

SMI-S Reference Guide SMI-S Reference Guide SMI-S Reference Guide

# Quantum Scalar Intelligent Libraries

# Scalar Series

Scalar Intelligent Libraries SMI-S Reference Guide, 6-01317-07, Ver. A, October 2008, Made in USA.

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# 1

## About This Guide and Your Product

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This reference guide provides a high-level overview of Storage Management Initiative-Specification (SMI-S) and the Common Information Model (CIM) for use with the Scalar<sup>®</sup> i2000 and Scalar<sup>®</sup> i500 libraries. It describes how to use CIM and Managed Object Format (MOF) files to obtain physical and logical entity information from your library, and how to use CIM indications to monitor the status of the library.

This reference guide is written for management application developers and system administrators who have a working knowledge of SMI-S. Readers should be able to understand and use intrinsic methods supported by CIM, and should also understand Unified Modeling Language (UML).

For information about integrating SMI-S into a management application, contact your software vendor. For more information about SMI-S, refer to the Storage Network Industry Association (SNIA) website at [www.snia.org](http://www.snia.org).

## Explanation of Symbols and Notes

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The following symbols appear throughout this document to highlight important information.



**WARNING**

**INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR BODILY INJURY.**



**CAUTION**

**Indicates a situation that may cause possible damage to equipment, loss of data, or interference with other equipment.**



**Note**

Indicates important information that helps you make better use of your system.

## Other Documents you Might Need

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The following documents are also available for this product. These documents can be found on the product CD or at [www.quantum.com/support](http://www.quantum.com/support).

- *Scalar i500 User's Guide* (6-01210-xx)

- *Scalar i2000 User's Guide (6-00421-xx)*
- *ADIC Management Console User's Guide (6-00064-xx)*

## Contact Information

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### **Quantum Corporate Headquarters**

Quantum Corporation Headquarters  
1650 Technology Drive, Suite 700  
San Jose, CA 95110-1382

### **Technical Publications**

Provide documentation feedback at:  
[docs-comments@quantum.com](mailto:docs-comments@quantum.com)

## Getting More Information or Help

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More information about this product is available on the Service and Support website at [www.quantum.com/support](http://www.quantum.com/support). The Service and Support Website contains a collection of information, including answers to frequently asked questions (FAQs). You can also access software, firmware, and drivers through this site.

For further assistance, or if training is desired, contact Quantum:

Global Call Handling	1-800-284-5101
For additional contact information:	<a href="http://www.quantum.com/support">www.quantum.com/support</a>
To open a Service Request:	<a href="http://www.quantum.com/osr">www.quantum.com/osr</a>
Quantum Corporation	<a href="http://www.quantum.com">www.quantum.com</a>

For the most updated information on Quantum Global Services, please visit [www.quantum.com/support](http://www.quantum.com/support).

# 2

## Understanding SMI-S, CIM, and MOF

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The Scalar i500 and Scalar i2000 libraries support the industry standard SMI-S application programming interface (API) described in the Storage Management Initiative Specification (SMI-S) version 1.2.

SMI-S is a standard management interface that facilitates the management of multi-vendor devices in a storage area networks (SANs) environment. SMI-S uses an object-oriented model based on the Common Information Model (CIM) and Web-Based Enterprise Management (WBEM) standards to define a set of objects and services that can manage the various elements of a SAN. By using a standardized architecture, SMI-S helps management application developers create common and extensible applications that work across multiple SAN vendor products.

The SMI-S server provides a hosting environment for plug-in instrumentation of host-based resources and management proxies for resources with remote management protocols. The general purpose of the SMI-S server is as follows:

- Implements Service Location Protocol (SLP) service agent functionality
- Implements CIM-server functionality as specified by the CIM-XML standard
- Supports the simple authentication scheme
- Supports Distributed Management Task Force (DMTF) CIM schema version 2.10

### Managing SANs With SMI-S

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SANs are becoming more and more common in multi-vendor network environments. SANs integrate host applications, fabric elements (such as switches and directors), and data storage devices from different vendors to create an interoperable storage network. Managing these elements from different vendors can be very challenging to network administrators, because each element has its own management interface, which may be proprietary. Network administrators must work with these disparate management APIs to build a cohesive management application that controls and monitors the SAN.

SMI-S addresses this management problem by creating a suite of flexible, open management API standards based on the vendor- and technology-independent CIM. Using the SMI-S APIs collected in profiles of common management classes, network administrators can create an interoperable management application, or CIM client, to control and monitor the disparate SAN elements that support SMI-S and CIM. With CIM servers either embedded within the SAN elements or supported by a proxy CIM server, these elements are accessible to the network administrator's CIM client application.

SMI-S uses SLP version 2 (RFC 2608) to discover CIM servers. After the CIM servers are identified, the CIM client uses a standard Server profile to determine which element-specific profiles are supported by the CIM servers. All SMI-S based CIM servers must have a Server profile.

# Your Library, SMI-S, and CIM

A CIM server is embedded within the Scalar i500 and Scalar i2000 libraries. The CIM server is SMI-S compliant and contains a Server profile and several subprofiles. For details about these profiles, refer to [CIM Profiles and Subprofiles](#) on page 7.

## Understanding CIM

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CIM is an object-oriented information model that describes management information in a network or enterprise environment. Because it is object-oriented, CIM provides abstraction, inheritance, and dependency or association relationships between objects within the model. CIM is based on XML and is platform-independent and technology neutral. Therefore, management application developers do not need to understand how CIM was implemented on a vendor product. Only the API is required to interact with a vendor product.

CIM uses a client/server model. The *CIM server* can either be embedded into the vendor product (as it is with your library) or it can be implemented by a proxy server that provides the CIM server functionality for the legacy vendor product. The *CIM client* is the management application that communicates with one or more CIM servers to manage the SAN. The CIM client discovers CIM servers through Service Location Protocol (SLP) version 2, as defined in RFC 2608. SLPv2 uses UDP port 427 for communication and is a discovery protocol that is separate from the CIM client/server communication path.

## WBEM Initiative

The WBEM initiative is a set of management and Internet standards developed to unify the management of enterprise computing environments. The WBEM initiative includes the following:

- CIM, which provides a common format, language, and methodology for collecting and describing management data.
- The CIM-XML Encoding Specification, a standards-based method for exchanging CIM information. CIM-XML uses an xmlCIM encoded payload and HTTP as the transport mechanism. CIM-XML consists of the following specifications:
  - The xmlCIM encoding, a standard way to represent CIM information in XML format.
  - CIM Operations over HTTP, a transportation method that describes how to pass xmlCIM encoded messages over HTTP.

For more information about the WBEM initiative, go to the DMTF website at <http://www.dmtf.org>.

## Unified Modeling Language

SMI-S relies on object-oriented classes as defined in CIM. These classes are frequently defined using Unified Modeling Language (UML). To understand SMI-S and the Quantum extensions present in this document, you must have a basic understanding of CIM classes and UML.

A class is a collection of properties and methods that define a type of object. For example, a generic network device is a type of object. To describe this object, you could define the `NetworkDevice` class. You could then define this `NetworkDevice` class with the properties or attributes of a network device, such as `IpAddress` and `DeviceType`. You can also control your network device through the `NetworkDevice` class by adding methods or routines that can trigger specific actions on your network device. Example methods are `enablePort()` and `rebootDevice()`.



After you have defined the `NetworkDevice` class, you can define a class for just switches. Since a switch is a special type of `NetworkDevice`, you can use the object-oriented concept of inheritance to define your `Switch` class. You can define the `Switch` class as a child of the `NetworkDevice` class, meaning that the `Switch` class automatically has the properties and methods of its parent class. From there, you can add properties and methods unique to a switch.

CIM defines a special type of class called an *association class*. An association class represents relationships between two or more classes. For example, you can define an association class to show the relationship between a `NetworkDevice` class and an `OperatingSystem` class. If there is a many-to-one or many-to-many relationship, the association class is considered an aggregation.

UML draws a visual representation of the classes that describe a product or technology. UML contains many visual elements, and only a subset of elements have been described here. For a full explanation of UML, go to <http://www.uml.org>.

## Understanding MOF

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CIM is described in the DMTF's Managed Object Format (MOF), a language based on the Object Management Group's Interface Definition Language (IDL). The MOF syntax describes object-oriented class and instance definitions in textual form, with the goals of human readability and parsing by a compiler.

The main components of a MOF specification are:

- Textual descriptions of element qualifiers (meta-data about classes, properties, methods, etc.)
- Comments and compiler directives
- The specific class and instance definitions that convey the semantics of the CIM schema

These MOF files are an extension to the standard CIM schema version 2.9.

For information about the standard CIM schema version 2.9 MOF files, go to the DMTF website at the following URL: <http://www.dmtf.org>. To view copies of the Quantum Managed Object Format (MOF) file for the Scalar i2000 and the Scalar i500 library, see [MOF Files](#) on page 17.



# 3

## CIM Profiles and Subprofiles

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SMI-S defines a number of profiles that specify the managed objects that control and monitor elements of a Storage Area Network (SAN). The CIM server embedded within your library supports the following standard profiles:

- [Server Profile, Version 1.2](#)
- [Storage Library Profile, Version 1.2](#)

When using CIM servers to manage a network of SAN elements, you must first discover the location of all available CIM servers and discover which services they support. The Service Location Protocol (SLP) version 2 provides this discovery mechanism. CIM clients use SLPv2 to discover CIM servers by gathering generic information about which services the CIM servers provide and the specific URL where these services are located. After the CIM client discovers the CIM servers within the SAN, the CIM client must determine the level of support that each CIM server provides. For details about discovering the CIM server embedded in your library, refer to [Discovering the CIM Server](#) on page 12.

The next step to using CIM servers to manage a network of SAN elements is to implement CIM indications. For details about CIM indications, refer to [Using CIM Indications](#) on page 13.

### Server Profile, Version 1.2

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Your library contains a CIM server, and the CIM server includes a standard profile called the Server profile. The Server profile defines the capabilities of a CIM server. This includes providing the namespace for the CIM server and all profiles and subprofiles that the CIM server supports. For each supported profile, the Server profile instantiates the `RegisteredProfile` class. Each instance of this class gives the CIM client the profile name and unique ID that is supported by the CIM server. Similarly, the CIM server lists all supported optional subprofiles, using the `RegisteredSubProfile` class and the `SubprofileRequiresProfile` association class to associate the subprofile with the profile.

### Storage Library Profile, Version 1.2

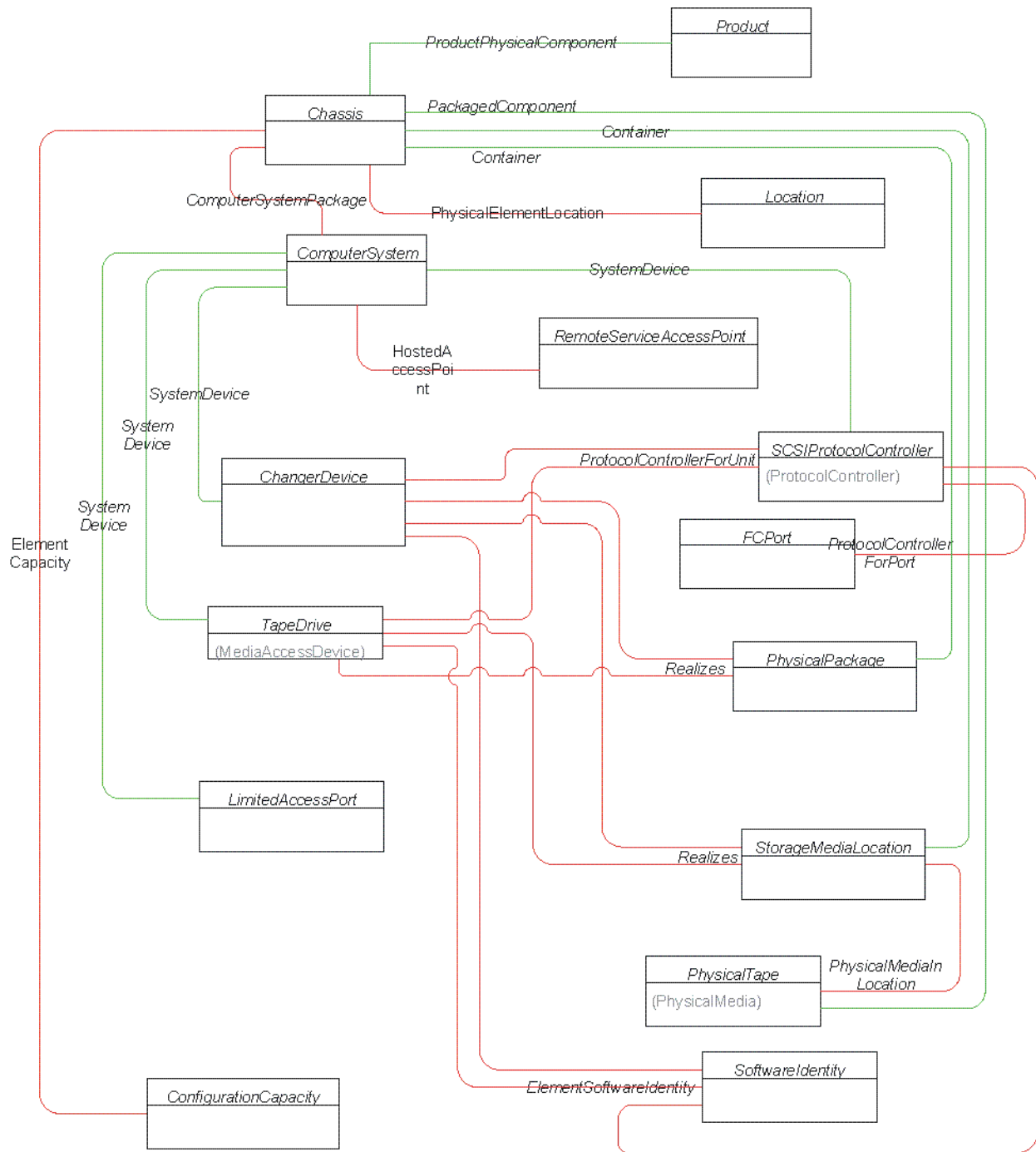
---

The schema for a storage library provides the classes and associations necessary to represent various forms of removable media libraries. This profile is based upon the CIM 2.9 object model and defines the subset of classes that supply the information necessary for robotic storage libraries.

