

# HP 3PAR Storage Replication Adapter 5.5.2 for VMware® vCenter Site Recovery Manager™ User Guide

## Abstract

HP 3PAR Storage Replication Adapter 5.5.2 for VMware® vCenter Site Recovery Manager™ (HP 3PAR SRA) is an integration component that communicates with HP 3PAR StoreServ to execute specific storage and HP 3PAR Remote Copy functions needed for VMware vCenter Site Recovery Manager operation. This document provides relevant information for installing and configuring the HP 3PAR SRA. This document also provides relevant information for the HP 3PAR Remote Copy Software configuration so that the HP 3PAR SRA can execute specific HP 3PAR Remote Copy functions to build, manage, test and execute disaster recovery.



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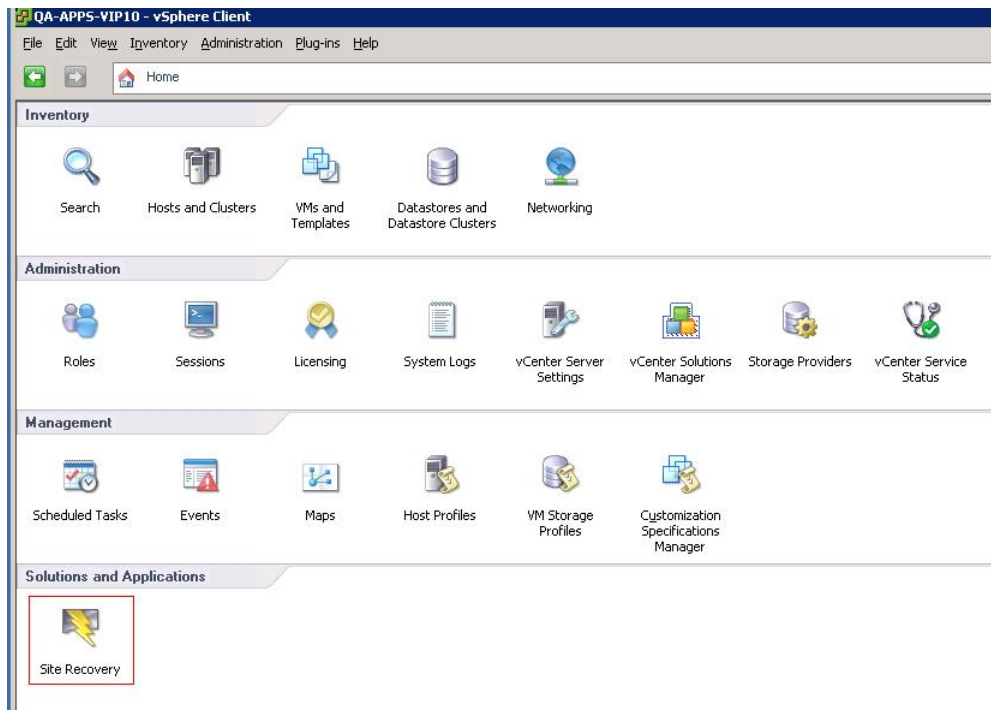
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# 1 Introduction

VMware vCenter Site Recovery Manager (SRM) is a management and automation product that helps build, manage, test, and execute disaster recovery plans for a VMware virtual infrastructure. The HP 3PAR storage system, as the storage component in a VMware virtual infrastructure, holds virtual machine information for a protected site/location and recovery site/location. HP 3PAR Site Recovery Adapter (SRA) is an important integration component that communicates with HP 3PAR StoreServ to execute specific storage and HP 3PAR Remote Copy functions needed for VMware vCenter Site Recovery Manager operations.

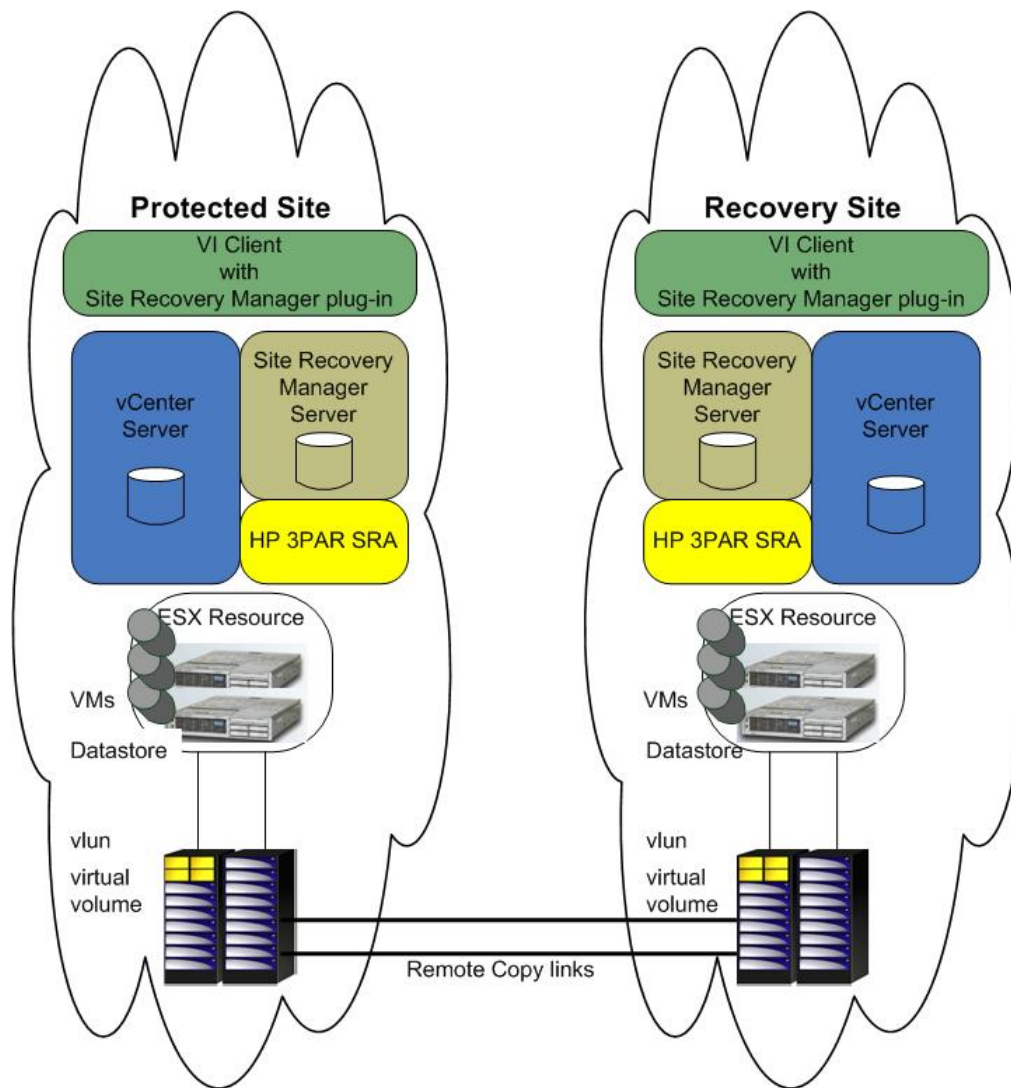
## 2 VMware vCenter Site Recovery Manager overview

VMware vCenter Site Recovery Manager works as a plug-in component for VMware vCenter and integrates its functionality in VMware vCenter.



VMware vCenter Site Recovery Manager:

- Builds, manages, tests, and executes disaster recovery solutions for virtual infrastructure implementations.
- Uses the storage replication mechanism between the protected site and the recovery site for disaster recovery of protected site virtual infrastructure.
- Creates a recovery point objective by creating a protection group at the protected site. The protection group contains replicated virtual machines.
- Creates a recovery plan at the recovery site for the protection group at the protection site.
  - The recovery plan can be tested at any time at the recovery site to verify that recovery point objective can be achieved at the time of disaster.
  - The recovery plan can be executed at disaster time or at any desired time at the recovery site to guarantee that recovery point objective is met.



The VMware vCenter Site Recovery Manager communicates with HP 3PAR Remote Copy Software for storage replication through the HP 3PAR SRA. The HP 3PAR SRA provides information about Remote Copy volume groups that exist in HP 3PAR StoreServ to Site Recovery Manager. The Site Recovery Manager identifies datastores and RDM devices in the Remote Copy volume group (also referred to as consistency groups). These datastores and RDM devices have corresponding virtual volumes in the Remote Copy volume group and replicates between the protected site and the recovery site.

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## 3 Supported configurations

For information about the supported hardware and software platforms, see the Single Point of Connectivity Knowledge for HP Storage Products (SPOCK) website: <http://www.hp.com/storage/spock>.

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## 4 HP 3PAR SRA installation and configuration prerequisites

HP 3PAR SRA is packaged in MSI format and installed onto the host where VMware vCenter Site Recovery Manager is installed.

- HP 3PAR SRA requires the following companion packages to be installed on the host before installation:
  - VMware Site Recovery Manager 5.0, 5.1, or 5.5
  - Microsoft .NET Framework 4.0
  - Microsoft Visual C++ 2010 Redistributable Package (x64)
- HP 3PAR SRA requires the following configurations on the HP 3PAR storage system:
  - All LUNs used by VMware Virtual Machines to form a protection group that are failed over together during test and recovery have to be part of a single HP 3PAR Remote Copy group. For more information about setting up and configuring Remote Copy group, see the *HP 3PAR Remote Copy Software User's Guide*.
  - All members of a virtual volume set must belong to the same Remote Copy group.
  - HP 3PAR Remote Copy Software license on the HP 3PAR storage system.
  - HP 3PAR Virtual Copy Software license on the HP 3PAR storage system.
  - HP 3PAR Storage system CLI user with edit permission.
  - In an SLD configuration with three HP 3PAR StoreServ Storage systems (A, B, and C), A—B is configured in synchronous mode, A—C in asynchronous periodic mode, and B—C is the standby link in asynchronous periodic mode. Then, SRM/SRA must be configured between A—C only, implying that StoreServ A is configured in the protected site and StoreServ C is configured in the recovery site.

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**NOTE:** HP 3PAR SRA installation adds the `SRA\3PARInServ` folder to VMware vCenter Site Recovery Manager storage folder (for example, `C:\Program Files (x64)\VMware\VMware vCenter Site Recovery Manager\storage`) and `TPDSrm.exe` is the adapter driver program that is invoked by VMware vCenter Site Recovery Manager.

