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Cisco MDS 9000 Family SANTap with EMC RecoverPoint Migration Guide

Upgrading the SSM to the Cisco MSM-18/4 and to the MDS 9222i Switch

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Preface

This preface describes the audience, organization, and conventions of the *Cisco MDS 9000 Family SANTap with EMC RecoverPoint Migration Guide*. It also provides information on how to obtain related documentation.



Note

As of NX-OS Release 4.1(1), SAN-OS has been changed to NX-OS. References to SAN-OS releases before 4.1(1) still apply.

Audience

This guide is intended for experienced network administrators who are responsible for planning, installing, configuring, and maintaining the Cisco MDS 9000 SANTap application.

Organization

This document is organized as follows:

Chapter	Title	Description
Chapter 1	Overview	Provides an overview of the SSM to MSM-18/4 and to the MDS 9222i switch upgrade.
Chapter 2	Migration Procedures	Provides an overview of the migration procedures from the RecoverPoint environment to the new Cisco platform.
Appendix A	Licensing and Commands	Provides information about licensing and commands for SANTap migration.

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Document Conventions

Command descriptions use these conventions:

boldface font	Commands and keywords are in boldface.
<i>italic font</i>	Arguments for which you supply values are in italics.
[]	Elements in square brackets are optional.
[x y z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.

Screen examples use these conventions:

screen font	Terminal sessions and information the switch displays are in screen font.
boldface screen font	Information you must enter is in boldface screen font.
<i>italic screen font</i>	Arguments for which you supply values are in italic screen font.
< >	Nonprinting characters, such as passwords, are in angle brackets.
[]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

This document uses the following conventions:



Note

Means reader *take note*. Notes contain helpful suggestions or references to material not covered in the manual.



Caution

Means reader *be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

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Related Documentation

The documentation set for the Cisco MDS 9000 Family includes the following documents. To find a document online, use the Cisco MDS NX-OS Documentation Locator at:

http://www.cisco.com/en/US/docs/storage/san_switches/mds9000/roadmaps/doclocator.htm

Release Notes

- *Cisco MDS 9000 Family Release Notes for Cisco MDS NX-OS Releases*
- *Cisco MDS 9000 Family Release Notes for MDS SAN-OS Releases*
- *Cisco MDS 9000 Family Release Notes for Storage Services Interface Images*
- *Cisco MDS 9000 Family Release Notes for Cisco MDS 9000 EPLD Images*
- *Release Notes for Cisco MDS 9000 Family Fabric Manager*

Regulatory Compliance and Safety Information

- *Regulatory Compliance and Safety Information for the Cisco MDS 9000 Family*

Compatibility Information

- *Cisco Data Center Interoperability Support Matrix*
- *Cisco MDS 9000 NX-OS Hardware and Software Compatibility Information and Feature Lists*
- *Cisco MDS NX-OS Release Compatibility Matrix for Storage Service Interface Images*
- *Cisco MDS 9000 Family Switch-to-Switch Interoperability Configuration Guide*
- *Cisco MDS NX-OS Release Compatibility Matrix for IBM SAN Volume Controller Software for Cisco MDS 9000*
- *Cisco MDS SAN-OS Release Compatibility Matrix for VERITAS Storage Foundation for Networks Software*

Hardware Installation

- *Cisco MDS 9500 Series Hardware Installation Guide*
- *Cisco MDS 9200 Series Hardware Installation Guide*
- *Cisco MDS 9100 Series Hardware Installation Guide*
- *Cisco MDS 9124 and Cisco MDS 9134 Multilayer Fabric Switch Quick Start Guide*

Software Installation and Upgrade

- *Cisco MDS 9000 NX-OS Release 4.1(x) and SAN-OS 3(x) Software Upgrade and Downgrade Guide*
- *Cisco MDS 9000 Family Storage Services Interface Image Install and Upgrade Guide*

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- *Cisco MDS 9000 Family Storage Services Module Software Installation and Upgrade Guide*

Cisco NX-OS

- *Cisco MDS 9000 Family NX-OS Licensing Guide*
- *Cisco MDS 9000 Family NX-OS Fundamentals Configuration Guide*
- *Cisco MDS 9000 Family NX-OS System Management Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Interfaces Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Fabric Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Quality of Service Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Security Configuration Guide*
- *Cisco MDS 9000 Family NX-OS IP Services Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Intelligent Storage Services Configuration Guide*
- *Cisco MDS 9000 Family NX-OS High Availability and Redundancy Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Inter-VSAN Routing Configuration Guide*

Cisco Fabric Manager

- *Cisco Fabric Manager Fundamentals Configuration Guide*
- *Cisco Fabric Manager System Management Configuration Guide*
- *Cisco Fabric Manager Interfaces Configuration Guide*
- *Cisco Fabric Manager Fabric Configuration Guide*
- *Cisco Fabric Manager Quality of Service Configuration Guide*
- *Cisco Fabric Manager Security Configuration Guide*
- *Cisco Fabric Manager IP Services Configuration Guide*
- *Cisco Fabric Manager Intelligent Storage Services Configuration Guide*
- *Cisco Fabric Manager High Availability and Redundancy Configuration Guide*
- *Cisco Fabric Manager Inter-VSAN Routing Configuration Guide*
- *Cisco Fabric Manager Online Help*
- *Cisco Fabric Manager Web Services Online Help*

Command-Line Interface

- *Cisco MDS 9000 Family Command Reference*

Intelligent Storage Networking Services Configuration Guides

- *Cisco MDS 9000 I/O Acceleration Configuration Guide*
- *Cisco MDS 9000 Family SANTap Deployment Guide*

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- *Cisco MDS 9000 Family Data Mobility Manager Configuration Guide*
- *Cisco MDS 9000 Family Storage Media Encryption Configuration Guide*
- *Cisco MDS 9000 Family Secure Erase Configuration Guide*
- *Cisco MDS 9000 Family Cookbook for Cisco MDS SAN-OS*

Troubleshooting and Reference

- *Cisco NX-OS System Messages Reference*
- *Cisco MDS 9000 Family NX-OS Troubleshooting Guide*
- *Cisco MDS 9000 Family NX-OS MIB Quick Reference*
- *Cisco MDS 9000 Family NX-OS SMI-S Programming Reference*
- *Cisco MDS 9000 Family Fabric Manager Server Database Schema*

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Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS version 2.0.



