

RELEASE NOTES

EMC[®] SMI-S Provider

Version 4.5.1

Release Notes

Rev 01

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These release notes contain supplemental information about EMC SMI-S Provider release 4.5.1 Topics include:

- ◆ [Product description](#)..... 2
- ◆ [New features and changes](#) 3
- ◆ [Fixed problems](#)..... 10
- ◆ [Environment and system requirements](#)..... 11
- ◆ [Known problems and limitations](#) 18
- ◆ [Technical notes](#) 31
- ◆ [Documentation](#) 33
- ◆ [Installation](#)..... 34
- ◆ [Post-installation tasks](#)..... 39
- ◆ [Troubleshooting and getting help](#) 54

Product description

EMC® SMI-S Provider V4.5.1 supports the SNIA Storage Management Initiative (SMI), an ANSI standard for storage management. This initiative has developed a standard management interface that has culminated in a comprehensive specification (SMI-Specification or SMI-S). SMI-S defines the open storage management interface that enables the interoperability of multiple vendor's storage management technologies. These technologies are used to monitor and control storage resources in multivendor or SAN topologies.

The SNIA SMI strives to ensure consistent data and eliminate inconsistencies among management tools by providing a unified interface to the many storage objects that must be managed in a storage environment. This enables application developers to focus on a single, standard interface for the development of management tools.

EMC SMI-S Provider is paired with the EMC CIM Server to provide an SMI-compliant interface for EMC Symmetrix® arrays, EMC CLARiiON® arrays, and EMC VNX family of storage systems.

Array, Host, and VASA providers

The SMI-S Provider offers the following providers:

- ◆ Array
- ◆ Host
- ◆ VASA

The Array provider allows a client application to retrieve information about a Symmetrix array, a CLARiiON array, and the VNX family of storage systems, as well as change the configuration of these EMC storage systems.

The Host provider allows a client application to retrieve information about the host on which the SMI-S Provider is running. It does *not* return any information about the EMC storage systems.

The VASA provider allows VMware vSphere® 5.0 or higher to retrieve the system capabilities for a particular EMC storage system.

New features and changes

This section details critical changes, new features, and software enhancements provided in the SMI-S Provider V4.5.1 product.

For information on previously released features or any updates to this document, refer to the corresponding release notes located on EMC online support at:

<https://support.EMC.com>

Support for EMC RecoverPoint

SMI-S Provider V4.5 and higher supports the EMC Symmetrix RecoverPoint splitter configuration by providing the ability to enable or disable the RecoverPoint device tag on a StorageVolume and a DeviceMaskingGroup. It also supports the EMC VNX RecoverPoint splitter configuration by allowing an SMI client to inspect the Privilege EMCInitiatorType property to determine whether it is a RecoverPoint initiator.

VMware vSphere management integration

SMI-S Provider V4.5 and higher supports VMware vSphere 5.0 or higher and the vSphere Storage API for Storage Awareness (VASA) by the introduction of a new provider, the VASA provider.

The VASA provider automatically installs with the Array provider of the SMI-S Provider and is not offered as a separate installation option. For installation information, see [“Installation” on page 34](#).

In addition, a pre-configured Solutions Enabler Virtual Appliance is shipped with the VASA provider. You can register this appliance with VMware vSphere, as instructed in the appropriate VMware vSphere documentation. For information about the deployment of the Solutions Enabler Virtual Appliance, see the *EMC Solutions Enabler Installation Guide*.

EMC ProSphere management integration

SMI-S Provider V4.5 and higher supports EMC ProSphere™. EMC ProSphere requires the installation of the Array provider of the SMI-S Provider. For installation information, see [“Installation” on page 34](#).

The minimum ProSphere version supporting SMI-S Provider 4.5.1 is 1.6.x.

Microsoft System Center 2012 - Virtual Machine Manager

SMI-S Provider V4.5 and higher supports the System Center 2012 - Virtual Machine Manager (VMM). VMM requires the installation of the Array provider of the SMI-S Provider. For installation information, see [“Installation” on page 34](#). For post installation information regarding VMM see [“Post-installation tasks” on page 39](#).

VMAX Series array integration

SMI-S Provider V4.5.1 is available for the Symmetrix VMAX Series arrays as a new management integration point. Before deploying SMI-S Provider in this manner, be aware of the following:

- ◆ The service processor is shared with EMC Customer Service for normal service operations.
- ◆ There is limited host access to the service processor, thereby limiting your ability to do backups of your management environment and the SMI-S Provider configuration files.
- ◆ Contact EMC Customer Service to enable SMI-S Provider on the service processor.
- ◆ You must involve EMC Customer Service when starting and stopping Solutions Enabler services and the SMI-S Provider.
- ◆ You must involve EMC Customer Service to review Solutions Enabler logs.

WBEM infrastructure

SMI-S Provider V4.5 and higher utilizes an EMC-based WBEM (Web-Based Enterprise Management) infrastructure called EMC CIM Object Manager (ECOM). This WBEM infrastructure is used for both proxy and embedded environments across all EMC hardware and software platforms to ensure consistent implementation and experience across EMC products.

For detailed information about ECOM, see the *ECOM Deployment and Configuration Guide*.

Replication services

Restored CopyState — Once a source element is restored from the target element (as a result of the Restore from Replica operation), the CopyState of the replication relationship will have the value of Restored, instead of Synchronized.

Partitioned CopyState — Previously, the provider used the value of 32794, for the Partitioned CopyState, in the Vendor Specific range. Since the Partitioned CopyState is now in the CIM standard, its value has changed to 16.

Windows authentication support

Windows authentication was added to ECOM running on Windows platforms to support Windows-based clients connecting to ECOM from a local, remote or intermediate host, such as a web service. Single sign-on allows users CIM access based on their configured role and/or class authorization. Administrators configure either users or user groups. No special credential management or security configuration is required as ECOM now integrates with the default Windows security configuration. However, you must modify certain default security settings, as explained in [“Array and Host provider Windows authentication settings” on page 39](#).

VP Snap for VMAX 10K Series arrays

For VMAX 10K Series arrays, SMI-S Provider V4.5.1 exposes VP Snap technology when an SMI client requests an SMI Snap copy of a source volume.

Support announcements

EMC announces the End of Service Life (EOSL) dates for the versions of SMI-S Provider listed in [Table 1](#). If you are running these or lower product versions, EMC recommends that you upgrade to the current version as soon as possible.

Table 1 SMI-S Provider version EOSL dates

Version	GA date	EOSL date
4.1	November 2009	November 2012
4.1.1	April 2010	November 2012
4.1.2	September 2010	November 2012
4.2	December 2010	December 2013
4.2.1	March 2010	December 2013
4.3	June 2011	June 2014
4.3.1	October 2011	June 2014
4.3.2	January 2012	June 2014
4.4	May 2012	May 2015
4.5	October 2012	October 2015
4.5.1	March 2013	October 2015

SMI-S supported profiles

[Table 2](#) shows the SMI-S Provider supported profile groupings and their namespaces:

Table 2 Profile groupings with namespaces

Profile	Namespace
Array	root/emc
Host	root/emc/host
Server	interop
Base Server	root/emc/host

Table 3 lists the SMI-S profiles supported by the Array provider of the SMI-S Provider:

Table 3 Array provider supported profiles (page 1 of 2)

Profile	SMI-S V1.3	SMI-S V1.4	SMI-S V1.5	SMI-S V1.6	DMTF
Access Points	X	X	X	X	
Automated Storage Tiering				X	
Automated Storage Tiering Policy				X	
Block Server Performance	X	X	X	X	
Block Services	X	X	X	X	
Block Storage Views	X	X	X	X	
Disk Drive Lite	X	X	X	X	
Disk Sparing	X	X	X	X	
Extent Composition	X	X	X	X	
Fan		X	X	X	X ⁴
FC Initiator Ports	X	X	X	X	
FC Target Ports	X	X	X	X	
FCoE Target Ports				X	
Group Masking and Mapping ^{1,2,3}		X	X	X	
Health	X	X	X	X	
Indication	X	X	X	X	
Indicator LED			X	X	X ⁶
iSCSI Target Ports	X	X	X	X	
Job Control	X	X	X	X	
Location	X	X	X	X	
Masking and Mapping	X	X	X	X	
Multiple Computer System	X	X	X	X	
Physical Package	X	X	X	X	
Pools from Volumes ²		X	X	X	

Table 3 Array provider supported profiles (page 2 of 2)

Profile	SMI-S V1.3	SMI-S V1.4	SMI-S V1.5	SMI-S V1.6	DMTF
Power Supply		X	X	X	X ⁵
Replication Services ²		X	X	X	
Software	X	X	X	X	
Software Inventory				X	
SPI Target Ports ¹	X	X	X	X	
Storage Element Protection ²	X	X	X	X	
Storage Server Asymmetry	X	X	X	X	
Thin Provisioning ²		X	X	X	
Volume Composition	X	X	X	X	

1. Only supported for Symmetrix arrays.
2. This profile is considered experimental and may change in future releases. As a result, backward compatibility cannot be guaranteed with the next release. Please contact EMC for permission to use this profile.
3. Only supported for Symmetrix arrays running Enginuity 5874 and higher.
4. The DMTF document is DSP1013, V1.0.1.
5. The DMTF document is DSP1015, V1.1.0.
6. The DMTF document is DSP1074, V1.0.0.