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## 5 Installing HP 3PAR SRA

You cannot upgrade to HP 3PAR SRA 5.5.2 from an earlier version. Therefore, you must remove the earlier version before installing HP 3PAR SRA 5.5.2.

If HP 3PAR SRA 5.5.1 is installed, then run the following command before you remove SRA 5.5.1:

`TPDSrm.exe removecert`—To delete the accepted HP 3PAR StoreServ certificate from the cache memory.

### Removing HP 3PAR SRA

To remove HP 3PAR SRA, do the following:

1. Log on as system administrator.
2. Click **Start**→**Control Panel**→**Programs and Features**.
3. Select **HP 3PAR SRA Software Version <x.x>**.
4. Click **Remove**.  
The **Program Maintenance** dialog box appears.
5. Select **Remove** and click **Next**.

### Installing HP 3PAR SRA 5.5.2

To install HP 3PAR SRA 5.5.2, do the following:

1. Double-click the installation executable to launch the installation wizard. Click **Next** to continue.

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**NOTE:** HP 3PAR SRA and SRM must be installed on the same host.

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2. Click **I Agree** to acknowledge the User License Agreement, and click **Next** to continue.
3. Click **Next** to start installation at the default path.
4. After the installation is complete, restart the VMware vCenter Site Recovery Manager service to ensure that HP 3PAR SRA is recognized by SRM.

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**NOTE:** This package can only be installed under the existing VMware® vCenter Site Recovery Manager™ installed path. No other installation location is provided as an option.

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### Verifying installation

To verify the installation of HP 3PAR SRA 5.5.2:

1. Click **Start** →**Control Panel**→**Programs and Features**.
2. Verify that **HP 3PAR SRA Software Version 5.5.2** appears in the **Currently installed programs** column.

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## 6 HP 3PAR storage system setup

Any HP 3PAR storage system acting as an array manager (at the protected site or at the recovery site) in VMware vCenter Site Recovery Manager setup must be configured with HP 3PAR Remote Copy Software.

HP 3PAR SRA supports synchronous and periodic replication modes in 1:1, 1:N, and N:1 configurations as supported by HP 3PAR remote copy, where N indicates the number of storage arrays. HP 3PAR SRA also supports synchronous long distance configurations. For more information about Remote Copy configurations, see the *HP 3PAR Remote Copy Software User's Guide*.

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### NOTE:

- An HP 3PAR Remote Copy Software license is required on the HP 3PAR StoreServ.  
HP 3PAR SRA 5.5.2 supports SLD Remote Copy environment on HP 3PAR OS 3.1.2 MU3 P16 or later MUs and HP 3PAR OS 3.1.3 or later.
- HP 3PAR SRA supports mixed (RCIP – Async [Periodic] and RCFC – Sync) configuration.

**NOTE:** When using Peer Motion to perform data migration, the Remote Copy configurations and SRM setup must be reestablished with the new array after migration. For more information about re-establishing Remote Copy configurations, see the *HP 3PAR Peer Motion Manager User Guide* or *HP 3PAR Remote Copy Software User's Guide*.

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The following are the configuration items:

- HP 3PAR StoreServ configuration at the protected site and the recovery site:
  - HP 3PAR Remote Copy Software setup.

Set up a Remote Copy link between the protected and recovery site. Create a Remote Copy volume group at the protected site. A corresponding Remote Copy group is automatically created at the recovery site. For more information about setting up HP 3PAR Remote Copy Software, see the *HP 3PAR Remote Copy Software User Guide*.

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**NOTE:** Remote Copy is supported on HP 3PAR OS 2.3.1 or later.

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  - Create virtual volumes.

Create the appropriate number of virtual volumes to meet the replication requirement of the virtual infrastructure. For more information about creating virtual volumes, see the *HP 3PAR OS CLI Administrator's Manual*.
- HP 3PAR StoreServ configuration at the protected site.
  - Admit the virtual volume to the Remote Copy volume group.

A virtual volume contains virtual infrastructure data (datastore, virtual disk and RDM disk). Replication of virtual infrastructure data is enabled by admitting virtual volumes to the Remote Copy volume group. Each virtual volume at the protected site is mapped to a corresponding virtual volume at the recovery site. Data in each virtual volume at the protected site is synced with the data in the corresponding virtual volume at the recovery site whenever Remote Copy is active. For more information about adding virtual volumes to Remote Copy volume groups, see the *HP 3PAR Remote Copy Software User Guide*.
  - Present the virtual volume to the ESX(i) host (i.e. create a VLUN).

It is assumed that ESX(i) host(s) are already connected to the HP 3PAR storage system and configured per the recommendations in the *VMware ESX Servers Implementation Guide*. Create a VLUN for the ESX(i) host(s) corresponding to the virtual volume. For more information, see the *HP 3PAR OS VMware ESX Server Implementation Guide*.

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**NOTE:** HP recommends that all LUNs used by VMware Virtual Machines should form a protection group to be failed over together during test and recovery, and be part of a single Remote Copy group and synchronized with the target Remote Copy group.

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A VLUN is not created for the recovery site ESX(i) host(s) for the replicated virtual volume. The failover process creates necessary VLUNs for the recovery site ESX(i) host(s) for all replicated virtual volumes that are part of a failover plan.

# Installing, configuring, and verifying the configurations on HP 3PAR storage system

1. Verify the correct version of HP 3PAR Operating System with the appropriate licensed features. This operation must be performed on both the protected site and the recovery site.

```
root@inodee2022:~# showversion
Release version 3.1.1
Patches: None

Component Name          Version
CLI Server              3.1.1
CLI Client              3.1.1
System Manager          3.1.1
Kernel                  3.1.1
TPD Kernel Code         3.1.1

root@root@inodee2022:~# showlicense
License key was generated on Tue Jul 26 11:15:47 2011

License features currently enabled:
Adaptive Optimization
Domains
Dynamic Optimization
InForm Suite
Management Plug-In for VMware vCenter
Recovery Manager for Exchange
Recovery Manager for Oracle
Recovery Manager for SQL
Recovery Manager for VMware vSphere
Remote Copy
System Reporter
System Tuner
Thin Conversion
Thin Copy Reclamation
Thin Persistence
Thin Provisioning (1024G)
Virtual Copy
Virtual Lock
VSS Provider for Microsoft Windows
```

2. Verify the HP 3PAR storage system details on the protected and recovery sites.

```
root@inodee2022:~# showsys
----- (MB) -----
ID -Name- ---Model--- -Serial- Nodes Master TotalCap AllocCap FreeCap FailedCap
388 s388 InServ V400 1400388 2 0 11149312 2421760 8727552 0
```

3. Create a user on the HP 3PAR storage system on the protected and recovery sites.

```
root@inodee2022:~# createuser srmuser all edit
Password for user srmuser:
Retype password for user srmuser:
User created
root@inodee2022:~# showuser
Username  Domain Role      Default
3paradm   all    super    N
3parbrowser all    browse   N
```

```

3parcim    all    browse    N
3parsnmp  all    super    N
3parsvc   all    super    N
bedituser  all    basic_edit N
edituser  all    edit     N
root      all    super    N
root2     all    super    N
srmuser   all    edit     N

```

4. Register the ESX(i) hosts on the HP 3PAR Storage system.

Before a LUN from the HP 3PAR storage system can be presented to the ESX(i) host, register the ESX(i) host WWNs/iSCSI names on the HP 3PAR storage system by creating a host entry. Perform this operation on both the protected and recovery sites.

**NOTE:** When you present LUNs to the ESXi host using Persona 11 at the recovery site, system stops responding while executing the **Rescan All** function. Hence, you must remove all LUN exposures of the Remote Copy group member on the recovery site, except the Peer Persistence configuration to the host with Persona 11, to prevent any delayed response during the ESXi rescan.

```

root@inodee2022:~# createhost -persona <persona_number> <host_name>

root@inodee2022:~# showhost pe2970-20
Id Name      Persona      -WWN/iSCSI_Name- Port
16 pe2970-20 Generic-legacy 21000024FF223A1B 1:1:2
                21000024FF223A1A 0:1:2

```

5. Create Common Provisioning Groups (CPGs) to be used during virtual volume creation on the protected and recovery sites.

```

root@inodee2022:~# createcpg usr_srm

root@inodee2022:~# showcpg usr_srm
----- (MB) -----
-Volumes- -Usage- --- Usr --- -- Snp --- -- Adm ---
Id Name    Warn% VVs  TPVs  Usr Snp  Total  Used  Total  Used  Total  Used
-----
1 total                31   0 39936 39936 60416   0 16384 7168

```

6. Create virtual volumes on the protected and recovery sites.

```

root@inodee2022:~# createvv -tpvv -snp_cpg snp_srm usr_srm srm_vol1 10g

oot@inodee2022:~# showvv srm_vol1
-----
Id Name      Prov Type CopyOf BsId Rd -Detailed_State- -Rsvd(MB) -- - (MB) -
4213 srm_vol1 tppv base --- 4213 RW normal 128 512 512 10240
-----
1 total                128 512 512 10240

```

7. Export VLUNs to the ESX(i) hosts on the protected site.

```

root@inodee2022:~# createvlun -f srm_vol1 0 pe2970-20

root@inodee2022:~# showvlun -a -host pe2970-20

```

Lun	VVName	HostName	-Host_WWN/iSCSI_Name-	Port	Type
0	srn_vol1	pe2970-20	21000024FF223A1B	1:1:2	host
0	srn_vol1	pe2970-20	21000024FF223A1A	0:1:2	host
-----					
2 total					

8. Discover the LUNs on the ESX(i) hosts.
9. After exporting the VLUNs to the ESX(i) host, rescan the HBA to verify if the VLUN is now visible to the ESX(i) host.
10. Create a VMFS Datastore.
11. Deploy VMs per your requirements on the protected site.

## Configuring Remote Copy with IP between the protected and recovery sites

HP 3PAR Remote Copy Software provides the capability to copy virtual volumes from the protected site HP 3PAR storage system to the recovery site HP 3PAR Storage system.

Ensure that the HP 3PAR storage system hardware is set up appropriately for creating a Remote Copy configuration between the protected site and recovery site.

