
**Information technology — Storage
management —**

**Part 3:
Common profiles**

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Foreword

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by SNIA (as Storage Management Technical Specification, Part 3 Common Profiles, Version 1.8.0, Revision 5) and drafted in accordance with its editorial rules. It was adopted, under the JTC 1 PAS procedure, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

This second edition cancels and replaces the first edition (ISO/IEC 24775-3:2014), which has been technically revised.

The main changes compared to the previous edition are as follows:

- USAGE text was revised to address code (now included in the front matter for all SNIA specifications)
- All recipes and their references were deleted.
- Instances of subprofile were changed to profile. In the annex, instances of subprofile were changed to component profile (TSG meeting voice vote).
- Profile versions and related text were updated. (TSG meeting voice vote).
- Indications have been replaced by DMTF Indications, and all affected clauses updated. (TSG meeting voice vote).
- Instances of Experimental within profiles already labeled as Experimental were removed to avoid confusion and redundancy. (Editorial change)
- CIM/XML was changed to CIM-XML (Response to ballot comments).

- Annex: SMI-S Information Model.
- The CIM schema version was changed to 2.51 for V1.8.0 Rev3.
- Multiple profiles (TSG-SMIS-SCR00315.001):
 - Promoted the maturity level from DRAFT to EXPERIMENTAL for these revisions: Update profiles to remove SNIA_ classes and use DMTF CIM_ classes in these profiles: Common, SAS Target Port, SB Target Ports, FC-SB-x Initiator Ports, Generic Initiator Ports, iSCSI Initiator Ports, FC Initiator Ports, SAS Initiator Ports, ATA Initiator Ports, SB Initiator Ports, FCoE Initiator Ports, Cascading, Server Profile, Experimental Indications, Proxy Server System Management, Operational Power, Indications.
- ATA Initiator Ports
 - Deprecated this experimental profile (TSG-SMIS-SCR00318).
- Backend Ports
 - Removed this obsolete and deprecated profile (TSG-SMIS-SCR00318).
- Base Server Profile
 - Changed references from DSP1011 version 1.0.1 to DSP1011 version 1.0.2.
 - Made the DMTF Computer System Profile Mandatory, since Base Server specializes the Computer.
- System profile
 - Fixed the reference to the Record Log profile.
 - Fixed the version numbers on the Related Profiles to match what the profiles claim,
 - Added the specialization information.
 - Fixed the Descriptions to the References in CIM_ComputerSystemPackage.
- Cluster Profile
 - Removed this obsolete and deprecated profile (TSG-SMIS-SCR00318).
- Cascading Profile
 - Deleted the text of this profile (was deprecated) and added a reference to the last (non-deprecated) version of this profile, in SMI-S Version 1.4.0 Revision 6.
- DA Target Ports Profile
 - Added the specialization information.
 - Made PortType Mandatory, since it is Mandatory in Generic Target Ports.
- Direct Attach (DA) Ports Profile
 - Promoted to Stable (TSG-SMIS-SCR00318).
- Extra Capacity Set
 - Removed this obsolete and deprecated profile (TSG-SMIS-SCR00318).

- Fan Profile
 - Added the specialization information.
- FC Initiator Ports Profile
 - Promoted to Stable (TSG-SMIS-SCR00318).
 - Added back in the specialization notations.
 - Redefined CIM_FCPortStatistics to be a specialization of CIM_StatisticalData.
- FC Target Ports Profile
 - SMI Referenced Properties/Methods for CIM_FCPort Table, Row for NetworkAddresses (added): text changed to “8 unseparated upper case hex digits”.
 - Added back in the specialization notations, including the fact that the profile specializes the Generic Target Ports Profile.
- FCoE Initiator Ports Profile
 - Added back in the specialization notations.
 - Redefined CIM_FCPortStatistics to be a specialization of CIM_StatisticalData.
- FCoE Target Ports Profile
 - Moved within Part 3 to follow FC Target Ports Profile (CORE-SMIS-SCR-00084).
 - Text tweaked for FCoE, including test and figure referencing ProtocolControllerForPort (CORE-SMIS-SCR-00084).
 - Added back in the specialization notations, including the fact that the profile specializes the Generic Target Ports Profile.
 - Removed the CIM_LogicalPort, since the CIM_FCPort specializes it.
- Generic Initiator Ports
 - Promoted to Stable (TSG-SMIS-SCR00318).
 - Changed CIM_LogicalPortStatistics to CIM_StatisticalData to resolve specialization issues.
- Health Package
 - Promoted sections 25.1.8 (RECE) and 25.1.6 (TSG-SMIS-SCR00318).
- Indication Profile
 - Removed this obsolete and deprecated profile (TSG-SMIS-SCR00318).
- Initiator Ports profile
 - Added back in properties that were dropped.
 - Change the name of the clause to match the name of the profile.
- iSCSI Initiator Port Profile
 - Promoted to Stable (TSG-SMIS-SCR00318).
 - Removed the statement that this profile specializes the Generic Initiator Ports Profile (it does not).

- iSCSI Target Ports Profile (SMIS-161-Errata-SCR00002)
 - Fixed typo: For CIM_ElementCapabilities, USAGE=CIM_iSCSICapabilities to System References.
 - Added the method CreateiSCSIProtocolEndpointUsingCS to CIM_iSCSIConfigurationService as optional.
 - Put in the existing methods of the service as Optional (since we never told anyone they were required).
 - Made CIM_SystemDevice (ComputerSystem to EthernetPort) conditional, since EthernetPort is Optional.
 - Fixed the reference descriptions in CIM_ConcreteDependency.
 - Fixed descriptions on the references in CIM_SAPAvailableForElement.
 - Changed the Central Class from EthernetPort to CIM_iSCSICapabilities (TSG-SMIS-SCR00333).
- Job Control Profile
 - Changed the Central Class from Service (e.g., StorageConfigurationService) to CIM_ConcreteJob (TSGSMIS-SCR00333).
- Location Profile
 - Added the Physical Package Related Profile to the spec.
- Media Access Device Profile
 - A CIM_ElementCapabilities was added to the Profile to link CIM_MediaAccessDevice to CIM_EnabledLogicalElementCapabilities.
 - Added the key property to CIM_EnabledLogicalElementCapabilities.
 - Made the DMTF Indications Profile optional, since both indications in the profile are optional.
- Miscellaneous Security Profiles
 - Removed this obsolete and deprecated profile (TSG-SMIS-SCR00318).
- MultiSystem Profile
 - SMI Referenced Properties/Methods for CIM_RedundancySet table: RedundancyStatus row revised (SMIS-160-Errata-SCR00010).
 - Changed the Central Class from ComputerSystem to CIM_ComputerSystem (Non-Top-Level System).
 - Fixed the profile versions in the Related Profiles table (TSG-SMIS-SCR00333).
- Parallel SCSI (SPI) Target Ports Profile
 - Removed per von Behren SMI-S V1.7r3 comments 2 and 3.
- Physical Package Package
 - Changed the Central Class from PhysicalPackage to CIM_PhysicalPackage (System) (TSG-SMIS-SCR00333).
- Power Supply Profile
 - Promoted to Stable (TSG-SMIS-SCR00318).
 - Added the Failover method to CIM_RedundancySet.

- Profile Introduction
 - Removed the statement that Packages are not advertised in the CIM Server (SMIS-180-Errata-SCR00005).
- Profile Registration
 - Added clarifying statements on the direction of the CIM_ReferencedProfile association (SMIS-180-Errata-SCR00006).
 - Added back in the specialization notations.
 - Added the Scoping class to the SynopsisComments.
- Proxy Server System Management Profile
 - Added a reference to the last version of this profile in SMI-S Version 1.6.1 Revision 5.
- Recipe Overview
 - Removed this obsolete and deprecated profile (TSG-SMIS-SCR00318).
- References
 - Updated some references here and within profiles, removed others (irrelevant).
 - Added DMTF DSP1054 v1.2.2, Indications Profile (and changed version to 1.2.2 throughout book).
 - Removed DSP0004, DSP0200, DSP0202, DSP0207.
- SAS Initiator Ports Profile
 - Promoted to Stable (TSG-SMIS-SCR00318).
 - Added the specialization information.
 - Added a key to CIM_SASPhyStatistics.
 - Fixed the references in both CIM_ElementStatisticalData CIM Elements tables.
- SAS Target Ports Profile
 - Added back in the specialization notations, including the fact that the profile specializes the Generic Target Ports Profile.
- Serial Attached SCSI (SAS) Target Port Profile (LSI/NetApp and HP implementations)
 - Promoted to Stable (TSG-SMIS-SCR00318).
- SATA Target Port Profile
 - Deprecated this experimental profile (TSG-SMIS-SCR00318).
- SB Initiator Ports Profile
 - Added back in the specialization notations, including the fact that this profile specializes the Generic Initiator Ports Profile.
- SB Target Ports Profile
 - Added back in the specialization notations, including the fact that the profile specializes the Generic Target Ports Profile.

- Added back in properties that were dropped.
- Server Profile
 - Copied the 1.6.1 version of the profile into this clause and edited it as follows:
 - Created a Synopsis subclause and deleted the Supported Subprofiles and Packages, and the Registered Name and Version.
 - Deleted the Experimental Indications Profile from the Related Profiles table.
 - Replaced the Indications Supported Profile Group with the DMTF Indications Profile.
 - Deleted the CIM_CIMXMLCommunicationMechanism (in favor of using the CIM_ObjectManagerCommunicationMechanism class).
 - Made CIM_ObjectManagerCommunicationMechanism Mandatory, since it now covers CIM-XML as well as WS-Man.
 - Deleted the deprecated WQL indication.
 - Removed deprecated properties from CIM_Namespace.
 - Changed the Scoping Class from System to ObjectManager (SMIS-180-Errata-SCR00004).
- Software Inventory Profile
 - Fixed the references on CIM_ElementSoftwareIdentity.
 - Added TargetOSTypes to CIM_SoftwareIdentity.
 - Added ResourceType to CIM_SoftwareIdentityResource.
- SPI Initiator Ports Profile
 - Deprecated this experimental profile (TSG-SMIS-SCR00318).
- SPI Target Ports Profile
 - Deprecated this experimental profile (TSG-SMIS-SCR00318).
 - Promoted to Stable (TSG-SMIS-SCR00318).
- Storage Enclosure Profile (TSG-SMIS-SCR00328)
 - Added “Specializes: DMTF Physical Asset Profile” to the Synopsis.
 - Fixed the version numbers on the Related Profiles to match what the profiles claim.
 - Changed references to “Base System” to be “Base Server”.
 - Included the classes inherited from the DMTF Physical Asset Profile.
- Annex A (informative) SMI-S Information Mode
 - Removed statement about SNIA_ classes.
 - This standard is now based on DMTF’s CIM schema Version 2.51.
- Annex B Cross Profile Considerations
 - Added: content moved within Part 3 to Annex B. (CORE-SMIS-SCR-00084).

A list of all parts in the ISO/IEC 24775 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

INTENDED AUDIENCE

This document is intended for use by individuals and companies engaged in developing, deploying, and promoting interoperable multi-vendor SANs through the Storage Networking Industry Association (SNIA) organization.

CHANGES TO THE SPECIFICATION

Each publication of this specification is uniquely identified by a three-level identifier, comprised of a version number, a release number and an update number. The current identifier for this specification is version 1.8.0. Future publications of this specification are subject to specific constraints on the scope of change that is permissible from one publication to the next and the degree of interoperability and backward compatibility that should be assumed between products designed to different publications of this standard. The SNIA has defined three levels of change to a specification:

- **Major Revision:** A major revision of the specification represents a substantial change to the underlying scope or architecture of the SMI-S API. A major revision results in an increase in the version number of the version identifier (e.g., from version 1.x.x to version 2.x.x). There is no assurance of interoperability or backward compatibility between releases with different version numbers.
- **Minor Revision:** A minor revision of the specification represents a technical change to existing content or an adjustment to the scope of the SMI-S API. A minor revision results in an increase in the release number of the specification's identifier (e.g., from x.1.x to x.2.x). Minor revisions with the same version number preserve interoperability and backward compatibility.
- **Update:** An update to the specification is limited to minor corrections or clarifications of existing specification content. An update will result in an increase in the third component of the release identifier (e.g., from x.x.1 to x.x.2). Updates with the same version and minor release levels preserve interoperability and backward compatibility.

TYPOGRAPHICAL CONVENTIONS

Maturity Level

In addition to informative and normative content, this specification includes guidance about the maturity of emerging material that has completed a rigorous design review but has limited implementation in commercial products. This material is clearly delineated as described in the following sections. The typographical convention is intended to provide a sense of the maturity of the affected material, without altering its normative content. By recognizing the relative maturity of different sections of the standard, an implementer should be able to make more informed decisions about the adoption and deployment of different portions of the standard in a commercial product.

This specification has been structured to convey both the formal requirements and assumptions of the SMI-S API and its emerging implementation and deployment lifecycle. Over time, the intent is that all content in the specification will represent a mature and stable design, be verified by extensive implementation experience, assure consistent support for backward compatibility, and rely solely on content material that has reached a similar level of maturity. Unless explicitly labeled with one of the subordinate maturity levels defined for this specification, content is assumed to satisfy these requirements and is referred to as "Finalized". Since much of the evolving specification

content in any given release will not have matured to that level, this specification defines three subordinate levels of implementation maturity that identify important aspects of the content's increasing maturity and stability. Each subordinate maturity level is defined by its level of implementation experience, its stability and its reliance on other emerging standards. Each subordinate maturity level is identified by a unique typographical tagging convention that clearly distinguishes content at one maturity model from content at another level.

Experimental Maturity Level

No material is included in this document unless its initial architecture has been completed and reviewed. Some content included in this document has complete and reviewed design, but lacks implementation experience and the maturity gained through implementation experience. This content is included in order to gain wider review and to gain implementation experience. This material is referred to as “Experimental”. It is presented here as an aid to implementers who are interested in likely future developments within the SMI specification. The contents of an Experimental profile may change as implementation experience is gained. There is a high likelihood that the changed content will be included in an upcoming revision of the specification. Experimental material can advance to a higher maturity level as soon as implementations are available. Figure 1 is a sample of the typographical convention for Experimental content.

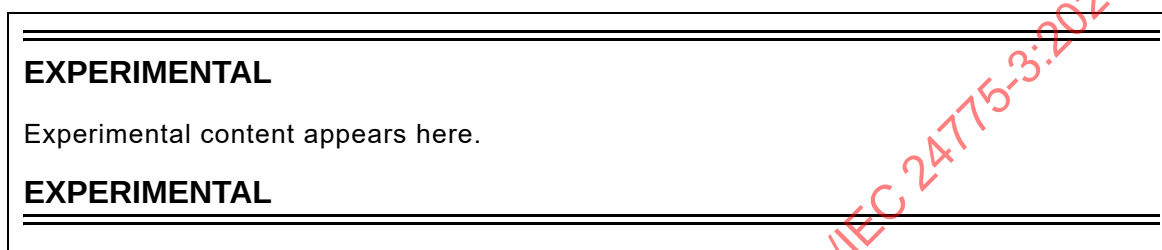


Figure 1 - Experimental Maturity Level Tag

Implemented Maturity Level

Profiles for which initial implementations have been completed are classified as “Implemented”. This indicates that at least two different vendors have implemented the profile, including at least one provider implementation. At this maturity level, the underlying architecture and modeling are stable, and changes in future revisions will be limited to the correction of deficiencies identified through additional implementation experience. Should the material become obsolete in the future, it must be deprecated in a minor revision of the specification prior to its removal from subsequent releases. Figure 2 is a sample of the typographical convention for Implemented content.

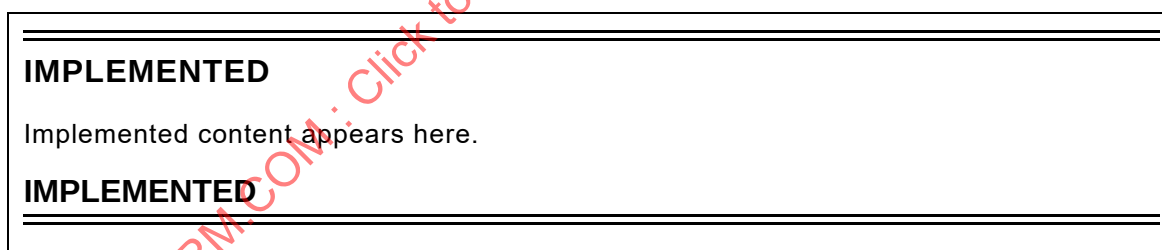


Figure 2 - Implemented Maturity Level Tag

Stable Maturity Level

Once content at the Implemented maturity level has garnered additional implementation experience, it can be tagged at the Stable maturity level. Material at this maturity level has been implemented by three different vendors, including both a provider and a client. Should material that has reached this maturity level become obsolete, it may only be deprecated as part of a minor revision to the specification. Material at this maturity level that has been deprecated may only be removed from the specification as part of a major revision. A profile that has reached this maturity level is guaranteed to preserve backward compatibility from one minor specification revision to the next. As a result, Profiles at or above the Stable

maturity level shall not rely on any content that is Experimental. Figure 3 is a sample of the typographical convention for Implemented content.

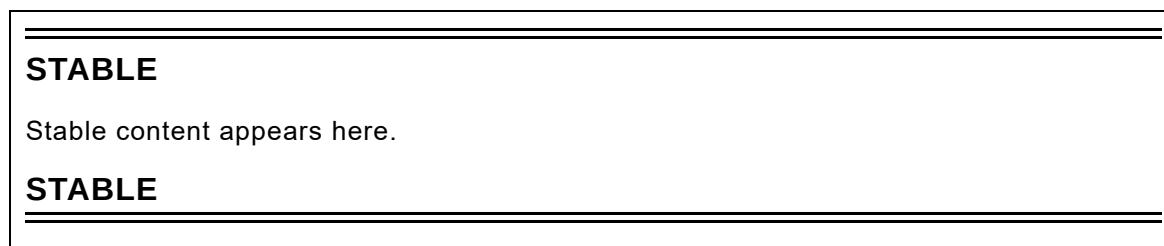


Figure 3 - Stable Maturity Level Tag

Finalized Maturity Level

Content that has reached the highest maturity level is referred to as “Finalized.” In addition to satisfying the requirements for the Stable maturity level, content at the Finalized maturity level must solely depend upon or refine material that has also reached the Finalized level. If specification content depends upon material that is not under the control of the SNIA, and therefore not subject to its maturity level definitions, then the external content is evaluated by the SNIA to assure that it has achieved a comparable level of completion, stability, and implementation experience. Should material that has reached this maturity level become obsolete, it may only be deprecated as part of a major revision to the specification. A profile that has reached this maturity level is guaranteed to preserve backward compatibility from one minor specification revision to the next. Over time, it is hoped that all specification content will attain this maturity level. Accordingly, there is no special typographical convention, as there is with the other, subordinate maturity levels. Unless content in the specification is marked with one of the typographical conventions defined for the subordinate maturity levels, it should be assumed to have reached the Finalized maturity level.

Deprecated Material

Non-Experimental material can be deprecated in a subsequent revision of the specification. Sections identified as “Deprecated” contain material that is obsolete and not recommended for use in new development efforts. Existing and new implementations may still use this material, but shall move to the newer approach as soon as possible. The maturity level of the material being deprecated determines how long it will continue to appear in the specification. Implemented content shall be retained at least until the next revision of the specialization, while Stable and Finalized material shall be retained until the next major revision of the specification. Providers shall implement the deprecated elements as long as it appears in the specification in order to achieve backward compatibility. Clients may rely on deprecated elements, but are encouraged to use non-deprecated alternatives when possible.

Deprecated sections are documented with a reference to the last published version to include the deprecated section as normative material and to the section in the current specification with the replacement. Figure 4 contains a sample of the typographical convention for deprecated content.



Figure 4 - Deprecated Tag

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FOREWORD

The Storage Management Technical Specification is published in several parts. *Storage Management Technical Specification, Part 3 Common Profiles, 1.8.0 Rev 4* defines profiles that are used by profiles in other parts of this standard. In general, the common profiles do not fully define storage elements, but define non-storage management aspects that are common to storage domains. For example, the Access Points Profile defines a technique that the arrays, switches, or libraries may use to inform clients of non-CIM network interfaces that are available.

Some of the common profiles are based on DMTF profiles. For these profiles, the DMTF profile may be “specialized” to assure SNIA requirements are met.

Parts of this Standard

This standard is subdivided in the following parts:

- *Storage Management Technical Specification, Part 1 Overview, 1.8.0 Rev 4*
- *Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4*
- *Storage Management Technical Specification, Part 3 Common Profiles, 1.8.0 Rev 4*
- *Storage Management Technical Specification, Part 4 Block Devices, 1.8.0 Rev 4*
- *Storage Management Technical Specification, Part 5 Filesystems, 1.8.0 Rev 4*
- *Storage Management Technical Specification, Part 6 Fabric, 1.8.0 Rev 4*
- *Storage Management Technical Specification, Part 7 Host Elements, 1.8.0 Rev 4*
- *Storage Management Technical Specification, Part 8 Media Libraries, 1.8.0 Rev 4*

SNIA Web Site

Current SNIA practice is to make updates and other information available through their web site at <http://www.snia.org>

SNIA Address

Requests for interpretation, suggestions for improvement and addenda, or defect reports are welcome. They should be sent via the SNIA Feedback Portal at <http://www.snia.org/feedback/> or by mail to the Storage Networking Industry Association, 4360 ArrowsWest Drive, Colorado Springs, Colorado 80907, U.S.A.

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1 Scope

Storage Management Technical Specification, Part 3 Common Profiles, 1.8.0 Rev 4 defines profiles that are supported by profiles defined in the other parts of this standard. The first few clauses provide background material that helps explain the purpose and profiles. Common port profiles are grouped together since they serve as transport-specific variations of a common model. The port profiles are followed by other common profiles.

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2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

2.1 Approved References

ISO/IEC 14776-413, SCSI Architecture Model - 3 (SAM-3) [ANSI INCITS 402-200x]

ISO/IEC 14776-452, SCSI Primary Commands - 3 (SPC-3) [ANSI INCITS.351-2005]

ANSI/INCITS 374:2003, Information technology - Fibre Channel Single - Byte Command Set-3 (FC-SB-3)

2.2 DMTF References (Final)

DMTF Final documents are accepted as standards.

DMTF DSP1001 Management Profile Specification Usage Guide 1.2.0

http://www.dmtf.org/sites/default/files/standards/documents/DSP1001_1.2.0.pdf

DMTF DSP1004 Base Server Profile 1.0.1

http://www.dmtf.org/sites/default/files/standards/documents/DSP1004_1.0.1.pdf

DMTF DSP1009 Sensors Profile, 1.1.1

http://www.dmtf.org/sites/default/files/standards/documents/DSP1009_1.1.1.pdf

DMTF DSP1011 Physical Asset Profile 1.0.2

http://www.dmtf.org/standards/published_documents/DSP1011_1.0.2.pdf

DMTF DSP1013, Fan Profile 1.0.1

http://www.dmtf.org/standards/published_documents/DSP1013_1.0.1.pdf

DMTF DSP1015 Power Supply Profile 1.1.0

http://www.dmtf.org/standards/published_documents/DSP1015_1.1.0.pdf

DMTF DSP1025 Software Update Profile 1.0.0

http://www.dmtf.org/standards/published_documents/DSP1025_1.0.0.pdf

DMTF DSP1033 Profile Registration Profile 1.1.0

http://www.dmtf.org/sites/default/files/standards/documents/DSP1033_1.1.0.pdf

DMTF DPS1052 Computer System Profile 1.0.3

http://www.dmtf.org/sites/default/files/standards/documents/DSP1052_1.0.3.pdf

DMTF DSP1054 Indications Profile 1.2.2

http://www.dmtf.org/sites/default/files/standards/documents/DSP1054_1.2.2.pdf

DMTF DSP1092:2013, WBEM Server Profile 1.0

http://www.dmtf.org/standards/published_documents/DSP1092_1.0.pdf

DMTF DSP1102 Launch in Context Profile 1.0.0

www.dmtf.org/sites/default/files/standards/documents/DSP1102_1.0.0_0.pdf

DMTF DSP1103 Job Control Profile v1.0.0

http://www.dmtf.org/sites/default/files/standards/documents/DSP1103_1.0.0_0.pdf

2.3 References under development

DMTF DSP1119, Diagnostics Job Control Profile v1.0.0b

http://www.dmtf.org/sites/default/files/standards/documents/DSP1119_1.0.0b.pdf

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3 Terms and Definitions

3.1 General

For the purposes of this document, the definitions, symbols, abbreviations, and conventions given in *Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4* and the following apply.

3.2 Terms

3.2.1

FC-SB-X

Fibre Channel Single-Byte command set used in FICON™¹ devices

3.2.2

SAS

Serial Attached SCSI

3.2.3

SATA

Serial ATA

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1.FICON™ is an example of a suitable product available commercially. This information is given for the convenience of users of this standard and does not constitute an endorsement of this product by SNIA or any standards organization.

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4 Profile Introduction

4.1 Profile Overview

A profile is a specification that defines the CIM model and associated behavior for an autonomous and self-contained management domain. The CIM model includes the CIM Classes, Associations, Indications, Methods and Properties. The management domain is a set of related management tasks. A profile is uniquely identified by the name, organization and version.

In SMI-S, a profile describes the management interfaces for a class of storage subsystem, typically realized as a hardware or software product. For example, SMI-S includes profiles for arrays, FC-Switches, and logical volume manager software. The boundaries chosen for SMI-S profiles are often those of storage products, but some vendors may package things differently. For example, one vendor may choose to package an Array and an FC Switch into a single product; this can be handled in SMI-S by implementing the Array and FC Switch Profiles for this product.

A profile may add restrictions to usage and behavior, but cannot change CIM defined characteristics. For example, if a property is required in the CIM model, then it is required in a profile. On the other hand, a profile may specify that a property is required even if it is not required by the general CIM model.

In SMI-S, profiles serve several purposes:

- Specification organization - the SMI-S object model (see *Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4 6 Object Model General Information*) is presented as a set of profiles, each describing a type of storage element or behavior,
- Certification - SMI-S profiles form the basis for CTP certification,
- Discovery- profiles are registered with the CIM Server and advertised to clients as part of the CIM model and using SLP (see *Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4 9 Service Discovery*). An SMI-S client uses SLP to determine which CIM Servers host profiles it wishes to manage, then uses the CIM model to discover the actual configurations and capabilities.

A component profile is a profile that specifies a subset of a management domain. A component profile's CIM elements are scoped within a containing profile. Multiple profiles may use the same component profile. A component profile is uniquely identified by the name, organization and version.

A profile specification may include a list of the component profiles it uses. The included component profiles may be optional or mandatory by the scoping profile. The behavior of a profile is specified in this profile and its included component profiles.

For example, target devices such as RAID arrays and tape libraries may support Fibre Channel or parallel SCSI connectivity. SMI-S includes an FC Target Port Profile and a Parallel SCSI Target Port Profile that may optionally be supported by profiles representing target devices. The elements defined in the port component profiles are scoped to the ComputerSystem in the profile. For example, each LogicalPort subclass has a SystemDevice association to the profile's ComputerSystem.

In addition to sharing the purposes of profiles (as described in this section), component profiles have these purposes:

- Optional behavior - a profile may allow, but not require, an implementation to support a component profile. Although a component profile does not describe a full product, a component profile should describe an aspect of a product that is recognizable to an knowledgeable end-user such as a storage administrator,
- Reuse of functionality - some storage management behavior is common across different types of storage elements. For example, block virtualization is managed similarly in RAID arrays and logical volume managers. These common sets of functionality are specified as profiles that are shared by several other profiles.

- Decomposition - certain functionality may not be reused multiple places, but is complicated enough to document as a separate profile. For example, Disk Partition management is only used in the Host Discovered Resources profiles, but is complicated enough that it has been documented as a separate profile.

4.2 Terminology

A profile collects included component profiles and provides the filler needed to define the management interfaces of a particular type of subsystem. Profiles are separated into two groups. *Storage profiles* define the management interfaces for storage subsystems such as arrays or FC switches. *Generic profiles* define management interfaces for generic systems that are related to storage management. Storage and generic profiles are specified the same way in SMI-S, but generic profiles are not certified as free-standing entities, only as a dependency of a storage profile.

A *Package* is a profile that whose implementation is mandatory to comply with the requirements of all of its containing top-level profiles.

Profiles may be related by *specialization* - where several profiles (or component profiles) share many common elements, but are specialized for specific implementations. The SMI-S Security profiles are an example; the specializations (Authorization Profile, Security Resource Ownership Profile,...) share some classes and behavior. Profile specialization is only an artifact of the specification. It saves the reader from reading common aspects in multiple places and help the specification stay consistent across the specialized profiles. There is no information in the CIM model about the relationship between generic and specialized profiles.

4.3 Format for Profile Specifications

For each profile there is a set of information that is provided to specify the characteristics and requirements of the profile. Component profiles are also defined using this format, but they are clearly identified as component profiles.

Each profile or component profile is defined in subsections that are described in Table 1.

NOTE CIM schema diagrams are logically part of a profile description. However, they can be rather involved and cannot be easily depicted in a single diagram. As a result, the reader is advised to refer to DMTF characterizations of CIM schema diagrams.

Table 1 - Profile Components (Sheet 1 of 2)

Profile Element	Goal
Description	This section provides a description of the profile and model including an overview of the objectives and functionality. <i>Synopsis</i> describes the name, version, scoping and central classes, as well as lists the related profiles. <i>Functionality</i> is described in a bullet-form in this section that includes functionality provided by the component profiles referenced by the profile. If a function is provided by a component profile, this is indicated, including whether the component profile is optional or required. Functionality listed in the profile is organized by Levels, and within each Level by FCAPS category, as defined in the SMI-S functionality matrix section <link>. <i>Instance Diagrams</i>: One or more instance diagrams to highlight common implementations that employ this section of the Object Model. Instance diagrams also contain classes and associations but represent a particular configuration; multiple instances of an object may be depicted in an instance diagram. Finally, this section may include supporting text for properties, and methods as needed.
Health & Fault Management Considerations	If a profile provides optional Health & Fault Management capabilities, then this section describes the specifics of these capabilities, including: • A table of the classes that report health information. • Tables of possible states of the OperationalStatus and HealthState attributes and descriptions for those elements that report state. • Cause and Effect associations. • Standard Errors produced (including Alert Indications, Errors, CIM Errors, and Health Related Live Cycle Events).
Cascading Considerations	A Profile may be a cascading profile. A cascading profile is any Profile that supports the Cascading Profile as either a mandatory or recommended component profile. If the profile is a cascading profile, this section documents cascading considerations in each of the following areas: • Cascaded Resources – Defines the type of resources in the Cascading Profile that are associated to what type of resources in the Leaf Profile and the association. • Ownership Privileges – Identifies the Resource Control Privileges (on leaf resources) that are established by the Cascading Profile. • Limitations on Cascading Profile – Identifies any limitations on the Cascading Profile that are imposed by the Cascading in effect
Methods of the Profile	This section documents the methods used in this profile.
Use Cases	This section documents steps required to accomplish particular tasks. No recipes are included in this version of the standard. The actual capabilities properties are documented in "Classes Used in the Profile" in this table.

Table 1 - Profile Components (Sheet 2 of 2)

Profile Element	Goal
CIM Elements	A table listing the classes, associations, and indication filters that this profile supports, and a brief description of each. Everything listed in this section is mandatory for the profile. This section shall not list optional elements. Prior to SMI-S 1.1.0, CIM did not have standard language for indication filters; SMI-S 1.0.x used the proposed WQL query language. This version of SMI-S uses the CQL standard query language.
Classes Used in the Profile	This section provides one table per class and lists each required and recommended property. For each required or recommended property a brief description on what information is to be encoded is identified. The class tables include a "Flags" column. This can contain "C" (the property is a correlatable name or a format for a name), "D" (the property is a durable name), "M" (the property is modifiable), or "N" (null is a valid value).

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EXPERIMENTAL

5 Generic Target Ports Profile

5.1 Synopsis

Profile Name: Generic Target Ports (Component Profile)

Version: 1.4.0

Organization: SNIA

Central Class: CIM_LogicalPort

Scoping Class: a CIM_System in a separate autonomous profile

Related Profiles: Not defined in this document.

The Generic Target Port Profile models the generic behavior of target ports in storage systems such as disk arrays and tape libraries.

This abstract profile specification shall not be directly implemented; implementations shall be based on a profile specification that specializes the requirements of this profile.

5.2 Description

The Generic Target Port Profile models the generic behavior of target ports in storage systems such as disk arrays and tape libraries. Separate profiles specialize the Generic Target Port Profile for Fibre Channel, iSCSI, and other transports. The primary classes of the Generic Target Port Profile are LogicalPort and ProtocolEndpoint, as shown in Figure 7. Instances of subclasses of a LogicalPort (e.g., FCPort, EthernetPort) represent the logical aspects of ports, independent from command protocols (such as SCSI). Instances of subclasses of ProtocolEndpoint (e.g., SCSIProtocolEndpoint or ATA ProtocolEndpoint) represent command protocols in use on the port.

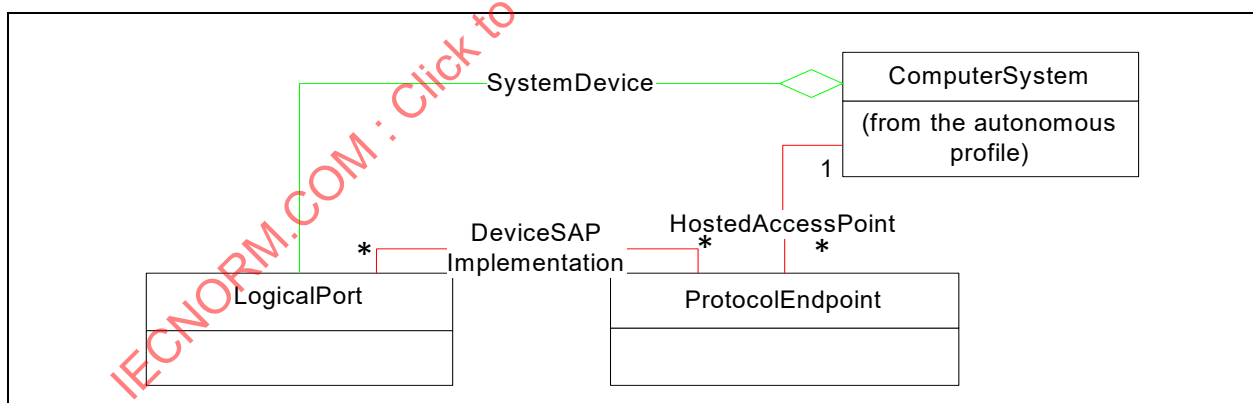


Figure 7 - Generic Target Port Classes

5.3 Implementation

5.3.1 Overview

Subclasses of ProtocolEndpoint represent command protocols supported by the port. SCSIProtocolEndpoint represents SCSI as a protocol, independent of specific transports or device types – i.e., the behavior described in the SCSI Primary Commands (SPC) and SCSI Architecture Model (SAM) specifications from T10. SCSIProtocolEndpoint.Role indicates whether this protocol endpoint instance

represents a SCSI Target or target. For target port profiles, Role shall be Target” or “Both Initiator and Target”. iSCSIProtocolEndpoint specializes SCSIProtocolEndpoint with additional iSCSI-specific properties.

ATAProtocolEndpoint represents the ATA command protocol. SBPProtocolEndpoint represents Single Byte protocol used with mainframes. ProtocolEndpoint is associated to a System instance with Hosted Access Point.

LogicalPort subclasses specify the type of transport. If the port is subclassed directly from LogicalPort it indicates it is connected to a bus. If the port is further subclassed from NetworkPort it indicates the port is capable of being used in a network. Specializations of this profile shall specify the appropriate subclass of LogicalPort. Figure 8 shows the subclasses of LogicalPort.

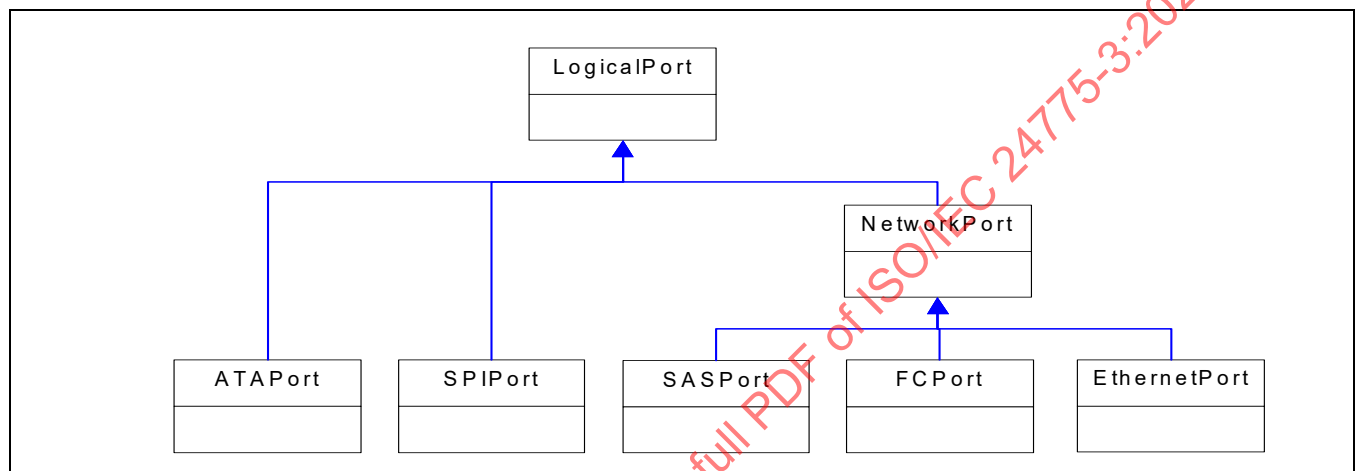


Figure 8 - LogicalPort Class Hierarchy

A property on LogicalPort called UsageRestriction indicates whether the port is restricted to use as a “front end” (target) or a “back end” (Target) interface or both. Note that port may not have a restriction and the actual point-in-time role is modeled in SCISProtocolEndpoint.Role. SystemDevice associates LogicalPort to a System.

ProtocolEndpoint and LogicalPort are associated with DeviceSAPImplementation. For most transports, the command protocol is implemented in the port hardware and there is 1-1 cardinality between the LogicalPort and ProtocolEndpoint instances. iSCSI is an exception, many-to-many relationships are possible between EthernetPort and iSCSIProtocolEndpoint instances.

ProtocolController (in the Mapping and Masking Profile) represents the SCSI (or SB) ‘view’ of ports and logical devices seen by target systems (e.g., arrays). In a system supporting Mapping and Masking, zero or more views exist; defined by the customer to expose subsets of logical units to certain Targets. SAPAvailableForElement connects ProtocolEndpoint from a target ports profile to SCSIProtocolController instances from the Mapping/Masking Profile. iSCSI and SB have protocol-specific, secondary uses of ProtocolController.

Figure 9 depicts a generic storage device with elements from a target ports profile, the Mapping/Masking Profile, and a target device profile. The LogicalDevice object represents logical units that are visible to

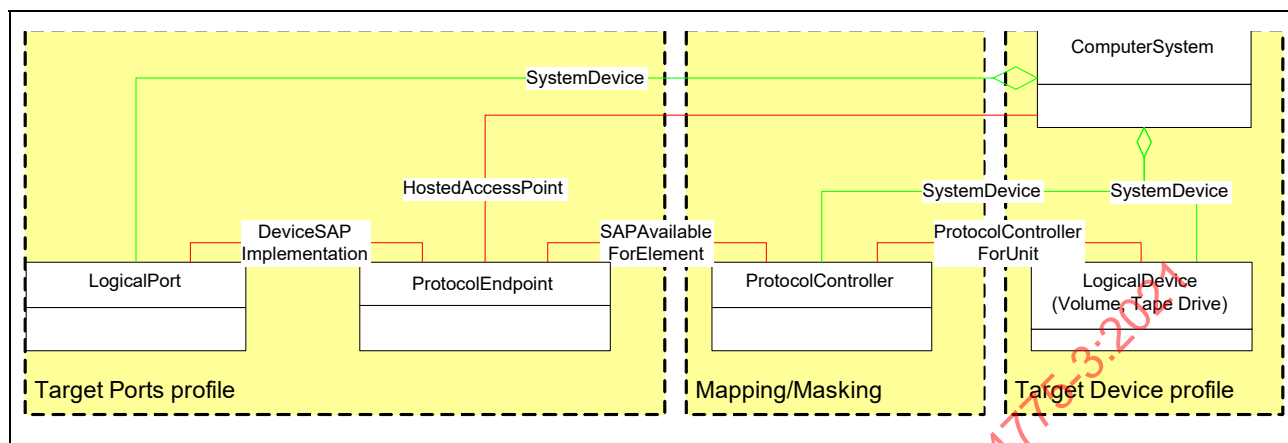


Figure 9 - Generic Target with LUN Masking

external systems. It is subclassed to StorageVolume, TapeDrive, etc. to identify the device type.

5.3.2 Modeling SCSI/SB Logical Units

The SCSI standard inquiry response includes a Device Type property with integers representing types of devices. Most of these devices types have a CIM analog. Devices that are used primarily for management are modeled as SCSIArbitraryLogicalUnit. SCSIArbitraryLogicalUnit.DeviceType maps to SCSI device types. Table 2 describes how common storage devices are modeled in CIM.

Table 2 - Modeling of Common Storage Devices in CIM

SCSI Device Type	Inquiry Device Type	LogicalDevice subclass
DirectAccessDevice	0	DiskDrive or StorageVolume
SequentialAccessDevice	1	TapeDrive
WriteOnceDevice	4	WormDrive
CD-ROM	5	CDROMDrive
MediaChanger	8	MediaTransferDevice
ArrayController	0xc	SCSIArbitraryLogicalUnit DeviceType="SCSI SCC Device"
SES	0xd	SCSIArbitraryLogicalUnit DeviceType="SCSI SES"
Other		SCSIArbitraryLogicalUnit DeviceType="Other"
Unknown		SCSIArbitraryLogicalUnit DeviceType="Unknown"
DirectAccessDevice	0	DiskDrive or StorageVolume

All devices (logical units) visible to external systems shall be modeled.

5.4 Methods of the Profile

5.4.1 Extrinsic Methods

Not defined in this document.

5.4.2 Intrinsic Methods

The profile supports read methods and association traversal. Specifically, the list of intrinsic operations supported are as follows:

- GetInstance
- Associators
- AssociatorNames
- References
- ReferenceNames
- EnumerateInstances
- EnumerateInstanceNames

5.5 Use Cases

Not defined in this document.

5.6 CIM Elements

5.6.1 Overview

Table 3 describes the CIM elements for Generic Target Ports.

Table 3 - CIM Elements for Generic Target Ports

Element Name	Requirement	Description
5.6.2 CIM_DeviceSAPImplementation	Mandatory	Associates front-end LogicalPort and target ProtocolEndpoint.
5.6.3 CIM_HostedAccessPoint	Mandatory	Associates ComputerSystem to ProtocolEndpoint.
5.6.4 CIM_LogicalPort	Mandatory	Represents the logical aspects of the physical port and may have multiple associated protocols.
5.6.5 CIM_ProtocolEndpoint	Mandatory	ProtocolEndpoint representing support for SCSI, ATA, or SB command set.
5.6.6 CIM_SystemDevice (Port)	Mandatory	Associates ComputerSystem to LogicalPort.

5.6.2 CIM_DeviceSAPImplementation

Associates front-end LogicalPort and target ProtocolEndpoint.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 4 describes class CIM_DeviceSAPImplementation.

Table 4 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	Reference to SCSI, ATA, or SB ProtocolEndpoint.
Antecedent		Mandatory	Reference to Port.

5.6.3 CIM_HostedAccessPoint

Associates ComputerSystem to ProtocolEndpoint. Limit to targets.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 5 describes class CIM_HostedAccessPoint.

Table 5 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in the referencing profile.
Dependent		Mandatory	Reference to SCSIProtocolEndpoint, ATAProtocolEndpoint or SBProtocolEndpoint.

5.6.4 CIM_LogicalPort

Represents the logical aspects of the physical port and may have multiple associated protocols.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 6 describes class CIM_LogicalPort.

Table 6 - SMI Referenced Properties/Methods for CIM_LogicalPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
OperationalStatus		Mandatory	
UsageRestriction		Mandatory	Shall be 2 for ports restricted to Front-end only or 4 if the port is unrestricted.
PortType		Mandatory	VALUE and DESC should be set appropriately for each specialized target port profile.

5.6.5 CIM_ProtocolEndpoint

ProtocolEndpoint representing support for SCSI, ATA, or SB command set. Shall be subclassed in specialized profiles.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 7 describes class CIM_ProtocolEndpoint.

Table 7 - SMI Referenced Properties/Methods for CIM_ProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
ProtocolIFType		Mandatory	Shall be 1 (Other).
OtherTypeDescription		Mandatory	Shall be the string 'SCSI', 'ATA', or 'SB'.

5.6.6 CIM_SystemDevice (Port)

Associates ComputerSystem to LogicalPort.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 8 describes class CIM_SystemDevice (Port).

Table 8 - SMI Referenced Properties/Methods for CIM_SystemDevice (Port)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem in the referencing profile.
PartComponent		Mandatory	Reference to Port.

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STABLE**6 FC Target Ports Profile****6.1 Synopsis****Profile Name:** FC Target Ports (Component Profile)**Version:** 1.7.0**Organization:** SNIA**Central Class:** CIM_FCPort**Scoping Class:** a CIM_ComputerSystem in a referencing autonomous profile**Specializes:** SNIA Generic Target Ports version 1.4.0**Related Profiles:** Table 9 describes the related profiles for FC Target Ports.**Table 9 - Related Profiles for FC Target Ports**

Profile Name	Organization	Version	Requirement	Description
Indications	DMTF	1.2.2	Mandatory	See DSP1054, version 1.2.2

6.2 Description

The FC Target Port Profile models the Fibre Channel specific aspects of a target storage system.

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6.3 Implementation

For Fibre Channel ports, the concrete subclass of LogicalPort is FCPort. FCPort is always associated 1-1 with a SCSIProtocolEndpoint instance, as shown in Figure 10.