[Table 4](#) lists the SMI-S profiles supported by the Host provider of the SMI-S Provider. Note that the Host provider also supports profiles from the Distributed Management Task Force (DMTF).

Table 4 Host provider supported profiles (page 1 of 2)

Profile	SMI-S V1.5	SMI-S V1.6	DMTF
Base Server	X		
Disk Partition		X	
Host Discovered Resources	X		
Host Filesystem		X	
IP Interface			X ¹

Table 4 Host provider supported profiles (page 2 of 2)

Profile	SMI-S V1.5	SMI-S V1.6	DMTF
OS Status			X ²
SCSI Multipath Management	X		
Storage HBA	X		

1. The DMTF document number is DSP1036, V1.1.0.
2. The DMTF document number is DSP1029, V1.0.0.

Powerlink soon to be decommissioned: Visit EMC Online Support

EMC Online Support is now available to customers, partners, and EMC employees for all EMC products. It can be accessed at <https://support.EMC.com>.

The new site is a completely redesigned customer support portal that takes your online support experience to the next level, offering industry-leading self-service.

Specific features include:

- ◆ Easier and faster product- and task-based navigation.
- ◆ Significantly improved search experience and relevancy with faceted search results.
- ◆ Single source for product information via the redesigned Support by Product pages.
- ◆ Easy access to key features such as Live Chat and integration with Support Community Forums.
- ◆ Personalization features for a tailored and streamlined experience.

With this release of the new site, Support by Product on Powerlink will be decommissioned in the future and is now available for all EMC products on the new EMC Online Support site. All other Powerlink support features will remain in place for a period of time before they are decommissioned in an orderly fashion. During this transition period, information will be posted on Powerlink redirecting you to the new site as the existing features are expired. View the brief Online Support Overview video for a quick tour of the new support experience.

Fixed problems

Details about SMI-S Provider issues that were fixed can be found online in EMC Issue Tracker. EMC Issue Tracker offers online access for up-to-date product issue information. Product issues can be searched using a keyword, issue number, product feature, or product version. Issue Tracker can be accessed on EMC online support at:

<https://support.EMC.com>

Environment and system requirements

Review the following sections before managing Symmetrix arrays, CLARiiON arrays, and VNX storage families with SMI-S Provider V4.5.1.

SMI-S supported products and specifications

[Table 5](#) lists the SMI-S schemas and specifications supported by SMI-S Provider V4.5.1.

Table 5 SMI-S Provider support for SMI-S

Supported schemas and specifications
Distributed Management Task Force Common Information Model (DMTF CIM) Schema V2.34.0
Storage Management Initiative Specification (SMI-S) V1.3.0, V1.4.0, V1.5.0, V1.6.0
EMC ECOM V2.7.2 ¹

1. This is included as part of the SMI-S Provider installation.

Solutions Enabler

Solutions Enabler customers who choose to upgrade their environments to SMI-S Provider V4.5.1 must uninstall their existing version of Solutions Enabler before the installation. The SMI-S Provider V4.5.1 installation is bundled with the required Solutions Enabler libraries.

Solutions Enabler access control requirements

If Solutions Enabler Access Control is enabled on the Symmetrix array, then the host on which the SMI-S Provider is running must have sufficient privileges to perform the necessary operations. At a minimum, the host on which the SMI-S Provider is running must be in a group that has access to ALL_DEVS with BASE and VLOGIX privileges.

Supported platforms

Table 6 lists the supported platforms for SMI-S Provider V4.5.1.

Table 6 Supported platforms

Platform	Architecture	OS Version	Minimum service pack level or kernel version
Windows	32-bit	Windows Server 2003 R2 Enterprise Edition	
Windows	64-bit	Windows Server 2003 R2 Enterprise Edition	
Windows	64-bit	Windows Server 2003 R2 Standard Edition	
Windows	x64	Windows Server 2003 R2 Standard Edition	
Windows	64-bit	Windows Server 2008 R2 Enterprise Edition	
Windows	64-bit	Windows Server 2012 Enterprise Edition	
Linux	32-bit	Red Hat Enterprise Linux 4	2.6.9-78
Linux	64-bit	Red Hat Enterprise Linux 4	2.6.9-42
Linux	64-bit	Red Hat Enterprise Linux 4.5	
Linux	32-bit	Red Hat Enterprise Linux 5	
Linux	64-bit	Red Hat Enterprise Linux 5.5, 5.6, and 5.8	
Linux	64-bit	Red Hat Enterprise Linux 6	
Linux	64-bit	Red Hat Enterprise Linux 6.1, 6.2, and 6.3	
Linux	32-bit	SuSE Enterprise Server 10 (i586)	SP2

Table 6 Supported platforms (continued)

Platform	Architecture	OS Version	Minimum service pack level or kernel version
Linux	64-bit	SuSE Enterprise Server 10 (x86_64)	SP3
Linux	64-bit	SuSE Enterprise Server 11 (x86_64)	SP1
Linux	64-bit	SuSE Enterprise Server 11 (x86_64)	

EMC hardware supported by SMI-S Provider

[Table 7](#) lists the Symmetrix, CLARiiON, and VNX storage families supported by SMI-S Provider 4.5.1.

Table 7 EMC hardware supported by SMI-S Provider

Supported Symmetrix arrays	Supported CLARiiON arrays	VNX families
<ul style="list-style-type: none"> • Symmetrix DMX™Series: DMX-4 DMX-3 DMX-2 • Symmetrix VMAX Family: Symmetrix VMAX 10K Series Symmetrix VMAX 20K Series Symmetrix VMAX 40K Series 	<ul style="list-style-type: none"> • CX4 Series, AX4 Series, and AX150 Series 	VNX Series

Symmetrix array requirements

[Table 8](#) lists additional Enginuity requirements that you must install to manage Symmetrix arrays using SMI-S Provider V4.5.1.

Table 8 Symmetrix array requirements

Requirements
Supported Enginuity version 5671.x, 5773.79 through 5773.176, or 5874 and higher
EMC Solutions Enabler V7.5.1 ¹

1. Solutions Enabler V7.5.1 provides the interface between the Storage Management Interface (SMI) and the Symmetrix and CLARiiON storage arrays. As such, the Solutions Enabler components required for SMI-S Provider operations are included as part of the SMI-S Provider installation.

Note: When using the SMI-S Provider to manage Symmetrix arrays, it is recommended that six gatekeepers be present for use by the provider.

CLARiiON array requirements

[Table 9](#) lists additional software that must be installed to manage CLARiiON arrays using the SMI-S Provider V4.5.1.

Table 9 CLARiiON array requirements

Requirements
CLARiiON FLARE 19, 22, 24, 26, 28, 29, 30
EMC Solutions Enabler V7.5.1 ¹
VNX OE 31, 32

1. Solutions Enabler V7.5.1. provides the interface between the Storage Management Interface (SMI) and the Symmetrix and CLARiiON storage arrays. As such, the Solutions Enabler components required for SMI-S Provider operations are included as part of the SMI-S Provider installation.

EMC storage systems supported for use with VMM

[Table 10](#) lists a subset of Symmetrix, CLARiiON, and VNX storage families supported for use with VMM.

Table 10 EMC storage systems supported for VMM

Supported Symmetrix arrays	Supported CLARiiON arrays	VNX families
<ul style="list-style-type: none"> Symmetrix VMAX Family: <ul style="list-style-type: none"> Symmetrix VMAX 10K Series running Enginuity 5875 or higher Symmetrix VMAX 20K Series running Enginuity 5875 or higher Symmetrix VMAX 40K Series running Enginuity 5876 or higher 	CX4 Series running FLARE 30 or higher	Running VNX OE 31 or higher

Note: EMC recommends no more than five Symmetrix or CLARiiON storage systems per SMI-S Array Provider when used with VMM. EMC also recommends using the 64-bit version of the SMI-S Array Provider along with a multicore server with a minimum of 8 GB physical memory.

Microsoft Visual Studio runtime requirements

For Windows environments, you need a minimum of Visual C++ 2008 SP1 Redistributable Package with KB973923 to be present. The installer applies this redistributable if it is not present prior to installing the Solutions Enabler kit.

GNU Compiler Collection (GCC) standard C++ library requirements

SMI-S Provider Version 4.5.1 requires the GNU Compiler Collection (GCC) standard C++ library `/usr/lib/libstdc++.so.6` for its dynamically linked C++ binaries. This generally comes with `libstdc++ rpm`, which is found in systems with GCC version 3.4.0 and higher or systems with `libstdc++` version 3.4.0 and higher.

Before installing SMI-S Provider in RedHat Enterprise Linux and SuSE systems, verify that `compat-libstdc++ rpm` is already installed, which provides the compatible C++ libraries.