**NOTE:** SRM works with a Remote Copy setup using IP or Fibre Channel connectivity. This document describes the steps required to configure Remote Copy with IP. For more information about implementing Remote Copy over Fibre Channel, see the *HP 3PAR Remote Copy Software User's Guide*.

### Initial setup for Remote Copy from the Protected Site

1. From the protected site (s230 in the following examples) set up the Gigabit Ethernet link.

```

root@inodee2023:~# controlport rcip addr -f 10.100.33.88 255.255.255.0 0:9:1
Remote Copy interface change successful.

root@inodee2023:~# controlport rcip addr -f 10.101.33.88 255.255.255.0 1:9:1
Remote Copy interface change successful.

root@inodee2023:~# controlport rcip gw -f 10.100.33.1 0:9:1
Remote Copy interface change successful.

root@inodee2023:~# controlport rcip gw -f 10.101.33.1 1:9:1
Remote Copy interface change successful.

```

2. Verify connectivity (s230).

```

root@inodee2023:~# showport -rcip
N:S:P State ---HwAddr--- IPAddr Netmask Gateway MTU Rate Duplex
AutoNeg
0:9:1 ready 0002AC8014A5 10.100.33.88 255.255.255.0 10.100.33.1 1500 1Gbps Full
Yes
1:9:1 ready 0002AC80149F 10.101.33.88 255.255.255.0 10.101.33.1 1500 1Gbps Full
Yes
-----

2

```

## Initial setup for Remote Copy from the Recovery Site

1. From the recovery site (s159 in the following examples) set up the Gigabit Ethernet link.

```
root@snodec242:~# controlport rcip addr -f 10.100.33.230 255.255.255.0 0:6:1
Remote Copy interface change successful.

root@snodec242:~# controlport rcip addr -f 10.101.33.230 255.255.255.0 1:6:1
Remote Copy interface change successful.

root@snodec242:~# controlport rcip gw -f 10.100.33.1 0:6:1
Remote Copy interface change successful.

root@snodec242:~# controlport rcip gw -f 10.101.33.1 1:6:1
Remote Copy interface change successful.
```

2. Verify connectivity (s159).

```
root@snodec242:~# showport -rcip
N:S:P State ---HwAddr---          IPAddr          Netmask          Gateway  MTU  Rate Duplex
AutoNeg
0:6:1 ready 0002AC530160 10.100.33.230 255.255.255.0 10.100.33.1 1500 1Gbps
Full      Yes
1:6:1 ready 0002AC530243 10.101.33.230 255.255.255.0 10.101.33.1 1500 1Gbps
Full      Yes
-----
2
```

## Setting up Remote Copy targets and links

1. Set up Remote Copy targets and links on the protected site.

```
root@inodee2023:~# startrcopy

root@inodee2023:~# creatercopytarget s230 IP 0:10.100.33.230 1:10.101.33.230

root@inodee2023:~# showrcopy links

Remote Copy System Information
Status: Started, Normal

Link Information

Target  Node Address          Status Options
s230    0    10.100.33.230 Up
s230    1    10.101.33.230 Up
receive 0    receive Up
receive 1    receive Up
```

2. Set up Remote Copy targets and links on the recovery site.

```
root@snodec242:~# startrcopy

root@snodec242:~# creatercopytarget s388 IP 0:10.100.33.88 1:10.101.33.88

root@snodec242:~# showrcopy links

Remote Copy System Information
```

```
Status: Started, Normal
```

#### Link Information

Target	Node	Address	Status	Options
s388	0	10.100.33.88	Up	
s388	1	10.101.33.88	Up	
receive	0	receive	Up	
receive	1	receive	Up	

## Creating Synchronous Remote Copy groups

To create synchronous Remote Copy groups (s230) on the protected site, do the following:

```
root@inodee2023:~# creatercopygroup srm_1 s230:sync
root@inodee2023:~# admitrcopyvv srm_vol1 srm_1 s230:srm_vol1
root@inodee2023:~# startrcopygroup srm_1
root@inodee2023:~# showrcopy groups srm_1

Remote Copy System Information
Status: Started, Normal

Group Information

Name          Target      Status      Role          Mode          Options
srm_1         s230        Started     Primary       Sync
  LocalVV      ID  RemoteVV    ID  SyncStatus    LastSyncTime
  srm_vol1     4213 srm_vol1    4237 Synced        NA
```

## Adding a Virtual Volume to existing Remote Copy groups

To add a virtual volume to an existing Remote Copy group (s230), do the following:

```
root@inodee2023:~# stoprcopygroup -f srm_1
root@inodee2023:~# admitrcopyvv srm_vol2 srm_1 s230:srm_vol2
root@inodee2023:~# admitrcopyvv srm_vol3 srm_1 s230:srm_vol3
root@inodee2023:~# startrcopygroup srm_1
Group srm_1 starts, task ID = 5711 5712 5713
root@inodee2023:~# showrcopy groups srm_1

Remote Copy System Information
Status: Started, Normal

Group Information

Name          Target      Status      Role          Mode          Options
srm_1         s230        Started     Primary       Sync
  LocalVV      ID  RemoteVV    ID  SyncStatus    LastSyncTime
  srm_vol1     4213 srm_vol1    4237 Synced        NA
  srm_vol2     4214 srm_vol2    4238 Synced        NA
  srm_vol3     4215 srm_vol3    4239 Synced        NA
```

**NOTE:** If applicable, create additional Remote Copy groups and add virtual volumes.



## Displaying the Remote Copy groups configuration

1. Display the Remote Copy groups configurations on the protected site.

```
root@inodee2023:~# showrcopy

Remote Copy System Information
Status: Started, Normal

Target Information

Name ID Type Status Options Policy
s230 19 IP ready mirror_config

Link Information

Target Node Address Status Options
s230 0 10.100.33.230 Up
s230 1 10.101.33.230 Up
receive 0 receive Up
receive 1 receive Up

Group Information

Name Target Status Role Mode Options
srm_1 s230 Started Primary Sync
LocalVV ID RemoteVV ID SyncStatus LastSyncTime
srm_vol1 4213 srm_vol1 4237 Synced NA
srm_vol2 4214 srm_vol2 4238 Synced NA
srm_vol3 4215 srm_vol3 4239 Synced NA
```

2. Display the Remote Copy groups configurations on the recovery site.

```
root@snoddec242:~# showrcopy

Remote Copy System Information
Status: Started, Normal

Target Information

Name ID Type Status Options Policy
s388 18 IP ready mirror_config

Link Information

Target Node Address Status Options
s388 0 10.100.33.88 Up
s388 1 10.101.33.88 Up
receive 0 receive Up
receive 1 receive Up

Group Information

Name Target Status Role Mode Options
srm_1.r388 s388 Started Secondary Sync
LocalVV ID RemoteVV ID SyncStatus LastSyncTime
srm_vol1 4237 srm_vol1 4213 Synced NA
srm_vol2 4238 srm_vol2 4214 Synced NA
srm_vol3 4239 srm_vol3 4215 Synced NA
```

---

## 7 Configuring VMware vCenter Site Recovery Manager and HP 3PAR SRA

The VMware vCenter Site Recovery Manager plug-in is installed and enabled by the vCenter Plug-in Manager (**Plug-ins**→**Manage Plug-ins...**).

---

**NOTE:** For more information about configuring VMware vCenter SRM, see the VMware vCenter Site Recovery Manager documentation.

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- ① **IMPORTANT:** Ensure that both vCenter servers are configured with each other and can be accessed from the respective sites.
-

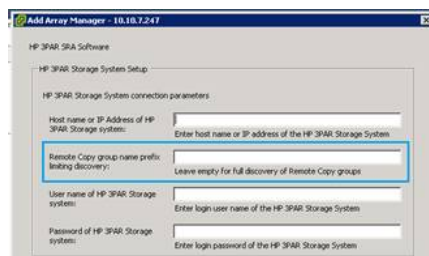
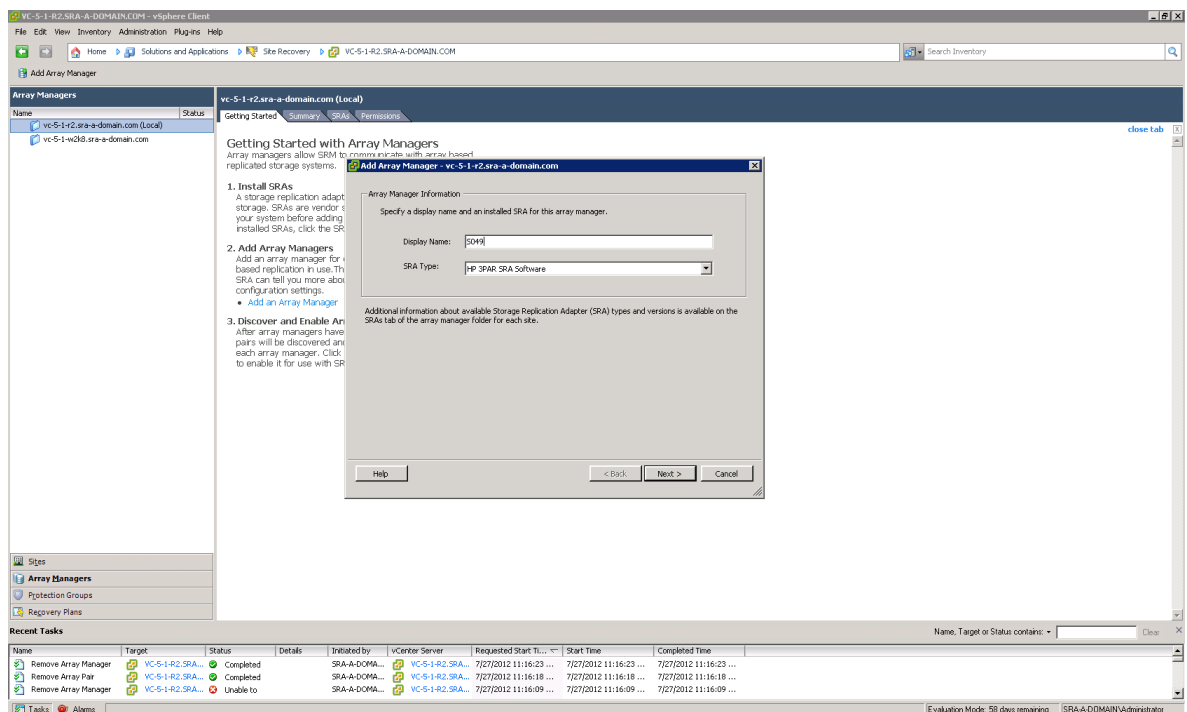
# Configuring HP 3PAR SRA