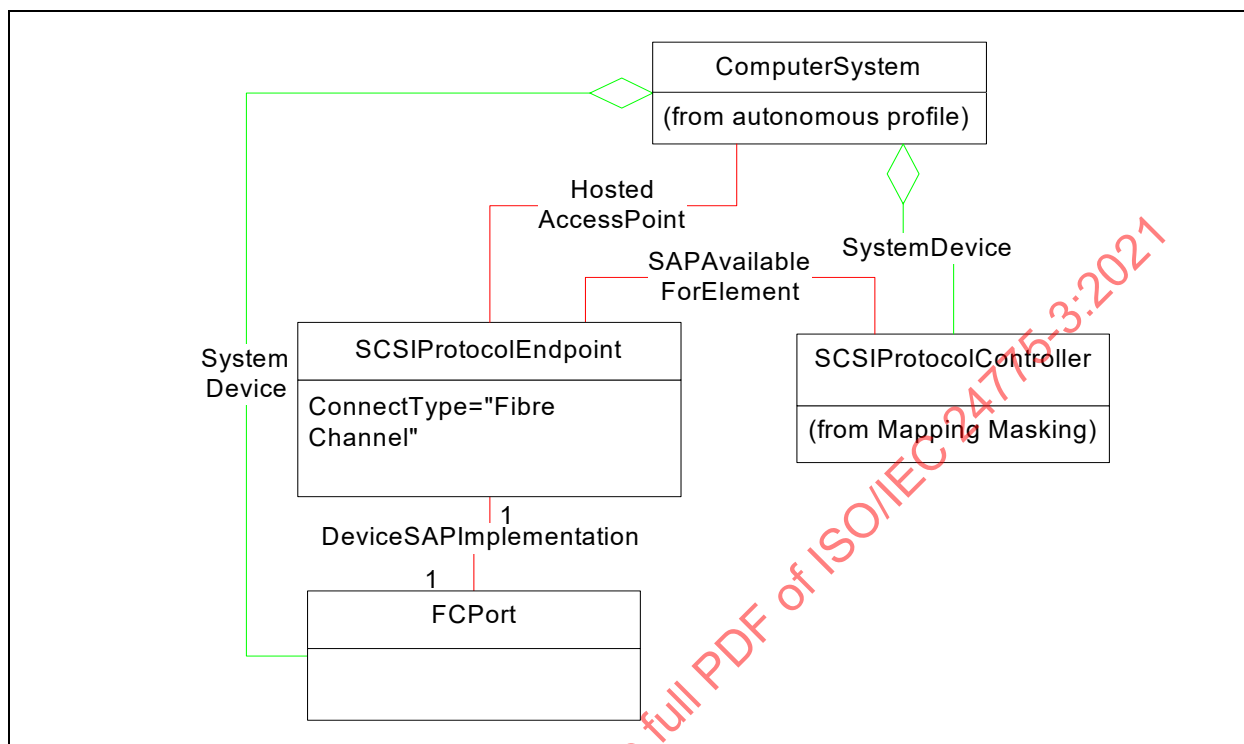


Figure 10 - FC Target Port Instance Diagram

6.4 Durable Names and Correlatable IDs of the Profile

FCPort.PermanantAddress shall contain the port's Port WWN.

6.5 Health and Fault Management

Table 10 describes FCPort OperationalStatus.

Table 10 - FCPort OperationalStatus

OperationalStatus	Description
OK	Port is online
Error	Port has a failure
Stopped	Port is disabled
InService	Port is in Self Test
Unknown	

6.6 Supported Profiles and Packages

Not defined in this document.

6.7 Extrinsic Methods of this Profile

Not defined in this document.

6.8 Client Considerations and Recipes

No recipes are defined in this version of the standard.

6.9 CIM Elements

6.9.1 Overview

Table 11 describes the CIM elements for FC Target Ports.

Table 11 - CIM Elements for FC Target Ports

Element Name	Requirement	Description
6.9.2 CIM_DeviceSAPImplementation	Mandatory	Associates FCPort and SCSIProtocolEndpoint.
6.9.3 CIM_FCPort	Mandatory	Represents the logical aspects of the physical port and may have multiple associated protocols.
6.9.4 CIM_HostedAccessPoint	Mandatory	Associates ComputerSystem to SCSIProtocolEndpoint.
6.9.5 CIM_SCSIProtocolEndpoint	Mandatory	Represents management characteristics related to the SCSI command set.
6.9.6 CIM_SystemDevice (Port)	Mandatory	Associates controller ComputerSystem to FCPort.
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_FCPort	Mandatory	Create FCPort.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_FCPort AND SourceInstance.CIM_FCPort::OperationalStatus <> PreviousInstance.CIM_FCPort::OperationalStatus	Mandatory	CQL -Change to FCPort OperationalStatus.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_FCPort AND SourceInstance.CIM_FCPort::Speed <> PreviousInstance.CIM_FCPort::Speed	Optional	CQL -Change to FCPort Speed.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_FCPort AND SourceInstance.CIM_FCPort::NetworkAddresses <> PreviousInstance.CIM_FCPort::NetworkAddresses	Optional	CQL -Change to FCPort NetworkAddresses.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_FCPort	Mandatory	Delete FCPort.

6.9.2 CIM_DeviceSAPImplementation

Associates FCPort and SCSIProtocolEndpoint. The class definition specializes the CIM_DeviceSAPImplementation definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 12 describes class CIM_DeviceSAPImplementation.

Table 12 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation

Properties	Flags	Requirement	Description & Notes
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint.
Antecedent (overridden)		Mandatory	Reference to FCPort.

6.9.3 CIM_FCPort

Represents the logical aspects of the physical port and may have multiple associated protocols. The class definition specializes the CIM_LogicalPort definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 13 describes class CIM_FCPort.

Table 13 - SMI Referenced Properties/Methods for CIM_FCPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
OperationalStatus		Mandatory	
UsageRestriction		Mandatory	Shall be 2 for ports restricted to Front-end only or 4 if the port is unrestricted.
PortType (overridden)		Mandatory	Shall be 0 1 10 11 12 13 14 15 16 17 18 (Unknown or Other or N or NL or F/NL or Nx or E or F or FL or B or G).
OtherPortType		Conditional	Required when PortType is Other
PermanentAddress (added)	CD	Mandatory	Port WWN. Shall be 16 unseparated uppercase hex digits.
Speed (added)		Optional	Speed in bits per second. Shall be 0, 1062500000 (1GFC), 2125000000 (2GFC), 4250000000 (4GFC), 8500000000 (8GFC), 10518750000 (10GFC), 14025000000 (16GFC), 21037500000 (20GFC) or 28500000000 (32GFC).
MaxSpeed (added)		Optional	Maximum Port Speed.
NetworkAddresses (added)		Optional	For Fibre Channel end device ports, the Fibre Channel ID. Shall be 8 unseparated upper case hex digits.

6.9.4 CIM_HostedAccessPoint

Associates ComputerSystem to SCSIProtocolEndpoint. Limit to targets. The class definition specializes the CIM_HostedAccessPoint definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Mandatory

Table 14 describes class CIM_HostedAccessPoint.

Table 14 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint

Properties	Flags	Requirement	Description & Notes
Antecedent (overridden)		Mandatory	
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint.

6.9.5 CIM_SCSIProtocolEndpoint

Represents management characteristics related to the SCSI command set. The class definition specializes the CIM_ProtocolEndpoint definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Mandatory

Table 15 describes class CIM_SCSIProtocolEndpoint.

Table 15 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
ProtocolIFType		Mandatory	Shall be 1 (Other).
OtherTypeDescription (overridden)		Mandatory	Shall be the string 'SCSI'.
ConnectionType (added)		Mandatory	Shall be 2 (Fibre Channel).
Role (added)		Mandatory	Shall be 3 (Target) or 4 (Both Initiator and Target).

6.9.6 CIM_SystemDevice (Port)

Associates controller ComputerSystem to FCPort. The class definition specializes the CIM_SystemDevice definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static
 Modified By: Static
 Deleted By: Static

Requirement: Mandatory

Table 16 describes class CIM_SystemDevice (Port).

Table 16 - SMI Referenced Properties/Methods for CIM_SystemDevice (Port)

Properties	Flags	Requirement	Description & Notes
GroupComponent (overridden)		Mandatory	Reference to ComputerSystem in the referencing profile.
PartComponent (overridden)		Mandatory	Reference to FCPort.

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7 FCoE Target Ports Profile

7.1 Synopsis

Profile Name: FCoE Target Ports (Component Profile)

Version: 1.7.0

Organization: SNIA

Central Class: FCPort

Scoping Class: a ComputerSystem in a referencing autonomous profile

Specializes: SNIA Generic Target Ports version 1.4.0

Related Profiles: Table 17 describes the related profiles for FCoE Target Ports.

Table 17 - Related Profiles for FCoE Target Ports

Profile Name	Organization	Version	Requirement	Description
Indications	DMTF	1.2.2	Mandatory	See DSP1054, version 1.2.2

7.2 Description

The FCoE Target Ports Profile is a component profile that models the behavior of the Fibre Channel over Ethernet (FCoE) functionality.

Figure 11 shows the topology of FCoE where the Fibre Channel protocol is carried over the Ethernet.

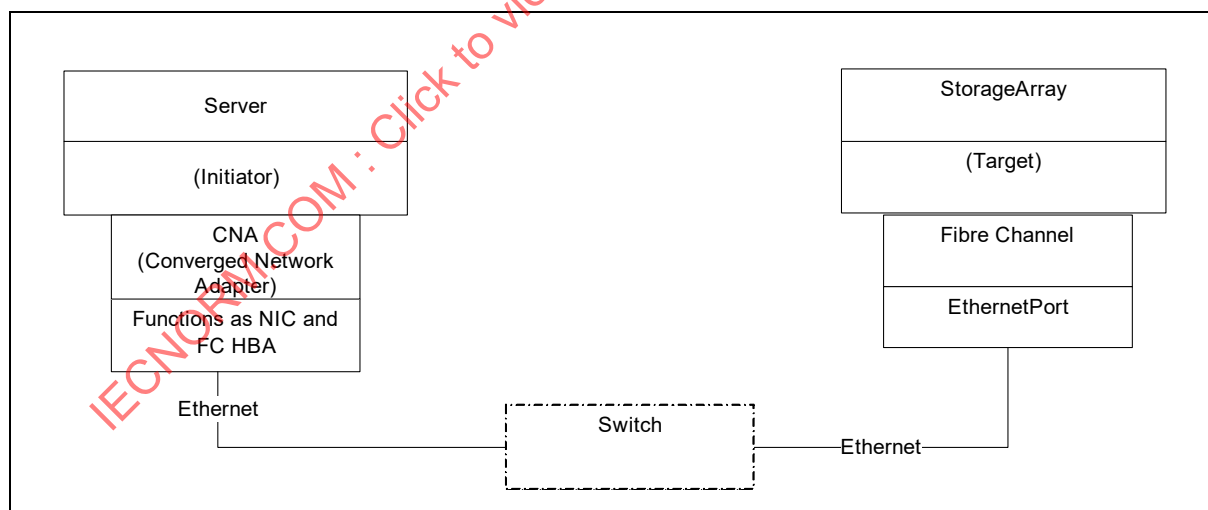


Figure 11 - FCoE Topology

7.3 Implementation

The FCPort is always associated 1-1 with a SCSIProtocolEndpoint instance. The EthernetPort is associated to 0 or more FCPorts. The EthernetPort used for FCoE protocol, shown in Figure 12, has a PortDiscriminator property with the value of "SNIA:FCoE".

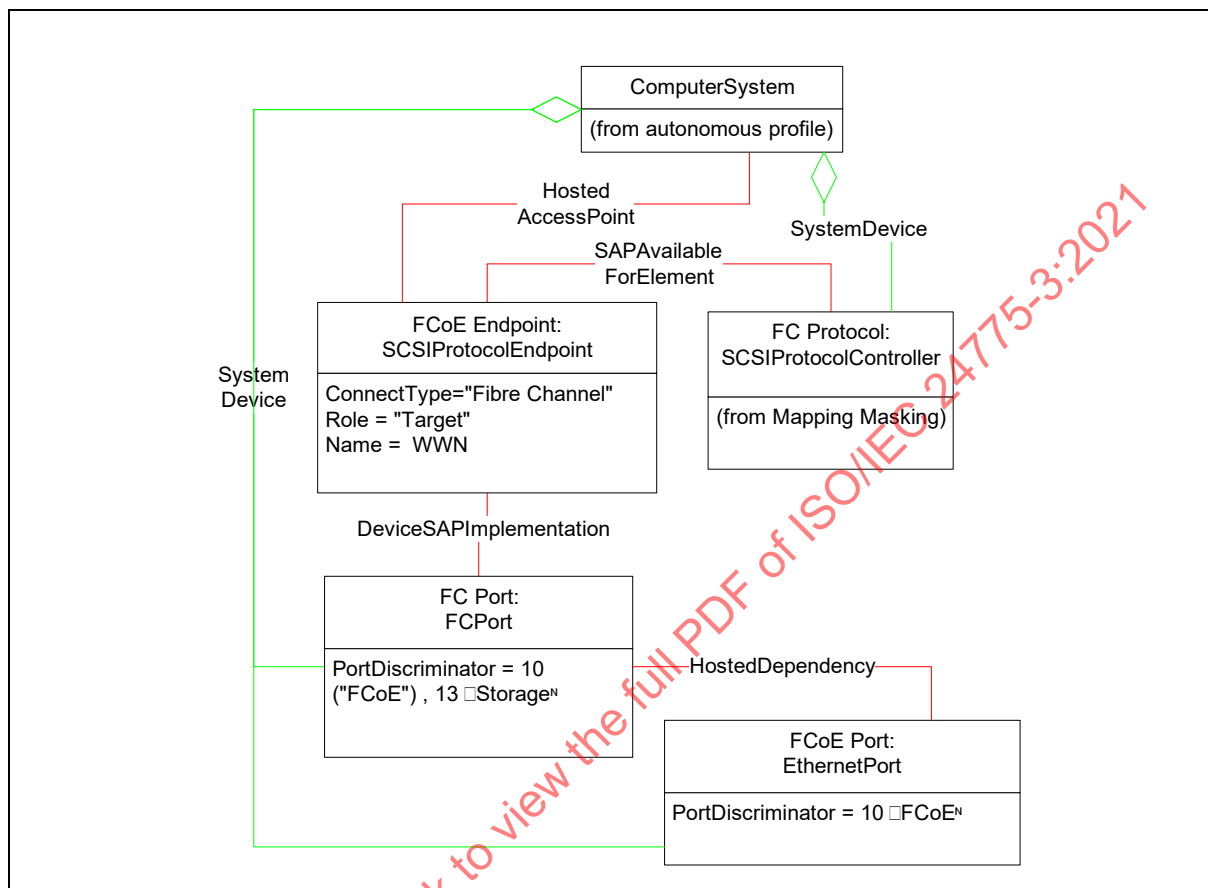


Figure 12 - EthernetPort used for FCoE

7.4 Durable Names and Correlatable IDs of the Profile

7.4.1 Permanent Address and WWN

FCPort.PermanantAddress shall contain the port's Port WWN.

7.4.2 Health and Fault Management Consideration

Table 18 describes FCPort OperationalStatus.

Table 18 - FCPort OperationalStatus

OperationalStatus	Description
OK	Port is online
Error	Port has a failure
Stopped	Port is disabled
InService	Port is in Self Test
Unknown	

7.4.3 Cascading Considerations

Not defined in this document.

7.5 Methods

Not defined in this document.

7.6 Use Cases

Not defined in this document.

7.7 CIM Elements

7.7.1 Overview

Table 19 describes the CIM elements for FCoE Target Ports.

Table 19 - CIM Elements for FCoE Target Ports

Element Name	Requirement	Description
7.7.2 CIM_DeviceSAPImplementation	Mandatory	Associates FCPort and SCSIProtocolEndpoint.
7.7.3 CIM_EthernetPort	Mandatory	
7.7.4 CIM_FCPort	Mandatory	FCPort specialized to handle FCoE.
7.7.5 CIM_HostedAccessPoint	Mandatory	Associates ComputerSystem to SCSIProtocolEndpoint.
7.7.6 CIM_HostedDependency (NetworkPort to FCPort)	Mandatory	Association between EthernetPort and FCPort.
7.7.7 CIM_SCSIProtocolEndpoint	Mandatory	Represents management characteristics related to the SCSI command set.
7.7.8 CIM_SystemDevice (Port)	Mandatory	Associates controller ComputerSystem to FCPort.
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_FCPort	Mandatory	Create FCPort.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_FCPort AND SourceInstance.CIM_FCPort::OperationalStatus <> PreviousInstance.CIM_FCPort::OperationalStatus	Mandatory	CQL -Change to FCPort OperationalStatus.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_FCPort AND SourceInstance.CIM_FCPort::Speed <> PreviousInstance.CIM_FCPort::Speed	Optional	CQL -Change to FCPort Speed.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_FCPort AND SourceInstance.CIM_FCPort::NetworkAddresses <> PreviousInstance.CIM_FCPort::NetworkAddresses	Optional	CQL -Change to FCPort NetworkAddresses.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_FCPort	Mandatory	Delete FCPort.

7.7.2 CIM_DeviceSAPImplementation

Associates FCPort and SCSIProtocolEndpoint. The class definition specializes the CIM_DeviceSAPImplementation definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 20 describes class CIM_DeviceSAPImplementation.

Table 20 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation

Properties	Flags	Requirement	Description & Notes
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint.
Antecedent (overridden)		Mandatory	Reference to FCPort.

7.7.3 CIM_EthernetPort

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 21 describes class CIM_EthernetPort.

Table 21 - SMI Referenced Properties/Methods for CIM_EthernetPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
LinkTechnology		Mandatory	Shall be 2 (Ethernet).
OperationalStatus		Mandatory	Shall be 0 (Unknown), 2 (OK), 6 (Error), 10 (Stopped), or 11 (In Service).
PermanentAddress	CD	Mandatory	The MAC Address. Shall be formatted as 12 un-separated upper case hex digits.
PortDiscriminator		Mandatory	Discriminates the supported context of this EthernetPort. Value: 10 ('FCoE').

7.7.4 CIM_FCPort

FCPort specialized to handle FCoE. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Requirement: Mandatory

Table 22 describes class CIM_FCPort..

Table 22 - SMI Referenced Properties/Methods for CIM_FCPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
OperationalStatus		Mandatory	
UsageRestriction		Mandatory	Shall be 2 for ports restricted to Front-end only or 4 if the port is unrestricted.
PortType (overridden)		Mandatory	Shall be 0 1 10 11 12 13 14 15 16 17 18 (Unknown or Other or N or NL or F/NL or Nx or E or F or FL or B or G).
PermanentAddress (added)	CD	Mandatory	Port WWN. Shall be 16 unseparated uppercase hex digits.
SupportedCOS (added)		Optional	
ActiveCOS (added)		Optional	
SupportedFC4Types (added)		Optional	
ActiveFC4Types (added)		Optional	
Speed (added)		Optional	Speed in bits per second. Shall be 0, 1062500000 (1GFC), 2125000000 (2GFC), 4250000000 (4GFC), 8500000000 (8GFC), 10518750000 (10GFC), 14025000000 (16GFC), 21037500000 (20GFC) or 28500000000 (32GFC).
MaxSpeed (added)		Optional	Maximum Port Speed.
NetworkAddresses (added)		Optional	For Fibre Channel end device ports, the Fibre Channel ID. Shall be 16 un-separated upper case hex digits.
PortDiscriminator (added)		Mandatory	Discriminates the supported context of this FCPort. Value: 10, 13 ('FCoE', 'Storage').

7.7.5 CIM_HostedAccessPoint

Associates ComputerSystem to SCSIProtocolEndpoint. Limit to targets. The class definition specializes the CIM_HostedAccessPoint definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 23 describes class CIM_HostedAccessPoint.

Table 23 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint

Properties	Flags	Requirement	Description & Notes
Antecedent (overridden)		Mandatory	
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint.

7.7.6 CIM_HostedDependency (NetworkPort to FCPort)

Association between EthernetPort and FCPort.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 24 describes class CIM_HostedDependency (NetworkPort to FCPort).

Table 24 - SMI Referenced Properties/Methods for CIM_HostedDependency (NetworkPort to FCPort)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to EthernetPort.
Dependent		Mandatory	Reference to FCPort.

7.7.7 CIM_SCSIProtocolEndpoint

Represents management characteristics related to the SCSI command set. The class definition specializes the CIM_ProtocolEndpoint definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 25 describes class CIM_SCSIProtocolEndpoint.

Table 25 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
ProtocolType		Mandatory	Shall be 1 (Other).
OtherTypeDescription (overridden)		Mandatory	Shall be the string 'SCSI'.

Table 25 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
ConnectionType (added)		Mandatory	Shall be 2 (Fibre Channel).
Role (added)		Mandatory	Shall be 3 (Target) or 4 (Both Initiator and Target).

7.7.8 CIM_SystemDevice (Port)

Associates controller ComputerSystem to FCPort. The class definition specializes the CIM_SystemDevice definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 26 describes class CIM_SystemDevice (Port).

Table 26 - SMI Referenced Properties/Methods for CIM_SystemDevice (Port)

Properties	Flags	Requirement	Description & Notes
GroupComponent (overridden)		Mandatory	Reference to ComputerSystem in the referencing profile.
PartComponent (overridden)		Mandatory	Reference to FCPort.

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8 iSCSI Target Ports Profile**8.1 Synopsis****Profile Name:** iSCSI Target Ports (Component Profile)**Version:** 1.8.0**Organization:** SNIA**Central Class:** CIM_iSCSICapabilities**Scoping Class:** a ComputerSystem in a separate autonomous profile**Related Profiles:** Not defined in this document.

Models an iSCSI target port

8.2 Description

The iSCSI Target Ports Profile describes the iSCSI specific aspects of a target device.

8.3 Implementation**8.3.1 Overview**

iSCSI terminology is different than that used in other parts of SMI-S. Table 27 provides a map of terminology from iSCSI standards and CIM class names used in this standard. iSCSI does have a specific naming requirement for SCSIProtocolController that is described in Table 27.

Table 27 - iSCSI Terminology and SMI-S Class Names

iSCSI Term	CIM Class Name	Notes
Network Entity	ComputerSystem	The Network Entity represents a device or gateway that is accessible from the IP network. A Network Entity shall have one or more Network Portals, each of which can be used to gain access to the IP network by some iSCSI Nodes contained in that Network Entity.
Session	iSCSI Session	The group of TCP connections that link a Target with a target form a session (loosely equivalent to a SCSI I-T nexus). TCP connections can be added and removed from a session. Across all connections within a session, a Target sees one and the same target.
Connection	NetworkPipe	A connection is a TCP connection. Communication between the Target and target occurs over one or more TCP connections. The TCP connections carry control messages, SCSI commands, parameters, and data within iSCSI Protocol Data Units (iSCSI PDUs).
SCSI Port	iSCSIProtocolEndpoint	A SCSI Port using an iSCSI service delivery subsystem. A collection of Network Portals that together act as a SCSI Target or target.

Table 27 - iSCSI Terminology and SMI-S Class Names

Portal Group	SystemSpecificCollection	iSCSI supports multiple connections within the same session; some implementations will have the ability to combine connections in a session across multiple Network Portals. A Portal Group defines a set of Network Portals within an iSCSI Network Entity that collectively supports the capability of coordinating a session with connections spanning these portals. Not all Network Portals within a Portal Group need participate in every session connected through that Portal Group. One or more Portal Groups may provide access to an iSCSI Node. Each Network Portal, as utilized by a given iSCSI Node, belongs to exactly one portal group within that node.
Network Portal	TCPProtocolEndpoint, IPProtocolEndpoint, EthernetPort	The Network Portal is a component of a Network Entity that has a TCP/IP network address and that may be used by an iSCSI Node within that Network Entity for the connection(s) within one of its iSCSI sessions. A Network Portal in a Target is identified by its IP address. A Network Portal in a target is identified by its IP address and its listening TCP port.
Node	SCSIProtocolController	The iSCSI Node represents a single iSCSI Target or iSCSI target. There are one or more iSCSI Nodes within a Network Entity. The iSCSI Node is accessible via one or more Network Portals. An iSCSI Node is identified by its iSCSI Name. The separation of the iSCSI Name from the addresses used by and for the iSCSI Node allows multiple iSCSI nodes to use the same address, and the same iSCSI node to use multiple addresses.

Figure 13 is a class diagram for iSCSI Target Ports and uses the UML instance naming notation (InstanceName:ClassName) with the iSCSI-style names before the CIM names. Figure 27: "iSCSI Terminology and SMI-S Class Names" explains the use of all these objects.

Note that ComputerSystem, SCSIProtocolController and StorageVolume are not actually part of this profile; they would be the parts of the Array Profile that associate with the iSCSI-specific classes.

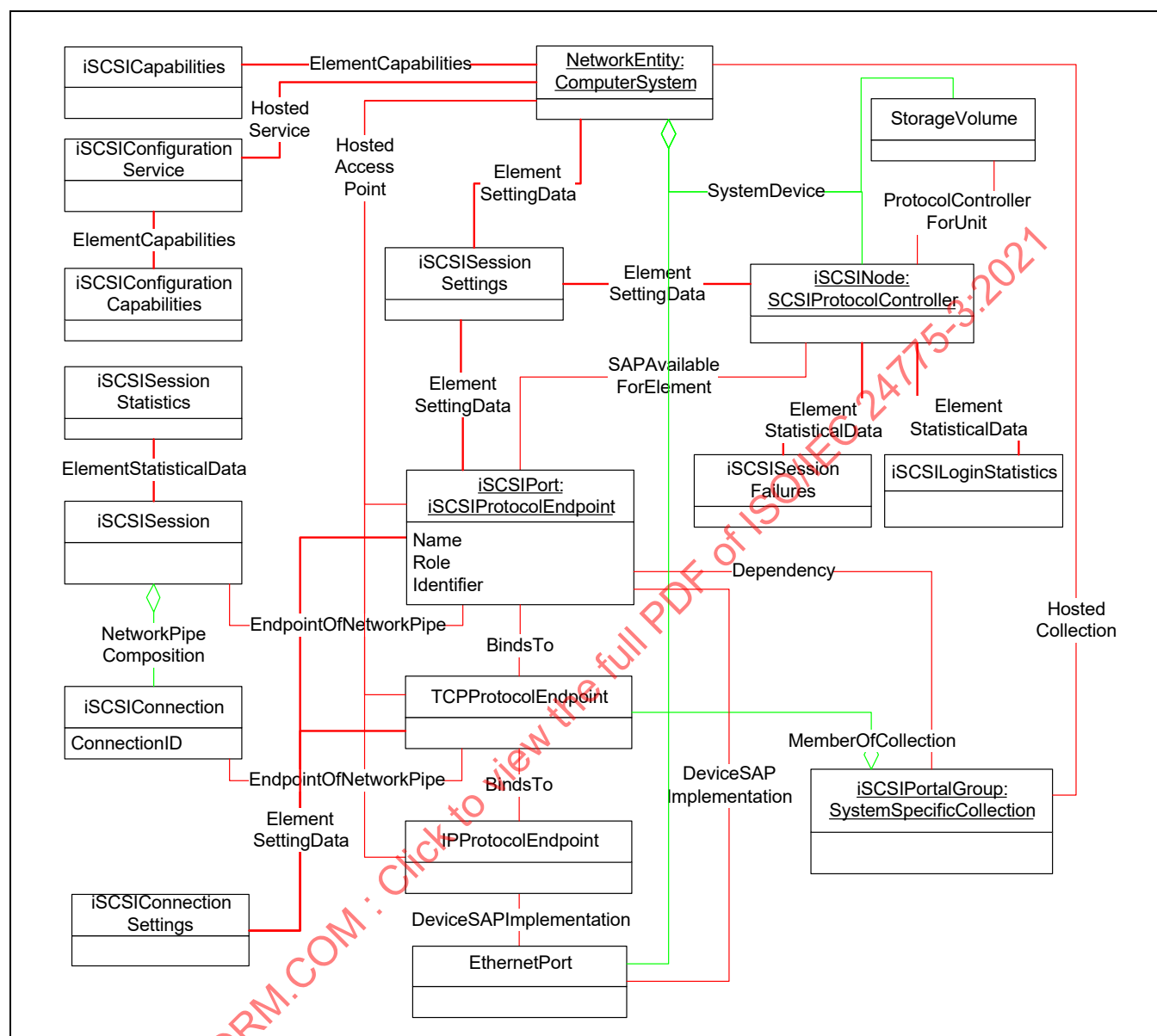


Figure 13 - iSCSI Target Ports Profile Instance Diagram

8.3.2 Mapping and Masking Considerations

The class SCSIProtocolController is used in the Mapping and Masking Profile to model a “view”, which is a set of logical devices exposed to a Target. It is in a sense a virtual SCSI device, but carries no SCSI device name when used with the other Target Ports profiles such as the FC Target Port Profile. In fact the class is even not part of these component profiles.

The iSCSI Target Ports Profile however uses SCSIProtocolController to model the iSCSI Node which is the SCSI Device as defined in the SAM specification. It has a SCSI device name which is the iSCSI Node Name. Thus the presence of instances of SCSIProtocolController with this profile has multiple meanings. Whereas there may be no instances of SCSIProtocolController with other Target Port component profiles until created as views by the Mapping and Masking method ExposePaths, instances of

SCSIProtocolControllers as iSCSINodes can be brought into existence by the iSCSI method CreateiSCSINode. The instances can then be used as inputs to ExposePaths to grant access by Targets to logical devices through the Node. This initial SCSIProtocolController that was created as a Node will be the first view. Additional “view” ProtocolControllers created by ExposePaths would carry the same iSCSI Node name to convey that they represent the same underlying Node.

8.3.3 Settings

An iSCSI Session is established between a Target Port and a Target Port through the establishment of an initial iSCSI Connection, which happens during the “Leading” Login. At this time the operational properties for the Session are negotiated and also the operational properties for the initial Connection. Additional Connections for the Session are established through subsequent logins. For many operational properties both the Target and Target have settings that specify the starting position for the negotiation process. The settings for negotiating Session-wide operational properties (found in iSCSISession) are in iSCSISessionSettings. Likewise the settings for negotiating Connection level operational properties (found in iSCSI Connection) are in iSCSIConnectionSettings. For example, iSCSISessionSettings contains the property MaxConnectionsPerSession, which is the value that the local system (which in this profile is the Target) would like to use for Session. When the leading login is complete the actual value agreed upon with the Target is in the property MaxConnectionsPerSession in iSCSI Session.

Different implementations may scope the settings classes differently.

iSCSISessionSettings can be associated to any one of the following classes:

- iSCSIProtocolEndpoint: The Settings apply to Sessions created on the iSCSI Port represented by the iSCSIProtocolEndpoint.
- SCSIProtocolController: The Settings apply to Sessions created on all iSCSIProtocolEndpoint belonging to the iSCSI Node represented by the SCSIProtocolController.
- ComputerSystem: The Settings apply to Sessions created on all iSCSIProtocolEndpoints belonging to all SCSIProtocolControllers belonging to the ComputerSystem.

iSCSIConnectionSettings can be associated to any one of the following classes:

- TCPProtocolEndpoint: The Settings apply to each Connection created using the Network Portal represented by the TCPProtocolEndpoint, regardless of which iSCSIProtocolEndpoint owns the Session that the Connection belongs to.
- iSCSIProtocolEndpoint: The Settings apply to Connections using NetworkPortals to which the iSCSIProtocolEndpoint is bound and belonging to Sessions on that same iSCSIProtocolEndpoint.

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NOTE The support on iSCSI Session is conditional, which means it is only supported when ‘iSCSI Session’ is included in iSCSICapabilities.SupportedFeatures.

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8.3.4 Durable Names and Correlatable IDs of the Profile

The Name property for the iSCSI node (SCSIProtocolController) shall be a compliant iSCSI name as described in *Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4, 7.8 “iSCSI Names”*. NameFormat shall be set to “iSCSI Name”.

Signature

The Name property for iSCSIProtocolEndpoint shall be a compliant iSCSI name as described in *Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4, 7.8 "iSCSI Names"*. ConnectionType shall be set to "iSCSI".

8.4 Health and Fault Management

Table 28 defines the SMI-S-defined meanings of the OperationalStatus property for EthernetPort used in the SB Target Port Profile.

Table 28 - EthernetPort OperationalStatus

OperationalStatus	Description
OK	Port is online
Error	Port has a failure
Stopped	Port is disabled
InService	Port is in Self Test
Unknown	

8.5 Methods of this Profile

8.5.1 Summary

The iSCSIConfigurationService provides the following methods that allow a client to manipulate iSCSIProtocolEndpoints in an iSCSI Target Node. The class iSCSIProtocolController models the iSCSI Target Port. The instance of the service is scoped by an instance of ComputerSystem that represents that Network Entity. The capabilities of this service are defined in the companion class iSCSIConfigurationCapabilities.

8.5.2 CreateiSCSINode

8.5.2.1 Signature

This method creates an iSCSI Node in the form of an instance of SCSIProtocolController. As part of the creation process a SystemDevice association is created between the new SCSIProtocolController and the scoping Network Entity (ComputerSystem) hosting this service.

CreateiSCSINode

IN, string **Alias**,

The iSCSI Alias for the new Node.

OUT, SCSIProtocolController REF **iSCSINode**,

A reference to the new SCSIProtocolController that is created.

8.5.2.2 Return Values

Success

Not Supported

Unspecified Error

Timeout

Failed

Node Creation Not Supported

Alias in use by Other Node

8.5.2.3 Created Instances

SCSIProtocolController

SystemDevice

8.5.2.4 Deleted Instances

Not defined in this document.

8.5.2.5 Modified Instances

Not defined in this document.

8.5.3 DeleteiSCSINode

8.5.3.1 Signature

The method deletes an instance of SCSIProtocolController representing an iSCSI Node and all associations in which this SCSIProtocolController is referenced. If Sessions are active on iSCSIProtocolEndpoints belonging to this Node an error will be returned. If no Sessions are active the scoped iSCSIProtocolEndpoints will be deleted.

DeleteiSCSINode

IN, SCSIProtocolController REF iSCSINode

The SCSIProtocolController to be deleted.

8.5.3.2 Return Values

Success

Not Supported

Unspecified Error

Timeout

Failed

Invalid Parameter

SCSIProtocolController Non-existent

Sessions Active on Node Ports

8.5.3.3 Created Instances

Not defined in this document.

8.5.3.4 Deleted Instances

SCSIProtocolController

SystemDevice

iSCSIProtocolEndpoint

HostedAccessPoint

SAPAvailableForElement

BindsTo

8.5.3.5 Modified Instances

Not defined in this document.

8.5.4 CreateiSCSIProtocolEndpoint

8.5.4.1 Signature

This method creates an iSCSI Port in the form of an instance of iSCSIProtocolEndpoint. As part of the creation process the iSCSIProtocolEndpoint is 'bound to' the underlying TCPProtocolEndpoints which are specified as inputs by creating instances of the BindsTo association between the new instance and those instances. In addition, an instance of SAPAvailableForElement is created between the specified SCSIProtocolController and the new instance of iSCSIProtocolEndpoint.

CreateiSCSIProtocolEndpoint

IN, SCSIProtocolController REF **iSCSINode**,

The SCSIProtocolController instance representing the iSCSI Node that will contain the iSCSI Port.

IN, uint16 **Role**,

For iSCSI, each iSCSIProtocolEndpoint acts as either a target or a Target endpoint. This property indicates which role this iSCSIProtocolEndpoint implements.

IN, string **Identifier**,

The Identifier shall contain the Target Portal Group Tag (TGPT). Each iSCSIProtocolEndpoint (iSCSI port) associated to a common SCSIProtocolController (iSCSI node) has a unique Identifier. This field is a string that contains 12 hexadecimal digits. If the property IdentifierSelectionSupported in class iSCSIConfigurationCapabilities is false, this parameter shall be set to NULL.

IN, ProtocolEndpoint REF **NetworkPortals[]**,

An Array of References to TCPProtocolEndpoints representing Target Network Portals. The TCPProtocolEndpoints specified each shall be associated to an instance of IPProtocolEndpoint via a BindsTo association in order to provide the Target Network Portal functionality. The selected Portal endpoints shall be from the same SystemSpecificCollection, which represents a Portal Group.

OUT, iSCSIProtocolEndpoint REF **iSCSIPort**,

A reference to the new iSCSIProtocolEndpoint that is created.

8.5.4.2 Return Values

Success

Not Supported

Unspecified Error

Timeout

Failed

SCSIProtocolController Non-existent

Role Not Supported By Specified SCSIProtocolController

Identifier In Use, Not Unique

Identifier Selection Not Supported

ProtocolEndpoint Non-Existent

TCPProtocolEndpoint Not Bound To Underlying IPProtocolEndpoint

TCPProtocolEndpoint In Use By Other iSCSIProtocolEndpoint In Same Target SCSIProtocolController.

ProtocolEndpoints Not From Same Endpoint Collection

8.5.4.3 Created Instances

iSCSIProtocolEndpoint

HostedAccessPoint

SAPAvailableForElement

BindsTo

8.5.4.4 Deleted Instances

Not defined in this document

8.5.4.5 Modified Instances

Not defined in this document

EXPERIMENTAL

8.5.5 CreateiSCSIProtocolEndpointUsingCS

Both CreateiSCSIProtocolEndpoint and CreateiSCSIProtocolEndpointUsingCS methods creates an iSCSI Port in the form of an instance of iSCSIProtocolEndpoint. This method additionally requires a reference of CIM_ComputerSystem to determine the StorageProcessofSystem in arrays with multiple StorageProcessorsSystem where the iSCSIProtocolEndpoint is created.

IN, CIM_ComputerSystem REF StorageProcessorSystem

EXPERIMENTAL

8.5.6 DeleteiSCSIProtocolEndpoint

8.5.6.1 Signature

The method deletes an instance of iSCSIProtocolEndpoint and all associations in which this iSCSIProtocolEndpoint is referenced.

DeleteiSCSIProtocolEndpoint

IN, iSCSIProtocolEndpoint REF iSCSIPort

The iSCSIProtocolEndpoint to be deleted.

8.5.6.2 Return Values

Success

Not Supported

Created Instances

Unspecified Error

Timeout

Failed

Invalid Parameter

Endpoint Non-existent

8.5.6.3 Created Instances

Not defined in this document

8.5.6.4 Deleted Instances

iSCSIProtocolEndpoint

HostedAccessPoint

SAPAvailableForElement

BindsTo

8.5.6.5 Modified Instances

Not defined in this document

8.5.7 Bind iSCSIProtocolEndpoint

8.5.7.1 Signature

This method provides for modification of an existing iSCSI Port by associating a TCPProtocolEndpoint representing a Target Network Portal to the iSCSIProtocolEndpoint. The association is persisted as an instance of BindsTo. The selected Portal endpoint shall be from the same SystemSpecificCollection, which represents a Portal Group, as those endpoints currently bound to the iSCSIProtocolEndpoint.

This action is intended to be reversed by the use of the intrinsic method '**DeleteInstance**'.

Bind iSCSIProtocolEndPoint

IN, iSCSIProtocolEndpoint REF **iSCSIPort**,

A reference to the iSCSIProtocolEndpoint

IN, ProtocolEndpoint REF **NetworkPortal**

An instance of TCPProtocolEndpoint representing the Network Portal to be added

8.5.7.2 Return Values

Success

Not Supported

Unspecified Error

Timeout

Failed

Invalid Parameter

ProtocolEndpoint Non-Existent

TCPPProtocolEndpoint Not Bound To Underlying IPProtocolEndpoint

ProtocolEndpoint In Use By Other iSCSIProtocolEndpoint In Same Target SCSIProtocolController

ProtocolEndpoint Not From Same Endpoint Collection

8.5.7.3 Created Instances

BindsTo

8.5.7.4 Deleted Instances

Not defined in this document

8.5.7.5 Modified Instances

Not defined in this document

8.6 Client Considerations and Recipes

No recipes are defined in this version of the standard.

8.7 CIM Elements

8.7.1 Overview

Table 29 describes the CIM elements for iSCSI Target Ports.

Table 29 - CIM Elements for iSCSI Target Ports

Element Name	Requirement	Description
8.7.2 CIM_BindsTo (TCPPProtocolEndpoint to IPProtocolEndpoint)	Mandatory	
8.7.3 CIM_BindsTo (iSCSIProtocolEndpoint to TCPPProtocolEndpoint)	Mandatory	
8.7.4 CIM_ConcreteDependency	Conditional	This is required if CIM_SystemSpecificCollection is used.
8.7.5 CIM_DeviceSAPImplementation (EthernetPort to IPProtocolEndpoint)	Optional	
8.7.6 CIM_DeviceSAPImplementation (EthernetPort to iSCSIProtocolEndpoint)	Optional	
8.7.7 CIM_ElementCapabilities (CIM_iSCSICapabilities to System)	Mandatory	
8.7.8 CIM_ElementCapabilities (iSCSIConfigurationCapabilities to iSCSIConfigurationService)	Conditional	Conditional requirement: Active configuration is supported.
8.7.9 CIM_ElementSettingData (iSCSIConnectionSettings to TCPPProtocolEndpoint)	Conditional	Conditional requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').
8.7.10 CIM_ElementSettingData (iSCSIConnectionSettings to iSCSIProtocolEndpoint)	Conditional	Conditional requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').
8.7.11 CIM_ElementSettingData (iSCSIConnectionSettings to SCSIProtocolController)	Conditional	Conditional requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').
8.7.12 CIM_ElementSettingData (iSCSIConnectionSettings to ComputerSystem)	Conditional	Conditional requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').

Modified Instances

Table 29 - CIM Elements for iSCSI Target Ports

Element Name	Requirement	Description
8.7.13 CIM_ElementSettingData (iSCSI_SessionSettings to iSCSI_ProtocolEndpoint)	Conditional	Conditional requirement: This is required if CIM_iSCSI_Capabilities.SupportedFeatures = '3' ('iSCSI Session').
8.7.14 CIM_ElementStatisticalData (iSCSI_LoginStatistics to SCSI_ProtocolController)	Optional	
8.7.15 CIM_ElementStatisticalData (iSCSI_SessionFailures to SCSI_ProtocolController)	Optional	
8.7.16 CIM_ElementStatisticalData (iSCSI_SessionStatistics to iSCSI_Session)	Conditional	Conditional requirement: This is required if CIM_iSCSI_Capabilities.SupportedFeatures = '3' ('iSCSI Session').
8.7.17 CIM_EndpointOfNetworkPipe (iSCSI_Connection to TCP_ProtocolEndpoint)	Conditional	Conditional requirement: This is required if CIM_iSCSI_Capabilities.SupportedFeatures = '3' ('iSCSI Session').
8.7.18 CIM_EndpointOfNetworkPipe (iSCSI_Session to iSCSI_ProtocolEndpoint)	Conditional	Conditional requirement: This is required if CIM_iSCSI_Capabilities.SupportedFeatures = '3' ('iSCSI Session').
8.7.19 CIM_EthernetPort	Optional	
8.7.20 CIM_HostedAccessPoint (ComputerSystem to IP_ProtocolEndpoint)	Mandatory	
8.7.21 CIM_HostedAccessPoint (ComputerSystem to TCP_ProtocolEndpoint)	Mandatory	
8.7.22 CIM_HostedAccessPoint (ComputerSystem to iSCSI_ProtocolEndpoint)	Mandatory	
8.7.23 CIM_HostedCollection	Conditional	This is required if CIM_SystemSpecificCollection is used.
8.7.24 CIM_HostedService	Optional	
8.7.25 CIM_IP_ProtocolEndpoint	Mandatory	
8.7.26 CIM_iSCSI_Capabilities	Mandatory	
8.7.27 CIM_iSCSI_ConfigurationCapabilities	Conditional	Conditional requirement: Active configuration is supported (iSCSI_ConfigurationService is supported).
8.7.28 CIM_iSCSI_ConfigurationService	Optional	Active configuration is supported.
8.7.29 CIM_iSCSI_Connection	Optional	
8.7.30 CIM_iSCSI_ConnectionSettings	Optional	
8.7.31 CIM_iSCSI_LoginStatistics	Optional	
8.7.32 CIM_iSCSI_ProtocolEndpoint	Mandatory	
8.7.33 CIM_iSCSI_Session	Conditional	Conditional requirement: This is required if CIM_iSCSI_Capabilities.SupportedFeatures = '3' ('iSCSI Session').
8.7.34 CIM_iSCSI_SessionFailures	Optional	
8.7.35 CIM_iSCSI_SessionSettings	Conditional	Conditional requirement: This is required if CIM_iSCSI_Capabilities.SupportedFeatures = '3' ('iSCSI Session').
8.7.36 CIM_iSCSI_SessionStatistics	Optional	
8.7.37 CIM_MemberOfCollection	Optional	

Table 29 - CIM Elements for iSCSI Target Ports

Element Name	Requirement	Description
8.7.38 CIM_NetworkPipeComposition	Optional	
8.7.39 CIM_SAPAvailableForElement	Mandatory	
8.7.40 CIM_SCSIProtocolController	Mandatory	
8.7.41 CIM_SystemDevice (ComputerSystem to EthernetPort)	Conditional	Conditional requirement: Required if an instance of CIM_EthernetPort has been implemented This association links all EthernetPorts to the scoping system.
8.7.42 CIM_SystemDevice (ComputerSystem to SCSIProtocolController)	Mandatory	This association links SCSIProtocolControllers to the scoping system.
8.7.43 CIM_SystemSpecificCollection	Optional	
8.7.44 CIM_TCPProtocolEndpoint	Mandatory	
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_EthernetPort	Optional	Create EthernetPort.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_EthernetPort AND SourceInstance.CIM_EthernetPort::OperationalStatus <> PreviousInstance.CIM_EthernetPort::OperationalStatus	Optional	CQL -Modify EthernetPort.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_EthernetPort	Optional	Delete EthernetPort.
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_iSCSIProtocolEndpoint	Mandatory	Create iSCSIProtocolEndpoint.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_iSCSIProtocolEndpoint	Mandatory	Delete SCSIProtocolEndpoint.
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_SCSIProtocolController	Mandatory	Create SCSIProtocolController.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_SCSIProtocolController	Mandatory	Delete iSCSIProtocolController.
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_iSCSISession	Optional	Create iSCSISession.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_iSCSISession AND SourceInstance.CIM_iSCSISession::CurrentConnections <> PreviousInstance.CIM_iSCSISession::CurrentConnections	Optional	CQL -Modify iSCSISession.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_iSCSISession	Optional	Delete iSCSISession.
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_iSCSIConnection	Optional	Create iSCSIConnection.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_iSCSIConnection	Optional	Delete iSCSIConnection.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_iSCSISessionSettings	Conditional	Conditional requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session'). Modify iSCSISessionSettings.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_iSCSIConnectionSettings	Optional	Modify iSCSIConnectionSettings.

8.7.2 CIM_BindsTo (TCPProtocolEndpoint to IPProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 30 describes class CIM_BindsTo (TCPProtocolEndpoint to IPProtocolEndpoint).

Table 30 - SMI Referenced Properties/Methods for CIM_BindsTo (TCPProtocolEndpoint to IPProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to IPProtocolEndpoint
Dependent		Mandatory	Reference to TCPProtocolEndpoint

8.7.3 CIM_BindsTo (iSCSIProtocolEndpoint to TCPProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 31 describes class CIM_BindsTo (iSCSIProtocolEndpoint to TCPProtocolEndpoint).

Table 31 - SMI Referenced Properties/Methods for CIM_BindsTo (iSCSIProtocolEndpoint to TCPProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to TCPProtocolEndpoint
Dependent		Mandatory	Reference to iSCSIProtocolEndpoint

8.7.4 CIM_ConcreteDependency

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Conditional. This is required if CIM_SystemSpecificCollection is used.

Table 32 describes class CIM_ConcreteDependency.

