

Application Note

January 2014

Configuring Remote Replication in an iSCSI-attached SAN Environment



Summary

This application note describes how to configure the remote replication in an iSCSI-attached SAN environment on a Windows Server 2008R2 using the SnapSAN Manager Server software.

Introduction

Remote replication solution includes methodologies and support for protecting production data while facilitating continuous business operations in the face of operational problems or large-scale catastrophic events. Remote Replication is a key storage feature which provides local copies of data to completely redundant environments at recovery sites located a great distance from the day-to-day operational environment. It provides the ability to create clones (point-in-time copies) of data with minimal impact to production.

The Master Volume (MV) or production data volume is what is being protected in case of a disaster. The copy or a clone is an identical copy of the Master Volume and can be referenced as a Replication Volume (RV). The Replication Volume is configured on another SnapSAN array located in a different building, city or state. Protection can be increased by configuring multiple RVs.

SnapSAN Storage arrays replication is Block-based (below the filesystem) using either Fibre Channel or iSCSI protocol. Data blocks changes are replicated from the MV to the RV using different replication methods. The replication methods are:

- Synchronous Mode
- Semi-synchronous Mode
- Background Copy Mode

This document provides the necessary steps in order to configure remote replication in a SnapSAN S5000 or S3000 environment. For additional information on the Remote Replication, please reference the *SnapSAN Replication/Mirroring User Guide*.

Here is an example of how Remote Replication is used in a backup server environment.

Jackup:

Online Backup:

Required Information, Tools, and Files

Before you begin these procedures, the following information, tools, and files are required.

Prerequisites

Prior to performing these procedures, ensure that you have the following:

- Overland Storage SnapSAN S3000/S5000 Disk Array must be installed and configured. You can get additional technical support from our website at http://support.overlandstorage.com, or by contacting Overland Storage using the information found on the Contact Us page on our web site.
- Verify that the following are installed on the Server:
 - Java Runtime Environment (JRE)
 - SnapSAN Manager Server Web Management Interface
- You must have two physical SnapSAN Disk Arrays that are attached together via iSCSI connectivity to each of the SnapSAN 1GbE or 10GbE controller ports, either direct connect or through an Ethernet switch.
- The examples we have provided in this document are of two separate servers. The primary application server which has the MV (Master Volume) and the backup server which has the RV (Replication Volume). This isn't a requirement, a single server can have both MV and RV assigned to it, but all precautions should be considered.
- This document assumes that the Storage Pool and Logical Disk have already been created. Additional information on Binding a Pool and Logical Disk can be found in the *SnapSAN S3000/S5000 Disk Array User Guide*:

http://docs.overlandstorage.com/snapsan

Versions

The test environment used for illustration in this document uses the following versions:

- Windows Server 2008R2
- Java JRE 7 update 40
- MS iSCSI Software Initiator version 6.1
- SnapSAN Manager Server version 8.2.060
- SnapSAN S3000 and S5000 software version 082R.007
- SnapSAN S3000 and S5000 firmware version U22R.007

Creating Replication Reserved Volume

The Replication Reserved Volume (logical disk) must be created on both the Primary and Remote SnapSAN arrays that are participating in the Remote Replication configuration.

 From the SnapSAN Manager Monitor screen, select Configuration > Logical Disk > Logical Disk Bind (for system or control volume).

Logical Disk Bind (for system or control volume)				
ogical Disk Bind (for system or control volume) > Co	nfirmation > Comple	tion		
: Select the pool where a logical disk will be bound.				
Show all pools				
- Pool list -				
Number Pool name RAID Physical disk type	Free capacity[GB]	Capacity[GB]	Actual capacity[GB] Actual us
0000h Ved_RDR_Pool RAID1/10 NLSAS	892.2	910.5		
[4]				Þ
Show logical disks of the selected pool				
Show Togical disks of the selected poor				
: Select a logical disk for system or control volume.				
C Control volume (0.2GB)				
Number of logical disks 📃 🕂				
System volume (8.0GB)				
Replication reserved volume (8.0GB)				
O Data migration reserved volume (14.0GB)				
() Data migration reserved volume (14.068)				
Logical disk capacity : 8.0 GB				
Capacity logical disks consume : 8.0 GB				
Unused capacity of the pool : 892.2 GB				
onused capacity of one poor . 092.200				
	< F	ack Next	t > Cancel	Help
	· L	MEX.	Cancer	nerp

- **2.** Select the following **details**:
 - Pool name
 - Replication reserved volume
- 3. Click Next.
- 4. Click Set.
- 5. Click Yes to confirm.
- 6. Click Finish.

NOTE: Repeat these steps for any other SnapSAN array participating in the Remote Replication process.