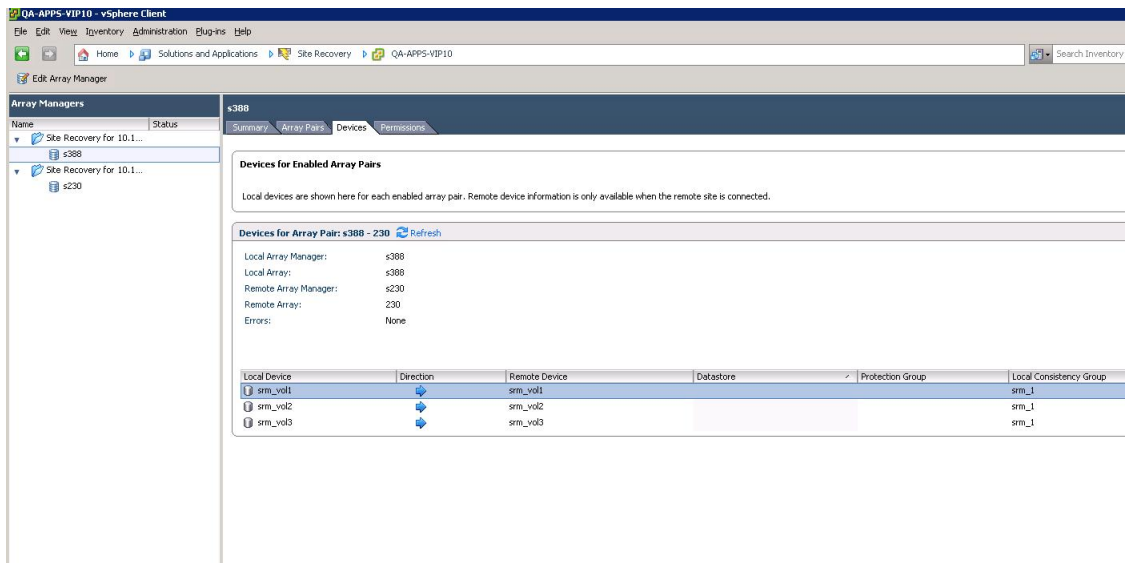
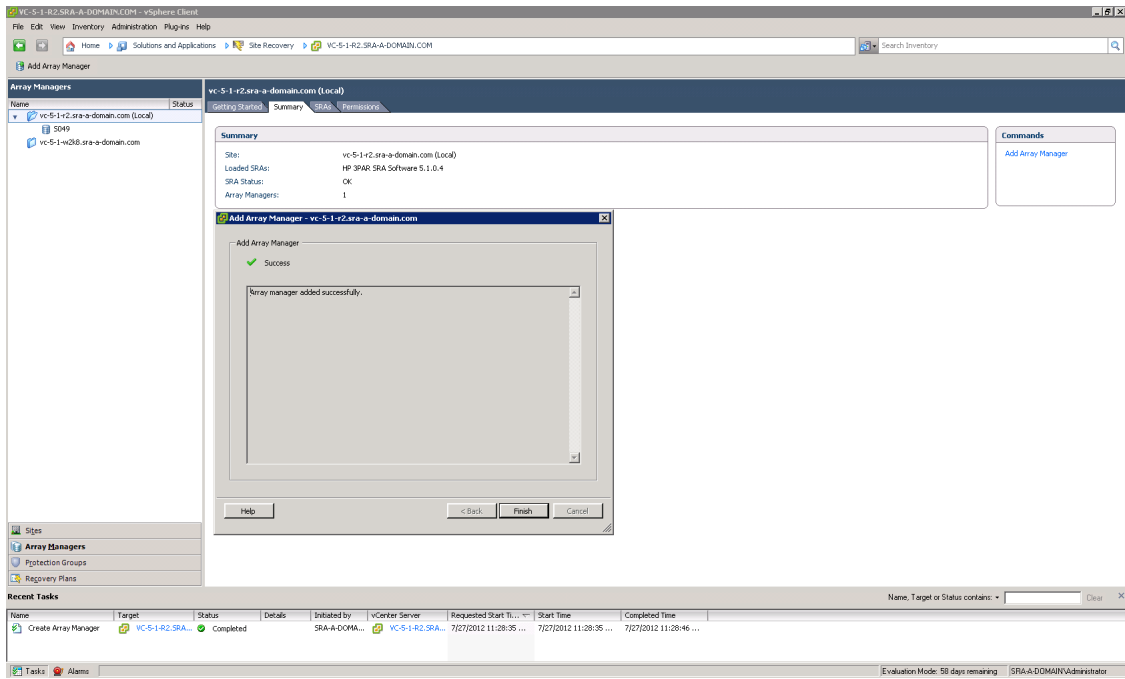
The following are the HP 3PAR SRA configuration items in vCenter Site Recovery (**View**→**Solutions and Applications** →**Site Recovery**):

- Add Array Manager
  - Display Name—your preferred array reference
  - SRA Type—HP 3PAR SRA Software
  - Host name or IP Address of HP 3PAR storage system—The host name or IP address of the storage system located at the protected or recovery sites providing storage replication.
  - Remote Copy group name prefix limiting discovery—The filtering condition to discover an RC group. You can use the asterisk (\*) wildcard to search for an RC group in an array. Filtering reduces the time to discover the RC groups in an array.

**NOTE:** If you do not specify any filtering condition, then SRA discovers all the Remote Copy groups in the array.

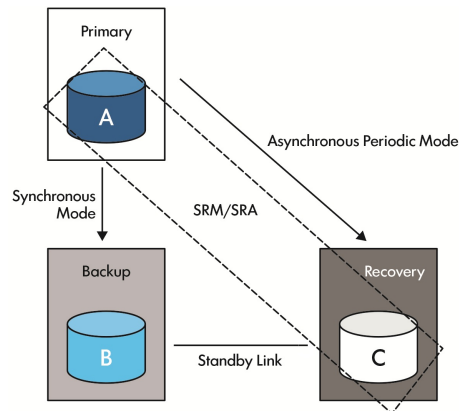
- User name of the HP 3PAR storage system—The user name that HP 3PAR SRA uses to connect to the storage system
- Password of the HP 3PAR storage system—The user password that HP 3PAR SRA uses to connect to the storage system.





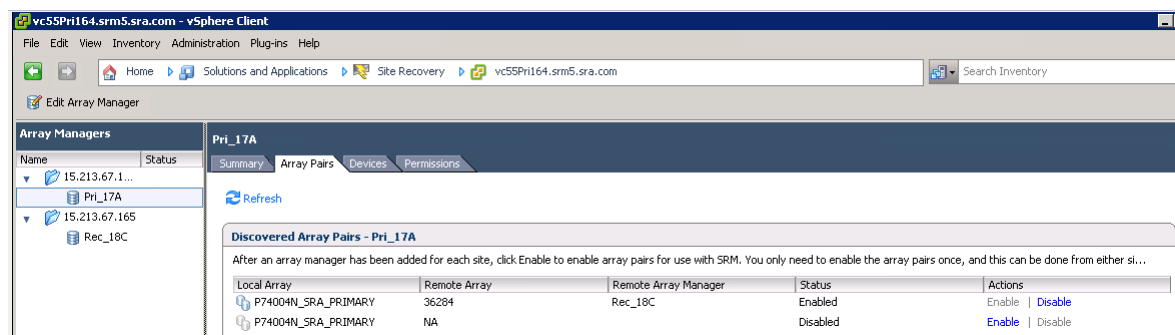
For an SLD configuration, after the Array Manager is added successfully, if you select the primary array, two target arrays are listed. You must configure SRM/SRA between HP 3PAR StoreServ Storage systems A and C.

**Figure 1 SLD configuration**



You must also enable the array pair between HP 3PAR StoreServ Storage systems A and C as shown below.

**Figure 2**



## Validating HP 3PAR StoreServ Storage SSL certificates

HP 3PAR StoreServ enables management and validation of SSL certificates by the host and client applications to establish a secure connection.

HP 3PAR CLI and HP 3PAR OS versions 2.3.1 MU5 P35, 3.1.1 MU3 P27, 3.1.2 MU3 P16, or later, supports a self-signed 2048-bit RSA SSL certificate for HP 3PAR StoreServ Storage.

After upgrade, SRA requires that you accept and validate the HP 3PAR StoreServ server SSL certificate to perform any operations related to HP 3PAR StoreServ. You must validate the HP 3PAR StoreServ certificate using the SRA command line interface (TPDSrm.exe) before you configure arrays from SRM. If you do not accept the specific HP 3PAR StoreServ certificate, then the connection is not established with HP 3PAR StoreServ, and SRA returns an error message to SRM.

The certificate validation is supported using the SRA command line options. SRA supports the following commands to view, validate, and remove the HP 3PAR StoreServ certificate:

- TPDSrm.exe viewcert—To view the currently accepted StoreServ certificate.
- TPDSrm.exe validatecert—To accept and save the HP 3PAR StoreServ certificate.

---

**NOTE:** You must accept and validate the HP 3PAR StoreServ certificate using the `TPDSrm` utility before you configure SRM with HP 3PAR StoreServ Storage System. If you do not validate the certificate, connection to HP 3PAR StoreServ is denied.

---

- `TPDSrm.exe removecert`—To delete the accepted HP 3PAR StoreServ certificate from the cache memory.

If you have configured an SLD remote copy environment with three HP 3PAR StoreServ Storage systems (A, B, and C), where A—B is configured in synchronous mode, A—C in asynchronous periodic mode, and B—C is the standby link in asynchronous periodic mode. SRM/SRA is configured between HP 3PAR StoreServ Storage systems A and C, then HP 3PAR SRA requires that you accept and validate the HP 3PAR StoreServ Storage SSL certificate for the primary and secondary HP 3PAR StoreServ Storage systems on both the Protected and Recovery sites.

---

**NOTE:** You must accept the certificate when the link between A and C is UP.

---

For example, HP 3PAR StoreServ A and SRM Server 1 are part of the protected site. HP 3PAR StoreServ B and SRM Server 2 are part of the recovery site. In SRM Server 1, you must accept and validate the HP 3PAR StoreServ A and HP 3PAR StoreServ B certificates. Perform a similar procedure for SRM Server 2.

