flash copies to remote-copy target volumes are on the recovery site.
- Make sure that you do not use TSE as the Global Mirror target volumes.
- After disaster recovery, you must 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 in place before reprotecting the plan.

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

- Preconfigured FlashCopy is not created to remote-copy target volumes on the recovery site.
- More than one preconfigured FlashCopy was created.
- Make sure that you do not use TSE as Global Mirror target volumes.
- Remote-copy target volume is not mapped to the recovery site.

"VMFS volume cannot be found" failures

Verify the following items when you encounter "VMFS volume cannot be found" failure during test or recovery operations.

- For environments that are preconfigured, ensure that the pre-created backup target volumes are pre-mapped to the VMware ESX servers at the recovery site.
- For environments that are not preconfigured, ensure that backup target volumes are mapped to the VMware ESX servers successfully at the recovery (secondary) site.

Example:

Symptom: VMFS volume that is on recovered devices "xxx" and expected to be auto-mounted during HBA rescan cannot be found. Figure 25 on page 40 shows an example error message of a VMFS volume that is on the recovered devices and expected to be auto-mounted during HBA rescan, but cannot be found.

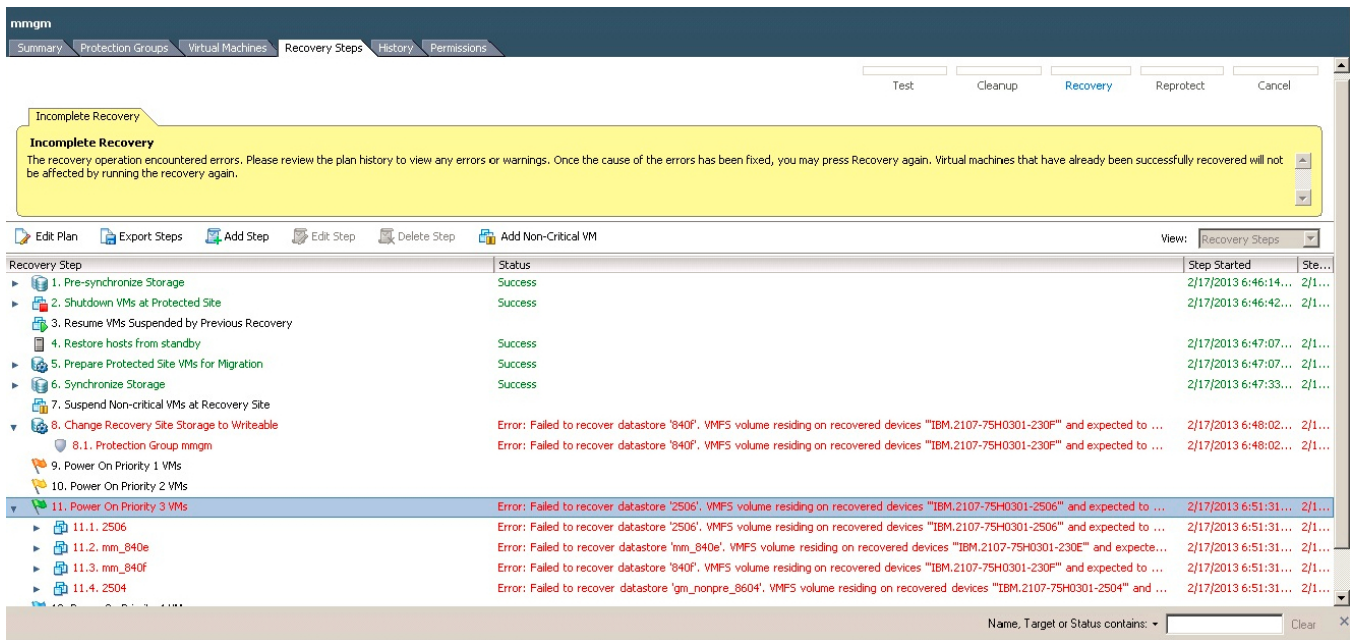


Figure 25. Incomplete Recovery

Possible causes and solutions:

- The backup target volumes are not mapped to the VMware ESX servers.
 - For environments that are preconfigured, check whether pre-created backup target volumes are pre-mapped to the VMware ESX servers at the recovery site.
 - For environments that are not preconfigured, check and correct host connections of the recovery site DS8000.
- Some extra time is required to be auto-mounted. Increase the value of parameter **WaitExtraSeconds** in the SRA configuration file, `sra.settings`. (To learn how, see [“Updating the SRA configuration file”](#) on page 11.) This parameter makes DS8000 SRA wait extra time before it responds to SRM.

Note: You might also need to increase the `storage.commandTimeout` value of VMware SRM appropriately.

Reprotect failures

Verify the following items when you encounter failure during Reprotect operations:

- The user name and password for both the protected (primary) and the recovery (secondary) site DS8000 device’s HMC are the same.
- Preconfigured/non-preconfigured is switched without rescanning SRA in SRM on both the protected and the recovery site.

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

- For Global Mirror/Metro-Global Mirror, not enough space is in the extent pool of the original remote-copy source volume to create Global Mirror FlashCopy.
- For Global Mirror/Metro-Global Mirror, make sure that no session or Global Mirror exists on the LSS of the original remote mirror target volume for the initial state.
- For Metro-Global Mirror, make sure that no session or Global Mirror exists on the LSS of the original Metro Mirror source volume for the initial state.

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

- For Global Mirror/Metro-Global Mirror, make sure that no session or Global Mirror exists on the LSS of the remote mirror target volume for the initial state.
- For Metro-Global Mirror, make sure that no session or Global Mirror exists on the LSS of the original Metro Mirror source volume for the initial state.

Managing SRM procedures

Verify the following items when you encounter failure during SRM procedures.

1. Refresh the devices in the SRM array managers. If there are no errors, go to step “3” on page 41.
2. Check all the previously related SRA-STATUS volume status’ items in the SRA installation directory. For example, run the following command to display SRA-STATUS content:

```
docker exec <container_id> cat /srm/sra/lib/SRA-STATUS
```

Note: The following example output shows the content format of the volume status item in the SRA-STATUS file:

```
[SourceVolumeId:]Target VolumeId@CopyType  
[@SessionId]:VOLUMESTATUS=VolumeStatus[@SessionId]
```

3. Refresh the devices in the SRM array managers 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.

See [“Getting information, help, and service”](#) on page viii.

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Printed in USA

SC27-4232-09