For example, run the following commands to check for these compatible C++ libraries:

```
# rpm -qa | grep libstdc++
compat-libstdc++-33-3.2.3-47.3
libstdc++-3.4.5-2
libstdc++-devel-3.4.5-2
compat-libstdc++-296-2.96-132.7.3
# rpm -ql libstdc++-3.4.5-2
/usr/lib/libstdc++.so.6
/usr/lib/libstdc++.so.6.0.3
```

If you do not have the correct version installed, obtain and install it before proceeding with the SMI-S Provider installation.

Run the following command to install the library:

```
# rpm -ivh compat-libstdc++*.rpm
```

Backward and forward compatibility for applications

An SMI-S V1.3 client that was written by using the CIM_* classes runs against the SMI-S Provider V4.5.1 without modification.

Note: Backward compatibility of clients that are written by using EMC-specific subclasses cannot be guaranteed.

Known problems and limitations

The following are performance or functionality restrictions and limitations that may apply to your specific storage environment or host platform.

In addition to these release notes, SMI-S Provider fixes, known issues, and limitations (and other EMC product releases) can be viewed, searched, and parsed online using the EMC Issue Tracker tool available from EMC online support.

SMI-S Provider and CIM server

ECOM failure to start

Security initialization failure

Red Hat and SuSE Linux platforms may generate the following set of errors when ECOM does not start:

```
02-Nov-2010 15:09:52.091 -3086366416-W- ECOM: CST Lockbox Initialization
Error:ERR_LIB_NOT_INIT
```

```
02-Nov-2010 15:09:52.091 -3086366416-C- ECOM: -E- Security manager
initialization failed. Check whether the security plugin exists and is
set up properly.
```

If you receive the above errors, do the following:

1. Set the default to `/opt/emc/ECIM/ECOM/thirdparty` and issue the following command:

```
[root@losaz134 thirdparty]# ./cstadmin initialize
/opt/emc/ECIM/ECOM/conf/cst
```

2. A request for a lockbox passphrase displays. Enter a text string for the passphrase:

```
Enter lockbox passphrase:
Confirm passphrase:
```

Unsupported SELinux setting is enabled

The following error indicates an unsupported SELinux setting is enabled, which is the default for Red Hat, and must be disabled:

```
cstadmin: Failure initializing lockbox
/opt/emc/ECIM/ECOM/conf/cst. [The cryptography library was not
  initialized.] [-48]
Failed to retrieve Log Service: The cryptography library was not
  initialized. [/opt/emc/ECIM/ECOM/conf/cst/csp.clb]
```

To temporarily disable this SELinux setting, do the following:

```
[root@losaz134 ~]# cat /selinux/enforce
1
[root@losaz134 ~]# echo 0 >/selinux/enforce
[root@losaz134 ~]# cat /selinux/enforce
0
[root@losaz134 ~]# cd /etc
[root@losaz134 etc]# cd selinux
```

To permanently disable this SELinux setting, follow the instructions at:

http://www.crypt.gen.nz/selinux/disable_selinux.html

No Solutions Enabler client/server support

SMI-S Provider does not support Solutions Enabler client/server functionality.

32-bit and 64-bit platform support

The 32-bit SMI-S Provider kit is only supported on 32-bit platforms, and the-64 bit SMI-S Provider kit is only supported on 64-bit platforms.

Shared CIM server restriction

The CIM server installed with the SMI-S Provider does not support or allow any third-party SMI-S providers be run under ECOM.

Network port contentions

By default, the ECOM server listens on ports 5988 (for HTTP) and 5989 (for HTTPS) for CIM-XML and listens on ports 5985 (for HTTP) and 5986 (for HTTPS) for WSMAN. When running on the Symmetrix service processor, the SMI-S Provider listens on port 5989 only. If the default ports are in use by some other process (such as WMIProvider), the CIM server does not start.

When this occurs, you can either move the other process to a different network port, or specify different port values for the EMC CIM server by changing the `Port0`, `Port1`, `Port2`, and `Port3` parameters of `port_settings.xml` file (located in the Solutions Enabler Windows directory `c:\Program Files\emc\ECIM\ECOM\conf` and UNIX directory `/opt/emc/ECIM/ECOM/conf`) and restarting the SMI-S Provider.

During installation the scripts attempt to determine if the default ports (5988, 5989, 5985, 5986) are in use. If they are in use at install time, the installation attempts to use other ports until free ports are found. Once a usable port value is found, the script automatically updates the `port_settings.xml` file with the ports that are used after installation.

The following is example output of the network port contentions:

```
21-Oct-2010 11:07:16.712 -7836-E- NAVIPHelper::getInterfaceList: subnetMask is NULL
21-Oct-2010 11:07:19.739 -6532-E- WebServer: Http Server Listener unable to listen
on address and port: [0:0:0:0:0:0:0:0]:5985
21-Oct-2010 11:07:19.739 -6532-E- WebServer: NAVSocket::bind() returned error
Permission denied (on [0:0:0:0:0:0:0:0]:5985) :
21-Oct-2010 11:07:26.741 -7836-E- CIMOM: Failure to start listener on port - 5985,
interface - :..
21-Oct-2010 11:07:27.743 -7836-E- CIMOM: Shutting down ECOM...
```

OpenPegasus port conflict with ECOM running on RedHat Linux 5.5 and higher

Problem

On Redhat Linux 5.5 and higher, ECOM fails to start the listener on port 5989.

Possible Reason

OpenPegasus cimserver is running and bound to port 5989.

Symptoms

ECOM does not start:

```
[root@smiprovider bin]# pwd
/opt/emc/ECIM/ECOM/bin
[root@smiprovider bin]# ./ECOM
-I- Loading configuration files from /opt/emc/ECIM/ECOM/conf
-I- Base directory set to /opt/emc/ECIM/ECOM/
-W- Could not get config setting ECOMContextManager:PluginName
-I- Could not initialize the platform specific context manager. Setting
    it to default behaviour of cimom.
-E- Failure to start listener on port - 5989, interface - ::.
Shutting down ECOM...
[root@smiprovider bin]#
```

ECOM cimomlog.txt contains errors:

```
[root@smiprovider bin]# cat ../log/cimomlog.txt
31-Aug-2011 22:30:32.021 -1109256512-E- WebServer: Http Server Listener
    unable to listen on address and port: [0:0:0:0:0:0:0:0]:5989
31-Aug-2011 22:30:32.021 -1109256512-E- WebServer: NAVSocket::bind()
    returned error Address already in use (on [0:0:0:0:0:0:0:0]:5989) :
31-Aug-2011 22:30:39.020 -868370176-E- CIMOM: Failure to start listener
    on port - 5989, interface - ::.
31-Aug-2011 22:30:40.022 -868370176-E- CIMOM: Shutting down ECOM...
[root@smiprovider bin]#
```

Workaround

1. Add port ranges to the conf/Port_settings.xml file:

```
<ECOMSettings>
  <ECOMSetting Name="Port0">
    <portRange>5988,25988-27000</portRange>
    <!--
      <port>5988</port>
    -->
    <secure>>false</secure>
    <slp>>true</slp>
  </ECOMSetting>
  <ECOMSetting Name="Port1">
    <portRange>5989,25989-27000</portRange>
    <!--
      <port>5989</port>
    -->
    <secure>>true</secure>
    <slp>>true</slp>
  </ECOMSetting>
  <ECOMSetting Name="Port2">
    <portRange>5985,25985-27000</portRange>
```

```

<!--
  <port>5985</port>
-->
  <secure>>false</secure>
  <slp>>true</slp>
</ECOMSetting>
<ECOMSetting Name="Port3">
  <portRange>5986,25986-27000</portRange>
<!--
  <port>5986</port>
-->
  <secure>>true</secure>
  <slp>>true</slp>
</ECOMSetting>

```

2. Start ECOM:

```

[root@smiprovider bin]# cd /opt/emc/ECIM/ECOM/bin
[root@smiprovider bin]# ./ECOM -d -c /opt/emc/ECIM/ECOM/conf
-I- Loading configuration files from /opt/emc/ECIM/ECOM/conf
-I- Base directory set to /opt/emc/ECIM/ECOM/
[root@smiprovider bin]#

```

3. Verify a warning (-w-) exists in the log/cimomlog.txt file:

```

31-Aug-2011 23:00:00.857 -1107540288-W- execute: Cannot bind to
port 5989

```

4. Verify ECOM has selected an alternate port. In this example, ECOM has selected port 25989:

```

[root@smiprovider bin]# netstat -an | grep 59
tcp        0      0 0.0.0.0:5900          0.0.0.0:*              LISTEN
tcp        0      0 10.31.188.155:23     168.159.244.189:2284   ESTABLISHED
tcp        0      0 :::5985              :::*                    LISTEN
tcp        0      0 :::5986              :::*                    LISTEN
tcp        0      0 :::5988              :::*                    LISTEN
tcp        0      0 :::25989             :::*                    LISTEN
tcp        0      0 :::5989              :::*                    LISTEN
unix  2      [ ACC ]     STREAM  LISTENING  11598  /var/lib/libuuid/request
unix  3      [ ]       STREAM  CONNECTED  25907  /var/symapi/ipc/storapid
unix  3      [ ]       STREAM  CONNECTED  25906
unix  3      [ ]       STREAM  CONNECTED  25905  /var/symapi/ipc/storapid
unix  3      [ ]       STREAM  CONNECTED  25904
unix  3      [ ]       STREAM  CONNECTED  16159
unix  3      [ ]       STREAM  CONNECTED  12559  /tmp/.X11-unix/X0
[root@smiprovider bin]#

```

Symmetrix array

Restore from Replica

Once synchronization is reached, a clone StorageSynchronized relationship can only be detached or restored using the ModifyReplicaSynchronization method call.