---

## 8 Recovery and failback

A recovery operation is executed when an SRM recovery plan is configured with SRM protection groups that uses replicated HP 3PAR Virtual Volumes as a Datastore.

Failback is a process that sets the replication environment back to its original state at the protected site (local site), prior to a failover. Failback is managed as a normal server migration process.

The following are the SRM operations that execute recovery and failback.

### Test

This option performs nondisruptive recovery operations.

SRM communicates with HP 3PAR SRA using the remote storage information obtained during the discovery process. SRA creates snapshots of the Remote Virtual Volumes, and presents them to the recovery ESX server. During this recovery process, the VMs continue to run at the production site (protected site). You can verify that the VMs are running at the recovery site.

### Clean Up

Perform the Cleanup operation after you have verified that the VMs are running at the recovery site (using the **Test** operation). SRA does a cleanup (unpresent and delete) of the previously created snapshots.

### Recovery

Perform a recovery operation by shutting down the VMs at the protected site (Site A), and recover those VMs at the recovery site (Site B).

- **Planned migration**—SRM shuts down the VMs at protected site and unmounts the Datastores. SRA changes the status of the source Datastores to `read-only`, and then creates the snapshots of the source device. SRA reverses the replication direction and swaps the `read/write` relation between the Datacenters. SRM then rescans the Datastores at the recovery site, and restarts the VMs.

---

**NOTE:** Later, the snapshots taken at the protected site (before failover) will be used for restore replication operation by SRA. `Restore replication` is restoring the VMs to the original state by discarding the recent changes made at the recovery site. You cannot perform this operation from the SRM GUI. However, you can run the following SRM commands, sequentially, to perform this operation:

- `prepareRestoreReplication`
- `restoreReplication`

- 
- **Disaster recovery**—If the protected Datacenter is unavailable due to any disasters or failures, then you must run the SRM recovery plan to start up the VMs at the recovery site. The SRA recovery process is similar to planned migration, except for the snapshot creation operations performed at the protected site.

For SLD configurations:

Consider the following scenarios where A is the Primary System, C the Asynchronous Periodic Backup System, and B the Synchronous Backup System, and SRM/SRA is configured between HP 3PAR StoreServ Storage systems A and C.

- All the links are up:  
SRM initiates the data transfer from A to C through HP 3PAR SRA. After the sync is complete, SRA stops the RC groups between A—B and also between A—C. Then SRA initiates failover at C so that C becomes the Failover System and takes the role of the Primary System.
- A—C link is down:  
HP 3PAR SRA initiates the data transfer from B to C.  
After the sync is complete, SRA stops the RC groups between A—B. Then SRA initiates failover at C so that C becomes the Failover System and takes the role of the Primary System. Also see the [“Limitations of SLD configuration” \(page 38\)](#) section.
- A—B link is down:  
When the A—C link is up:  
SRM initiates the data transfer from A to C through HP 3PAR SRA. Once the sync is complete, SRA stops the RC groups between A—C. SRA then initiates a failover at C so that C becomes the Failover System and takes the role of the Primary System.  
When A—C link is down:  
Depending on the situation, either B or C will have the most current data since the synchronous link between A—B is down. In such a scenario, as per the design, HP 3PAR SRA does not initiate any data transfer from B to C. With the available data, C becomes the failover system and takes the role of the primary system.

---

△ **CAUTION:** If C does not contain the most current data then any data replicated to B that is not replicated to C is discarded.

---

- B—C link is down:  
When A—C link is up:  
SRM initiates the data transfer from A to C through HP 3PAR SRA. Once the sync is complete, SRA stops the RC groups between A—B and also between A—C. SRA then initiates failover at C so that C becomes the failover system and takes the role of the primary system.  
When the A—C link is down:  
HP 3PAR SRA will not initiate the data transfer between B—C, because the B—C standby link is not available for data transfer. SRA stops the RC groups between A—B. SRA then initiates failover at C. With the available data, C becomes the Failover System and takes the role of the Primary System.

---

△ **CAUTION:** If C does not contain the most current data and any data replicated to B that is not yet replicated to the C is discarded.

---

## Reprotect

Perform the reprotect operation to configure protection in the reverse direction (from Site B to Site A), as a preparation for failback to the original state. The SRA operations are similar to the planned migrations, and deletes the earlier snapshots that were created during failover from Site A to Site B.

For SLD configurations, the reprotect operation requires that the remote copy links between the new primary and both the targets to be up. If the array C is the new primary system and if the links



between C—A and C—B are up, then SRA starts the remote replication from C—A and C—B and waits till the sync is complete as part of the reprotect operation.

During the reprotect operation, SRA triggers delta resync operation from C—A and C—B where C is the new primary system after failover. If the SRM recovery operation was performed when either A—B or B—C or both the remote copy links are down, then as per the remote copy behavior, reprotect operation triggered by SRM through SRA will initiate a full copy from C—B only (from C—A, delta resync will be initiated).

## 9 HP 3PAR SRA for the VMware SRM 5.5 utility

HP 3PAR SRA supports the command line interface `TPDSrm.exe`. VMware vCenter Site Recovery Manager requests are sent via a Perl script `command.pl` in the HP 3PAR SRA installed directory. The Perl script internally processes the data to an XML file and spawns an instance of `TPDSrm.exe` to process the XML file. The XML file is removed once `TPDSrm.exe` returns to `command.pl`.

The HP 3PAR Storage Replication Adapter for VMware SRM 5.5 utility supports the following options:

### Syntax

- To obtain current version number of the SRA:  
`TPDSrm.exe <-v>`
- To remove all test snapshots from the specified HP 3PAR Storage system:  
`TPDSrm.exe cleansnaps <-sys StorageSystemName -user UserName -pass Password [-loglevel Num]>`
- To view all state cached on local system:  
`TPDSrm.exe viewstate`
- To remove a particular state cached for a Remote Copy group on the specified HP 3PAR storage system on local system:  
`TPDSrm.exe cleanstate <-sysid StorageSystemID> <-rcgroup RCGroupName>`
- To view or modify log file setting information:  
`TPDSrm.exe log [-size LogSize] [-cnt Num]`

### Options

- `-v`  
Show version information.
- `cleansnaps`  
Remove any snapshot created for test failover on the HP 3PAR Storage system.
  - `-sys <StorageSystem>`  
The HP 3PAR storage system name or IP address to connect.
  - `-user <UserName>`  
The HP 3PAR storage system user name.
  - `-pass <Password>`  
The HP 3PAR storage system password.
  - `-loglevel <Num>`  
Optional. Overrides the default output message level using a numeral from 1 to 5. The default is 3 (1-error, 2-warning, 3-info, 4-verbose, 5-trivia).
- `viewstate`  
View the local disaster recovery state cache information. Only `prepareFailover` and `failover` states are available.

- `cleanstate`  
Remove the local disaster recovery state cache created during failover operation.
  - `-sysid <StorageSystemID>`  
The system ID of the HP 3PAR storage system where the Remote Copy group name is found. Use the `viewstate` command to see currently cached info.
  - `-rcgroup <RCGroupName>`  
The Remote Copy group name.
- `log`  
View or modify the current log size limit and the maximum number of log history files to maintain.
  - `-size <LogSize>`  
Specify the log file size limit (in MB). The default is 2 MB.
  - `-cnt <Num>`  
Specify the maximum log history files besides the latest log file to maintain. The default is 20 histories.

---

## 10 Partial licensing

The HP 3PAR SRA supports partial licensing facility to purchase license based on the capacity used on the storage array. This feature is available if you have HP 3PAR OS 3.1.2 MU2, or later.

The following features are available with the partial license:

- InForm Suite
- Remote Copy
- Thin Copy Reclamation
- Transparent Failover
- Virtual Copy

The following features are available with the regular license:

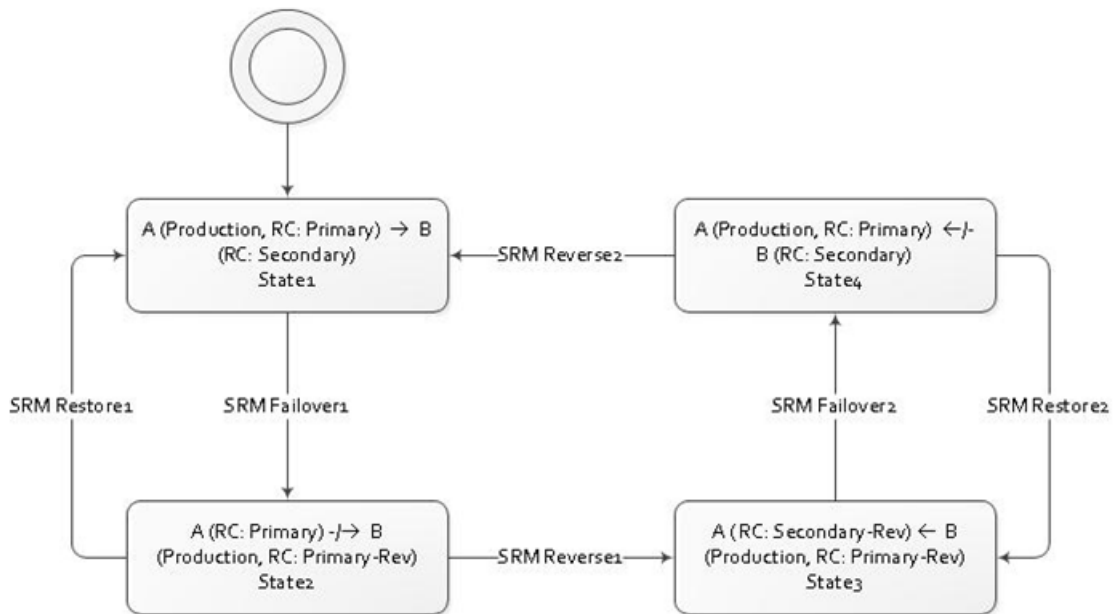
- Adaptive Optimization
- Domains
- Dynamic Optimization
- InForm Suite
- Management Plug-In for VMware vCenter
- Peer Motion
- Recovery Manager for Exchange
- Recovery Manager for Microsoft Hyper-V
- Recovery Manager for Oracle
- Recovery Manager for SQL
- Recovery Manager for VMware vSphere
- Remote Copy
- System Reporter
- System Tuner
- Thin Conversion
- Thin Copy Reclamation
- Thin Persistence
- Thin Provisioning
- VDS Provider for Microsoft Windows
- Virtual Copy
- Virtual Lock
- VSS Provider for Microsoft Windows

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**NOTE:** SRA 5.5.2 supports partial licensing only with HP 3PAR OS 3.1.2 MU2, or later.