This profile further describes how the classes are to be used to satisfy various use cases, and offers suggestions to agent implementors and client application developers. Detailed descriptions of classes can be found in the CIM 2.9 preliminary schema.

For a comprehensive view of all the supported profiles and subprofiles, see [Figure 1](#) on page 8.

**Figure 1** Storage Library Profile, Version 1.2



# Storage Library Subprofiles

The following subprofiles are available for the storage library profile.

## Library Capacity Subprofile

Using the `ConfigurationCapacity` and `ElementCapacity` classes, servers publish the minimum and maximum number of slots, drives, magazines, media changers, and other elements associated with the library.

## Software Subprofile

Using the `SoftwareIdentity` class, provides information on the installed controller software. This is linked to the controller using an `InstalledSoftwareIdentity` association.

## Location Subprofile

Using an instance of a `Location` class and the `PhysicalElementLocation` association, provides the location of a SAN element. Associated with product information, a `PhysicalPackage` may also have a location.

## Access Points Subprofile

Provides remote access points for management tools.

Devices with a web GUI allow device-specific configurations. This is modeled using a `RemoteServiceAccessPoint`. This is linked to the managed element using a `HostedAccessPoint` association. Only the `HostedAccessPoint` association needs to be instantiated. The `HostedAccessPoint` associates the service to the System on which it is hosted.

## Limited Access Port Subprofile

Libraries contain Limited Access Ports elements (mail slots, cartridge access ports, or import/export elements). This subprofile defines the required classes necessary to publish information about these common components.

## Physical Package Subprofile

CIM has a strong separation between the physical and logical sides of the model. A system is "realized" using a `SystemPackaging` association to a `PhysicalPackage` (or one of its subclasses such as `Chassis`). The physical containment model can then be built using `Container` associations and subclasses.

Physical elements can be described as products by using the `Product` and `ProductPhysicalComponent` associations.

## Fibre Channel Target Port Subprofile

The Fibre Channel Target Port Subprofile models the Fibre Channel-specific aspects of a target storage system. For Fibre Channel ports, the concrete subclass of `CIM_LogicalPort` is `CIM_FCPort`. `CIM_FCPort` is always associated 1 to 1 with a `CIM_SCSIProtocolEndpoint` instance.

## **Element Counting Subprofile**

The Element Counting Subprofile defines methods to count the number of physical tapes, storage media locations, and other classes within a storage library (or other system type). Such methods allow clients to avoid retrieving all instances of physical element classes simply to count them. Therefore, network traffic will be saved between client applications and storage library providers. These methods are modeled by the Configuration Reporting Service hosted by the storage library's (or other system type's) top-level Computer System.

# 4

## Service Discovery and CIM Indications

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This chapter explains how to discover the CIM server embedded within your library, and how to use CIM indications to help you monitor the status of the library.

### Setting up Authentication and Privacy

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To use the CIM server embedded within your library, the CIM server must be enabled and your CIM clients must connect to it using the appropriate credentials.

### Enabling the CIM Server

The CIM server uses port 5988 for HTTP and port 5989 for HTTPS. To enable the CIM server in your library, HTTP and/or HTTPS must be enabled. By default, HTTP port 5988 is enabled on the Scalar i500 and Scalar i2000 library, while the HTTPS port 5989 can be selectively either enabled or disabled on both libraries.

Enabling HTTP or HTTPS also enables the Service Location Protocol (SLP) service. The SLP service is also enabled by default. SLP is disabled if both HTTP and HTTPS are disabled.



#### Note

You can disable the CIM server by disabling HTTP and/or HTTPS.

On both the Scalar i2000 and the Scalar i500, you can disable both HTTP and HTTPS (which also disables SLP). For more information about performing this task, see library's *User's Guide*.

If you disable the CIM server and need to enable it again in the future, refer to the library's *User's Guide*.

### CIM Clients

CIM clients can connect to the library only by using the admin user and appropriate password on both the Scalar i2000 library and the Scalar i500 library. The interop namespace is `root/cimv2`.

Both the Scalar i500 and Scalar i2000 libraries support Secure Socket Layer (SSL) 3.0 authentication. To use SSL, however, you must have an SSL certificate key. The SSL certificate key for SMI-S clients is provided in the `.pem` file on the library's *Documentation CD*. For more information about the SSL certificate key, refer to the library's *User's Guide*.

# Discovering the CIM Server

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When you discover the CIM server that is embedded within your library, you not only determine its location within your SAN, but you also determine which services it supports (as defined by the server's profiles).

Discovering CIM servers provides information about the physical and logical entities within your SAN. This information changes dynamically as SAN entities are added, moved, or removed. This discovery process also helps you discover object classes and related association classes, as well as return status codes that are provided by servers in the managed environment.

You can discover the CIM server in your library by using the following:

- IP address and hostname of the library
- SLP

SLP supports the WBEM SLP template, v1.0.0. You can use the following profiles and subprofiles for discovery and performance monitoring:

- Storage Library Profile ([Storage Library Profile, Version 1.2](#))
- [Library Capacity Subprofile](#)
- [Software Subprofile](#)
- [Location Subprofile](#)
- [Access Points Subprofile](#)
- [Limited Access Port Subprofile](#)
- [Physical Package Subprofile](#)
- [Fibre Channel Target Port Subprofile](#)
- [Element Counting Subprofile](#)
- Various methods defined by CIM

Use the following methods, which are intrinsic methods defined by CIM, to retrieve information about your library.

The location of the CIM server, which is identified by the library's IP address, is the target of these methods. These methods are supported for the CIM protocol only and cannot be entered as commands.



**Table 1** CIM Methods

Method	How it is Used
<code>enumerateInstances()</code>	Enumerates instances of a CIM class
<code>enumerateInstanceNames()</code>	Enumerates names of instances of a CIM class
<code>getInstance()</code>	Gets a CIM instance
<code>associators()</code>	Enumerates associators of a CIM object
<code>associatorName()</code>	Enumerates names of associators of a CIM object
<code>references()</code>	Enumerates references to a CIM object
<code>referenceName()</code>	Enumerates names of references to a CIM object

## Using CIM Indications

A CIM indication is a message that communicates a change in the status of an SMI-S managed device—in this case, a change in the status of the library. Your library can send these messages, or indications, to any CIM client that has subscribed to receive them.

To enable indications, first subscribe your CIM clients to receive indications from the library, and then use a WQL query to identify each indication that you want to receive.

### To subscribe your CIM clients to receive indications from your library

- 1 Create a `CIM_ListenerDestinationCIMXML` instance for each client listening for indications. Clients can only receive indications on port 61000 over http or https. So the `CIM_ListenerDestinationCIMXML`. Destination should use the `http://< ip address of the client>:61000` format. For example, <http://172.16.42.122:61000>
- 2 Use the appropriate WBEM query language (WQL) queries from [Table 2](#) to create the supported Indication filters.
- 3 Create a `CIM_IndicationSubscription` association between the `CIM_ListenerDestinationCIMXML` and the `CIM_IndicationFilters`.

For details on how to create and receive indications, refer to the Indications subprofile in the SMI-S 1.2 specification.

The storage library profile and its subprofiles contain a list of indication filters that your CIM clients can receive, while the messages themselves are defined in the SMI-S Indications subprofile. The following table provides WQL queries for all indications supported by the Scalar i500 and i2000.

**Table 2** Supported Queries for CIM Indications

<b>Area of Library</b>	<b>Query</b>	<b>Purpose</b>
<b>Library</b>	SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_ComputerSystem	Indicates that the library is available for use (after it has been powered on or restarted).
	SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_ComputerSystem	Indicates that the library is shutting down.
	SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_ComputerSystem AND PreviousInstance.OperationalStatus <> SourceInstance.OperationalStatus	Indicates a change in the library's RAS status of overall library health.
<b>Robotics</b>	SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_ChangerDevice	Indicates that the library's robotics system is ready for use (after library has initialized).
	CIM_SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_ChangerDevice	Indicates that the library has transitioned to a "not ready" state, and that its robotics system is currently unavailable.
	SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_ChangerDevice AND PreviousInstance.OperationalStatus <> SourceInstance.OperationalStatus	Indicates a change in the library's RAS status for the robotics system.
<b>I/E Station and Tape Media</b>	SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA PhysicalMedia	Indicates that tape media has been inserted into the I/E station.
	SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_PhysicalMedia	Indicates that tape media has been removed from the I/E station.
	SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_PhysicalMedia AND PreviousInstance.OperationalStatus <> SourceInstance.OperationalStatus	Indicates a change in the library's RAS status for tape media.
<b>Tape Drives/ I/O Blades</b>	SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_MediaAccessDevice	Indicates that a tape drive has been added to the library.
	SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_MediaAccessDevice	Indicates that a tape drive has been removed from the library.

**Table 2** Supported Queries for CIM Indications (Continued)

Area of Library	Query	Purpose
	SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_MediaAccessDevice AND PreviousInstance.OperationalStatus <> SourceInstance.OperationalStatus	Indicates a change in the library's RAS status for tape drives.
	SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_FCPort	Indicates that a Fibre Channel tape drive or SNC FC I/O blade has been added to the library.
	SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_FCPort	Indicates that a Fibre Channel tape drive or SNC FC I/O blade has been removed from the library.
	SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_FCPort AND PreviousInstance.OperationalStatus <> SourceInstance.OperationalStatus	Indicates a change in the RAS status of the Fibre Channel port on a tape drive. or SNC FC I/O blade.





## MOF Files

The Managed Object Format (MOF) files for the Scalar i2000 and Scalar i500 tape libraries are reproduced below.

The MOF files for the Scalar i2000 and Scalar i500 library are identical.

### MOF File for the Scalar i2000 and the Scalar i500

```
// =====  
// ComputerSystem  
// =====  
[Description("CMPI SMIS ComputerSystem provider"),  
 provider("cmpi::cmpicomputersystem")  
]  
class SMIS_ComputerSystem : CIM_ComputerSystem  
{  
    [Description ("Generate indication")]  
    uint32 GenerateIndication();  
  
};  
  
// =====  
// ComponentCS  
// =====  
[Description("CMPI SMIS ComponentCS association provider"),  
 provider("cmpi::cmpicomponentcs")  
]  
class SMIS_ComponentCS : CIM_ComponentCS  
{
```

```

};

// =====
// Chassis
// =====
[Description("CMPI SMIS Chassis provider"),
 provider("cmpi::cmpichassis")
]
class SMIS_Chassis : CIM_Chassis
{
};

// =====
// Product
// =====
[Description("CMPI SMIS Product provider"),
 provider("cmpi::cmpiproduct")
]
class SMIS_Product : CIM_Product
{
};

// =====
// SoftwareIdentity
// =====
[Description("CMPI SMIS Softwareidentity provider"),
 provider("cmpi::cmpisoftwareidentity")
]
class SMIS_SoftwareIdentity : CIM_SoftwareIdentity
{
};

// =====
// ConfigurationCapacity
// =====
[Description("CMPI SMIS ConfigurationCapacity provider"),
 provider("cmpi::cmpiconfigurationcapacity")
]

```

```

class SMIS_ConfigurationCapacity : CIM_ConfigurationCapacity
{
};

// =====
// FCPort
// =====
[Description("CMPI SMIS FCPort provider"),
 provider("cmpi::cmpifcport")
]
class SMIS_FCPort : CIM_FCPort
{
    [Description ("Generate indication")]
    uint32 GenerateIndication();
};

// =====
// SCSIProtocolController
// =====
[Description("CMPI SMIS SCSIProtocolController provider"),
 provider("cmpi::cmpiscsiprotocolcontroller")
]
class SMIS_SCSIProtocolController : CIM_SCSIProtocolController
{
};

// =====
// InstalledSoftwareIdentity
// =====
[Description("CMPI SMIS InstalledSoftwareIdentity provider"),
 provider("cmpi::cmpiinstalledsoftwareidentity")
]
class SMIS_InstalledSoftwareIdentity : CIM_InstalledSoftwareIdentity
{
};

// =====
// ElementConformsToProfile

```

```

// =====
[Description("CMPI SMIS ElementConformsToProfile provider"),
    provider("cmpi::cmpielementconformstoprofile")
]
class SMIS_ElementConformsToProfile : CIM_ElementConformsToProfile
{
};

// =====
// HostedService
// =====
[Description("CMPI SMIS HostedService provider"),
    provider("cmpi::cmpihostedservice")
]
class SMIS_HostedService : CIM_HostedService
{
};

// =====
// RegisteredProfile
// =====
[Description("CMPI SMIS RegisteredProfile provider"),
    provider("cmpi::cmpiregisteredprofile")
]
class SMIS_RegisteredProfile : CIM_RegisteredProfile
{
};

// =====
// RegisteredSubProfile
// =====
[Description("CMPI SMIS RegisteredSubProfile provider"),
    provider("cmpi::cmpiregisteredsubprofile")
]
class SMIS_RegisteredSubProfile : CIM_RegisteredSubProfile
{
};

```



```

// =====
// ObjectManager
// =====
[Description("CMPI SMIS ObjectManager provider"),
  provider("cmpi::cmpiobjectmanager")
]
class SMIS_ObjectManager : CIM_ObjectManager
{
};

// =====
// ComputerSystemPackage
// =====
[Description("CMPI SMIS ComputerSystemPackage provider"),
  provider("cmpi::cmpicomputersystempackage")
]
class SMIS_ComputerSystemPackage : CIM_ComputerSystemPackage
{
};

// =====
// ProductPhysicalComponent
// =====
[Description("CMPI SMIS ProductPhysicalComponent provider"),
  provider("cmpi::cmpiproductphysicalcomponent")
]
class SMIS_ProductPhysicalComponent : CIM_ProductPhysicalComponent
{
};

// =====
// ElementCapacity
// =====
[Description("CMPI SMIS ElementCapacity provider"),
  provider("cmpi::cmpielementcapacity")
]
class SMIS_ElementCapacity : CIM_ElementCapacity
{