CHAPTER 1

Overview

The Cisco SANTap application is an Intelligent Storage Services feature. This application is supported on the Storage Services Module (SSM), MDS 9222i Multiservice Modular Switch, and MDS 9000 18/4-Port Multiservice Module (MSM-18/4). The Storage Services Module (SSM) supports SANTap in Cisco MDS SAN-OS Release 3.0(2a) or higher, and in Cisco NX-OS Release 4.1(1b) or higher.

This chapter includes the following sections:

- [About RecoverPoint with SANTap, page 1-1](#)
- [New Platform Availability, page 1-1](#)
- [Migration Requirements, page 1-2](#)

About RecoverPoint with SANTap

EMC RecoverPoint offers a single product solution for local data protection, remote replication, and disaster recovery. Based on scalable out-of-band appliances that leverage intelligent write-splitting, EMC RecoverPoint delivers Continuous Data Protection (CDP), Continuous Remote Replication (CRR), and Concurrent Local and Remote (CLR) data protection of the same data with recovery to any point in time.

The Cisco MDS 9000 SANTap service is part of the intelligent fabric applications offered by the Cisco MDS 9000 Family. SANTap allows the deployment of EMC RecoverPoint on Cisco MDS 9000 Family switches. The SANTap service functions as a network splitter (by replicating write I/Os to the RecoverPoint appliance).

EMC RecoverPoint with Cisco SANTap provides protection of heterogeneous storage without compromising the integrity, availability, and performance of the I/Os between the host and primary target.

New Platform Availability

The RecoverPoint with SANTap solution was initially supported only on the Cisco MDS 9000 Storage Services Module (SSM). Starting with NX-OS Release 4.1(1i) and RecoverPoint 3.1.1, two new platforms can be used to deploy the solution: MDS 9000 18/4-Port Multiservice Module (MSM-18/4) and MDS 9222i Multiservice Modular Switch. The solution can now be deployed on the following platforms:

- MDS 9000 Storage Services Module (SSM) — The SSM is a Generation 1 module that has 32 2-Gbps Fibre Channel switching ports.

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- MDS 9000 18/4-Port Multiservice Module (MSM-18/4) — The MSM-18/4 is a Generation 2 module with 18 4-Gbps Fibre Channel switching ports and 4 Gigabit Ethernet IP storage services ports.
- MDS 9222i Multiservice Modular Switch — The MDS 9222i switch is a Generation 2 fabric switch offering 18 4-Gbps Fibre Channel ports and 4 Gigabit Ethernet IP storage services ports, and an expansion slot to host Cisco switching and services modules. Slot 1 of the MDS 9222i switch has a nonremovable supervisor module with and integrated MSM-18/4.

Migrating to New Platforms

RecoverPoint with SANTap was previously deployed using the SSM module. With the introduction of the new platforms, if you already are running SANTap, you can migrate to the new Generation 2 MSM-18/4 or MDS 9222i switch.

Migration Requirements

[Table 1-1](#) lists the product evaluation requirements for migrating from the RecoverPoint environment to the new Cisco platform.

Table 1-1 Product Evaluation Requirements

Product Evaluation Requirement	Description
Cisco SANTap with EMC RecoverPoint	<ul style="list-style-type: none"> • Migrate with minimal impact from currently provisioned SANTap environment running on an SSM to the following hardware: <ul style="list-style-type: none"> – MSM-18/4 — Same slot in the same chassis – MSM-18/4 — Different slot in the same chassis – Base MDS 9222i switch— Same chassis – Chassis to chassis (SSM to MSM-18/4 or MDS 9222i switch)



CHAPTER 2

Migration Procedures

This chapter describes the migration procedures from the RecoverPoint environment to the new Cisco platform and includes the following sections:

- [Migration Guidelines, page 2-1](#)
- [Software Upgrade, page 2-2](#)
- [Hardware Upgrade, page 2-6](#)

Migration Guidelines

Migration to the new platform involves both a software upgrade and a hardware upgrade. The software upgrade is a prerequisite for the hardware upgrade and has to be performed first.

As a best practice, RecoverPoint with SANTap should be deployed in a dual-fabric configuration. This deployment allows the upgrade procedure to be nondisruptive to the host application, and it can be performed on one fabric at a time. In a single fabric environment, when the hardware upgrade is performed, the application servers lose access to the target LUNs (which are in the second path). In a dual environment, the upgrade is performed on one path at a time. The application servers lose only the path being upgraded, and the traffic is routed on the other path with no disruption for the application. Once the software and hardware upgrade is complete, the upgraded path can be manually or automatically restored using the host multipathing software, and the upgrade on the second path can be performed.

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Software Upgrade

This section describes the procedures for the software upgrade of MDS switches with the SSM running SANTap. The software upgrade is a prerequisite for the hardware upgrade in the migration to the MSM-18/4 and the MDS 9222i switch.



Note

- The MSM-18/4 and the MDS 9222i switch base module that is integrated in slot 1 can be used for provisioning SANTap only upon upgrading to NX-OS 4.x and equivalent SSI image.
- To upgrade to NX-OS Release 4.1(1b) from SAN-OS Release 3.2(3a) or earlier, it is necessary to upgrade to SAN-OS Release 3.3(2) and then to NX-OS Release 4.1(1b).
- The software upgrade is a three-step process; if you want to run SANTap on the MDS 9222i switch slot 1, an additional step is required. (Refer to [Step 4, page 2-5](#))

Refer to the following links for more information:

http://www.cisco.com/en/US/docs/switches/datacenter/mds9000/sw/4_1/release/notes/17675_02.html#wp353739

http://www.cisco.com/en/US/docs/switches/datacenter/mds9000/sw/4_1/ssi/upgrade/guide/SSIupgd.html

[Table 2-1](#) lists the compatibility matrix for Cisco MDS SAN-OS and Cisco NX-OS and the corresponding SSI image.

Table 2-1 Compatibility Matrix

SAN-OS / NX-OS	Equivalent SSI Image
3.2.2c	3.2.3t
3.2.2	3.2.3t
4.1.1b	4.1.1x



Note

- Currently, 4.1(1x) can refer to either 4.1(1i) or 4.1(1j). Refer to the *Cisco MDS NX-OS Release Compatibility Matrix for Storage Service Interface Images* for the latest supported version at the following URL:
http://www.cisco.com/en/US/docs/switches/datacenter/mds9000/sw/4_1/ssi/matrix/SSImtx.html
- RecoverPoint supported versions are from 3.1(1) (3.1, Service Pack 1) onwards (for example 3.1(2)). This guide documents the migration procedures using 3.1(1).

