

Application Note

February 2014

Configuring Remote Replication in a Fibre-attached SAN Environment



Summary

This application note describes how to configure the remote replication in a Fibre-attached SAN environment on a Windows Server 2012 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 (FC) 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.

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 Fibre Channel to each of the SnapSAN controller's Fibre port, either direct connect or through a FC switch (fabric). In a fabric environment the ports from the Primary and Remote SnapSAN array must be in the same fabric zone configuration.
- 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 2012
- Java JRE 7 update 40
- QLogic QA2462 HBA
- 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	m or control volume)								
Logical Disk Bind (for system or control volume) > Confirmation > Completion									
1: Select the pool where a logical	disk will be bound.								
Show all pools									
- Pool list -									
Number Pool name UUU3h SRM_3K_RS_Pool	RAID Physical disk type RAIDI/IU SAS	Free capacity[GB]	Capacity[GB] Act 404.0	ual capacity[GB] Ac					
0004h HNR10	RAID1/10 SAS	0.7	808.0						
0005h HN_ESX51_3420_R10	RAID1/10 SAS	808.0	808.0	_					
0006h Ved_RDR	RAID1710 SAS	388.7	404.0						
Show logical disks of the 2: Select a logical disk for system	e selected pool								
Control volume (0.2GB) Number of logical disks	5	le.							
C System volume (8.0GB)									
Replication reserved vol	ume (8.0GB)								
C Data migration reserved	volume (14.0GB)								
Logical disk capacity	: 8.0 GB								
Capacity logical disks c	consume : 8.0 GB								
Unused capacity of the p	0001 : 388.7 GB								
9: Catlagical disk name									
		< Back	N Xt >	Cancel Help					

- **2.** Select the following **details**:
 - Pool name
 - Replication reserved volume
- **3.** Enter the Logical disk name.
- 4. Click Next.
- 5. Click Set.
- 6. Click Yes to confirm.
- 7. 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 (FC).
- 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.

NOTE: It is recommended to put all the replication ports into one zone. This avoids communication problems with other FC ports.

Zones	Config File
Host1 ports. Disk Array ports)
Host2 ports. Disk Arrav	Configurations file of FC switch
Replication ports	J

- 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.

00000169712242	8 Propertie	5							
General Netwo	rk Acces:	s (iSCSI)	License						
2020001/07132420									
Monitoring Sta	tus : Ru	nning							
	_								
Status	: Re	ady							
Type		Status	Number	Fault	Attn.	Info			
Pool		Ready	1	0	0	0			
E Logic	al Disk	Ready	3	0	0	0			
Physi	cal Disk	Ready	12	0	0	0			
Contr	oller	Ready	16	0	0	0			
Conf.Chg		: -							
Product ID		: Sna	apSAN S5000						
Product FW Rev		: 010	010A						
Serial Number		: 000	0000942090036						
SAA		: 020	0200000169712	242B00000	00000000				
World Wide Nam	.e	: 200	000169712242B						
Total Capacity		: 1.7	786 TB						
Number of DEs		: 1							
Control Path (Current)	: 10.	25.15.17						
Control Path (Reserve)	: 10.	25.15.18						
User System Co	de	: 000	0000000						
Revision of St Control Softwa	orage	: 082	R.007						
CONSTOR DOLOWS		0.77							
Conv Back Mode		- ORI	7						

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:
 - iSMrc_arrayinfo -arrayname SnapSAN -dinfo

login as: sysadmin Using keyboard-interactive au Password: Last login: Tue Dec 10 22:51 sysadmin@200000169712242B-0#	thentication. <u>57 2013 from 10.20.34.15</u> iSMrc_arrayinfo -arrayname 200000169712242B -dinfo
Disk Array Name	200000169712242B
SAA	020020000169712242b0000000000000000000000000000000000
000000	
Differential Map	Build
Replication Status	Ready
Back Ground Copy Level	3
Max Number of RV Setting	4
Max Capacity of Pair Volume	262143GB
ExitStatus:0	

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.

12	RDR Setting			
1	Set Link information 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 FC.
 - c. Click Add.

🚟 RDR setting					
1: Specify SAA of destination	i disk array.				
020020000016971224140000	000000000000000000000000000000000000000	000000000000000000000000000000000000000			
When value is less tha the end is supplemente	n 56 character, d with O automa	tically.			
2: Select the protocol.					
⊙ FC					
C iscsi		Ĵ.			
3: Set path information.					
No Port number	Port name	Transfer Rate	Port Identifier Lock	Port Identifier	Add
					Edit
					Delete
1					

5. To set the **path** in an FC-attached SAN environment:

Set path.		2
Port for the path :	0	0h-02h
Transfer Rate	:	Over 256Mbps 💌
Port Identifier Lock	:	Unlock
Port Identifier	:	000000
OK Car	ncel	Help

- a. Select the replication port from the Port for the path drop-down list.
- **b.** Using the default settings for the other items, click **OK**.
- 6. On the RDR Settings page, click OK.