Table 32 - SMI Referenced Properties/Methods for CIM_ConcreteDependency

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to iSCSIProtocolEndpoint
Dependent		Mandatory	Reference to SystemSpecificCollection

8.7.5 CIM_DeviceSAPImplementation (EthernetPort to IPProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 33 describes class CIM_DeviceSAPImplementation (EthernetPort to IPProtocolEndpoint).

Table 33 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation (EthernetPort to IPProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to EthernetPort
Dependent		Mandatory	Reference to IPProtocolEndpoint

8.7.6 CIM_DeviceSAPImplementation (EthernetPort to iSCSIProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 34 describes class CIM_DeviceSAPImplementation (EthernetPort to iSCSIProtocolEndpoint).

Table 34 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation (EthernetPort to iSCSIProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to EthernetPort
Dependent		Mandatory	Reference to iSCSIProtocolEndpoint

8.7.7 CIM_ElementCapabilities (CIM_iSCSICapabilities to System)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 35 describes class CIM_ElementCapabilities (CIM_iSCSICapabilities to ComputerSystem).

Table 35 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (CIM_iSCSICapabilities to ComputerSystem)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to ComputerSystem
Capabilities		Mandatory	Reference to iSCSICapabilities

8.7.8 CIM_ElementCapabilities (iSCSIConfigurationCapabilities to iSCSIConfigurationService)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Active configuration is supported.

Table 36 describes class CIM_ElementCapabilities (iSCSIConfigurationCapabilities to iSCSIConfigurationService).

Table 36 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (iSCSIConfigurationCapabilities to iSCSIConfigurationService)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to iSCSIConfigurationService
Capabilities		Mandatory	Reference to iSCSIConfigurationCapabilities

8.7.9 CIM_ElementSettingData (iSCSIConnectionSettings to TCPProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').

Table 37 describes class CIM_ElementSettingData (iSCSIConnectionSettings to TCPProtocolEndpoint).

Table 37 - SMI Referenced Properties/Methods for CIM_ElementSettingData (iSCSIConnectionSettings to TCPProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to TCPProtocolEndpoint
SettingData		Mandatory	Reference to iSCSIConnectionSettings

8.7.10 CIM_ElementSettingData (iSCSIConnectionSettings to iSCSIProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').

Table 38 describes class CIM_ElementSettingData (iSCSIConnectionSettings to iSCSIProtocolEndpoint).

Table 38 - SMI Referenced Properties/Methods for CIM_ElementSettingData (iSCSIConnectionSettings to iSCSIProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to iSCSIProtocolEndpoint
SettingData		Mandatory	Reference to iSCSIConnectionSettings

8.7.11 CIM_ElementSettingData (iSCSI SessionSettings to SCSIProtocolController)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').

Table 39 describes class CIM_ElementSettingData (iSCSI SessionSettings to SCSIProtocolController).

Table 39 - SMI Referenced Properties/Methods for CIM_ElementSettingData (iSCSI SessionSettings to SCSIProtocolController)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to SCSIProtocolController
SettingData		Mandatory	Reference to iSCSI SessionSettings

8.7.12 CIM_ElementSettingData (iSCSI SessionSettings to ComputerSystem)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').

Table 40 describes class CIM_ElementSettingData (iSCSI SessionSettings to ComputerSystem).

Table 40 - SMI Referenced Properties/Methods for CIM_ElementSettingData (iSCSI SessionSettings to ComputerSystem)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to ComputerSystem
SettingData		Mandatory	Reference to iSCSI SessionSettings

8.7.13 CIM_ElementSettingData (iSCSI SessionSettings to iSCSIProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').

Table 41 describes class CIM_ElementSettingData (iSCSI SessionSettings to iSCSIProtocolEndpoint).

Table 41 - SMI Referenced Properties/Methods for CIM_ElementSettingData (iSCSI SessionSettings to iSCSIProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to iSCSIProtocolEndpoint
SettingData		Mandatory	Reference to iSCSI SessionSettings

8.7.14 CIM_ElementStatisticalData (iSCSILoginStatistics to SCSIProtocolController)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 42 describes class CIM_ElementStatisticalData (iSCSILoginStatistics to SCSIProtocolController).

Table 42 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (iSCSILoginStatistics to SCSIProtocolController)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to iSCSIProtocolEndpoint
Stats		Mandatory	Reference to iSCSILoginStatistics

8.7.15 CIM_ElementStatisticalData (iSCSI SessionFailures to SCSIProtocolController)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 43 describes class CIM_ElementStatisticalData (iSCSI SessionFailures to SCSIProtocolController).

Table 43 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (iSCSI SessionFailures to SCSIProtocolController)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to iSCSIProtocolEndpoint
Stats		Mandatory	Reference to iSCSI SessionFailures

8.7.16 CIM_ElementStatisticalData (iSCSI SessionStatistics to iSCSI Session)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').

Table 44 describes class CIM_ElementStatisticalData (iSCSI SessionStatistics to iSCSI Session).

Table 44 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (iSCSI SessionStatistics to iSCSI Session)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to iSCSI Session
Stats		Mandatory	Reference to iSCSI SessionStatistics

8.7.17 CIM_EndpointOfNetworkPipe (iSCSIConnection to TCPProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').

Table 45 describes class CIM_EndpointOfNetworkPipe (iSCSIConnection to TCPProtocolEndpoint).

Table 45 - SMI Referenced Properties/Methods for CIM_EndpointOfNetworkPipe (iSCSIConnection to TCP-ProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to TCPProtocolEndpoint
Dependent		Mandatory	Reference to iSCSIConnection

8.7.18 CIM_EndpointOfNetworkPipe (iSCSISession to iSCSIProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').

Table 46 describes class CIM_EndpointOfNetworkPipe (iSCSISession to iSCSIProtocolEndpoint).

Table 46 - SMI Referenced Properties/Methods for CIM_EndpointOfNetworkPipe (iSCSISession to iSCSIProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to iSCSIProtocolEndpoint
Dependent		Mandatory	Reference to iSCSISession

8.7.19 CIM_EthernetPort

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 47 describes class CIM_EthernetPort.

Table 47 - SMI Referenced Properties/Methods for CIM_EthernetPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	

Table 47 - SMI Referenced Properties/Methods for CIM_EthernetPort

Properties	Flags	Requirement	Description & Notes
OperationalStatus		Mandatory	
PermanentAddress	CD	Mandatory	

8.7.20 CIM_HostedAccessPoint (ComputerSystem to IPProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 48 describes class CIM_HostedAccessPoint (ComputerSystem to IPProtocolEndpoint).

Table 48 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (ComputerSystem to IPProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem
Dependent		Mandatory	Reference to IPProtocolEndpoint

8.7.21 CIM_HostedAccessPoint (ComputerSystem to TCPProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 49 describes class CIM_HostedAccessPoint (ComputerSystem to TCPProtocolEndpoint).

Table 49 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (ComputerSystem to TCPProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem
Dependent		Mandatory	Reference to TCPProtocolEndpoint

8.7.22 CIM_HostedAccessPoint (ComputerSystem to iSCSIProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 50 describes class CIM_HostedAccessPoint (ComputerSystem to iSCSIProtocolEndpoint).

Table 50 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (ComputerSystem to iSCSIProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem
Dependent		Mandatory	Reference to iSCSIProtocolEndpoint

8.7.23 CIM_HostedCollection

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Conditional. This is required if CIM_SystemSpecificCollection is used.

Table 51 describes class CIM_HostedCollection.

Table 51 - SMI Referenced Properties/Methods for CIM_HostedCollection

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem
Dependent		Mandatory	Reference to SystemSpecificCollection (iSCSIPortalGroup)

8.7.24 CIM_HostedService

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 52 describes class CIM_HostedService.

Table 52 - SMI Referenced Properties/Methods for CIM_HostedService

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem
Dependent		Mandatory	Reference to iSCSIConfigurationService

8.7.25 CIM_IPProtocolEndpoint

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Modified Instances

Table 53 describes class CIM_IPProtocolEndpoint.

Table 53 - SMI Referenced Properties/Methods for CIM_IPProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
IPv4Address	CD	Optional	
IPv6Address	CD	Optional	
ProtocolIFType		Mandatory	

8.7.26 CIM_iSCSICapabilities

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 54 describes class CIM_iSCSICapabilities.

Table 54 - SMI Referenced Properties/Methods for CIM_iSCSICapabilities

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
ElementName		Mandatory	
MinimumSpecificationVersionSupported		Mandatory	
MaximumSpecificationVersionSupported		Mandatory	
AuthenticationMethodsSupported		Mandatory	
SupportedFeatures		Mandatory	
OtherSupportedFeatures		Conditional	Required when the corresponding SupportedFeatures array element is set to the value "1" (Other). Each element that corresponds to a SupportedFeatures array element with a value other than "1" (Other) shall have a value of NULL

8.7.27 CIM_iSCSIConfigurationCapabilities

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Active configuration is supported (iSCSIConfigurationService is implemented).

Table 55 describes class CIM_iSCSIConfigurationCapabilities.

Table 55 - SMI Referenced Properties/Methods for CIM_iSCSIConfigurationCapabilities

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
ElementName		Mandatory	
iSCSINodeCreationSupported		Mandatory	
iSCSIProtocolEndpointCreationSupported		Mandatory	
IdentifierSelectionSupported		Mandatory	

8.7.28 CIM_iSCSIConfigurationService

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 56 describes class CIM_iSCSIConfigurationService

Table 56 - SMI Referenced Properties/Methods for CIM_iSCSIConfigurationService

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
CreateiSCSINode()		Optional	
DeleteiSCSINode()		Optional	
CreateiSCSIProtocolEndpoint()		Optional	
CreateiSCSIProtocolEndpointUsingCS()		Optional	
DeleteiSCSIProtocolEndpoint()		Optional	
BindiSCSIProtocolEndPoint()		Optional	

8.7.29 CIM_iSCSIConnection

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Modified Instances

Table 57 describes class CIM_iSCSIConnection.

Table 57 - SMI Referenced Properties/Methods for CIM_iSCSIConnection

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
ConnectionID		Mandatory	
MaxReceiveDataSegment Length		Mandatory	
MaxTransmitDataSegment Length		Mandatory	
HeaderDigestMethod		Mandatory	
OtherHeaderDigestMethod		Conditional	Required when HeaderDigestMethod is Other
DataDigestMethod		Mandatory	
OtherDataDigestMethod		Conditional	Required when DataDigestMethod is Other
ReceivingMarkers		Mandatory	
SendingMarkers		Mandatory	
ActiveiSCSIVersion		Mandatory	
AuthenticationMethodUsed		Mandatory	
MutualAuthentication		Mandatory	

8.7.30 CIM_iSCSIConnectionSettings

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 58 describes class CIM_iSCSIConnectionSettings.

Table 58 - SMI Referenced Properties/Methods for CIM_iSCSIConnectionSettings

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
ElementName		Mandatory	
MaxReceiveDataSegment Length		Mandatory	
PrimaryHeaderDigestMethod		Mandatory	
OtherPrimaryHeaderDigestMethod		Conditional	Required when PrimaryHeaderDigestMethod is Other
PrimaryDataDigestMethod		Mandatory	
OtherPrimaryDataDigestMethod		Conditional	Required when PrimaryDataDigestMethod is Other

Table 58 - SMI Referenced Properties/Methods for CIM_iSCSIConnectionSettings

Properties	Flags	Requirement	Description & Notes
SecondaryHeaderDigestMethod		Mandatory	
OtherSecondaryHeaderDigestMethod		Conditional	Required when SecondaryHeaderDigestMethod is Other
SecondaryDataDigestMethod		Mandatory	
OtherSecondaryDataDigestMethod		Conditional	Required when SecondaryDataDigestMethod is Other
RequestingMarkersOnReceive		Mandatory	
PrimaryAuthenticationMethod		Mandatory	
SecondaryAuthenticationMethod		Mandatory	

8.7.31 CIM_iSCSILoginStatistics

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 59 describes class CIM_iSCSILoginStatistics.

Table 59 - SMI Referenced Properties/Methods for CIM_iSCSILoginStatistics

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
ElementName		Mandatory	
LoginFailures		Optional	
LastLoginFailureTime		Optional	
LastSessionFailureType		Optional	
OtherLastLoginFailureType		Conditional	Required when LastLoginFailureType is Other
LastLoginFailureRemoteNodeName		Optional	
LastLoginFailureRemoteAddressType		Optional	
LastLoginFailureRemoteAddress		Optional	
SuccessfulLogins		Optional	
NegotiationLoginFailures		Optional	
AuthenticationLoginFailures		Optional	

Table 59 - SMI Referenced Properties/Methods for CIM_iSCSILoginStatistics

Properties	Flags	Requirement	Description & Notes
AuthorizationLoginFailures		Optional	
LoginRedirects		Optional	
OtherLoginFailures		Optional	
NormalLogouts		Optional	
OtherLogouts		Optional	

8.7.32 CIM_iSCSIProtocolEndpoint

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 60 describes class CIM_iSCSIProtocolEndpoint.

Table 60 - SMI Referenced Properties/Methods for CIM_iSCSIProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name	CD	Mandatory	Shall contain the iSCSI port name as described in the iSCSI RFC (currently http://www.ietf.org/rfc/rfc3720.txt) - < iSCSI node name> + ',t,' + TPGT for targets
ConnectionType		Mandatory	iSCSI.
Identifier		Mandatory	Shall contain the TPGT.
ProtocolIFType		Mandatory	Other.
OtherTypeDescription		Mandatory	Shall be "iSCSI"
Role		Mandatory	Shall be 3 (Target) or 4 (Both Initiator and Target).

8.7.33 CIM_iSCSISession

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').

Table 61 describes class CIM_iSCSI_Session.

Table 61 - SMI Referenced Properties/Methods for CIM_iSCSI_Session

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
Directionality		Mandatory	
SessionType		Mandatory	
TSIH		Mandatory	
EndPointName		Mandatory	
CurrentConnections		Mandatory	
InitialR2T		Mandatory	
ImmediateData		Mandatory	
MaxOutstandingR2T		Mandatory	
MaxUnsolicitedFirstDataBurstLength		Mandatory	
MaxDataBurstLength		Mandatory	
DataSequenceInOrder		Mandatory	
DataPDUInOrder		Mandatory	
ErrorRecoveryLevel		Mandatory	
MaxConnectionsPerSession		Mandatory	
DefaultTimeToWait		Mandatory	
DefaultTimeToRetain		Mandatory	

8.7.34 CIM_iSCSI_SessionFailures

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 62 describes class CIM_iSCSI_SessionFailures.

Table 62 - SMI Referenced Properties/Methods for CIM_iSCSI_SessionFailures

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
ElementName		Mandatory	
SessionFailures		Optional	
LastSessionFailureType		Optional	
OtherLastSessionFailureType		Conditional	Required when LastSessionFailureType is Other

Table 62 - SMI Referenced Properties/Methods for CIM_iSCSISessionFailures

Properties	Flags	Requirement	Description & Notes
LastSessionFailureRemote NodeName		Optional	
SessionDigestFailures		Optional	
SessionConnectionTimeou tFailures		Optional	
SessionFormatErrors		Optional	

8.7.35 CIM_iSCSISessionSettings

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: This is required if CIM_iSCSICapabilities.SupportedFeatures = '3' ('iSCSI Session').

Table 63 describes class CIM_iSCSISessionSettings.

Table 63 - SMI Referenced Properties/Methods for CIM_iSCSISessionSettings

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
ElementName		Mandatory	
MaxConnectionsPerSession		Mandatory	
InitialR2TPreference		Mandatory	
ImmediateDataPreference		Mandatory	
MaxOutstandingR2T		Mandatory	
MaxUnsolicitedFirstDataBurstLength		Mandatory	
MaxDataBurstLength		Mandatory	
DataSequenceInOrderPreference		Mandatory	
DataPDUIInOrderPreference		Mandatory	
DefaultTimeToWaitPreference		Mandatory	
DefaultTimeToRetainPreference		Mandatory	
ErrorRecoveryLevelPreference		Mandatory	

8.7.36 CIM_iSCSISessionStatistics

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 64 describes class CIM_iSCSIStatistics.

Table 64 - SMI Referenced Properties/Methods for CIM_iSCSIStatistics

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
ElementName		Mandatory	
CommandPDUsTransferred		Optional	
ResponsePDUsTransferred		Optional	
BytesTransmitted		Optional	
BytesReceived		Optional	
DigestErrors		Optional	
ConnectionTimeoutErrors		Optional	

8.7.37 CIM_MemberOfCollection

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 65 describes class CIM_MemberOfCollection.

Table 65 - SMI Referenced Properties/Methods for CIM_MemberOfCollection

Properties	Flags	Requirement	Description & Notes
Collection		Mandatory	Reference to SystemSpecificCollection (iSCSIPortalGroup)
Member		Mandatory	Reference to TCPProtocolEndpoint

8.7.38 CIM_NetworkPipeComposition

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 66 describes class CIM_NetworkPipeComposition.

Table 66 - SMI Referenced Properties/Methods for CIM_NetworkPipeComposition

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to iSCSIConnection
PartComponent		Mandatory	Reference to iSCSIStatistics

8.7.39 CIM_SAPAvailableForElement

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 67 describes class CIM_SAPAvailableForElement

Table 67 - SMI Referenced Properties/Methods for CIM_SAPAvailableForElement

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to SCSIProtocolController
AvailableSAP		Mandatory	Reference to iSCSIProtocolEndpoint

8.7.40 CIM_SCSIProtocolController

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 68 describes class CIM_SCSIProtocolController.

Table 68 - SMI Referenced Properties/Methods for CIM_SCSIProtocolController

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
ElementName		Mandatory	iSCSI Alias.
Name	CD	Mandatory	
NameFormat		Mandatory	Shall be '3' iSCSI Name

8.7.41 CIM_SystemDevice (ComputerSystem to EthernetPort)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Required if an instance of CIM_Ethernet Port has been implemented.

Modified Instances

Table 69 describes class CIM_SystemDevice (ComputerSystem to EthernetPort).

Table 69 - SMI Referenced Properties/Methods for CIM_SystemDevice (ComputerSystem to EthernetPort)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem
PartComponent		Mandatory	Reference to EthernetPort

8.7.42 CIM_SystemDevice (ComputerSystem to SCSIProtocolController)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 70 describes class CIM_SystemDevice (ComputerSystem to SCSIProtocolController).

Table 70 - SMI Referenced Properties/Methods for CIM_SystemDevice (ComputerSystem to SCSIProtocolController)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem
PartComponent		Mandatory	Reference to SCSIProtocolController

8.7.43 CIM_SystemSpecificCollection

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 71 describes class CIM_SystemSpecificCollection (iSCSIPortalGroup).

Table 71 - SMI Referenced Properties/Methods for CIM_SystemSpecificCollection

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
ElementName		Mandatory	

8.7.44 CIM_TCPProtocolEndpoint

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 72 describes class CIM_TCPProtocolEndpoint.

Table 72 - SMI Referenced Properties/Methods for CIM_TCPProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
PortNumber		Mandatory	
ProtocolIFType		Mandatory	

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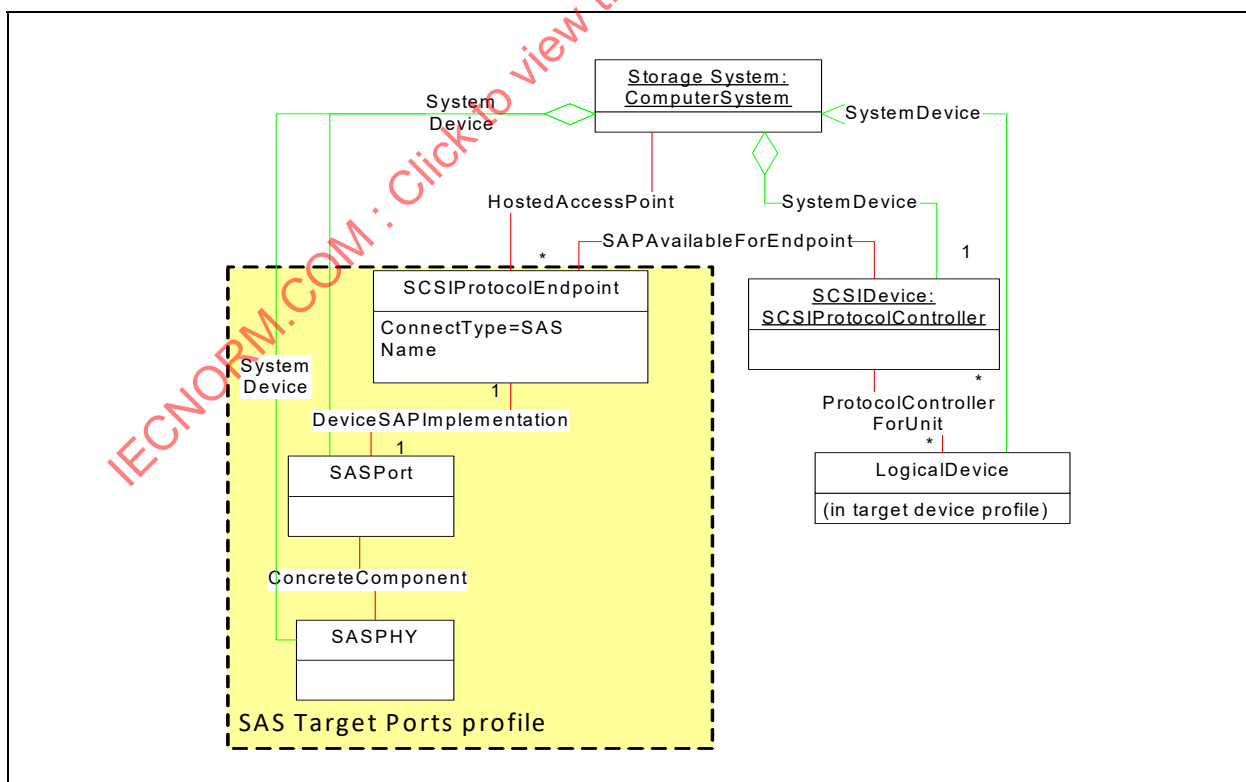
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STABLE**9 Serial Attached SCSI (SAS) Target Ports Profile****9.1 Synopsis****Profile Name:** SAS Target Ports (Component Profile)**Version:** 1.7.0**Organization:** SNIA**Central Class:** CIM_SASPort**Scoping Class:** a CIM_System in a separate autonomous profile**Specializes:** SNIA Generic Target Ports version 1.4.0**Related Profiles:** Table 73 describes the related profiles for SAS Target Ports.**Table 73 - Related Profiles for SAS Target Ports**

Profile Name	Organization	Version	Requirement	Description
Indications	DMTF	1.2.2	Mandatory	See DSP1054, version 1.2.2

9.2 Description

Figure 14 illustrates the Serial Attached SCSI (SAS) Target Port. Serial Attached SCSI is a lower cost network interface for SCSI communication.

**Figure 14 - Serial Attached SCSI (SAS) Target Port Instance Diagram**

SCSIProtocolEndpoint.ConnectionType shall be set to "SAS". SASPort represents the port and is connected to SCSIProtocolEndpoint by DeviceSAPImplementation. The SASPort contains information about the speed for the bus.

The SASPHY class represents a SAS PHY. A SAS Port may have multiple associated PHYs; generally, all the PHYs are connected to the same initiator or expander and provide additional bandwidth.

9.3 Health and Fault Management

Table 74 describes SASPort OperationalStatus.

Table 74 - SASPort OperationalStatus

OperationalStatus	Description
OK	Port is online
Error	Port has a failure
Stopped	Port is disabled
InService	Port is in Self Test
Unknown	

9.4 Methods

9.4.1 Extrinsic Methods of this Profile

Not defined in this document

9.4.2 Intrinsic Methods of this Profile

The profile supports read methods and association traversal. Specifically, the list of intrinsic operations supported are as follows:

- GetInstance
- Associators
- AssociatorNames
- References
- ReferenceNames
- EnumerateInstances
- EnumerateInstanceNames

9.5 Client Considerations and Recipes

No recipes are defined in this version of the standard.

9.6 CIM Elements

9.6.1 Overview

Table 75 describes the CIM elements for SAS Target Ports.

Table 75 - CIM Elements for SAS Target Ports

Element Name	Requirement	Description
9.6.2 CIM_ConcreteComponent	Mandatory	Associates SASPort and SASPHY.
9.6.3 CIM_DeviceSAPImplementation	Mandatory	Associates SASPort and SCSIProtocolEndpoint.
9.6.4 CIM_HostedAccessPoint	Mandatory	Associates ComputerSystem to ProtocolEndpoint.
9.6.5 CIM_SASPort	Mandatory	Represents the logical aspects of the physical port and may have multiple associated protocols.
9.6.6 CIM_SCSIProtocolEndpoint	Mandatory	Represents management characteristics related to the SCSI command set.
9.6.7 CIM_SystemDevice (Port)	Mandatory	Associates ComputerSystem to LogicalPort.
9.6.8 CIM_SystemDevice (SAS PHY)	Mandatory	Associates ComputerSystem to SASPHY.
9.6.9 CIM_SASPHY	Mandatory	Several SASPHYs may together be aggregated into a SAS Logical Port.
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_SASPort	Mandatory	CQL -Create SASPort.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_SASPort AND SourceInstance.CIM_SASPort::OperationalStatus <> PreviousInstance.CIM_SASPort::OperationalStatus	Mandatory	CQL -Modify SASPort.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_SASPort	Mandatory	CQL -Delete SASPort.

9.6.2 CIM_ConcreteComponent

Associates SASPort and SASPHY.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 76 describes class CIM_ConcreteComponent.

Table 76 - SMI Referenced Properties/Methods for CIM_ConcreteComponent

Properties	Flags	Requirement	Description & Notes
PartComponent		Mandatory	Reference to SASPHY.
GroupComponent		Mandatory	Reference to SASPort.

9.6.3 CIM_DeviceSAPImplementation

Associates SASPort and SCSIProtocolEndpoint. The class definition specializes the CIM_DeviceSAPImplementation definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 77 describes class CIM_DeviceSAPImplementation.

Table 77 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation

Properties	Flags	Requirement	Description & Notes
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint.
Antecedent (overridden)		Mandatory	Reference to SASPort.

9.6.4 CIM_HostedAccessPoint

Associates ComputerSystem to ProtocolEndpoint. Limit to targets. The class definition specializes the CIM_HostedAccessPoint definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 78 describes class CIM_HostedAccessPoint.

Table 78 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in the referencing profile.
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint.

9.6.5 CIM_SASPort

Represents the logical aspects of the physical port and may have multiple associated protocols. The class definition specializes the CIM_LogicalPort definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 79 describes class CIM_SASPort.

Table 79 - SMI Referenced Properties/Methods for CIM_SASPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
OperationalStatus		Mandatory	
UsageRestriction (overridden)		Mandatory	Shall be 2 (Front-end Only).
PortType (overridden)		Mandatory	Shall be 94 (SAS).
PermanentAddress (added)		Mandatory	SAS Address. Shall be 16 un-separated upper case hex digits.

9.6.6 CIM_SCSIProtocolEndpoint

Represents management characteristics related to the SCSI command set. The class definition specializes the CIM_ProtocolEndpoint definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 80 describes class CIM_SCSIProtocolEndpoint.

Table 80 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
ProtocolType		Mandatory	Shall be 1 (Other).
OtherTypeDescription (overridden)		Mandatory	Shall be the string 'SCSI'.
ConnectionType (added)		Mandatory	Shall be 8 (SAS).
Role (added)		Mandatory	Shall be 3 (Target).

9.6.7 CIM_SystemDevice (Port)

Associates ComputerSystem to LogicalPort. The class definition specializes the CIM_SystemDevice definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 81 describes class CIM_SystemDevice (Port).

Table 81 - SMI Referenced Properties/Methods for CIM_SystemDevice (Port)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem in the referencing profile.
PartComponent (overridden)		Mandatory	Reference to SASPort.

9.6.8 CIM_SystemDevice (SAS PHY)

Associates ComputerSystem to SASPHY.

Requirement: Mandatory

Table 82 describes class CIM_SystemDevice (SAS PHY).

Table 82 - SMI Referenced Properties/Methods for CIM_SystemDevice (SAS PHY)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem.
PartComponent		Mandatory	Reference to SASPHY.

9.6.9 CIM_SASPHY

Several SASPHYs may together be aggregated into a SAS Logical Port.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 83 describes class CIM_SASPHY.

Table 83 - SMI Referenced Properties/Methods for CIM_SASPHY

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
HardwareMinimumPhysicalLinkRate		Mandatory	
HardwareMaximumPhysicalLinkRate		Mandatory	
ProgrammedMinimumPhysicalLinkRate		Mandatory	
ProgrammedMaximumPhysicalLinkRate		Mandatory	
NegotiatedPhysicalLinkRate		Mandatory	

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10 Serial ATA (SATA) Target Ports Profile

The functionality of the Experimental SATA Target Ports Profile has been removed.

The Serial ATA Target Ports Profile is defined in Clause 11 of SMI-S 1.6.1

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EXPERIMENTAL
11 SB Target Ports Profile**11.1 Synopsis****Profile Name:** SB Target Ports (Component Profile)**Version:** 1.7.0**Organization:** SNIA**Central Class:** FCPort**Scoping Class:** ComputerSystem**Specializes:** SNIA Generic Target Ports version 1.4.0**Related Profiles:** Table 84 describes the related profiles for SB Target Ports.**Table 84 - Related Profiles for SB Target Ports**

Profile Name	Organization	Version	Requirement	Description
Indications	DMTF	1.2.2	Mandatory	See DSP1054, version 1.2.2

11.2 Description

The SB Target Port Profile models the SB (Single Byte) Fibre Channel specific aspects of a target storage system. The Single Byte protocols are FC4 protocols that support mainframe IO (as opposed to SCSI, which supports IO from non-mainframe systems such as Unix or Windows systems).

The SB Target Port Profile provides a way for storage profiles to model target ports that are dedicated to serving SB hosts attachment. With this support a client will be able to distinguish FC ports that are provided for SCSI access from FC Ports that are provided for mainframe attachment. This is an important distinction for management, since fabric connectivity collections for SB would typically be separate for fabric connectivity collections for SCSI. Similarly, management functions for masking and mapping are somewhat different for SB than SCSI. So, it is important for management applications to be aware of the distinctions.

The SB Target Port Profile specializes the Generic Target Port Profile.

For SB enabled Fibre Channel ports, the concrete subclass of LogicalPort is FCPort. FCPort is always associated 1-1 with a SBProtocolEndpoint instance.

11.3 Implementation

Figure 15 illustrates the SB Target Port Profile.

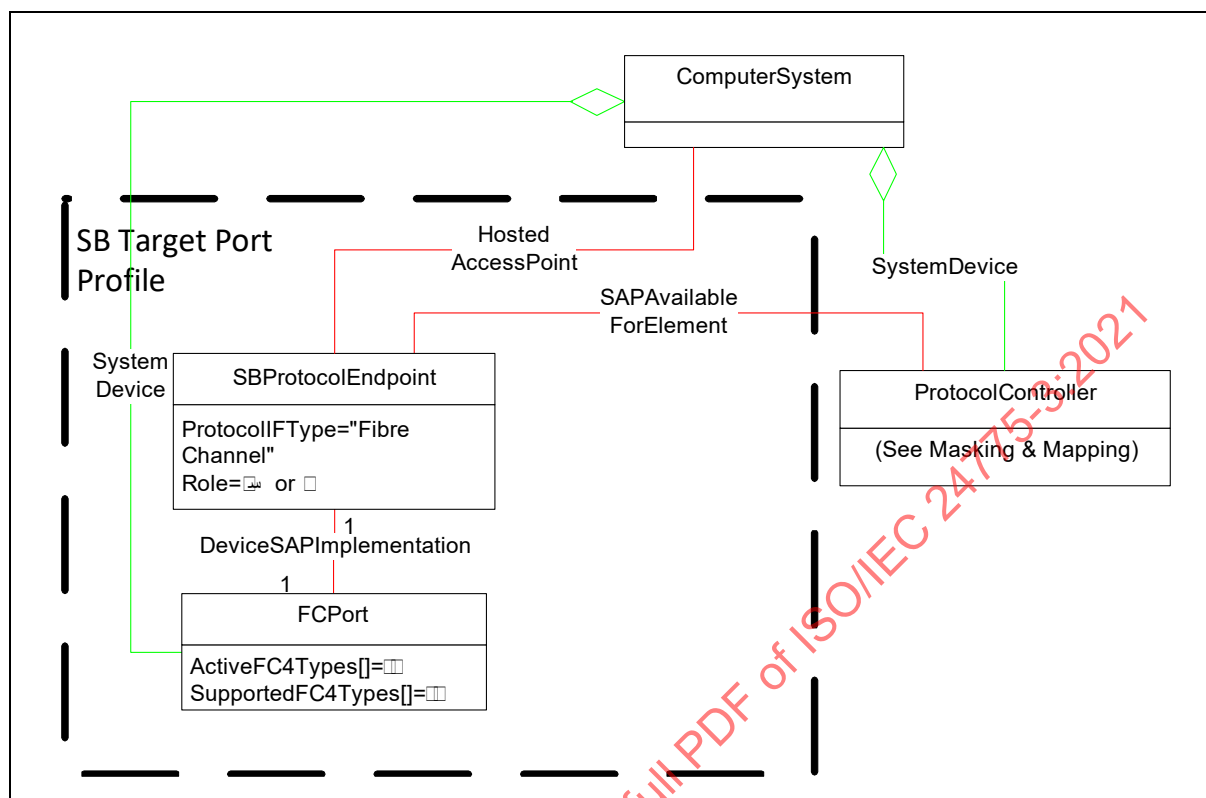


Figure 15 - SB Target Port Instance Diagram

SB Ports are Fibre Channel Ports with the SupportedFC4Types[] and ActiveFC4Types[] arrays holding the value “28” (for “FC-SB-2 Control Unit”). The SupportedFC4Types[] property shall contain the value “28”. The ActiveFC4Types[] property shall contain the value “28” for FCPorts that are actively supporting SB protocols.

The FCPort shall also support an SBProtocolEndpoint with a role property of either “3” (“Target”) or “4” (“Both initiator and target”).

For the SB Target Port Profile, the FCPort is the central class of the Profile.

11.4 Health and Fault Management Consideration

Table 85 defines the SMI-S defined meanings of the OperationalStatus property for FCPorts used in the SB Target Port Profile.

Table 85 - FCPort OperationalStatus

OperationalStatus	Description
OK	Port is online
Error	Port has a failure
Stopped	Port is disabled
InService	Port is in self test
Unknown	

11.5 Cascading Considerations

Not defined in this document

11.6 Methods of the Profile

11.6.1 Extrinsic Methods of the Profile

Not defined in this document

11.6.2 Intrinsic Methods of the Profile

The profile supports read methods and association traversal. Specifically, the list of intrinsic operations supported are as follows:

- GetInstance
- Associators
- AssociatorNames
- References
- ReferenceNames
- EnumerateInstances
- EnumerateInstanceNames

11.7 Client Considerations and Recipes

No recipes are defined in this version of the standard.

11.8 CIM Elements

11.8.1 Overview

Table 86 describes the CIM elements for SB Target Ports.

Table 86 - CIM Elements for SB Target Ports

Element Name	Requirement	Description
11.8.2 CIM_DeviceSAPImplementation	Mandatory	Associates front-end FCPort and target SBProtocolEndpoint.
11.8.3 CIM_FCPort	Mandatory	The FCPort provides transport for SB protocols.
11.8.4 CIM_HostedAccessPoint	Mandatory	Associates ComputerSystem to SBProtocolEndpoint.
11.8.5 CIM_SystemDevice (Port)	Mandatory	Associates controller ComputerSystem to FCPort.
11.8.6 CIM_SBProtocolEndpoint	Mandatory	This defines the protocol being used on the FC Port as SB (Single Byte).
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_FCPort	Mandatory	Create FCPort.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_FCPort AND SourceInstance.CIM_FCPort::OperationalStatus <> PreviousInstance.CIM_FCPort::OperationalStatus	Mandatory	CQL -Change to FCPort OperationalStatus.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_FCPort	Mandatory	Delete FCPort.

11.8.2 CIM_DeviceSAPImplementation

Associates front-end FCPort and target SBProtocolEndpoint. Limit to target ProtocolEndpoints and front-end ports. The class definition specializes the CIM_DeviceSAPImplementation definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 87 describes class CIM_DeviceSAPImplementation.

Table 87 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation

Properties	Flags	Requirement	Description & Notes
Antecedent (overridden)		Mandatory	Reference to FCPort
Dependent (overridden)		Mandatory	Reference to SBProtocolEndpoint

11.8.3 CIM_FCPort

The CIM_FCPort class for SB Target Ports is the same as the FC Target Port class, except that the SupportedFC4Types and ActiveFC4Types properties are mandatory, and the SupportedFC4Types shall contain "28" and the ActiveFC4Types should contain "28" to indicate support for FC-SB-2 Control Unit functions. The class definition specializes the CIM_LogicalPort definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 88 describes class CIM_FCPort.

Table 88 - SMI Referenced Properties/Methods for CIM_FCPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
OperationalStatus		Mandatory	
UsageRestriction (overridden)		Mandatory	Shall be 2 (Front-end Only).
PortType (overridden)		Optional	Shall be 0 1 10 11 12 13 14 15 16 17 18 (Unknown or Other or N or NL or F/NL or Nx or E or F or FL or B or G).
OtherPortType		Conditional	Required when PortType is Other
PermanentAddress (added)	CD	Mandatory	Port WWN. Shall be 16 unseparated uppercase hex digits.

Table 88 - SMI Referenced Properties/Methods for CIM_FCPort

Properties	Flags	Requirement	Description & Notes
SupportedCOS (added)		Optional	
ActiveCOS (added)		Optional	
SupportedFC4Types (added)		Mandatory	For SB Target Ports this array shall contain 28 (FC-SB-2 Control Unit).
ActiveFC4Types (added)		Mandatory	For SB Target Ports this array should contain 28 (FC-SB-2 Control Unit).

11.8.4 CIM_HostedAccessPoint

Associates ComputerSystem to SBProtocolEndpoint. Limit to targets (Role = 3). The class definition specializes the CIM_HostedAccessPoint definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 89 describes class CIM_HostedAccessPoint.

Table 89 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in the referencing profile.
Dependent (overridden)		Mandatory	Reference to SBProtocolEndpoint.

11.8.5 CIM_SystemDevice (Port)

Associates controller ComputerSystem to FCPort. The class definition specializes the CIM_SystemDevice definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 90 describes class CIM_SystemDevice (Port).

Table 90 - SMI Referenced Properties/Methods for CIM_SystemDevice (Port)

Properties	Flags	Requirement	Description & Notes
GroupComponent (overridden)		Mandatory	Reference to ComputerSystem in the referencing profile.
PartComponent (overridden)		Mandatory	Reference to FCPort.

11.8.6 CIM_SBProtocolEndpoint

The CIM_SBProtocolEndpoint specializes the Generic Target Port CIM_ProtocolEndpoint. The main difference is that the OtherTypeDescription is set to "SB". The class definition specializes the CIM_ProtocolEndpoint definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 91 describes class CIM_SBProtocolEndpoint.

Table 91 - SMI Referenced Properties/Methods for CIM_SBProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
ProtocolIFType		Mandatory	Shall be 1 (Other).
OtherTypeDescription (overridden)		Mandatory	Shall be the string 'SB'.
Role (added)		Mandatory	Shall be 3 (Target).
ConnectionType (added)		Mandatory	Shall be 2 (Fibre Channel).

EXPERIMENTAL

STABLE**12 Direct Attach (DA) Ports Profile****12.1 Synopsis**

Profile Name: Direct Access Ports (Component Profile)

Version: 1.4.0

Organization: SNIA

Central Class: DAPort

Scoping Class: ComputerSystem in a separate autonomous profile

Specializes: SNIA Generic Target Ports version 1.4.0

Related Profiles: Not defined in this document.

12.2 Description

The DAPort (Direct Attach) port models storage systems that attach directly to buses in a host system (e.g., PCI, PCI-E, and chip interfaces on a motherboard). The DAPort can be viewed as both the initiator and Target ports.

This port can not be used with the LUN Mapping and Masking Profile. All volumes served by this port are fully accessible by the host system.

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Figure 16 illustrates the Direct Attach (DA) Ports Profile. Volumes served by this port shall be discovered and presented by the Host Discovered Resources Profile.

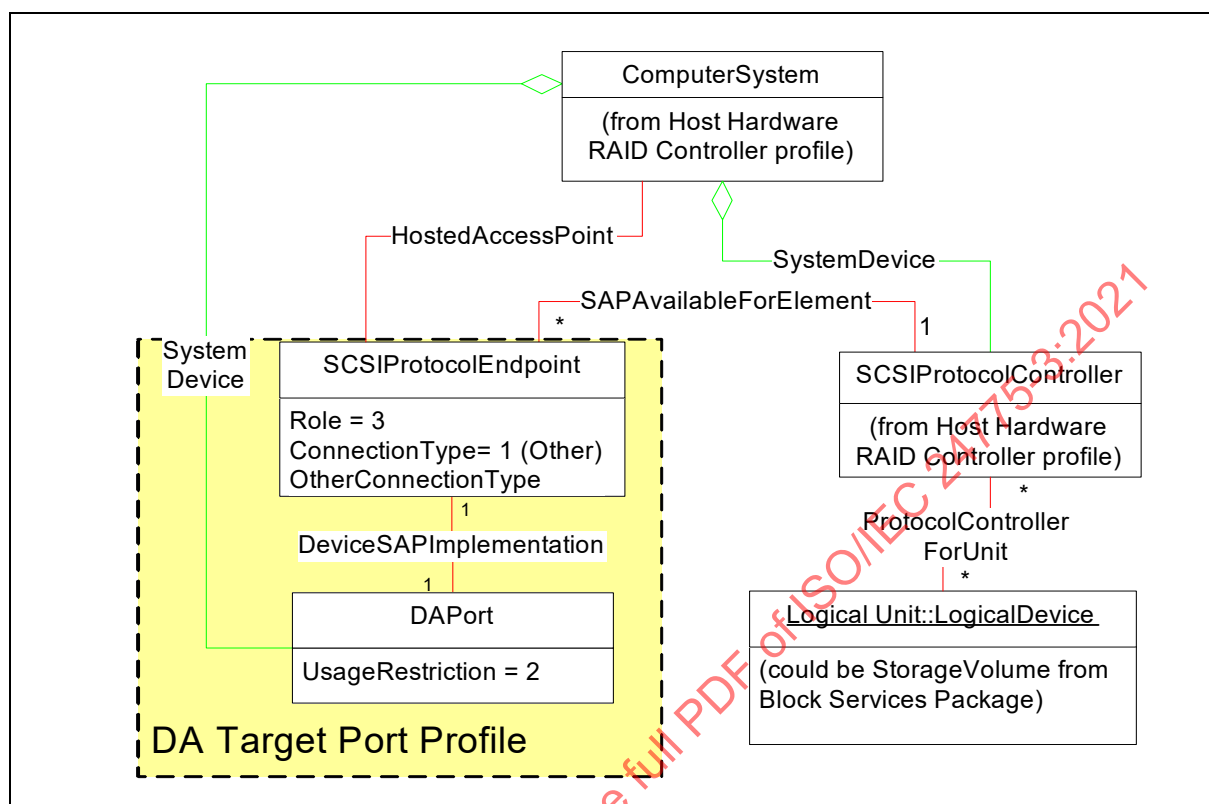


Figure 16 - DA Port Instance Diagram

The DAPort class is connected to the ProtocolEndpoint using the DeviceSAPImplementation association and to the controller ComputerSystem (in the Host Hardware RAID Controller Profile) using SystemDevice. SCSIProtocolController is associated to the controller ComputerSystem from the same ComputerSystem using HostedAccessPoint.

12.3 Health and Fault Management

Not defined in this document.

12.4 Extrinsic Methods

Not defined in this document.

12.5 Use Cases

Not defined in this version of the standard.

12.6 CIM Elements

12.6.1 Overview

Table 92 describes the CIM elements for DA Target Ports.

Table 92 - CIM Elements for DA Target Ports

Element Name	Requirement	Description
12.6.2 CIM_DAPort	Mandatory	Models the "port" emulated by a host RAID controller.
12.6.3 CIM_DeviceSAPImplementation	Mandatory	Associates DAPort and SCSIProtocolEndpoint.
12.6.4 CIM_HostedAccessPoint	Mandatory	Associates ComputerSystem to SCSIProtocolEndpoint.
12.6.5 CIM_SCSIProtocolEndpoint	Mandatory	ProtocolEndpoint representing support for SCSI.
12.6.6 CIM_SystemDevice (Port)	Mandatory	Associates controller ComputerSystem to DAPort.

12.6.2 CIM_DAPort

Models the "port" emulated by a host RAID controller. The class definition specializes the CIM_LogicalPort definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 93 describes class CIM_DAPort.

Table 93 - SMI Referenced Properties/Methods for CIM_DAPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
OperationalStatus		Mandatory	
UsageRestriction (overridden)		Mandatory	Shall be 2 (Front-end Only).
PortType (overridden)		Optional	Not defined in this version of the standard.

12.6.3 CIM_DeviceSAPImplementation

Associates DAPort and SCSIProtocolEndpoint. The class definition specializes the CIM_DeviceSAPImplementation definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 94 describes class CIM_DeviceSAPImplementation.

Table 94 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation

Properties	Flags	Requirement	Description & Notes
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint.
Antecedent (overridden)		Mandatory	Reference to DAPort.

12.6.4 CIM_HostedAccessPoint

Associates ComputerSystem to SCSIProtocolEndpoint. Limit to targets. The class definition specializes the CIM_HostedAccessPoint definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 95 describes class CIM_HostedAccessPoint.

Table 95 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint

Properties	Flags	Requirement	Description & Notes
Antecedent (overridden)		Mandatory	Reference to controller ComputerSystem.
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint.

12.6.5 CIM_SCSIProtocolEndpoint

ProtocolEndpoint representing support for SCSI. The class definition specializes the CIM_ProtocolEndpoint definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column..

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 96 describes class CIM_SCSIProtocolEndpoint.

Table 96 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
ProtocolIFType		Mandatory	Shall be 1 (Other).

Table 96 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
OtherTypeDescription (overridden)		Mandatory	Shall be the string 'SCSI'.
Role (added)		Mandatory	Shall be 3 (Target).
ConnectionType (added)		Mandatory	Shall be 1 (Other).
OtherConnectionType (added)		Mandatory	

12.6.6 CIM_SystemDevice (Port)

Associates controller ComputerSystem to DAPort. The class definition specializes the CIM_SystemDevice definition in the Generic Target Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 97 describes class CIM_SystemDevice (Port).

Table 97 - SMI Referenced Properties/Methods for CIM_SystemDevice (Port)

Properties	Flags	Requirement	Description & Notes
GroupComponent (overridden)		Mandatory	Reference to controller ComputerSystem.
PartComponent (overridden)		Mandatory	Reference to DAPort.