```

```

};

// =====
// CommMechanismForManager
// =====
[Description("CMPI SMIS CommMechanismForManager provider"),
  provider("cmpi::cmpicommmechanismformanager")
]
class SMIS_CommMechanismForManager : CIM_CommMechanismForManager
{
};

// =====
// CIMXMLCommunicationMechanism
// =====
[Description("CMPI SMIS CIMXMLCommunicationMechanism provider"),
  provider("cmpi::cmpicimxmlcommunicationmechanism")
]
class SMIS_CIMXMLCommunicationMechanism : CIM_CIMXMLCommunicationMechanism
{
};

// =====
// SystemDevice
// =====
[Description("CMPI SMIS SystemDevice provider"),
  provider("cmpi::cmpisystemdevice")
]
class SMIS_SystemDevice : CIM_SystemDevice
{
};

// =====
// Namespace
// =====
[Description("CMPI SMIS Namespace provider"),
  provider("cmpi::cmpinamespace")
]

```

```

class SMIS_Namespace : CIM_Namespace
{
};

// =====
// NamespaceInManager
// =====
[Description("CMPI SMIS NamespaceInManager provider"),
  provider("cmpi::cmpinamespaceinmanager")
]
class SMIS_NamespaceInManager : CIM_NamespaceInManager
{
};

// =====
// Realizes
// =====
[Description("CMPI SMIS Realizes provider"),
  provider("cmpi::cmpirealizes")
]
class SMIS_Realizes : CIM_Realizes
{
};

// =====
// ChangerDevice
// =====
[Description("CMPI SMIS ChangerDevice provider"),
  provider("cmpi::cmpichangerdevice")
]
class SMIS_ChangerDevice : CIM_ChangerDevice
{
  [Description ("Generate indication")]
  uint32 GenerateIndication();
};

// =====
// TapeDrive

```

```

// =====
[Description("CMPI SMIS TapeDrive provider"),
    provider("cmpi::cmpitapedrive")
]
class SMIS_TapeDrive : CIM_TapeDrive
{
    [Description ("Generate indication")]
    uint32 GenerateIndication();
};

// =====
// Magazine
// =====
// [Description("CMPI SMIS Magazine provider"),
//     provider("cmpi::cmpimagazine")
// ]
//class SMIS_Magazine : CIM_Magazine
//{
//};

// =====
// StorageMediaLocation
// =====
[Description("CMPI SMIS StorageMediaLocation provider"),
    provider("cmpi::cmpistoragemedialocation")
]
class SMIS_StorageMediaLocation : CIM_StorageMediaLocation
{
};
// =====
// PhysicalTape
// =====
[Description("CMPI SMIS PhysicalTape provider"),
    provider("cmpi::cmpiphysicaltape")
]
class SMIS_PhysicalTape : CIM_PhysicalTape
{
    [Description ("Generate indication")]

```

```

    uint32 GenerateIndication();
};

// =====
// PhysicalMediaInLocation
// =====
[Description("CMPI SMIS PhysicalMediaInLocation"),
    provider("cmpi::cmpiphysicalmediainlocation")
]
class SMIS_PhysicalMediaInLocation : CIM_PhysicalMediaInLocation
{
};

// =====
// PhysicalPackage
// =====
[Description("CMPI SMIS PhysicalPackage provider"),
    provider("cmpi::cmpiphysicalpackage")
]
class SMIS_PhysicalPackage : CIM_PhysicalPackage
{
};

// =====
// Container
// =====
[Description("CMPI SMIS Container provider"),
    provider("cmpi::cmpicontainer")
]
class SMIS_Container : CIM_Container
{
};

// =====
// PackageInChassis
// =====
/*
[Description("CMPI SMIS PackageInChassis provider"),

```

```

        provider("cmpi::cmpipackageinchassis")
    ]
class SMIS_PackageInChassis : CIM_PackageInChassis
{
};
*/
// =====
// ProtocolControllerForUnit
// =====
[Description("CMPI SMIS ProtocolControllerForUnit provider"),
    provider("cmpi::cmpiprotocolcontrollerforunit")
]
class SMIS_ProtocolControllerForUnit : CIM_ProtocolControllerForUnit
{
};

// =====
// ProtocolControllerForPort
// =====
[Description("CMPI SMIS ProtocolControllerForPort provider"),
    provider("cmpi::cmpiprotocolcontrollerforport")
]
class SMIS_ProtocolControllerForPort : CIM_ProtocolControllerForPort
{
};

// =====
// PackagedComponent
// =====
[Description("CMPI SMIS PackagedComponent provider"),
    provider("cmpi::cmpipackagedcomponent")
]
class SMIS_PackagedComponent : CIM_PackagedComponent
{
};

// =====
// ElementSoftwareIdentity

```

```

// =====
[Description("CMPI SMIS ElementSoftwareIdentity provider"),
  provider("cmpi::cmpielementsoftwareidentity")
]
class SMIS_ElementSoftwareIdentity : CIM_ElementSoftwareIdentity
{
};

// =====
// LimitedAccessPort
// =====
[Description("CMPI SMIS LimitedAccessPort provider"),
  provider("cmpi::cmpilimitedaccessport")
]
class SMIS_LimitedAccessPort : CIM_LimitedAccessPort
{
};

// =====
// Location
// =====
[Description("CMPI SMIS Location provider"),
  provider("cmpi::cmpilocation")
]
class SMIS_Location : CIM_Location
{
};

// =====
// PhysicalElementLocation
// =====
[Description("CMPI SMIS PhysicalElementLocation provider"),
  provider("cmpi::cmpiphysicalelementlocation")
]
class SMIS_PhysicalElementLocation : CIM_PhysicalElementLocation
{
};

```

```

// =====
// RemoteServiceAccessPoint
// =====
[Description("CMPI SMIS RemoteServiceAccessPoint provider"),
  provider("cmpi::cmpiremoteserviceaccesspoint")
]
class SMIS_RemoteServiceAccessPoint : CIM_RemoteServiceAccessPoint
{
};

// =====
// HostedAccessPoint
// =====
[Description("CMPI SMIS HostedAccessPoint provider"),
  provider("cmpi::cmpihostedaccesspoint")
]
class SMIS_HostedAccessPoint : CIM_HostedAccessPoint
{
};

// =====
// SubProfileRequiresProfile
// =====
[Description("CMPI SMIS SubProfileRequiresProfile provider"),
  provider("cmpi::cmpisubprofilerequiresprofile")
]
class SMIS_SubProfileRequiresProfile : CIM_SubProfileRequiresProfile
{
};

// =====
// ObjectManagerAdapter
// =====
[Description("CMPI SMIS ObjectManagerAdapter provider"),
  provider("cmpi::cmpiobjectmanageradapter")
]
class SMIS_ObjectManagerAdapter : CIM_ObjectManagerAdapter
{

```



```

};

// =====
// CommMechanismForManagerAdapter
// =====
[Description("CMPI SMIS CommMechanismForManagerAdapter provider"),
  provider("cmpi::cmpicommmechanismformanageradapter")
]
class SMIS_CommMechanismForObjectManagerAdapter :
CIM_CommMechanismForObjectManagerAdapter
{
};

// =====
// SAPAvailableForElement
// =====
[Description("CMPI SMIS SAPAvailableForElement provider"),
  provider("cmpi::cmpisapavailableforelement")
]
class SMIS_SAPAvailableForElement : CIM_SAPAvailableForElement
{
};

// =====
// SCSIProtocolEndpoint
// =====
[Description("CMPI SMIS SCSIProtocolEndpoint provider"),
  provider("cmpi::cmpiscsiprotocolendpoint")
]
class SMIS_SCSIProtocolEndpoint : CIM_SCSIProtocolEndpoint
{
};

// =====
// PortImplementsEndpoint
// =====
[Description("CMPI SMIS PortImplementsEndpoint provider"),
  provider("cmpi::cmpiportimplementsendpoint")
]

```

```

]
class SMIS_PortImplementsEndpoint : CIM_PortImplementsEndpoint
{
};

// =====
//  CIM_DeviceServicesLocation
// =====
[Description("CMPI SMIS DeviceServicesLocation provider"),
  provider("cmpi::cmpideviceserviceslocation")
]
class SMIS_DeviceServicesLocation : CIM_DeviceServicesLocation
{
};

// =====
//  ConfigurationReportingService
// =====
[Description("CMPI SMIS ConfigurationReportingService provider"),
  provider("cmpi::cmpiconfigurationreportingservice")
]
class SMIS_ConfigurationReportingService : CIM_ConfigurationReportingService
{
};

// =====
//  CIM_StorageHardwareID
// =====
[Description("CMPI SMIS StorageHardwareID provider"),
  provider("cmpi::cmpistoragehardwareid")
]
class SMIS_StorageHardwareID : CIM_StorageHardwareID
{
};

// =====
//  CIM_AuthorizedPrivilege
// =====
[Description("CMPI SMIS AuthroizedPrivilege provider"),

```

```

        provider("cmpi::cmpiauthorizedprivilege")
    ]
class SMIS_AuthorizedPrivilege : CIM_AuthorizedPrivilege
{
};

// =====
//  CIM_AuthorizedSubject
// =====
[Description("CMPI SMIS AuthroizedSubject provider"),
    provider("cmpi::cmpiauthorizedsubject")
]
class SMIS_AuthorizedSubject : CIM_AuthorizedSubject
{
};

// =====
//  CIM_AuthorizedTarget
// =====
[Description("CMPI SMIS AuthroizedTarget provider"),
    provider("cmpi::cmpiauthorizedtarget")
]
class SMIS_AuthorizedTarget : CIM_AuthorizedTarget
{
};

// =====
//  CIM_ProtocolControllerMaskingCapabilities
// =====
[Description("CMPI SMIS ProtocolControllerMaskingCapabilities provider"),
    provider("cmpi::cmpiprotocolcontrollermaskingcapabilities")
]
class SMIS_ProtocolControllerMaskingCapabilities :
CIM_ProtocolControllerMaskingCapabilities
{
};

// =====

```

```

// CIM_StorageClientSettingData
// =====
[Description("CMPI SMIS StorageClientsettingData provider"),
  provider("cmpi::cmpistorageclientsettingdata")
]
class SMIS_StorageClientSettingData : CIM_StorageClientSettingData
{
};

// =====
// CIM_ElementSettingData
// =====
[Description("CMPI SMIS ElementSettingData provider"),
  provider("cmpi::cmpielementsettingdata")
]
class SMIS_ElementSettingData : CIM_ElementSettingData
{
};

// =====
// CIM_ElementCapabilities
// =====
[Description("CMPI SMIS ElementCapabilities provider"),
  provider("cmpi::cmpielementcapabilities")
]
class SMIS_ElementCapabilities : CIM_ElementCapabilities
{
};

// =====
// SASPort
// =====
[Description("CMPI SMIS SASPort provider"),
  provider("cmpi::cmpisasport")
]
class SMIS_SASPort : CIM_SASPort
{
};

```

```
// =====  
// SPIPort  
// =====  
[Description("CMPI SMIS SPIPort provider"),  
 provider("cmpi::cmpispiport")  
]  
class SMIS_SPIPort : CIM_SPIPort  
{  
};
```



# B

## References

---

This Appendix lists some web resources and popular Common Information Model (CIM)-XML tools.

### Web Resources

---

Information about the following standards organizations are accessible on the internet:

- Website for the Storage Networking Industry Association (SNIA): <http://www.snia.org>
- Website for the Distributed Management Task Force (DMTF): <http://www.dmtf.org>

### CIM-XML Tools

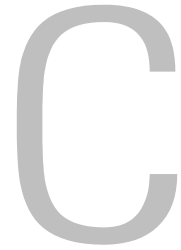
---

The following tools are available from these websites:

- Open Web Based Enterprise Management (WBEM): <http://www.openwbem.com>
- CimNavigator: <http://www.cimnavigator.com>
- OpenPegasus: <http://www.openpegasus.org>
- WBEM Services: <http://wbemservices.sourceforge.net>
- Standards Based Linux Instrumentation for Manageability (SBLIM): <http://www-124.ibm.com/sblim/clientapps.html>







# SMI-S Common Protocol Interface Specification

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This section provides a detailed list of the SMI-S feature set that is supported on specific Scalar libraries and provides updates for the SMI-S1.2.0 and other extensions. These features currently target the current Scalar i500 libraries and future Scalar i2000 libraries.

## Resources

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### Web

information about the following standards organizations are accessible on the Internet:

- Website for the Storage Networking Industry Association (SNIA): <http://www.snia.org>
- Website for the Distributed Management Task Force (DMTF): <http://www.dmtf.org>

### Notes and Issues

Refer to SMI-S 1.2 for more information

## Overview

---

To meet the SNIA SMI-S 1.2 CTP standards, Quantum SMI-S implementation on the Scalar i2000 and i500 provides support for the following profiles:

- Server profile
- Profile registration subprofile
- Indication subprofile
- Access points subprofile
- Storage library profile
- Element counting subprofile
- Fibre channel target port subprofile (for libraries)
- Library Capacity subprofile

- Limited Access Port subprofile
- Software subprofile

The following subprofiles are used in modeling; however, Quantum does not claim support as they are not supported subprofiles of the SML profile. As of SMI-S 1.3.0, these will be supported by SML and then they will be officially supported by the implementers of this specification.