After a successful Restore from Replica operation, the relationship's CopyState property indicates Restored. Before you are able to perform any other operations on that relationship, you are required to Detach the clone relationship, Fracture the mirror relationship, and Return to ResourcePool the snap relationship.

IdleTimeCounter Disk metric in the Block Server Performance subprofile

The IdleTimeCounter Disk metric in the Block Server Performance subprofile is only supported on Symmetrix arrays running Enginuity 5771 and higher.

Automated storage tiering

Before deleting a storage tier on a Symmetrix array, you must first remove all the associations between the storage pools and the storage tier. The TierService.RemoveFromStorageTier method allows you to remove storage objects (such as StoragePools) from an existing storage tier.

Shrinking the capacity of the Symmetrix DEFAULT_POOL

At this time, EMC does not recommend shrinking the capacity of the Symmetrix DEFAULT_POOL used for snapshot targets. Any attempt to shrink the capacity of the Symmetrix DEFAULT_POOL using the SMI-S Provider results in the job failing with an error message containing the following text:

```
"<PROPERTY NAME="ErrorDescription" TYPE="string">
<VALUE>Pool Shrink failed: F:ERROR_FAMILY_FAILED R:1900006 L:2 1900006 :
  "Session cannot perform the requested service at this time" : 2 : 7505
  : "A savedev cannot be removed from the DEFAULT_POOL, it must be added
  to a named pool" @&#10;[1]
  com.emc.cmp.osls.se.osl.Pool.StorStoragePoolControl():255&#10;[0]
  com.emc.cmp.osls.se.array.job.JOB_PoolCreateModify.run():113&#10;
</VALUE>
</PROPERTY>"
```

Management integration with the Symmetrix service processor

When running the SMI-S Provider on the Symmetrix service processor, the SMI-S Provider listens on port 5989 only.

Composite volume

Creating a Composite Volume — Attempting to create a new Composite Volume (Meta) using the auto-meta feature of the Symmetrix array, ignores any supplied thick StoragePools. The auto-meta feature only accepts a single thin StoragePool.

Storage Element Protection

Because a volume can be Ready/Not-Ready independent of whether the volume is Read/Write enabled, in addition to the StorageProtectionSetting.Access property, in the StorageProtectionSetting class, there are now two additional properties titled EMCDeviceProtectionState and EMCDeviceProtectionStateDescription, which indicate the protection state of a volume.

Additionally, to set a volume Ready/Not-Ready, the method StorageProtectionService.Protect(), in its Access parameter, accepts the values 32768 for Ready and 32769 for Not-Ready.

CLARiiON array

Masking and mapping profile

Occasionally, clients of CLARiiON arrays are unable to traverse the Masking and Mapping profile because they are unable to obtain instances of the Clar_LunMaskingSCSIProtocolController class. This results in the following error being generated in the Solutions Enabler `symapi` log file:

```
STOR_C_MASK_DB_INCONSISTENT_STATE
```

The internal database is in an inconsistent state, and must be fully synchronized before performing this operation.

The `symapi` log file is located in the following directories:

- ◆ Windows: `c:\program files\emc\symapi\log`
- ◆ Linux: `/var/symapi/log`

The following two EMC Knowledgebase articles are associated with this error message:

- ◆ EMC386086: This is for duplicate HBA records: The fix is to restart the CLARiiON CIMOM.
- ◆ EMC241018: This is for duplicate HBA records information with different data (One has SG information and the other one does not). The fix is to delete the initiator records.

Unisphere for VNX not displaying some paths

When HBAs for the same host have different host IDs, Unisphere for VNX may not display all paths. In this scenario, when Solutions Enabler attempts to discover or synchronize a CLARiiON array, the following error is likely to occur:

```
1 CIM_ERR_FAILED: A general error occurred hat is not covered by a more specific error code. (com.emc.cmp.osl.Masking.StorMaskGroupShow():138 F:ERROR_FAMILY_FAILED R:1200019 1200019 : "The internal database is in an inconsistent state, and must be fully synchronized before performing this operation.") [err=Operation encountered a CIM/SMIS client exception]
```

To avoid the above issue, upgrade to Unisphere for VNX R29.014 or R30.507.

Block server performance profile

For the Block Server Performance profile, the WriteHitIOs metric for element types 2 and 8 (Array and StorageVolume classes) is always zero for CLARiiON arrays running pre-FLARE 30. For this 4.5.1 release, the WriteHitIOs metric for element types 2 and 8 is populated for all CLARiiON/VNX storage systems running FLARE 30 and higher.

SMI-S Provider registered hosts can fail to access CLARiiON LUNs

If the initiator type or failover mode for a host is incorrect, CLARiiON LUNs may not be accessible. The failover mode for a host registered through SMI-S Provider is set to four by default. Detailed information about the initiator type and the failover mode settings for different host types is available in EMC Knowledgebase article EMC99467.

To set the failover mode, the SetProperty or ModifyInstance operation must be invoked on the Clar_Privilege instance associated with the host requiring access to a CLARiiON LUN. For information on setting the failover mode on the Clar_Privilege instance, see the Clar_Privilege::setProperty/ModifyInstance section in the Masking and Mapping Subprofile chapter in the *SMI-S Provider Programmer's Guide*.

CLARiiON discover: Error logged

The following message is logged in the SMI-S Provider log file when an unsupported event is being registered during the discovery of a CLARiiON array.

This message can be safely ignored:

```
Sun Apr 06 09:47:17 Eastern Daylight Time 2008 HostName cimserver.exe 3188 3056
HostPath ERROR EventHandler.cpp 407 : Received exception while registering for event
for array <Array type="CLARiiON" encoding="String" value="FCNBD060307696" />:
F:ERROR_FAMILY_FAILED R:2200007 2200007 : "A processing error occurred within the
event daemon (storevntd)" : "Error returned from the event infrastructure." May not
receive events or indications for all modifications to array.
```

Manual registration for unknown storage hardware IDs for CLARiiON arrays

If multiple StorageHardwareIDs are being created using StorageHardwareIDManagementService::CreateStorageHardwareID() invoke method for a CLARiiON array and each of these unique StorageIDs require association with the same EMCIpAddress parameter value, also supply the EMCHostName parameter to the invoke method and make sure that the EMCHostName parameter value has one to one correspondence with the EMCIpAddress parameter value.

Example EMCHostName = "ABC" for both StorageID "XXXX" and StorageID "YYYY" if they share the same EMCIpAddress "ip.ip.ip.ip."

This recommendation avoids failures during the ControllerConfigurationService::ExposePaths() invoke method for a CLARiiON array.

Array Provider

VP Snaps

The current Array provider supports the creation of VP Snaps (formerly known as VSE Clones) on Symmetrix VMAX 10K arrays. However, all of the supplied target snapshots from a given source element must be allocated from the same thin storage pool; otherwise, an error message similar to the following is returned:

```
"Local snap not established" : 2 : 10650 : "All VP Snap targets must be bound to the same datadev pool."
```

By default, if a snapshot target element is not supplied, the SMI-S Provider allocates the target snapshots (VP Snaps) from the same storage pool as that of the source element.

The current Array provider does not support the creation of VP Snaps on Symmetrix VMAX 20K or VMAX 40K Series arrays. However, if the Array provider discovers a VP Snap copy relationship, the Array provider can perform various operations on the relationship, such as, Return to ResourcePool, Restore from Replica, etc.

Replication services profile

Symmetrix array: SMI-S Provider remote clone requirements

For the remote clone copy operations on Symmetrix arrays, the SMI-S Provider utilizes RCopy technology, which requires the source and target elements to be configured appropriately. For example, for online copy operations from or to a remote element (RCopy hot push or hot pull), all Symmetrix directors must see the remote device; and for offline copy operations to a remote element (RCopy cold push), the source element must be in the Not Ready state.

CLARiiON array: SMI-S Provider mirror and clone requirements

Physically connect the local and remote storage processor (SP) ports. For combination arrays, you may need one connection for each supported protocol (FC and iSCSI).

Always add any new arrays to the CLARiiON management domain.

CLARiiON array: SMI-S Provider clone requirements

For a storage group on the (non-owning) remote system, including the target and source devices, and the storage group must have the owning system's storage port initiator connected.

Enable the storage group on the non-owning array for SanCopy operations.

CLARiiON array: SMI-S Provider additional requirements

For point-in-time related copy operations such as SMI-S clone and snapshot, it is important to ensure the date and time are set correctly on both service processors.

Restrictions

Avoid using the underscore character, "_", in group and relationship names. If the group and relationships names containing the underscore characters are created on the array using the vendor specific tools, SMI-S Provider is unable to manipulate such groups and relationships.