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IMPLEMENTED

13 Generic Initiator Ports Profile

13.1 Synopsis

Profile name: Generic Initiator Ports

Version: 1.7.0

Organization: SNIA

Central Class: LogicalPort

Scoping Class: a ComputerSystem in a separate autonomous profile

Related Profiles: Table 98 describes the related profiles for Generic Initiator Ports.

Table 98 - Concrete Initiator Ports Profiles

Profile Name	Organization	Version	Requirement	Description
FC Initiator Ports	SNIA	1.7.0	Optional	
SAS Initiator Ports	SNIA	1.7.0	Optional	
SB Initiator Ports	SNIA	1.7.0	Optional	Experimental.
FCoE Initiator Ports	SNIA	1.6.0	Optional	Experimental.

The Generic Initiator Port Profile models the generic management interfaces of initiator ports in host adaptors or storage systems.

This abstract profile specification shall not be directly implemented; implementations shall be based on a profile specification that specializes the requirements of this profile.

13.2 Description

The Generic Initiator Port Profile models the generic behavior of initiator ports in host adaptors. It uses the same primary classes as the Generic Target Port Profile (see 5 Generic Target Ports Profile)

13.3 Implementation

13.3.1 Overview

The initiator port is modeled as a ProtocolEndpoint connected to a LogicalPort.

The LogicalDevice instances may represent local storage (embedded in the system containing the initiator ports) or remote storage. When it represents remote storage the Name and NameFormat properties are used as correlatable ids to reference the remote device. When the LogicalDevice represents local disk storage, it may be represented as an instance of StorageVolume (subclass of LogicalDevice) or part of an instance of the Disk Drive Lite Profile. A property on LogicalPort called UsageRestriction is available to indicate whether the controller is capable of providing a “front end” (target), a “back end” (initiator), or both interfaces.

Figure 17: "Generic Initiator Port Model" depicts the generic model

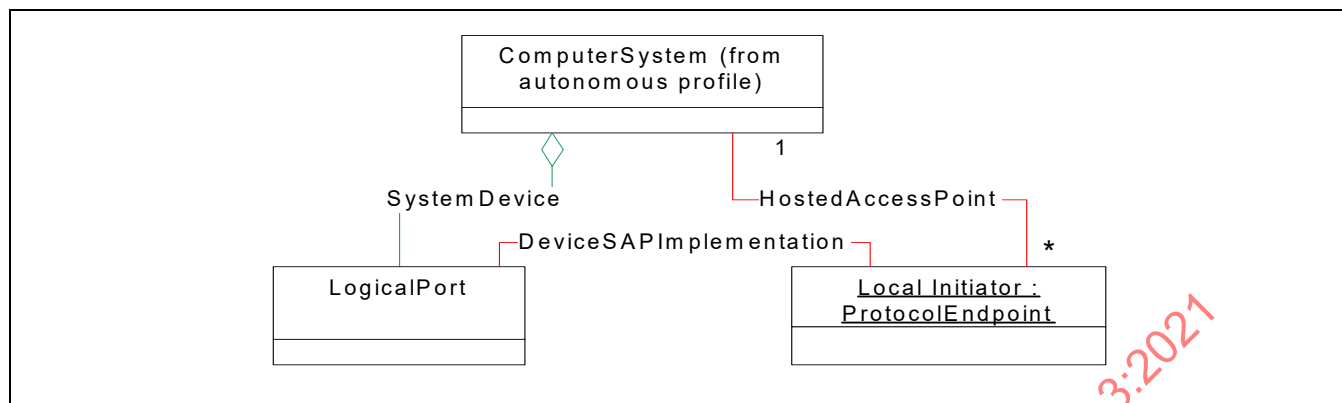


Figure 17 - Generic Initiator Port Model

13.3.2 Remote Device Models

The implementation may optionally include discovered remote elements. There are two optional approaches to modeling remote elements, depending on the capabilities of the underlying host drivers

The first approach is to model a collection of ports representing the local and remote ports that are known to be connected. This approach is appropriate for ATA device and when the underlying drivers or software is limited to information about remote ports and does not include details of the logical devices connected to remote ports. Figure 18 depicts the optional connectivity collection model.

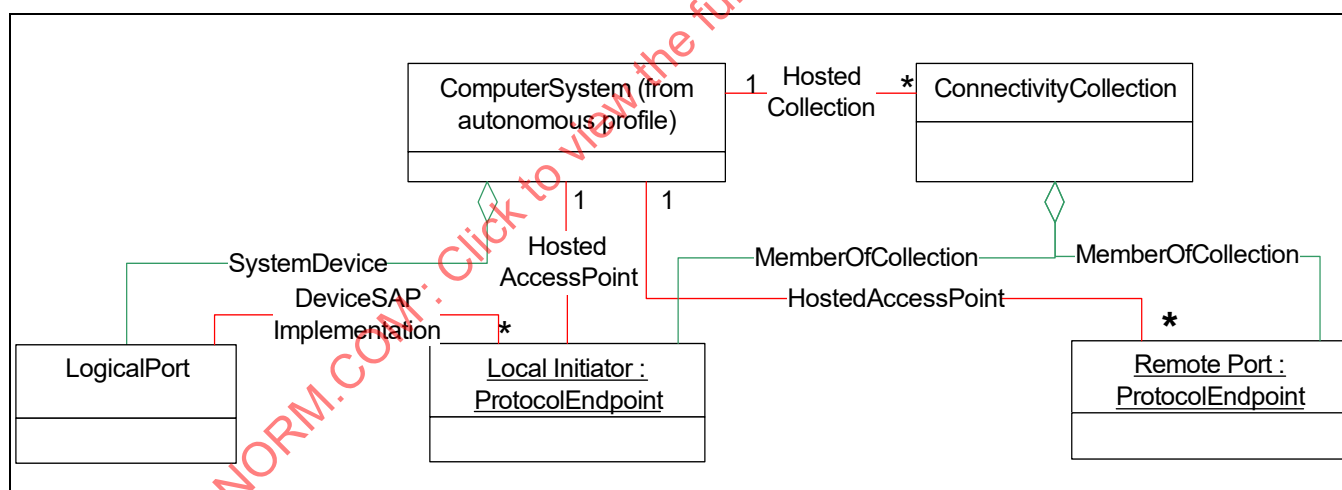


Figure 18 - Optional Connectivity Collection Model

The nature of membership in the collection varies with transports and configuration options. For example, in a parallel SCSI environment, the ConnectivityCollection includes all initiators/targets attached to the bus. In an FC fabric environment, the ConnectivityCollection contains ports that share a zone. In many cases, the ConnectivityCollection could include remote initiators as well as remote devices.

The second approach to modeling remote devices is to include the full initiator/target/logical-unit path model that describes multipath connectivity. This approach has the advantage of including the logical units and including the full path connectivity. The disadvantage is that some OSes handle multipath

support in different components from HBA support, making it more efficient to provide the multipath model as part of the Host Discovered Resources Profile. Figure 19 depicts the optional full-path model.

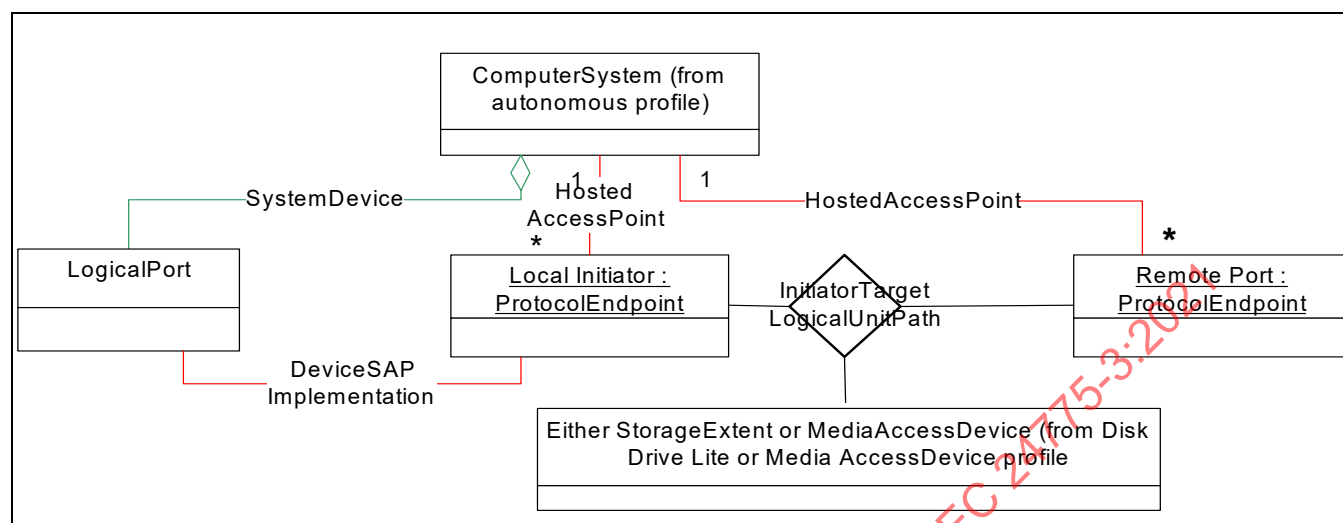


Figure 19 - Optional Full-Path Model

The instrumentation may support the full-path and connectivity collection options by making appropriate ProtocolEndpoints members of ConnectivityCollections.

13.3.3 Optional Model for Attached Disks

Disks are modeled using the full-path model and the Disk Drive Lite Profile. The appropriate subclass of InitiatorTargetLogicalUnitPath shall be dependent on whether the disks use the SCSI, ATA or SB command set. This association references StorageExtent and initiator and target ProtocolEndpoints. The association also provides the disk's logical unit number. The target ProtocolEndpoint referenced from InitiatorTargetLogicalUnitPath shall be the ProtocolEndpoint from the Disk Drive Lite Profile associated indirectly to StorageExtent via DiskDrive. This is the same ProtocolEndpoint described as the optional remote ProtocolEndpoint in initiator ports profiles.

The ProtocolEndpoints may be associated to a ConnectivityCollection representing a collection of logically connected devices, as illustrated in Figure 20.

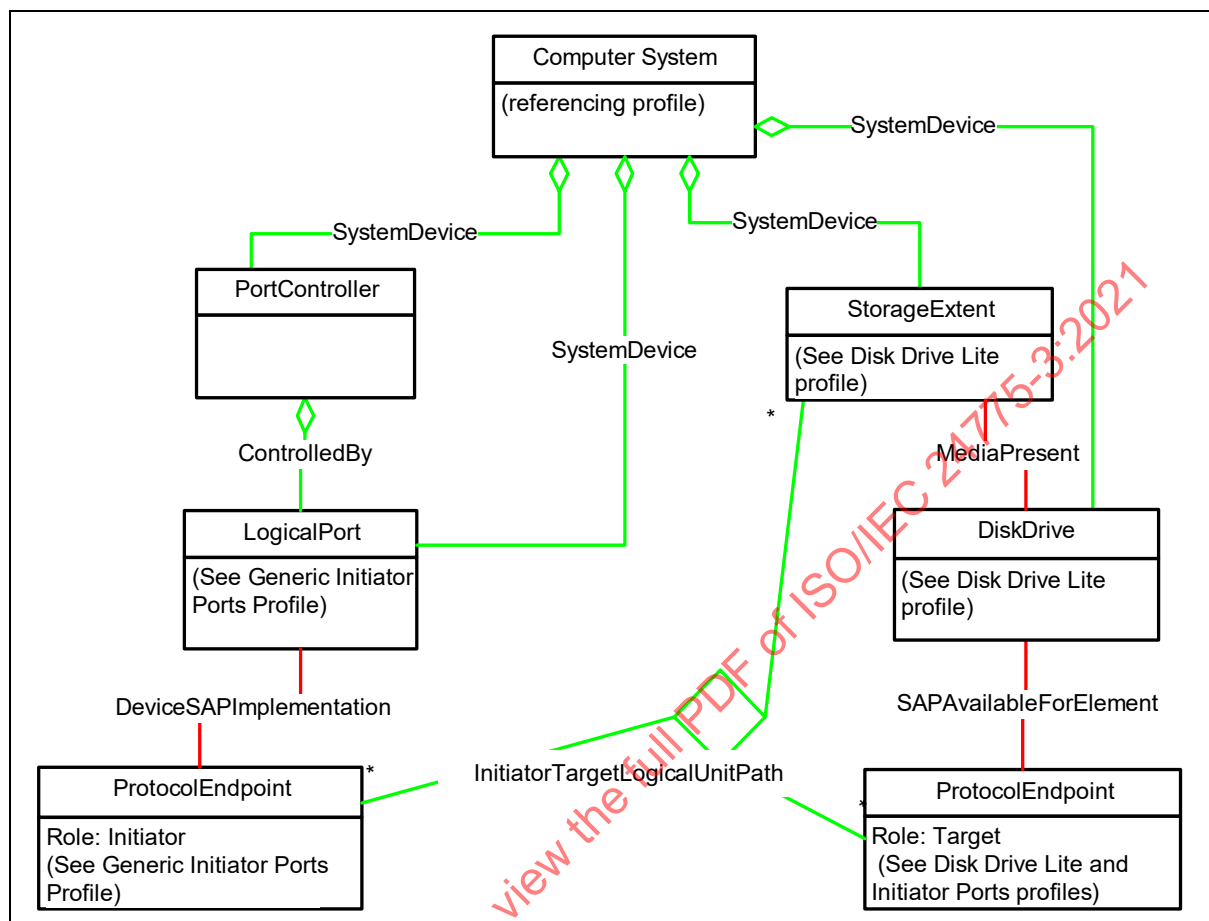


Figure 20 - HBA and Disk Model

13.3.4 Optional Model for attached Tape/CD/DVD Drives

The model, illustrated in Figure 21, and requirements are similar to those for disks (see 13.3.3), but use the Media Access Device Profile rather than Disk Drive Lite and the appropriate subclass of MediaAccessDevice rather than DiskDrive.

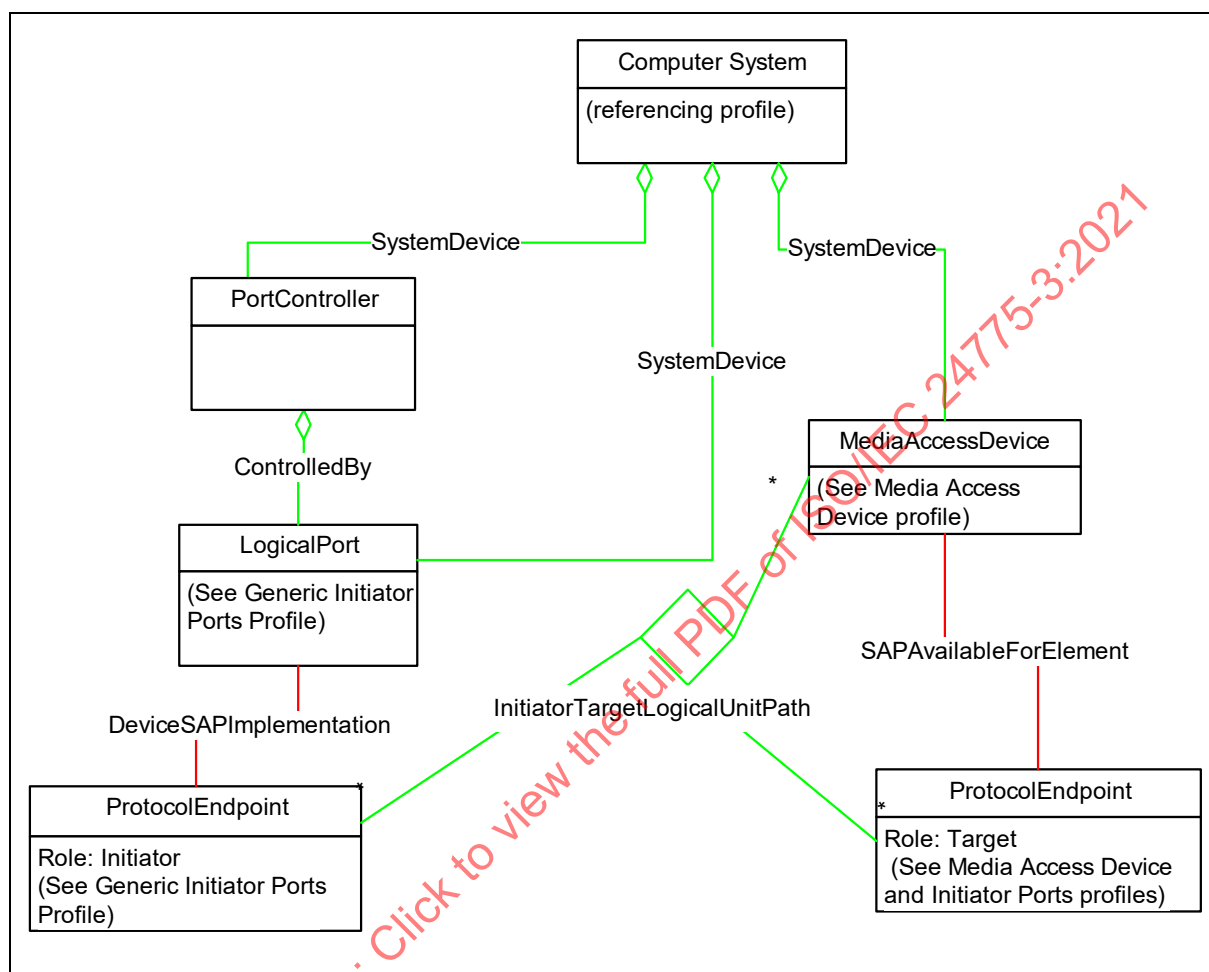


Figure 21 - HBA and Tape or Optical Devices

13.3.5 Optional Port Statistics

An implementation of an initiator port profile may optionally support port statistics. Figure 22 depicts the model for port statistics.

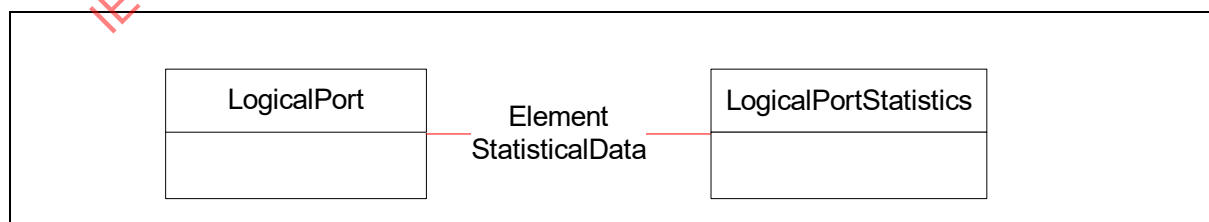


Figure 22 - Port Statistics

If a specialization of the profile specifies a subclass of LogicalPortStatistics (e.g., FCPortStatistics), the implementation should associate that subclass to the appropriate subclass of LogicalPort (e.g., FCPort), as shown in Figure 23. Otherwise, an implementation should use LogicalPortStatistics directly.

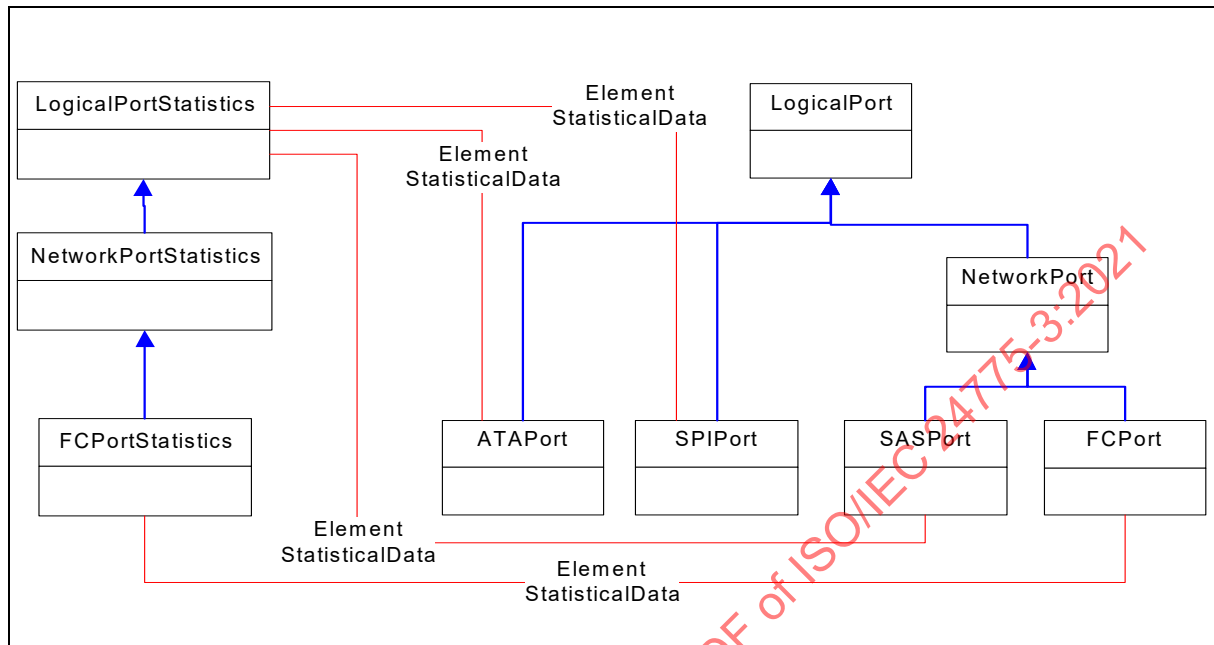


Figure 23 - Port Statistics Hierarchy

13.3.6 Health and Fault Management Considerations

Not defined in this document.

13.3.7 Cascading Considerations

Not defined in this document.

13.4 Methods

13.4.1 Extrinsic Methods of this Profile

Not defined in this document

13.4.2 Intrinsic Methods of this Profile

The profile supports read methods and association traversal. Specifically, the list of intrinsic operations supported are as follows:

- GetInstance
- Associators
- AssociatorNames
- References
- ReferenceNames
- EnumerateInstances

- EnumerateInstanceNames

13.5 Use Cases

Not defined in this document.

13.6 CIM Elements

13.6.1 Overview

Table 99 describes the CIM elements for Generic Initiator Ports.

Table 99 - CIM Elements for Generic Initiator Ports

Element Name	Requirement	Description
13.6.2 CIM_ConnectivityCollection	Optional	Represents a collection of connected ProtocolEndpoints.
13.6.3 CIM_DeviceSAPImplementation	Mandatory	Connects Initiator LogicalPort and ProtocolEndpoint.
13.6.4 CIM_ElementStatisticalData (Port Statistics)	Optional	Connects LogicalPort and LogicalPortStatistics.
13.6.5 CIM_HostedAccessPoint (Initiator)	Mandatory	Associates system to initiator protocol endpoints.
13.6.6 CIM_HostedAccessPoint (Target)	Optional	Associates system to optional remote protocol endpoints.
13.6.7 CIM_HostedCollection (Connectivity Collection)	Conditional	Conditional requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections. Associates the ConnectivityCollection to the hosting System.
13.6.8 CIM_LogicalPort	Mandatory	Represents the logical aspects of the physical port and may have multiple associated protocols.
13.6.9 CIM_MemberOfCollection (Connectivity Collection)	Conditional	Conditional requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections. Associates ProtocolEndpoints to the ConnectivityCollection.
13.6.10 CIM_ProtocolEndpoint (Initiator)	Mandatory	Represents a protocol (command set) supported by the port. The appropriate subclass (SCSIProtocolEndpoint, ATAProtocolEndpoint, SBProtocolEndpoint) should be used in initiator port specialized profiles.
13.6.11 CIM_ProtocolEndpoint (Target)	Optional	Models protocols of remote ports - target devices and possibly other initiators.
13.6.12 CIM_SystemDevice (Initiator Ports)	Mandatory	Associates system to initiator ports.
13.6.13 CIM_StatisticalData	Optional	Statistics for a port.

13.6.2 CIM_ConnectivityCollection

Represents a collection of connected ProtocolEndpoints.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 100 describes class CIM_ConnectivityCollection.

Table 100 - SMI Referenced Properties/Methods for CIM_ConnectivityCollection

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	

13.6.3 CIM_DeviceSAPImplementation

Connects Initiator LogicalPort and ProtocolEndpoint.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 101 describes class CIM_DeviceSAPImplementation.

Table 101 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	Reference to ProtocolEndpoint(Initiator).
Antecedent		Mandatory	Reference to LogicalPort.

13.6.4 CIM_ElementStatisticalData (Port Statistics)

Connects LogicalPort and LogicalPortStatistics.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 102 describes class CIM_ElementStatisticalData (Port Statistics).

Table 102 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (Port Statistics)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to LogicalPort.
Stats		Mandatory	Reference to LogicalPortStatistics.

13.6.5 CIM_HostedAccessPoint (Initiator)

Associates system to initiator protocol endpoints.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 103 describes class CIM_HostedAccessPoint (Initiator).

Table 103 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (Initiator)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.
Dependent		Mandatory	Reference to ProtocolEndpoint(Initiator).

13.6.6 CIM_HostedAccessPoint (Target)

Associates system to optional remote protocol endpoints.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 104 describes class CIM_HostedAccessPoint (Target).

Table 104 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (Target)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.
Dependent		Mandatory	Reference to ProtocolEndpoint(Target).

13.6.7 CIM_HostedCollection (Connectivity Collection)

Associates the ConnectivityCollection to the hosting System.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections.

Table 105 describes class CIM_HostedCollection (Connectivity Collection).

Table 105 - SMI Referenced Properties/Methods for CIM_HostedCollection (Connectivity Collection)

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	Reference to ConnectivityCollection.
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.

13.6.8 CIM_LogicalPort

Represents the logical aspects of the physical port and may have multiple associated protocols.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 106 describes class CIM_LogicalPort.

Table 106 - SMI Referenced Properties/Methods for CIM_LogicalPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
OperationalStatus		Mandatory	
UsageRestriction		Mandatory	Shall be 3 for ports restricted to back-end (initiator) only or 4 if the port is unrestricted.
PortType		Mandatory	Initiator port specialized profiles specify the appropriate subset of values.

13.6.9 CIM_MemberOfCollection (Connectivity Collection)

Associates ProtocolEndpoints to the ConnectivityCollection.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections.

Table 107 describes class CIM_MemberOfCollection (Connectivity Collection).

Table 107 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (Connectivity Collection)

Properties	Flags	Requirement	Description & Notes
Member		Mandatory	Reference to ProtocolEndpoint.
Collection		Mandatory	Reference to ConnectivityCollection.

13.6.10 CIM_ProtocolEndpoint (Initiator)

Represents a protocol (command set) supported by the port.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 108 describes class CIM_ProtocolEndpoint (Initiator).

Table 108 - SMI Referenced Properties/Methods for CIM_ProtocolEndpoint (Initiator)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name	C	Mandatory	See <i>Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4</i> 7.6.3 Standard Formats for Port Names.
ProtocolIFType		Mandatory	Shall be 1 (Other).
OtherTypeDescription		Mandatory	Shall be the string 'SCSI', 'ATA', or 'SB'. Initiator port specialized profiles specify the appropriate subset.

13.6.11 CIM_ProtocolEndpoint (Target)

Models protocols of remote ports - target devices and possibly other initiators. The appropriate subclass (SCSIProtocolEndpoint, ATAProtocolEndpoint, SBProtocolEndpoint) should be used in initiator port specialized profiles.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 109 describes class CIM_ProtocolEndpoint (Target).

Table 109 - SMI Referenced Properties/Methods for CIM_ProtocolEndpoint (Target)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
ProtocolIFType		Mandatory	The values in MOFs map to IETF values and exclude storage. Shall be 1 (Other) and set OtherTypeDescription appropriately.
OtherTypeDescription		Mandatory	Shall be the string 'SCSI', 'ATA', or 'SB'. Initiator port specialized profiles specify the appropriate subset.

13.6.12 CIM_SystemDevice (Initiator Ports)

Associates system to initiator ports.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 110 describes class CIM_SystemDevice (Initiator Ports).

Table 110 - SMI Referenced Properties/Methods for CIM_SystemDevice (Initiator Ports)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem.
PartComponent		Mandatory	Reference to LogicalPort.

13.6.13 CIM_StatisticalData

Statistics for a port.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 111 describes class CIM_StatisticalData.

Table 111 - SMI Referenced Properties/Methods for CIM_StatisticalData

Properties	Flags	Requirement	Description & Notes
ElementName		Mandatory	
InstanceID		Mandatory	

IMPLEMENTED

DEPRECATED**14 Parallel SCSI (SPI) Initiator Ports Profile****14.1 Synopsis****Profile Name:** SPI Initiator Ports (Component Profile)**Version:** 1.4.0**Organization:** SNIA**Specializes:** Generic Initiator Port Profile**Central Class:** SPIPort**Scoping Class:** a ComputerSystem in a separate autonomous profile**Related Profiles:** Not defined in this document.

The SPI Initiator Ports Profile models the behavior of a parallel SCSI (SPI) initiator port.

14.2 Description

The SPI Initiator Port Profile defines the model to parallel SCSI ports.

14.3 Implementation

A typical instance diagram is provided in Figure 24: "SPI Initiator Port Instance Diagram".

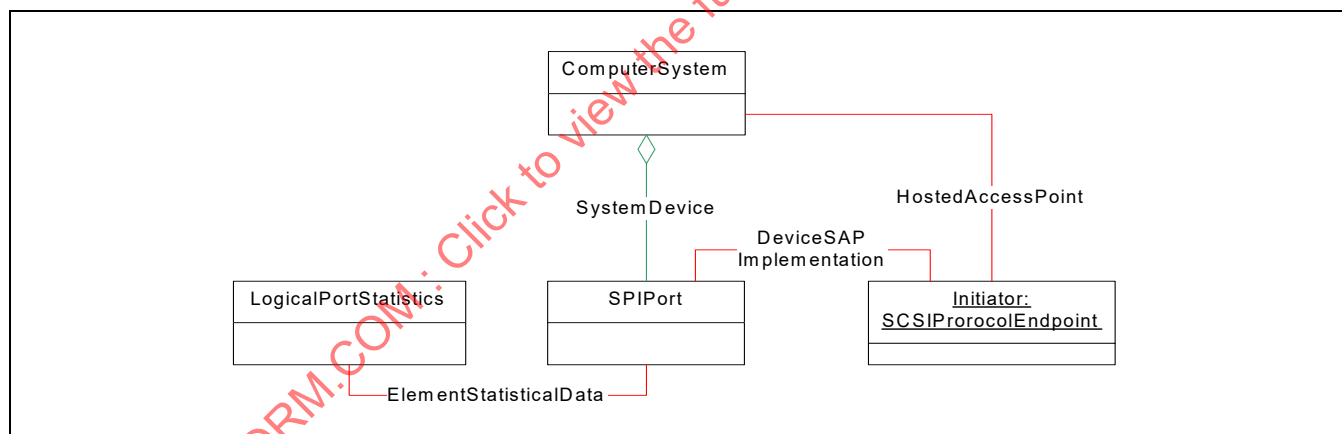
**Figure 24 - SPI Initiator Port Instance Diagram****14.3.1 Health and Fault Management Considerations**

Table 112 summarizes the Health and Fault Management issues that are unique to this profile.

Table 112 - SPIPort OperationalStatus

OperationalStatus	Description
OK	Port is online
Error	Port has a failure
Stopped	Port is disabled

Table 112 - SPIPort OperationalStatus

OperationalStatus	Description
InService	Port is in Self Test
Unknown	

14.3.2 Cascading Considerations

Not defined in this document.

14.4 Methods

14.4.1 Extrinsic Methods of this Profile

Not defined in this document

14.4.2 Intrinsic Methods of this Profile

The profile supports read methods and association traversal. Specifically, the list of intrinsic operations supported

are as follows:

- GetInstance
- Associators
- AssociatorNames
- References
- ReferenceNames
- EnumerateInstances
- EnumerateInstanceNames

14.5 Use Cases and Recipes

No recipes are defined in this version of the standard.

14.6 CIM Elements

Table 113 describes the CIM elements for SPI Initiator Ports.

Table 113 - CIM Elements for SPI Initiator Ports

Element Name	Requirement	Description
14.6.1 CIM_ConnectivityCollection	Optional	Represents a collection of connected SCSIProtocolEndpoints.
14.6.2 CIM_DeviceSAPImplementation	Mandatory	Connects Initiator SPILogicalPort and SCSIProtocolEndpoint.
14.6.3 CIM_ElementStatisticalData (Port Statistics)	Optional	Connects SPIPort and LogicalPortStatistics.
14.6.4 CIM_HostedAccessPoint (Initiator)	Mandatory	Associates system to initiator protocol endpoints.
14.6.5 CIM_HostedAccessPoint (Target)	Optional	Associates system to optional remote protocol endpoints.

Table 113 - CIM Elements for SPI Initiator Ports

Element Name	Requirement	Description
14.6.6 CIM_HostedCollection (Connectivity Collection)	Conditional	Conditional requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections. Associates the ConnectivityCollection to the hosting System.
14.6.7 CIM_MemberOfCollection (Connectivity Collection)	Conditional	Conditional requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections. Represents a collection of connected SCSIProtocolEndpoints.
14.6.8 CIM_SCSIInitiatorTargetLogicalUnitPath	Optional	Represents a path between a SCSI initiator, target, and logical unit.
14.6.9 CIM_SCSIProtocolEndpoint (Initiator)	Mandatory	Represents support for the SCSI command set.
14.6.10 CIM_SCSIProtocolEndpoint (Target)	Optional	Models protocols of remote ports - target devices and possibly other initiators.
14.6.11 CIM_SPIPort	Mandatory	Represents the logical aspects of the physical port and may have multiple associated protocols.
14.6.12 CIM_SystemDevice (Initiator Ports)	Mandatory	Associates system to initiator ports.
14.6.13 CIM_LogicalPortStatistics	Optional	Statistics for a port.

14.6.1 CIM_ConnectivityCollection

Represents a collection of connected SCSIProtocolEndpoints. The class definition specializes the CIM_ConnectivityCollection definition in the Generic Initiator Ports profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 114 describes class CIM_ConnectivityCollection.

Table 114 - SMI-Referenced Properties/Methods for CIM_ConnectivityCollection

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	

14.6.2 CIM_DeviceSAPImplementation

Connects Initiator SPILogicalPort and SCSIProtocolEndpoint. The class definition specializes the CIM_DeviceSAPImplementation definition in the Generic Initiator Ports profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 115 describes class CIM_DeviceSAPImplementation.

Table 115 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	Reference to SCSIProtocolEndpoint(Initiator).
Antecedent		Mandatory	Reference to SPIPort.

14.6.3 CIM_ElementStatisticalData (Port Statistics)

Connects SPIPort and LogicalPortStatistics. The class definition specializes the CIM_ElementStatisticalData definition in the Generic Initiator Ports profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 116 describes class CIM_ElementStatisticalData (Port Statistics).

Table 116 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (Port Statistics)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to SPIPort.
Stats		Mandatory	Reference to LogicalPortStatistics.

14.6.4 CIM_HostedAccessPoint (Initiator)

Associates system to initiator protocol endpoints. The class definition specializes the CIM_HostedAccessPoint definition in the Generic Initiator Ports profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 117 describes class CIM_HostedAccessPoint (Initiator).

Table 117 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (Initiator)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.
Dependent		Mandatory	Reference to SCSIProtocolEndpoint(Initiator).

14.6.5 CIM_HostedAccessPoint (Target)

Associates system to optional remote protocol endpoints. The class definition specializes the CIM_HostedAccessPoint definition in the Generic Initiator Ports profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 118 describes class CIM_HostedAccessPoint (Target).

Table 118 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (Target)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.
Dependent		Mandatory	Reference to SCSIProtocolEndpoint(Target).

14.6.6 CIM_HostedCollection (Connectivity Collection)

Associates the ConnectivityCollection to the hosting System.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections.

Table 119 describes class CIM_HostedCollection (Connectivity Collection).

Table 119 - SMI Referenced Properties/Methods for CIM_HostedCollection (Connectivity Collection)

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	Reference to ConnectivityCollection.
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.

14.6.7 CIM_MemberOfCollection (Connectivity Collection)

Represents a collection of connected SCSIProtocolEndpoints. The class definition specializes the CIM_MemberOfCollection definition in the Generic Initiator Ports profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections.

Table 120 describes class CIM_MemberOfCollection (Connectivity Collection).

Table 120 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (Connectivity Collection)

Properties	Flags	Requirement	Description & Notes
Member		Mandatory	Reference to SCSIProtocolEndpoint(Initiator or Target).
Collection		Mandatory	Reference to ConnectivityCollection.

14.6.8 CIM_SCSIInitiatorTargetLogicalUnitPath

Represents a path between a SCSI initiator, target, and logical unit.

Created By: Static

Modified By: Static
 Deleted By: Static
 Requirement: Optional

Table 121 describes class CIM_SCSIInitiatorTargetLogicalUnitPath.

Table 121 - SMI Referenced Properties/Methods for CIM_SCSIInitiatorTargetLogicalUnitPath

Properties	Flags	Requirement	Description & Notes
LogicalUnit		Mandatory	Reference to StorageExtent in Disk Drive Lite Profile or MediaAccessDevice in Media Access Device Profile.
Target		Mandatory	Reference to SCSIProtocolEndpoint(Target).
Initiator		Mandatory	Reference to SCSIProtocolEndpoint(Initiator).

14.6.9 CIM_SCSIProtocolEndpoint (Initiator)

Represents support for the SCSI command set. The class definition specializes the CIM_ProtocolEndpoint definition in the Generic Initiator Ports profile.

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Mandatory

Table 122 describes class CIM_SCSIProtocolEndpoint (Initiator).

Table 122 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint (Initiator)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name	C	Mandatory	See <i>Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4 7.6.3</i> Standard Formats for Port Names.
ProtocolIFType		Mandatory	Shall be 1 (Other).
OtherTypeDescription		Mandatory	Shall be the string 'SCSI', 'ATA', or 'SB'. Initiator port specialized profiles specify the appropriate subset.
ConnectionType		Mandatory	Shall be 3 (Parallel SCSI).
Role		Mandatory	Shall be 2 (Initiator).

14.6.10 CIM_SCSIProtocolEndpoint (Target)

Models protocols of remote ports - target devices and possibly other initiators. The appropriate subclass (SCSIProtocolEndpoint, ATAProtocolEndpoint, SBProtocolEndpoint) should be used in initiator port specialized profiles. The class definition specializes the CIM_ProtocolEndpoint definition in the Generic Initiator Ports profile.

Created By: Static

Modified By: Static
 Deleted By: Static
 Requirement: Optional

Table 123 describes class CIM_SCSIProtocolEndpoint (Target).

Table 123 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint (Target)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
ProtocolIFType		Mandatory	The values in MOFs map to IETF values and exclude storage. Shall be 1 (Other) and set OtherTypeDescription appropriately.
OtherTypeDescription		Mandatory	Shall be the string 'SCSI', 'ATA', or 'SB'. Initiator port specialized profiles specify the appropriate subset.
ConnectionType		Mandatory	Shall be 3 (Parallel SCSI).

14.6.11 CIM_SPIPort

Represents the logical aspects of the physical port and may have multiple associated protocols. The class definition specializes the CIM_LogicalPort definition in the Generic Initiator Ports profile.

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Mandatory

Table 124 describes class CIM_SPIPort.

Table 124 - SMI Referenced Properties/Methods for CIM_SPIPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
OperationalStatus		Mandatory	Shall be 0 (Unknown), 2 (OK), 6 (Error), 10 (Stopped), or 11 (In Service).
UsageRestriction		Mandatory	Shall be 3 (Back-end Only).
PortType		Mandatory	Shall be 140 (SCSI Parallel).

14.6.12 CIM_SystemDevice (Initiator Ports)

Associates system to initiator ports. The class definition specializes the CIM_SystemDevice definition in the Generic Initiator Ports profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 125 describes class CIM_SystemDevice (Initiator Ports).

Table 125 - SMI Referenced Properties/Methods for CIM_SystemDevice (Initiator Ports)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem.
PartComponent		Mandatory	Reference to SPIPort(Initiator).

14.6.13 CIM_LogicalPortStatistics

Statistics for a port.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 126 describes class CIM_LogicalPortStatistics.

Table 126 - SMI Referenced Properties/Methods for CIM_LogicalPortStatistics

Properties	Flags	Requirement	Description & Notes
ElementName		Mandatory	
InstanceID		Mandatory	
BytesTransmitted		Mandatory	
BytesReceived		Mandatory	
PacketsTransmitted		Mandatory	
PacketsReceived		Mandatory	

DEPRECATED

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15 iSCSI Initiator Port Profile

15.1 Synopsis

Profile Name: iSCSI Initiator Ports (Component Profile)

Version: 1.7.0

Organization: SNIA

Central Class: CIM_EthernetPort

Scoping Class: a CIM_System in a separate autonomous profile

Related Profiles: Table 127 describes the related profiles for iSCSI Initiator Ports.

Table 127 - Related Profiles for iSCSI Initiator Ports

Profile Name	Organization	Version	Requirement	Description
Indications	DMTF	1.2.2	Mandatory	See DSP1054, version 1.2.2

Models an adapter (NIC, HBA, TOE) for iSCSI.

15.2 Description

Models an adapter (NIC, HBA, TOE) for iSCSI.

15.3 Implementation

15.3.1 Overview

Other port profiles have a single physical port (LogicalPort subclass) associated with each SCSI initiator (SCSIProtocolEndpoint). iSCSI allows multiple connections (each with a single Ethernet port) in a session that acts as a SCSI initiator. This profile includes the subset of classes that model the SCSI initiator and its relationship to logical classes that model physical elements (Ethernet ports).

Figure 25 depicts a configuration with an initiator with two Ethernet ports that are part of a single session that acts as a SCSI initiator. The Ethernet ports (referred to in iSCSI literature as Network Portals) are modeled as instances of EthernetPort, IPProtocolEndpoint, and TCPProtocolEndpoint with 1-1 cardinality. These ports are in the initiator side, the target ports are not required in this profile. Note that all ProtocolEndpoint instances need a HostAccessPoint association to the ComputerSystem, some are omitted to keep the diagram less cluttered.

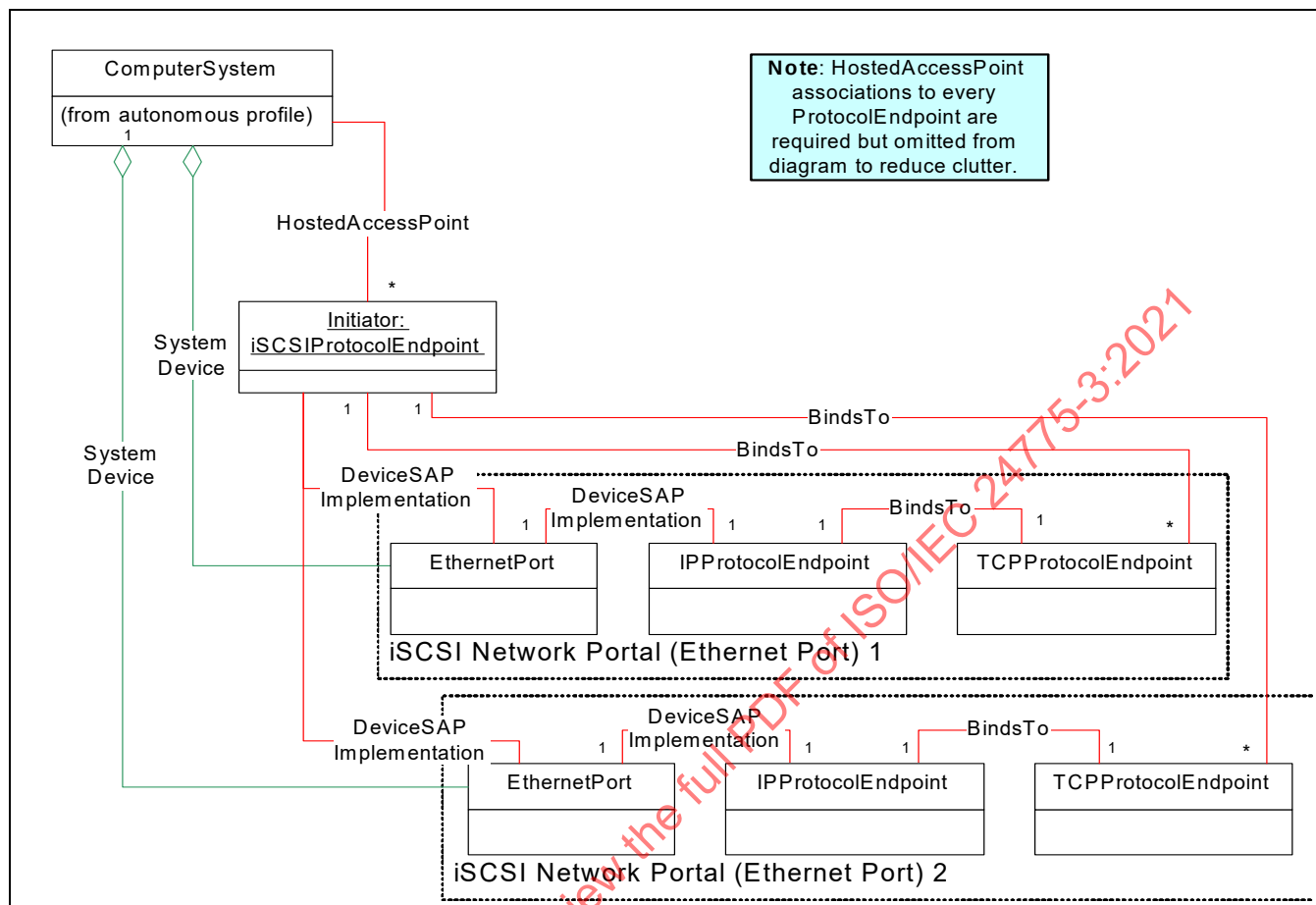


Figure 25 - iSCSI Initiator Port Instance Diagram

15.3.2 Health and Fault Management Considerations

Table 128 describes EthernetPort OperationalStatus.

Table 128 - EthernetPort OperationalStatus

OperationalStatus	Description
OK	Port is online
Error	Port has a failure
Stopped	Port is disabled
InService	Port is in Self Test
Unknown	

15.3.3 Cascading Considerations

Not defined in this document.

15.4 Methods

15.4.1 Extrinsic Methods of this Profile

Not defined in this document

15.4.2 Intrinsic Methods of this Profile

The profile supports read methods and association traversal. Specifically, the list of intrinsic operations supported are as follows:

- GetInstance
- Associators
- AssociatorNames
- References
- ReferenceNames
- EnumerateInstances
- EnumerateInstanceNames

15.5 Use Cases and Recipes

No recipes are defined in this version of the standard.

15.6 CIM Elements

15.6.1 Overview

Table 129 describes the CIM elements for iSCSI Initiator Ports.