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# 11 HP 3PAR SRA 5.5.2 SRM vs HP 3PAR Remote Copy state diagram



**Table 1 Remote Copy failover from Site A to Site B**

State	SRM Command	Execution Site	Site A Role After HP 3PAR System Command	Site B Role after HP 3PAR System Command	HP 3PAR OS Command	Description
1	—	—	Primary	Secondary	—	State 1
Failover 1.1	checkFailover	B	Primary	Secondary	getvv getvlun getrcopy	Check current group status.
Failover 1.2	syncOnce	A	Primary	Secondary	getvv getvlun syncrcopy	Make sure all changes are replicated to the remote site.
Failover 1.3	querySyncStatus	A	Primary	Secondary	getvv getvlun getrcopy	Report replication status.
Failover 1.4	prepareFailover	A	Primary	Secondary	getvv getvlun getrcopy removevlun	Remove LUN exposure from the host. Add Remote Copy state to the registry.
Failover 1.5	failover	B	Primary	Primary-Rev	getvv getvlun getrcopy gethost	Failover the Remote Copy group to the target site. Add the Remote Copy state to the registry.

**Table 1 Remote Copy failover from Site A to Site B (continued)**

State	SRM Command	Execution Site	Site A Role After HP 3PAR System Command	Site B Role after HP 3PAR System Command	HP 3PAR OS Command	Description
					getport setrcopygroup failover	
Failover 1.6	–	–	Primary	Primary-Rev	–	State 2
2	–	–	Primary	Primary-Rev	–	State 2
Restore 1.1	prepareRestoreReplication	B	Primary	Primary-Rev	getvv getvlun getrcopy setrcopygroup reverse removevlun	Remove LUN exposure on Site B. Reverses the Remote Copy changes. Remove the Remote Copy state from the registry.
Restore 1.2	restoreReplication	A	Primary	Secondary	getvv getvlun getrcopy startrcopygroup createvlun	Restore LUN exposure on Site A. Start the replication flow. Remove the Remote Copy state from the registry.
Restore 1.3	syncOnce	A	Primary	Secondary	getvv getvlun syncrcopy	Make sure all changes are replicated to the remote site.
1	–	–	Primary	Secondary	–	State 1

**Table 2 Remote Copy recover — Replication begins from Site B to Site A**

State	SRM Command	Execution Site	Site A Role After HP 3PAR System Command	Site B Role after HP 3PAR System Command	HP 3PAR OS Command	Description
2	–	–	Primary	Primary-Rev	–	State 2
Reverse 1.1	prepareReverseReplication	A	Primary	Primary-Rev	getvv getvlun	Remove the Remote Copy state from the registry.
Reverse 1.2	reverseReplication	B	Secondary-Rev	Primary-Rev	getvv getvlun setrcopygroup recover	Remove the Remote Copy state from the registry. Start Remote Copy replication.
Reverse 1.3	syncOnce	B	Secondary-Rev	Primary-Rev	getvv getvlun syncrcopy	Make sure all changes are replicated to the remote site.
3	–	–	Secondary-Rev	Primary-Rev	–	State 3

**Table 3 Remote Copy restore role back (without sync)**

State	SRM Command	Failover Site	Site A Role After HP 3PAR System Command	Site B Role after HP 3PAR System Command	HP 3PAR OS Command	Description
3	—	—	Secondary-Rev	Primary-Rev	—	State 3
Failover 2.1	checkFailover	A	Secondary-Rev	Primary-Rev	getvv getvlun getrcopy starttrcopygroup	Check current group status. Make sure the group is started.
Failover 2.2	synceOnce	B	Secondary-Rev	Primary-Rev	getvv getvlun syncrcopy	Make sure all changes are replicated to the remote site.
Failover 2.3	querySyncStatus	B	Secondary-Rev	Primary-Rev	getvv getvlun getrcopy	Report replication status.
Failover 2.4	prepareFailover	B	Secondary-Rev	Primary-Rev	getvv getvlun getrcopy removevlun	Remove LUN exposure from the host. Add Remote Copy state to the registry.
Failover 2.5	failover	A	Primary	Secondary	getvv getvlun setrcopygroup restore remote nostart	Failover the Remote Copy group to the target site. Add the Remote Copy state to the registry.
4	—	—	Primary	Secondary	—	State 4 (replication is stopped)
4	—	—	Primary	Secondary	—	State 4
Restore 2.1	prepareRestoreReplication	A	Primary	Secondary	getvv getvlun getrcopy setrcopygroup reverse removevlun	Remove LUN exposure on Site A. Revers the Remote Copy role changes. Remove the Remote Copy state from the registry.
Restore 2.2	restoreReplication	B	Secondary-Rev	Primary-Rev	getvv getvlun getrcopy starttrcopygroup createvlun	Restore LUN exposure on Site B. Start the replication flow. Remove the Remote Copy state from the registry.
Restore 2.3	syncOnce	A	Secondary-Rev	Primary-Rev	getvv getvlun syncrcopy	Make sure all changes are replicated to the remote site.
3	—	—	Secondary-Rev	Primary-Rev	—	State 3

**Table 4 Remote Copy sync from Site A to Site B**

State	SRM Command	Origin Site	Site A Role After HP 3PAR System Command	Site B Role after HP 3PAR System Command	HP 3PAR OS Command	Description
4	—	—	Primary	Secondary	—	State 4
Reverse 2.1	prepareReverseReplication	B	Primary	Secondary	getvv getvlun	Remove the Remote Copy state from the registry.
Reverse 2.2	reverseReplication	A	Primary	Secondary	getvv getvlun setrcopygroup	Remove the Remote Copy state from the registry. Start Remote Copy replication.
Reverse 2.3	syncOnce	B	Primary	Secondary	getvv getvlun syncrcopy	Make sure all changes are replicated to the remote site.
1	—	—	Primary	Secondary	—	State 1

**Table 5 Test failover workflow**

State	SRM Command	Origin Site	Site A Role After HP 3PAR System Command	Site B Role after HP 3PAR System Command	HP 3PAR OS Command	Description
1	—	—	Primary	Secondary	—	State 1
TestFailover 1	checkTestFailoverStart	B	Primary	Secondary	getvv getvlun getrcopy	Check the current group status for eligibility for test failover operation.
TestFailover 2	syncOnce	A	Primary	Secondary	getvv getvlun syncrcopy	Make sure all changes are replicated to the remote site.
TestFailover 3	testFailoverStart	B	Primary	Secondary	getvv getvlun getrcopy gethost getport creatercopygroupsv createvlun	Create group snapshot and expose the snapshot to the host.
TestFailover 4	testFailoverStop	B	Primary	Secondary	getvv getvlun getrcopy gethost getport removevlun	Remove snapshot LUN exposure from the host.
1	—	—	Primary	Secondary	—	State 1



---

## 12 Special notes

- If a single virtual machine sits on two datastores and two virtual volumes, it is recommended to include both virtual volumes in the same Remote Copy group.
- In a disaster recovery scenario, when Remote Copy links are down, the Remote Copy group status could still be `Started`. A failover attempt will not be successful until the Remote Group status becomes `Stopped`.
- HP 3PAR SRA configuration will not be deleted in the Windows registry when the HP 3PAR SRA package is uninstalled.
- If a virtual machine sits on a spanned datastore, all virtual volumes used for the spanned datastore need to be included in a single Remote Copy group.
- SRM might potentially time out if multiple test failover or recovery operations are run simultaneously. Rerun the operation if the time out error occurs. Alternatively, the time out error might be avoided if the operations are run sequentially.
- If an ESX(i) host has both FC and iSCSI definitions created on the HP 3PAR storage system and vCenter Server also has both FC and iSCSI software adapter configured, per the vCenter Server's request, LUNs will be exposed to both host definitions in the event of failover. However, if only one host definition is presented on the HP 3PAR storage system (either FC or iSCSI), HP 3PAR SRA will only expose LUNs to whichever is defined on the HP 3PAR Storage system.
- It is strongly recommended to configure one protected group per Remote Copy group.
- If multiple Remote Copy groups are included in one protected group, it is recommended to set the same sync time on all of the periodic Remote Copy groups.
- Remote Copy group reserves `.r` for naming. Do not include the reserved naming in your Remote Copy group name.
- `SRM_RO_<VVID>`, `SRM_RW_<VVID>`, `SRM_RECOVER_RO_<VVID>`, and `SRM_TARGETBK_RO_<VVID>` are reserved virtual volume naming convention for HP 3PAR SRA.
- SRM might potentially run into a virtual volume promote operation during re-protect. If this occurs, retry the re-protect operation.
- Devices on the protected storage system should be read-only after `prepareFailover` and optionally take snapshots of the source devices for restoration if needed. The way to make a device read-only to meet SRM's specification before failover is to remove VLUN exposure so that no one has access to it. Remote Copy will internally manage the snapshot taking in case something goes wrong during the failover process. In addition, HP 3PAR SRA will also take a snapshot of the devices on the protected site of the SRM (Remote Copy role `Primary` or `Primary-Rev`) for restore purposes since the user might activate the Remote Copy sync after failback (`setrcopygroup restore`) which would destroy the data content. The snapshot name will have the following prefix: `SRM_RECOVER_RO_<VVID>`.
- Devices on the protected storage system should be read-only after failover. This is the same with `prepareFailover`. The only difference is if the failover is part of the failback workflow, the protected storage system will become `secondary` after failback using the `setrcopygroup restore` command. Devices under the secondary Remote Copy group will automatically have read-only access.
- Devices on the recovery storage system should be read-writable after failover. The way to make the recovery storage system devices read-writable is to make the Remote Copy role on the recovery storage system to `Primary` or `Primary-Rev` with the `setrcopygroup failover/restore` or `setrcopygroup reverse` command.