Changing a Host Port to the Replication Port

Use the following steps to change the host connection port on the SnapSAN controller to a dedicated replication port. Changing the Host Connection Port to a Replication Port must be performed on both of the SnapSAN arrays that are participating in the Remote Replication configuration.

- 1. From the SnapSAN Manager Monitor screen, select Configuration > Disk Array > Host Connection Port > Host Connection Port Settings (iSCSI).
- 2. Select the **port** to be used as a replication port and click **Edit**.
- 3. Change the Port Type to Replication Port, and click OK.
- 4. Click Next.
- 5. Click Set.
- 6. Click Yes to confirm.
- 7. Click Finish.
- 8. Click Yes.
- 9. Repeat Steps 1–8 to create a replication port on the remote SnapSAN array.

Documenting the SAA ID

The SAA (Sub-system Absolute Address) ID is a unique identifier for each SnapSAN arrays. The SAA ID is used to configure remote replication and identifying and documenting the SAA is required on both SnapSAN arrays (Primary and Remote) that are participating in the Remote Replication configuration.

Use one of the following options in order to identify the SAA ID.

Option1: Using the SnapSAN Manager GUI

- 1. From the SnapSAN Manager Monitor screen, click Screen.
- 2. Right-click the disk array and select Properties.

Under the **General** tab, you can see the hardware information and SAA ID of the particular disk array.