Table 129 - CIM Elements for iSCSI Initiator Ports

Element Name	Requirement	Description
15.6.2 CIM_BindsTo (iSCSIProtocolEndpoint to TCPProtocolEndpoint)	Mandatory	
15.6.3 CIM_BindsTo (TCPProtocolEndpoint to IPProtocolEndpoint)	Mandatory	
15.6.4 CIM_DeviceSAPImplementation (IPProtocolEndpoint to EthernetPort)	Mandatory	
15.6.5 CIM_DeviceSAPImplementation (iSSIPProtocolEndpoint to EthernetPort)	Mandatory	
15.6.6 CIM_EthernetPort	Mandatory	
15.6.7 CIM_HostedAccessPoint (ComputerSystem to IPProtocolEndpoint)	Mandatory	
15.6.8 CIM_HostedAccessPoint (ComputerSystem to TCPProtocolEndpoint)	Mandatory	
15.6.9 CIM_HostedAccessPoint (ComputerSystem to iSCSIProtocolEndpoint)	Mandatory	
15.6.10 CIM_IPProtocolEndpoint	Mandatory	
15.6.11 CIM_iSCSIProtocolEndpoint	Mandatory	

Table 129 - CIM Elements for iSCSI Initiator Ports

Element Name	Requirement	Description
15.6.12 CIM_SystemDevice (ComputerSystem to EthernetPort)	Mandatory	
15.6.13 CIM_TCPProtocolEndpoint	Mandatory	
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_EthernetPort	Mandatory	Port Creation.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_EthernetPort AND SourceInstance.CIM_EthernetPort::OperationalStatus <> PreviousInstance.CIM_EthernetPort::OperationalStatus	Mandatory	Port Status Change.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_EthernetPort	Mandatory	Port Removal.

15.6.2 CIM_BindsTo (iSCSIProtocolEndpoint to TCPProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 130 describes class CIM_BindsTo (iSCSIProtocolEndpoint to TCPProtocolEndpoint) .

Table 130 - SMI Referenced Properties/Methods for CIM_BindsTo (iSCSIProtocolEndpoint to TCPProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to TCPProtocolEndpoint
Dependent		Mandatory	Reference to iSCSIProtocolEndpoint

15.6.3 CIM_BindsTo (TCPProtocolEndpoint to IPProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 130 describes class CIM_BindsTo (TCPProtocolEndpoint to IPProtocolEndpoint).

Table 131 - SMI Referenced Properties/Methods for CIM_BindsTo(TCPProtocolEndpoint to IPProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to IPProtocolEndpoint
Dependent		Mandatory	Reference to TCPProtocolEndpoint

15.6.4 CIM_DeviceSAPImplementation (IPProtocolEndpoint to EthernetPort)

Created By: Static

Modified By: Static
 Deleted By: Static
 Requirement: Mandatory

Table 132 describes class CIM_DeviceSAPImplementation (IPProtocolEndpoint to EthernetPort).

Table 132 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation (IPProtocolEndpoint to EthernetPort)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to EthernetPort
Dependent		Mandatory	Reference to IPProtocolEndpoint

15.6.5 CIM_DeviceSAPImplementation (iSSIPProtocolEndpoint to EthernetPort)

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Mandatory

Table 133 describes class CIM_DeviceSAPImplementation (iSSIPProtocolEndpoint to EthernetPort).

Table 133 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation (iSSIPProtocolEndpoint to EthernetPort)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to EthernetPort
Dependent		Mandatory	Reference to iSSIPProtocolEndpoint

15.6.6 CIM_EthernetPort

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Mandatory

Table 134 describes class CIM_EthernetPort .

Table 134 - SMI Referenced Properties/Methods for CIM_EthernetPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
PortType		Mandatory	

Table 134 - SMI Referenced Properties/Methods for CIM_EthernetPort

Properties	Flags	Requirement	Description & Notes
OperationalStatus		Mandatory	
PermanentAddress	CD	Mandatory	

15.6.7 CIM_HostedAccessPoint (ComputerSystem to IPProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 135 describes class CIM_HostedAccessPoint (ComputerSystem to IPProtocolEndpoint).

Table 135 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (ComputerSystem to IPProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem
Dependent		Mandatory	Reference to IPProtocolEndpoint

15.6.8 CIM_HostedAccessPoint (ComputerSystem to TCPProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 136 describes class CIM_HostedAccessPoint (ComputerSystem to TCPProtocolEndpoint).

Table 136 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (ComputerSystem to TCPProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem
Dependent		Mandatory	Reference to TCPProtocolEndpoint

15.6.9 CIM_HostedAccessPoint (ComputerSystem to iSCSIProtocolEndpoint)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 137 describes class CIM_HostedAccessPoint (ComputerSystem to iSCSIProtocolEndpoint).

Table 137 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (ComputerSystem to iSCSIProtocolEndpoint)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem
Dependent		Mandatory	Reference to iSCSIProtocolEndpoint

15.6.10 CIM_IPProtocolEndpoint

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 138 describes class CIM_IPProtocolEndpoint .

Table 138 - SMI Referenced Properties/Methods for CIM_IPProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
IPv4Address	CD	Optional	Maps to IMA_NETWORK_PORTAL_PROPERTIES, ipAddress.
IPv6Address	CD	Optional	Maps to IMA_NETWORK_PORTAL_PROPERTIES, ipAddress.
ProtocolIFType		Mandatory	

15.6.11 CIM_iSCSIProtocolEndpoint

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 139 describes class CIM_iSCSIProtocolEndpoint .

Table 139 - SMI Referenced Properties/Methods for CIM_iSCSIProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	

Table 139 - SMI Referenced Properties/Methods for CIM_iSCSIProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
Name	CD	Mandatory	MUST contain the iSCSI port name as described in the iSCSI RFC (currently http://www.ietf.org/rfc/rfc3720.txt) - < iSCSI node name> + ',i,' + ISID for initiators
ProtocolIFType		Mandatory	Shall be Other (1).
OtherTypeDescription		Mandatory	Shall be "iSCSI"
ConnectionType		Mandatory	iSCSI.
Role		Mandatory	Shall be 2 (Initiator).
Identifier		Mandatory	ISID.

15.6.12 CIM_SystemDevice (ComputerSystem to EthernetPort)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 140 describes class CIM_SystemDevice (ComputerSystem to EthernetPort).

Table 140 - SMI Referenced Properties/Methods for CIM_SystemDevice (ComputerSystem to EthernetPort)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem
PartComponent		Mandatory	Reference to EthernetPort

15.6.13 CIM_TCPProtocolEndpoint

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 141 describes class CIM_TCPProtocolEndpoint .

Table 141 - SMI Referenced Properties/Methods for CIM_TCPProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
PortNumber	CD	Mandatory	
ProtocolType		Mandatory	

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STABLE**16 FC Initiator Ports Profile****16.1 Synopsis****Profile Name:** FC Initiator Ports (Component Profile)**Version:** 1.7.0**Organization:** SNIA**Specializes:** Generic Initiator Ports Profile**Central Class:** FCPort**Scoping Class:** a ComputerSystem in a referencing autonomous profile**Related Profiles:** Table 142 describes the related profiles for FC Initiator Ports.**Table 142 - Related Profiles for FC Initiator Ports**

Profile Name	Organization	Version	Requirement	Description
Indications	DMTF	1.2.2	Mandatory	See DSP1054, version 1.2.2

The FC Initiator Ports Profile models the behavior of a Fibre Channel port supporting FCP (SCSI command protocol).

16.2 Description

The FC Initiator Ports Profile models the behavior of a Fibre Channel port supporting FCP (SCSI command protocol).

16.3 Implementation**16.3.1 Overview**

Figure 26 is an example of a single port and drive connected to a single system using Fibre Channel. This instance diagram shows a disk (LogicalDevice in the diagram would be subclassed as something like

StorageExtent) in an array, connected by a Fibre Channel port. The full model for the disk is shown in *Storage Management Technical Specification, Part 4 Block Devices, 1.8.0 Rev 4 10 Disk Drive Lite Profile*.

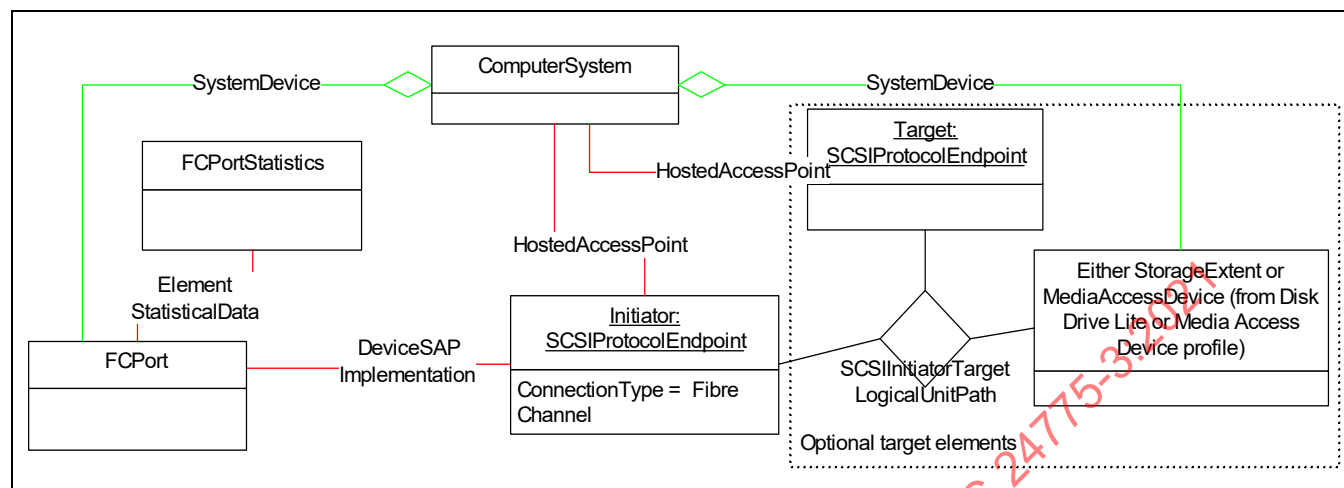


Figure 26 - Fibre Channel Initiator Instance Diagram

16.3.2 Port Statistics

The FCPortStatistics subclass of NetworkPortStatistics is optional. If supported, FCPortStatistics shall be associated to FcPort using ElementStatisticalData.

16.3.3 Logical Port Group (FC Node)

LogicalPortGroup may optionally be used to model the collection of ports that shared a Node WWN (in this case, both ports on a card, but other implementations are in use). If LogicalPortGroup is instantiated, it shall be associated to the ComputerSystem in the referencing profile using HostedCollection and also associated to FCPorts using MemberOfCollection. Figure 27 shows to model for FC Nodes.

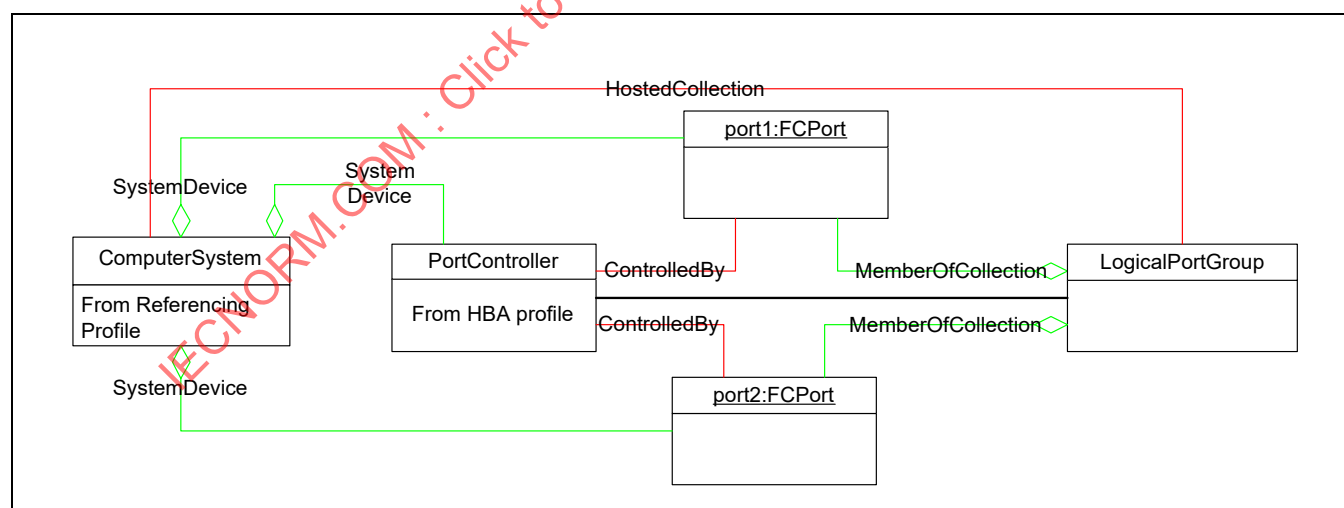


Figure 27 - FC Node Model

16.3.4 Health and Fault Management Considerations

Table 143 summarized the Health and Fault Management considerations specific to this profile.

Table 143 - FCPort OperationalStatus

OperationalStatus	Description
OK	Port is online
Error	Port has a failure
Stopped	Port is disabled
InService	Port is in Self Test
Unknown	

16.3.5 Cascading Considerations

Not defined in this document.

16.4 Methods

16.4.1 Extrinsic Methods of this Profile

Not defined in this document

16.4.2 Intrinsic Methods of this Profile

The profile supports read methods and association traversal. Specifically, the list of intrinsic operations supported are as follows:

- GetInstance
- Associators
- AssociatorNames
- References
- ReferenceNames
- EnumerateInstances
- EnumerateInstanceNames

16.5 Use Cases and Recipes

No recipes are defined in this version of the standard.

16.6 CIM Elements

16.6.1 Overview

Table 144 describes the CIM elements for FC Initiator Ports.

Table 144 - CIM Elements for FC Initiator Ports

Element Name	Requirement	Description
16.6.2 CIM_ConnectivityCollection	Optional	Represents a collection of connected ProtocolEndpoints.
16.6.3 CIM_DeviceSAPImplementation	Mandatory	Connects Initiator FCPort and SCSIProtocolEndpoint.

Table 144 - CIM Elements for FC Initiator Ports

Element Name	Requirement	Description
16.6.4 CIM_ElementStatisticalData (Port Statistics)	Conditional	Conditional requirement: support for the FC HBA profile. Connects FCPort and FCPortStatistics.
16.6.5 CIM_FCPort	Mandatory	Represents the logical aspects of the physical port and may have multiple associated protocols.
16.6.6 CIM_FCPortStatistics	Conditional	Conditional requirement: support for the FC HBA profile. Statistics for a port.
16.6.7 CIM_HostedAccessPoint (Initiator)	Mandatory	Associates system to initiator protocol endpoints.
16.6.8 CIM_HostedAccessPoint (Target)	Optional	Associates system to optional remote protocol endpoints.
16.6.9 CIM_HostedCollection (Connectivity Collection)	Conditional	Conditional requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections. Associates the ConnectivityCollection to the hosting System.
16.6.10 CIM_MemberOfCollection (Connectivity Collection)	Conditional	Conditional requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections. Associates SCSIProtocolEndpoints to the ConnectivityCollection.
16.6.11 CIM_SCSIInitiatorTargetLogicalUnitPath	Optional	Represents a path between a SCSI initiator, target, and logical unit.
16.6.12 CIM_SCSIProtocolEndpoint (Initiator)	Mandatory	Represents support for the SCSI command set.
16.6.13 CIM_SCSIProtocolEndpoint (Target)	Optional	Models remote ports - target devices and possibly other initiators.
16.6.14 CIM_SystemDevice (Initiator Ports)	Mandatory	Associates system to initiator ports.
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_FCPort	Optional	Create FCPort.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_FCPort AND SourceInstance.CIM_FCPort::OperationalStatus <> PreviousInstance.CIM_FCPort::OperationalStatus	Optional	CQL -Modify FCPort.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_FCPort	Optional	Delete FCPort.

16.6.2 CIM_ConnectivityCollection

Represents a collection of connected ProtocolEndpoints.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 145 describes class CIM_ConnectivityCollection.

Table 145 - SMI Referenced Properties/Methods for CIM_ConnectivityCollection

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	

16.6.3 CIM_DeviceSAPImplementation

Connects Initiator FCPort and SCSIProtocolEndpoint. The class definition specializes the CIM_DeviceSAPImplementation definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 146 describes class CIM_DeviceSAPImplementation.

Table 146 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation

Properties	Flags	Requirement	Description & Notes
Dependent (overridden)		Mandatory	Reference to Initiator SCSIProtocolEndpoint.
Antecedent (overridden)		Mandatory	Reference to FCPort.

16.6.4 CIM_ElementStatisticalData (Port Statistics)

Connects FCPort and FCPortStatistics. The class definition specializes the CIM_ElementStatisticalData definition in the Generic Initiator Ports profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: support for the FC HBA profile.

Table 147 describes class CIM_ElementStatisticalData (Port Statistics).

Table 147 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (Port Statistics)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to FCPort.
Stats		Mandatory	Reference to FCPortStatistics.

16.6.5 CIM_FCPort

Represents the logical aspects of the physical port and may have multiple associated protocols. The class definition specializes the CIM_LogicalPort definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 148 describes class CIM_FCPort.

Table 148 - SMI Referenced Properties/Methods for CIM_FCPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
OperationalStatus(overridden)		Mandatory	Shall be 0 (Unknown), 2 (OK), 6 (Error), 10 (Stopped), or 11 (In Service).
UsageRestriction		Mandatory	Shall be 3 for ports restricted to back-end (initiator) only or 4 if the port is unrestricted.
PortType (overridden)		Mandatory	Shall be 0 1 10 11 12 13 14 15 16 17 18 (Unknown or Other or N or NL or F/NL or Nx or E or F or FL or B or G).
OtherPortType		Conditional	Required when PortType is Other
ElementName (added)		Mandatory	Port Symbolic Name.
Speed (added)		Mandatory	Speed in bits per second. Shall be 0, 1062500000 (1GFC), 2125000000 (2GFC), 4250000000 (4GFC), 8500000000 (8GFC), 10518750000 (10GFC), 14025000000 (16GFC), 21037500000 (20GFC) or 28500000000 (32GFC).
MaxSpeed (added)		Mandatory	Maximum Port Speed.
PortNumber (added)		Optional	
PermanentAddress (added)	CD	Optional	Port WWN. PermanentAddress is optional when used as a back-end port in a device. This may be overridden in profiles that use this profile. Shall be 16 un-separated upper case hex digits. See <i>Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4 7.6.3 Standard Formats for Port Names</i> .
NetworkAddresses (added)		Optional	For Fibre Channel end device ports, the Fibre Channel ID. Shall be 16 un-separated upper case hex digits.
SupportedCOS (added)		Optional	Shall be 0 (unknown), 1 (Class 1), 2 (Class 2), 3, (Class 3), 4 (Class 4), 6 (Class 6), or 7 (Class 7).
ActiveCOS (added)		Optional	Shall be 0 (unknown), 1 (Class 1), 2 (Class 2), 3, (Class 3), 4 (Class 4), 6 (Class 6), or 7 (Class 7).
SupportedFC4Types (added)		Optional	
ActiveFC4Types (added)		Optional	
LinkTechnology (added)		Mandatory	Shall be 4 (FC).
SupportedMaximumTransmissionUnit (added)		Mandatory	
ActiveMaximumTransmissionUnit (added)		Optional	
PortDiscriminator (added)		Conditional	Experimental. Conditional requirement: support for the Storage HBA profile. Shall include 11 (FC Native) and 12 (HBA).

16.6.6 CIM_FCPortStatistics

Statistics for a port. The class definition specializes the CIM_StatisticalData definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: support for the FC HBA profile.

Table 149 describes class CIM_FCPortStatistics.

Table 149 - SMI Referenced Properties/Methods for CIM_FCPortStatistics

Properties	Flags	Requirement	Description & Notes
ElementName		Mandatory	
InstanceID		Mandatory	
BytesTransmitted (added)		Mandatory	From NetworkPortStatistics Superclass. Maps to HBA_PortStatistics.TxWords. Multiply word count by 4.
BytesReceived (added)		Mandatory	From NetworkPortStatistics Superclass. Maps to HBA_PortStatistics.RxWords. Multiply word count by 4.
PacketsTransmitted (added)		Mandatory	From NetworkPortStatistics Superclass. Maps to HBA_PortStatistics.TxFrames.
PacketsReceived (added)		Mandatory	From NetworkPortStatistics Superclass. Maps to HBA_PortStatistics.RxFrames.
CRCErrors (added)		Mandatory	Maps to HBA_PortStatistics.InvalidCRCCCount.
LinkFailures (added)		Mandatory	Maps to HBA_PortStatistics.LinkFailureCount.
PrimitiveSeqProtocolErrCount (added)		Mandatory	
LossOfSignalCounter (added)		Mandatory	Maps to HBA_PortStatistics.LossOfSignalCount.
InvalidTransmissionWords (added)		Mandatory	Maps to HBA_PortStatistics.InvalidTxWordCount.
StatisticTime (added)		Optional	Time last measurement was taken.
LIPCount (added)		Mandatory	
NOSCount (added)		Mandatory	
ErrorFrames (added)		Mandatory	
DumpedFrames (added)		Mandatory	
LossOfSyncCounter (added)		Mandatory	Maps to HBA_PortStatistics.LossOfSynchCount.

16.6.7 CIM_HostedAccessPoint (Initiator)

Associates system to initiator protocol endpoints. The class definition specializes the CIM_HostedAccessPoint definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Mandatory

Table 150 describes class CIM_HostedAccessPoint (Initiator).

Table 150 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (Initiator)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint(Initiator).

16.6.8 CIM_HostedAccessPoint (Target)

Associates system to optional remote protocol endpoints. The class definition specializes the CIM_HostedAccessPoint definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Optional

Table 151 describes class CIM_HostedAccessPoint (Target).

Table 151 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (Target)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint(Target).

16.6.9 CIM_HostedCollection (Connectivity Collection)

Associates the ConnectivityCollection to the hosting System.

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections.

Table 152 describes class CIM_HostedCollection (Connectivity Collection).

Table 152 - SMI Referenced Properties/Methods for CIM_HostedCollection (Connectivity Collection)

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	Reference to ConnectivityCollection.
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.

16.6.10 CIM_MemberOfCollection (Connectivity Collection)

Associates SCSIProtocolEndpoints to the ConnectivityCollection. The class definition specializes the CIM_MemberOfCollection definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections.

Table 153 describes class CIM_MemberOfCollection (Connectivity Collection).

Table 153 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (Connectivity Collection)

Properties	Flags	Requirement	Description & Notes
Member (overridden)		Mandatory	Reference to target or initiator SCSIProtocolEndpoint.
Collection		Mandatory	Reference to ConnectivityCollection.

16.6.11 CIM_SCSIInitiatorTargetLogicalUnitPath

Represents a path between a SCSI initiator, target, and logical unit.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 154 describes class CIM_SCSIInitiatorTargetLogicalUnitPath.

Table 154 - SMI Referenced Properties/Methods for CIM_SCSIInitiatorTargetLogicalUnitPath

Properties	Flags	Requirement	Description & Notes
LogicalUnit		Mandatory	Reference to StorageExtent in Disk Drive Lite Profile or MediaAccessDevice in Media Access Device Profile.
Initiator		Mandatory	Reference to SCSIProtocolEndpoint(Initiator).
Target		Mandatory	Reference to SCSIProtocolEndpoint(Target).

16.6.12 CIM_SCSIProtocolEndpoint (Initiator)

Represents support for the SCSI command set. The class definition specializes the CIM_ProtocolEndpoint definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 155 describes class CIM_SCSIProtocolEndpoint (Initiator).

Table 155 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint (Initiator)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name	C	Mandatory	See <i>Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4</i> 7.6.3 Standard Formats for Port Names.
ProtocolIFType		Mandatory	Shall be 1 (Other).
OtherTypeDescription (overridden)		Mandatory	Shall be the string 'SCSI'.
ConnectionType (added)		Mandatory	Shall be 2 (Fibre Channel).
Role (added)		Mandatory	Shall be 2 (Initiator) or 4 (Both Initiator and Target).

16.6.13 CIM_SCSIProtocolEndpoint (Target)

Models remote ports - target devices and possibly other initiators. The class definition specializes the CIM_ProtocolEndpoint definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 156 describes class CIM_SCSIProtocolEndpoint (Target).

Table 156 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint (Target)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
ProtocolIFType		Mandatory	The values in MOFs map to IETF values and exclude storage. Shall be 1 (Other) and set OtherTypeDescription appropriately.
OtherTypeDescription (overridden)		Mandatory	Shall be the string 'SCSI'.
Role (added)		Mandatory	Should be set appropriately by the instrumentation. If not known, use 0 (Unknown).
ConnectionType (added)		Mandatory	Shall be 8 (FC).

16.6.14 CIM_SystemDevice (Initiator Ports)

Associates system to initiator ports. The class definition specializes the CIM_SystemDevice definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 157 describes class CIM_SystemDevice (Initiator Ports).

Table 157 - SMI Referenced Properties/Methods for CIM_SystemDevice (Initiator Ports)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem.
PartComponent (overridden)		Mandatory	Reference to FCPort.

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17 SAS Initiator Ports Profile

17.1 Synopsis

Profile Name: SAS Initiator Ports (Component Profile)

Version: 1.7.0

Organization: SNIA

Specializes: Generic Initiator Port Profile

Central Class: SASPort

Scoping Class: a ComputerSystem in a separate autonomous profile

Related Profiles: Not defined in this document.

The SAS Initiator Port Profile models the management of a Serial Attached SCSI port that initiates commands to devices.

17.2 Description

The SAS Initiator Port Profile defines the model Serial Attached SCSI (SAS) ports. A typical instance diagram is provided in Figure 28.

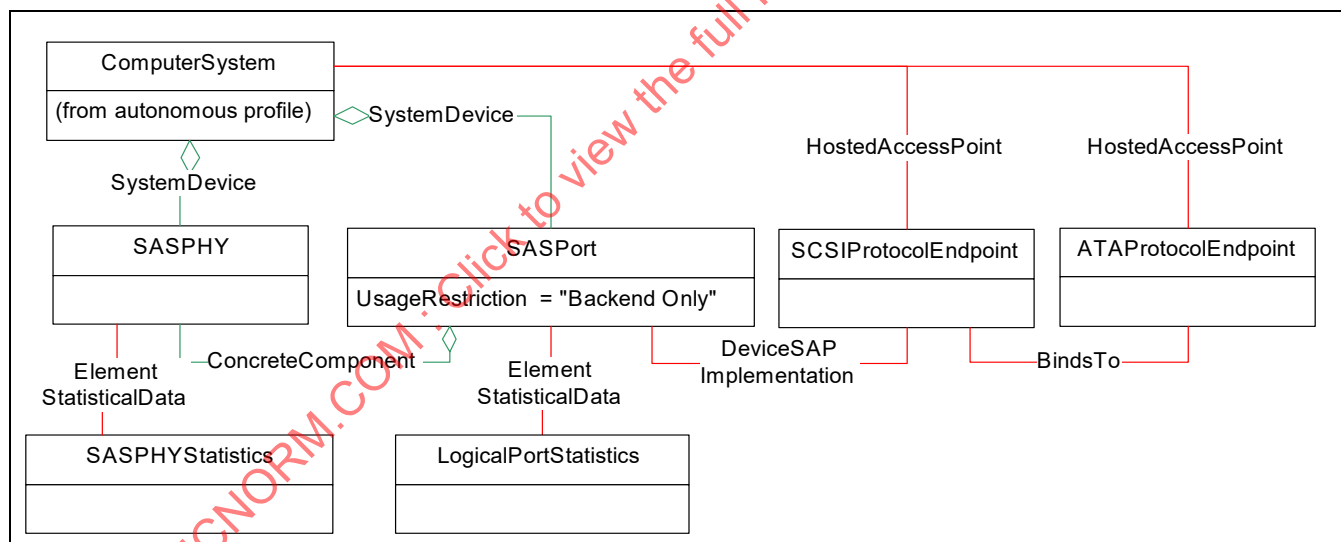


Figure 28 - SAS Initiator Port Model

The SASPhy class represents a SAS PHY. A SAS Port may have multiple associated PHYs; generally, all the PHYs are connected to the same target or expander and provide additional bandwidth.

SASPort represents a SAS initiator port which is an aggregation of SASPHY instances.

SASPhyStatistics is optional and may be associated to SASPhy to hold PHY error statistics.

LogicalPortStatistics is optional and may be associated to SASPort to hold port I/O statistics.

ATAProtocolEndpoint associated to SCSIProtocolEndpoint using BindsTo shall be used to represent support for ATA (SATA) tunneled over SCSI.

17.3 Health and Fault Management Considerations

Table 158 summarizes the Health and Fault Management issues that are unique to this profile.

Table 158 - SASPort OperationalStatus

OperationalStatus	Description
OK	Port is online
Error	Port has a failure
Stopped	Port is disabled
InService	Port is in Self Test
Unknown	

17.4 Methods of the profile

Not defined in this document.

17.5 Client Considerations and Recipes

Not defined in this document.

17.6 CIM Elements

17.6.1 Overview

Table 159 describes the CIM elements for SAS Initiator Ports.

Table 159 - CIM Elements for SAS Initiator Ports

Element Name	Requirement	Description
17.6.2 CIM_ATAProtocolEndpoint (Initiator)	Optional	Initiator ATA endpoints.
17.6.3 CIM_BindsTo	Optional	Associates SCSIProtocolEndpoint and ATAProtocolEndpoint.
17.6.4 CIM_ConcreteComponent	Mandatory	Associates SASPort and SASPHY.
17.6.5 CIM_ConnectivityCollection	Optional	Represents a collection of connected ProtocolEndpoints.
17.6.6 CIM_DeviceSAPImplementation	Mandatory	Connects Initiator SASLogicalPort and SCSIProtocolEndpoint.
17.6.7 CIM_ElementStatisticalData (PHY Statistics)	Optional	Associates SASPHY and SASPhyStatistics.
17.6.8 CIM_ElementStatisticalData (Port Statistics)	Optional	Connects SASPort and LogicalPortStatistics.
17.6.9 CIM_HostedAccessPoint (Initiator)	Mandatory	Associates system to initiator protocol endpoints.
17.6.10 CIM_HostedAccessPoint (Target)	Optional	Associates system to optional remote protocol endpoints.
17.6.11 CIM_HostedCollection (Connectivity Collection)	Conditional	Conditional requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections. Associates the ConnectivityCollection to the hosting System.
17.6.12 CIM_MemberOfCollection (Connectivity Collection)	Conditional	Conditional requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections. Associates ProtocolEndpoints to the ConnectivityCollection.
17.6.13 CIM_SASPort	Mandatory	Represents the logical aspects of the physical port and may have multiple associated protocols.

Table 159 - CIM Elements for SAS Initiator Ports

Element Name	Requirement	Description
17.6.14 CIM_SCSIInitiatorTargetLogicalUnitPath	Optional	Represents a path between a SCSI initiator, target, and logical unit.
17.6.15 CIM_SCSIProtocolEndpoint (Initiator)	Mandatory	Represents support for the SCSI command set.
17.6.16 CIM_SCSIProtocolEndpoint (Target)	Optional	Models remote ports - target devices and possibly other initiators.
17.6.17 CIM_SystemDevice (Initiator PHY)	Mandatory	Associates system to initiator SAS PHYs.
17.6.18 CIM_SystemDevice (Initiator Ports)	Mandatory	Associates system to initiator ports.
17.6.19 CIM_LogicalPortStatistics	Optional	Statistics for a port.
17.6.20 CIM_SASPHY	Mandatory	A PHY on a SAS HBA, Expander, or device.
17.6.21 CIM_SASPhyStatistics	Optional	Statistics for a SAS PHY.

17.6.2 CIM_ATAProtocolEndpoint (Initiator)

Initiator ATA endpoints.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 160 describes class CIM_ATAProtocolEndpoint (Initiator).

Table 160 - SMI Referenced Properties/Methods for CIM_ATAProtocolEndpoint (Initiator)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	See <i>Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4</i> 7.6.3 Standard Formats for Port Names.
ProtocolIFType		Mandatory	Shall be 1 (Other).
OtherTypeDescription		Mandatory	Shall be 'ATA'.
ConnectionType		Mandatory	Shall be 3 (SATA).
Role		Mandatory	Shall be 3 (Target).

17.6.3 CIM_BindsTo

Associates SCSIProtocolEndpoint and ATAProtocolEndpoint.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 161 describes class CIM_BindsTo.

Table 161 - SMI Referenced Properties/Methods for CIM_BindsTo

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	Reference to ATAProtocolEndpoint.
Antecedent		Mandatory	Reference to SCSIProtocolEndpoint.

17.6.4 CIM_ConcreteComponent

Associates SASPort and SASPHY.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 162 describes class CIM_ConcreteComponent.

Table 162 - SMI Referenced Properties/Methods for CIM_ConcreteComponent

Properties	Flags	Requirement	Description & Notes
PartComponent		Mandatory	Reference to SASPHY.
GroupComponent		Mandatory	Reference to SASPort.

17.6.5 CIM_ConnectivityCollection

Represents a collection of connected ProtocolEndpoints.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 163 describes class CIM_ConnectivityCollection.

Table 163 - SMI Referenced Properties/Methods for CIM_ConnectivityCollection

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	

17.6.6 CIM_DeviceSAPImplementation

Connects Initiator SASLogicalPort and SCSIProtocolEndpoint. The class definition specializes the CIM_DeviceSAPImplementation definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 164 describes class CIM_DeviceSAPImplementation.

Table 164 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation

Properties	Flags	Requirement	Description & Notes
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint(Initiator).
Antecedent (overridden)		Mandatory	Reference to SASPort.

17.6.7 CIM_ElementStatisticalData (PHY Statistics)

Associates SASPHY and SASPhyStatistics.

Requirement: Optional

Table 165 describes class CIM_ElementStatisticalData (PHY Statistics).

Table 165 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (PHY Statistics)

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to SASPHY.
Stats		Mandatory	Reference to SASPhyStatistics.

17.6.8 CIM_ElementStatisticalData (Port Statistics)

Connects LogicalPort and LogicalPortStatistics. The class definition specializes the CIM_ElementStatisticalData definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 166 describes class CIM_ElementStatisticalData (Port Statistics).

Table 166 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (Port Statistics)

Properties	Flags	Requirement	Description & Notes
ManagedElement (overridden)		Mandatory	Reference to LogicalPort.
Stats		Mandatory	Reference to LogicalPortStatistics.

17.6.9 CIM_HostedAccessPoint (Initiator)

Associates system to initiator protocol endpoints. The class definition specializes the CIM_HostedAccessPoint definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column

Created By: Static

Modified By: Static
 Deleted By: Static
 Requirement: Mandatory

Table 167 describes class CIM_HostedAccessPoint (Initiator).

Table 167 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (Initiator)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint(Initiator).

17.6.10 CIM_HostedAccessPoint (Target)

Associates system to optional remote protocol endpoints. The class definition specializes the CIM_HostedAccessPoint definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Optional

Table 168 describes class CIM_HostedAccessPoint (Target).

Table 168 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (Target)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint(Target).

17.6.11 CIM_HostedCollection (Connectivity Collection)

Associates the ConnectivityCollection to the hosting System.

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections.

Table 169 describes class CIM_HostedCollection (Connectivity Collection).

Table 169 - SMI Referenced Properties/Methods for CIM_HostedCollection (Connectivity Collection)

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	Reference to ConnectivityCollection.
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.

17.6.12 CIM_MemberOfCollection (Connectivity Collection)

Associates ProtocolEndpoints to the ConnectivityCollection. The class definition specializes the CIM_MemberOfCollection definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections.

Table 170 describes class CIM_MemberOfCollection (Connectivity Collection).

Table 170 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (Connectivity Collection)

Properties	Flags	Requirement	Description & Notes
Member (overridden)		Mandatory	Reference to SCSIProtocolEndpoint.
Collection		Mandatory	Reference to ConnectivityCollection.

17.6.13 CIM_SASPort

Represents the logical aspects of the physical port and may have multiple associated protocols. The class definition specializes the CIM_LogicalPort definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 171 describes class CIM_SASPort.

Table 171 - SMI Referenced Properties/Methods for CIM_SASPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
OperationalStatus (overridden)		Mandatory	Shall be 0 (Unknown), 2 (OK), 6 (Error), 10 (Stopped), or 11 (In Service).
UsageRestriction (overridden)		Mandatory	Shall be 3 (Back-end Only).
PortType (overridden)		Mandatory	Shall be 94 (SAS).
PermanentAddress (added)		Mandatory	SAS Address. Shall be 16 un-separated upper case hex digits. See <i>Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4 7.6.3 Standard Formats for Port Names</i> .

17.6.14 CIM_SCSIIInitiatorTargetLogicalUnitPath

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 172 describes class CIM_SCSIIInitiatorTargetLogicalUnitPath.

Table 172 - SMI Referenced Properties/Methods for CIM_SCSIIInitiatorTargetLogicalUnitPath

Properties	Flags	Requirement	Description & Notes
LogicalUnit		Mandatory	Reference to StorageExtent in Disk Drive Lite Profile or MediaAccessDevice in Media Access Device Profile.
Target		Mandatory	Reference to SCSIProtocolEndpoint(Target).
Initiator		Mandatory	Reference to SCSIProtocolEndpoint(Initiator).

17.6.15 CIM_SCSIProtocolEndpoint (Initiator)

Represents support for the SCSI command set. The class definition specializes the CIM_ProtocolEndpoint definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 173 describes class CIM_SCSIProtocolEndpoint (Initiator).

Table 173 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint (Initiator)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name	C	Mandatory	See <i>Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4</i> 7.6.3 Standard Formats for Port Names.
ProtocolIFType		Mandatory	Shall be 1 (Other).
OtherTypeDescription (overridden)		Mandatory	Shall be the string 'SCSI'.
ConnectionType (added)		Mandatory	Shall be 8 (SAS).
Role (added)		Mandatory	Shall be 2 (Initiator).

17.6.16 CIM_SCSIProtocolEndpoint (Target)

Models remote ports - target devices and possibly other initiators. The class definition specializes the CIM_ProtocolEndpoint definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Optional

Table 174 describes class CIM_SCSIProtocolEndpoint (Target).

Table 174 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint (Target)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
ProtocolIFType		Mandatory	The values in MOFs map to IETF values and exclude storage. Shall be 1 (Other) and set OtherTypeDescription appropriately.
OtherTypeDescription (overridden)		Mandatory	Shall be the string 'SCSI'.
Role (added)		Mandatory	SCSI target or initiator role. Should be set appropriately by the instrumentation. If not know, use 0 (Unknown).
ConnectionType (added)		Mandatory	Shall be 8 (SAS).

17.6.17 CIM_SystemDevice (Initiator PHY)

Associates system to initiator SAS PHYs.

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Mandatory

Table 175 describes class CIM_SystemDevice (Initiator PHY).

Table 175 - SMI Referenced Properties/Methods for CIM_SystemDevice (Initiator PHY)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem.
PartComponent		Mandatory	Reference to SASPHY.

17.6.18 CIM_SystemDevice (Initiator Ports)

Associates system to initiator ports. The class definition specializes the CIM_SystemDevice definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static
 Modified By: Static
 Deleted By: Static

Requirement: Mandatory

Table 176 describes class CIM_SystemDevice (Initiator Ports).

Table 176 - SMI Referenced Properties/Methods for CIM_SystemDevice (Initiator Ports)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem.
PartComponent (overridden)		Mandatory	Reference to back-end (initiator) SASPorts.

17.6.19 CIM_LogicalPortStatistics

Statistics for a port. The class definition specializes the CIM_StatisticalData definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 177 describes class CIM_LogicalPortStatistics.

Table 177 - SMI Referenced Properties/Methods for CIM_LogicalPortStatistics

Properties	Flags	Requirement	Description & Notes
ElementName		Mandatory	
InstanceID		Mandatory	
BytesTransmitted (added)		Mandatory	
BytesReceived (added)		Mandatory	
PacketsTransmitted (added)		Mandatory	
PacketsReceived (added)		Mandatory	

17.6.20 CIM_SASPHY

A PHY on a SAS HBA, Expander, or device.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 178 describes class CIM_SASPHY.

Table 178 - SMI Referenced Properties/Methods for CIM_SASPHY

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
HardwareMinimumPhysicalLinkRate		Mandatory	
HardwareMaximumPhysicalLinkRate		Mandatory	
ProgrammedMinimumPhysicalLinkRate		Mandatory	
ProgrammedMaximumPhysicalLinkRate		Mandatory	
NegotiatedPhysicalLinkRate		Mandatory	

17.6.21 CIM_SASPhyStatistics

Statistics for a SAS PHY.

Requirement: Optional

Table 179 describes class CIM_SASPhyStatistics.

Table 179 - SMI Referenced Properties/Methods for CIM_SASPhyStatistics

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	Key
InvalidDwordCount		Mandatory	
RunningDisparityErrorCount		Mandatory	
LossOfDwordSyncCount		Mandatory	
ResetProblemCount		Mandatory	

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DEPRECATED

18 ATA Initiator Ports Profile

The functionality of the ATA Initiator Ports Profile has been removed from this version of the standard.

The Experimental ATA Initiator Ports Profile is defined in Clause 19 of SMI-S 1.6.1

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EXPERIMENTAL

19 SB Initiator Ports Profile

19.1 Synopsis

Profile Name: SB Initiator Ports (Component Profile)

Version: 1.7.0

Organization: SNIA

Central Class: FCPort

Scoping Class: a ComputerSystem in a referencing autonomous profile

Specializes: Generic Initiator Ports Profile

Related Profiles: Table 180 describes the related profiles for SB Initiator Ports.

Table 180 - Related Profiles for SB Initiator Ports

Profile Name	Organization	Version	Requirement	Description
Indications	DMTF	1.2.2	Mandatory	See DSP1054, version 1.2.2

19.2 Description

The SB Initiator Ports Profile models initiator ports that support the FC-SB-x protocol.

19.3 Implementation

19.3.1 Overview

Figure 29 is an example of a single initiator port. The instance diagram shows a disk (LogicalDevice in the diagram would be subclassed as something like StorageExtent) in an array, connected by a Fibre Channel port. The full model for the disk is shown in the Disk Drive Lite Profile. SBProtocolController is not generally used in initiator contexts. It is included here to be compatible with SMI-S 1.0 clients.

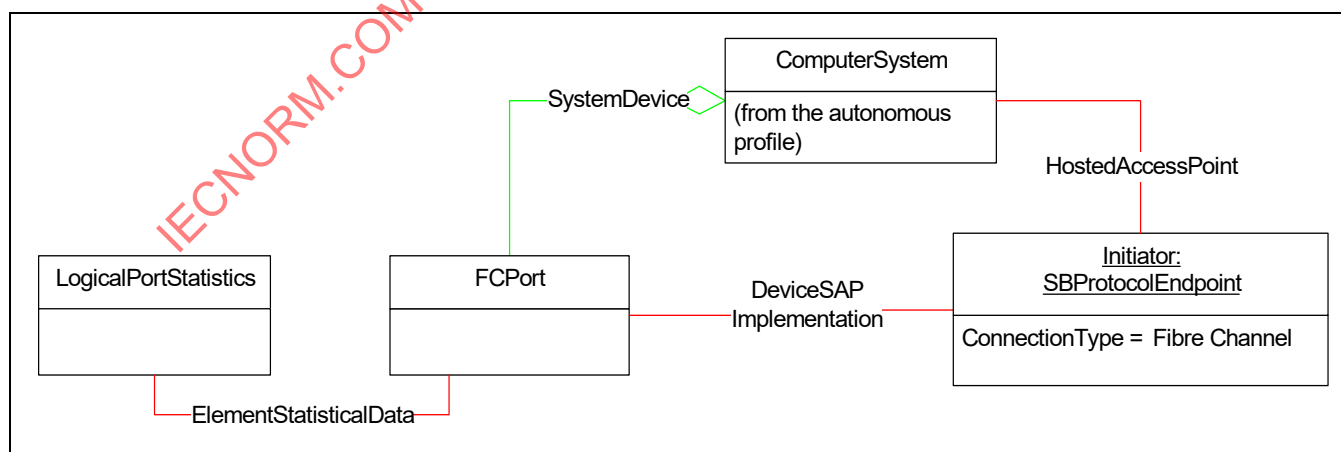


Figure 29 - Fibre Channel Initiator Instance Diagram

19.3.2 Health and Fault Management Considerations

Table 181 summarizes the Health and Fault Management considerations specific to this profile.

Table 181 - FCPort OperationalStatus

OperationalStatus	Description
OK	Port is online
Error	Port has a failure
Stopped	Port is disabled
InService	Port is in Self Test
Unknown	

19.3.3 Cascading Considerations

Not defined in this document.

19.4 Methods

19.4.1 Extrinsic Methods of the Profile

Not defined in this document.

19.4.2 Intrinsic Methods of this Profile

The profile supports read methods and association traversal. Specifically, the list of intrinsic operations supported are as follows:

- GetInstance
- Associators
- AssociatorNames
- References
- ReferenceNames
- EnumerateInstances
- EnumerateInstanceNames

19.5 Client Considerations and Recipes

No recipes are defined in this version of the standard.

19.6 CIM Elements

19.6.1 Overview

Table 182 describes the CIM elements for SB Initiator Ports.

Table 182 - CIM Elements for SB Initiator Ports

Element Name	Requirement	Description
19.6.2 CIM_ConnectivityCollection	Optional	Represents a collection of connected SBProtocolEndpoints.
19.6.3 CIM_DeviceSAPImplementation	Mandatory	Connects Initiator SBLogicalPort and SBProtocolEndpoint.
19.6.4 CIM_ElementStatisticalData (Port Statistics)	Optional	Connects SBPort and LogicalPortStatistics.
19.6.5 CIM_FCPort	Mandatory	Represents the logical aspects of the physical port and may have multiple associated protocols.
19.6.6 CIM_HostedAccessPoint (Initiator)	Mandatory	Associates system to initiator protocol endpoints.
19.6.7 CIM_HostedAccessPoint (Target)	Optional	Associates system to optional remote protocol endpoints.
19.6.8 CIM_HostedCollection (Connectivity Collection)	Conditional	Conditional requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections. Associates the ConnectivityCollection to the hosting System.
19.6.9 CIM_MemberOfCollection (Connectivity Collection)	Conditional	Conditional requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections. Represents a collection of connected SBProtocolEndpoints.
19.6.10 CIM_SystemDevice (Initiator Ports)	Mandatory	Associates system to initiator ports.
19.6.11 CIM_LogicalPortStatistics	Optional	Statistics for a port.
19.6.12 CIM_SBInitiatorTargetLogicalUnitPath	Optional	
19.6.13 CIM_SBProtocolEndpoint (Initiator)	Mandatory	Represents a protocol (command set) supported by the port. The appropriate subclass (SCSIProtocolEndpoint, ATAPProtocolEndpoint, SBProtocolEndpoint) should be used in initiator port specialized profiles.
19.6.14 CIM_SBProtocolEndpoint (Target)	Optional	Target or non-local ProtocolEndpoint.
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_FCPort	Optional	Create FCPort.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_FCPort AND SourceInstance.CIM_FCPort::OperationalStatus <> PreviousInstance.CIM_FCPort::OperationalStatus	Optional	CQL -Modify FCPort.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_FCPort	Optional	Delete FCPort.