The `ModifyListSynchronization` method call is not supported for the `GroupSynchronized` associations.

On CLARiiON arrays, the `ModifyReplicaSynchronization` method call cannot operate on SMI-S snapshot `StorageSynchronized` associations if these associations belong to a `GroupSynchronized` relationship.

The SMI-S Provider supports consistency groups. However, the properties `ConsistencyState` and `ConsistencyStatus` of the `GroupSynchronized` association are not reflected correctly. Therefore, ignore these properties in this release.

On some arrays, in response to the Restore from Replica operation, the array may create an additional `StorageSynchronized` association between the target element (as a new source) back to the source element (as a new target). These additional `StorageSynchronized` associations can be ignored.

Note: For local mirror and clone operations, if the target element is not specified, SMI-S Provider creates or locates a suitable target element. An element is considered available if it is not mapped to a port, not in a storage group, not already in a copy relationship, or not marked private. If SMI-S Provider locates a target element for these operations, it may select a target slated for future use.

To avoid such a situation, SMI-S Provider has set a default of `True` for its runtime property called:

```
OSLSProvider/com.emc.cmp.osls.se.array.Replication
```

`Service.provider.create.target`, which always creates a new target for all mirror and clone operations. If you change this default, the provider can select its own target, and may override any information on it. [“SMI-S Provider runtime settings” on page 51](#) explains this runtime property.

Host provider

SMI 1.0 backwards-compatibility classes

The `SCSIProtocolController` and `ProtocolControllerForPort` classes are not exposed by the Host provider.

Persistent binding model

The persistent binding model is not implemented by the Host provider.

LED Blinking via an AlarmDevice

The LED blinking via an `AlarmDevice` is not implemented by the Host provider.

Recipes for defining persistent binding

Recipes for defining a persistent binding to a target port WWN or a logical unit ID are *not* implemented by the Host provider.

Discovery of local disks and CLARiiON LUNz devices

A host server can contain both locally-attached devices and imported EMC storage array devices. The Host provider only discovers and models the EMC storage array devices and does not show any locally-attached devices. With respect to the EMC storage array devices, the Host provider does not show any EMC CLARiiON LUNz devices.

IPv4 support

Currently, the Host provider only supports IPv4.

VASA provider

VASA storage capabilities consistently missing a capability from list

The VMware vSphere 5.0 Manage Storage Capabilities client dialog box is consistently missing one of its capabilities from its expanded list of capabilities reported by the VASA provider. This missing capability is random and does not apply to a specific capability. This is a known issue in the VMware vSphere 5.0 client and will be fixed in an updated release of this product. For more information about future releases of VMware vSphere 5.0, please contact VMware support.

Failed to add vendor providers in VMware VCenter

If a VASA provider does not connect to an EMC storage array, adding this VASA provider into the VMware VCenter vendor providers list fails with error message `Failed to serialize response`. Ensure that the VASA provider can discover the EMC storage array properly before adding it into the VCenter.

Technical notes

This section provides technical notes for the advanced configuration of SMI-S Provider V4.5.1.

CIM interop namespace

The CIM interop namespace for the SMI-S Provider is:

```
interop
```

Creating or expanding snap pool capacity

For CLARiiON arrays, supply additional LUNs to add to a snap pool to increase the pool's capacity. You cannot specify a new size.

Unexpected termination: Windows dump file

SMI-S Provider was enhanced in this release to produce a dump file on the Microsoft Windows platform should the provider terminate unexpectedly.

If an unexpected termination occurs on the Windows platform, a dump file is produced in the `Program Files\EMC\ECIM\ECOM\Providers` directory with the name `ECOM.exe.dmp`. If this occurs, send this file along with the remaining contents of the log directory to EMC Customer Support for analysis.

Statistics collection interval

By default the Block Server Performance Subprofile collects statistics from an array every 15 minutes once the collection of statistics for that array is initiated. EMC does not support changing that interval to anything less than 15 minutes.

Certain devices not exposed as StorageVolumes

With the exception of the *private devices*, all devices on Symmetrix and CLARiiON arrays are exposed as StorageVolumes. The following devices are considered private devices:

- ◆ Composite Members — The capacity of Composite Members is reflected in the capacity of a Composite StorageVolume (such as a Composite Head or a Composite Device). Refer to the Volume Composition subprofile for additional details.
- ◆ Any device actively contributing capacity to a storage pool, such as snap/mirror pools — This contribution is reflected in the capacity of the device's storage pool. This storage pool may also be known as an upper pool, or a pool from pools. Effectively, the devices that contribute to an upper pool are allocated from a lower pool, but contribute capacity to an upper pool. In the SMI-S Provider model, the devices that contribute capacity to another pool are exposed as partially allocated storage extents, which are the ConcreteComponents of the StoragePool to which they contribute.

Composite StorageExtent

Beginning with FLARE 30, the CLARiiON storage array, in support of UnifiedStoragePools, introduces variations of Composite StorageExtent, called UnifiedExtent and UnifiedExtentTier. A UnifiedExtent is based on one or more UnifiedExtentTiers. The UnifiedExtent is associated to a UnifiedStoragePool via the AssociatedComponentExtent (or ConcreteComponent for older Providers) association.

Documentation

All EMC documentation can be found on EMC online support at:

<https://support.EMC.com>

Installation

This section covers the following:

- ◆ [SMI-S Provider installation overview](#) 34
- ◆ [Windows: Installing the SMI-S Provider](#)..... 35
- ◆ [Linux: Installing the SMI-S Provider](#) 36
- ◆ [Uninstalling the SMI-S Provider](#) 37

SMI-S Provider installation overview

The SMI-S Provider installation and setup process installs the following:

- ◆ EMC CIM server
- ◆ EMC Solutions Enabler V7.5.1 runtime libraries

Depending on which installation option you select, SMI-S Provider installs the following providers:

- ◆ Array
- ◆ Host
- ◆ VASA (automatically installs with the Array provider)

You can install and run the Host provider on the same host where the Array provider resides. From the standpoint of operation and model dependencies, both providers are mutually exclusive. Each provider represents its own implementation in separate libraries and namespaces.

Note: Only install the Host provider if your client application is capable of consuming information from this provider.

The Array provider depends on the `root/emc` namespace and the Host provider depends on the `root/emc/host` namespace. An SMI-S Provider client can correlate between these providers using a specified identifier representing the storage device WWN, as shown below.

- ◆ EMC SMI-S Array Provider Device WWN: `Symm_StorageVolume.DeviceWWN`
- ◆ EMC SMI-S Host Provider Device WWN: `SE_StorageExtent.DeviceWWN`

If the values for each of these properties match exactly, then an SMI client can correlate between the array model and the host model within the same ECOM process.

You can also install and run the Array and Host providers on different hosts. In such a configuration, the correlation between the two models is still possible using the Device WWN correlatable ID.

Windows: Installing the SMI-S Provider

The installation software for Windows platforms is on the SMI-S Provider V4.5.1 CD or you can download it from EMC online support.

1. Before you begin installation, save all your files and exit all Windows applications.
2. Launch the self-extracting executable `se751-WINDOWS-x86-SMI.exe` for 32-bit Windows operating systems or `se751-WINDOWS-x64-SMI.exe` for 64-bit Windows operating systems.
3. The EMC Solutions Enabler with SMI X86 welcome page appears prompting you to install Solutions Enabler with SMI-S Provider version 4.5.1.
4. Click **Next** to begin the installation. The Destination Folder dialog box opens and prompts you to select an install directory for Solutions Enabler and SMI-S Provider. EMC recommends that you choose the default directory.
5. Click **Next** to continue. The **Provider List** dialog box opens listing the Array and Host providers. By default, the VASA provider is automatically installed with the Array provider and is not offered as a separate installation option. If you want to install the VASA provider for use with VMware vSphere 5.0, just select the Array provider.

If you are installing the SMI-S Provider for use with VMM or EMC ProSphere, then selecting the Array provider is sufficient. Both VMM and ProSphere require the installation of the Array provider. The minimum ProSphere version supporting SMI-S Provider 4.5.1 is 1.6.x.

Note: Do not install the Host provider unless the client software that you are using with this kit specifically calls for it. EMC is not currently aware of any third-party applications that make use of the Host provider.

6. If you are installing the provider on a host, and no other EMC-based Solutions Enabler applications will be sharing the Solution Enabler installation, then the default daemons shown as selected are sufficient for the array provider to function. If the Solutions Enabler installation will be shared with other software, such as, ECC or Unisphere for VMAX, then additional daemons may need to be started. Consult the appropriate product documentation for those products for information regarding any additional daemons that may need to be started.
7. After selecting a provider, click **Next** to continue. The **Ready to Install the Program** dialog box opens.
8. Click **Install** to begin installing files to your selected folder. This may take several minutes. The **Installation Wizard Completed** dialog box opens.
9. Click **Finish** to complete the setup.
10. When the installation has completed, update your environment variable path to include the Solutions Enabler installation directory, which by default is `C:\Program Files\EMC\SYMCLI\bin`, to run the command line utilities from any directory.
11. After installing the SMI-S Provider, complete the appropriate post-installation tasks starting on [page 39](#).