General Network Access (1SCSI) License 200000169712242B Monitoring Status : Running Status : : Ready Type Status Number Fault Attm. Info Pool Ready 1 0 0 0 Pool Ready 12 0 0 0 Physical Disk Ready 16 0 0 0 Controller Ready 16 0 0 0 Product ID : ShapSAN \$5000 - - Product ID : ShapSAN \$5000 - - Status : 0000000042090036 - - SAA : : 000000000000000000000000000000000000	00001697122428 Properties							
Monitoring Status : Running Status : Ready Type Status Number Fault Attn. Info Pool Ready 1 0 0 Dogical Disk Ready 12 0 0 0 Physical Disk Ready 16 0 0 0 Product Disk : - - Product ID : SnapSAN \$5000 0 Product ID : SnapSAN \$5000 - Statu : 0000000942090036 - SAA : 000000000000000000000000000000000000	General Network Access (iSCSI) License							
Status : Ready Type Status Number Fault Attn. Info Pool Ready 1 0 0 0 Pool Ready 3 0 0 0 Physical Disk Ready 12 0 0 0 Controller Ready 16 0 0 0 Controller Ready 16 0 0 0 Product ID : SnapSAN S5000 - - Product FW Rev : 010A - - Sarial Number : 000000042090036 - - Stat : 000000000000000000000000000000000000	200000169712242B							
Status : Ready Type Status Number Fault Attn. Info Pool Ready 1 0 0 0 Pool Ready 3 0 0 0 Physical Disk Ready 12 0 0 0 Controller Ready 16 0 0 0 Controller Ready 16 0 0 0 Product ID : SnapSAN S5000 - - Product FW Rev : 010A - - Sarial Number : 000000042090036 - - Stat : 000000000000000000000000000000000000								
Type Status Number Fault Attn. Info Pool Ready 1 0 0 0 Logical Disk Ready 3 0 0 0 Physical Disk Ready 12 0 0 0 Controller Ready 16 0 0 0 Conf.Chg : - - - - Product ID : SnapSAN S5000 - - - Product FW Rev : 010A - - - - Sata : 020020000169712242B0000000000000000000000000000000000	Conitoring Status : Running							
Type Staus Number Fault Attn. Info Pool Ready 1 0 0 0 Doical Disk Ready 3 0 0 0 Physical Disk Ready 12 0 0 0 Controller Ready 16 0 0 0 Conf.Chg : - - - - Product ID : SnapSAN S5000 - - - Product FW Rev : 010A - - - Sala : 020020000169712242B0000000000000000000000000000000000	Status - Da	odv						
Pool Ready 1 0 0 0 Logical Disk Ready 3 0 0 0 Physical Disk Ready 12 0 0 0 Controller Ready 16 0 0 0 Conf. Chg : - - - - Product ID : SnapSAN \$5000 - - Product FW Rev : 0100 - - Sata : 0000000942090036 - - SAA : 000000000000000000000000000000000000	-							
Logical Disk Ready 3 0 0 0 Physical Disk Ready 12 0 0 0 Controller Ready 16 0 0 0 Controller Ready 16 0 0 0 Product ID : SnapSAN \$5000 - - Product FW Rev : 010A - - Serial Mumber : 0000000942090036 - - SAA : 000000000000000000000000000000000000								
Physical Disk Ready 12 0 0 0 Controller Ready 16 0 0 0 Controller Ready 16 0 0 0 Controller Ready 16 0 0 0 Controller : SnapSAN S5000		-						
Controller Ready 16 0 0 Conf.Chy : - Product ID : SnapSAN S5000 Product ID : SnapSAN S5000 Product FW Rev : 010A Serial Number : 000000942090036 SAA : C20020000169712242E0000000000000000000000000000000000		-						
Conf.Chg : - Product ID : SnapSAN S5000 Product FW Rev : 010A Serial Number : 000000942090036 SAA : 020020000169712242B00000000000 World Wide Name : 200000169712242B Total Capacity : 1.786 TB Number of DEs : 1 Control Path (Current) : 10.25.15.17 Control Path (Reserve) : 10.25.15.18 User System Code : 000000000 Revision of Storage : 082R.007 Control Software : 0FF Write Cache Mode : Write Back Mode					-	-		
Product ID : SnapSAN S5000 Product FW Rev : 010A Serial Number : 000000942090036 SAA : 020020000169712242B0000000000 World Wide Name : 200000169712242B Total Capacity : 1.786 TB Number of DEs : 1 Control Path (Current) : 10.25.15.17 Control Path (Reserve) : 10.25.15.18 User System Code : 000000000 Revision of Storage : 082R.007 Copy Back Mode : 0FF Write Cache Mode : Write Back Mode		neady	10	Ŭ	Ŭ	Ŭ		
Product ID : SnapSAN S5000 Product FW Rev : 010A Serial Number : 000000942090036 SAA : 020020000169712242B0000000000 World Wide Name : 200000169712242B Total Capacity : 1.786 TB Number of DEs : 1 Control Path (Current) : 10.25.15.17 Control Path (Reserve) : 10.25.15.18 User System Code : 000000000 Revision of Storage : 082R.007 Copy Back Mode : 0FF Write Cache Mode : Write Back Mode								
Product ID : SnapSAN S5000 Product FW Rev : 010A Serial Number : 000000942090036 SAA : 020020000169712242B0000000000 World Wide Name : 200000169712242B Total Capacity : 1.786 TB Number of DEs : 1 Control Path (Current) : 10.25.15.17 Control Path (Reserve) : 10.25.15.18 User System Code : 000000000 Revision of Storage : 082R.007 Copy Back Mode : 0FF Write Cache Mode : Write Back Mode								
Product ID : SnapSAN S5000 Product FW Rev : 010A Serial Number : 000000942090036 SAA : 020020000169712242B00000000000 World Wide Name : 200000169712242B Total Capacity : 1.786 TB Number of DEs : 1 Control Path (Current) : 10.25.15.17 Control Path (Reserve) : 10.25.15.18 User System Code : 000000000 Revision of Storage : 082R.007 Copy Back Hode : 0FF Write Cache Mode : Write Back Mode	1							
Product FW Rev : 010Å Serial Number : 0000000942090036 SAA : 020020000169712242B00000000000 World Wide Name : 200000169712242B Total Capacity : 1.786 TB Number of DEs : 1 Control Path (Current) : 10.25.15.17 Control Path (Reserve) : 10.25.15.18 User System Code : 000000000 Revision of Storage : 082R.007 Copy Back Hode : Write Back Mode	Conf.Chg	: -						
Serial Number : 000000942090036 SAA : 020020000169712242B0000000000 World Wide Name : 20000169712242B Total Capacity : 1.786 TB Number of DEs : 1 Control Path (Current) : 10.25.15.17 Control Path (Reserve) : 10.25.15.18 User System Code : 000000000 Revision of Storage Control Software : 082R.007 Copy Back Mode : 0FF Write Cache Mode : Write Back Mode		-	SAN 85000					
SAA : 020020000169712242B0000000000 World Wide Name : 200000169712242B Total Capacity : 1.786 TB Number of DEs : 1 Control Path (Current) : 10.25.15.17 Control Path (Reserve) : 10.25.15.18 User System Code : 000000000 Revision of Storage : 082R.007 Control Software : 0FF Write Eache Mode : Write Back Mode								
SAA : 0000000000000000000000000000000000	Serial Number					_		
Total Capacity : 1.796 TB Number of DEs : 1 Control Path (Current) : 10.25.15.17 Control Path (Reserve) : 10.25.15.18 User System Code : 000000000 Revision of Storage : 082R.007 Control Software : 0FF Write Cache Mode : Write Back Mode	SAA	: 0200;			00000000			
Number of DEs : 1 Control Path (Current) : 10.25.15.17 Control Path (Reserve) : 10.25.15.18 User System Code : 000000000 Revision of Storage : 082R.007 Control Software : 082R.007 Copy Back Mode : 0FF Write Eache Mode	World Wide Name	ld Wide Name : 200000169712242B						
Control Path (Current) : 10.25.15.17 Control Path (Reserve) : 10.25.15.18 User System Code : 0000000000 Revision of Storage : 082R.007 Control Software : 0FF Write Cache Mode : Write Back Mode	Total Capacity	: 1.78	5 TB					
Control Path (Reserve) : 10.25.15.18 User System Code : 0000000000 Revision of Storage : 082R.007 Control Software : 0FF Write Cache Mode : Write Back Mode	Number of DEs	: 1						
Control Path (Reserve) : 10.25.15.18 User System Code : 0000000000 Revision of Storage : 082R.007 Control Software : 0FF Write Cache Mode : Write Back Mode	Compared Database (Compared)	. 10.2						
User System Code : 000000000 Revision of Storage : 082R.007 Control Software : 0FF Copy Back Mode : 0FF Write Cache Mode : Write Back Mode								
Revision of Storage : 082R.007 Control Software : 0FF Copy Back Mode : 0FF Write Cache Mode : Write Back Mode	concroi Fach (Reserve)	. 10.2	5.15.10					
Revision of Storage : 082R.007 Control Software : 0FF Copy Back Mode : 0FF Write Cache Mode : Write Back Mode								
Revision of Storage : 082R.007 Control Software : 0FF Copy Back Mode : 0FF Write Cache Mode : Write Back Mode								
Revision of Storage : 082R.007 Control Software : 0FF Copy Back Mode : 0FF Write Cache Mode : Write Back Mode								
Revision of Storage : 082R.007 Control Software : 0FF Copy Back Mode : 0FF Write Cache Mode : Write Back Mode								
Control Software : 082R.007 Copy Back Mode : 0FF Write Cache Mode : Write Back Mode	User System Code	: 0000	00000					
Write Cache Mode : Write Back Mode		: 082R	. 007					
	Copy Back Mode	: OFF						
	Write Cache Mode	: Writ	e Back Mode					
Close			[