19.6.2 CIM_ConnectivityCollection

Represents a collection of connected SBProtocolEndpoints. The class definition specializes the CIM_ConnectivityCollection definition in the Generic Initiator Ports profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 183 describes class CIM_ConnectivityCollection.

Table 183 - SMI Referenced Properties/Methods for CIM_ConnectivityCollection

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	

19.6.3 CIM_DeviceSAPImplementation

Connects Initiator SBLogicalPort and SBProtocolEndpoint. The class definition specializes the CIM_DeviceSAPImplementation definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 184 describes class CIM_DeviceSAPImplementation.

Table 184 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation

Properties	Flags	Requirement	Description & Notes
Dependent (overridden)		Mandatory	Reference to SBProtocolEndpoint(Initiator).
Antecedent (overridden)		Mandatory	Reference to FCPort.

19.6.4 CIM_ElementStatisticalData (Port Statistics)

Connects SBPort and LogicalPortStatistics. The class definition specializes the CIM_ElementStatisticalData definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 185 describes class CIM_ElementStatisticalData (Port Statistics).

Table 185 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (Port Statistics)

Properties	Flags	Requirement	Description & Notes
ManagedElement (overridden)		Mandatory	Reference to FCPort.
Stats		Mandatory	Reference to LogicalPortStatistics.

19.6.5 CIM_FCPort

Represents the logical aspects of the physical port and may have multiple associated protocols. The class definition specializes the CIM_LogicalPort definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 186 describes class CIM_FCPort.

Table 186 - SMI Referenced Properties/Methods for CIM_FCPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
OperationalStatus		Mandatory	
UsageRestriction (overridden)		Mandatory	Shall be 3 for ports restricted to Back-end only or 4 if the port is unrestricted.
PortType (overridden)		Mandatory	Shall be 0 1 10 11 12 13 14 15 16 17 18 (Unknown or Other or N or NL or F/NL or Nx or E or F or FL or B or G).
ElementName (added)		Mandatory	Port Symbolic Name.
Speed (added)		Mandatory	
MaxSpeed (added)		Mandatory	Port Supported Speed from HBA API.
PortNumber (added)		Optional	
PermanentAddress (added)	CD	Optional	Port WWN. PermanentAddress is optional when used as a backend port in a device. This may be overridden in profiles that use this profile. See <i>Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4 7.6.3 Standard Formats for Port Names</i> .
NetworkAddresses (added)		Optional	For Fibre Channel end device ports, the Fibre Channel ID.
SupportedCOS (added)		Optional	
ActiveCOS (added)		Optional	
SupportedFC4Types (added)		Optional	
ActiveFC4Types (added)		Optional	
LinkTechnology (added)		Mandatory	
SupportedMaximumTransmissionUnit (added)		Mandatory	
ActiveMaximumTransmissionUnit (added)		Optional	

19.6.6 CIM_HostedAccessPoint (Initiator)

Associates system to initiator protocol endpoints.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 187 describes class CIM_HostedAccessPoint (Initiator).

Table 187 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (Initiator)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.
Dependent		Mandatory	Reference to ProtocolEndpoint(Initiator).

19.6.7 CIM_HostedAccessPoint (Target)

Associates system to optional remote protocol endpoints.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 188 describes class CIM_HostedAccessPoint (Target).

Table 188 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (Target)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.
Dependent		Mandatory	Reference to ProtocolEndpoint(Target).

19.6.8 CIM_HostedCollection (Connectivity Collection)

Associates the ConnectivityCollection to the hosting System.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections.

Table 189 describes class CIM_HostedCollection (Connectivity Collection).

Table 189 - SMI Referenced Properties/Methods for CIM_HostedCollection (Connectivity Collection)

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	Reference to ConnectivityCollection.
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.

19.6.9 CIM_MemberOfCollection (Connectivity Collection)

Represents a collection of connected SBProtocolEndpoints. The class definition specializes the CIM_MemberOfCollection definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections.

Table 190 describes class CIM_MemberOfCollection (Connectivity Collection).

Table 190 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (Connectivity Collection)

Properties	Flags	Requirement	Description & Notes
Member (overridden)		Mandatory	Reference to SBProtocolEndpoint(Initiator or Target).
Collection		Mandatory	Reference to ConnectivityCollection.

19.6.10 CIM_SystemDevice (Initiator Ports)

Associates system to initiator ports.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 191 describes class CIM_SystemDevice (Initiator Ports).

Table 191 - SMI Referenced Properties/Methods for CIM_SystemDevice (Initiator Ports)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem.
PartComponent		Mandatory	Reference to LogicalPort.

19.6.11 CIM_LogicalPortStatistics

Statistics for a port. The class definition specializes the CIM_StatisticalData definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 192 describes class CIM_LogicalPortStatistics.

Table 192 - SMI Referenced Properties/Methods for CIM_LogicalPortStatistics

Properties	Flags	Requirement	Description & Notes
ElementName		Mandatory	
InstanceID		Mandatory	
BytesTransmitted (added)		Mandatory	
BytesReceived (added)		Mandatory	
PacketsTransmitted (added)		Mandatory	
PacketsReceived (added)		Mandatory	

19.6.12 CIM_SBInitiatorTargetLogicalUnitPath

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 193 describes class CIM_SBInitiatorTargetLogicalUnitPath.

Table 193 - SMI Referenced Properties/Methods for CIM_SBInitiatorTargetLogicalUnitPath

Properties	Flags	Requirement	Description & Notes
UsePreferredPath		Optional	Boolean indicating whether preferred path processing is required.
PreferredPath		Optional	Boolean indicating whether this is a preferred path.
PathGroupState		Optional	One of 0(Unknown), 2(Path grouping not supported), 3(Reset), 4(Grouped), or 5(Ungrouped).
PathGroupMode		Optional	One of 0(Unknown), 2(None), 3(Single path), or 4(Multipath). Single path and multipath only valid if PathGroupState is grouped.
PathGroupID		Optional	String containing the ID from the OS, only valid if PathGroupState is Grouped.
LogicalUnit		Mandatory	Reference to StorageExtent in Disk Drive Lite Profile or MediaAccessDevice in Media Access Device Profile.
Target		Mandatory	Reference to SCSIProtocolEndpoint(Target).
Initiator		Mandatory	Reference to SCSIProtocolEndpoint(Initiator).

19.6.13 CIM_SBProtocolEndpoint (Initiator)

Represents a protocol (command set) supported by the port. The class definition specializes the CIM_ProtocolEndpoint definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 194 describes class CIM_SBProtocolEndpoint (Initiator).

Table 194 - SMI Referenced Properties/Methods for CIM_SBProtocolEndpoint (Initiator)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name	C	Mandatory	See <i>Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4 7.6.3 Standard Formats for Port Names</i> .
ProtocolIFType (overridden)		Mandatory	Shall be 1 (Other).
OtherTypeDescription (overridden)		Mandatory	Shall be 'SB'.
ConnectionType (added)		Mandatory	Shall be 2 (Fibre Channel).
Role (added)		Mandatory	Shall be 2 (Initiator) or 4 (Both Initiator and Target).

19.6.14 CIM_SBProtocolEndpoint (Target)

Target or non-local ProtocolEndpoint. The class definition specializes the CIM_ProtocolEndpoint definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 195 describes class CIM_SBProtocolEndpoint (Target).

Table 195 - SMI Referenced Properties/Methods for CIM_SBProtocolEndpoint (Target)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
ProtocolIFType (overridden)		Mandatory	Shall be 1 (Other).
OtherTypeDescription (overridden)		Mandatory	Shall be 'SB'.
Role (added)		Mandatory	Should be set appropriately by the instrumentation. If not know, use 0 (Unknown).
ConnectionType (added)		Mandatory	Shall be 2 (Fibre Channel).

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20 FCoE Initiator Ports Profile

20.1 Synopsis

Profile Name: FCoE Initiator Ports (Component Profile)

Version: 1.7.0

Organization: SNIA

Specializes: Generic Initiator Ports Profile

Central Class: FCPort shall be 2 for ports restricted to Front-end only or 4 if the port is unrestricted.

Scoping Class: ComputerSystem in the Base Server Profile (or some other autonomous profile)

Related Profiles: Not defined in this document.

The FCoE Initiator Ports Profile models the behavior of the Fibre Channel over Ethernet (FCoE) functionality of a Converged Network Adaptor (CNA).

20.2 Description

The FCoE Initiator Ports Profile is a component profile that models the behavior of the Fibre Channel over Ethernet (FCoE) functionality of a Converged Network Adaptor (CNA).

A CNA may support functionality beyond FCoE, including generic TCP/IP support. Functionality of CNAs other than FCoE is outside the scope of this profile.

20.3 Implementation

20.3.1 Overview

Figure 30 shows the model for classes in the FCoE Initiator Ports Profile

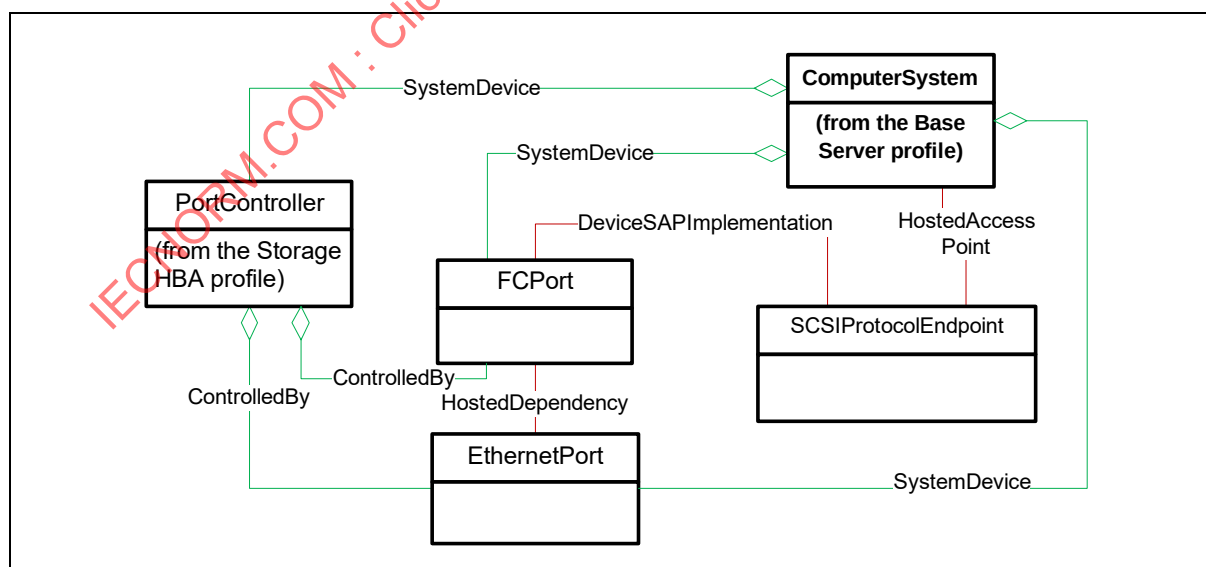


Figure 30 - FCoE Initiator Instance Diagram

Each FCoE port shall be modeled with single instance each of FCPort, EthernetPort, and SCSIProtocolEndpoint. FCPort and EthernetPort shall be associated with HostedDependency. FCPort and EthernetPort shall each be associated to the ComputerSystem in the Base Server Profile with SystemDevice. FCPort and SCSIProtocolEndpoint shall be associated with DeviceSAPImplementation. SCSIProtocolEndpoint shall be associated to the ComputerSystem (defined in the Base Server Profile) with HostedAccessPoint.

20.3.2 Relationship to Storage HBA Profile

The FCoE Initiator ports profile is used in conjunction with the Storage HBA Profile (see *Storage Management Technical Specification, Part 7 Host Elements, 1.8.0 Rev 4 6 Storage HBA Profile*). The Storage HBA Profile models the management of HBA cards independent of connectivity, and the FCoE Ethernet Ports Profile models the management of FCoE ports on an HBA.

The ControlledBy association defined in *Storage Management Technical Specification, Part 7 Host Elements, 1.8.0 Rev 4 6 Storage HBA Profile* shall reference instance of FCPort and shall not reference instances of EthernetPort.

20.3.3 Optional target model

Figure 31 shows an example of a single port and drive connected to a single system using Fibre Channel. This instance diagram shows a disk (LogicalDevice in the diagram would be subclassed as something like StorageExtent) in an array, connected by a Fibre Channel port. The full model for the disk is shown in 10 Disk Drive Lite Profile.

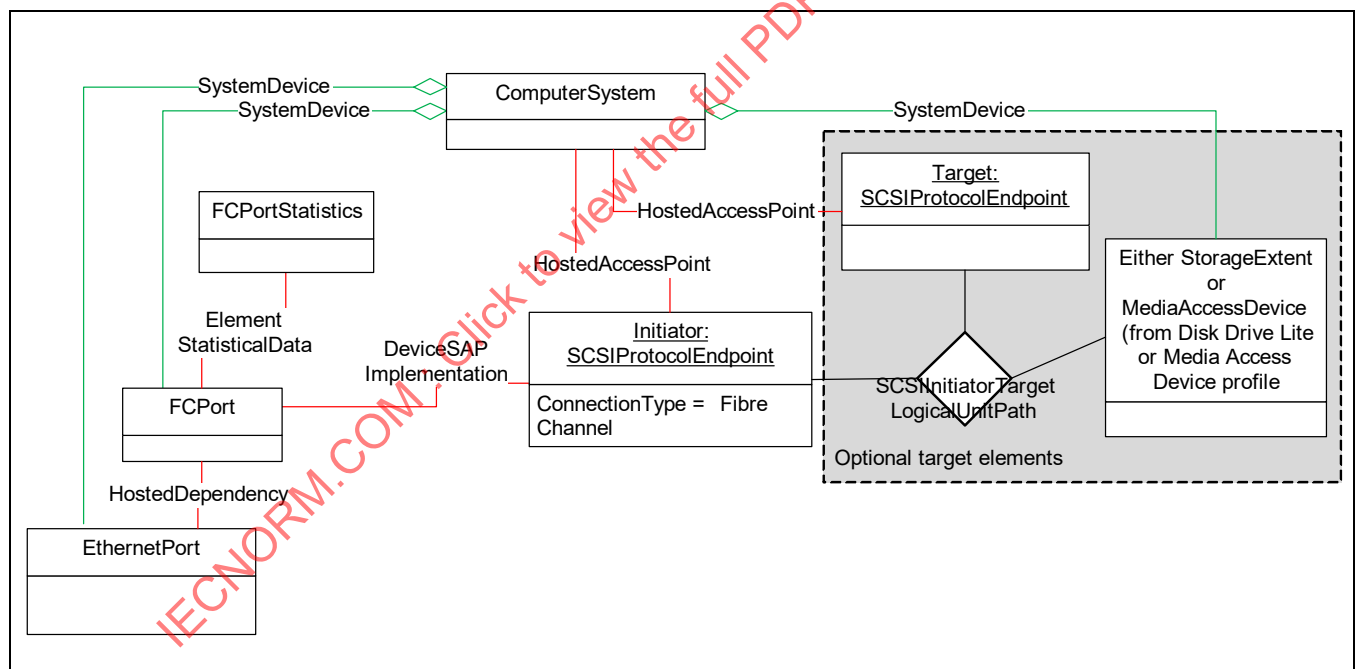


Figure 31 - Optional Target Element Model

20.3.4 Port Statistics

The FCPortStatistics subclass of NetworkPortStatistics is optional. If supported, FCPortStatistics shall be associated to FcPort using ElementStatisticalData.

20.3.5 Logical Port Group (FC Node)

LogicalPortGroup, illustrated in Figure 32, may optionally be used to model the collection of ports that shared a Node WWN (in this case, both ports on a card, but other implementations are in use). If LogicalPortGroup is instantiated, it shall be associated to the ComputerSystem in the referencing profile using HostedCollection and also associated to FCPorts using MemberOfCollection.

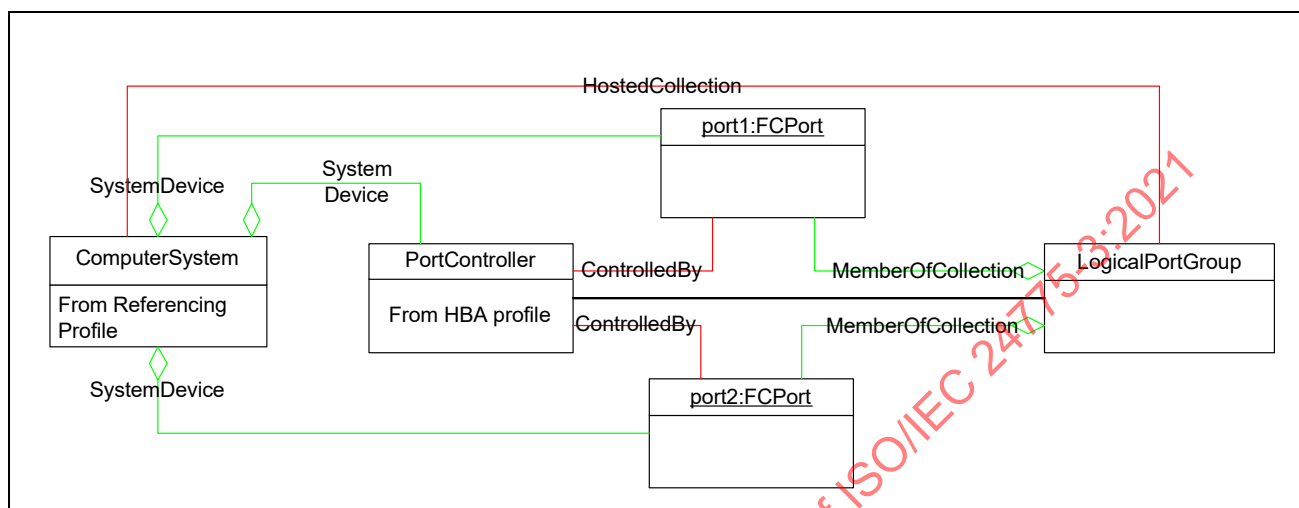


Figure 32 - Logical Port Group Model

20.3.6 Health and Fault Management Considerations

Table 196 summarized the Health and Fault Management considerations specific to this profile.

Table 196 - FCPort OperationalStatus

OperationalStatus	Description
(2) OK	Port is online
(6) Error	Port has a failure
(10) Stopped	Port is disabled
(11) InService	Port is in Self Test
(0) Unknown	

20.3.7 Cascading Considerations

Not defined in this document.

20.4 Methods

20.4.1 Extrinsic Methods of this Profile

Not defined in this document

20.4.2 Intrinsic Methods of this Profile

The profile supports read methods and association traversal. Specifically, the list of intrinsic operations supported

are as follows:

- GetInstance
- Associators
- AssociatorNames
- References
- ReferenceNames
- EnumerateInstances
- EnumerateInstanceNames

20.5 Use Cases and Recipes

No recipes are defined in this version of the standard.

20.6 CIM Elements

20.6.1 Overview

Table 197 describes the CIM elements for FCoE Initiator Ports.

Table 197 - CIM Elements for FCoE Initiator Ports

Element Name	Requirement	Description
20.6.2 CIM_ConnectivityCollection	Optional	Represents a collection of connected ProtocolEndpoints.
20.6.3 CIM_DeviceSAPImplementation	Mandatory	Connects Initiator LogicalPort and ProtocolEndpoint.
20.6.4 CIM_ElementStatisticalData (Port Statistics)	Optional	Connects LogicalPort and LogicalPortStatistics.
20.6.5 CIM_EthernetPort	Mandatory	
20.6.6 CIM_FCPort	Mandatory	Represents the logical aspects of the physical port and may have multiple associated protocols.
20.6.7 CIM_FCPortStatistics	Mandatory	Statistics for a port.
20.6.8 CIM_HostedAccessPoint (Initiator)	Mandatory	Associates system to initiator protocol endpoints.
20.6.9 CIM_HostedAccessPoint (Target)	Optional	Associates system to optional remote protocol endpoints.
20.6.10 CIM_HostedCollection (Connectivity Collection)	Conditional	Conditional requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections. Associates the ConnectivityCollection to the hosting System.
20.6.11 CIM_HostedCollection (FC Node)	Optional	Associates the LogicalPortGroup (Fibre Channel Node) to the hosting System.
20.6.12 CIM_HostedDependency (NetworkPort to FCPort)	Mandatory	Association between EthernetPort and FCPort.
20.6.13 CIM_LogicalPortGroup	Optional	Collection of Fibre Channel ports that share a Node WWN.
20.6.14 CIM_MemberOfCollection (Connectivity Collection)	Conditional	Conditional requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections. Associates ProtocolEndpoints to the ConnectivityCollection.
20.6.15 CIM_MemberOfCollection (FC Node)	Optional	Associates FCPort to the LogicalPortGroup.

Table 197 - CIM Elements for FCoE Initiator Ports

Element Name	Requirement	Description
20.6.16 CIM_ProtocolEndpoint (Initiator)	Mandatory	Represents a protocol (command set) supported by the port. The appropriate subclass (SCSIProtocolEndpoint, ATAProtocolEndpoint, SBProtocolEndpoint) should be used in initiator port specialized profiles.
20.6.17 CIM_ProtocolEndpoint (Target)	Optional	Models protocols of remote ports - target devices and possibly other initiators.
20.6.18 CIM_SCSIInitiatorTargetLogicalUnitPath	Optional	Represents a path between a SCSI initiator, target, and logical unit.
20.6.19 CIM_SCSIProtocolEndpoint (Initiator)	Mandatory	
20.6.20 CIM_SCSIProtocolEndpoint (Target)	Optional	Models remote ports - target devices and possibly other initiators.
20.6.21 CIM_SystemDevice (Ethernet Port)	Mandatory	Associates system to ethernet ports.
20.6.22 CIM_SystemDevice (Initiator Ports)	Mandatory	Associates system to FCPorts.
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_FCPort	Optional	CQL -Creation of an FCoE Port.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_FCPort AND SourceInstance.CIM_FCPort::OperationalStatus <> PreviousInstance.CIM_FCPort::OperationalStatus	Optional	CQL -Modify FCPort.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_FCPort	Optional	CQL -Deletion of an FCoE Port.

20.6.2 CIM_ConnectivityCollection

Represents a collection of connected ProtocolEndpoints.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 198 describes class CIM_ConnectivityCollection.

Table 198 - SMI Referenced Properties/Methods for CIM_ConnectivityCollection

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	

20.6.3 CIM_DeviceSAPImplementation

Connects Initiator LogicalPort and ProtocolEndpoint. The class definition specializes the CIM_DeviceSAPImplementation definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 199 describes class CIM_DeviceSAPImplementation.

Table 199 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation

Properties	Flags	Requirement	Description & Notes
Dependent (overridden)		Mandatory	Reference to SCSIProtocolEndpoint.
Antecedent (overridden)		Mandatory	Reference to FCPort.

20.6.4 CIM_ElementStatisticalData (Port Statistics)

Connects LogicalPort and LogicalPortStatistics. The class definition specializes the CIM_ElementStatisticalData definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 200 describes class CIM_ElementStatisticalData (Port Statistics).

Table 200 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (Port Statistics)

Properties	Flags	Requirement	Description & Notes
ManagedElement (overridden)		Mandatory	Reference to FCPort.
Stats (overridden)		Mandatory	Reference to FCPortStatistics.

20.6.5 CIM_EthernetPort

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 201 describes class CIM_EthernetPort.

Table 201 - SMI Referenced Properties/Methods for CIM_EthernetPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
LinkTechnology		Mandatory	Shall be 2 (Ethernet).

Table 201 - SMI Referenced Properties/Methods for CIM_EthernetPort

Properties	Flags	Requirement	Description & Notes
OperationalStatus		Mandatory	Shall be 0 (Unknown), 2 (OK), 6 (Error), 10 (Stopped), or 11 (In Service).
PermanentAddress	CD	Mandatory	The MAC Address. Shall be formatted as 12 un-separated upper case hex digits.

20.6.6 CIM_FCPort

Represents the logical aspects of the physical port and may have multiple associated protocols. The class definition specializes the CIM_LogicalPort definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the leftmost column

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 202 describes class CIM_FCPort.

Table 202 - SMI Referenced Properties/Methods for CIM_FCPort

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
OperationalStatus		Mandatory	
UsageRestriction		Mandatory	Shall be 3 for ports restricted to back-end (initiator) only or 4 if the port is unrestricted.
PortType (overridden)		Mandatory	Shall be 0 (Unknown), 1 (Other), N (10), or Nx (13).
OtherPortType		Conditional	Required when PortType is Other
ElementName (added)		Mandatory	Port Symbolic Name.
Speed (added)		Mandatory	Speed in bits per second. Shall be 0, 1062500000 (1GFC), 2125000000 (2GFC), 4250000000 (4GFC), 8500000000 (8GFC), 10312500000 (10GE/10GFCoE), 14025000000 (16GFC), or 28500000000 (32GFC).
MaxSpeed (added)		Mandatory	Maximum Port Speed.
PortNumber (added)		Optional	
PermanentAddress (added)	CD	Optional	Port WWN. PermanentAddress is optional when used as a back-end port in a device. This may be overridden in profiles that use this profile. Shall be 16 un-separated upper case hex digits.
NetworkAddresses (added)		Optional	For Fibre Channel end device ports, the Fibre Channel ID. Shall be 16 un-separated upper case hex digits.
SupportedCOS (added)		Optional	List of supported classes of services. Shall include 0 (unknown), 1 (Class1), 2 (Class 2), 3, (Class 3), 4 (Class 4), 6 (Class 6), or 7 (Class 7).

Table 202 - SMI Referenced Properties/Methods for CIM_FCPort

Properties	Flags	Requirement	Description & Notes
ActiveCOS (added)		Optional	List of active classes of services. Shall include 0 (unknown), 1 (Class 1), 2 (Class 2), 3, (Class 3), 4 (Class 4), 6 (Class 6), or 7 (Class 7).
SupportedFC4Types (added)		Optional	
ActiveFC4Types (added)		Optional	
LinkTechnology (added)		Mandatory	Shall be 4 (FC).
SupportedMaximumTransmissionUnit (added)		Mandatory	
ActiveMaximumTransmissionUnit (added)		Optional	
PortDiscriminator (added)		Mandatory	Experimental. Shall include 10 (FCoE) and 12 (HBA).

20.6.7 CIM_FCPortStatistics

The class definition specializes the CIM_StatisticalData definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 203 describes class CIM_FCPortStatistics.

Table 203 - SMI Referenced Properties/Methods for CIM_FCPortStatistics

Properties	Flags	Requirement	Description & Notes
ElementName		Mandatory	
InstanceID		Mandatory	
BytesTransmitted (added)		Mandatory	
BytesReceived (added)		Mandatory	
PacketsTransmitted (added)		Mandatory	
PacketsReceived (added)		Mandatory	
CRCErrors (added)		Mandatory	Maps to HBA API HBA_PortStatistics.InvalidCRCCCount.
LinkFailures (added)		Mandatory	Maps to HBA API HBA_PortStatistics.LinkFailureCount.
PrimitiveSeqProtocolErrCount (added)		Mandatory	
LossOfSignalCounter (added)		Mandatory	Maps to HBA API HBA_PortStatistics.LossOfSignalCount.
InvalidTransmissionWords(added)		Mandatory	Maps to HBA API HBA_PortStatistics.InvalidTxWordCount.
StatisticTime (added)		Optional	Time last measurement was taken.
LIPCount (added)		Mandatory	
NOSCount (added)		Mandatory	

Table 203 - SMI Referenced Properties/Methods for CIM_FCPortStatistics

Properties	Flags	Requirement	Description & Notes
ErrorFrames (added)		Mandatory	
DumpedFrames (added)		Mandatory	
LossOfSyncCounter (added)		Mandatory	Maps to HBA API HBA_PortStatistics.LossOfSynchCount.

20.6.8 CIM_HostedAccessPoint (Initiator)

Associates system to initiator protocol endpoints.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 204 describes class CIM_HostedAccessPoint (Initiator).

Table 204 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (Initiator)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.
Dependent		Mandatory	Reference to ProtocolEndpoint(Initiator).

20.6.9 CIM_HostedAccessPoint (Target)

Associates system to optional remote protocol endpoints.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 205 describes class CIM_HostedAccessPoint (Target).

Table 205 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (Target)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.
Dependent		Mandatory	Reference to ProtocolEndpoint(Target).

20.6.10 CIM_HostedCollection (Connectivity Collection)

Associates the ConnectivityCollection to the hosting System.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections.

Table 206 describes class CIM_HostedCollection (Connectivity Collection).

Table 206 - SMI Referenced Properties/Methods for CIM_HostedCollection (Connectivity Collection)

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	Reference to ConnectivityCollection.
Antecedent		Mandatory	Reference to ComputerSystem in referencing profile.

20.6.11 CIM_HostedCollection (FC Node)

Associates the LogicalPortGroup (Fibre Channel Node) to the hosting System.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 207 describes class CIM_HostedCollection (FC Node).

Table 207 - SMI Referenced Properties/Methods for CIM_HostedCollection (FC Node)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem.
Dependent		Mandatory	Reference to LogicalPortGroup.

20.6.12 CIM_HostedDependency (NetworkPort to FCPort)

Association between EthernetPort and FCPort.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 208 describes class CIM_HostedDependency (NetworkPort to FCPort).

Table 208 - SMI Referenced Properties/Methods for CIM_HostedDependency (NetworkPort to FCPort)

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to EthernetPort.
Dependent		Mandatory	Reference to FCPort.

20.6.13 CIM_LogicalPortGroup

Represents the Fibre Channel Node.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 209 describes class CIM_LogicalPortGroup.

Table 209 - SMI Referenced Properties/Methods for CIM_LogicalPortGroup

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	Opaque.
Name	D	Mandatory	Fibre Channel Node WWN.
NameFormat		Mandatory	Shall be 'WWN'.
ElementName		Mandatory	Node Symbolic Name.

20.6.14 CIM_MemberOfCollection (Connectivity Collection)

Associates ProtocolEndpoints to the ConnectivityCollection. The class definition specializes the CIM_MemberOfCollection definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for ConnectivityCollections that are not RemoteReplicationCollections.

Table 210 describes class CIM_MemberOfCollection (Connectivity Collection).

Table 210 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (Connectivity Collection)

Properties	Flags	Requirement	Description & Notes
Member (overridden)		Mandatory	Reference to ProtocolEndpoint.
Collection		Mandatory	Reference to ConnectivityCollection.

20.6.15 CIM_MemberOfCollection (FC Node)

Associates FCPort to the LogicalPortGroup.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 211 describes class CIM_MemberOfCollection (FC Node).

Table 211 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (FC Node)

Properties	Flags	Requirement	Description & Notes
Collection		Mandatory	Reference to LogicalPortGroup.
Member		Mandatory	Reference to FCPort.

20.6.16 CIM_ProtocolEndpoint (Initiator)

Represents a protocol (command set) supported by the port.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 212 describes class CIM_ProtocolEndpoint (Initiator).

Table 212 - SMI Referenced Properties/Methods for CIM_ProtocolEndpoint (Initiator)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name	C	Mandatory	See <i>Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4 7.6.3</i> Standard Formats for Port Names.
ProtocolIFType		Mandatory	Shall be 1 (Other).
OtherTypeDescription		Mandatory	Shall be the string 'SCSI', 'ATA', or 'SB'. Initiator port specialized profiles specify the appropriate subset.

20.6.17 CIM_ProtocolEndpoint (Target)

Models protocols of remote ports - target devices and possibly other initiators. The appropriate subclass (SCSIProtocolEndpoint, ATAProtocolEndpoint, SBProtocolEndpoint) should be used in initiator port specialized profiles.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 213 describes class CIM_ProtocolEndpoint (Target).

Table 213 - SMI Referenced Properties/Methods for CIM_ProtocolEndpoint (Target)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
ProtocolIFType		Mandatory	The values in MOFs map to IETF values and exclude storage. Shall be 1 (Other) and set OtherTypeDescription appropriately.
OtherTypeDescription		Mandatory	Shall be the string 'SCSI', 'ATA', or 'SB'. Initiator port specialized profiles specify the appropriate subset.

20.6.18 CIM_SCSIIInitiatorTargetLogicalUnitPath

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 214 describes class CIM_SCSIIInitiatorTargetLogicalUnitPath.

Table 214 - SMI Referenced Properties/Methods for CIM_SCSIIInitiatorTargetLogicalUnitPath

Properties	Flags	Requirement	Description & Notes
LogicalUnit		Mandatory	
Initiator		Mandatory	
Target		Mandatory	

20.6.19 CIM_SCSIProtocolEndpoint (Initiator)

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 215 describes class CIM_SCSIProtocolEndpoint (Initiator).

Table 215 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint (Initiator)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
ProtocolIFType		Mandatory	Shall be 1 (Other).
OtherTypeDescription		Mandatory	Shall be the string 'SCSI'.
ConnectionType		Mandatory	Shall be 2 (Fibre Channel).
Role		Mandatory	Shall be 2 (Initiator).

20.6.20 CIM_SCSIProtocolEndpoint (Target)

Models remote ports - target devices and possibly other initiators.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 216 describes class CIM_SCSIProtocolEndpoint (Target).

Table 216 - SMI Referenced Properties/Methods for CIM_SCSIProtocolEndpoint (Target)

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	
Role		Mandatory	Should be set appropriately by the instrumentation. If not know, use 0 (Unknown).
ProtocolIFType		Mandatory	The values in MOFs map to IETF values and exclude storage. Shall be 1 (Other) and set OtherTypeDescription to 'SCSI'.
OtherTypeDescription		Mandatory	Shall be the string 'SCSI'.
ConnectionType		Mandatory	Shall be 8 (FC).

20.6.21 CIM_SystemDevice (Ethernet Port)

Associates system to ethernet ports.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 217 describes class CIM_SystemDevice (Ethernet Port).

Table 217 - SMI Referenced Properties/Methods for CIM_SystemDevice (Ethernet Port)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem.
PartComponent		Mandatory	Reference to EthernetPort.

20.6.22 CIM_SystemDevice (Initiator Ports)

Associates system to FCPorts. The class definition specializes the CIM_SystemDevice definition in the Generic Initiator Ports profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 218 describes class CIM_SystemDevice (Initiator Ports).

Table 218 - SMI Referenced Properties/Methods for CIM_SystemDevice (Initiator Ports)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem.
PartComponent (overridden)		Mandatory	Reference to FCPort.

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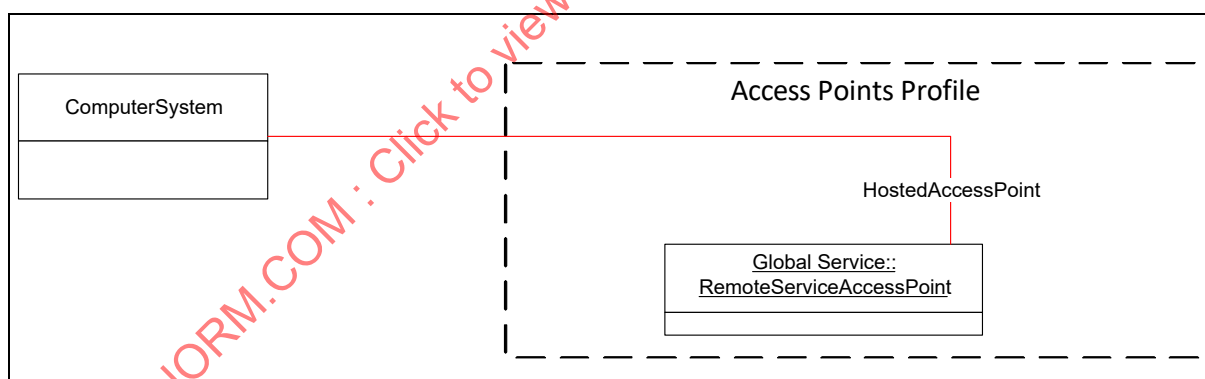
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21 Access Points Profile**21.1 Synopsis****Profile Name:** Access Points (Component Profile)**Version:** 1.3.0**Organization:** SNIA**Central Class:** RemoteServiceAccessPoint**Scoping Class:** a ComputerSystem in a separate autonomous profile**Related Profiles:** Not defined in this document.**21.2 Description**

The Access Points Profile provides addresses of remote access points for management services.

This is modeled using a RemoteServiceAccessPoint linked to the managed system using a HostedAccessPoint association.

A management service is typically associated with all elements in a system, but in some cases, a management service relates to a subset of elements. The scope of a RemoteServiceAccessPoint may be constrained to a subset of elements using SAPAvailableForElement. If the service referenced in RemoteServiceAccessPoint is not referenced by any SAPAvailableForElement associations, then the service described by RemoteServiceAccessPoint shall apply to all the elements of the system referenced via HostedAccessPoints. This type of system-wide service is depicted in Figure 33.

**Figure 33 - System-wide Remote Access Point**

If the service referenced in RemoteServiceAccessPoint is referenced by any SAPAvailableForElement associations, then the service described by RemoteServiceAccessPoint shall apply to the subset of elements referenced via SAPAvailableForElement associations. The HostedAccessPoint association between RemoteServiceAccessPoint is still mandatory (so the client can readily associate the service to a specific storage system).

Figure 34 depicts a configuration with two RemoveServiceAccessPoint instances. One represents a system-wide service and the other represents a service that applies just to certain devices.

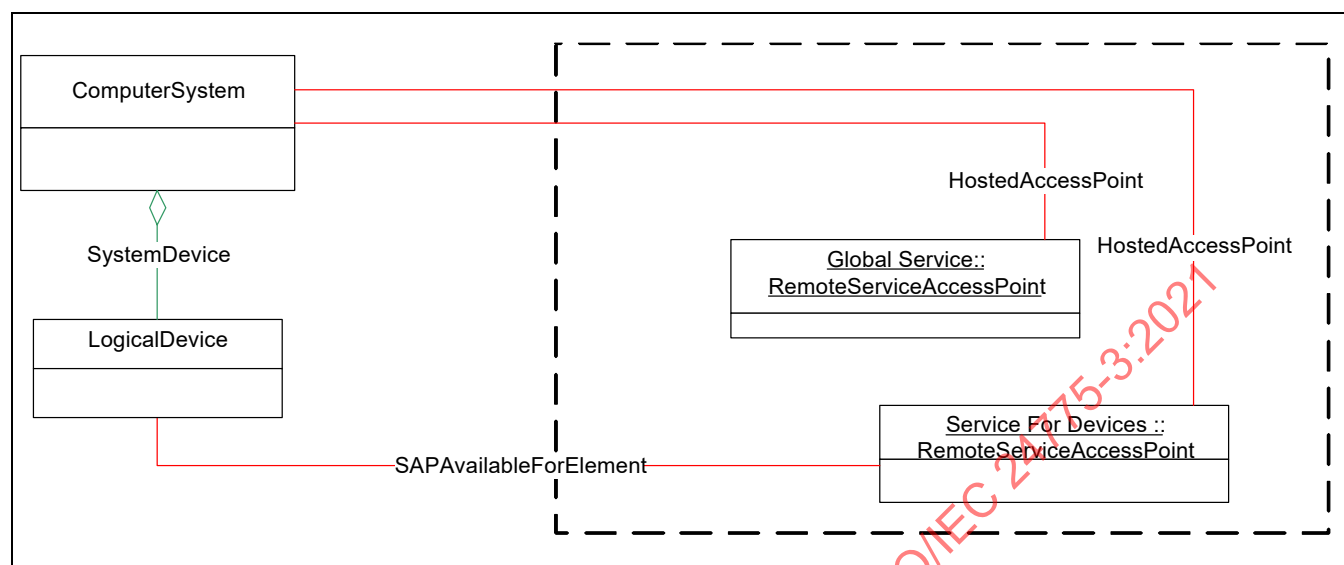


Figure 34 - Access Point Instance Diagram

The exposed management services may represent a web UI that can be launched by a web browser, a telnet interface, or some vendor-specific interface. RemoteServiceAccessPoint InfoFormat property describes the format of the AccessInfo property; valid options include “URL” and FQDN”. In a URL, the text before the “://” is referred to as the “scheme”. A URL with an http or HTTPS scheme is often a web/HTML page, but HTTP can be used for other purposes. Table 219 specifies the requirements for InfoFormat, AccessInfo, and the scheme subset of a URL AccessInfo.

Table 219 - RemoteAccessPoint InfoFormat and AccessInfo Properties

InfoFormat	AccessInfo Scheme	Description
“URL”	“http” or “https”	The references URL shall be a valid web page. It should provide element management for the system or elements referenced by the associated HostedAccessPoint association.
“Other” with OtherInfoFormatDescription = “Non-UI URL”	“http” or “https”	Used for HTTP URLs that do not reference a valid web UI.
“URL”	anything other than “http” and “https”	May be used. No standard behavior is specified.
others from the MOF	n/a	May be used. No standard behavior is specified.

21.3 Health and Fault Management Considerations

Not defined in this document.

21.4 Cascading Considerations

Not defined in this document.

21.5 Methods of this Profile

Not defined in this document.

21.6 Client Considerations and Recipes

Not defined in this document.

21.7 CIM Elements

21.7.1 Overview

Table 220 describes the CIM elements for Access Points.

Table 220 - CIM Elements for Access Points

Element Name	Requirement	Description
21.7.2 CIM_HostedAccessPoint	Mandatory	Associate the RemoteServiceAccessPoint to the System on which it is hosted.
21.7.3 CIM_RemoteServiceAccessPoint	Mandatory	A ServiceAccessPoint for management tools.
21.7.4 CIM_SAPAvailableForElement	Optional	This association identifies the element that is serviced by the RemoteServiceAccessPoint.

21.7.2 CIM_HostedAccessPoint

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 221 describes class CIM_HostedAccessPoint.

Table 221 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	The Hosting System.
Dependent		Mandatory	The access point(s) that are hosted on this System.

21.7.3 CIM_RemoteServiceAccessPoint

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 222 describes class CIM_RemoteServiceAccessPoint.

Table 222 - SMI Referenced Properties/Methods for CIM_RemoteServiceAccessPoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
CreationClassName		Mandatory	
SystemName		Mandatory	
Name		Mandatory	

Table 222 - SMI Referenced Properties/Methods for CIM_RemoteServiceAccessPoint

Properties	Flags	Requirement	Description & Notes
ElementName		Mandatory	User Friendly name.
AccessInfo		Mandatory	Management Address.
InfoFormat		Mandatory	The format of the Management Address. For interoperability, this shall be 'URL' (200).

21.7.4 CIM_SAPAvailableForElement

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 223 describes class CIM_SAPAvailableForElement.

Table 223 - SMI Referenced Properties/Methods for CIM_SAPAvailableForElement

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	The managed element.
AvailableSAP		Mandatory	The service access point.

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22 Health Package

22.1 Synopsis

Profile Name: Health Package (Component Profile)

Version: 1.2.0

Organization: SNIA

Central Class: N/A

Scoping Class: a ComputerSystem in a separate autonomous profile

Related Profiles: Not defined in this document.

22.2 Description

Failures and abnormal occurrences are a common and expected part of monitoring, controlling, and configuring devices and applications. A SMI-S client needs to be prepared at all times to trap unexpected situations and take appropriate action. This package defines the general mechanisms used in the expression of health in SMI-S. This package does not define the particular way a particular profile or package reports health.

This package builds on *Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4* 5 Health and Fault Management. In particular, this package defines the basis of all the sections that currently and will exist in this document or future versions of same.

22.3 Reporting

22.3.1 Error Reporting Mechanism

Error are reports for many reasons. Not all the reasons are directly related to the operation being imposed on the implementation by the client. It is therefore necessary for the client to be able to distinguish between errors that are associated to problems in the formation and invocation of a method, extrinsic or intrinsic, or are related to other conditions.

The client application may need to reform the method call itself, by fixing parameters for example, or the client may need to stop what its attempting. At a basic level, the client needs to know that this operation will succeed at all, given the prevailing conditions on the managed element. A client may also need to notify the end-user of the situation that is preventing the client from fulfilling its function. A HFM application may need to investigate the failure and develop a prognosis.

The types of errors are categorized in the three following types.

- a) Errors associated to the method call
- b) Errors caused by adverse prevailing conditions in the managed element
- c) Errors causes by adverse prevailing conditions in the WBEM Server or related, infrastructural components

Obviously, the method called may not exist. There may be a spelling mistake for the method name. One or more of the parameters may be incorrectly formed, expressed, or otherwise invalid. The first type of error, type a, is designed to inform the client that the operation attempted is still valid, but that the request was faulty. The intent of such an error is to tell the client what is wrong with the method call and allow the method to be invoked again.

On the other hand, the device or application may be in some failure condition which prevents it from honoring this particular or several method calls. This type of error, type b, tells the client that the it is unlikely that the method being attempted will be honored. Specifically, the method execution is blocked by the prevailing condition being described in the error itself. Given the presence of both type a and type b error situations, the implementations should report the type b error. In this case, it does not matter how many fixes are made to the method call, the method call will fail anyway.

The WBEM Service is a separate architectural element from the managed element itself. It can fail, even though the methods and the managed element itself are without error. For example, the WBEM Server may allow only a limited number of concurrent connection or request and reject all others. The server may be shutting down or starting up and thus be unable to process any requests at the time. Unlike type b errors, type c errors are usually transient in nature. Since a failure in the WBEM Server or its components constitutes a communications failure, the reporting of type c errors shall take precedence over all other existing error type conditions.

The WBEM Server returns a error response or a results response to the request, which contains the operation previously mentioned. Errors in WBEM may be reported through two ways. The status code itself provides basic failure information. The number of status codes is very limited. Also on conveyed on the error response, is a Error instance. The Error provides vastly most information than the status code and, as such, is a superior mechanism for reporting errors.

The CIM Error provides attributes to express the categorization and severity of the error. More importantly, the CIM Error and AlertIndication, to be discussed later, contain the exact expression of the nature of the error and additional parameters to that error.

22.3.2 Event Reporting Mechanism

It is not sufficient to simply report the adverse conditions of the device or application through the error reporting mechanism. Many of the adverse conditions that would be reported to a client application attempting control or configuration operations are also of interest to client applications monitoring the very same device or application.

The CIM Event model provides a special class for reporting event conditions, AlertIndication. The AlertIndication is used to report a device or application conditions that may also be represented in one or more other instances. When the implementation detects the presence of a supported condition, it generates an AlertIndication to those listening clients.

It is recommended that the type b and type c errors reported in also be reported through AlertIndications.

22.3.3 Standard Events

The expression of Error or an Alertindication is not entirely meaningful to the SMI-S client without the standardization. A client can use these classes to determine the category, severity, and some other characteristics of the event, but the client can not determine the exact nature of the event without this standardization.

Standard events are registered and this registry is maintained by some organization or company, like SNIA.