Linux: Installing the SMI-S Provider

1. Download the SMI-S Provider V4.5.1 software from EMC online support.
2. Extract the `se751-Linux-i386-SMI.tar` image to a temporary directory.
3. Change the directory to the location of the SMI-S Provider kit and run the install script by using the following command:

```
cd /<location of extracted files or CD>/UNIX
```
4. Run one of the commands in [Table 11](#). If you are installing the SMI-S Provider for use with VMM, EMC ProSphere, or VMware vSphere 5.0, then selecting the first installation command option in [Table 11](#) is sufficient.

Table 11 Installation command options

Command	Description
<code>se751_install.sh -install</code>	Installs and sets up the Array and VASA providers.
<code>se751_install.sh -install -smi</code>	Installs and sets up the Array, VASA, and Host providers.
<code>se751_install.sh -install -smi_host</code>	Installs and sets up the Host provider.

The installation program begins copying the files. When complete, the installation program automatically starts the `storapid` and the `storevntd` daemons. This may take a few minutes.

When complete, the installation program returns the following confirmation message, listing EMC Solutions Enabler with SMI-S Provider in the following `HAS BEEN INSTALLED` list:

```
#-----
# The following HAS BEEN INSTALLED in /opt/emc via the rpm utility.
#-----
ITEM   PRODUCT                                VERSION
01     EMC Solutions Enabler                   V7.5.1
SMI    KIT                                     V4.5.1
#-----
```

5. After installing the SMI-S Provider, complete the appropriate post-installation tasks starting on [page 39](#).

Uninstalling the SMI-S Provider

Before uninstalling SMI-S Provider, back up the SYMAPI directory:

- Windows: `C:\Program Files\EMC\SYMAPI`
- Linux: `/var/symapi`

Windows: Uninstalling SMI-S Provider

1. Verify all application processes using SMI-S Provider or Solutions Enabler libraries and binaries are stopped.

2. Use the Windows **Add/Remove Programs Properties** dialog box to remove **EMC Solutions Enabler With SMI**.

If the uninstall process detects that a service or library is in use, a message appears. If this occurs:

- a. Click **OK** to stop the uninstall process.
- b. Close the application using the service or library.
- c. Restart the SMI-S Provider uninstall.

Linux: Uninstalling SMI-S Provider

1. Verify that all application processes using the SMI-S Provider or Solutions Enabler libraries and binaries are stopped.
2. Change the directory to the location of the SMI-S Provider kit and run the uninstall script by using the following command:

```
./se751_install.sh -uninstall
```

Note: If you did not properly shut down SMI-S Provider or the Solutions Enabler processes, you are prompted to do so during the uninstall process.

The installation program begins removing the files. When complete, the installation program returns the following confirmation message:

```
Solutions Enabler successfully uninstalled from your system.
```

Post-installation tasks

This section explains the post-installation tasks that you must complete, which are covered in the following topics:

◆ Array and Host provider Windows authentication settings	39
◆ VASA provider	40
◆ Symmetrix array	42
◆ CLARiiON and VNX arrays	43
◆ ECOM	48
◆ VMM: Required ECOM modifications	50
◆ SMI-S Provider runtime settings	51

Array and Host provider Windows authentication settings

To enable Windows authentication for the Array and Host providers, you must modify default settings in the `security_settings.xml` file. On Windows platforms, this file resides in `c:\program files\emc\ecim\ecom\conf`.

To enable Windows authentication, do the following:

1. If ECOM is running, stop it, as explained in [“Starting and stopping ECOM” on page 49](#).
2. Modify the following default settings in `security_settings.xml`:

```
<ECOMSettingName="NonCIMRequest_AuthenticationEnabled
  "Type="boolean" Value="false"/>
```

```
<ECOMSetting Name="HTTPChallengeMechanism"
  Type="string" Value="Basic"/>
```

to:

```
<ECOMSetting Name="NonCIMRequest_AuthenticationEnabled
  "Type="boolean" Value="true"/>
```

```
<ECOMSetting Name="HTTPChallengeMechanism"
  Type="string" Value="Basic,WindowsAuth"/>
```

3. Restart ECOM.

Note: Changing the default setting of `<ECOMSetting Name="NonCIMRequest_AuthenticationEnabled" Type="boolean" Value="true"/>` prevents the VASA provider from working properly. To use the VASA provider with VMware vCenter™ 5.0, you must set up a separate SMI-S Provider installation to use with VMware vCenter 5.0. Changing this setting also prevents EMC Prosphere from working properly. If the provider is being installed for the sole purpose of use with EMC Prosphere, it is recommended that this setting not be changed.

VASA provider

To use the VASA provider, you must modify an ECOM setting and register this provider with VMware vSphere 5.0

Modifying ECOM to work with the VASA provider

After the VASA provider is installed, you must modify an ECOM setting in order for VMware vSphere 5.0 to properly use this provider. This modification does not preclude the use of the Array and Host providers.

To modify the ECOM setting, do the following:

1. If ECOM is running, stop it, as explained in [“Starting and stopping ECOM” on page 49](#).
1. On Windows, go to the file `c:\program files\emc\ecim\ecom\conf\security_settings.xml` and change the following setting:

```
<ECOMSetting Name="ExternalConnectionLimit" Type="uint32" Value="100"/>
```

to:

```
<ECOMSetting Name="ExternalConnectionLimit" Type="uint32" Value="1200"/>
```

2. Save this file and restart ECOM.

The VASA provider obtains its information from the Array provider. After the above procedure is completed, your EMC storage arrays must be connected to the Array provider, which should already be installed. If connecting to Symmetrix arrays, see [“Symmetrix array” on page 42](#). If connecting to CLARiiON arrays and/or VNX storage systems, see [“CLARiiON and VNX arrays” on page 43](#).

Registering the VASA provider with VMware vSphere 5.0

For the most up-to-date instructions on registering the VASA provider, see the appropriate VMware vSphere 5.0 documentation.

To register the VASA provider with VMware vSphere 5.0, do the following:

1. In the Virtual Data Center, go to the **Home->Administration->Storage Providers** menu, and select Storage Provider in the Navigator bar.
2. In the **Vendor Providers** pane, select **Add**. When prompted, add the vendor provider properties: name, URL, and login information. An example of a proper URL is:

`https://<ipaddress>:5989/vasa/services/vasaService`

where `<ipaddress>` is the IP address of the host on which the VASA provider is running.
3. When the VASA provider is first connected, the host authentication certificate displays. After verifying the certificate, click **Yes** to complete the registration.
4. Go to the **Vendor Providers** pane to see if the VASA provider is listed. If listed, the VASA provider is registered with the Virtual Data Center.
5. Read the *Using EMC Symmetrix Storage in VMware vSphere Environments TechBook*, located on the EMC website:

<http://www.emc.com>

Symmetrix array

When using the SMI-S Provider to manage Symmetrix arrays, it is recommended that you configure six gatekeepers for each Symmetrix array accessed by the provider. Only set up these gatekeepers for the host on which the SMI-S Provider is running. When started, the SMI-S Provider automatically discovers all Symmetrix storage arrays connected to the host on which the Array provider is running. No other action is required, such as running the `symcfg discover` command.

ECC and Unisphere for VMAX 1.0 coexistence: `symapi_db.bin` database sharing

When the SMI-S Provider is installed on the same host as the ECC Symmetrix agent and/or the Unisphere for VMAX 1.0, you may see the following memory allocation errors in the `syampi` log file:

```
EMC:SMBASE __iload_db_osl pdsDbRecRead() failed : OSL:CONN_INFO ([PDS/DB] (Unable to allocate memory)
```

```
EMC:SMBASE emcSymDBLoad Error encountered while reading from DB file [C:\Program Files\EMC\SYMAPI\db\symapi_db.bin] (SYMAPI_C_MEMORY_ALLOC_ERROR)
```

The factors determining these memory allocation errors are governed by the amount of physical memory on the host as well as the number and size of the array configurations. Because it is difficult to predict how much memory is required for this type of installation scenario, perform the following steps to prevent the above errors from occurring:

1. Instruct SMI-S Provider to use its own `symapi` database by editing the `c:\program files\emc\ecim\ecom\providers\oslsprovider.conf` file.
2. Change the following line in `oslsprovider.conf`:

```
#OSLSProvider/com.emc.cmp.osls.se.array.StorApi.database.filename =
```

to:

```
OSLSProvider/com.emc.cmp.osls.se.array.StorApi.database.filename = c:/program files/emc/symapi/db/symapi_smi_db.bin
```

3. Stop ECOM, the ECC Symmetrix agents, Unisphere for VMAX 1.0, and the Solutions Enabler daemons.
4. Remove the existing `symapi_db.bin` file, and save all device group information to be later restored to the new `symapi` database.
5. Restart ECOM, the ECC Symmetrix agents, Unisphere for VMAX 1.0, and the Solutions Enabler daemons.