Option 2: Using the command line interface (CLI)

Use the following CLI steps to gather the SAA ID:

1. Log in as **sysadmin/sys123** to the controller using SSH.

2. Run the following **command** after logging in:

ntication. 2013 from 10.20.34.15 rc arrayinfo -arrayname 200000169712242B -dinfo
rc arravinfo -arravname 200000169712242B -dinfo
-
0000169712242B
00200000169712242b0000000000000000000000000000000000
ild
ady
2143GB

iSMrc arrayinfo -arrayname SnapSAN -dinfo

Creating the Remote Replication Link

Creating a Remote Replication link (rdrlink) is only used in an iSCSI SnapSAN environment and it must be created on both of the SnapSAN arrays that are participating in the Remote Replication configuration.

Use the following steps to create an **rdrlink**:

- 1. On the SnapSAN Manager Monitor screen from either the Primary or Remote SnapSAN array, select Configuration > Host, then press Shift + LD Set Management.
- 2. Click Create.
- **3.** Provide the following **details**:
 - For the host interface, select iSCSI RDR.
 - Provide the LD Set name as rdrlink.
 - Leave the default Platform and Action Mode values as is.

LD Set Creating	. >	Confirm > Finish	
1: Select the inte	erfac	e of the host.	
OFC Oi	scsi	🕜 SAS 🕟 iSCSI	RDF
		t (host) information.	
LD Set Name	4	rdrlink	

4. Click **Add** to add the initiator assignable to the host. Specify the **SAA** ID of the remote SnapSAN array.

- 5. Click OK.
- 6. Click Next.

7. Click **Authentication Settings** to start configuring the CHAP (Challenge Handshake Authentication Protocol) authentication.

Provide the following CHAP Authentication details:

- Select Enable Initiator CHAP Authentication.
- Provide the CHAP Secret password.
- Confirm the **password**.

able Initiator CHAP Authenticat:	ion
Secret: **********	
irm Secret: ***********	
Enable Mutual CHAP Authenticatio	m
IP Secret:	

- 8. Click OK.
- 9. Click Set.
- **10.** Click **Yes** to confirm.
- 11. Click Finish.

You are taken back to the LD Set Management page from which you will see the available (and previously created) LD set list.