- Additional protection to the data on the recovery Storage System. HP 3PAR SRA will take a snapshot of the devices on the recovery storage system of the SRM before failover for optional restore purpose. The snapshot name will have the following prefix:  
SRM\_TARGETBK\_RO\_<VVID>.
- Support of Dynamic Access Group. The concept of Dynamic Access Group support is to expose LUNs only to the specified HBA initiators provided by SRM. Any exposure of the participating LUNs made to other initiators not on the requested list will be removed. This feature is always enabled.
- Multiple Remote Copy groups in one protected group is not recommended. HP 3PAR SRA will log a warning to user if multiple instances of such configurations are detected during the Test or Recovery operation since this might be an indication that VMs are using virtual volumes from different Remote Copy groups.
- The re-protect operation requires at least one Remote Copy link to be running for the intended storage pair to be up. If a recovery operation is performed as part of the failback process when all Remote Copy links are down, additional manual steps are required on the storage system before the user can re-protect the data.
  1. On the original protected storage system, run the command `showrcopy groups <RC group name>`  
If the group role is not `Primary-Rev`, continue with SRM Reprotect; otherwise, go to step 2.
  2. Run the following command to change Remote Copy role:  
`setrcopygroup reverse -local -current <RC group name>`
  3. Continue with the SRM reprotect operation.

---

**NOTE:** You need not perform these manual steps if the Primary Array is up and if you have validated the HP 3PAR StoreServ SSL certificate for both the Primary and Secondary HP 3PAR StoreServ Storage systems on both the primary and recovery sites. For more information on validating SSL certificates, see [“Validating HP 3PAR StoreServ Storage SSL certificates” \(page 21\)](#).

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- If a failover operation is unsuccessful, make sure to clean up the local disaster state cache. Otherwise, the subsequent SRM operations will fail.  
On both the protected and recovery sites where HP 3PAR SRA is installed, issue the following command:
  - `TPDSrm viewstate`
  - `TPDSrm cleanstate -sysid <StorageSystemID> -rcgroup <RCGroupName>`
- If HP 3PAR SRA fails the `QuerySyncStatus` call due to the `GetTaskStatus` call returning the error, `Malformed InServ Data List: xxx`, perform the following steps to work around this problem:
  1. Get the task ID from the `Malformed InServ Data List: {0 {<TaskID>} xxx}` error.
  2. Log into the HP 3PAR storage system at the protected site and issue the `showtask -d <TaskID>` command. Ensure that the task ID is valid.

3. Issue the `removetask -d <TaskID>` command to remove the task detail.
4. Rerun the SRM operation again.

If you have multiple failed virtual volumes in the group, you may need to repeat steps 1 through 4 for all volumes.

- For HP 3PAR OS versions up to 3.1.2 MU2:
  - SRM supports only one-to-one replication. If one of the pair in an SLD setup is selected for an SRM configuration, only the selected pair will be started after re-protect in failover workflow.
  - Before failback, all the pairs in the SLD setup needs to be started as the requirement for `setrcopygroup restore` operation. You can run the `showrcopy groups <groupname>` command to see the status of the SLD groups. All the virtual volume members in the SLD setup has to be in `Synced` status for failback operation to be successful.

- Primary Array is down or is taken offline:

When the primary array is down or the remote copy link between the primary and secondary array is down, and if you need to run the recovery operation, then perform the follow steps:

1. Click **Disaster Recovery with Forced Recovery** to execute the recovery.

After completing this step, SRM displays the `Recovery Required` prompt. This implies that after bringing the storage array or link up, you must run the recovery again.

2. After bringing the storage array or link up, navigate to the **Devices** tab in SRM and click **Refresh** to rediscover the devices.

Make sure that the devices are discovered again in SRM.

3. Execute the **Recovery** and **Reprotect** operations.

For more information about Disaster Recovery—Forced Recovery option, see the *VMware vCenter Site Recovery Manager* documentation.

- If the same virtual volume IDs are part of a single RC group across two storage arrays that are part of an SRM array pair, then during failback reprotect operation SRM service might stop. To avoid this issue, maintain unique ids for the virtual volumes in the RC group across the storage arrays.

For Example:

Run the `showrcopy` command from the HP 3PAR CLI interface. The output for one of the RC Groups is as follows:

```
showrcopy

Group Information

Name          Target      Status      Role      Mode      Options
TestRCG       rsra        Started     Primary   Periodic  Last-Sync 2014-10-20 12:44:24
SGT , over_per_alert
LocalVV      ID  RemoteVV    ID  SyncStatus  LastSyncTime
TestVV_Pri.0 1741 TestVV_Sec.0 1740 Synced      2014-10-20 12:44:24 SGT
TestVV_Pri.1 1742 TestVV_Sec.1 1741 Synced      2014-10-20 12:44:24 SGT
```

As displayed in the above result, the virtual volume id 1741 is same between the primary and secondary volumes in the same RC group. In an RC Group, none of the virtual volumes should have the same virtual volume ID.

If you see this issue, do the following to resolve this issue:

- Process 1

1. Identify all serial ID numbers on Primary\_array and Secondary\_array by running the showrcopy command in HP 3PAR CLI interface.

Sample output:

```
Primary_array Secondary_array

Group Information

Name          Target      Status      Role      Mode      Options
TestRCG       rsra        Started     Primary   Periodic  Last-Sync 2014-10-20
12:44:24 SGT , over_per_alert
LocalVV       ID          RemoteVV    ID        SyncStatus  LastSyncTime
TestVV_Pri.0 1741 TestVV_Sec.0 1740 Synced      2014-10-20 12:44:24
SGT
TestVV_Pri.1 1742 TestVV_Sec.1 1741 Synced      2014-10-20 12:44:24
SGT
```

In the sample set of replications seen above, the serial ID 1741 is used on both arrays.

2. Stop the replication between Primary\_array and Secondary\_array by running the stoprcopygroup <group\_name> command in HP 3PAR CLI interface for RC groups that have the same serialIDs used by source and target devices.
3. Destroy the target device (Secondary Virtual volume) TestVV\_Sec.1 with serialID 1741 on Secondary\_array.
4. Recreate the target device TestVV\_Sec.1 on Secondary\_array. The Secondary\_array assigns a new serialID automatically. This new serialID, one above the largest serialID currently used by Secondary\_array. For example, if the highest current serialID on Secondary\_array is 400, the new device TestVV\_Sec.1 assigned is serialID 401.
5. Ensure that the serialID of the new device TestVV\_Sec.1 is not used by any device on Primary\_array.
6. Re-establish the replication relationship between device TestVV\_Pri.1 on Primary\_array and device TestVV\_Sec.1 on Secondary\_array.

---

ⓘ **IMPORTANT:** This solution destroys the designated target devices only. Do not make any changes to the source devices. However, if it is not possible to achieve uniqueness of serialIDs between the two Arrays, it might be necessary to recreate the source devices. To recreate source devices safely, migrate the data to new storage devices before the source (Primary\_array) device is destroyed.

---

- Process 2

Create a series of small volumes that are sufficient to bring the serialIDs list out of sync between the two Sites. For example:

1. Ensure that Primary\_array has serialIDs starting from 250.
2. Ensure that Secondary\_array has serialIDs starting from 240.
3. Create 30 to 40 small volumes or devices on Primary\_array to use all the indexes from 250 to 280.
4. Delete these small volumes or devices which also delete these serialIDs.

---

**NOTE:** The next serialID on Primary\_array would be 281 and thus preventing any duplication.

---

## Support for multiple array pair configuration

HP 3PAR SRA supports multiple array pair configurations. Different remote copy groups from the array pairs can be part of a single recovery plan or separate recovery plan.

## Support for virtual volume sets and host sets

HP 3PAR SRA supports vvset (virtual volume set) and host set features of HP 3PAR StoreServ Storage system.

The following are the HP 3PAR SRA pre-requisites for HP 3PAR host set and HP 3PAR virtual volume set features:

- For HP 3PAR OS versions 3.1.3 or later:

When an RC group is created, virtual volume set is automatically generated for the remote copy group virtual volumes in both primary and secondary HP 3PAR StoreServ Storage systems. To use the vv set feature for presenting LUNs to a host, then HP recommends that you use automatically created vv sets to present the virtual volumes to the host.

- For HP 3PAR OS version 3.1.2 MU3:

To use the vv set feature for presenting the primary LUNs to host, you must manually create the vv set and map the remote copy group virtual volumes to the created vv set in the primary HP 3PAR StoreServ Storage system. Similarly, HP recommends that you create the vv set manually in the secondary HP 3PAR StoreServ Storage system and map the RC group virtual volumes to the created vv set. In the event of failover, HP 3PAR SRA will use the manually created vv set to present LUNs to the host and HP 3PAR SRA does not create the vv set by itself.

All virtual volumes exposed via the same HP 3PAR virtual volume set and protected by SRM must belong to the same remote copy group.

If virtual volumes are from a virtual volume set with multiple VMs created, make sure to include all virtual volumes in a single remote copy group and in the same protection group. Otherwise, there is a potential of losing connectivity to the VMs if virtual volumes are included in more than one remote copy group and all remote copy groups are not included in the same protection group.

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### NOTE:

- If a remote copy group has virtual volumes that are not participating in datastore creation and if these virtual volumes are exposed to a different host, then there are chances of data corruption.
  - You must make sure that all virtual volumes in remote copy group are participating in datastore. The virtual volumes in a remote copy group that are not participating in datastore creation must not be presented to a host.
  - If the virtual volumes participating in an SRM configuration are exposed using a virtual volume set, any virtual volume member in this set, not used by SRM in the same protected group loses connectivity to the LUN after a failover.
  - In the event of a failover, if the participating virtual volumes and hosts are part of vv set and host set respectively, then the LUNs are exposed using vv set and host set features.
  - If the participating virtual volumes and host are not part of vv set and host set features, then the LUNs are exposed individually to the ESX(i) hosts.
-

## Support for SLD

- HP 3PAR SRA supports synchronous long distance remote copy groups on HP 3PAR OS 3.1.2 MU3 P16 or later MUs, and HP 3PAR OS 3.1.3 or later.
- HP 3PAR SRA can coexist with a synchronous long distance remote copy group on HP 3PAR OS version 3.1.1 to HP 3PAR OS 3.1.2 MU2.