CLARiiON and VNX arrays

SMI-S Provider discovers CLARiiON and VNX storage arrays using one of the following discovery methods:

- ◆ In-band discovery. This is conceptually the same as the Symmetrix SMI-S Provider-based discovery. If the correct information is in place, SMI-S Provider can automatically discover a CLARiiON array or VNX storage system during its startup.
- ◆ Out-of-band discovery. You can add a CLARiiON or VNX array to the SMI-S Provider without a CLARiiON or VNX LUN being present on the host on which SMI-S Provider is installed. Typically, this method is preferred over in-band discovery.

In-band discovery method

For SMI-S Provider to automatically discover locally-attached CLARiiON or VNX arrays, you must add authorization information for its storage processors. A locally-attached storage array is one in which at least one CLARiiON or VNX LUN is visible to the host on which the SMI-S Provider is running.

Use the SYMCLI `symcfg` command, as shown in the following syntax example, to add the username and password for each storage processor:

```
symcfg authorization add -host HostName -username UserName -password PassWord
```

For example, to add authorization for storage processor A with IP address 172.23.193.86, username *myname* and password *mypassword*, use the following command:

```
symcfg auth add -host 172.23.193.86 -username myname -password mypassword
```

First list the information for storage processor A and then storage processor B. Before adding a locally-attached CLARiiON or VNX array to SMI-S Provider, shut down the EMC CIM Server, add the above authorization information, and then restart the EMC CIM Server.

Note: You must add authorization information for each storage processor. If you fail to complete this task before running SMI-S Provider, you may receive an error message stating that you do not have NaviCLI installed. NaviCLI is not required for Navisphere Release 19 or higher but you must still supply the authorization connectivity information as previously described.

Out-of-band discovery method

SMI-S Provider has a programmatic interface that provides management applications integrated with the provider the ability to discover CLARiiON or VNX storage arrays out of band. This discovery method does not require that a CLARiiON or VNX LUN be visible to the host on which the SMI-S Provider is running. Only the IP connection to the storage array is required.

If your management application uses this programmatic interface, you must provide the following information:

- ◆ IP address of SPA and SPB of the CLARiiON or VNX array to be managed.
- ◆ Username and password of the CLARiiON or VNX array that is of administrator-level privilege with global scope.

If your management application does not use this programmatic interface, EMC offers the testsmiprovider tool for adding CLARiiON and VNX arrays to the SMI-S Provider. On Windows platforms, TestSmiProvider.exe resides in c:\program files\emc\ecim\ecom\bin. On Linux platforms, TestSmiProvider resides in /opt/emc/ECIM/ECOM/bin.

The following testsmiprovider program is interactive and provides acceptable defaults:

```
C:\Program Files\EMC\ECIM\ECOM\bin>testsmiprovider

Connection Type (ssl,no_ssl,native) [no_ssl]:
Host [localhost]:
Port [5988]:
Username [admin]:
Password [#1Password]:
Log output to console [y|n (default y)]:
Log output to file [y|n (default y)]:
Logfile path [Testsmiprovider.log]:
Connecting to localhost:5988
Using user account 'admin' with password '#1Password'

#####
##
##          EMC SMI Provider Tester          ##
## This program is intended for use by EMC Support personnel only. ##
## At any time and without warning this program may be revised   ##
## without regard to backwards compatibility or be               ##
## removed entirely from the kit.                                ##
#####
slp      - slp urls          slpv      - slp attributes
```

```

cn      - Connect                dc      - Disconnect
rc      - RepeatCount           st      - Set timeout value
ns      - NameSpace             ens     - EnumerateNamespaces
ec      - EnumerateClasses      ecn     - EnumerateClassNames

ei      - EnumerateInstances    ein     - EnumerateInstanceNames

a       - Associators           an      - AssociatorNames
r       - References            rn      - ReferenceNames

gi      - GetInstance           gc      - GetClass
lc      - Log control           dv      - Display version info
ind     - Indications menu     sl      - Start listener

addsys  - EMC AddSystem         refsys  - EMC RefreshSystem
disco   - EMC Discover          remsys  - EMC RemoveSystem
im      - InvokeMethod         tms     - TotalManagedSpace

q       - Quit                  h       - Help
#####
Namespace: root/emc
repeat count: 1
(localhost:5988) ?

```

If you successfully connected to the SMI-S Provider, issue the **dv** command to list basic information about the provider and any attached storage arrays:

```

(localhost:5988) ? dv
++++ Display version information +++++

CIM ObjectManager Name: EMC:10.247.73.48

CIMOM Version: EMC CIM Server Version 2.7.1.0.0.0

SMI-S spec version: 1.5.0

SMI-S Provider version: V4.5.1

SMI-S Provider Location: Proxy

SMI-S Provider Server:
Windows_NT l2se0048 6.1.7600 x86_64 (64bit Libraries)

Solutions Enabler version: V7.5.1

Retrieve and Display data - 1 Iteration(s) In 0.109006 Seconds

Please press enter key to continue...

```

In the previous example, the SMI-S Provider is not aware of any attached storage arrays.

Use the **addsys** command to attach a CLARiiON or VNX array to SMI-S Provider. This command is not for Symmetrix arrays. The following is an example of attaching an VNX array to the SMI-S Provider:

```
(localhost:5988) ? addsys
Add System {y|n} [n]: y

ArrayType (1=Clar, 2=Symm) [1]:
One or more IP address or Hostname or Array ID

Elements for Addresses
IP address or hostname or array id 0 (blank to quit): 10.247.73.78
IP address or hostname or array id 1 (blank to quit): 10.247.73.79
IP address or hostname or array id 2 (blank to quit):
Address types corresponding to addresses specified above.
(1=URL, 2=IP/Nodename, 3=Array ID)
Address Type (0) [default=2]:
Address Type (1) [default=2]:
User [null]: clariion
Password [null]: clariion
++++ EMCAddSystem ++++
OUTPUT : 0
Legend:0=Success, 1=Not Supported, 2=Unknown, 3=Timeout, 4=Failed
       5=Invalid Parameter
       4096=Job Queued, 4097=Size Not Supported
```

Note: In the previous example, not all the values apply to all methods. See the MOF for the method.

```
System :
//10.247.73.48/root/emc:Clar_StorageSystem.CreationClassName="Clar_StorageSystem",Name="CLARiiON+FNM00104500227"
```

In the previous example, the first SPA and the SPB of the VNX array is provided. The username/password combination must be of administrator level and global scope.

By issuing the following **dv** command, you can see the VNX array (which displays as CLARiiON Array FNM00104500227) is now present in the provider:

```
(localhost:5988) ? dv
++++ Display version information ++++

CIM ObjectManager Name: EMC:10.247.73.48

CIMOM Version: EMC CIM Server Version 2.7.1.0.0.0
```

```
SMI-S spec version: 1.5.0
SMI-S Provider version: V4.5.1
SMI-S Provider Location: Proxy
SMI-S Provider Server:
Windows_NT l2se0048 6.1.7600 x86_64 (64bit Libraries)
Solutions Enabler version: V7.5.1
Firmware version information:
(Remote) CLARiiON Array FNM00104500227 (Rack Mounted VNX7500) :
  5.31.0.5.006
Retrieve and Display data - 1 Iteration(s) In 0.155009 Seconds
Please press enter key to continue...
```

Firewall considerations

If a firewall exists between the SMI-S Provider installation and a CLARiiON or VNX array, port 443 must be opened in both directions in the firewall for management communications to occur with the array.

CLARiiON and VNX account information

In order for the SMI-S Provider and Solutions Enabler to discover a CLARiiON or VNX array, the specified username and password must be of the administrator level and of global scope.

ECOM

The ECOM post-installation tasks require that you set up an administrator role, supply certificates to both the ECOM server and its client, and then start ECOM.

Setting up administrator authentication

Authentication is required to query the EMC CIM Server. An initial setup is required on the EMC CIM Server to create a CIM user. This can be done as follows:

1. Go to the URL `https://<ipaddress>:5989/ecomconfig`, and log in using the username `admin` and the password `#1Password`.
2. Click **Add User** and create a user with the role of **Administrator**. This newly created username can now be used to obtain access to the SMI-S Provider.

Note: For security reasons, change the default password of the user `admin`.

ECOM certificate management

In order for SSL communications between two peers to be authenticated, one of the following conditions must exist:

- ◆ If a peer presents a self-signed certificate, the host receiving the self-signed certificate must have its trust store seeded with that certificate.
- ◆ If a peer presents a CA-signed certificate, the host receiving the CA-signed certificate must have its trust store seeded with a chain of certificates starting from the issuer of the peer's certificate and ending with the root certificate.

Installing certificates in trust stores is performed at configuration time, not at runtime. The following sections describe how to supply certificates to both the ECOM server and its client.

Supplying a client with the ECOM server certificate

1. Obtain the ECOM certificate (`ecomtls.crt`) from the directory `<ECOM_Home>\conf\ssl`.
2. If `ecomtls.crt` does not exist, point your browser to the ECOM Admin page `https://<server>:<port>/ECOMConfig`. The connection fails as the trust store is not yet set up but the certificate is generated.
3. Add the ECOM certificate (`ecomtls.crt`) to the client's trust store. The certificate is in PEM format.