Set LD Set.					
					(Used connections : 3)
- LD Set List	s –		c	Number of LD	Sets : 3 Number of selected LD Sets : 0)
Platform	Name	Host Name	Configuration Lock	Action Mode	Target Mode
Windows (WN)	192-168-1-8			Normal	Normal
Windows (WN)	192-168-1-9			Normal	Normal
DEFAULT (DF)	rdrlink			Normal	Normal

12. Repeat Steps 1–11 for the **other** SnapSAN array.

Adding the Remote Disk Array to the Primary Disk Array

This section describes how to configure the RDR Setting. You must add both the Primary and Remote SnapSAN array in order to configure RDR settings. Repeat the steps outlined below on each of the SnapSAN arrays.

- 1. Press and hold the **Shift** key while clicking **Configuration**.
- 2. Navigate to Maintenance Functions >RDR Settings.

Set Link in	formation of subsystems.			
No	SAA of destination disk array	Port	Protocol	Add
				Edit
				Delete

3. Click Add.

- **4**. Provide the **RDR Settings** as the following:
 - **a.** Enter the **SAA** ID of the remote SnapSAN array.
 - **b.** Select **iSCSI**.
 - c. Click Add.

	RDR sett	ing					
1	Specify	SAA of destination	disk array.				
	02002000	00016971224280000	0000000				
		alue is less thar d is supplemented		cically.			
2	: Select th	ne protocol.					
	O FC						
	⊙ iscsI						
3	: Set path	information.					
	No	Port number	Port name	Transfer Rate	IP address	Destination Target name	Add
							Edit
							Delete

5. To set the path in an iSCSI-attached SAN environment, provide the following details:

Set path.	Ŀ.	×
Port for the path : 00h-01h	$\overline{\nabla}$	
Transfer Rate	:	Over 256Mbps
TCP port number	:	3260
СНАР Туре	:	Simplex 💌
IP Type	:	IPv4 v
IP address	:	192 . 168 . 1 . 12
CHAP Secret(Initiator)	:	
CHAP Secret(Target)	:	******
Local Initiator alias(on demand)	:	
Destination Target name	:	:ist-m000-sn-0000000942090036.df-rdrlinktarget0002
Local Initiator name	:	saa-0200200000255c3a0edd0000000000000000000000000000000000
	0K	Cancel Help

Field	Recommended Input			
Port for the path	Use drop-down list to choose the port.			
СНАР Туре	Select Simplex for one-way CHAP.			
ІР Туре	Select IPv4.			
IP Address	IP address of the remote SnapSAN array's replication port.			
Chap Secret (Initiator)	Only required if using Duplex CHAP type.			
Chap Secret (Target)	Enter the Target password.			
	NOTE: The type of the initiator CHAP authentication password was configured when creating the rdr link on the remote disk array.			

Field	Recommended Input
Local Initiator alias (on demand)	Optional input.
Destination Target name	Enter the destination target IQN.
Local Initiator name	Enter the local disk array IQN.

NOTE: To get the IQN information of the destination target and local initiator, login to the remote disk array through **ssh** or **telnet**, and run the following command: iSMview -dpi

You can see the Target Name (**Destination Target name**) and Initiator List (that is, the **Local Initiator name**) under the **iSCSI RDR Target Information** section, as shown in the following image:

iSCSI RDR Target	Information
Platform	: DF
LD Set Name	: rdrlink
Target Name	: iqn.2001-03.jp.overland:storage01:ist-m000-sn-0000000942090036.df-rdrlinktarget0002
Portal	:
Initiator List	: iqn.2001-03.jp.overland:storage01:saa-0200200000255c3a0edd0000000000000000000000000000000000

- 6. Click OK.
- 7. On the RDR Settings page, click OK.
- 8. Click Yes.
- **9.** Select the added **SAA ID**.
- 10. Click Online.

🕎 RDR Setting									
1: Set Link information of subsystems.									
No SAA of destination disk array	Port	Protocol	Add						
0 020020000016971224250000000000000000000000000000000000	00h-01h	iSCSI							
			Edit						
			Delete						
0. Openié stan path far nanonatis its tant and the test as set									
Specify the path for connectivity test and the test count.									
Path No 0(00h-01h)									
Count 1 Test									
Test result NormalEnd									
Set remote disk array path to Online/Offline.									
Path No 0(00h-01h) v Online Offline									
Path state ONLINE									

The Path state types:

- Offline Indicates an error in the configuration.
- **Freeze** Indicates that the data replication function in the linked disk array is frozen. The Freeze path state automatically changes to **Online** within few seconds, and, if it does not, then click the **Online** button to manually change the path state to **Online**.
- 11. Repeat Steps 1–10 to add the local SnapSAN array to the remote array.

Testing the Connectivity

Follow this procedure to test the connectivity between the Remote and Primary disk arrays.

- 1. From the **RDR Settings** page, click **Test**.
- 2. Click Yes.