- SAS Target Port subprofile
- SPI Target Port subprofile
- Multiple Computer System subprofile
- Masking and Mapping profile

Optional support for the following will be provided in the future:

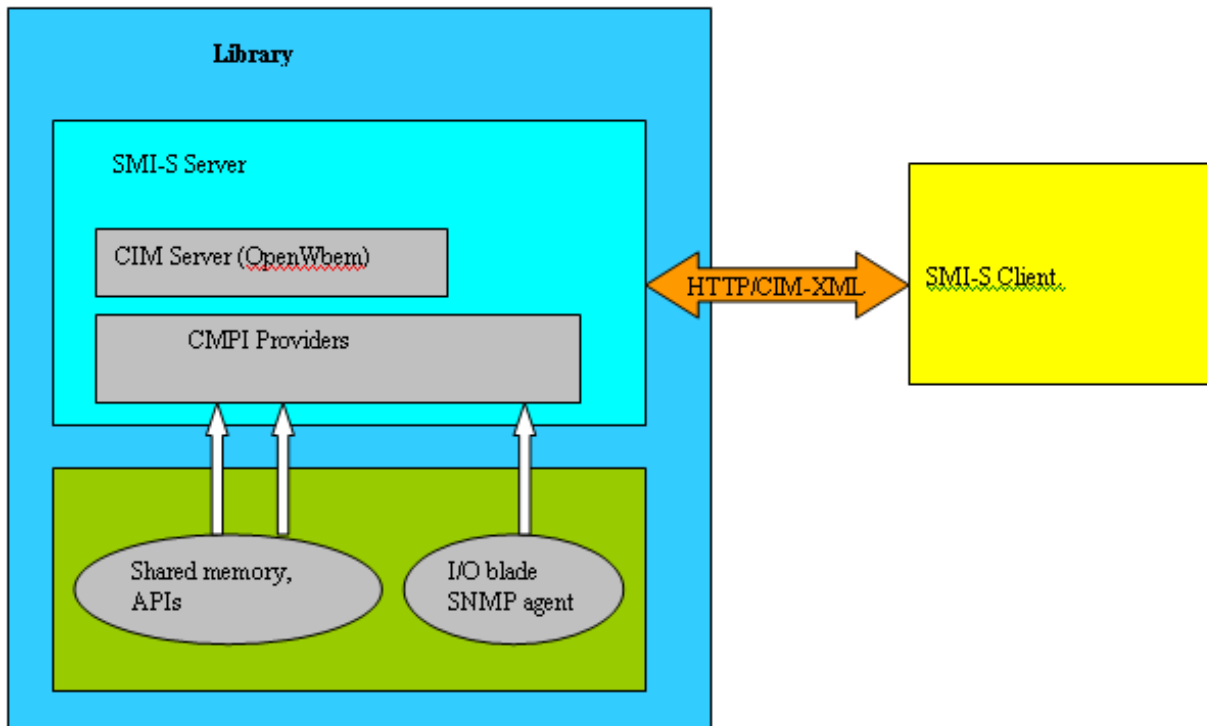
- Partitioned Library subprofile
- LibraryAlert Events/Indications for library devices
- Media Movement subprofile

Future SMI-S server releases planned to be SNIA SMI-S compliant.

## Architecture

The diagram below shows the interaction between CIM Server / Providers and Software Components of the MCB/library.

**Figure 2** SMI-S Implementation Architecture on the Scalar i2000 and Scalar i500



# Requirements

---

## General Purpose SMI-S Server

### Overview

The General Purpose SMI-S Server role can provide a hosting environment for the plug-in instrumentation of host-based resources and management proxies for resources with remote management protocols. These plug-ins are called providers and considered sub roles of the General Purpose SMI-S Server.

### SLP

The General Purpose SMI-S Server role MUST implement SLP Service agent (SA) functionality using the required template: [www.dmtf.org/standards/wbem/wbem.1.0.en](http://www.dmtf.org/standards/wbem/wbem.1.0.en)

### Communication Interface

The General Purpose SMI-S Server role MUST implement CIM-Server functionality as specified by the CIM-XML standard.

### Security Considerations

The General Purpose SMI-S Server role MUST support simple authentication scheme.

### Schema Considerations

The General Purpose SMI-S Server supports CIM 2.9 schema.

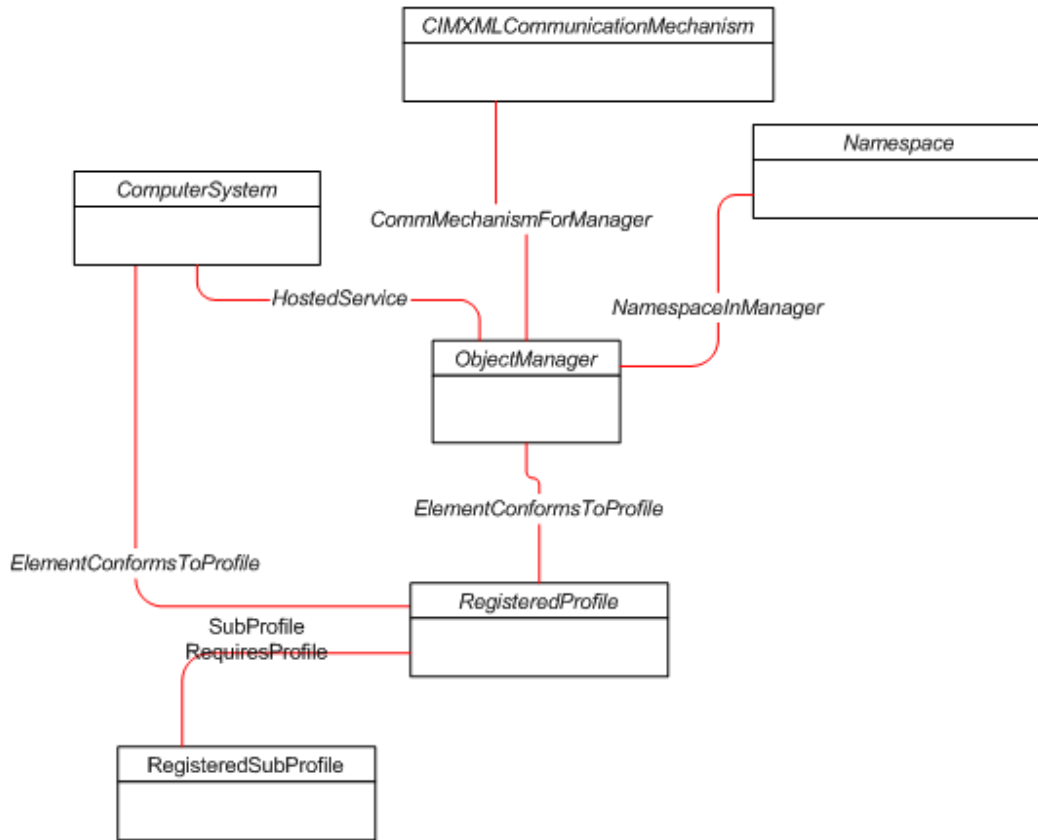
## Profiles

### Server Profile Content

**Table 1** Required Functional Profiles

Functional Group	Required
Basic Read	Yes
Basic Write	No
Instance Manipulation	No
Schema Manipulation	No
Association Traversal	Yes
Query Execution	No
Qualifier Declaration	No
Indication	Yes

**Figure 3** Instance Diagram for Server Profile



**Table 2** Required Properties for ObjectManager

Property	Type	Description/Notes
SystemCreationClassName[key]	string, MaxLen(256)	
SystemName[key]	string	Host name of the library
CreationClassName[key]	string	
Name[key]	String, MaxLen(256)	
ElementName	String	
Description	String	
OperationalStatus	Uint16[]	
StatusDescriptions	String[]	MUST NOT be NULL if Other is identified in OperationalStatus
Started	Boolean	

**Table 3** Required Server Level Instances of ObjectManager

Property	Instance 1
SystemCreationClassName[key]	"CIM_ComputerSystem"
SystemName[key]	<host name of the library>
CreationClassName[key]	"CIM_ObjectManager"
Name[key]	"owcimomd"
ElementName	"CIM_ObjectManager"
Description	"owcimomd"
OperationalStatus	Example : OK(2)
StatusDescriptions	OK
Started	TRUE

**Table 4** Required Properties for HostedService

Property	Type	Description/Notes
Antecedent	REF	The hosting system
Dependent	REF	The service hosted on the system

**Table 5** Required Server Level Instances of HostedService

Property	Instance 1
Antecedent	Reference to "CIM_ComputerSystem"
Dependent	Reference to "CIM_ObjectManager"

**Table 6** Required Properties for RegisteredProfile

Property	Type	Description/Notes
InstanceID[key]	String	This is a unique value for the profile instance.
RegisteredOrganization	String, MAXLEN(256) Required	This is the official name of the organization that created the Profile. For SMI-S profiles, this would be SNIA.
OtherRegisteredOrganization	String, MAXLEN(256)	
RegisteredName	String, MAXLEN(256) Required	This is the name assigned by the organization that created the profile.
RegisteredVersion	String Required	This is the version number of the organization that defined the profile.
AdvertiseTypes	Uint16[] Required	Defines the advertisement of this profile. If the property is null then no advertisement is defined.
AdvertiseTypeDescriptions	String[]	This MUST NOT be NULL if "Other" is identified in AdvertiseType.

**Table 7** Required Server Level Instances of RegisteredProfile

Property	Instance 1	Instance 2	Instance 3
InstanceID[key]	"SNIA:Server"	"SNIA:Storage Library"	"SMIS"
RegisteredOrganization	SNIA(11)	SNIA(11)	SNIA(11)
OtherRegisteredOrganization			
RegisteredName	"Server"	"Storage library"	"SMI-S"
RegisteredVersion	"1.2.0"	"1.2.0"	"1.2.0"
AdvertiseTypes	{ SLP(3) }	{ SLP(3) }	{ SLP(3) }
AdvertiseTypeDescriptions	{ "SLP" }	{ "SLP" }	{ "SLP" }

**Table 8** Required Properties for RegisteredSubProfile

Property	Type	Description/Notes
InstanceID[key]	String	This is a unique value for the profile instance.
RegisteredOrganization	String, MAXLEN(256) Required	This is the official name of the organization that created the Profile. For SMI-S profiles, this would be SNIA.
OtherRegisteredOrganization	String, MAXLEN(256)	
RegisteredName	String, MAXLEN(256) Required	This is the name assigned by the organization that created the profile.
RegisteredVersion	String Required	This is the version number of the organization that defined the profile.
AdvertiseTypes	Uint16[] Required	Defines the advertisement of this profile. If the property is null then no advertisement is defined.
AdvertiseTypeDescriptions	String[]	This MUST NOT be NULL if "Other" is identified in AdvertiseType.

**Table 9** Required Server Level Instances of RegisteredSubProfile

Property	Instance 1	Instance 2	Instance 3	Instance 4
InstanceID[key]	"SNIA:Storage Library:Software"	"SNIA:Storage Library:Location"	"SNIA:Storage Library:Limited Access Port Elements"	"SNIA:Storage Library:Access Points"
RegisteredOrganization	SNIA(11)	SNIA(11)	SNIA(11)	SNIA(11)
OtherRegisteredOrganization				
RegisteredName	"SNIA:Software"	"SNIA:Location"	"SNIA:Limited Access Port Elements"	"SNIA:Access Points"
RegisteredVersion	"1.2.0"	"1.2.0"	"1.2.0"	"1.2.0"
AdvertiseTypes	{ SLP(3) }	{ SLP(3) }	{ SLP(3) }	{ SLP(3) }
AdvertiseTypeDescriptions	{ "SLP" }	{ "SLP" }	{ "SLP" }	{ "SLP" }

Property	Instance 5	Instance 6	Instance 7	Instance 8
InstanceID[key]	"SNIA:Storage Library:Storage Library Capacity"	"SNIA:Storage Library:FC Target Ports"	"SNIA:Storage Library:Element Counting"	"SNIA:Server:Indication"
RegisteredOrganization	SNIA(11)	SNIA(11)	SNIA(11)	SNIA(11)
OtherRegisteredOrganization				
RegisteredName	"SNIA:Storage Library:Capacity"	"SNIA:FC Target Ports"	"SNIA:Element Counting"	"SNIA:Indication"
RegisteredVersion	"1.2.0"	"1.2.0"	"1.2.0"	"1.2.0"
AdvertiseTypes	{ SLP(3) }	{ SLP(3) }	{ SLP(3) }	{ SLP(3) }
AdvertiseTypeDescriptions	{ "SLP" }	{ "SLP" }	{ "SLP" }	{ "SLP" }

Property	Instance 9	Instance 10
InstanceID[key]	"SNIA:Server:Object Manager Adapter"	"SNIA:Server:Profile Registration"
RegisteredOrganization	SNIA(11)	SNIA(11)
OtherRegisteredOrganization		
RegisteredName	"SNIA:Object Manager Adapter"	"SNIA:Profile Registration"
RegisteredVersion	"1.2.0"	"1.2.0"
AdvertiseTypes	{ SLP(3) }	{ SLP(3) }
AdvertiseTypeDescriptions	{ "SLP" }	{ "SLP" }

**Table 10** Required Properties for SubProfileRequiresProfile

Property	Type	Description/Notes
Antecedent	REF	The RegisteredProfile that is referenced/required by the subprofile.
Dependent	REF	A RegisteredSubProfile that requires a scoping profile, for context..



**Table 11** Required Server Level Instances of SubProfileRequiresProfile

Property	Instance 1
Antecedent	CIM_RegisteredProfile
Dependent	CIM_RegisteredSubProfile

**Table 12** Required Properties for ElementConformsToProfile

Property	Type	Description/Notes
ConformantStandard	REF	The RegisteredProfile to which the ManagedElement conforms.
ManagedElement	REF	The ManagedElement that conforms to the RegisteredProfile.

**Table 13** Required Server Level Instances of ElementConformsToProfile

Property	Instance 1	Instance 2	Instance 3
ConformantStandard	Server	Library	SNIA:SMIS Registered
ManagedElement	CIM_ObjectManager	CIM_ComputerSystem	CIM_RegisteredProfile

**Table 14** Required Properties for Namespace

Property	Type	Description/Notes
SystemCreationClassName[key]	String, MAXLEN(256)	
SystemName[key]	String, MAXLEN(256)	Host name of the library.
ObjectManagerCreationClassName	String, MAXLEN(256)	
ObjectManagerName	String, MAXLEN(256)	
CreationClassName	String, MAXLEN(256)	
Name	String, MAXLEN(256)	
ClassInfo	Uint16 Required	

**Table 15** Required Server Level Instances of Namespace

Property	Instance 1
SystemCreationClassName[key]	"CIM_System"
SystemName[key]	<host name of the library>
ObjectManagerCreationClassName	"CIM_ObjectManager"
ObjectManagerName	"owcimomd"
CreationClassName	"CIM_Namespace"
Name	"root/cimv2"
ClassInfo	CIM 2.9 (11)

**Table 16** Required Properties for NamespaceInManager

Property	Type	Description/Notes
Antecedent	REF	The ObjectManager containing a Namespace.
Dependent	REF	The Namespace in an ObjectManager.