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To complete the software upgrade process, follow these steps:

- Step 1** Verify prerequisites. Ensure that you meet the following required prerequisites:
- An operational dual fabric is required both at the production site and at the mirror site.
 - The RecoverPoint software has been upgraded at all sites. Refer to the *EMC RecoverPoint Installation Guide* for upgrading to the 3.2 RecoverPoint version.
 - The appropriate versions of the software have been downloaded. Refer to *EMC RecoverPoint Release Notes* for the RecoverPoint version you are using to determine the version of the system image, kickstart image, and software services interface image required (in this case, Cisco NX-OS Release 4.1(1b) with SSI 4.1(1i)). Download the required version of the files from this link:
www.cisco.com
or
<http://powerlink.emc.com>
 - At each RecoverPoint site, the switch hardware and software upgrade should be completed first on one fabric, then on the other fabric. In order to keep hosts and I/O operational, an I/O path to the second switch must be available when one switch is being upgraded.



Note

From this point on, all instructions refer only to the fabric being upgraded.

- Step 2** Upgrade from SAN -OS Release 3.2(2x) (for example, Release 3.2(2c) to Release 3.3(2), by following these steps:
- a. In the RecoverPoint Management Application, select each SANTap splitter on the fabric you are upgrading, detach all volumes from the splitter, then remove the splitter. Repeat these steps for all the SANTap splitters on the fabric being upgraded. If the splitter is not removed initially, RecoverPoint displays a warning message and checks for the old Cisco Virtual Initiators entries (9 Cisco Virtual Initiators) even after rezoning the RecoverPoint target ports with the new Cisco Virtual Initiators entries (3 Cisco Virtual Initiators).
 - b. Stop all the firewall programs on the management workstation.
 - c. Start an FTP server on the management workstation connected to the switch.
 - d. Make a backup copy of the running configuration file (<file_name> on the bootflash) at an FTP or TFTP location.
 - e. Copy the the system, kickstart, and SSI files that you wish to install. Use the following commands to check the space available, clean up unused files (if required) and copy the new ones:

```
switch# dir bootflash:
switch# delete bootflash:filename
switch# copy ftp://ftp server IP address/ source filename bootflash:destination
filename
switch# dir bootflash:
```

- f. Use the following command to keep track of the CVT pWWN and nWWN information at the SANTap command line interface:

```
switch# show santap module # of slot running SANTap cvt
```

The output of this command should be in the following format:

CVT Information :

```
cvt pwwn      = 23:4b:33:33:33:33:33:36
```

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```

cvt nwwn      = 23:4b:33:33:33:34:36
cvt id        = 0x89e909c
cvt xmap_id   = 0x89f1f74
cvt vsan      = 2
cvt name      = CENV4_PROD_CVT

```

- g. Record the CVT pWWN and the CVT nWWN.
- h. Keep track of the WWNs in each VSAN and store them for future reference. Capture the output of the following command:

```
switch# show fcs database
```

- i. Use the **install all** command to upgrade from SAN-OS Release 3.2(2x) to Release 3.3(2)

```
switch# install all system bootflash:m9200-s2ek9-mz.3.3.2.bin kickstart
bootflash:m9200-s2ek9-kickstart-mz.3.3.2.bin ssi bootflash:m9000-ek9-ssi-mz.3.2.3t.bin
```

- j. Verify if the installation is successful by entering the commands shown in the following examples:

```

switch# show install all status
switch# show version internal build-identifier
Kickstart image file: bootflash:///m9200-s2ek9-kickstart-mz.3.3.2.bin : S12
System image file: bootflash:///m9200-s2ek9-mz.3.3.2.bin : S12
Linecard1 image build-id: S12
Linecard2 image build-id: S12
Linecard IPS addon image build-id: S12
Module 1 SSI SAN-OS packaged image build-id: S12
Module 2 SSI image file: modflash://2-1/m9000-ek9-ssi-mz.3.2.3t.bin : S13

```

```

switch# show module
Mod      Application Image Description          Application Image Version
-----
2        SSI linecard image                        3.2.3t

```

Step 3 Upgrade from SAN-OS Release 3.3(2) to NX-OS Release 4.1(1b) by following these steps:

- a. Use the **install all** command to upgrade from SAN-OS Release 3.2(2) to NX-OS Release 4.1(1b).

```

switch# install all system bootflash:m9200-s2ek9-mz.4.1.1b.bin kickstart
bootflash:m9200-s2ek9-kickstart-mz.4.1.1b.bin ssi
bootflash:m9000-ek9-ssi-mz.4.1.1i.bin

```

- b. Verify if the installation is successful by entering the commands shown in the following examples:

```

switch# show install all status

switch# show version internal build-identifier
Kickstart image file: bootflash:///m9200-s2ek9-kickstart-mz.4.1.1b.bin : S1
System image file: bootflash:///m9200-s2ek9-mz.4.1.1b.bin : S1
Linecard1 image build-id: S1
Linecard2 image build-id: S1
Linecard IPS addon image build-id: S1
Module 1 SSI SAN-OS packaged image build-id: S1
Module 2 SSI image file: modflash://2-1/m9000-ek9-ssi-mz.4.1.1i.bin : S24

```

```

switch# show module
Mod      Application Image Description          Application Image Version
-----
2        SSI linecard image                        4.1(1i)

```


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- Step 4** Upgrade the base module of the MDS 9222i switch from NX-OS Release 4.1(1b) to NX-OS 4.1(1i) by following these steps:



Note

Step 4 applies only to the MDS 9222i switch and SANTap must be provisioned on slot 1.

- a. Use **install all** command to upgrade the base MDS 9222i switch module without the other extended option of the command.