2: Specify the p	ath for connectivity test and the test count.
Path No	0(00h-01h)
Count	1 Test
Test result	NormalEnd

A successfully established connection results in a Normal End status.

NOTE: Configuring the SAA on a single SnapSAN array will not establish a proper connection and the test results fails as **Abnormal End** status. Thus it is imperative to establish a proper connection, and configure both SAA on each SnapSAN array.

Configuring the Remote Replication Environment

Pairing MV and RV

- 1. From the SnapSAN Manager Monitor screen, select **Option > Replication**.
- **2.** From the **Disk Array Link Information** tab, check if the disk arrays are properly linked for the remote replication.

iSM Server	Replicati	on Informa.	tion Disk Arra	y Link Information	ATgroup Informat	tion	
+ S 200000255C3A0EDD	Link	Link	Link Disk	Link Mode	Path Number	Path State	Direc
	00h	iSCSI	200000255C	Normal	00h	Normal	01h

For example, if a SnapSAN S5000 is added to a SnapSANS3000 but the S3000 has not been added to S5000, then clicking the **Disk Array Link Information** tab displays a blue dot icon under the **Link** column and the **Path State** status appears as **Freeze**.

iSM Server	Replicati	on Informat.	ion	Disk Array Link Informat	ion ATgroup Infor	mation	
200000255C3A0EDD	Link	Link	Link	n Disk Array Name	Link Mode	Path Number	Path Stat
	🥘 00h	iSCSI	2000	000169712242B	Normal	00h	Freeze
						•	

3. After verifying the proper link connection, pair the MV and RV by using either Option 1 or Option 2:

Option 1: Using the SnapSAN Manager GUI:

a. In the **left** pane, click the **Primary SnapSAN array** (from which the data has to be replicated).

b. In the **right** pane, right-click the **disk** to be replicated (known as the Master Volume or MV) and select **Pair Settings**.

iSM Server	Replics	ation I	nforma	tion	Disk Arra	ay Link	Infor	mation	Tgroup In	format	ion	
	Type	N	0	Logi	cal Disk N	Jame			PD	Pair	Number	Pair D.
	VI	0	WN	Pp				[NLSAS			
					Pair Settires Unpair							
					Volume Operat	ion						
					Forced Operati		- L					
					r orcea operad							
	I				Connection Sta	atus En	ter					

- c. Provide the following **details**:
 - Select Remote Data Replication.
 - In the field labeled LD Set Name, use default ALL for both the MV and RV sections.
 - In the field labeled Logical Disk, select the master volume under the MV section and the replication volume under the RV section.
- d. Click Pair.
- e. Click Yes to confirm.
- f. Click OK.
- g. Once the pairing has finished, close the Pair Settings dialog box.

File View Operation Help											
iSM Server	Replic	ation I	nforma	tion	Disk Ar	ray Link	Information	ΑTς	roup Inf	ormati	ion
+ 200000155712242B	Type	N	0	Logi	cal Disk	Name			PD	Pair	Number
E	MU		<u> </u>								
	MV	0	ωN	RIS	MV				NLSAS	0000h	

Option 2: Using the command line interface:

- a. Login as sysadmin/sys123 to the controller through SSH.
- **b.** Run the following command line to **pair** the MV and RV:

```
iSMrc_pair -pair -mv MV_rdr -mvflg ld -rv RV_rdr -rvflg ld
login as: sysadmin
Using keyboard-interactive authentication.
Password:
Last login: Wed Dec 11 21:54:48 2013 from cnt1
sysadmin@200000169712242B-0# iSMrc_pair -pair -mv RDR_MV -mvflg ld -rv VED_RDR_RV -rvflg ld [
iSMrc_pair: Info: iSM13248: Command has completed successfully.(already) (code=0b0d-0d03-0003-0000)
ExitStatus:3
```

Testing Remote Replication

As a best practice, always test the replication environment after initial configuration. Use the following steps in order to copy sample data from the Primary MV to the Remote RV. The following steps describe how to prepare the MV and RV through Windows Disk Management.

- 1. From the Primary Windows host server that has the Master Volume or production disk, select Computer Management > Disk Management.
- 1. Change the status of the assigned disk to Online.
- 2. Initialize the **disk**.
- 3. Format the assigned disk.
- 4. Copy or create some **sample data** to the prepared Master Volume.

5. On the Remote backup host server, initialize the **RV** leaving it unformatted.

Performing the Remote Replication

1. To start replication, you must change the RV disk to an **Offline** status on the **Remote Server**.

On Windows Server 2008R2 and newer Operating Systems, the disk can be taken offline using Windows Disk Management. To do this on Windows 2003 and older Microsoft Operating Systems, the RV must be unassigned through the SnapSAN Manager from **Configuration > Host > Assignment of Logical Disk**.