## Workarounds for SLD error codes

This section describes workaround for the following SLD error codes:

- **Error code 1110:** One of the failure reasons might be remote copy replication role of the RC Group `<RC group name>` in target storeserv system `<target name>` is not secondary. Please manually issue the HP 3PAR remote copy `setrcopygroup` CLI command with reverse option to change the role.  
To resolve this, do the following:
  1. Run the `showrcopy groups <RC group name>` command on the original protected storage system.
  2. If the group role is `Primary-Rev`, run the `setrcopygroup reverse -local -current <RC group name>` command to change remote copy role.
- **Error code 1112:** HP 3PAR SRA is not able to connect to target storeserv system `<target name>` to execute the failover operation with restore option. HP 3PAR SRA fails to connect to target HP 3PAR storeserv system with the available credentials. Please try the following options
  1. Try accepting target HP 3PAR SSL certificate again
  2. Verify the connectivity to target HP 3PAR array from SRM host and retry the operation. If above options do not resolve the issue, please manually issue the HP 3PAR remote copy `setrcopygroup` CLI command with restore option to change the replication roles.

To resolve this, do the following:

1. On the protected storage system, run the `showrcopy groups <RC group name>` command.
2. On the recovery storage system, run the `showrcopy groups <RC group name>` the command.
3. If the group role is `Primary-ReV` on the protected storage system, and `Secondary-Rev` on the recovery storage system, run the `setrcopygroup restore -t <targetname> <RC group name>` command on the protected storage system to change the remote copy roles.

## Limitations of SLD configuration

In an SLD remote copy environment with three HP 3PAR StoreServ Storage systems (A, B, and C), where A—B is configured in synchronous mode, A—C in asynchronous periodic mode, and B—C is the standby link in asynchronous periodic mode. SRM/SRA is configured between HP 3PAR StoreServ Storage systems A and C.

- Restore replication after failover:

Data can be restored at the original protected site (A) by discarding all changes made at site (C) after failover. You cannot perform this from the SRM GUI. However, you can run the commands `prepareRestoreReplication` and `restoreReplication` in sequence. You can run these commands from the command prompt using the XML input files.

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**NOTE:** If the commands are executed from the command prompt, the SRM GUI might not reflect the latest status.

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For SLD Remote Copy groups, after restore replication, only the remote copy group between A—C will be started automatically by SRA. Once *Restore Replication* is complete, you must

manually start the remote copy group between A—B before you proceed with any other SRM operations.

- During the reprotect operation, SRA triggers delta resync operation from C—A and C—B, where C is the new primary system after failover. If the SRM recovery operation was performed when either A—B or B—C or both the remote copy links are down, then as per the remote copy behavior, reprotect operation triggered by SRM through SRA will initiate a full copy from C—B only (from C—A delta resync will be initiated).
- SRM recovery operation initiated at C will do a delta sync from B to C and then initiate the failover operation at C. When the A—C link is down, under certain conditions, as per the remote copy behavior, the data transfer from B—C will go into full-sync mode during SRM recovery operation at C.

**Workaround:** When all the remote copy links are UP, run the SRM *Test* operation at least once before executing the disaster recovery at 'C' when the A—C link is down to avoid "B—C" going to FULL SYNC.

# 13 Support and other resources

## Contacting HP

For worldwide technical support information, see the HP support website:  
<http://www.hp.com/support>

Before contacting HP, collect the following information:

- Product model names and numbers
- Technical support registration number (if applicable)
- Product serial numbers
- Error messages
- Operating system type and revision level
- Detailed questions

## HP 3PAR documentation

**Table 6 Documentation list**

<b>For information about:</b>	<b>See:</b>
Supported hardware and software platforms	The Single Point of Connectivity Knowledge for HP Storage Products (SPOCK) website: <a href="http://www.hp.com/storage/spock">http://www.hp.com/storage/spock</a>
Locating HP 3PAR documents	The HP 3PAR StoreServ Storage site: <a href="http://www.hp.com/go/3par">http://www.hp.com/go/3par</a> To access HP 3PAR documents, click the <b>Support</b> link for your product.
<b>HP 3PAR storage system software</b>	
Storage concepts and terminology	<i>HP 3PAR StoreServ Storage Concepts Guide</i>
Using the HP 3PAR Management Console (GUI) to configure and administer HP 3PAR storage systems	<i>HP 3PAR Management Console User's Guide</i>
Using the HP 3PAR CLI to configure and administer storage systems	<i>HP 3PAR Command Line Interface Administrator's Manual</i>
CLI commands	<i>HP 3PAR Command Line Interface Reference</i>
Analyzing system performance	<i>HP 3PAR System Reporter Software User's Guide</i>
Installing and maintaining the Host Explorer agent in order to manage host configuration and connectivity information	<i>HP 3PAR Host Explorer User's Guide</i>
Creating applications compliant with the Common Information Model (CIM) to manage HP 3PAR storage systems	<i>HP 3PAR CIM API Programming Reference</i>
Migrating data from one HP 3PAR storage system to another	<i>HP 3PAR-to-3PAR Storage Peer Motion Guide</i>
Configuring the Secure Service Custodian server in order to monitor and control HP 3PAR storage systems	<i>HP 3PAR Secure Service Custodian Configuration Utility Reference</i>
Using the CLI to configure and manage HP 3PAR Remote Copy	<i>HP 3PAR Remote Copy Software User's Guide</i>
Updating HP 3PAR operating systems	<i>HP 3PAR Upgrade Pre-Planning Guide</i>



**Table 6 Documentation list (continued)**


<b>For information about:</b>	<b>See:</b>
Identifying storage system components, troubleshooting information, and detailed alert information	<i>HP 3PAR F-Class, T-Class, and StoreServ 10000 Storage Troubleshooting Guide</i>
Installing, configuring, and maintaining the HP 3PAR Policy Server	<i>HP 3PAR Policy Server Installation and Setup Guide</i> <i>HP 3PAR Policy Server Administration Guide</i>
<b>Planning for HP 3PAR storage system setup</b>	
Hardware specifications, installation considerations, power requirements, networking options, and cabling information for HP 3PAR storage systems	
HP 3PAR 7200 and 7400 storage systems	<i>HP 3PAR StoreServ 7000 Storage Site Planning Manual</i>
HP 3PAR 10000 storage systems	<i>HP 3PAR StoreServ 10000 Storage Physical Planning Manual</i> <i>HP 3PAR StoreServ 10000 Storage Third-Party Rack Physical Planning Manual</i>
<b>Installing and maintaining HP 3PAR 7200 and 7400 storage systems</b>	
Installing 7200 and 7400 storage systems and initializing the Service Processor	<i>HP 3PAR StoreServ 7000 Storage Installation Guide</i> <i>HP 3PAR StoreServ 7000 Storage SmartStart Software User's Guide</i>
Maintaining, servicing, and upgrading 7200 and 7400 storage systems	<i>HP 3PAR StoreServ 7000 Storage Service Guide</i>
Troubleshooting 7200 and 7400 storage systems	<i>HP 3PAR StoreServ 7000 Storage Troubleshooting Guide</i>
Maintaining the Service Processor	<i>HP 3PAR Service Processor Software User Guide</i> <i>HP 3PAR Service Processor Onsite Customer Care (SPOCC) User's Guide</i>
<b>HP 3PAR host application solutions</b>	
Backing up Oracle databases and using backups for disaster recovery	<i>HP 3PAR Recovery Manager Software for Oracle User's Guide</i>
Backing up Exchange databases and using backups for disaster recovery	<i>HP 3PAR Recovery Manager Software for Microsoft Exchange 2007 and 2010 User's Guide</i>
Backing up SQL databases and using backups for disaster recovery	<i>HP 3PAR Recovery Manager Software for Microsoft SQL Server User's Guide</i>
Backing up VMware databases and using backups for disaster recovery	<i>HP 3PAR Management Plug-in and Recovery Manager Software for VMware vSphere User's Guide</i>
Installing and using the HP 3PAR VSS (Volume Shadow Copy Service) Provider software for Microsoft Windows	<i>HP 3PAR VSS Provider Software for Microsoft Windows User's Guide</i>
Best practices for setting up the Storage Replication Adapter for VMware vCenter	<i>HP 3PAR Storage Replication Adapter for VMware vCenter Site Recovery Manager User Guide</i>
Troubleshooting the Storage Replication Adapter for VMware vCenter Site Recovery Manager	<i>HP 3PAR Storage Replication Adapter for VMware vCenter Site Recovery Manager Troubleshooting Guide</i>
Installing and using vSphere Storage APIs for Array Integration (VAAI) plug-in software for VMware vSphere	<i>HP 3PAR VAAI Plug-in Software for VMware vSphere User's Guide</i>

# Typographic conventions

Table 7 Document conventions

Convention	Element
<b>Bold text</b>	<ul style="list-style-type: none"><li>• Keys that you press</li><li>• Text you typed into a GUI element, such as a text box</li><li>• GUI elements that you click or select, such as menu items, buttons, and so on</li></ul>
Monospace text	<ul style="list-style-type: none"><li>• File and directory names</li><li>• System output</li><li>• Code</li><li>• Commands, their arguments, and argument values</li></ul>
<Monospace text in angle brackets>	<ul style="list-style-type: none"><li>• Code variables</li><li>• Command variables</li></ul>
<b>Bold monospace text</b>	<ul style="list-style-type: none"><li>• Commands you enter into a command line interface</li><li>• System output emphasized for scannability</li></ul>

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 **WARNING!** Indicates that failure to follow directions could result in bodily harm or death, or in irreversible damage to data or to the operating system.

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 **CAUTION:** Indicates that failure to follow directions could result in damage to equipment or data.

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**NOTE:** Provides additional information.

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## Required

Indicates that a procedure must be followed as directed in order to achieve a functional and supported implementation based on testing at HP.

## HP 3PAR branding information

- The server previously referred to as the "InServ" is now referred to as the "HP 3PAR StoreServ Storage system."
- The operating system previously referred to as the "InForm OS" is now referred to as the "HP 3PAR OS."
- The user interface previously referred to as the "InForm Management Console (IMC)" is now referred to as the "HP 3PAR Management Console."
- All products previously referred to as "3PAR" products are now referred to as "HP 3PAR" products.

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## 14 Documentation feedback

HP is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback ([docsfeedback@hp.com](mailto:docsfeedback@hp.com)). Include the document title and part number, version number, or the URL when submitting your feedback.