Primary event identification and characterization properties:

- **OwningEntity**
This property defines the registration entity for the event. The entities that are in scope for SMI-S are "DMTF" and "SNIA". If the OwningEntity is neither of these, then this specification provides no meaning for this event.
- **MessageID**
This property defines an event identifier that is unique for the OwningEntity. The combination of the OwningEntity and MessageID defines the entry in the registry.

- **Message**
This property contains the message that can be forwarded to the end-user. The message is built from using the static, `MessageFormatString`, and dynamic, `MessageArguments`, components. This text may be localized. This text is not intended for programmatic processing
- **MessageArguments**
This property defines the variable content for the message. The client would programmatically process the arguments to get further details on the nature of the event. For example, the message argument can tell the client which method parameter has a problem and what the problem is.
- **MessageFormatString**
This property defines the static component of the message. This property is not included in the event instance itself and is only present in the event registry.

22.3.4 Reporting Health

Many devices or applications can attempt to fix themselves upon encountering some adverse condition. The set of components which the device or application can attempt to fix is called the Fault Region. The set may include part or all of other devices or applications. Having the Fault Regions declared helps a HFM application, acting as a doctor, to do no harm by attempting to interfere and thereby adversely effect the corrective action being attempted.

When components fail or become degraded, they can cause other components to fail or become degraded. For an HFM application to report or attempt to diagnose the problem, the device or application should express what the cause and effect relationships are that define the extent of the components affected by the failure or degradation. The `RelatedElementCausingError` class provides just such a mechanism.

The cause and effect relationships identified by the `RelatedElementCausingError` association may be a chain of cause and effect relationships with many levels. Given that devices or applications are sometimes subject to several levels of decomposition, each level of may have its own set of these associations that represent the ranking of cause and effect relationships and their effect on the parent component on the given level.

22.3.5 Computer System Operational Status

For most profiles, the `ComputerSystem` class is used to define the top or head of the object hierarchy. A profile may allow for partitioning or clustering by having more than one `ComputerSystem`, but one `ComputerSystem` often represents the device or application representation. In this role, it is important the summary of the health of the device or application is declared in the `ComputerSystem` instance.

Table 224 - OperationalStatus Details

Primary Operational Status	Subsidiary Operational Status	Description
2 "OK"		The system has a good status.
2 "OK"	4 "Stressed"	The system is stressed, for example the temperature is over limit or there is too much IO in progress.
2 "OK"	5 "Predictive Failure"	The system will probably fail sometime soon.
3 "Degraded"		The system is operational but not at 100% redundancy. A component has suffered a failure or something is running slow.
6 "Error"		An error has occurred causing the system to stop. This error may be recoverable with operator intervention.

Table 224 - OperationalStatus Details (Continued)

Primary Operational Status	Subsidiary Operational Status	Description
6 "Error"	7 "Non-recoverable error"	A severe error has occurred. Operator intervention is unlikely to fix it.
6 "Error"	16 "Supporting entity in error"	A modeled element has failed.
12 "No contact"		The provider knows about the array but has not talked to it since last reboot.
13 "Lost communication"		The provider used to be able to communicate with the array, but has now lost contact.
8 "Starting"		The system is starting up.
9 "Stopping"		The system is shutting down.
10 "Stopped"		The data path is OK but shut down, the management channel is still working.

OperationalStatus is an array. The primary and subsidiary statuses are both OperationalStatus property, and are summarized in Table 224. If the subsidiary operational status is present in the array, it is intended to provide additional clarification to the primary operational status. The implementation shall report one of the above combinations of statuses. It may also report additional statuses beyond the ones defined in Table 224.

The operational status combinations listed in Table 224 that include descriptions about "provider" (i.e., the CIM Provider), are only valid in those cases where the implementation of SMI-S employs a proxy provider.

The operational statuses listed in Table 224 shall not be used to report the status of the WBEM Server itself.

22.3.6 Event Reporting

The implementation may report Event or AlertIndication instances. The profile or package that includes this package defines whether or not these events are supported and when the events are produced.

If the support Event or AlertIndication is implemented, then the implementation shall also support the common messages through both Errors and AlertIndications. This means that the implementation produce the common event listed in the registry when the condition, also described in the registry, is present.

It is mandatory to report error conditions through both AlertIndication or Lifecycle indication and Error in those cases where Error is returned when the method call failed for reasons other than the method call itself. For example, if the device is over heated, then a method call can fail because of this condition. It is expected that the device will report an over heat AlertIndication to listening clients as well.

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22.3.7 Fault Region

If the device or application is itself attempting to rectify an adverse condition reported through a standard error, then the implementation shall report what corrective action, if any, it is taking. This is necessary to prevent a HFM application from also trying to rectify the very same condition. An HFM application should avoid a interfering with ongoing corrective action taken by the device or application itself.

The corrective action may be a process, like hardware diagnostics or volume rebuild. In which case, the above requirement is fulfilled by expressing the instances representing the process.

The corrective action may be a state change, like reboot. In which case, the above requirement is fulfilled by expressing the state change in some CIM Instances.

In all cases, the profile or package that includes this package defines the standard events included and the associated, possible corrective actions taken in response to these events.

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22.3.8 RelatedElementCausingError

This package provides a mechanism in which the effect of a component failure on other components can be reported. the RelatedElementCausingError association defines what components are causing a particular component to failure or become degraded.

Some effects are more germane to the failure or degradation than others. In other words, there are primary and second effects. This association provides a mechanism for ranking the effect. The implementing shall provide the EffectCorrelation property, but it recommended that the implementation also provide the FailureRelationshipInitiated and Ranking properties

If there are these cause and effect relationships, the RelatedElementCausingError association should be implemented to report the causes of the failure or degradation.

22.3.9 HealthState

The HealthState property in LogicalDevice defines the state for a particular component. The OperationalStatus defines operational status. For example, a disk or port may be taken off-line for service. The component's health may still be OK or not OK. The two properties, when used in combination, disambiguate the health of the component. For example, an OperationalStatus of 10 "Stopped" and a HealthState of 30 "Major Failure" means that the component is off-line and has failed. While an OperationalStatus of 10 "Stopped" and a HealthState of 5 "OK" for the very same component means that although the component is off-line, the component is still in good working order.

The HealthState of a component should not represent the health of any other component as well by way of a summary or aggregate health state. However, if the component is itself relies on other components for its health, because the component itself is an aggregate of components, then the HealthState may represent a summary HealthState by side-effect.

HealthState is a mandatory for all system device logical devices that are defined by the profile that includes this package. It is recommended that HealthState is something other than 0 "Unknown". However, a component may report "Unknown" after it has reported one of the other HealthStates. When HealthState changes from 5 "OK", it is mandatory that a LogicalDevice report some other HealthState (e.g., 30 "Major Failure") before reporting 0 "Unknown". Such a requirement is necessary, so that the client can notice the adverse state change via polling or indication before the component is no longer responding.

22.4 Health and Fault Management Considerations

Not defined in this document.

22.5 Cascading Considerations

Not defined in this document.

22.6 Use Cases

Not defined in this version of the standard.

22.7 CIM Elements

22.7.1 Overview

Table 225 describes the CIM elements for Health.

Table 225 - CIM Elements for Health

Element Name	Requirement	Description
22.7.2 CIM_ComputerSystem	Mandatory	
22.7.3 CIM_LogicalDevice	Mandatory	
22.7.4 CIM_RelatedElementCausingError	Optional	
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_ComputerSystem AND SourceInstance.CIM_ComputerSystem::OperationalStatus[*] <> PreviousInstance.CIM_ComputerSystem::OperationalStatus[*]	Mandatory	CQL -Operational Status change of the device and application.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_LogicalDevice AND SourceInstance.CIM_LogicalDevice::HealthState <> PreviousInstance.CIM_LogicalDevice::HealthState	Mandatory	CQL -Health State change of the logical component.

22.7.2 CIM_ComputerSystem

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 226 describes class CIM_ComputerSystem.

Table 226 - SMI Referenced Properties/Methods for CIM_ComputerSystem

Properties	Flags	Requirement	Description & Notes
CreationClassName		Mandatory	
Name		Mandatory	
OperationalStatus		Mandatory	Overall status of the Host.

22.7.3 CIM_LogicalDevice

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 227 describes class CIM_LogicalDevice.

Table 227 - SMI Referenced Properties/Methods for CIM_LogicalDevice

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
HealthState		Mandatory	Reports the health of the component beyond the operational status.

22.7.4 CIM_RelatedElementCausingError

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 228 describes class CIM_RelatedElementCausingError.

Table 228 - SMI Referenced Properties/Methods for CIM_RelatedElementCausingError

Properties	Flags	Requirement	Description & Notes
FailureRelationshipInitiated		Optional	Reports the date and time when this cause and effect was created. The population of this property is RECOMMENDED.
EffectCorrelation		Mandatory	Describes the general nature of the cause and effect correlation.
Ranking		Optional	Describes the order of effect from 1, the highest effect, on. If there is only one of these associations between two elements, the ranking shall 1. Once more associations are added, then it RECOMMENDED that the implementation assist the client by stating which of the cause and effect relationship should be reviewed and addressed first. This property assists a client in accomplishing a triage of known problems.
Antecedent		Mandatory	Element causing the failure.
Dependent		Mandatory	

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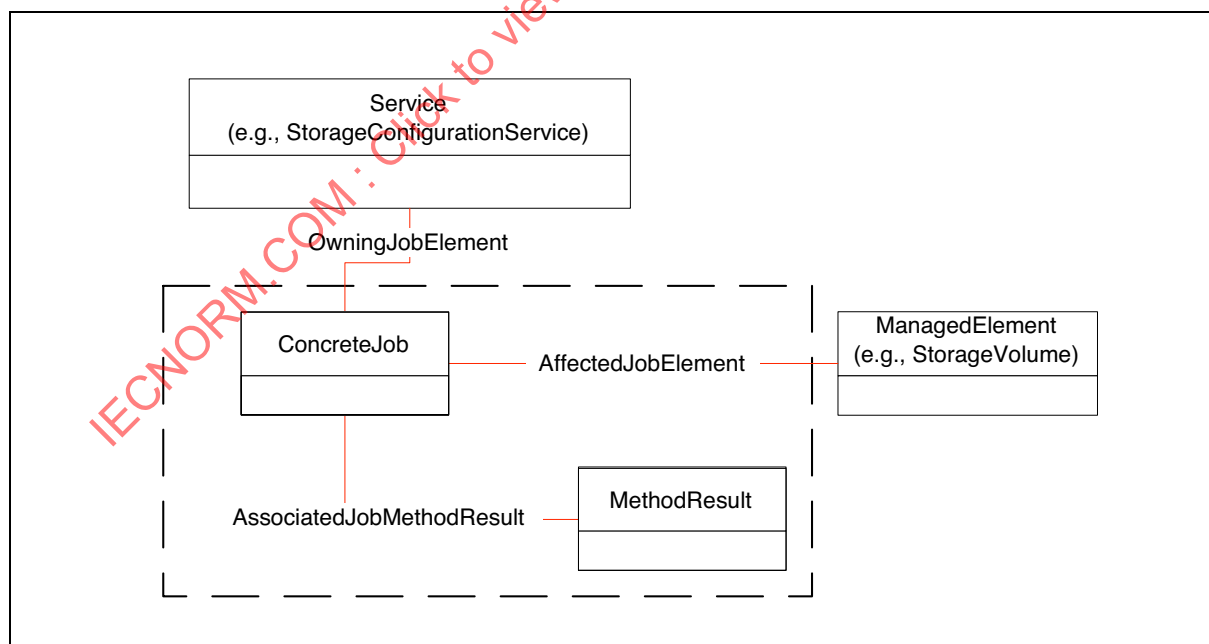
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23 Job Control Profile**23.1 Synopsis****Profile Name:** Job Control (Component Profile)**Version:** 1.5.0**Organization:** SNIA**Central Class:** Service (e.g., StorageConfigurationService)**Scoping Class:** CIM_ConcreteJob**Related Profiles:** Not defined in this document.**23.2 Overview****23.2.1 Description**

In some profiles, some or all of the methods described may take some time to execute (longer than a HTTP time-out). In this case, a mechanism is needed to handle asynchronous execution of the method as a 'Job'.

NOTE The profile describes a specific use of the constructs and properties involved. The actual CIM capability may be more, but this specification clearly states what clients may depend on in SNIA profiles that implement the Job Control Profile.

23.2.2 Instance Diagram

A normal instance diagram is provided in Figure 35.

**Figure 35 - Job Control Profile Model**

When the Job Control Profile is implemented and a client executes a method that executes asynchronously, a reference to an instance of ConcreteJob is returned and the return value for the method is set to "Method parameters checked - job started".

The ConcreteJob instance allows the progress of the method to be checked, and instance Indications can be used to subscribe for Job completion.

The associations OwningJobElement and AffectedJobElement are used to indicate the service whose method created the job by side-effect and the element being affected by the job. The job itself may create, modify and/or delete many elements during its execution. The nature of this affect is the creation or deletion of the instances or associations or the modification of instance properties. These elements, albeit regular instances or associations, are said to be *affected* by the job. The elements linked by AffectedJobElement may change through the execution of the job, and in addition, the job may be associated to more than one Input and/or Output elements or other elements affected by side-effect. Input and Output elements are those referenced by method parameters of the same type, input and output parameters respectively.

EXPERIMENTAL

The following set of rules defines the nature of the AffectedJobElement associations for a given job in terms of the references passed as parameters to the service method that spawned the job. Obviously, the distinction of Input element from Output element in the following rules only makes sense if these parameters are not both Input and Output elements.

- If all Elements created by the method exists immediately upon the return from the method, then AffectedJobElement shall reference the Output Element.
- If the Output Element, one or more, does not exist until the job has completed, the AffectedJobElement shall reference the Input Element until the job completes, at which time AffectedJobElement shall then reference the Output Element instead.
- In the event the job fails and the Output Element created during the job and referenced by AffectedJobElement is no longer available, AffectedJobElement shall revert to referencing the Input Element.
- If the method affects elements without referencing elements as Output parameters, then the AffectedJobElement Association shall reference the Input element, one or more.
- If the method only modifies the elements referenced with method parameters, then the AffectedJobElement association references the modified elements. Elements modified by the job shall be reference by this association.
- If the method affects elements but references no elements as either Input or Output parameters or the only Input elements referenced are those of the elements to be deleted, then AffectJobElement associations shall exist to other elements that are affected by the job.
- Other elements whose references are not used in the method invocation, but that are created or modified by side-effect of the job's execution shall be associated to the job via the AffectJobElement association, but may cease to be associated once the job has finished execution.

The lifetime of a completed job instance, and thus the AffectedJobElement association to the appropriate Element is currently implementation dependent. However, the set of AffectedJobElement associations to Input and Output element present when the job finishes execution shall remain until the job is deleted.

23.2.3 MethodResult

Jobs are produced by side effect of the invocation of an extrinsic method. Reporting the resulting Job is the purpose of this component profile. The MethodResult class is used to report the extrinsic method

called and the parameters passed to the method. In this way, third party observers of a CIMOM can tell what the job is and what it is doing. A `MethodResult` instance contains the `LifeCycle` indications that have been or would have been produced as the result of the extrinsic method invocation. That is, the instance contains the indications whether or not there were the appropriate indication subscription at the time the indication were produced.

A client may fetch the method lifecycle indication produced when the method was called from the `PreCallIndication` attribute. This indication, an instance of `InstMethodCall`, contains the input parameters provided by the client that called the method.

A client may fetch the method lifecycle indication produced once the method execution was completed from the `PostCallIndication`. This indication contains the input parameters provided by the client that called the method and output parameters returned by the method implementation. Parameters that are both input and output parameters will contain the output parameter provided by the method implementation.

EXPERIMENTAL

23.2.4 OperationalStatus for Jobs

The `OperationalStatus` property is used to communicate that status of the job that is created. As such, it is critical that implementations are consistent in how this property is set. The values that shall be supported consistently are:

- 2 “OK” - combined with 17 “Completed” to indicate that the job completed with no error.
- 6 “Error” - combined with 17 “Completed” to indicate that the job did not complete normally and that an error occurred.
- 10 “Stopped” implies a clean and orderly stop.
- 17 “Completed” indicates the Job has completed its operation. This value should be combined with either 2 “OK” or 6 “Error, so that a client can tell if the complete operation passed (Completed with OK), and failure (Completed with Error).

23.2.5 JobState for Jobs

The `JobState` property is used to communicate Job specific states and statuses.

- 2 “New” - Job was created but has not yet started
- 3 “Starting” - Job has started
- 4 “Running” - Job is current executing
- 5 “Suspended” - Job has been suspended. The Job may be suspended for many reasons like it has been usurped by a higher priority or a client has suspended it (not described within this component profile).
- 6 “Shutting Down” - Job is completing its work, has been terminated, or has been killed. The Job may be cleaning up after only having completed some of its work.
- 7 “Completed” - Job has completed normally, its work has been completed successfully.
- 8 “Terminated” - Job has been terminated
- 9 “Killed” - Job has been aborted. The Job may not cleanup after itself.
- 10 “Exception” - Job failed and is in some abnormal state. The client may fetch the error conditions from the job. See 23.5.2.

Table 229 maps the standard mapping between the OperationalStatus and JobState properties on ConcreteJob. The actual values of the properties are listed in Table 229 with the associated value from the property's ValueMap qualifier.

Table 229 - OperationalStatus to Job State Mapping

OperationalStatus	JobState	Job is
2 "OK", 17 "Completed"	7 "Completed"	Completed normally
6 "Error", 17 "Completed"	10 "Exception"	Completed abnormally
10 "Stopped"	8 "Terminated"	Terminated
6 "Error"	9 "Killed"	Aborted / Killed
2 "OK"	4 "Running"	Executing
15 "Dormant"	2 "New"	Created but not yet executing
2 "OK", 8 "Starting"	3 "Starting"	Starting up
2 "OK"	5 "Suspended"	Suspended
2 "OK", 9 "Stopping"	6 "Shutting Down"	Terminated and potentially cleaning up
6 "Error"	6 "Shutting Down"	Killed and is aborting

23.2.6 Determining How Long a Job Remains after Execution

The Job shall report how long it will remain after it has finished executing, fails on its own, is terminated, or is killed. The TimeBeforeRemoval attribute reports a datetime offset.

The TimeBeforeRemoval and DeleteOnCompletion attributes are related. If the DeleteOnCompletion is FALSE, then the Job shall remain until it is explicitly deleted. If the DeleteOnCompletion is TRUE, then the Job shall exist for the length of time specified in the TimeBeforeRemoval attribute. An implementation may not support the setting of the DeleteOnCompletion attribute because it does not support the client modifying the Job instance.

The amount of time specified in the TimeBeforeRemoval should be five or more minutes. This amount of time allows a client to recognize that the Job has failed and retrieve the Error.

23.3 Health and Fault Management

The implementation should report CIM Errors from the ConcreteJob.GetError() method. See 22 Health Package for details.

EXPERIMENTAL

The standards messages specific to this profile are listed in Table 230. See 8 Standard Messages in *Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4* for a description of standard messages and the list all standard messages

Table 230 - Standard Message for Job Control Profile

Message ID	Message Name
DRM22	Job failed to start
DRM23	Job was halted

EXPERIMENTAL

23.4 Cascading Considerations

Not defined in this document.

23.5 Methods of the Profile

23.5.1 Job Modification

A Job instance may be modified. The `DeleteOnCompletion` and `TimeBeforeRemoval` properties are writable. If the intrinsic `ModifyInstance` method is supported, then the setting of both attributes shall be supported.

EXPERIMENTAL

23.5.2 Getting Error Conditions from Jobs

```
uint32 GetError(
    [Out, EmbeddedObject] string Error);
```

This method is used to fetch the reason for the job failure. The type of failure being report is when a Job stops executing on its own. That is, the Job was not killed or terminated. An Embedded Object, encoded in a string, shall returned if the method is both supported and the job has failed. The Job shall report the 10 "Exception" status when the Job has failed on its own.

The `GetError` method should be supported.

The Error string contains a Error instance. See 22 Health Package for details on how to process this CIM Instance.

EXPERIMENTAL

23.5.3 Suspending, Killing or Terminating a Job

A Job may be suspended, terminated or killed. Suspending a Job means that the Job will not be executing and be suspended until it is resumed. Terminating a job means to request that the Job stop executing and that the Job clean-up its state prior to completing. Killing a job means to request that the Job abort executing, usually meaning there is little or no clean-up of Job state.

```
uint32 RequestStateChange(
    [In] RequestedState,
    [In] TimeoutPeriod);
```

A client may request a state change on the Job.

- RequestedState - The standard states that can be requested are "Start", "Suspend", "Terminate", "Kill", "Service". A new Job may be started. A suspended Job may be resumed, using the "Started" requested status. A executing Job may be suspended, terminated, or killed. A new or executing Job may be put into the "Service" state. The "Service" state is vendor specific. An implementation can indicate what state transitions are supported by not returning the 4 098 "Invalid State Transition" return code
- TimeoutPeriod - The client expects the state transition to occur within the specified amount of time. The implementation may support the method but not this parameter.

Return codes:

- 0 "Completed with No Error"
- 1 "Not Supported" - The method is not supported
- 2 "Unknown/UnSpecified Error" - Failure for some vendor specific reason
- 3 "Can not complete within Timeout Period" - The requested amount of time is less than how long the requested state transition takes
- 4 "Failed"
- 5 "Invalid Parameters" - The parameters are incorrect
- 6 "In Use" - Another client has requested a state change that has not completed
- 4 096 "Method Parameters Checked - Transition Started" - The method can return before the state transition completes. This error code tells that calling that this situation has occurred
- 4 097 "Invalid State Transition" - The state change requested is invalid for the current state. 4 098 "Use of Timeout Parameter Not Supported" - This implementation does not support the TimeoutPeriod parameter. A client may pass a NULL for the TimeoutPeriod and try again. There is no mechanism to determine what state changes are supported by a particular implementation. Such a mechanism is planned for a future version of this specification.
- 4 099 "Busy" - A state change is underway in the Job and, as such, the state can not be changed. An implementation may use this return code to indicate the job can not be suspended, killed, or terminated at all or in the current phase of execution

23.6 Client Considerations and Recipes

23.6.1 Client Considerations

If the operation will take a while (longer than an HTTP timeout), a handle to a newly minted ConcreteJob is returned. This allows the job to continue in the background. Note a few things:

- The job is associated to the Service via OwningJobElement and is also linked to the object being modified/created via AffectedJobElement. For example, a job to create a StorageVolume may start off pointing to a Pool until the Volume is instantiated at which point the association would change to the StorageVolume.
- These jobs do not have to get instantiated! If the method completes quickly, a null can be returned as a handle, as illustrated in Figure 36: "Storage Configuration".
- It may take some time before the Job starts.

- A Job may be terminated or killed.
- Jobs may be modified.
- Jobs may be restarted.

23.6.2 Recipes

No recipes are defined in this version of the standard.

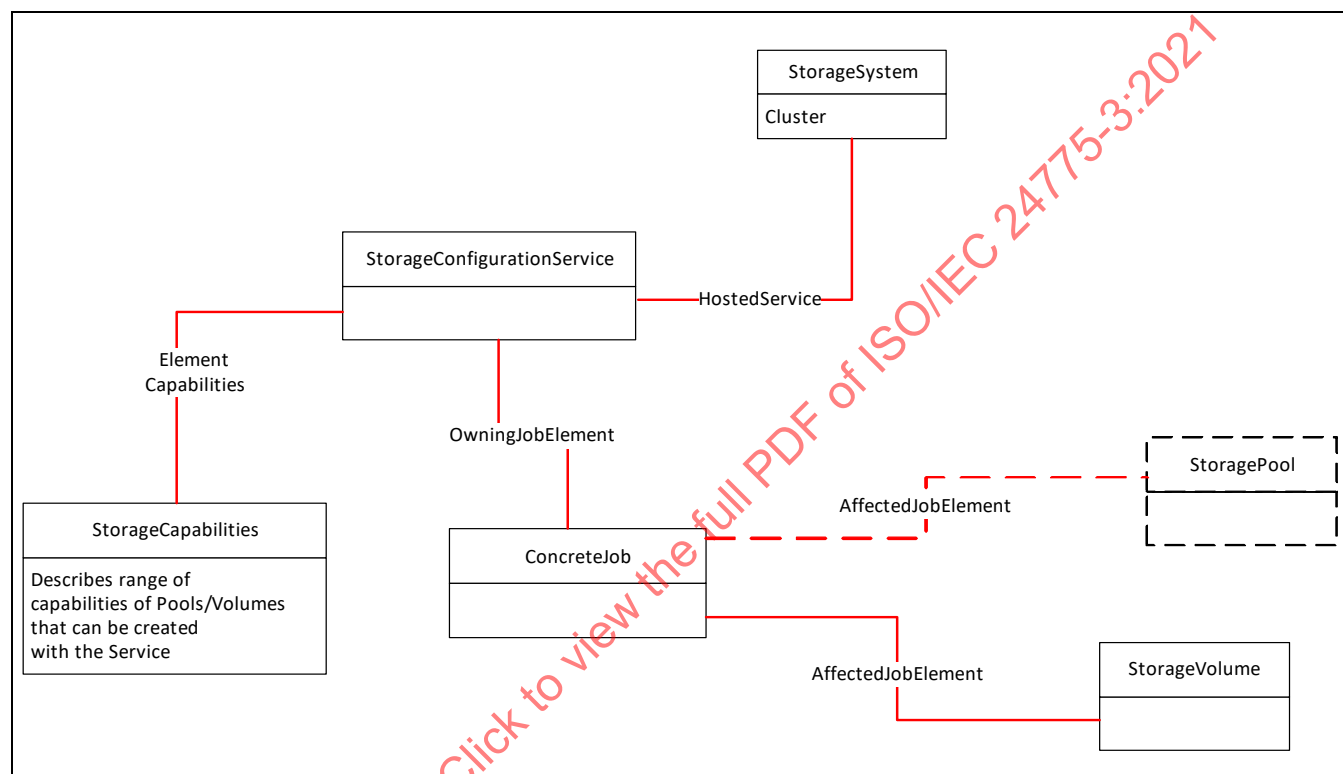


Figure 36 - Storage Configuration

23.7 Registered Name and Version

Job Control version 1.5.0 (Component Profile)

23.8 CIM Elements

23.8.1 Overview

Table 231 describes the CIM elements for Job Control.

Table 231 - CIM Elements for Job Control

Element Name	Requirement	Description
23.8.2 CIM_AffectedJobElement	Mandatory	
23.8.3 CIM_AssociatedJobMethodResult	Mandatory	
23.8.4 CIM_ConcreteJob	Mandatory	
23.8.5 CIM_MethodResult	Mandatory	

Table 231 - CIM Elements for Job Control

Element Name	Requirement	Description
23.8.6 CIM_OwningJobElement	Mandatory	
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_ConcreteJob AND SourceInstance.CIM_ConcreteJob::JobStatus <> PreviousInstance.CIM_ConcreteJob::JobStatus	Optional	CQL -Deprecated. Modification of Job Status for a Concrete Job.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_ConcreteJob AND SourceInstance.CIM_ConcreteJob::PercentComplete <> PreviousInstance.CIM_ConcreteJob::PercentComplete	Mandatory	CQL -Modification of Percentage Complete for a Concrete Job.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_ConcreteJob AND ANY SourceInstance.CIM_ConcreteJob::OperationalStatus[*] = 17 AND ANY SourceInstance.CIM_ConcreteJob::OperationalStatus[*] = 2	Mandatory	CQL -Modification of Operational Status for a Concrete Job to 'Complete' and 'OK'.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_ConcreteJob AND ANY SourceInstance.CIM_ConcreteJob::OperationalStatus[*] = 17 AND ANY SourceInstance.CIM_ConcreteJob::OperationalStatus[*] = 6	Mandatory	CQL -Modification of Operational Status for a Concrete Job to 'Complete' and 'Error'.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_ConcreteJob AND SourceInstance.CIM_ConcreteJob::JobState <> PreviousInstance.CIM_ConcreteJob::JobState	Mandatory	CQL -Modification of Job State for a Concrete Job.
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_ConcreteJob	Mandatory	Creation of a ConcreteJob.

23.8.2 CIM_AffectedJobElement

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 232 describes class CIM_AffectedJobElement.

Table 232 - SMI Referenced Properties/Methods for CIM_AffectedJobElement

Properties	Flags	Requirement	Description & Notes
AffectedElement		Mandatory	The ManagedElement affected by the execution of the Job.
AffectingElement		Mandatory	The Job that is affecting the ManagedElement.

23.8.3 CIM_AssociatedJobMethodResult

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 233 describes class CIM_AssociatedJobMethodResult.

Table 233 - SMI Referenced Properties/Methods for CIM_AssociatedJobMethodResult

Properties	Flags	Requirement	Description & Notes
Job		Mandatory	The Job that has parameters.
JobParameters		Mandatory	The parameters for the method which by side-effect created the Job.

23.8.4 CIM_ConcreteJob

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 234 describes class CIM_ConcreteJob.

Table 234 - SMI Referenced Properties/Methods for CIM_ConcreteJob

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
Name		Mandatory	The user-friendly name for this instance of Job. In addition, the user-friendly name can be used as a property for a search or query. (Note: Name does not have to be unique within a namespace.)"
OperationalStatus		Mandatory	Describes whether the Job is running or not.
JobStatus		Optional	Add additional detail beyond OperationalStatus about the runtime status of the Job. This property is vendor specific.
JobState		Mandatory	Add additional detail beyond the OperationalStatus about the runtime state of the Job.
ElapsedTime		Optional	The time interval that the Job has been executing or the total execution time if the Job is complete.
PercentComplete		Mandatory	The percentage of the job that has completed at the time that this value is requested. Optimally, the percentage should reflect the amount of work accomplished in relation to the amount of work left to be done. 0 percent complete means that the job has not started and 100 percent complete means the job has finished all its work. However, in the degenerate case, 50 percent complete means that the job is running and may remain that way until the job completes.
DeleteOnCompletion		Mandatory	Indicates whether or not the job should be automatically deleted upon completion. If this property is set to false and the job completes, then the extrinsic method DeleteInstance shall be used to delete the job versus updating this property. Even if the Job is set to delete on completion, the job shall remain for some period of time, see GetError() method.
ErrorCode		Optional	A vendor specific error code. This is set to zero if the job completed without error.
ErrorDescription		Optional	A free form string containing the vendor error description.
TimeBeforeRemoval		Mandatory	The amount of time the job will exist after the execution of the Job if DeleteOnCompletion is set to FALSE. Jobs that complete successfully or fail shall remaining for at least this period of time before being removed from the model (CIMOM).

Table 234 - SMI Referenced Properties/Methods for CIM_ConcreteJob

Properties	Flags	Requirement	Description & Notes
GetError()		Mandatory	This method is used to retrieve the error that caused the Job to fail. The Job shall remain in the model long enough to allow client to a) notice that the job was stopped executing and b) to retrieve the error using this method. There are not requirements for how long the job must remain; however, it is suggested that the Job remain for at least five minutes. JobStatus=10 (Exception) tell the client that the job failed and this method can be called to retrieve the reason why embedded in the CIM_Error, see GetError() method.
RequestStateChange()		Optional	This method changes the state of the job. The client may suspend, terminate, or shutdown the job. To terminate a job means to request a clean shutdown of the job, have it finish some portion of it's work and terminate or to roll back the changes done by the job to date. The implement can make the choice which behavior. To kill a job means to abort the job, perhaps leaving some element of the work partially done and in an unknown state.

23.8.5 CIM_MethodResult

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 235 describes class CIM_MethodResult.

Table 235 - SMI Referenced Properties/Methods for CIM_MethodResult

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
PreCallIndication		Mandatory	Contains a copy of the CIM_InstMethodCall produced when the configuration or control change method was called. This Embedded Instance shall contain the configuration or control change extrinsic method name (MethodName) and parameters (MethodParameters).
PostCallIndication		Mandatory	Contains a copy of the CIM_InstMethodCall produced when the configuration or control change method has completed execution and control was returned to the client. This Embedded Instance shall contain the configuration or control change extrinsic method name (MethodName) and parameters (MethodParameters).

23.8.6 CIM_OwningJobElement

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 236 describes class CIM_OwningJobElement.

Table 236 - SMI Referenced Properties/Methods for CIM_OwningJobElement

Properties	Flags	Requirement	Description & Notes
OwningElement		Mandatory	The ManagedElement responsible for the creation of the Job. (e.g., StorageConfigurationService).
OwnedElement		Mandatory	The Job created by the ManagedElement.

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24 Location Profile**24.1 Synopsis****Profile Name:** Location (Component Profile)**Version:** 1.4.0**Organization:** SNIA**Central Class:** Location**Scoping Class:** PhysicalPackage**Related Profiles:** Table 237 describes the related profiles for Location.**Table 237 - Related Profiles for Location**

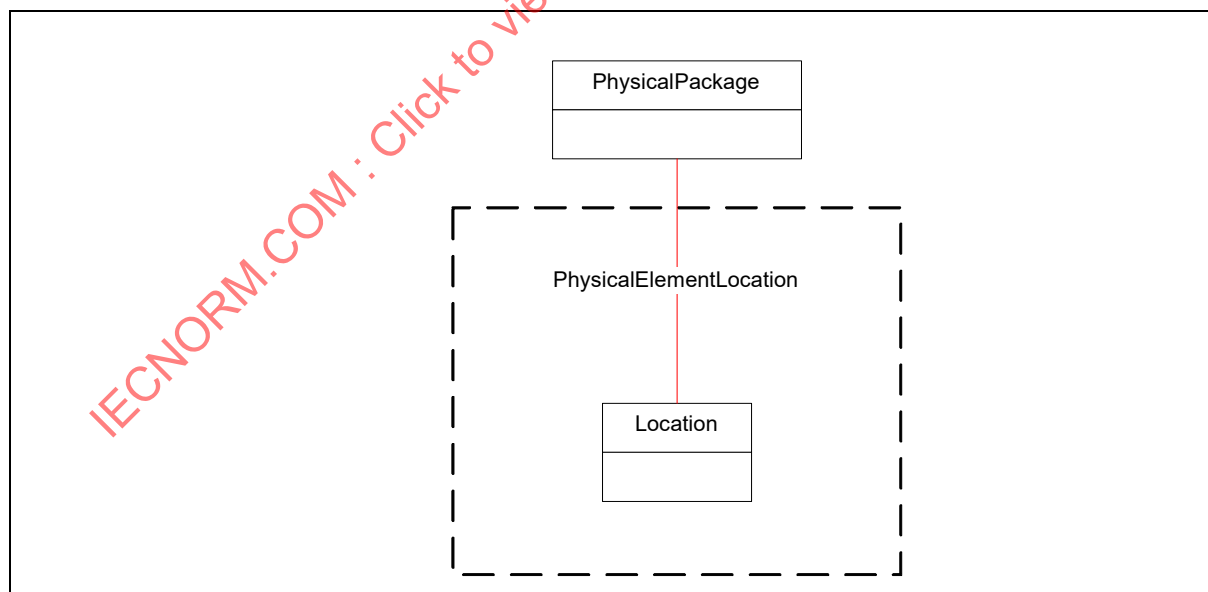
Profile Name	Organization	Version	Requirement	Description
PhysicalPackage	SNIA	1.5.0	Mandatory	

24.2 Description

Associated with product information, a PhysicalPackage may also have a location. This is indicated using an instance of a Location class and the PhysicalElementLocation association.

24.3 Instance Diagram

Figure 37 illustrates a typical instance diagram.

**Figure 37 - Location Instance****24.4 Health and Fault Management Considerations**

Not defined in this document.

24.5 Cascading Considerations

Not defined in this document.

24.6 Methods of the Profile

Not defined in this document.

24.7 Use Cases

Not defined in this version of the standard.

24.8 CIM Elements**24.8.1 Overview**

Table 238 describes the CIM elements for Location.

Table 238 - CIM Elements for Location

Element Name	Requirement	Description
24.8.2 CIM_Location	Mandatory	
24.8.3 CIM_PhysicalElementLocation	Mandatory	Associates the location to package.

24.8.2 CIM_Location

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 239 describes class CIM_Location.

Table 239 - SMI Referenced Properties/Methods for CIM_Location

Properties	Flags	Requirement	Description & Notes
Name		Mandatory	A free-form string defining a label for the Location.
PhysicalPosition		Mandatory	A free-form string indicating the placement of a PhysicalElement.
ElementName		Optional	User-friendly name.
Address		Optional	A free-form string indicating a street, building or other type of address for the PhysicalElement's Location.

24.8.3 CIM_PhysicalElementLocation

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 240 describes class CIM_PhysicalElementLocation.

Table 240 - SMI Referenced Properties/Methods for CIM_PhysicalElementLocation

Properties	Flags	Requirement	Description & Notes
Element		Mandatory	
PhysicalLocation		Mandatory	

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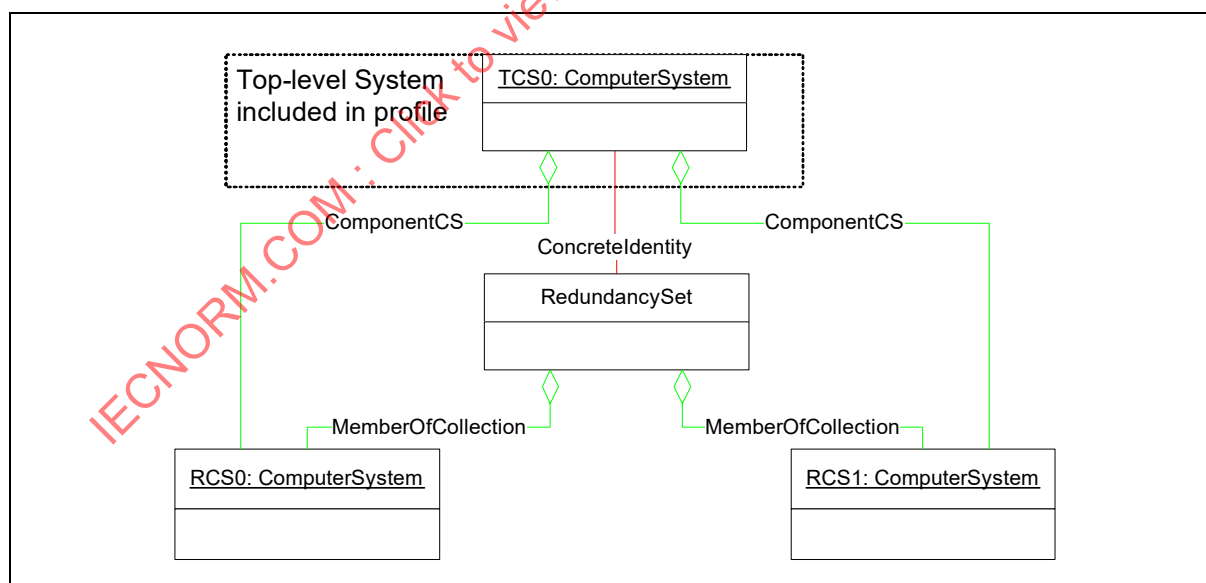
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25 Multiple Computer System Profile**25.1 Synopsis****Profile Name:** Multiple Computer System (Component Profile)**Version:** 1.2.0**Organization:** SNIA**Central Class:** CIM_ComputerSystem (Non-Top-Level System)**Scoping Class:** a top-level ComputerSystem**Related Profiles:** Table 241 describes the related profiles for Multiple Computer System.**Table 241 - Related Profiles for Multiple Computer System**

Profile Name	Organization	Version	Requirement	Description
Storage Server Asymmetry	SNIA	1.7.0	Optional	Experimental.

25.2 Description**25.2.1 Overview**

The Multiple Computer System Profile models multiple systems that cooperate to present a “virtual” computer system with additional capabilities or redundancy. This virtual aggregate system is sometimes referred to as a cluster, and is illustrated in Figure 38.

**Figure 38 - Two Redundant Systems Instance Diagram**

The general pattern for the redundancy aspect of Multiple Systems uses an instance of RedundancySet to aggregate multiple “real” ComputerSystem instances (labeled RCS0 and RCS1 in the diagram). Another ComputerSystem instance (TCS0) is associated to the RedundancySet instance using a ConcretelIdentity association and is associated to the real ComputerSystems using ComponentCS.

25.2.2 Top Level System

The top ("virtual") system in this diagram (labeled TCS0) is referred to as the Top Level System. Note that for single-system configurations, the top-level system is the only system. Top-level systems have characteristics different from the underlying ComputerSystem instances.

The Top Level System is associated to the registered profile described in 35 Server Profile. Other elements such as LogicalDevices (ports, volumes), ServiceAccessPoints, and Services are associated to the top-level system if these elements are supported by multiple underlying systems (for example, the underlying systems provide failover and/or load balancing). Alternatively, elements can be associated to an underlying system if that system is a single point of failure. For example, a RAID array may associate StorageVolume instances to a top-level system since these are available when one underlying system (RAID controller) fails, all the port elements are associated to one underlying system because the ports become unavailable when this system fails.

The Dedicated property is required for top-level systems. Each profile defines the values that are appropriate for Dedicated.

25.2.3 Non-Top-Level Systems

Each ComputerSystem instance shall have a unique Name property. For non-top-level systems, Name may be vendor-unique; in which case, NameFormat shall be set to "Other".

ComputerSystem.Dedicated should not be used in non-top-level systems.

Non-top-level systems shall not be associated to registered profiles.

Each non-top-level ComputerSystem shall be associated to the top-level system using ComponentCS. Note that non-top-level systems may not be members of a RedundancySet. For example, a top-level system may be associated to a RedundancySet with two systems as described in Figure 38: "Two Redundant Systems Instance Diagram" and also associated via ComponentCS to another Computer (not a member of a RedundancySet) representing a service processor.

25.2.4 Types of RedundancySets

The TypeOfSet property of RedundancySet is a list describing the types of redundancy. Its values are summarized in Table 242.

Table 242 - Redundancy Type

Redundancy Type	Description
N+1	All ComputerSystems are active, are unaware and function independent of one another. However, there exists at least one extra ComputerSystem to achieve functionality.
Load Balanced	All computer systems are active. However, their functionality is not independent of each other. Their functioning is determined by some sort of load balancing algorithm (implemented in hardware and/or software). 'Sparing' is implied (i.e., each computer system can be a spare for the other(s).
Sparing	All computer systems are active and are aware of each other. However, their functionality is independent until failover. Each computer system can be a spare for the other(s).
Limited Sparing	All members are active, and they may or may not be aware of each and they are not spares for each other. Instead, their redundancy is indicated by the IsSpare relationship.
Other/Unspecified	The relationship between the computer systems is not specified.

25.2.5 Multiple Tiers of Systems

The diagram above describes two tiers of systems; the real systems (labeled RCS0 and RCS1) in the lower tier are aggregated into a top-level system (TCS0) in the upper tier. There may be more than two tiers, as depicted in Figure 39: "Multiple Redundancy Tier Instance Diagram".

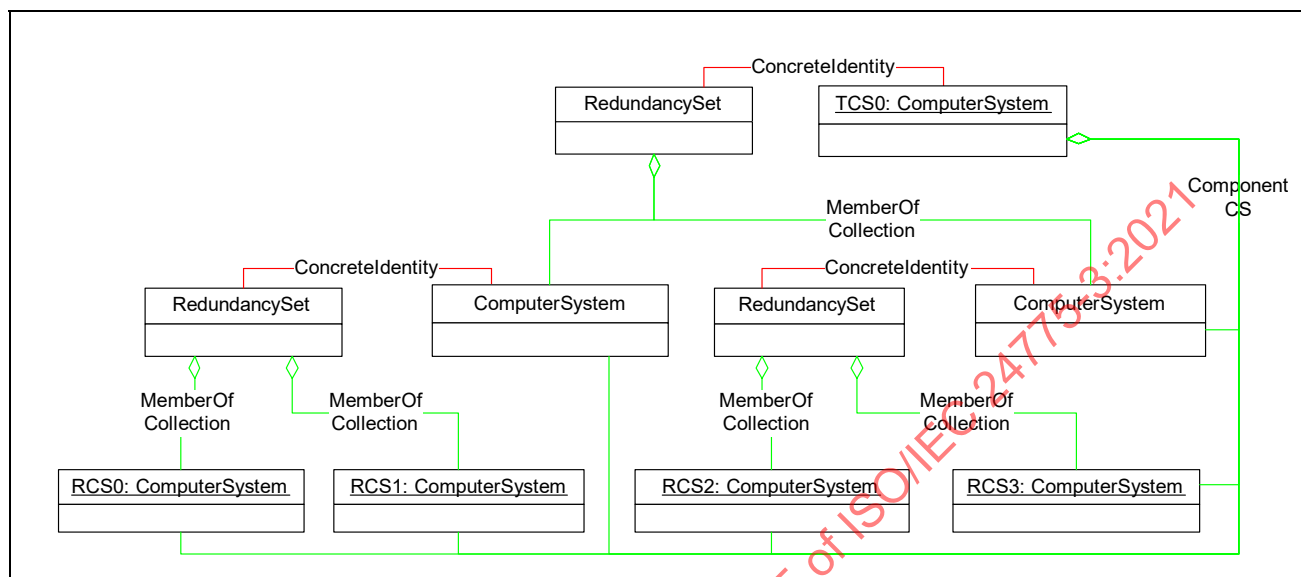


Figure 39 - Multiple Redundancy Tier Instance Diagram

The systems in the bottom tier (RCS0-RCS3) represent "real" systems.

RedundancySet.TypeOfSet can be used as part of multiple tier configurations to describe different types of redundancy at different tiers. For example, a virtualization system has four controllers that operate in pairwise redundancy. This could be modeled using the model in the diagram above and setting TypeOfSet in the top RedundancySet to "N+1" and setting TypeOfSet to "LoadBalancing" in the lower two RedundancySets.

25.2.6 Associations between ComputerSystems and other Logical Elements

SystemDevice associates device (subclasses of LogicalDevice such as LogicalPort or StorageVolume) and ComputerSystem instances. The cardinality of SystemDevice is one-to-many; a LogicalDevice may be associated with one and only one ComputerSystem. If the device availability is equivalent to that of the top-level system, it shall be associated to the top-level system via SystemDevice. If the device may become unavailable while the system as a whole remains available, the device shall be associated to a non-top-level system that has availability equivalent to the device. This system could be a real system or a system in an intermediate tier (representing some redundancy less than full redundancy).

This same approach shall be used for all other logical CIM elements with associations to systems. For example, HostedService and HostedAccessPoint shall associate elements (services, access points, and protocol endpoints) to the ComputerSystem with availability to the element.

Based on the arrangement of systems in Figure 31, associations from systems to service and capabilities classes shall not be lower than associations to other classes. For the purpose of formally stating this rule, each ComputerSystem is assigned a level number. The profile's top-level ComputerSystem has level number 0. The ComputerSystem instances that are members of RedundancySets associated via ConcretelDentity to the top-level system have level number 1. The members of redundancy sets associated to the level number 1 systems via ConcretelDentity have level number 2. In general, the ComputerSystem members of redundancy sets associated to the level number n systems via ConcretelDentity have level number n+1. The level of non-system objects is the level of the

ComputerSystem instance associated to the object via associations such as SystemDevice, HostedAccessPoint, HostedService, or ElementCapabilities.