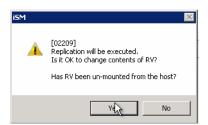
- **2.** From the left pane of the Repli interface in SnapSAN Manager, select the particular disk array from which data is being replicated, then right-click the **MV** and select the path **Volume Operation > Replicate**.
- 3. In the Replicate dialog box, under Copy Conditions, select the following details:
 - Range of replication as All.
 - Copy Mode as Synchronous.

Below is a sample table of copy control state:

Co	py Control State	Copy State
Foreground Copy	Sync Mode	Copy for reflecting difference is performed.
		 Updates to MV are reflected RV sequentially.
	Semi Sync Mode	 Copy for reflecting difference is performed.
		• I/O of updates to MV is completed when data is written to MV, and the data is copied to RV immediately after that.
		• Cannot be set to a pair (DDR) in the same disk array.
Background Copy	8 4 0	Copy for reflecting difference is performed.
		• I/O of updates to MV is completed when data is written to MV, and the data is accumulated as difference information. For the accumulated difference, data is copied to RV asynchronously. The copy interval to RV (background copy level) can be changed in units of disk arrays.
		 When performing Separate, the state must be changed to Foreground Copy in advance.
Suspend	Suspend	Copy for reflecting difference is not performed.
		• I/O of updates to MV is completed when data is written to MV, and the data is accumulated as difference information. Reflection to RV is not performed.
	Suspend due to a	Forcefully suspended in the disk array due to a copy fault.
	failure	Copy for reflecting difference is not performed.
		• I/O of updates to MV is completed when data is written to MV, and the data is accumulated as difference information. Reflection to RV is not performed.

- RV Status as Not Ready.
- 4. Click Replicate.

5. If RV is dismounted, click Yes.



Once the replication starts, you can close the replication dialog box.

Checking the Replication Status

- 1. From the Repli interface, select the Primary SnapSAN Array where the MV is located by double-clicking MV (or right-clicking the MV and select Connection Status.)
- **2.** Check the **details** of the data replication from MV to RV.

Connection Status			
200000169712242B	200000255C3A0EDD		
200000169712242		200000255C3A0EDD	
(0000h)WN:RDR	- 	191 GB(0.0MB/S) moteDataReplication (0000k)WN:VED_RDR_RV RV Not Ready	
	Activity Sync Copy Con Copy Mod Replicate s Remaining	: Sync Execution ntrol : Foreground Copy ode : Synchronous Copy	
		Close Refresh Help	

Verifying the Replicated Data

Separate the Connection between MV and RV

- 1. From the Repli interface, select the Primary SnapSAN array.
- 2. Right-click MV and select Volume Operation > Separate.
- 3. Click Separate.
- 4. Click Yes to confirm.

Assign RV to the Host

If the RV is not assigned to the host, use the following steps to assign it:

- From the SnapSAN Manager Monitor screen, select Configuration > Host > Assignment of Logical Disk.
- 2. Select the Host and the Logical Disk for assignment.
- 3. Click Next.
- 4. Click Set.

- 5. Click Yes to confirm.
- 6. Click Finish.
- 7. Click Yes.

Change the Drive Letter

- 1. From the remote backup host server, launch Windows Disk Management.
- 2. Under Storage, rescan the disks or refresh the details to rediscover the RV disk.
- **3.** Find the new disk with no drive letter, right-click it, and select the option **Change Drive** Letter and Paths.

(= =) =	? 🖬 🛛 🗙 I	e 😼							
Volume	Layout	Туре	File System	Status	Capacity	Free Space	% Free	Fault Tolerance	Overhead
-	Simple	Basic	NTFS	Healthy (S	100 MB	72 MB	72 %	No	0%
-	Simple	Basic	NTFS	Healthy (P	10.00 GB	9.92 GB	99 %	No	0%
⊃ (C:)	Simple	Basic	NTFS	Healthy (B	232.73 GB	204.15 GB	88 %	No	0%
Disk 0									
Basic				(C:)					
232.83 GB Online	100 MB NTFS Healthy (System	Activo Drimo	eu Dartition)	232.73) GB NTFS y (Boot, Page File	Grade Dump, Br	impeus Dostition		
or mile	Treating (bystern	, Active, Frind	ry Fardoori)	rieaich	y (DODC, Page File	, crash bump, Fr	inaly Faluuon		
Disk 1									
Basic	27/////////////////////////////////////	///////////////////////////////////////			///////////////////////////////////////	///////////////////////////////////////			
10.00 GB Online	10.00 GB NTF5			Open					
Unline	Healthy (Primary	Partition)		Explore					
0				Mark Partition	a ac Activo				
CD-ROM 0 DVD (D:)					Letter and Paths				
				Format					
No Media				Extend Volum					
				Extend Volum Shrink Volume					
					2				
				Add Mirror					

- 4. Click Add.
- 5. Select the following **details**:
 - Assign the following Drive Letter
 - Drive
- 6. Click OK.