```
switch# install all ssi bootflash:m9000-ek9-ssi-mz.4.1.1i.bin
```

- b. Verify if the installation is successful by entering the commands shown in the following examples:

```
switch# show version internal build-identifier
Kickstart image file: bootflash:///m9200-s2ek9-kickstart-mz.4.1.1b.bin : S1
System image file: bootflash:///m9200-s2ek9-mz.4.1.1b.bin : S1
Linecard1 image build-id: S1
Linecard2 image build-id: S1
Linecard IPS addon image build-id: S1
Module 1 SSI image file: modflash://1-1/m9000-ek9-ssi-mz.4.1.1i.bin : S24
Module 2 SSI image file: modflash://2-1/m9000-ek9-ssi-mz.4.1.1i.bin : S24
```

```
switch# show module
Mod      Application Image Description      Application Image Version
-----
1        SSI linecard image                4.1(1i)
2        SSI linecard image                4.1(1i)
```

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Hardware Upgrade

The MSM-18/4 and the MDS 9222i switch have only one virtualization engine (one data path processor [DPP]), while the SSM has eight DPPs. Therefore, it is not required to partition the hosts in different VSANs to use all the DPPs. You may want to merge all the hosts in one single front end VSAN and remove the others if not required.

Refer to the commands listed in [Appendix A, “Licensing and Commands”](#) or refer the configuration guide at the following URL:

http://cisco.com/en/US/docs/switches/datacenter/mds9000/sw/4_1/configuration/guides/cli_4_1/clubook.html

This section includes the following topics:

- [Upgrading SANTap from SSM to MSM-18/4 for Same Slot in the Same Chassis, page 2-6](#)
- [Upgrading SANTap from SSM to MSM-18/4 for Different Slot in the Same Chassis, page 2-9](#)
- [Upgrading SANTap from SSM to Base 9222i on the Same Chassis, page 2-12](#)
- [Upgrading SANTap from SSM to MSM-18/4 or 9222i for Chassis to Chassis, page 2-15](#)

Upgrading SANTap from SSM to MSM-18/4 for Same Slot in the Same Chassis

To complete the hardware upgrade of SANTap from the SSM to the MSM-18/4, follow these steps:

- Step 1** Verify that the NX-OS version is Release 4.1(1b) and SSI version is Release 4.1(1i) on the switch where the SSM is currently provisioned with SANTap and is fully configured with EMC RecoverPoint.

```
switch# show version internal build-identifier
```

- Step 2** Verify that the installed version of RecoverPoint is compatible with the proposed upgrade. The current upgrade example requires RecoverPoint 3.1.1 (3.1, Service Pack 1). There are two options to verify the RecoverPoint version:

- In the RecoverPoint Management Application, go to the menu bar, select **Help > About RecoverPoint Management Application**. A dialog window appears.
- Verify that the RecoverPoint version is 3.1 and Service Pack 1 is displayed in the dialog window.
- At the RecoverPoint command-line interface, enter the following command:

```
switch# get_version
```



Note

In the RecoverPoint Management Application, verify that RecoverPoint is replicating without errors.

- Step 3** Save the running configuration (ASCII format) from the MDS switch provisioned with SANTap to the switch bootflash. Make a backup of the running configuration (<file_name> on the bootflash) to an FTP or TFTP location.

```
switch# copy running-config startup-config
[#####] 100%
switch# copy running-config bootflash:run-0430
```

- Step 4** Copy the information related to SANTap configuration from the ASCII configuration to restore the same configuration on the MSM-18/4 later.
- a. Enabling SANTap on the module

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```
switch# show file bootflash:run-0430 | i ssm
ssm enable feature santap module 5
```

b. CVT information (with WWNs)

```
switch# show file bootflash:run-0430 | i cvt
santap module 5 appl-vsana 40 cvt-name CVT-MOD5-ST2 cvt-nwwn 22:81:00:0d:ec:3c:7e:02
cvt-pwwn 22:7e:00:0d:ec:3c:7e:02
santap module 5 appl-vsana 41 cvt-name CVT2-MOD5-ST2 cvt-nwwn 22:95:00:0d:ec:3c:7e:02
cvt-pwwn 22:94:00:0d:ec:3c:7e:02
```

c. DVT information (with WWNs)

```
switch# show file bootflash:run-0430 | i dvt
santap module 5 dvt target-pwwn 50:06:04:82:ca:fd:a0:93 target-vsana 40 dvt-name
DVT-4BA dvt-vsana 30
santap module 5 dvt target-pwwn 50:06:04:82:ca:fd:a0:b3 target-vsana 40 dvt-name
DVT-4BB dvt-vsana 30
santap module 5 dvt target-pwwn 50:06:0e:80:04:5a:0e:1a target-vsana 40 dvt-name DVT-2L
dvt-vsana 30
santap module 5 dvt target-pwwn 50:06:0e:80:04:5a:0e:5a target-vsana 41 dvt-name DVT-6L
dvt-vsana 31
```



Note

- If the CVTs were created without providing a cvt-name during initial configuration, then the cvt-nwwn and the cvt-pwwn will not be a part of the running configuration. In such cases, the cvt-wwn and cvt-pwwn must be copied from the CLI output of **show santap module x cvt** command.
- Even if the DVTs were created without a dvt-name during the initial configuration, the dvt-name will still be a part of the running configuration. In such cases, the dvt-name needs to be edited or removed from the command syntax before applying the command.

Step 5 Remove the SSM from the chassis (slot 5).

At this point, the RecoverPoint Appliance will lose its connection to the splitter. The hosts will also lose its path to the target port because the SANTap process is removed along with the SSM from the chassis.

Step 6 Insert the new MSM-18/4 to the same slot (slot 5) in the chassis and verify the new module comes up with module status OK.



Note

If the MSM-18/4 is inserted in the same slot (slot 5), then all SANTap pertinent information will be automatically removed from the switch.

Step 7 Load the supported SSI image Release 4.1(1i) on the newly inserted MSM-18/4 module and verify that the installation has been successful.

```
switch# install all ssi bootflash:m9000-ek9-ssi-mz.4.1.1i.bin
```

Verify the install is successful:

```
switch# show module
```



Note

The **install all ssi** command will install the SSI image on all the intelligent modules (SSM, MSM 18/4) that are present in the switch and in addition the module that was replaced. You can verify the installations by entering the **show install all status** command.