**Table 17** Required Server Level Instances of NamespaceInManager

Property	Instance 1
Antecedent	"CIM_ObjectManager"
Dependent	"CIM_Namespace"

**Table 18** Required Properties for CIMXMLCommunicationMechanism

Property	Type	Description/Notes
ElementName	String	
CreationClassName[key]	String, MaxLen(256)	
SystemCreationClassName[key]	String, MaxLen(256)	
SystemName[key]	String	Host name of the library.
Name[key]	String, MaxLen(256)	
OperationalStatus	Uint16[]	
StatusDescriptions	String[]	MUST NOT be NULL if "Other" is identified in OperationalStatus.
CommunicationMechanism	Uint16, Required	Must be 2
OtherCommunicationMechanismDescription	String	MUST NOT be NULL if "Other" is identified in CommunicationMechanism.
FunctionalProfilesSupported	Uint16[], Required	
FunctionalProfileDescriptions	String[]	
MultipleOperationsSupport	Boolean, Required	
AuthenticationMechanismsSupported	Uint16[], Required	
AuthenticationMechanismDescriptions	String[]	MUST NOT be NULL if "Other" is identified in AuthenticationMechanismSupported.
CIMXMLProtocolVersion	Uint16, Required	1.0(1)
CIMValidated	Boolean, Required	
Version	string	Must be 1.0, 1.1, or 1.2

**Table 19** Required Server Level Instances for CIMXMLCommunicationMechanism

Property	Instance 1
ElementName	"CIM_CIMXMLCommunicationMechanism"
CreationClassName[key]	"CIM_CIMXMLCommunicationMechanism"
SystemCreationClassName[key]	"CIM_ObjectManager"
SystemName[key]	<host name of the library>
Name[key]	"CIM_CIMXMLCommunicationMechanism"
OperationalStatus	OK(2)
StatusDescriptions	"OK"
CommunicationMechanism	CIM-XML (2)
OtherCommunicationMechanismDescription	
FunctionalProfilesSupported	{ Basic Read (2), Association Traversal (7), Indications (9) }
FunctionalProfileDescriptions	{ "Basic Read", "Association Traversal ", "Indications" }
MultipleOperationsSupport	FALSE
AuthenticationMechanismsSupported	Basic(3)
AuthenticationMechanismDescriptions	"Basic"
CIMXMLProtocolVersion	1.0(1)
CIMValidated	TRUE
Version	1.2

**Table 20** Required Properties for CommMechanismForManager

Property	Type
ObjectManager	REF
ObjectManagerCommunicationMechanism	REF

**Table 21** Required Server Level Instances of CommMechanismForManager

Property	Instance 1
ObjectManager	Reference to "CIM_ObjectManager"
ObjectManagerCommunicationMechanism	Reference to "CIM_CIMXMLCommunicationMechanism"

**Table 22** Required Properties for ComputerSystem

Property	Type	Description/Notes
CreationClassName[key]	String	Name of Class
Name[key]	String	For component computer systems, the provider MUST provide a unique name using one of the NameFormats.
Dedicated	Uint16[]	Container type (for example, SML).
OperationalStatus	Uint16[]	Container status.
ElementName	String	User-friendly name.
NameFormat	String	"HID" or "IP"
PrimaryOwnerName	String	
PrimaryOwnerContact	String	
Caption	String	
Description	String	

**Table 23** Required Properties for ComputerSystem

Property	Instance 1
CreationClassName[key]	"CIM_ComputerSystem"
Name[key]	IP Example: 172.16.41.26
Dedicated	Storage (4).
OperationalStatus	Example: ok(2)
ElementName	"CIM_ComputerSystem"
NameFormat	"IP"
PrimaryOwnerName	"ADIC" or "QUANTUM" (depends on brand)
PrimaryOwnerContact	support@adic.com or techsup@quantum.com (depends on brand)
Caption	IP
Description	"QUANTUM"



**Table 24** Required Container Level Instances of ComputerSystem

Property	Instance 1
CreationClassName[key]	"CIM_ComputerSystem"
Name[key]	Vendor + Product + Serial Example: ADIC i2000 APJ1234
Dedicated	sml (22)
OperationalStatus	Example : ok(2)
ElementName	"CIM_ComputerSystem"
NameFormat	"HID"
Automated	True
PrimaryOwnerName	Owner Name from contact info
PrimaryOwnerContact	Owner Phone + Owner E-mail from contact info
Caption	ComputerSystem
Description	Tape Library Backup Unit

**Table 25** Required Properties for Chassis

Property	Type	Description/Notes
Tag[key]	String	Module (CM/EM) location number (0, -1, 1, etc.).
CreationClassName[key]	String	Indicates the name of the class or subclass used in the creation of an instance.
Serial Number	String	Frame serial number
Model	String	Frame display name (ControlModuleFrame, ExpansionModuleFrame).
Description	String	Frame display name/model description.
Manufacturer	String	Frame manufacturer.
LockPresent	Boolean	Boolean indicating whether the frame is protected with a lock.
SecurityBreach	Uint16	Boolean indicating whether the aggregated door status of the library (any door) is open (breach successful) or closed (no breach).
IsLocked	Boolean	Boolean indicating that the frame is currently locked.
ElementName	string	

**Table 26** Required Container Level Instances of Chassis

Property	Instance (one per frame)
Tag[key]	Module (CM/EM) location number (0, -1, 1, etc.).
CreationClassName[key]	"CIM_Chassis"
Serial Number	Frame serial number
Model	"ControlModuleFrame" or "ExpansionModuleXU" frame where XU is the frame size
Manufacturer	"ADIC" or "QUANTUM" (depends on branding)
LockPresent	False
SecurityBreach	Breach Successful if any door open or No Breach(3) if all doors closed.
IsLocked	False
ElementName	"Chassis X" where X is frame number.

**Table 27** Required Properties for Location

Property	Type	Description/Notes
Name[key]	String	Position is a free-form string indicating the placement of a PhysicalElement.
PhysicalPosition[key]	String	Address is a free-form string indicating a street, building, or other type of address for the PhysicalElement's Location.
Caption	String	

**Table 28** Required Container Level Instances of Location

Property	Instance
Name[key]	IP
PhysicalPosition[key]	Location from contact info
Caption	IP

**Table 29** Required Properties for PhysicalElementLocation

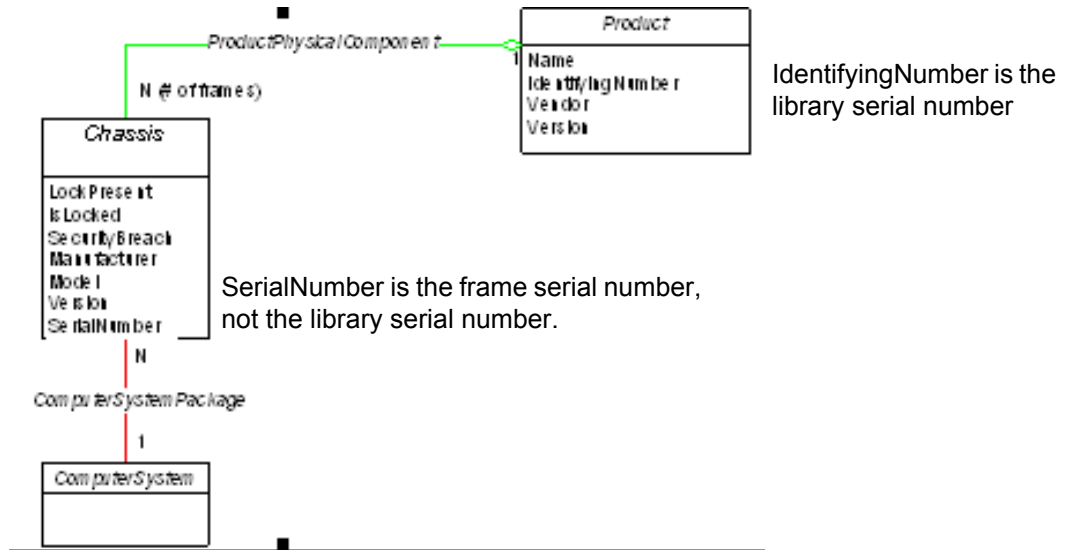
Property	Type	Description/Notes
Element	REF	The reference to the chassis.
PhysicalLocation	REF	The reference to the Location.



**Table 30** Required Server Level Instances of PhysicalElementLocation

Property	Instance 1
Element	CIM_Chassis
PhysicalLocation	CIM_Location

**Figure 5** Instance Diagram of ComputerSystemPackage



**Note:** Scalar i2000 is modeled to have a single chassis. Scalar i500 is modeled to have a chassis for each frame.

**Table 31** Required Properties for ComputerSystemPackage

Property	Type	Description/Notes
Antecedent	REF	The reference to the PhysicalPackage(s) that realize a UnitaryComputerSystem.
Dependent	REF	The reference to the UnitaryComputerSystem.
PlatformGUID	PlatformGUID	A globally unique identifier for the system's package.

**Table 32** Required Server Level Instances of ComputerSystemPackage

Property	Instance 1
Antecedent	CIM_Chassis
Dependent	CIM_ComputerSystem
PlatformGUID	Library-wide unique ID

**Table 33** Required Properties for Product

Property	Type	Description/Notes
Name[key]	String, MaxLen(256)	Commonly used product name.
IdentifyingNumber[key]	String, MaxLen(64)	Product identification such as a serial number on software, a die number on a hardware chip, or a project number.
Vendor[key]	String, MaxLen(256)	The name of the product supplier, or entity selling the product.
Version[key]	String, MaxLen(64)	Firmware version information.
ElementName	String	User-friendly name. Suggested use is vendor, version, and product name.

**Table 34** Required Container Level Instances of Product

Property	Instance 1
Name[key]	<company> <product> (for example, ADIC Scalar i500 or QUANTUM Scalar i2000)
IdentifyingNumber[key]	<serial number> (for example: A0C0085826)
Vendor[key]	ADIC or QUANTUM (depends on branding)
Version[key]	Example: 200A.TS01003
ElementName	SMIS_Product

**Table 35** Required Properties for ProductPhysicalComponent

Property	Type	Description/Notes
GroupProduct	REF	The product.
PartComponent	REF	The physical element which is part of the product.

**Table 36** Required Server Level Instances of ProductPhysicalComponent

Property	Instance 1
Product	CIM_Product
Component	CIM_Chassis

**Table 37** Required Properties for SoftwareIdentity

Property	Type	Description/Notes
InstanceID[key]	String	Instance name.
VersionString	String	Version.
Manufacturer	String	Manufacturer of this software.

**Table 38** Required Container Level Instances of SoftwareIdentity

Property	Firmware Instance (one for system)	Tape Drive Instances (per drive)	Providers Instance (one for system)	Changer Device Instance (one for system)
InstanceID[key]	"Scalar i500 Firmware" or "Scalar i2000 Firmware"	"TapeDrive:<drive serial>:<Vendor> <FWR>"	"Providers Revision"	"Changer Device:<Version>"
VersionString	Example : "1.2.3"	Drive <FWR> Example : "6B20"	Same as Firmware	Same as Firmware
Manufacturer	ADIC or QUANTUM (depends on branding)	Example: IBM or HP	ADIC or QUANTUM (depends on branding)	ADIC or QUANTUM (depends on branding)
Caption	"S101Core"	"<serial>:<Vendor > <FWR>"	"Providers Revision"	"Providers Revision"

**Table 39** Required Properties for InstalledSoftwareIdentity

Property	Type	Description/Notes
System	REF	System on which software is installed.
InstalledSoftware	REF	Software identity that is installed.

**Table 40** Required Server Level Instances of InstalledSoftwareIdentity

Property	Library System Instance	Drive Instances
System	CIM_ComputerSystem for Library (HID)	CIM_TapeDrive for drive.
InstalledSoftware	CIM_SoftwareIdentity "Scalar i500 Firmware"	CIM_SoftwareIdentity for corresponding drive software instance.

Property	Server Instance (one for System)	Changer Instances (one for each changer)
System	CIM_ComputerSystem for Server	CIM_ChangerDevice.
InstalledSoftware	CIM_SoftwareIdentity "Providers Revision"	CIM_SoftwareIdentity (the single changer device software instance).

**Table 41** Required Properties for ElementCapacity

Property	Type	Description/Notes
Capacity	REF	Physical capacity describes the minimum and maximum requirements.
Element	REF	Physical element being described.

**Table 42** Required Server Level Instances of ElementCapacity

Property	Instance 1
Capacity	CIM_ConfigurationCapacity
Element	CIM_Chassis

**Table 43** Required Properties for ConfigurationCapacity

Method	Type	Description/Notes
Name[key]	String	Instance Name.
ObjectType[key]	Uint16	Object type.
MaximumCapacity	Uint64	Maximum capacity. Should not be compressed capacity.
OtherTypeDescription	String	A string describing the object type - used when the ObjectType property is set to "Other(0)".

**Table 44** Required Container Level Instances of ConfigurationCapacity

Property	Instance 1	Instance 2	Instance 3
Name[key]	"Tape Library Maximum Slots"	"Tape Library Number of Tapes"	"Tape Library Number of Tape Drives"
ObjectType[key]	StorageMediaLocation Slots ( 8 )	Other (0)	MediaAccessDevices ( Drives ) (7)
MaximumCapacity	Depends on library configuration	Same as instance 1	Depends on library configuration
OtherTypeDescription	"Estimated number of maximum slots"	"Estimated number of maximum tapes"	"Estimated number of maximum tape drives"

Property	Instance 4	Instance 5	Instance 6
Name[key]	"Tape Library Total RAW Capacity"	"Tape Library Total RAW Free Capacity"	"Tape Library Total RAW Used Capacity"
ObjectType[key]	Other (0)	Other (0)	Other (0)
MaximumCapacity	Example: 400000 in GB	Example: 400000 in GB	Example: 0 in GB
OtherTypeDescription	"Estimated total raw capacity"	"Estimated total raw Free capacity"	"Estimated total raw used capacity"

**Note:** Total RAW capacity is computed as "number of slots" multiplied by "tape size". "Tape size" is the size of the tape type with maximum capacity. Example, If the library supports LTO-1 and LTO-2, tape size would be the RAW capacity of the LTO-2 tape.