The replicated data should now be the same as what was created on the Master Volume.



Restoring Data from the RV to the MV

Fail-over to the RV is used primary in Backup or Disaster Recovery. The following steps describe how to use the Restore option or Fail-back from the RV to the MV (in reverse) in order to update the MV that had changes made while the MV was unavailable.

Prerequisites:

- The MV must not be formatted (delete the partition and make it unallocated).
- The volumes MV and RV must both be dismounted.

NOTE: When restoring the data without dismounting MV and RV from hosts, the restore task will be completed but with errors and after completing the restore process, no data will be restored.

To start data restorations from the RV to MV use the following steps:

- 1. From the Repli interface, select the particular **disk array** in which data is replicated, rightclick the RV, and select **Volume Operation > Restore**.
- **2.** Select the details under the section **Restore Conditions** as per your requirements, and click **Restore**.
- **3.** Do **one** of the following;
 - If MV and RV are dismounted, click Yes.
 - If they are not dismounted, first dismount them and then click Yes.

iSM	•	×
	[02210] Restoring will be executed. Is it OK to change contents of MV? Have both MV and RV been un-mounted from the host?	
е ,	Yes No	

Verifying the Restored Data

To verify the restored data:

- 1. Separate the connection between MV and RV
- 2. Assign MV to the host.
- **3.** If required (not found), change the **drive letter**. Details for changing the drive letter can be found in **Change the Drive Letter**.
- 4. From the Primary host server, launch Windows Disk Management.
- 5. Under Storage, rescan the disks or refresh the details to rediscover the MV disk.
- **6.** Find the new disk with no drive letter, right-click it, and select the option **Change Drive** Letter and Paths.

autocal Disk (F:)	omputer	 Local Disk (F:) 		🔻 🚱 Sea	rch Local Disk (F:)
Organize 👻 🧾 Op	en 🔻	Print New folder			III 🕶 🔟 😧
🧮 Desktop	_	Name ^	Date modified	Туре	Size
Downloads 📃 Recent Places		퉬 McAfee	12/11/2013 9:00 PM	File folder	
Mates		鷆 McAfee virus update	12/11/2013 9:00 PM	File folder	
詞 Libraries		New Text Document	12/11/2013 8:27 PM	Text Document	1 KB
Documents Music		v Text Document - Notepad Edit Format View Help			
📄 Pictures 🚼 Videos		o Iam from MV!			

7. The replicated data should be the same as what was created on the Replication Volume.

Performance Analysis using Performance Monitor

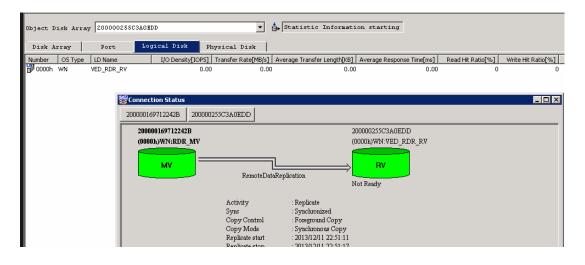
This section discusses the Synchronous and Semi-synchronous replication modes and their performances. For more details on how to configure the Performance Monitor, refer to the *Performance Monitor* User Guide.

Synchronous Replication

In Synchronous Replication mode, the data copy from MV to RV begins when the write request command is issued, and is done when the data copy has completed and the write request command completion notification is issued to the host:

- 1. The write request data from the host is stored in the cache memory area of the MV.
- **2.** The write data from the cache memory is transferred to the remote SnapSAN array and stores the data in the cache memory of the RV.
- **3.** Completion of the write request is sent to the host.
- 4. The data from cache memory is written to each physical disk of the MV and RV.

The example shows the performance details on an active Synchronous Replication:



Semi-synchronous Replication

The Semi-synchronous mode, the host is notified of the completion of the write request at the completion of writing to the MV, and then the data is copied from the MV to the RV. Even if the RV is located a great distance from the MV, this mode has less impact on I/O performance than Synchronous mode.

- 1. The write request data from the host is stored in the cache memory area of the MV.
- 2. Completion of the write request is sent to the host.
- **3.** The write data from the cache memory is transferred to the remote SnapSAN array and stores the data in the cache memory of the RV.
- 4. The data from cache memory is written to each physical disk of the MV and RV.