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- Step 8** Install the new license file for enabling and restoring SANTap services on the MSM-18/4. By default, a 120-day grace period for the SANTap process will be enabled in the absence of a SANTap license for the MSM-18/4 module.

```
switch# install license bootflash:SSE_licensefile
```

Restore the SANTap configuration from the saved running configuration. (ASCII format)

For more information on licensing, refer to [Appendix A, “Licensing and Commands.”](#)

Copy and paste the following configuration commands saved from Step 4:

```
switch(config)# show ssm provisioning
switch(config)# show santap module 5 cvt brief
switch# show santap module 5 dvt brief
```

Verify that the command is executed after every step before proceeding to the next step:

- Enabling SANTap on the module
- CVT information (with WWNs)
- DVT information (with WWNs)

**Note**

At this point, SANTap is fully provisioned and functional. All the hosts regain access to the target LUNs on this path. However, the RecoverPoint communication is still not established. The communication is established only when the new Cisco Virtual Initiators are able to access the RecoverPoint target ports.

- Step 9** Add the new Cisco Virtual Initiators to the RecoverPoint target zone and reactivate the zoneset. Remove the old Cisco Virtual Initiators (9 entries) from the RecoverPoint target zone and add the new Cisco Virtual Initiators (3 entries) to the same zone and reactivate the zoneset.

- Step 10** Verify that the RecoverPoint cluster recognizes and reconfigures the splitter.

RecoverPoint cluster should automatically recognize the splitter and reconfigure the splitter after the zoneset activation from previous step.

```
Event ID: 5003 - RPA access to splitter is restored
Event ID: 14001- Splitter is up and version is supported
```

- Step 11** Verify that all SANTap sessions are created after the splitter reconfiguration by the RecoverPoint Appliances.

```
switch# show santap module 5 session brief
```

- Step 12** Save the current configuration to preserve all the changes made to the fabric.

```
switch# copy running-config startup-config
[#####] 100%
```

- Step 13** Repeat the same steps (1 to 13) to migrate the other fabrics after the system is stable.

The hardware upgrade of SANTap from SSM to MSM-18/4 for both fabrics is complete.

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Upgrading SANTap from SSM to MSM-18/4 for Different Slot in the Same Chassis



Note

This procedure is applicable only for MDS 9500 switches.

To complete the hardware upgrade of SANTap from SSM to MSM-18/4 for different slots in the same chassis, follow these steps:

- Step 1** Verify that the NX-OS version is Release 4.1(1b) and SSI version is Release 4.1(1i) on the switch where the SSM is currently provisioned with SANTap and is fully configured with EMC RecoverPoint.

```
switch# show version internal build-identifier
```

- Step 2** Verify that the installed version of RecoverPoint is compatible with the proposed upgrade. The current upgrade example requires RecoverPoint SAN-OS Release 3.1(1) (3.1, Service Pack 1). There are two options to verify the RecoverPoint version:

- In the RecoverPoint Management Application, go to the menu bar, select **Help > About RecoverPoint Management Application**. A dialog window appears.
- Verify that the RecoverPoint version is 3.1 and Service Pack 1 is displayed in the dialog window.
- At the RecoverPoint command-line interface, enter the following command:

```
switch# get_version
```



Note

In the RecoverPoint Management Application, verify that RecoverPoint is replicating without errors.

- Step 3** Save the running configuration (ASCII format) from the MDS switch provisioned with SANTap to the switch bootflash. Make a backup copy of the running configuration file (<file_name> on the bootflash) at an FTP or TFTP location.

```
switch# copy running-config startup-config
[#####] 100%
switch# copy running-config bootflash:run-0430
```

- Step 4** Copy the information related to the SANTap configuration from the ASCII configuration for restoring the same configuration on the MSM-18/4 later.

- a. Enabling SANTap on the module

```
switch# show file bootflash:run-0430 | i ssm
ssm enable feature santap module 5
```

- b. CVT information (with WWNs)

```
switch# show file bootflash:run-0430 | i cvt
santap module 5 appl-vsan 40 cvt-name CVT-MOD5-ST2 cvt-nwwn 22:81:00:0d:ec:3c:7e:02
cvt-pwwn 22:7e:00:0d:ec:3c:7e:02
santap module 5 appl-vsan 41 cvt-name CVT2-MOD5-ST2 cvt-nwwn 22:95:00:0d:ec:3c:7e:02
cvt-pwwn 22:94:00:0d:ec:3c:7e:02
```

- c. DVT information (with WWNs)

```
switch# show file bootflash:run-0430 | i dvt
```

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```
santap module 5 dvt target-pwwn 50:06:04:82:ca:fd:a0:93 target-vsan 40 dvt-name
DVT-4BA dvt-vsan 30
santap module 5 dvt target-pwwn 50:06:04:82:ca:fd:a0:b3 target-vsan 40 dvt-name
DVT-4BB dvt-vsan 30
santap module 5 dvt target-pwwn 50:06:0e:80:04:5a:0e:1a target-vsan 40 dvt-name DVT-2L
dvt-vsan 30
santap module 5 dvt target-pwwn 50:06:0e:80:04:5a:0e:5a target-vsan 41 dvt-name DVT-6L
dvt-vsan 31
```

**Note**

- If the CVTs were created without providing a cvt-name during the initial configuration, then the cvt-nwwn and the cvt-pwwn will not be a part of the running configuration. In such cases, the cvt-wwn and cvt-pwwn must be copied from the CLI output of **show santap module x cvt** command.
- Even if the DVTs were created without a dvt-name during the initial configuration, the dvt-name will still be a part of the running configuration. In such cases, the dvt-name need to be edited or removed from the command syntax before applying the command.

Step 5 Unprovision SANTap from the current SSM module in slot 5.

This will erase all SANTap-related information from that particular SSM in slot 5. At this point, the RecoverPoint Appliance will lose its connection to the splitter. The host will also lose its path to the target port (second path) because the SANTap process is unprovisioned.

```
switch(config)# no ssm enable feature santap module 5
switch(config)# show ssm provisioning
```

```
RecoverPoint Event-ID: 12001 - splitter is down
```

Step 6 Insert the new MSM-18/4 module in any slot (for example slot 13) in the chassis and verify that the new module displays the module status as OK.**Note**

If the MSM-18/4 module is inserted in a different slot within the chassis, then SANTap needs to be unprovisioned from the SSM module, and the new MSM-18/4 module needs to be reconfigured for SANTap.

Step 7 Load the supported SSI image Release 4.1(1i) to the newly inserted MSM-18/4 module and verify that the installation process is successful.