**Table 45** Required Properties for SystemDevice

Property	Type	Description/Notes
GroupComponent	REF	Parent system in the association.
PartComponent	REF	Logical device that is component of the association product.

**Table 46** Required Library Level Instances of SystemDevice

Property	FCPort Instances (one for each FC Port)	SASPort Instances (one for each SAS Port)	SPI Port Instances (one for each FC Port)
GroupComponent	CIM_ComputerSystem*	CIM_ComputerSystem	CIM_ComputerSystem
PartComponent	CIM_FCPort	CIM_SASPort	CIM_SPIPort

\* For FCPort, SCSIProtocolEndpoint and SCSIProtocolController, they may have a SystemDevice association to the ComputerSystem of the blade, not the library (for example, if the object represents a blade FC port). See [Fibre Channel Blade Support](#) on page 77 for more detail on blade support.

**Table 47** Required Library Level Instances of SystemDevice

Property	SPC Instances (one for each SPC)SPE	Instances (one for each SPE)	IE Instances (one for each IE slot)
GroupComponent	CIM_ComputerSystem*	CIM_ComputerSystem*	CIM_ComputerSystem
PartComponent	CIM_SCSIProtocolController	CIM_SCSIProtocolEndpoint	CIM_LimitedAccessPort

Property	Drive Instances (one for each tape drive)	Changer Instances (one for each partition + physical)
GroupComponent	CIM_ComputerSystem	CIM_ComputerSystem
PartComponent	CIM_TapeDrive	CIM_ChangerDevice

\* For FCPort, SCSIProtocolEndpoint and SCSIProtocolController, they may have a SystemDevice association to the ComputerSystem of the blade, not the library (for example, if the object represents a blade FC port). See [Fibre Channel Blade Support](#) on page 77 for more detail on blade support.

**Table 48** Required Properties for Realizes

Property	Type 1	Description/Notes
Antecedent	REF	The physical component that implements the device.
Dependent	REF	The LogicalDevice.

**Table 49** Required Library Level instances of Realizes

<b>Property</b>	<b>Accessor Instances (one for each partition + physical)</b>	<b>Drive Instances (one for each drive)</b>	<b>IE Instances (one for each IE slot)</b>
Antecedent	CIM_StorageMediaLocation	CIM_StorageMediaLocation	CIM_StorageMediaLocation
Dependent	CIM_ChangerDevice	CIM_TapeDrive	CIM_LimitedAccessPort

<b>Property</b>	<b>Changer Package (one for system)</b>	<b>Drive Package Instances (one for each drive)</b>	<b>Chassis IE (one for each IE slot)</b>
Antecedent	CIM_PhysicalPackage	CIM_PhysicalPackage	CIM_Chassis
Dependent	CIM_ChangerDevice (only the physical changer)	CIM_TapeDrive	CIM_LimitedAccessPort

**Table 50** Required Properties for FCPort

Property	Type	Description/Notes
SystemCreationClassName[key]	String	
SystemName[key]	String	Host name of the library.
CreationClassName[key]	String	
DeviceID[key]	String	
PortNumber	Uint16	
PermanentAddress	String	Port WWN.
ElementName	String	
OperationalStatus	Uint16	Port Status.
NetworkAddress	String	FCID.
PortType	Uint16	Port Type.
ActiveFC4Types	Uint16	Supported FC types.
OtherNetworkPortType	String	Describes the type of module, when PortType is set to 1 ("Other").
LinkTechnology	Uint16	
OtherLinkTechnology	String	A string value describing LinkTechnology when it is set to 1, "Other".
ActiveCOS	Uint16	An array of integers indicating the class of service that is active.
UsageRestriction	Uint16	LogicalPort may be identifiable as a front end or back end port.



**Table 51** Required Direct Attached Drive Front-End Ports Instances of FCPort

Property	Description/Notes
SystemCreationClassName[key]	"CIM_ComputerSystem"
SystemName[key]	<HID (Vendor + Product + Serial of the library)>
CreationClassName[key]	"CIM_FCPort"
DeviceID[key]	"D:<GUID>:<Location>:<Serial>:<WWPN>"
PortNumber	Example: 1
PermanentAddress	WW Port Name Format is 16 octets 1234567887654321
ElementName	"FC Port"
OperationalStatus	Example : ok(2)
NetworkAddress	0
PortType	Example: N(10)
ActiveFC4Types	SCSI-FCP(8)
OtherNetworkPortType	"" since portType is N(10)
LinkTechnology	Example: FC(4)
OtherLinkTechnology	""
ActiveCOS	3
UsageRestriction	Front-end only(2)

**Table 52** Required Properties for SASPort

Property	Type	Description/Notes
SystemCreationClassName[key]	String	
SystemName[key]	String	Host name of the library.
CreationClassName[key]	String	
DeviceID[key]	String	
PortNumber	UInt16	
PermanentAddress	String	SAS UID.
ElementName	String	
OperationalStatus	UInt16[]	Port status.

**Table 53** Required Library Level Instances of SASPort

Property	Value (one for each SAS drive)
SystemCreationClassName[key]	CIM_ComputerSystem
SystemName[key]	<Vid> <Pid> <Serial>
CreationClassName[key]	CIM_SCSIProtocolController
DeviceID[key]	<DriveGUID>
PermanentAddress	SAS UID
Description	"SCSI port on drive <serial>"
OperationalStatus	Status of drive
Caption	<drive GUID>

**Table 54** Required Properties for SPIPort

Property	Type	Description/Notes
SystemCreationClassName[key]	String	
SystemName[key]	String	Host name of the library.
CreationClassName[key]	String	
DeviceID[key]	String	
PortNumber	Uint16	
PermanentAddress	String	SAS UID.
NetworkAddress	String Array	
ElementName	String	
OperationalStatus	Uint16[]	Port status.

**Table 55** Required Library Level Instances of SPIPort

Property	Value
SystemCreationClassName[key]	CIM_ComputerSystem
SystemName[key]	<Vid> <Pid> <Serial>
CreationClassName[key]	CIM_SPIPort
DeviceID[key]	<drive GUID>
PermanentAddress	""
NetworkAddresses	{<target ID>}
Description	"SCSI port on drive <serial>"
OperationalStatus	Status of drive
MaxDataWidth	Maximum bus width
MaxTransferRate	Maximum data transfer rate
Caption	<drive GUID>

**Table 56** Required Properties for ChangerDevice

Property	Type	Description/Notes
SystemCreationClassName[key]	string, MaxLen(256)	The scoping system's CreationClassName.
SystemName[key]	string	The scoping system's name.
CreationClassName[key]	string	Indicates the name of the class or subclass used in the creation of an instance.
DeviceID[key]	string , MaxLen(256)	
MediaFlipSupported	Boolean	
ElementName	String	User-friendly name.
OperationalStatus[valuemap]	Uint16[]	
Caption	String	
Description	String	
Availability[valuemap]	Uint16	

**Table 57** Required Server Level Instances of ChangerDevice

Property	Physical Library Instance 1	Partition Instances (one for each partition)
SystemCreationClassName[key]	"CIM_ComputerSystem"	"CIM_ComputerSystem"
SystemName[key]	<HID of the library>	<HID of the library>
CreationClassName[key]	"CIM_Computersystem"	"CIM_Computersystem"
DeviceID[key]	"<GUID>:<Serial>:<Version>"	"<GUID>:<Serial>:<Version>"
MediaFlipSupported	False	False
ElementName	"SMIS_ChangerDevice"	"SMIS_ChangerDevice"
OperationalStatus[valuemap]	Robotics RAS status	{OK(2)}
Caption	Physical Library	Library name (library_a or library_b, etc.)
Description	Physical Medium Changer	"Partition <HID>"
Availability[valuemap]	Running/Full Power(3) or Offline (8)	Running/Full Power(3) or Offline (8)

**Table 58** Required Properties for ProtocolControllerForUnit

Property	Type	Description/Notes
Antecedent	REF	The ProtocolController.
Dependent	REF	The controlled device.
DeviceNumber	string	Address of associated device in context of the antecedent ProtocolController. Formatted as unseparated uppercase hexadecimal digits, with no leading "0x".

**Table 59** Required Server Level Instances of ProtocolControllerForUnit

Property	Drive Instances (one for each direct-attached drive)	Changer Instance (one for each changer which has a control-path drive)
Antecedent	CIM_SCSIProtocolController (corresponding to the drive)	CIM_SCSIProtocolController (corresponding to control path drive)
Dependent	CIM_TapeDrive	CIM_ChangerDevice
DeviceNumber	"0"	"1"

**Table 60** Required Properties for SCSIProtocolController

Property	Type	Description/Notes	Comments/Remarks
SystemCreationClassName[key]	string, MaxLen(256)	The scoping System's CreationClassName.	
SystemName[key]	string	The scoping System's Name.	Library's host name.
CreationClassName[key]	string	Indicates the name of the class or subclass used in the creation of an instance.	
DeviceID[key]	string , MaxLen(256)	Opaque	
MaxUnitsControlled	Uint32	Maximum number of units controlled by this ProtocolController (optional)	
ElementName	String	User friendly name	
OperationalStatus[valuemap]	Uint16[]	Status of device (optional)	
Caption	String	(optional)	
Description	String	(optional)	
OtherIdentifyingInfo]	String[]	Captures additional data, beyond System Name information, that could be used to identify a LogicalDevice.	WWN

**Table 61** Required Server Level Instances of SCSIProtocolController

Property	Drive Instances (one for each direct-attached drive)
SystemCreationClassName[key]	"CIM_SCSIProtocolController"
SystemName[key]	IP
CreationClassName[key]	"CIM_ComputerSystem"
DeviceID[key]	"D:<GUID>:<serial>:<vendor> <fwr>:<SPE DeviceID>"
MaxUnitsControlled	2048
ElementName	"SMIS_SCSIProtocolController"
OperationalStatus[valuemap]	{Unknown(0)}
Caption	Same as DeviceID
Description	"Tape Drive <Type>" where <Type> is SCSI/FC/SAS
OtherIdentifyingInfo	{<serial>}
IdentifyingInfoDescriptions	{"Serial Number"}

**Table 62** Required Properties of SCSIProtocolEndpoint

Property	Type	Description/Notes	Comments/Remarks
SystemCreationClassName[key]	string, MaxLen(256)	The scoping System's CreationClassName.	
SystemName[key]	string	The scoping System's Name.	Library's host name.
CreationClassName[key]	string	Indicates the name of the class or subclass used in the creation of an instance.	
DeviceID[key]	string , MaxLen(256)	Opaque	
MaxUnitsControlled	UInt32	Maximum number of units controlled by this ProtocolController (optional)	
ElementName	String	User-friendly name	
OperationalStatus[valuemap]	UInt16[]	Status of device (optional)	
Caption	String	(optional)	
Description	String	(optional)	
ConnectionType [valuemap]	UInt16	Fibre/ISDN/...	
Role [valuemap]	UInt16	Target/Initiator...	
ProtocolIFType [valuemap]	UInt16	Protocol Interface.	

**Table 63** Required Library Instances of SCSIProtocolEndpoint

Property	Drive Instances (one for each direct-attached drive)
SystemCreationClassName[key]	"CIM_ComputerSystem"
SystemName[key]	HID
CreationClassName[key]	"CIM_SCSIProtocolEndpoint"
DeviceID[key]	"<WWPN>"
ConnectionType	Fibre Channel (2)
Role	Target (3)
OperationalStatus[valuemap]	{Unknown(0)}
ProtocolIFType	Fibre Channel (56)
Description	"SMIS_SCSIProtocolEndpoint"

**Table 64** Required Properties of PortImplementsEndpoint

Property	Type	Description/Notes
Antecedent	REF	The LogicalPort.
Dependent	REF	The ProtocolEndpoint.

**Table 65** Required Library Instances of PortImplementsEndpoint

Property	FCPort Instances (one for each direct-attached FC drive)	SAS Instances (one for each SAS drive)	SPI Instances (one for each SCSI drive)
Antecedent	CIM_FCPort	CIM_SASPort.	CIM_SPIPort
Dependent	CIM_SCSIProtocolEndpoint	CIM_SCSIProtocolEndpoint.	CIM_SCSIProtocolEndpoint

**Table 66** Required Properties of SAPAvailableForElement

Property	Type	Description/Notes
AvailableSAP	REF	The ServiceAccessPoint.
ManagedElement	REF	The ManagedElement that is accessible by the SAP.

**Table 67** Required Library Instances of SAPAvailableForElement

Property	Instance (one for each SCSIProtocolController)
AvailableSAP	CIM_SCSIProtocolEndpoint
ManagedElement	CIM_SCSIProtocolController

**Table 68** Required Properties for ElementSoftwareIdentity

Property	Type	Description/Notes
Antecedent	REF	The SoftwareIdentity.
Dependent	REF	The ManagedElement that requires or uses the software.

**Table 69** Required Library/Server Level Instances of ElementSoftwareIdentity

Property	Drive Instance (one for each drive)	Changer Instance (one for each partition + physical)	Profile Instances (one for each Registered Profile or Subprofile)
Antecedent	CIM_SoftwareIdentity (corresponding to drive)	CIM_SoftwareIdentity (the changer software instance).	CIM_SoftwareIdentity ("Providers Revision")
Dependent	CIM_TapeDrive	CIM_ChangerDevice.	CIM_RegisteredProfile or CIM_RegisteredSubprofile



**Table 70** Required Properties for TapeDrive

Property	Type	Description/Notes	Comments/Remarks
SystemCreationClassName[key]	string, MaxLen(256)	The scoping System's CreationClassName.	
SystemName[key]	string	The scoping System's Name.	Library's host name.
CreationClassName[key]	string	Indicates the name of the class or subclass used in the creation of an instance.	
DeviceID[key]	string , MaxLen(256)	Opaque	
Availability	UInt16		
NeedsCleaning	Boolean	Boolean indicating that the MediaAccessDevice needs cleaning. Whether manual or automatic cleaning is possible is indicated in the Capabilities array property.	
PowerOnHours	UInt64	counter, units("hours")	
TotalPowerOnHours	UInt64	counter, units("hours")	
OperationalStatus [valuemap]	UInt16[]	Status of device (optional)	
MountCount	UInt64	For a MediaAccessDevice that supports removable media, the number of times that media have been mounted for data transfer or to clean the device. For devices accessing nonremovable media, such as hard disks, this property is not applicable and should be set to 0.	