- 7. Click Yes.
- 8. Select the added SAA ID.
- 9. Click Online.

	RDR Setting	
1:	Set Link information of subsystems.	
	No SAA of destination disk array Port Protocol	Add
	0 02002000001697122414000000000000000000000000000000000	Rdit
		Delete
2:	Specify the path for connectivity test and the test count.	
	Path No 0(00h-02h)	
	Count 1 Test	
	Test result	
3:	Set remote disk array path to Online/Offline.	
	Path No 0(00h-02h) v Online Offline	
Ľ	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**.

10. Repeat Steps 1–9 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 conne	ctivity te	st and the test count	
Path No	0(00h-02h)	Ŧ		
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	ion Informa	ation Disk Arra	y Link Information	n ATgroup Informa	tion	
+ 🖼 SDS500034	Link	Link	Link Disk	Link Mode	Path Number	Path State	Direct
	00h	FC	SSS3000SD	Normal	00h	Normal	00h

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**

File View Operation Help									
iSM Server	Replicati	on Informa.	ation I	Disk Arra	y Link Informatior	ATgroup Informat	tion		
SDS500034170	Link	Link	Link 1	Disk	Link Mode	Path Number	Path Sta	te	Direc
	0 0h	FC	SDS50	0034170	Normal	00h	Freeze		01h

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**.

SM Server	Replics	tion I	nforma	tion Disk Array Link Information Al	group Inf	ormation
	Type	N	0	Logical Disk Name	PD	Pai F
	🗳 i v	0		SRM_RS_Volume0006	SAS	
	NI 😋	0		SRM_RS_Volume0007	SAS	
	🗳 IV	0	LХ	SRM_50GB_TARGET_CB	SAS	
	🗳 IV	0	LХ	SRM_50GB_DDR_CLONE	SAS	
	UI 😋	0	WG	HNR10LD1	SAS	
	1V 🗳	0	WN	VED_SHARED	SAS	
	🗳 IV	0	WN	VED_HEARTBEAT_STORE0013	SAS	
	🗳 IV	0	WN	VED_HEARTBEAT_STORE0014	SAS	
	🗳 IV	0	WN	VED_INQ	SAS	
	UI 😋	0	WG	VED_GPT	SAS	
	VI	0	WN	VED_MY Pair Settings	SAS	
				Libbair		
				Volume Operation		
				Forced Operation		
				Connection Status Enter		

- 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.

iSM Server	Replica	tion I:	nforma	tion Disk Array Link Information ATe	roup Inf	ormation	1]		
	Type N 0			Logical Disk Name	PD	Pai	Pair D	Pair	
	🗳 iv	0		SRM_RS_Volume0006	SAS				
	🖕 IV	0		SRM_RS_Volume0007	SAS				
	🖕 IV	0	ΓX	SRM_50GB_TARGET_CB	SAS				
	UI 😋	0	ΓX	SRM_50GB_DDR_CLONE	SAS				
	UI 🖸	0	WG	HNR10LD1	SAS				
	UI 🖸	0	WN	VED_SHARED	SAS				
	UI 🖸	0	WN	VED_HEARTBEAT_STORE0013	SAS				
	UI 💭	0	WN	VED_HEARTBEAT_STORE0014	SAS				
🖄 IV 0 WN		WN	ARD IND	SAS					
	Ö TV	TV O NG		VRD_GPT	SAS				
	W NV	0	WN	VED_NV_LD	SAS	0001h	VED_RV_LD	SAS	

g. Once the pairing has finished, close the Pair Settings dialog box.