```
switch# install all ssi bootflash:m9000-ek9-ssi-mz.4.1.1i.bin
```

Verify if the installation process is successful:

```
switch# show module
```

**Note**

The **install all ssi** command will install the SSI image on all intelligent modules (SSM, MSM-18/4) that are present in the switch and not just the module that was replaced. You can verify the installations by entering **show install all status** command.

Step 8 Install the new license file for enabling and restoring SANTap services on the MSM-18/4 module. By default, a 120-day grace period for the SANTap process will be enabled in the absence of a SANTap license for MSM-18/4 line card.

```
switch# install license bootflash:SSE_licensefile
```

For more information on licensing, refer to [Appendix A, "Licensing and Commands."](#)

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Step 9 Edit and restore the SANTap configuration from the saved running configuration. (ASCII format)
Copy the ASCII configuration (saved in Step 4) to a notepad, edit the module information, and paste the configuration commands back. All the new configuration commands should reflect the new module number.

Verify that the command is executed after every step before proceeding to the next step.

- a. Enabling SANTap on the module
- b. CVT information (with WWNs)
- c. DVT information (with WWNs)

Verification commands:

```
switch(config)# show ssm provisioning
switch(config)# show santap module 13 cvt brief
switch# show santap module 13 dvt brief
```



Note

At this point, SANTap is fully provisioned and functional. All the hosts should now regain access to the target LUNs on this path as well. However, the RecoverPoint communication is still not established. The communication is established only when the new Cisco Virtual Initiators (VIs) are able to access the RecoverPoint target ports.

Step 10 Add the new Cisco Virtual Initiators to the RecoverPoint target zone and reactivate the zoneset.
Remove the old Cisco Virtual Initiators (9 entries) from the RecoverPoint target zone and add the new Cisco Virtual Initiators (3 entries) to the same zone and reactivate the zoneset.

Step 11 Verify that the RecoverPoint cluster recognizes and reconfigures the splitter.
The RecoverPoint cluster should automatically recognize the splitter and reconfigure the splitter after the zoneset activation from the previous step.

```
Event ID: 5003 - RPA access to splitter is restored
Event ID: 14001- Splitter is up and version is supported
```

Step 12 Verify that all SANTap sessions are created after the splitter reconfiguration by the RecoverPoint Appliances.

```
switch# show santap module 5 session brief
```

Step 13 Save the current configuration to preserve all the changes made to the fabric.

```
switch# copy running-config startup-config
[#####] 100%
```

Step 14 Repeat the same steps (1 to 13) to migrate the other fabrics after the system is stable.
The hardware upgrade of SANTap from SSM to MSM-18/4 module for both fabrics is complete.

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Upgrading SANTap from SSM to Base 9222i on the Same Chassis

This hardware upgrade is performed from a MDS 9222i switch with an SSM in the second slot running SANTap to the base module of the MDS 9222i switch.



Note

If there are any hosts or storage or RecoverPoint devices connected to the front panel ports of the SSM, you need to reconfigure the connectivity of these devices before proceeding with the hardware upgrade procedures.

If you want to retain the SSM after the hardware upgrade to the base MDS 9222i switch, then the SSM will operate as a regular Fibre Channel.

If you want to remove the SSM after the hardware migration, then the connections need to be moved to other Fibre Channel ports in the fabric.

To complete the hardware upgrade of SANTap from SSM to the base MDS 9222i switch, follow these steps:

- Step 1** Verify that the NX-OS version is Release 4.1(1b) and SSI version is Release 4.1(1i) on the switch where the SSM is currently provisioned with SANTap and is fully configured with EMC RecoverPoint. The same release should be running on the base module (fixed slot - module 1) of the MDS 9222i switch as well.

```
switch# show version internal build-identifier
```

- Step 2** Verify that the installed version of RecoverPoint is compatible with the proposed upgrade. The current upgrade example requires RecoverPoint SAN-OS Release 3.1(1) (3.1, Service Pack 1). There are two options to verify the RecoverPoint version:

- In the RecoverPoint Management Application, go to the menu bar, select **Help > About RecoverPoint Management Application**. A dialog window appears.
- Verify that the RecoverPoint version is 3.1 and Service Pack 1 is displayed in the dialog window.
- At the RecoverPoint command-line interface, enter the following command:

```
switch# get_version
```

- Step 3** Save the running configuration (ASCII format) from the MDS switch provisioned with SANTap to the switch bootflash. Make a backup copy of the running configuration file (<file_name> on the bootflash) on an FTP or TFTP location.

```
switch# copy running-config startup-config
[#####] 100%
switch# copy running-config bootflash:run-0430
```

- Step 4** Copy the information related to the SANTap configuration from the ASCII configuration for restoring the same configuration on the base 9222i switch (fixed slot - module 1).

- a. Enabling SANTap on the module

```
switch# show file bootflash:run-0430 | i ssm
ssm enable feature santap module 2
```

- b. CVT information (with WWNs)

```
switch# show file bootflash:run-0430 | i cvt
```


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```
santap module 2 appl-vsan 40 cvt-name CVT-MOD5-ST2 cvt-nwwn 22:81:00:0d:ec:3c:7e:02
cvt-pwwn 22:7e:00:0d:ec:3c:7e:02
santap module 2 appl-vsan 41 cvt-name CVT2-MOD5-ST2 cvt-nwwn 22:95:00:0d:ec:3c:7e:02
cvt-pwwn 22:94:00:0d:ec:3c:7e:02
```

c. DVT information (with WWNs)

```
switch# show file bootflash:run-0430 | i dvt
santap module 2 dvt target-pwwn 50:06:04:82:ca:fd:a0:93 target-vsan 40 dvt-name
DVT-4BA dvt-vsan 30
santap module 2 dvt target-pwwn 50:06:04:82:ca:fd:a0:b3 target-vsan 40 dvt-name
DVT-4BB dvt-vsan 30
santap module 2 dvt target-pwwn 50:06:0e:80:04:5a:0e:1a target-vsan 40 dvt-name DVT-2L
dvt-vsan 30
santap module 2 dvt target-pwwn 50:06:0e:80:04:5a:0e:5a target-vsan 41 dvt-name DVT-6L
dvt-vsan 31
```



Note

- If the CVTs were created without providing a cvt-name during the initial configuration, then the cvt-nwwn and the cvt-pwwn will not be a part of the running configuration. In such cases, the cvt-wwn and cvt-pwwn must be copied from the CLI output of **show santap module x cvt** command.
- Even if the DVTs were created without a dvt-name during the initial configuration, the dvt-name will still be a part of the running configuration. In such cases, the dvt-name need to be edited or removed from the command syntax before applying the command.