Supplying ECOM with the client certificate

To authenticate the client certificate, you must import the client certificate into the ECOM trust store. To do this, you must append the certificate to the file `ecomtls.ca` found in the directory `<ECOM_HOME>\conf\ssl`.

Follow these steps:

1. Obtain the client certificate from an SSL certificate provider.

Note: ECOM accepts certificates in PEM format only at this time.

2. Point your browser to the ECOM Administration Login page:

`https://<ServerName>:5989/ECOMConfig`

3. Select the **SSL Certificate Management** submenu.
4. Select **Import CA certificate file** to import the certificate. You do this by cut/pasting the certificate to the end of the list of already existing certificates if any exist.
5. Start ECOM.

Starting and stopping ECOM

ECOM runs on both Windows and UNIX environments. After installation completion, ECOM automatically starts. You can use the following commands to manually stop and restart the service should the need arise.

If ECOM does not start, review the problem resolution in [“ECOM failure to start” on page 18](#).

Windows

On Windows, ECOM runs as a service and can be controlled through the Windows **Services** control panel. The service name is `ECOM.exe` and it displays as `ECOM` in the **Services** control panel.

As an alternative method for stopping and starting ECOM, the `ECOM.exe` file is located in the Solutions Enabler `C:/Program Files/EMC/ECIM/ECOM/bin` directory. Use the following command to start the EMC CIM Server:

```
sm_service start ecom.exe
```

Use the following command to stop ECOM:

```
sm_service stop ecom.exe
```

UNIX

On UNIX, ECOM runs as a daemon in the background. To stop ECOM, obtain the PID of the ECOM process and issue the `kill -SIGTERM` command for that PID. For example:

```
kill -SIGTERM [PID]
```

The ECOM executable file is located in the Solutions Enabler `/opt/emc/ECIM/ECOM/bin` directory. Use the following command from this directory to restart ECOM:

```
./ECOM -d
```

VMM: Required ECOM modifications

After the Array provider is installed, you must modify an ECOM setting in order for VMM to properly use this provider.

To modify the ECOM setting, do the following:

1. If ECOM is running, stop it as explained in [“Starting and stopping ECOM” on page 49](#).
2. On Windows, go to the file `c:\program files\emc\ecim\ecom\conf\security_settings.xml`, review the comments in this file, and change the following settings:

```
ECOMSetting Name="ExternalConnectionLimit" Type="uint32"  
Value="100"/
```

```
ECOMSetting Name="ExternalConnectionLimitPerHost" Type="uint32"  
Value="100"/
```

to:

```
ECOMSetting Name="ExternalConnectionLimit" Type="uint32"  
Value="600"/
```

```
ECOMSetting Name="ExternalConnectionLimitPerHost" Type="uint32"  
Value="600"/
```

3. Save the `security_settings.xml` file and restart ECOM.

SMI-S Provider runtime settings

The `OSLSProvider.conf` file allows you to control the runtime behavior of the SMI-S Provider. You can find this file in the following directories of the Solutions Enabler:

- ◆ Windows platforms:
C:/Program Files/EMC/ECIM/ECOM/Providers
- ◆ UNIX platforms:
/opt/emc/ECIM/ECOM/Providers

[Table 12](#) describes the SMI-S Provider runtime settings. In order for these runtime settings to take effect, you must stop and then restart ECOM.

Table 12 SMI-S Provider runtime settings (page 1 of 3)

SMI-S Provider properties	= <OptVal DefaultVal>	Description
OSLSProvider /com.emc.cmp.osls.se.array.StorApi.database.filename	[filename] <empty>	Specifies the Solution Enabler database filename. If empty, uses the default database file.
OSLSProvider /com.emc.cmp.osls.se.array.StorApi.database.discover	true false	Specifies whether to perform a one-time discover upon starting a CIM Server. This is done before processing the first request received by the CIM Server. Note: SMI-S Provider is not loaded until requested by the CIM Server.
*/com.emc.cmp.ofl.log.Control.severity.id ¹	FATAL, ERROR, WARNING, NOTICE, INFO	Specifies the severity levels for the event logs: FATAL — Events leading to shutdown of the system ERROR — Internal or client error conditions WARNING — Potential errors NOTICE — Very important information (default if not present) INFO — Informational, non-error messages Each setting causes messages of the set severity and more severe to be appended to the log.

Table 12 SMI-S Provider runtime settings (page 2 of 3)

SMI-S Provider properties	= < <i>OptVal</i> <i>DefaultVal</i> >	Description
*/com.emc.cmp.ofl.log.Control.directory ¹	[<i>directory</i>] /var/symantec/pi/log/	Specifies the event log directory. If removed or empty, the SMI-S Provider log file is placed in the default location, which is the log directory of the EMC Solutions Enabler. The log filename takes the format: EMCProvider-yyyymmdd.log
OSLSProvider /com.emc.cmp.osls.se.array.LunMask.controls.enable	false true	If false, disables the Masking and Mapping active controls.
OSLSProvider /com.emc.cmp.osls.se.array.Session.StorageConfiguration.controls.enable	false true	If false, disables the Session Storage Configuration controls.
OSLSProvider /com.emc.cmp.osls.se.array.Session.StorageConfiguration.job.deleteoncompletion	true false	If true, automatically deletes jobs that successfully completed after timebeforedeletion, as explained in the next row. A failed job is removed only when GetErrors() is called to schedule its removal.
OSLSProvider /com.emc.cmp.osls.se.array.Session.StorageConfiguration.job.timebeforedeletion	5 minutes	Amount of time to wait before deleting jobs that successfully completed. The default of 5 minutes is the same as it appears in the standard MOF.
OSLSProvider /com.emc.cmp.osls.se.array.ReplicationService.controls.enable	false true	If false, disables the Replication Service controls.
OSLSProvider /com.emc.cmp.osls.se.array.ReplicationService.multi.virtual.snap	true false	If true, supports the Symmetrix multi-virtual snap feature, which allows a source element to have as many as 128 simultaneous snapshots. Note: This feature does not allow a mix of traditional snapshots and multi-virtual snaps.

Table 12 SMI-S Provider runtime settings (page 3 of 3)

SMI-S Provider properties	= < <i>OptVal</i> <i>DefaultVal</i>	Description
OSLSProvider /com.emc.cmp.osls.se.array.SystemRegistrationService. controls.enable	false true	If false, disables the System Registration Services controls.
OSLSProvider /com.emc.cmp.osls.se.array.StorageProtectionService. controls.enable	false true	If false, disables the Storage Protection Service controls.
OSLSProvider/com.emc.cmp.osls.se.array.Session.All. controls.enable	false true	If false, disables all controls. A false setting takes precedence over all control settings previously explained in this table.

1. The path shown is a UNIX-specific default installation path. Your actual install path may differ.

Troubleshooting and getting help

When experiencing difficulties with your host and connected storage environment, be sure to examine “[Known problems and limitations](#)” on page 18 and “[Technical notes](#)” on page 31 to see if your difficulty is a known problem recognized by EMC.

To ensure your host operating system is supported, check all specifications and limitations defined in E-Lab Interoperability Navigator, which can be reached at:

<https://elabnavigator.EMC.com>

Examine the Symmetrix system you are managing, noting its version of the Symmetrix Engenuity operating environment. Correlate Engenuity feature behaviors and problems while referencing parameters and limitations. If an SMI-S Provider feature does not function properly, or does not function as described in this document, contact the EMC Customer Support Center for assistance.

Where to get help

EMC support, product, and licensing information can be obtained on EMC Online Support as described next.

Note: To open a service request through EMC Online Support, you must have a valid support agreement. Contact your EMC sales representative for details about obtaining a valid support agreement or to answer any questions about your account.

Product information

For documentation, release notes, software updates, or for information about EMC products, licensing, and service, go to EMC Online Support (registration required) at:

<https://support.EMC.com>

Technical support

EMC offers a variety of support options.

Support by Product — EMC offers consolidated, product-specific information on the Web at:

<https://support.EMC.com/products>

The Support by Product web pages offer quick links to Documentation, White Papers, Advisories (such as frequently used Knowledgebase articles), and Downloads, as well as more dynamic content, such as presentations, discussion, relevant Customer Support Forum entries, and a link to EMC Live Chat.

EMC Live Chat — Open a Chat or instant message session with an EMC Support Engineer.

eLicensing support

To activate your entitlements and obtain your Symmetrix license files, visit the Service Center on <https://support.EMC.com>, as directed on your License Authorization Code (LAC) letter emailed to you.

For help with missing or incorrect entitlements after activation (that is, expected functionality remains unavailable because it is not licensed), contact your EMC Account Representative or Authorized Reseller.

For help with any errors applying license files through Solutions Enabler, contact the EMC Customer Support Center.

If you are missing a LAC letter, or require further instructions on activating your licenses through the Online Support site, contact EMC's worldwide Licensing team at licensing@emc.com or call:

- ◆ North America, Latin America, APJK, Australia, New Zealand: SVC4EMC (800-782-4362) and follow the voice prompts.
- ◆ EMEA: +353 (0) 21 4879862 and follow the voice prompts.

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