**Table 71** Required Server Level Instances of TapeDrive

Property	Type
SystemCreationClassName[key]	"CIM_TapeDrive"
SystemName[key]	<IP>
CreationClassName[key]	"CIM_ComputerSystem"
DeviceID[key]	"<GUID>:<serial>:<Vendor> <version>"
Availability	Running/Full Power(3) or Offline (8)
NeedsCleaning	False
PowerOnHours	Hours since last drive power
TotalPowerOnHours	Total hours the drive has been on
OperationalStatus [valuemap]	{OK(2)}
MountCount	Number of times the drive has been mounted

**Table 72** Required Properties for PackageInChassis

Property	Type	Description/Notes
GroupComponent	REF	The chassis that contains other PhysicalPackages.
PartComponent	REF	The PhysicalPackage which is contained in the chassis.

**Table 73** Required Server Level Instances of PackageInChassis

Property	Instance 1
GroupComponent	CIM_Chassis
PartComponent	CIM_PhysicalPackage

**Table 74** Required Properties for PhysicalPackage

Property	Type	Description/Notes
CreationClassName[key]	String	
Tag[key]	String	Type + SerialNumber
Manufacturer	String	Manufacturer
Model	String	Model
Caption	String	

**Table 75** Required Library Level Instances of PhysicalPackage

Property	Tape Drive Instances (one for each drive)	Control Module Instances (one for the system)
CreationClassName[key]	"CIM_PhysicalPackage"	"CIM_PhysicalPackage"
Tag[key]	"<GUID>:<Location>"	"<Physical Changer GUID>:<CM Location>"
Manufacturer	Vendor (example: "IBM")	Branding
Model	Product ID (example: "ULTRIUM-TD3")	"ControlModule5U"
Caption	<Serial>	Same as Tag
Serial Number	<Serial>	<Serial>

**Table 76** Required Properties for PhysicalTape

Property	Type	Description/Notes
Tag[key]	String, MaxLen(256)	An arbitrary string that uniquely identifies the Physical Element.
CreationClassName[key]	String	The name of the concrete subclass.
Capacity	UInt64	Units ("bytes").
MediaType	UInt16	
MediaDescription	String	Additional detail related to the MediaType enumeration.
CleanerMedia	Boolean	
DualSided	Boolean	
PhysicalLabels	string[]	One or more strings on 'labels' on the PhysicalMedia.

**Table 77** Required Server Level Instances of PhysicalTape

Property	Instance (one for each present cartridge)
Tag[key]	"<Changer GUID>:<Tape GUID>:0"
CreationClassName[key]	"SMIS_PhysicalTape"
Capacity	Size of data on tape12345
MediaType	LTO Ultrium(7)
MediaDescription	"LTO 1"
CleanerMedia	Boolean
DualSided	False
PhysicalLabels	Barcode {"12345"}
EncryptionState	0 Unknown, 1 Unencrypted, 2 Encrypted

**Table 78** Required Properties for PackagedComponent

Property	Type	Description/Notes
GroupComponent	REF	PhysicalPackageReference
PartComponent	REF	PhysicalComponentReference

**Table 79** Required Server Level Instances of PackagedComponent

Property	Type
GroupComponent	CIM_Chassis
PartComponent	CIM_PhysicalTape

**Table 80** Required Properties for StorageMediaLocation

Property	Type	Description/Notes
Tag[key]	String, MaxLen(256)	An arbitrary string that uniquely identifies the Physical Element.
CreationClassName[key]	String	Indicated the name of the class or subclass.
LocationType	Uint16	The type of location.
LocationCoordinates	String	General location information about the physical location of the StorageMediaLocation.
MediaTypesSupported	Uint16[]	Complete list of accepted media types.
MediaCapacity	Uint32	The maximum number of physical media that this StorageMediaLocation can hold.

**Table 81** Required Server Level Instances of StorageMediaLocation

Property	Type
Tag[key]	<elementaddress>.<chassis>.<type>
CreationClassName[key]	"CIM_ComputerSystem"
LocationType	Slot(2) or MediaAccessDevice (4) or LimitedAccessPort (6)
LocationCoordinates	"<Location>"
MediaTypesSupported	{ LTO Ultrium(56)}
MediaCapacity	1
Manufacturer *	Branding for slots and IE, vendor for drives
Model *	"LTO" for slots and IE, product ID for drives

\* Properties inherited from the superclass PhysicalPackage.

**Table 82** Required Properties for Container

Property	Type	Description/Notes
GroupComponent	REF	PhysicalPackageReference
PartComponent	REF	PhysicalComponentReference

**Table 83** Required Server Level Instances of Container(Chassis)

Property	StorageMediaLocation Instances (one for each SML)	PhysicalPackage Instances (one for each PP)
GroupComponent	CIM_Chassis	CIM_Chassis
PartComponent	CIM_StorageMediaLocation	CIM_PhysicalPackage

**Table 84** Required Properties for PhysicalMediaInLocation

Property	Type	Description/Notes
Antecedent	REF	StorageMediaLocation Reference
Dependent	REF	PhysicalMedia Reference

**Table 85** Required Server Level Instances of PhysicalMediaInLocation

Property	Instance 1
Antecedent	StorageMediaLocation Reference
Dependent	CIM_PhysicalTape

**Table 86** Required Properties of LimitedAccessPort

Property	Type	Description/Notes
SystemCreationClassName[key]	String, MaxLen(256)	The scoping system's CreationClassName.
SystemName[key]	String	The scoping system's name.
CreationClassName[key]	String	Indicates the name of the class or subclass used in the creation of an instance.
DeviceID[key]	String, MaxLen(256)	Opaque.
Locked	Boolean	

**Table 87** Required Library Level Instances of LimitedAccessPort

Property	Physical Library Instance 1
SystemCreationClassName[key]	"CIM_ComputerSystem"
SystemName[key]	<IP of the library>
CreationClassName[key]	"<GUID>:<Location>"
DeviceID[key]	True if locked.
Locked	

**Associated Indications****Table 88** Creation/Deletion of a ComputerSystem

Query	Comments/Remarks
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_ComputerSystem SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_ComputerSystem	Event to notify when library is ready to operate when it is initialized (startup) or de-initialized (shutdown). Corresponding events for FC I/O blades will be supported in future.

**Table 89** Creation/Deletion of a PhysicalMedia

Query	Comments/Remarks
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA PhysicalMedia SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_PhysicalMedia SourceInstance ISA CIM_ComputerSystem	Event to notify when a physical tape comes into the library or leaves the library.

**Table 90** Creation/Deletion of a TapeDrive

Query	Comments/Remarks
<pre>SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_TapeDrive SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_TapeDrive</pre>	Event to notify when a tape drive comes into the library or leaves the library.

**Table 91** Creation/Deletion of a ChangerDevice

Query	Comments/Remarks
<pre>SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_ChangerDevice CIM_SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_ChangerDevice</pre>	Event to notify that the robotics is ready for use after library is initialized (startup). Event to notify when the library is getting de-initialized (shutdown) and robotics becomes unavailable. Event to notify when a logical library is created or deleted.

**Table 92** Creation/Deletion of an FCPort

Query	Comments/Remarks
<pre>SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_FCPort SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_FCPort</pre>	Event to notify when an FC port comes into the library or leaves the library. It is the same as when an FC tape drive or FC I/O blade enters or leaves the library.

**Table 93** Change in Operational Status of a ComputerSystem

Query	Comments/Remarks
<pre>SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_ComputerSystem AND PreviousInstance.OperationalStatus &lt;&gt; SourceInstance.OperationalStatus</pre>	Event to notify change in operational status of overall library status.

**Table 94** Change in Operational Status of a PhysicalMedia

Query	Comments/Remarks
<pre>SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_PhysicalMedia AND PreviousInstance.OperationalStatus &lt;&gt; SourceInstance.OperationalStatus</pre>	Event to notify change in operational status of physical media.

**Table 95** Change in Operational Status of a TapeDrive

Query	Comments/Remarks
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_TapeDrive AND PreviousInstance.OperationalStatus <> SourceInstance.OperationalStatus	Event to notify change in operational status of a tape drive.

**Table 96** Change in Operational Status of a ChangerDevice

Query	Comments/Remarks
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_ChangerDevice AND PreviousInstance.OperationalStatus <> SourceInstance.OperationalStatus	Event to notify change in operational status of a changer device.

**Table 97** Change in Operational Status of an FCPort

Query	Comments/Remarks
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_FCPort AND PreviousInstance.OperationalStatus <> SourceInstance.OperationalStatus	Event to notify change in operational status of an FCPort.





**Table 98** Fibre Channel I/O Blade Instances of Computer System

Property	Instances (one per Fibre Channel I/O Blade)
CreationClassName[key]	"CIM_ComputerSystem"
Name[key]	Blade WWNN
Dedicated	Router (4)
OperationalStatus	Blade state, example: ok(2)
OtherIdentifyingInfo	"ComputerSystem"
ElementName	"SMIS_FCComputerSystem"
NameFormat	"WWN"
PrimaryOwnerName	"ADIC" or "QUANTUM" (depends on brand)
PrimaryOwnerContact	support@adic.com or techsup@quantum.com (depends on brand)
CaptionBlade	WWN
Description	This is an ADIC Fibre Channel Blade

**Table 99** Required Properties for ComponentCS

Property	Type	Description/Notes
GroupComponent	REF	ComputerSystem Reference
PartComponent	REF	ComputerSystem Reference

**Table 100** Required Server Level Instances of ComponentCS

Property	Instances (one for each blade)
GroupComponent	CIM_ComputerSystem (for the library)
PartComponent	CIM_ComputerSystem (for the library)

**Table 101** Required Blade Instances of FCPort

Property	Blade Instances (one for each blade target FC port)
SystemCreationClassName[key]	"CIM_ComputerSystem"
SystemName[key]	<HID>
CreationClassName[key]	"SMIS_FCPort"
DeviceID[key]	"B:<bladeID>:<portID>:<location>:WWN"
PortNumber	Example: 1
PermanentAddress	WW Port Name Format is 16 octets 1234567887654321
ElementName	"CIM_FCPort"
OperationalStatus	Port Status. Example: ok(2)
NetworkAddress	0
PortType	Example: N(10)
ActiveFC4Types	SCSI-FCP(8)
OtherNetworkPortType	"" since portType is N(10)
LinkTechnology	FC(4)
OtherLinkTechnology	""
ActiveCOS	3
UsageRestriction	Front-end only(2)

**Table 102** Required Blade Instances of SCSIProtocolController (LUN Mapping Disabled)

When LUN Mapping is disabled, the blade has a SCSIProtocolController representing each zone on the blade, and since zoning is tied to target ports, this ties the blade SPC object to a blade target port.

Property	Instances (one for each port on a Fibre Channel I/O blade)
SystemCreationClassName[key]	CIM_ComputerSystem
SystemName[key]	<Vid> <Pid> <Serial>
CreationClassName[key]	CIM_SCSIProtocolController
DeviceID[key]	"B":<bladeIP>:.<port>
OtherIdentifyingInfo	{blade serial}
Caption	"B":<bladeIP>:.<port>
Description	"FC Blade <IP>, port <port>"
ElementName	CIM_SCSIProtocolController
IdentifyingInfoDescriptions	{"Serial Number"}

**Table 103** Required Blade Instances of SCSIProtocolEndpoint

Property	Drive Instances (one for each direct-attached drive)
SystemCreationClassName[key]	"CIM_ComputerSystem"
SystemName[key]	HID
CreationClassName[key]	"CIM_SCSIProtocolEndpoint"
DeviceID[key]	"<WWPN>"
ConnectionType	Fibre Channel (2)
Role	Target (3)
OperationalStatus [valuemap]	{Unknown(0)}
ProtocolIFType	Fibre Channel (56)
Description	"SMIS_SCSIProtocolEndpoint"

**Table 104** Required Blade Instances of PortImplementsEndpoint

Property	FCPort Instances (one for each blade target port)
Antecedent	CIM_FCPort
Dependent	CIM_SCSIProtocolEndpoint

**Table 105** Required Blade Instances of SAPAvailableForElement

Property	Instance (one for each SCSIProtocolController)
AvailableSAP	CIM_SCSIProtocolEndpoint
ManagedElement	CIM_SCSIProtocolController

**Table 106** Required Blade Instances of ProtocolControllerForUnit

Property	Drive Instances (one for each drive and each SPC that has access to it through zoning)	Changer Instances (partition) x (blade ports)
Antecedent	CIM_SCSIProtocolController (represents a port that has zoning access to this drive)	CIM_SCSIProtocolController (corresponding to blade port)
Dependent	CIM_TapeDrive	CIM_ChangerDevice
DeviceNumber	Internal LUN of the drive	Internal LUN of changer

**Table 107** Required Blade Instances of SystemDevice

Property	FCPort Instances (one for each target port)	SPC Instances (one for each SPC)	SPE Instances (one for each target port)
GroupComponent	CIM_ComputerSystem	CIM_ComputerSystem	CIM_ComputerSystem
PartComponent	CIM_FCPort	CIM_SCSIProtocolController	CIM_SCSIProtocolEndpoint

**Table 108** Required Blade Instances of InstalledSoftwareIdentity

Property	Instance 1 (one for each Fibre Channel I/O blade)
System	CIM_ComputerSystem
InstalledSoftware	CIM_SoftwareIdentity

**Table 109** Required Blade Instances of InstalledSoftwareIdentity

Property	Blade Instance (1 per Fibre Channel I/O blade)
InstanceID[key]	"FCB:blade id:Version WWN"
VersionString	Blade firmware version
Manufacturer	Same as instance ID

**Table 110** Required Blade Instances of ComputerSystemPackage

Property	Instance 1
Antecedent	CIM_PhysicalPackage
Dependent	CIM_ComputerSystem



**Table 111** Required Properties for StorageHardwareID

Property	Type	Description/Notes
InstanceID[key]	String	This is a unique value for the instance
CurrentlyAuthenticated	Boolean	Whether the identity has been authenticated (optional)
StorageID	String	The hardware ID
IDType	Uint16	Type of ID PortWWN, iSCSI, etc.