Step 5 Unprovision SANTap from the current SSM module in slot 2.

This will erase all the SANTap-related information from that particular SSM in slot 2. At this point, the RecoverPoint Appliance will lose its connection to the splitter. The host will also lose its path to the target port (second path) because the SANTap process is unprovisioned.

```
switch(config)# no ssm enable feature santap module 2
switch(config)# show ssm provisioning
```

```
RecoverPoint Event-ID: 12001 - splitter is down
```

Step 6 Install the new license file for enabling or restoring SANTap services on the MSM-18/4 module. By default, a 120-day grace period for the SANTap process will be enabled in the absence of the SANTap license for the base MDS 9222i switch.

```
switch# install license bootflash:SSE_licensefile
```

For more information on licensing, refer to the [Appendix A, "Licensing and Commands."](#)

Step 7 Edit and restore the SANTap configuration from the saved running configuration. (ASCII format)

Copy the ASCII configuration (saved from Step 4) to a notepad, edit the module information, and paste the configuration commands back. All the new configuration commands should reflect the new module number (fixed slot - module 1).

Verify that the command is executed after every step before proceeding to the next step.

- Enabling SANTap on the module
- CVT information (with WWNs)
- DVT information (with WWNs)

Verification commands:

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```
switch(config)# show ssm provisioning
switch(config)# show santap module 1 cvt brief
switch# show santap module 1 dvt brief
```

**Note**

At this point, SANTap is fully provisioned and functional. All the hosts regain access to the target LUNs on this path. However, the RecoverPoint communication is still not established. The communication is established only when the new Cisco Virtual Initiators are able to access the RecoverPoint target ports.

Step 8 Add the new Cisco Virtual Initiators to the RecoverPoint target zone and reactivate the zoneset.
Remove the old Cisco Virtual Initiators (9 entries) from the RecoverPoint target zone and add the new Cisco Virtual Initiators (3 entries) to the same zone and reactivate the zoneset.

Step 9 Verify that the RecoverPoint cluster recognizes and reconfigures the splitter.
The RecoverPoint cluster should automatically recognize the splitter and reconfigure the splitter after the zoneset activation from previous step.

```
Event ID: 5003 - RPA access to splitter is restored
Event ID: 14001- Splitter is up and version is supported
```

Step 10 Verify all SANTap sessions are created upon splitter reconfiguration by the RecoverPoint Appliances.

```
switch# show santap module 1 session brief
```

Step 11 Save the current configuration to preserve all the changes made to the fabric.

```
switch# copy running-config startup-config
[#####] 100%
```

Step 12 Repeat the same steps (1 to 11) to migrate the other fabrics after the system is stable.
The hardware upgrade of SANTap from the SSM to MSM-18/4 module for both fabrics is complete.

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Upgrading SANTap from SSM to MSM-18/4 or 9222i for Chassis to Chassis

This hardware upgrade is performed from a 9216i (chassis-1) with an SSM in the second slot running SANTap to a MDS 9222i switch (chassis-2) and SSM in slot 2 running SANTap.



Note

- The same procedure can be used for any chassis-to-chassis migration. You can have different environments, and you may want to move to different configurations. This procedure addresses the following combinations:
 - From 92xx to 9222i native (SANTap in slot 1) or with 18/4 (SANTap in slot 2)
 - From 95xx to 9222i native (SANTap in slot 1) or with 18/4 (SANTap in slot 2)
- If there any hosts or storage or RecoverPoint devices connected to the front panel ports of the SSM, it is necessary to reconfigure the connectivity of these devices before proceeding with the hardware upgrade procedures.

To complete the hardware upgrade of SANTap from SSM to MSM-18/4 or the MDS 9222i switch for chassis to chassis, follow these steps:

- Step 1** Verify that the NX-OS version is Release 4.1(1b) and SSI version is Release 4.1(1i) on the switch where the SSM is currently provisioned with SANTap and is fully configured with EMC RecoverPoint.

```
switch# show version internal build-identifier
```

- Step 2** Verify that the installed version of RecoverPoint is compatible with the proposed upgrade. The current upgrade example requires RecoverPoint Release 3.1(1) (3.1, Service Pack 1). There are two options to verify the RecoverPoint version:

- In the RecoverPoint Management Application, go to the menu bar, select **Help > About RecoverPoint Management Application**. A dialog window appears.
- Verify that the RecoverPoint version is 3.1 and Service Pack 1 is displayed in the dialog window.
- At the RecoverPoint command-line interface, run the following command:

```
switch# get_version
```

- Step 3** Save the running configuration (ASCII format) from the chassis-1 switch provisioned with SANTap to the switch bootflash. Make a backup copy of the running configuration file (<file_name> on the bootflash) at an FTP or TFTP location.

```
switch# copy running-config startup-config
[#####] 100%
switch# copy running-config bootflash:run-0430
```

- Step 4** Copy the information related to SANTap configuration from the ASCII configuration for restoring the same configuration on to the new switch.

- a. Enabling SANTap on the module

```
switch# show file bootflash:run-0430 | i ssm
ssm enable feature santap module 2
```

- b. CVT information (with WWNs)

```
switch# show file bootflash:run-0430 | i cvt
```

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```
santap module 2 appl-vsan 40 cvt-name CVT-MOD5-ST2 cvt-nwwn 22:81:00:0d:ec:3c:7e:02
cvt-pwwn 22:7e:00:0d:ec:3c:7e:02
santap module 2 appl-vsan 41 cvt-name CVT2-MOD5-ST2 cvt-nwwn 22:95:00:0d:ec:3c:7e:02
cvt-pwwn 22:94:00:0d:ec:3c:7e:02
```

c. DVT information (with WWNs)

```
switch# show file bootflash:run-0430 | i dvt
santap module 2 dvt target-pwwn 50:06:04:82:ca:fd:a0:93 target-vsan 40 dvt-name
DVT-4BA dvt-vsan 30
santap module 2 dvt target-pwwn 50:06:04:82:ca:fd:a0:b3 target-vsan 40 dvt-name
DVT-4BB dvt-vsan 30
santap module 2 dvt target-pwwn 50:06:0e:80:04:5a:0e:1a target-vsan 40 dvt-name DVT-2L
dvt-vsan 30
santap module 2 dvt target-pwwn 50:06:0e:80:04:5a:0e:5a target-vsan 41 dvt-name DVT-6L
dvt-vsan 31
```



Note

- If the CVTs were created without providing a cvt-name during initial configuration, then the cvt-nwwn and the cvt-pwwn will not be a part of the running configuration. In such cases, the cvt-wwn and cvt-pwwn must be copied from the CLI output of the **show santap module x cvt** command.
- Even if the DVTs were created without a dvt-name during the initial configuration, the dvt-name will still be a part of the running configuration. In such cases, the dvt-name needs to be edited or removed from the command syntax before applying the command.