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
```

sysadmin@SSS3000SD-0# iSMrc_pair -pair -mv VED_MV_LD -mvflg ld -rv VED_RV_LD -rvflg ld iSMrc_pair: Info: iSM13247: Command has completed successfully. (code=427e-0d03-0004-0000) ExitStatus:0

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**.

- 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.

(Copy 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		 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 failure	 Forcefully suspended in the disk array due to a copy fault. 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. 			

Below is a sample table of copy control state:

- 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	
SDS500034170 SSS3000SD	
SSS3000SD (0017h)WN:VED_MY_LD	SDS500034170 (0001h)WN:VED_RV_LD 7.47 GB(98 2MB/S) RemoteDataReplication RemoteDataReplication
	Activity : Replicate Sync : Sync Execution Copy Control : Foreground Copy Copy Mode : Synchronous Copy Replicate start : 2013/11/07 06:06:40 Remaining copy time : Im 17s
	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:

- 1. 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.

/olume	Layout	Туре	File System	Status	Capacity	Free Space	% Free	Fault Tolerance	Overhead
9	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%
asic 32,83 GB Online	100 MB NTFS Healthy (System,	, Active, Prima	ary Partition)	(C:) 232.73 Health	GB NTFS / (Boot, Page File	, Crash Dump, Pr	imary Partition)	
Disk 0 Sasic Sasic Sasic Sasic Sasic Doline Disk 1 Sasic 0.00 GB Doline	100 MB NTF5 Healthy (System, 10.00 GB NTF5 Healthy (Primary	, Active, Prima Partition)	ary Partition)	(C:) 232,73 Healthy Open Explore	GB NTFS y (Boot, Page File	, Crash Dump, Pr	imary Partition		
Disk 0 asic 232.83 GB Online Disk 1 asic 10.00 GB Online Disk Disk	100 MB NTF5 Healthy (System, 10.00 GB NTF5 Healthy (Primary	, Active, Prima	ry Partition)	Open Explore Mark Partition Format.	GB NTFS y (Boot, Page File as Active Letter and Paths	, Crash Dump, Pr	imary Partition		

- 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.

File Home Sha	re View Computer ► VED RDR (E:)			
☆ Favorites	Name	Date modified	Туре	Size
💼 Desktop 🐌 Downloads 🗐 Recent places	MV.bt	11/7/2013 6:05 AM	Text Document	1 KB
🥃 Libraries				
Documents Music	2	MV.tx	t - Notepad	
E Pictures	File Edit Format View Help Thisris From 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.



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.

File Action View I	Help									
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	NTES	Healthy (B	232.73 GB	204.15 GB	88 %	No	0%	

Disk 0 Basic 232.83 GB Online	100 MB NTFS Healthy (System, Active, Primary Partition)	(C:) 232.73 GB NTFS Healthy (Boot, Page File, Cra	sh Dump, Primary Partition)
Disk 1 Basic 10.00 GB Online	10.00 GB NTFS Healthy (Primary Parition)	Open Explore	
DVD (D:)		Mark Partition as Active Change Prive Letter and Paths Format Extend Volume	

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

File Home Sha	re View					
© • ↑ 🖬 •	Computer 🔸 VED_RDR (E:)				hr.	∨ Ċ S
🚖 Favorites	Name	Date modified	Туре	Size	. 0	
🛄 Desktop	MV.txt	11/7/2013 6:05 AM	Text Document	1 KB		
🗼 Downloads						
📷 Recent places						
🥽 Libraries						
Documents		MV.tx	t - Notepad		-	
Music Pictures	File Edit Format View Help					
Videos	This is From Master volume					^

8. Open the particular disk drive and verify the restored data.

File Action Vie	ew Help												
I I I I I I I I I I I I I I I I I I I	🗊 🖸 🗳 📓												
Volume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free						
📼 (C:) 📼 System Reserved	Simple Simple	Basic Basic	NTFS NTFS	Healthy (B Healthy (S	136.35 GB 350 MB	115.83 GB 109 MB	85 % 31 %						
C VED_RDR (F:)	Simple	👝 I ⊋ 🛛	} ∓			VED_R	DR (F:)			L	- 0	x	J
		File	Home Shar	e View								~ ?	
		\odot	* 1 🖬 🕨	Computer 🕨 V	ED_RDR (F:)			¥ (🖒 🛛 Search V	ED_RDR (F:)		P	
		🚖 Favo	rites	Name	•	Date modified	Туре		Size				
Disk 0		📃 De	sktop	🗎 MV		11/7/2013 6:05 A	M Text Doc	ument	1 KB				
Basic 136.70 GB Online	System Reserv 350 MB NTFS Healthy (System	🎉 Do 🔛 Re	wnloads cent places										
Disk 1				2 11 1		MV	- Notepad				-	• >	
15.00 GB Online	VED_RDR 15.00 GB NTFS Healthy (Primar	This	is From Ma	ster volum	e								<u>^</u>

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.

Dbject D)isk A	rray SDS5000	34170			Statistic Informati	on starting		
Disk A	rray	Port	Logic	al Disk Phy	ysical Disk				
Number	OS T WN	VEC_RV_LD		I/O Density[IOPS] 6.17	Transfer Rate[MB/s] 1.31	Average Transfer Length[KB] 217.99	Average Response Time[ms] 21.73	Read Hit Ratio[%]	Write Hit Ratio[%]
		Connection St SDS500034170	atus SSS3000SE						×
		SSS3000SI (0017h)WN) Remote	DataReplication	SDS500034170 (0001h)WN:VED_F RV Not Ready	wTD		
				Activity Sync Copy Control Copy Mode Replicate star Replicate stop	: Replicate : Synchror 1 : Foregrou : Semi-syn t : 2013/11/0 o : 2013/11/0	ized nd Copy chronous Copy 17 21:19:47 17 21:19:53			
	ĺ				Close	Refresh Help			