**Table 112** Required Instances for StorageHardwareID

Property	Instances (one for each host)
InstanceID[key]	<Vendor> <Product> <Serial> <WWN hi: lo>:<blade IP>:<hostIndex>
CurrentlyAuthenticated	“true”
StorageID	WW Port Name Format is 16 octets 12345678:87654321
IDType	2 (WWPN)

**Table 113** Required Properties for StorageClientSettingData

Property	Type	Description/Notes
InstanceID[key]	String	This is a unique value for the instance
ClientTypes [valuemap]	Uint16 array	Operating system, version of client (optional)
ElementName	String	The hardware ID
OtherClientTypeDescriptions	String	String for the types that have other client types

**Table 114** Required Instances for StorageClientSettingData

Property	Instance (one for each present OS as chosen from host type config)
InstanceID[key]	# (used for internal lookup)
ClientTypes	1 (Other: UNISYS, FCR-2, PV-136T-FC, SWITCH, GATEWAY, GENERIC), 4 (HPUX, HP-V2), 7 (NETWARE), 9(AIX), 14 (LINUX), 15 (Windows), 16 (AS400)
ElementName	String type shown in GUI
OtherClientTypeDescriptions	String type shown in GUI for the ones that have 1 (other) client types

**Table 115** Required Properties for AuthorizedPrivilege

Property	Type	Description/Notes
InstanceID[key]	String	This is a unique value for the instance
PrivilegeGranted	Boolean	Whether privilege has been granted or denied (optional)
Activities [valuemap]	Uint16 array	Read/write/create...

**Table 116** Required Instances for AuthorizedPrivilege

Property	Instance (one for each host-blade combination)
InstanceID[key]	<Vendor> <Product> <Serial>:<blade IP>:<hostIndex>:<WWN hi: lo>
PrivilegeGranted	True
Activities	5,6 (read,write)

**Table 117** Required Properties for ElementSettingData

Property	Type	Description/Notes
SettingData	REF	The SettingData associated with the element.
ManagedElement	REF	The ManagedElement.

**Table 118** Required Instances for ElementSettingData

Property	Instance (one for each host)
SettingData	CIM_SettingData
ManagedElement	CIM_StorageHardwareID

**Table 119** Required Properties for AuthorizedSubject

Property	Type	Description/Notes
Privilege	REF	Privilege grant or denial.
PrivilegedElement	REF	The subject which has been granted or denied access.

**Table 120** Required Instances for AuthorizedSubject

Property	Value (one for each blade-host combination)
Privilege	CIM_AuthorizedPrivilege describing blade-host combination
PrivilegedElement	CIM_StorageHardwareID of the host



**Table 121** Required Properties for AuthorizedTarget

Property	Type	Description/Notes
Privilege	REF	Privilege grant or denial
TargetElement	REF	The object to be accessed

**Table 122** Required Instances for AuthorizedTarget

Property	Value (one for each blade-host-port combination)
Privilege	CIM_AuthorizedPrivilege of the blade-initiator combination
TargetElement	CIM_SCSIProtocolController for blade-host-port combination

**Table 123** Required Properties for ProtocolControllerMaskingCapabilities

Property	Type	Description/Notes
InstanceID[key]	String	This is a unique value for the instance
ElementName	String	
ValidHardwareIDTypes	Uint16 array	Supported ID's for masking
PortsPerView	Uint16	Integer enumeration for one port or multiple ports per view
ClientSelectableDeviceNumbers	Boolean	True if the user selects the device numbers (LUNs)
OneHardwareIDPerView	Boolean	Whether multiple ID's can have the same view
UniqueUnitNumbersPerPort	Boolean	Whether a unit number (LUN) is unique across each port for an SPC
PrivilegeDeniedSupported	Boolean	True if the a view can be created with privilege denied
ProtocolControllerSupportsCollections	Boolean	True if the system has multiple hosts treated together in one view
SPCAllowsNoInitiators	Boolean	Creation related (read-write)
AttachDeviceSupported	Boolean	Creation related (read-write)
ProtocolControllerRequiresAuthorizedIdentity	Boolean	Creation related (read-write)
ExposePathsSupported	Boolean	Creation related (read-write)
CreateProtocolControllerSupported	Boolean	Creation related (read-write)
SPCAllowsNoLUs	Boolean	Creation related (read-write)
SPCAllowsNoTargets	Boolean	Creation related (read-write)
SPCSupportsDefaultViews	Boolean	Creation related (read-write)

**Table 124** Required Instances for ProtocolControllerMaskingCapabilities

Property	Top-level Computer System	Blade LUN Mapping On	Blade LUN Mapping Off
InstanceID[key]	<Vid> <Pid> <Serial>:"L"	<Vid> <Pid> <Serial>:"E"	<Vid> <Pid> <Serial>:"B"
ElementName	"CS SPC Masking Capabilities"	"EVPS Enabled SPC Masking Capabilities"	"EVPS Disabled SPC Masking Capabilities"
ValidHardwareIDTypes	{2} (wwpn)	{2} (wwpn)	{2} (wwpn)
PortsPerView	1	1	Multiple
ClientSelectableDeviceNumbers	False	True	False
OneHardwareIDPerView	False	True	False
UniqueUnitNumbersPerPort	False	False	False
PrivilegeDeniedSupported	False	False	False
ProtocolControllerSupportsCollections	False	False	False
SPCAllowsNoInitiators	False	False	False
AttachDeviceSupported	False	False	False
ProtocolControllerRequiresAuthorizedIdentity	False	False	False
ExposePathsSupported	False	False	False
CreateProtocolControllerSupported	False	False	False
SPCAllowsNoLUs	False	False	False
SPCAllowsNoTargets	False	False	False
SPCSupportsDefaultViews	False	False	False

**Table 125** Required Properties of ElementCapabilities

Property	Type	Description/Notes
Capabilities	REF	The capabilities supported by the ManagedElement
ManagedElement	REF	The ManagedElement

**Table 126** Required Instances for ElementCapabilities

Property	Instance (one for each computer system)
Capabilities	CIM_ProtocolControllerMaskingCapabilities
ManagedElement	CIM_ComputerSystem

**Table 127** Lun Mapping Instances of SCSIProtocolController

When LUN mapping is enabled, there is a an instance for each host-blade-port combination. A single host has a single StorageHardwareID, which is then associated through AuthorizedSubject to multiple AuthorizedPrivileges, one for each blade that the host is attached to (or has ever been), and that, in turn, is associated through AuthorizedTarget to two SCSIProtocolControllers (one for each port on the blade).

Property	Instances (one for each host-blade-port combination)
SystemCreationClassName[key]	CIM_ComputerSystem
SystemName	<Vid> <Pid> <Serial>
CreationClassName[key]	CIM_SCSIProtocolController
DeviceID	"B":<bladelP>.:<port>:<blade host ID>:WWPN_HI:WWPNLO
OtherIdentifyingInfo	{WWPN, hostname, blade serial}
Caption	"B":<bladelP>.:<port>:<blade host ID>:WWPN_HI:WWPNLO
Description	"FC Blade <IP>, port <port>, host: <hostname> (<WWPN>)"
ElementName	CIM_SCSIProtocolController
IdentifyingInfoDescriptions	{"Host WWPN", "Host name", "Serial Number"}

**Table 128** LUN Mapping Instances of ProtocolControllerForUnit

Property	Changer Instances (one for each time that a partition is exposed)	Drive Instances (one for each time that a drive is exposed)
Antecedent	CIM_SCSIProtocolController.	CIM_SCSIProtocolController
Dependent	CIM_ChangerDevice	CIM_TapeDrive
DeviceAccess	2 (Read/Write)	2 (Read/Write)
DeviceNumber	Host LUN	Host LUN
AccessState	2 (online) if host is Online in GUI, 3 (offline) if host is offline in GUI	



# D

## Glossary

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This glossary consists of terms that can be used when describing the SNC and the Scalar libraries that you may have in your SAN.

### **AMC (ADIC Management Console)**

Client-server software. The AMC server is used to manage the SAN and the library. It has two clients, the AMC client (which manages the SAN) and the LMC client (which manages the Scalar i2000).

### **API**

Application Programming Interface

### **CIMOM**

Common Information Model Object Manager

### **CMPI**

Common Manageability Programming Interface

### **DNS (Domain Name Service)**

A service that translates domain names into IP addresses.

### **Event**

A condition that matches a numbered, predefined set of circumstances. The AMC client can be configured to display events at specified severity levels and to generate traps (also called “event traps”) for specified occurrences.

### **Event log**

A list of all pre-defined events logged by the AMC server, whether or not the AMC client has been configured to display these events to the user.

### **eVPS (extended Virtual Private SAN)**

A virtual LUN mapping scheme for Fibre Channel hosts that runs on the SNC. It allows each host to see the LUN map as if the LUN map began at “1”, subject to an overall device total of 2048, and a per-host device total of 256. Refer to FC Host.

### **FC Host**

A virtual LUN mapping scheme for Fibre Channel hosts that runs on the MCB. It allows each host to see the LUN map as if the LUN map began at “1”, subject to an overall device total of 2048, and a per-host device total of 256. Refer to eVPS.

**FC (Fibre Channel)**

A high speed data transfer architecture. Using optical fibre to connect devices, Fibre Channel communications are serial communications that occur at full duplex and achieve data transfer rates of 200 MBps.

**FCB (Fibre Channel blade)**

A board-level component of the Scalar 12000 or the Pathlight VX that is responsible for the data interface between hosts and storage devices.

**Graphical panel**

The upper right quadrant of the AMC window, where configuration information is displayed in graphical format.

**GUI (Graphical User Interface)**

A computer environment that provides a visual view of a system by incorporating windows, icons, menus, and a pointing device. Sometimes referred to as UI (user interface).

**Health check**

An AMC feature that provides predictive alerts, warning of any loss of connectivity or device failure using local or remote alerts. Health check allows administrators to correct faults before they affect backup or other data transfer operations.

**Host initiator**

A host bus adapter that provides the host with a Fibre Channel port capable of initiating SCSI commands at the host's request.

**HRS (Host Registration Service)**

Software that presents host information the AMC server uses to manage host access and data retrieval. This information includes host name, host type, host connection and the online or offline status.

**HTTP (Hypertext Transfer Protocol)**

The communication rules by which a Web browser (client) and a server delivering Web pages exchange information.

**HTTPS (Hypertext Transfer Protocol over Secure Socket Layer)**

URI scheme indicating a secure HTTP connection.

**I/O blade**

A board-level component of the Scalar 12000 or the Pathlight VX that is responsible for the data interface between hosts and storage devices. See FCB.

**IP (Internet Protocol)**

A protocol that specifies the formats of packets and addresses. Addresses are formulated as dotted quads, for example, 123.456.789.123.

**ISV**

Independent software vendor

**Library**

A large-scale tape device with robotics that can house multiple tape drives and a significant number of tape cartridges.

**LMC (Library Management Console)**

LMC is the management software for the Scalar i2000 library that runs on that library's touch screen. It can also run remotely if there is a Scalar i2000 in the SAN. It is client software that communicates with the AMC server.

**LUN (Logical Unit Number)**

A unique identifier used on a SCSI bus to distinguish between devices that share the same bus. SCSI is a parallel interface that allows up to eight devices (target IDs) to be connected along a single cable. Each of these eight devices has access to 16 unique address spaces (LUNs). A specified intersection of target ID and target LUN can be construed as the Assigned LUN.

**Mac address**

An IEEE-defined globally unique address for Ethernet controllers. Short for “Universal LAN MAC Address.”

**MAP (Maintenance Action Plan)**

A CLI routine that guide a user through troubleshooting system or component error.

**MCB (Management Control Blade)**

A PCB that passes commands to and from the robotics control unit as well as to SAN components in order to manage the Scalar i2000 intelligent library. All control modules have an MCB. No expansion module has an MCB.

**MIB (Management Information Base)**

A database of objects that can be monitored by SNMP or other database management system.

**NDMP**

Network Data Management Protocol

**NVRAM (Non-Volatile Random Access memory)**

A type of memory that retains its contents when power is turned off.

**Organizationally unique identifier**

A number assigned to organizations by a recognized naming authority. It is part of the world wide name.

**PCB (Printed Circuit Board)**

A thin plate on which chips and other electronic components are placed. A board. A blade.

**PIP (Power and Identification Processor)**

A chip on an I/O blade.

**POST (Power On Self Test)**

A diagnostic testing sequence run by the SNC or MCB BIOS (basic input/output system) when the power is initially turned on.

**Point to Point**

A Fibre Channel topology.

**SAN (Storage Area Network)**

A SAN is a dedicated, high-performance network whose primary purpose is the transfer of data along FC or high-speed Ethernet connections between servers, interconnect devices, and storage peripherals.

**SCSI (Small Computer System Interface)**

A parallel interface standard.

**SCSI Host**

A virtual LUN mapping scheme for SCSI-attached hosts, allowing an overall LUN total of 256 devices to be virtually remapped. For Scalar libraries other than the Scalar i2000, called VPM.

**SFM (Scalar Firewall Manager)**

A virtual LUN mapping scheme for Fibre Channel hosts, allowing an overall LUN total of 2048 devices to be virtually remapped on a SAN-wide basis.

**SMI-S**

Storage Management Initiative Specifications

**SNC (Storage Networking Controller)**

Quantum term for a storage networking appliance. The SNC enables high-performance, networked communications that support intelligence functionality within the Scalar storage system. For the Scalar i2000, SNC functions are carried out by the MCB.

**SML**

Storage Media Library

**SNIA**

Storage Network Industry Association

**SNMP (Simple Network Management Protocol)**

SNMP is the protocol governing network management and the monitoring of network devices and their functions.

**SOIP**

Quantum proprietary protocol for sending SCSI commands over TCP/IP

**Target ID**

SCSI bus address. Refer also to LUN.

**Trap**

An SNMP alert that is sent to the AMC client when predefined conditions are met.

**VPM (Virtual Private MAP)**

A virtual LUN mapping scheme for SCSI-attached hosts, allowing an overall LUN total of 256 devices to be virtually remapped.

**WBEM**

Web Based Enterprise Management

**WWN (World Wide Name)**

A unique number assigned by a recognized naming authority. The WWN is integral to Fibre Channel operations.

**XML**

Extensible Markup Language



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