Step 5 Unprovision SANTap from the current chassis-1.

This will erase all the SANTap-related information from the SSM in chassis-1. At this point, the RecoverPoint Appliance will lose its connection to the splitter. The hosts will also lose their path to the target port (second path) as the SANTap process is unprovisioned.

```
switch(config)# no ssm enable feature santap module 2
switch(config)# show ssm provisioning
```

```
RecoverPoint Event-ID: 12001 - splitter is down
```

Step 6 Complete configuration of the new hardware (chassis-2 with SSM or MSM-18/4 in slot 2).

Refer to the *Cisco MDS 9000 Family SANTap Deployment guide* for more information:

http://www.cisco.com/en/US/docs/switches/datacenter/mds9000/sw/4_1/santap/configuration/guide/SANTap.html

Verify the chassis-2 is running the supported SAN-OS/SSI image.

```
switch-chassis-2# show version internal build-identifier
```



Note

Depending on your specific topology, the necessary connections and configuration rearrangements must be performed. For example, you may have to remove certain devices from the old chassis and connect them to the new one (or to other ports available in the fabric), and you may need to reconfigure the VSANs. In general, the network administrator must restore the hosts, storage, and RecoverPoint device connections before proceeding with SANTap provisioning.

Step 7 Install the new license file for enabling and restoring SANTap services on the MSM-18/4. By default, a 120-day grace period for the SANTap process will be enabled in the absence of SANTap license for the base MDS 9222i switch.

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```
switch# install license bootflash:SSE_licensefile
```

For more information on licensing, refer to [Appendix A, “Licensing and Commands.”](#)


Note

At this point, all hosts and storage connections are restored to the appropriate VSANs and is extended to the new hardware as well.

Step 8

Edit and restore the SANTap configuration from the saved running configuration. (ASCII format)

Copy the ASCII configuration (saved from Step 4) to a notepad, edit the module information if necessary, and paste the configuration commands back. All the new configuration commands should reflect the new SSM module in chassis-2.

Verify that the command is executed after every step before proceeding to the next step.

- a. Enabling SANTap on the module
- b. CVT information (with WWNs)
- c. DVT information (with WWNs)

Verification commands:

```
switch-chassis-2(config)# show ssm provisioning
switch-chassis-2(config)# show santap module 2 cvt brief
switch-chassis-2# show santap module 2 dvt brief
```


Note

At this point SANTap is fully provisioned and functional. All the hosts regain access to the target LUNs on this path. However, the RecoverPoint communication is still not established. The communication is established only when the new Cisco Virtual Initiators are able to access the RecoverPoint target ports.

Step 9

Complete the remaining steps of the RecoverPoint configuration on the new chassis-2.


Note

Refer to the latest EMC Technical notes: *EMC® RecoverPoint Deploying RecoverPoint with SANTap*.

Step 10

Verify that all SANTap sessions are created after the splitter is recognized by the RecoverPoint cluster.

```
switch-chassis-2# show santap module 2 session brief
```

Step 11

Save the current configuration to preserve all the changes made to the fabric.

```
switch-chassis-2# copy running-config startup-config
[#####] 100%
```

Step 12

In the RecoverPoint Management Application, add splitters and attach volumes to splitter. A full resynchronization of all replicated volumes in the fabric will occur. You need not wait for the full synchronization to be completed, you can proceed to the next step.

Step 13

Repeat the same steps (1 to 12) to migrate the other fabric.

The hardware upgrade of SANTap from chassis to chassis on both fabrics is complete.

Send documentation comments to mdsfeedback-doc@cisco.com



APPENDIX **A**

Licensing and Commands

This appendix covers the following sections:

- [License Information for SANTap, page A-1](#)
- [CLI Command Reference, page A-2](#)

License Information for SANTap

The SANTap service can only be provisioned on the three hardware platforms listed in this section. Each model requires specific licenses for enabling the SANTap service. The appropriate licenses need to be purchased and be available during SANTap hardware upgrade.

The following are the SANTap-supported hardware with equivalent license filenames:

- DS-X9032-SSM (SSM) — STORAGE_SERVICES_ENABLER_PKG
- DS-X9304-18K9 (MSM-18/4) — STORAGE_SERVICES_184
- DS-X9222I-k9 (MDS-9222i) — STORAGE_SERVICES_9222I



Note

The license files are not transferable between different hardware.

For more information on the Storage Services Enabler (SSE) package, refer to the link below:

http://www.cisco.com/en/US/prod/collateral/ps4159/ps6409/ps4358/product_data_sheet0900aecd8017a6eb_ps6029_Products_Data_Sheet.html

[Send documentation comments to mdsfeedback-doc@cisco.com](mailto:mdsfeedback-doc@cisco.com)

CLI Command Reference

The Cisco MDS SANTap feature provides CLI commands that support scripting and advanced operations.

For more information about other commands that apply to the Cisco MDS 9000 Family of multilayer directors and fabric switches, refer to the *Cisco MDS 9000 Family Command Reference Guide*.

To assign interfaces to the appropriate VSAN, use the following commands:

```
switch# config terminal
switch(config)# vsan database
switch(config-vsan-db)# vsan <frontend vsan #>
switch(config-vsan-db)# vsan <frontend vsan #> interface fc x/y
switch(config-vsan-db)# vsan <backend vsan #> interface fc xx/yy
```

To verify that the VSANs are configured with the correct WWNs, use the following command:

```
switch# show santap module
```

To verify if any port is inactive or in a unknown state, use the following commands to restart the port:

```
switch# config terminal
switch(config)# interface fc slot#/port#
switch(config-if)# shutdown
switch(config-if)# no shutdown
```

To verify that all the ports are active, use the following command:

```
switch# show fcs database
```