Figure 40 demonstrates these system level numbers using the same configuration from Figure 39: "Multiple Redundancy Tier Instance Diagram". Note that ComponentCS diagrams are omitted from this diagram to avoid clutter.

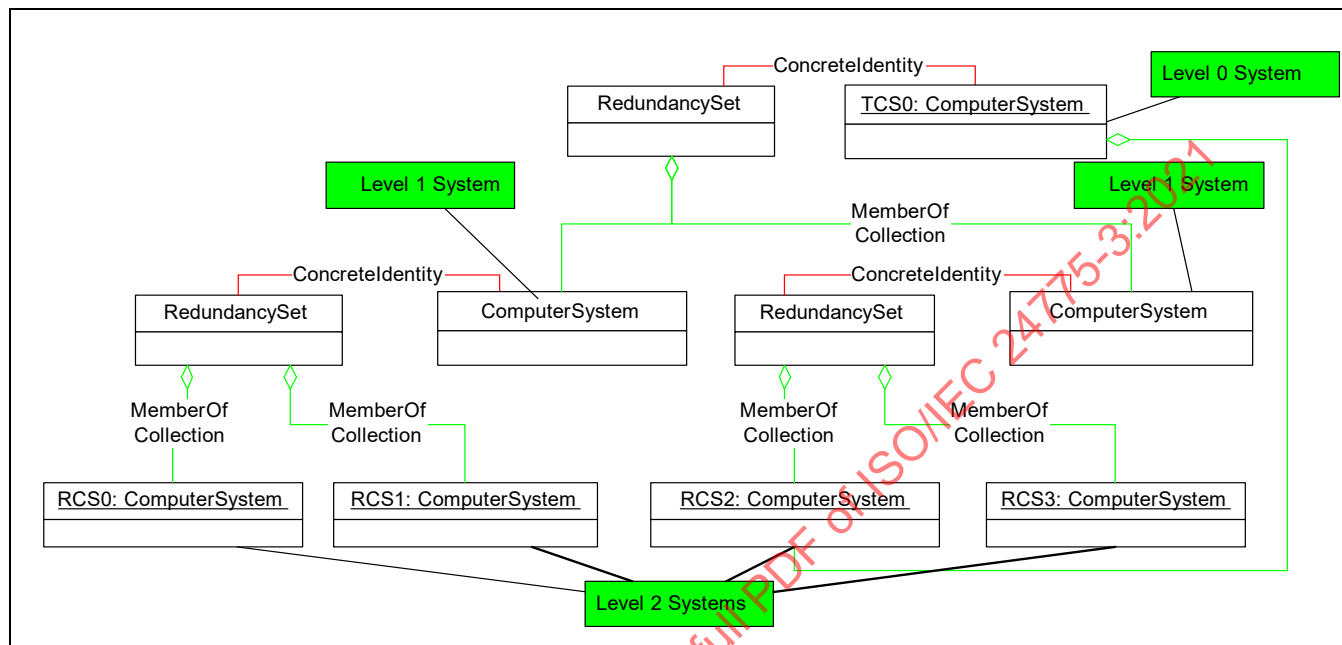


Figure 40 - System Level Numbers

All subclasses of CIM_Service and CIM_Capabilities shall have a level number less than or equal to the level number of storage classes (ports, volumes, etc.) that are influenced by the properties and methods of the Service and Capabilities classes. In some cases, different storage classes are influenced by different Service or Capabilities classes; the "level number less than or equal to" requirement may apply differently to different Service/Capabilities classes. It is always valid to associate Service and Capabilities classes to the top-level ComputerSystem since the level number of the top-level system (0) is always less than or equal to the level number of any other system.

Example 1 - An array with two controllers is modeled as a top-level ComputerSystem with real systems representing the controllers. The system's storage volumes remain available when one controller fails, but each LogicalPort becomes unavailable when a controller fails. The StorageVolumes should be associated to the top-level ComputerSystem and the LogicalPorts should be associated to one of the real ComputerSystems.

Example 2 - An array with four pair-wise redundant controllers. Each LogicalPort is associated with a pair of controllers - if one controller in a pair fails, the port is still accessible through the alternate controller. This corresponds to Figure 39: "Multiple Redundancy Tier Instance Diagram"; the ports should be associated with one of the ComputerSystems in the middle tier.

A provider shall delete and create associations between ComputerSystems and logical elements (e.g., ports, logical devices) during failover or failback to represent changes in availability. This includes SystemDevice, HostedAccessPoint, HostedService, or HostedFileSystem associations (and other associations weak to systems). The effect of the creation and deletion of associations is to switch these elements from one ComputerSystem to another. The profiles that include Multiple Computer System Profile shall specify the affected associations and indications for creation and deletion of these associations.

25.2.7 Associations between ComputerSystems and PhysicalPackages and Products

The relationship between ComputerSystems, PhysicalPackages, and Products is defined in the Physical Package Package (see 26 Physical Package Package) which may be required by the profile including the Multiple Computer System Profile. Typically, the top-level system is associated to a PhysicalPackage which is associated to a Product. Non-top-level systems may also be associated to PhysicalPackage and indirectly to a Product. If all underlying ComputerSystems share the same physical package, a single PhysicalPackage should be associated to the upper ComputerSystem.

The relationships between ComputerSystems, redundancy sets, and CIM logical elements serve as a redundancy topology - informing the client of the availability of subsets of logical elements. The relationships between PhysicalPackages and logical elements serve as a physical topology. These two topologies need not be equivalent. Consider these examples:

Example 1: a RAID array with a single controller (no redundancy); the controller and all backend disks are housed in a single chassis. This is modeled as a single ComputerSystem, no RedundancySets, no ComponentCS associations, and a single PhysicalPackage with a single associated Product.

Example 2: a RAID array with two redundant controllers; both controllers and all backend disks share a single chassis. In this case, the redundancy topology matches Figure 38: "Two Redundant Systems Instance Diagram". The top-level ComputerSystem is associated to a PhysicalPackage with a single associated Product.

Example 3: two arrays described in example 1 are assembled as part of common rack and sold as a single product. Note that although there are two controllers, there is no redundancy - the two controllers act completely independently. This is modeled as two top-level computer systems attached to separate PhysicalPackages (representing the two internal chassis). These two PhysicalPackages have a Container association to third PhysicalPackage representing the assembly - which has an association to a Product.

Example 4: two arrays described in Example 1 are assembled as part of a common rack and also share a high-speed trunk and a mutual failover capability. This failover capability means the two controllers share a RedundancySet and common top-level system. The result is similar to example 2, but each real ComputerSystem is now associated to separate PhysicalPackages which have Container associations to a common PhysicalPackage.

25.2.8 Storage Systems without Multiple Systems

In configurations where the instrumentation does not model multiple ComputerSystem instances, all the associations described above reference the one and only ComputerSystem.

25.2.9 Durable Names and Correlatable IDs of the Profile

This profile does not impose any requirements on names. The requirements for ComputerSystem names are defined in the profiles that depend on Multiple Computer System Profile and in *Storage Management Technical Specification, Part 2 Common Architecture, 1.8.0 Rev 4 7* Correlatable and Durable Names. Clients should not expect that a network name or IP address is exposed as a ComputerSystem property. The Access Points Profile should be used to model a network access point.

25.3 Health and Fault Management Considerations

The requirements for OperationalStatus of a ComputerSystem are discussed in 22 Health Package.

25.4 Cascading Considerations

Not defined in this document

25.5 Methods of the Profile

This profile does not include any extrinsic methods. A client may use this profile to discover information about the topology of computer systems, but cannot change the topology.

25.6 Use Cases

25.6.1 Navigate the Redundancy Topology

A client cannot generally interoperably navigate the redundancy topology using ComponentCS because some Component CS associations may not parallel RedundancySet associations. But a client may use ComponentCS selectively to speed up certain tasks. In particular, a client may locate the top-level system from other ComputerSystems using ComponentCS.

25.6.2 Find Top-level Computer Systems

Top-level systems are the only objects in SMI-S associated to RegisteredProfile via ElementConformsToProfile.

25.7 CIM Elements

25.7.1 Overview

Table 243 describes the CIM elements for Multiple Computer System.

Table 243 - CIM Elements for Multiple Computer System

Element Name	Requirement	Description
25.7.2 CIM_ComponentCS	Mandatory	Associates non-top-level systems to the top-level system.
25.7.3 CIM_ComputerSystem (Non-Top-Level System)	Mandatory	Non-Top-level System.
25.7.4 CIM_ConcretelDentity	Mandatory	Associates aggregate (possibly top-level) ComputerSystem and RedundancySet.
25.7.5 CIM_IsSpare	Optional	Associates the ComputerSystem that may be used as a spare to the RedundancySet of ActiveComputerSystem.
25.7.6 CIM_MemberOfCollection	Mandatory	Associates RedundancySet and its member ComputerSystems.
25.7.7 CIM_RedundancySet	Mandatory	
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_ComputerSystem	Mandatory	Creation of a ComputerSystem instance.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_ComputerSystem	Mandatory	Deletion of a ComputerSystem instance.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_ComputerSystem AND SourceInstance.CIM_ComputerSystem::OperationalStatus <> PreviousInstance.CIM_ComputerSystem::OperationalStatus	Mandatory	CQL -Change of Operational Status of a ComputerSystem instance.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_RedundancySet AND SourceInstance.CIM_RedundancySet::RedundancyStatus <> PreviousInstance.CIM_RedundancySet::RedundancyStatus	Mandatory	CQL -Change of redundancy status.

25.7.2 CIM_ComponentCS

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 244 describes class CIM_ComponentCS.

Table 244 - SMI Referenced Properties/Methods for CIM_ComponentCS

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	The Top-Level ComputerSystem; must be associated to a RegisteredProfile.
PartComponent		Mandatory	The contained (Sub)ComputerSystem.

25.7.3 CIM_ComputerSystem (Non-Top-Level System)

Non-Top-level system.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 245 describes class CIM_ComputerSystem (Non-Top-Level System).

Table 245 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Non-Top-Level System)

Properties	Flags	Requirement	Description & Notes
CreationClassName		Mandatory	
Name		Mandatory	
NameFormat		Mandatory	Non-top-level system names are not correlatable, any format is valid.
ElementName		Mandatory	
OperationalStatus		Mandatory	

25.7.4 CIM_ConcreteIdentity

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 246 describes class CIM_ConcreteIdentity.

Table 246 - SMI Referenced Properties/Methods for CIM_ConcreteIdentity

Properties	Flags	Requirement	Description & Notes
SystemElement		Mandatory	Reference to ComputerSystem
SameElement		Mandatory	Reference to RedundancySet

25.7.5 CIM_IsSpare

Associates the ComputerSystem that may be used as a spare to the RedundancySet of ActiveComputerSystem.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 247 describes class CIM_IsSpare.

Table 247 - SMI Referenced Properties/Methods for CIM_IsSpare

Properties	Flags	Requirement	Description & Notes
SpareStatus		Mandatory	
FailoverSupported		Mandatory	
Dependent		Mandatory	The RedundancySet.
Antecedent		Mandatory	The spare system.

25.7.6 CIM_MemberOfCollection

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 248 describes class CIM_MemberOfCollection.

Table 248 - SMI Referenced Properties/Methods for CIM_MemberOfCollection

Properties	Flags	Requirement	Description & Notes
Collection		Mandatory	Reference to RedundancySet
Member		Mandatory	Reference to ComputerSystem

25.7.7 CIM_RedundancySet

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 249 describes class CIM_RedundancySet.

Table 249 - SMI Referenced Properties/Methods for CIM_RedundancySet

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
ElementName		Mandatory	
RedundancyStatus		Mandatory	The redundancy status shall be either 'Unknown' 0, 'Redundant' 2, 'Degraded Redundancy' 3, 'Redundancy Lost' 4, or 'Overall Failure' 5. implementation should report 2 or 3 most of the time, although it may report 0. It should report 2 or 3 when there is at least one spare per the RedundancySet. It should report 4 when there are no more spares (via IsSpare association) per the RedundancySet. It should report 5 when there is a failure of the RedundancySet.
TypeOfSet		Mandatory	

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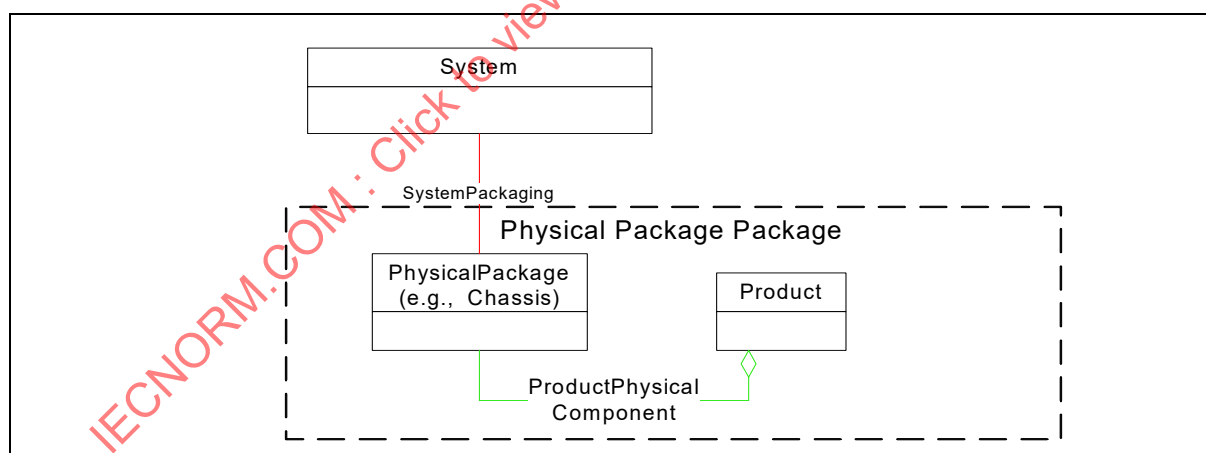
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26 Physical Package Package**26.1 Synopsis****Profile Name:** Physical Package (Component Profile)**Version:** 1.5.0**Organization:** SNIA**Central Class:** CIM_PhysicalPackage (System)**Scoping Class:** a ComputerSystem in a separate autonomous profile**Related Profiles:** Not defined in this document.**26.2 Description****26.2.1 Overview**

Physical Package Package models information about a storage system's physical package and optionally about internal sub-packages. A System is 'realized' using a SystemPackaging association to a PhysicalPackage (or a subclasses such as Chassis). The physical containment model can then be built up using Container associations and subclasses (such as PackageInChassis).

Physical elements are described as products using the Product class and ProductPhysicalComponent associations, as shown in Figure 41. The Product instances may be built up into a hierarchy using the ProductParentChild association. The Product class holds information such as vendor name, serial number and version.

**Figure 41 - Physical Package Package Mandatory Classes****26.2.2 Well Defined Subcomponents**

In addition to defining physical packages at the "System" level, PhysicalPackage may also be defined at a lower, subcomponent level. For example, PhysicalPackage is used in the Disk Drive Lite Profile and for devices supported by storage media libraries (e.g., TapeDrive and ChangerDevice). If the subcomponents are supported by the Profile, they should model their physical packaging. When subcomponents are modeled, there shall be a container relationship between their physical package and the containing package (e.g., the System level physical package). In addition, there shall be a ProductParentChild association between the subcomponent Product and the parent Product.

The Physical Package constructs may also be used to model other aspects of the environment. However, this is not mandatory. Note that each logical device may be realized by a card. The cards are contained in a controller chassis.

When establishing physical packages for logical device subcomponents (e.g., disk drives, changers, etc.) the provider shall populate both Container and Realizes associations. When establishing physical packages for processor subcomponents (e.g., non-top level systems.) the provider shall populate both Container and SystemPackaging associations. When establishing the Product instances for the subcomponent packages the provider shall populate the ProductParentChild association to the parent product. This is illustrated in Figure 42.

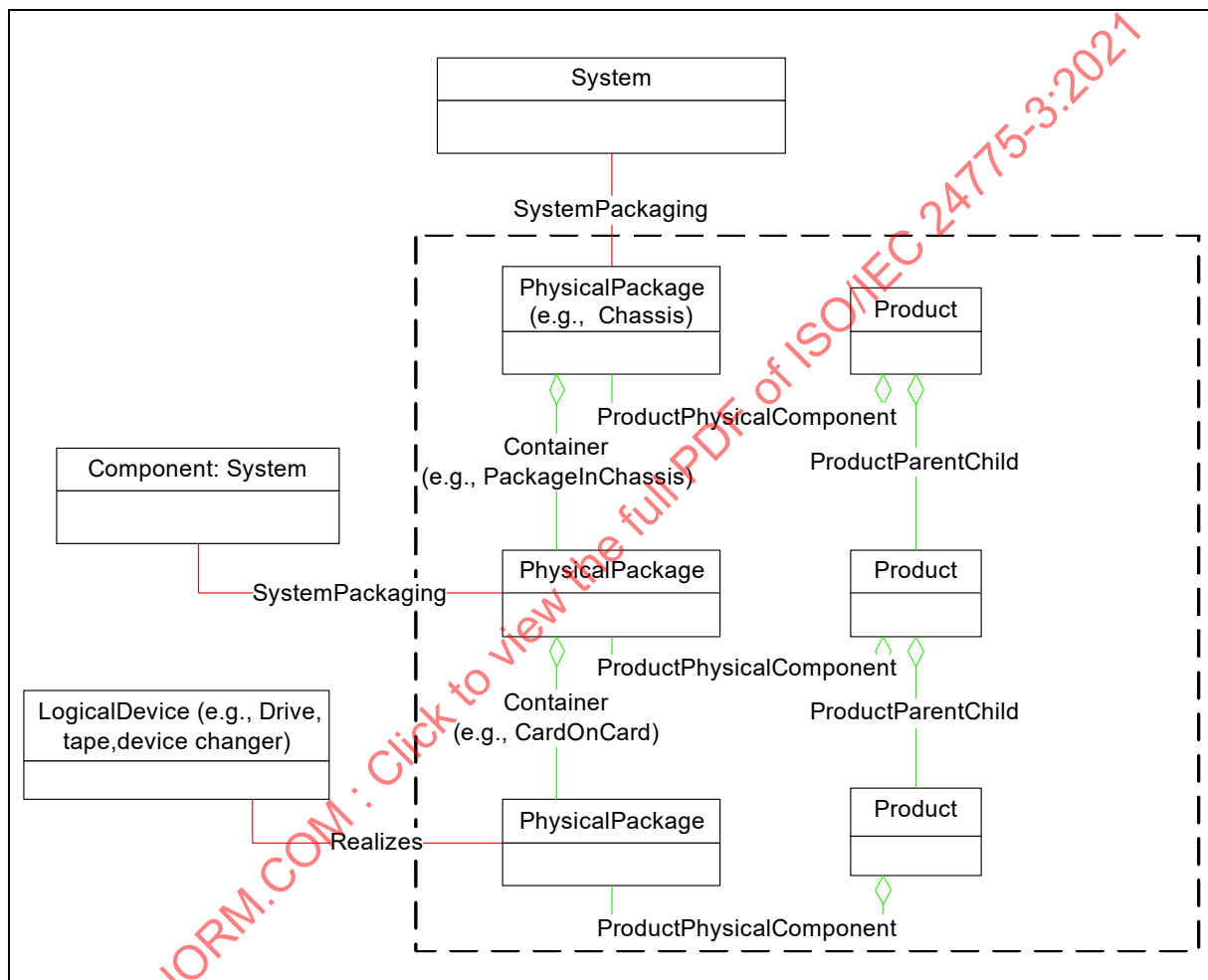


Figure 42 - Modeling for well defined subcomponents

26.2.3 Multiple Product Identities

Instrumentation may optionally describe multiple product identities for a physical package, for example, product information for both an OEM and vendor. This information should be modeled as multiple instances of CIM_Product associated with the LogicalIdentity association. The Product instance that clients should treat as primary is directly associated with PhysicalPackage via ProductPhysicalComponent. Additional product instances are associated with the primary product using the LogicalIdentity association.

Figure 43 shows an example of the use of mandatory and optional physical package classes.

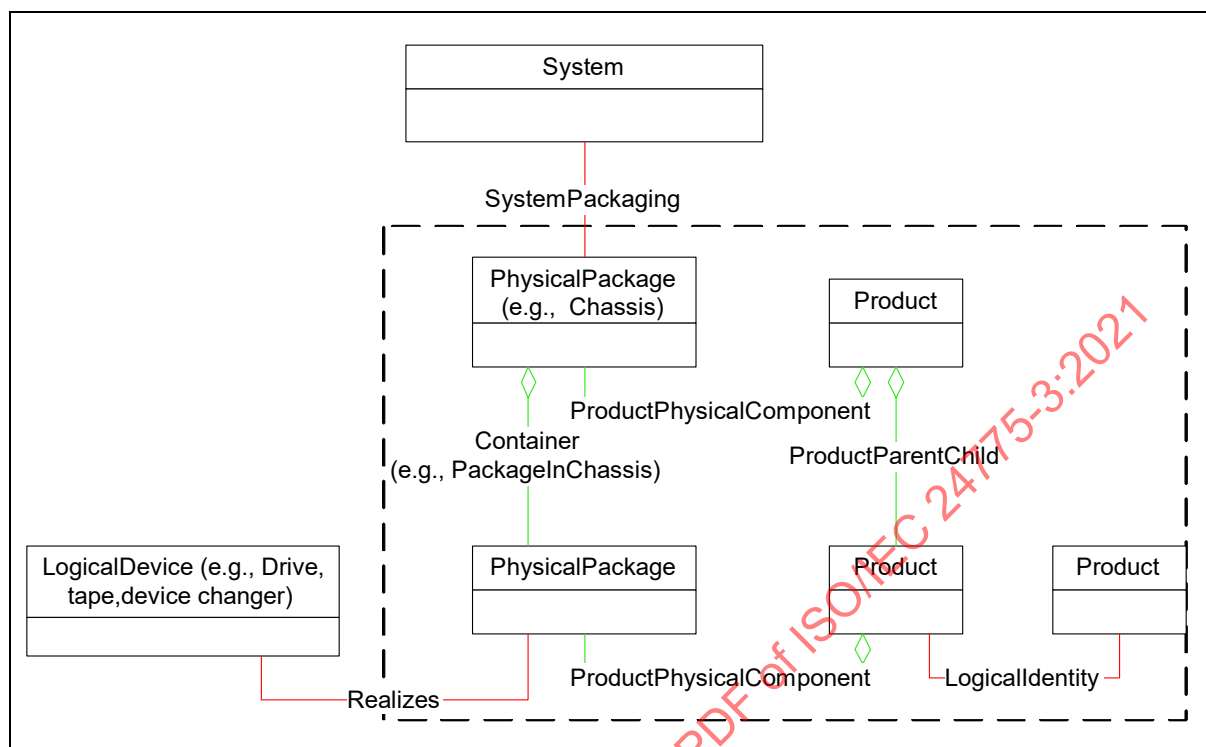


Figure 43 - Physical Package Package with Optional Classes

26.3 Health and Fault Management Considerations

Not defined in this document.

26.4 Cascading Considerations

Not defined in this document.

26.5 Methods of this Profile

Not defined in this document

26.6 Use Cases

26.6.1 Find Asset Information

Information about a system is modeled in `PhysicalPackage`. `PhysicalPackage` may be subclassed to `Chassis`; the more general `PhysicalPackage` is used here to accommodate device implementations that are deployed in multiple chassis. `PhysicalPackage` has an associated `Product` with physical asset information such as `Vendor` and `Version`.

26.6.2 Finding Product information

To locate product information (Vendor, Serial number and product versions) information about a device that is conforms to the profile, you would start with the “top-level” computer system and traverse the SystemPackaging to the PhysicalPackage (e.g., a Chassis). From the PhysicalPackage, the client would then traverse the ProductPhysicalComponent association to locate the Product instance. The primary Vendor, Serial Number and version for the device is in the Product instance associated with the PhysicalPackage. Additional product identities may be associated with the primary Product using the LogicalIdentity association.

26.6.3 Finding Asset information

There are certain subcomponents of a device that a client may be interested in locating. For example, disk drives in an array or changer devices in a library. To locate the asset information of these subcomponents, the client would follow the ProductParentChild association from the system Product to lower level Products.

Alternatively, if the client is starting from a LogicalDevice, it can locate the PhysicalPackage by following the Realizes association from the LogicalDevice. From the PhysicalPackage, the client can find the Product information by traversing the ProductPhysicalComponent association.

26.7 CIM Elements

26.7.1 Overview

Table 250 describes the CIM elements for Physical Package.

Table 250 - CIM Elements for Physical Package

Element Name	Requirement	Description
26.7.2 CIM_Container	Optional	Associates a PhysicalPackage to its component physical packages (e.g., Drives in a Storage System).
26.7.3 CIM_LogicalIdentity	Optional	Associates the primary product information to secondary product information.
26.7.4 CIM_PhysicalElementLocation	Conditional	Conditional requirement: Support for the Location profile. Associates the physical package of the system to its location.
26.7.5 CIM_PhysicalPackage (Component)	Optional	A physical package for a component of the overall system.
26.7.6 CIM_PhysicalPackage (System)	Mandatory	The physical package for the overall system.
26.7.7 CIM_Product (Component)	Optional	The product information for a physical package that is a component of the system.
26.7.8 CIM_Product (System)	Mandatory	The product information for the physical package of the system.
26.7.9 CIM_ProductParentChild	Optional	If more than one product comprises a system, this association should be used to indicate the 'parent' product.
26.7.10 CIM_ProductPhysicalComponent (Component)	Optional	Associates a component physical package to its product information.
26.7.11 CIM_ProductPhysicalComponent (System)	Mandatory	Associates the system physical package to its product information.
26.7.12 CIM_SystemPackaging (Component)	Optional	Associates a component system and its physical components.
26.7.13 CIM_SystemPackaging (System)	Mandatory	Associates the top level system and its physical package.

26.7.2 CIM_Container

Associates a PhysicalPackage to its component physical packages (e.g., Drives in a Storage System). This may be subclassed (e.g., PackageInChassis or CardOnCard), but only the Container properties are required.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 251 describes class CIM_Container.

Table 251 - SMI Referenced Properties/Methods for CIM_Container

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	A reference to the higher level physical package.
PartComponent		Mandatory	A reference to a lower level physical package.

26.7.3 CIM_LogicalIdentity

Associates the primary product information to secondary product information. The secondary product information might be the OEM product information.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 252 describes class CIM_LogicalIdentity.

Table 252 - SMI Referenced Properties/Methods for CIM_LogicalIdentity

Properties	Flags	Requirement	Description & Notes
SystemElement		Mandatory	A reference to the primary product information.
SameElement		Mandatory	A reference to a secondary product information.

26.7.4 CIM_PhysicalElementLocation

Associates the physical package of the system to its location.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for the Location profile.

Table 253 describes class CIM_PhysicalElementLocation.

Table 253 - SMI Referenced Properties/Methods for CIM_PhysicalElementLocation

Properties	Flags	Requirement	Description & Notes
PhysicalLocation		Mandatory	The reference to the location of the system physical package.
Element		Mandatory	The reference to the system physical package.

26.7.5 CIM_PhysicalPackage (Component)

A physical package for a component of the overall system. There may be multiple instances of a component physical package. For certain component physical packages, this "generic" physical package

may be the same as physical packages defined in other component profiles (e.g., this physical package is the same instance as the physical package defined in Disk Drive Lite. It is preferred that component physical packages are modeled in their respective component profiles. However, the component physical package defined in this profile is intended for components (e.g., non-Top Level Systems in the Multiple Computer System Profile) that do not model their physical package.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 254 describes class CIM_PhysicalPackage (Component).

Table 254 - SMI Referenced Properties/Methods for CIM_PhysicalPackage (Component)

Properties	Flags	Requirement	Description & Notes
CreationClassName		Mandatory	
Tag		Mandatory	
ElementName		Optional	
Name		Optional	
Manufacturer		Mandatory	
Model		Mandatory	
SerialNumber		Optional	
Version		Optional	
PartNumber		Optional	

26.7.6 CIM_PhysicalPackage (System)

The physical package for the overall system. There shall be only one instance of this class for an autonomous profile (e.g., Array or Fabric).

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 255 describes class CIM_PhysicalPackage (System).

Table 255 - SMI Referenced Properties/Methods for CIM_PhysicalPackage (System)

Properties	Flags	Requirement	Description & Notes
CreationClassName		Mandatory	
Tag		Mandatory	
ElementName		Optional	
Name		Optional	
Manufacturer		Mandatory	

Table 255 - SMI Referenced Properties/Methods for CIM_PhysicalPackage (System)

Properties	Flags	Requirement	Description & Notes
Model		Mandatory	
SerialNumber		Optional	
Version		Optional	
PartNumber		Optional	

26.7.7 CIM_Product (Component)

The product information for a physical package that is a component of the system.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 256 describes class CIM_Product (Component).

Table 256 - SMI Referenced Properties/Methods for CIM_Product (Component)

Properties	Flags	Requirement	Description & Notes
Name		Mandatory	
IdentifyingNumber		Mandatory	
Vendor		Mandatory	
Version		Mandatory	
ElementName		Mandatory	

26.7.8 CIM_Product (System)

The product information for the physical package of the system.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 257 describes class CIM_Product (System).

Table 257 - SMI Referenced Properties/Methods for CIM_Product (System)

Properties	Flags	Requirement	Description & Notes
Name		Mandatory	
IdentifyingNumber		Mandatory	
Vendor		Mandatory	
Version		Mandatory	
ElementName		Mandatory	

26.7.9 CIM_ProductParentChild

If more than one product comprises a system, this association should be used to indicate the 'parent' product.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 258 describes class CIM_ProductParentChild.

Table 258 - SMI Referenced Properties/Methods for CIM_ProductParentChild

Properties	Flags	Requirement	Description & Notes
Parent		Mandatory	A reference to the parent (System or Component) product.
Child		Mandatory	A reference to a component product.

26.7.10 CIM_ProductPhysicalComponent (Component)

Associates a component physical package to its product information.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 259 describes class CIM_ProductPhysicalComponent (Component).

Table 259 - SMI Referenced Properties/Methods for CIM_ProductPhysicalComponent (Component)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	A reference to the product information for a component of the system.
PartComponent		Mandatory	A reference to the component physical package.

26.7.11 CIM_ProductPhysicalComponent (System)

Associates the system physical package to its product information.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 260 describes class CIM_ProductPhysicalComponent (System).

Table 260 - SMI Referenced Properties/Methods for CIM_ProductPhysicalComponent (System)

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	The reference to the product information for the system.
PartComponent		Mandatory	The reference to the system physical package.

26.7.12 CIM_SystemPackaging (Component)

Associates a component system and its physical components. The ComputerSystemPackage subclass should be used if the referenced system is subclassed as ComputerSystem.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 261 describes class CIM_SystemPackaging (Component).

Table 261 - SMI Referenced Properties/Methods for CIM_SystemPackaging (Component)

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	The component system that has a physical package.
Antecedent		Mandatory	The reference to the PhysicalPackage of the component system.

26.7.13 CIM_SystemPackaging (System)

Associates the top level system and its physical package. The ComputerSystemPackage subclass should be used if the referenced system is subclassed as ComputerSystem.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 262 describes class CIM_SystemPackaging (System).

Table 262 - SMI Referenced Properties/Methods for CIM_SystemPackaging (System)

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	The system that has a physical package.
Antecedent		Mandatory	The reference to the PhysicalPackage of the top level system.

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STABLE**27 Power Supply Profile****27.1 Synopsis****Profile Name:** Power Supply (Component Profile)**Version:** 1.0.1**Organization:** SNIA**Specializes:** DMTF Power Supply Profile**Central Class:** PowerSupply**Scoping Class:** ComputerSystem**Related Profiles:** Table 263 describes the related profiles for Power Supply.**Table 263 - Related Profiles for Power Supply**

Profile Name	Organization	Version	Requirement	Description
Physical Asset	DMTF	1.0.2	Optional	See DSP1011, version 1.0.2
Indications	DMTF	1.2.2	Mandatory	See DSP1054, version 1.2.2

27.2 Description

The SNIA Power Supply Profile specializes the DMTF Power Supply Profile by adding indications. No other changes are made to the DMTF profile.

27.3 Implementation**27.3.1 Profile Basis**

See DSP1015: the DMTF Power Supply Profile.

27.3.2 Health and Fault Management Consideration

Not defined in this document

27.3.3 Cascading Considerations

Not defined in this document

27.4 Methods

See DSP1015: the DMTF Power Supply Profile.

27.5 Use Cases

See DSP1015: the DMTF Power Supply Profile.

27.6 CIM Elements

27.6.1 Overview

Table 264 describes the CIM elements for Power Supply.

Table 264 - CIM Elements for Power Supply

Element Name	Requirement	Description
27.6.2 CIM_ElementCapabilities	Conditional	Conditional requirement: Support for EnabledLogicalElementCapabilities.
27.6.3 CIM_EnabledLogicalElementCapabilities	Optional	
27.6.4 CIM_IsSpare	Optional	
27.6.5 CIM_MemberOfCollection	Conditional	Conditional requirement: Support for Power Supply redundancy.
27.6.6 CIM_OwningCollectionElement	Conditional	Conditional requirement: Support for Power Supply redundancy.
27.6.7 CIM_PowerSupply	Mandatory	
27.6.8 CIM_RedundancySet	Optional	
27.6.9 CIM_SuppliesPower	Optional	
27.6.10 CIM_SystemDevice	Mandatory	
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_PowerSupply	Mandatory	Creation of a PowerSupply instance.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_PowerSupply	Mandatory	Deletion of a PowerSupply instance.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_PowerSupply AND SourceInstance.CIM_PowerSupply::OperationalStatus <> PreviousInstance.CIM_PowerSupply::OperationalStatus	Mandatory	CQL -Change of Operational Status of a PowerSupply instance.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_PowerSupply AND SourceInstance.CIM_PowerSupply::EnabledState <> PreviousInstance.CIM_PowerSupply::EnabledState	Mandatory	CQL -Change of EnabledState of a PowerSupply instance.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_RedundancySet AND SourceInstance.CIM_RedundancySet::RedundancyStatus <> PreviousInstance.CIM_RedundancySet::RedundancyStatus	Conditional	Conditional requirement: Support for Power Supply redundancy. CQL -Change of redundancy status.

27.6.2 CIM_ElementCapabilities

CIM_ElementCapabilities is used to associate CIM_PowerSupply with CIM_EnabledLogicalElementCapabilities that describes the capabilities of CIM_PowerSupply.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for CIM_EnabledLogicalElementCapabilities.

Table 265 describes class CIM_ElementCapabilities.

Table 265 - SMI Referenced Properties/Methods for CIM_ElementCapabilities

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to CIM_PowerSupply.
Capabilities		Mandatory	Reference to CIM_EnabledLogicalElementCapabilities.

27.6.3 CIM_EnabledLogicalElementCapabilities

CIM_EnabledLogicalElementCapabilities represents the capabilities of the power supply.

Requirement: Optional

Table 266 describes class CIM_EnabledLogicalElementCapabilities.

Table 266 - SMI Referenced Properties/Methods for CIM_EnabledLogicalElementCapabilities

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
RequestedStatesSupported		Mandatory	Array that contains the supported requested states for the instance of CIM_PowerSupply. Shall include 2 (Enabled), 3 (Disabled), 6 (Offline), or 11 (Reset).
ElementNameEditSupported		Mandatory	
MaxElementNameLen		Conditional	Conditional requirement: Support for Element Name editing. Conditional on Support for Element Name editing.
ElementName		Mandatory	User-friendly name.

27.6.4 CIM_IsSpare

CIM_IsSpare is used to associate CIM_PowerSupply with CIM_RedundancySet that the CIM_PowerSupply is a member of and where CIM_PowerSupply represents a spare power supply.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 267 describes class CIM_IsSpare.

Table 267 - SMI Referenced Properties/Methods for CIM_IsSpare

Properties	Flags	Requirement	Description & Notes
SpareStatus		Mandatory	Shall be 0 (Unknown), 1 (Cold Standby), or 2 (Hot Standby).
FailoverSupported		Mandatory	Shall be are 2 (Automatic), 3 (Manual) or 4 (Both Manual and Automatic).
Antecedent		Mandatory	The RedundancySet.
Dependent		Mandatory	PowerSupply.

27.6.5 CIM_MemberOfCollection

CIM_MemberOfCollection is used to associate CIM_PowerSupply with CIM_RedundancySet that the CIM_PowerSupply is a member of.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for Power Supply redundancy.

Table 268 describes class CIM_MemberOfCollection.

Table 268 - SMI Referenced Properties/Methods for CIM_MemberOfCollection

Properties	Flags	Requirement	Description & Notes
Collection		Mandatory	Reference to RedundancySet
Member		Mandatory	Reference to PowerSupply

27.6.6 CIM_OwningCollectionElement

CIM_OwningCollectionElement is used to associate CIM_RedundancySet with CIM_ComputerSystem that the CIM_RedundancySet is a member of. The instance of CIM_OwningCollectionElement is conditional on having instantiation of the CIM_RedundancySet class.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for Power Supply redundancy.

Table 269 describes class CIM_OwningCollectionElement.

Table 269 - SMI Referenced Properties/Methods for CIM_OwningCollectionElement

Properties	Flags	Requirement	Description & Notes
OwningElement		Mandatory	Reference to ComputerSystem
OwnedElement		Mandatory	Reference to RedundancySet

27.6.7 CIM_PowerSupply

CIM_PowerSupply is used to represent the power supply.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 270 describes class CIM_PowerSupply.

Table 270 - SMI Referenced Properties/Methods for CIM_PowerSupply

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	Key.
SystemName		Mandatory	Key.
CreationClassName		Mandatory	Key.
DeviceID		Mandatory	Key.
TotalOutputPower		Mandatory	Shall match 0 when the power supply's total output power is unknown.
ElementName		Mandatory	
OperationalStatus		Mandatory	
HealthState		Mandatory	
EnabledState		Mandatory	Shall be 2 (Enabled), 3 (Disabled), 5 (Not Applicable) or 6 (Enabled but Offline).
RequestedState		Mandatory	Shall be 2 (Enabled), 3 (Disabled), 5 (No Change), 6 (Offline), 11 (Reset) or 12 (Not Applicable).
RequestStateChange()		Conditional	Conditional requirement: updating requested states. The implementation shall support this method, but the method may always return 'Not Supported.'

27.6.8 CIM_RedundancySet

CIM_RedundancySet is used to represent the aggregation of redundant power supplies.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 271 describes class CIM_RedundancySet.

Table 271 - SMI Referenced Properties/Methods for CIM_RedundancySet

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
ElementName		Mandatory	shall be formatted as a free formed string of variable length (pattern ".+").
RedundancyStatus		Mandatory	
TypeOfSet		Mandatory	Shall be 2 (N+1), 3 (Load Balanced), 4 (Sparing) or 5 (Limited Sparing).
MinNumberNeeded		Mandatory	shall match 0 when the minimum number of power supplies needed for the redundancy is unknown.
Failover()		Optional	

27.6.9 CIM_SuppliesPower

CIM_SuppliesPower is used to associate CIM_PowerSupply with CIM_ManagedSystemElement that the power supply represented by the CIM_PowerSupply instance supplies power to.

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Optional

Table 272 describes class CIM_SuppliesPower.

Table 272 - SMI Referenced Properties/Methods for CIM_SuppliesPower

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	
Dependent		Mandatory	Shall reference the instance of the subclass of CIM_ManagedSystemElement representing element receiving the power.

27.6.10 CIM_SystemDevice

CIM_SystemDevice is used to associate CIM_PowerSupply with CIM_ComputerSystem that the CIM_PowerSupply is a member of.

Created By: Static
 Modified By: Static
 Deleted By: Static
 Requirement: Mandatory

Table 273 describes class CIM_SystemDevice.

Table 273 - SMI Referenced Properties/Methods for CIM_SystemDevice

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	
PartComponent		Mandatory	

STABLE

STABLE**28 Fan Profile****28.1 Synopsis****Profile Name:** Fan (Component Profile)**Version:** 1.5.0**Organization:** SNIA**Specializes:** DMTF Fan Profile**Central Class:** Fan**Scoping Class:** ComputerSystem**Related Profiles:** Table 274 describes the related profiles for Fan.**Table 274 - Related Profiles for Fan**

Profile Name	Organization	Version	Requirement	Description
Physical Asset	DMTF	1.0.2	Optional	See DSP1011, version 1.0.2
Sensors	SNIA	1.5.0	Optional	Experimental.
Indications	DMTF	1.2.2	Mandatory	See DSP1054, version 1.2.2

The SNIA Fan Profile specializes DSP1013: the DMTF Fan Profile by adding indications.

28.2 Description

The SNIA Fan Profile specializes the DMTF Fan Profile by adding indications. Other changes are made to the DMTF Profile, include making a couple of classes conditional and elaborating on the definition of RedundancyStatus.

28.3 Implementation**28.3.1 Profile Basis**

See DSP1013: the DMTF Fan Profile.

28.3.2 Health and Fault Management Consideration

Not defined in this document

28.3.3 Cascading Considerations

Not defined in this document

28.4 Methods

See DSP1013: the DMTF Fan Profile.

28.5 Use Cases

See DSP1013: the DMTF Fan Profile.

28.6 CIM Elements

28.6.1 Overview

Table 275 describes the CIM elements for Fan.

Table 275 - CIM Elements for Fan

Element Name	Requirement	Description
28.6.2 CIM_AssociatedCooling	Optional	
28.6.3 CIM_AssociatedSensor	Optional	
28.6.4 CIM_ElementCapabilities	Conditional	Conditional requirement: Support for EnabledLogicalElementCapabilities.
28.6.5 CIM_EnabledLogicalElementCapabilities	Optional	
28.6.6 CIM_Fan	Mandatory	
28.6.7 CIM_HostedCollection	Optional	
28.6.8 CIM_IsSpare	Optional	
28.6.9 CIM_MemberOfCollection	Conditional	Conditional requirement: Support for Fan redundancy.
28.6.10 CIM_NumericSensor	Optional	
28.6.11 CIM_OwningCollectionElement	Conditional	Conditional requirement: Support for Fan redundancy.
28.6.12 CIM_RedundancySet (Fan Redundancy)	Optional	
28.6.13 CIM_Sensor	Optional	
28.6.14 CIM_SystemDevice	Mandatory	
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_Fan	Mandatory	Creation of a Fan instance.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_Fan	Mandatory	CQL -Deletion of a Fan instance.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_Fan AND SourceInstance.CIM_Fan::OperationalStatus <> PreviousInstance.CIM_Fan::OperationalStatus	Mandatory	CQL -Change of Operational Status of a Fan instance.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_Fan AND SourceInstance.CIM_Fan::EnabledState <> PreviousInstance.CIM_Fan::EnabledState	Mandatory	CQL -Change of EnabledState of a Fan instance.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_RedundancySet AND SourceInstance.CIM_RedundancySet::RedundancyStatus <> PreviousInstance.CIM_RedundancySet::RedundancyStatus	Conditional	Conditional requirement: Support for Fan redundancy. CQL -Change of redundancy status.

28.6.2 CIM_AssociatedCooling

CIM_AssociatedCooling associates CIM_Fan with a subclass of CIM_ManagedSystemElement.

Requirement: Optional

Table 276 describes class CIM_AssociatedCooling.

Table 276 - SMI Referenced Properties/Methods for CIM_AssociatedCooling

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to CIM_Fan.
Dependent		Mandatory	Shall reference an instance of a subclass of CIM_ManagedSystemElement for which the fan is providing cooling.

28.6.3 CIM_AssociatedSensor

This is described in the DMTF profile, but is missing from the CIM Elements table.

Requirement: Optional

Table 277 describes class CIM_AssociatedSensor.

Table 277 - SMI Referenced Properties/Methods for CIM_AssociatedSensor

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	Reference to CIM_Fan.
Antecedent		Mandatory	Reference to Sensor or NumericSensor.

28.6.4 CIM_ElementCapabilities

SNIA makes this conditional on the existence of CIM_EnabledLogicalElementCapabilities. The class definition specializes the CIM_ElementCapabilities definition in the Fan profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for CIM_EnabledLogicalElementCapabilities.

Table 278 describes class CIM_ElementCapabilities.

Table 278 - SMI Referenced Properties/Methods for CIM_ElementCapabilities

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to CIM_Fan.
Capabilities		Mandatory	Reference to CIM_EnabledLogicalElementCapabilities.

28.6.5 CIM_EnabledLogicalElementCapabilities

CIM_EnabledLogicalElementCapabilities represents the capabilities of the Fan.

Requirement: Optional

Table 279 describes class CIM_EnabledLogicalElementCapabilities.

Table 279 - SMI Referenced Properties/Methods for CIM_EnabledLogicalElementCapabilities

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
RequestedStatesSupported	N	Mandatory	Array that contains the supported requested states for the instance of CIM_Fan. Shall be an empty array or contain any combination of: 2 (Enabled), 3 (Disabled), or 11 (Reset).
ElementNameEditSupported		Mandatory	property shall have a value of TRUE when the implementation supports client modification of the ElementName property of the associated instance of CIM_Fan.
MaxElementNameLen		Conditional	Conditional requirement: The ElementNameEditSupported property has a value of TRUE. Conditional on Support for Element Name editing.

28.6.6 CIM_Fan

CIM_Fan is used to represent the fan.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 280 describes class CIM_Fan.

Table 280 - SMI Referenced Properties/Methods for CIM_Fan

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	Key.
SystemName		Mandatory	Key.
CreationClassName		Mandatory	Key.
DeviceID		Mandatory	Key.
OperationalStatus		Mandatory	
HealthState		Mandatory	
VariableSpeed		Mandatory	
DesiredSpeed		Conditional	Conditional requirement: Support for the SetSpeed method (VariableSpeed=TRUE) and EnabledState is NOT 3(Disabled).'
ActiveCooling		Mandatory	Shall have the value TRUE.
EnabledState		Mandatory	This property shall match the values 0 (Unknown), 2(Enabled), 3(Disabled) or 5(Not Applicable).
RequestedState		Mandatory	This property shall have a value of 2 (Enabled), 3 (Disabled) , 5 (No Change), 11 (Reset) or 12 (Not Applicable).
ElementName		Mandatory	This property shall be modifiable when the ElementNameEditSupported property of the associated CIM_EnabledLogicalElementCapabilities instance has a value of TRUE.

Table 280 - SMI Referenced Properties/Methods for CIM_Fan

Properties	Flags	Requirement	Description & Notes
SetSpeed()		Conditional	Conditional requirement: Support for the SetSpeed method (VariableSpeed=TRUE) and EnabledState is NOT 3 (Disabled).
RequestStateChange()		Conditional	Conditional requirement: The RequestedStatesSupported property has a value of 2 (Enabled), 3 (Disabled) or 11 (Reset) in the CIM_EnabledLogicalElementCapabilities for the Fan..

28.6.7 CIM_HostedCollection

HostedCollection defines a SystemSpecificCollection in the context of a scoping System.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 281 describes class CIM_HostedCollection.

Table 281 - SMI Referenced Properties/Methods for CIM_HostedCollection

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Key: Shall reference a CIM_ComputerSystem instance of which a CIM_RedundancySet instance is a member.
Dependent		Mandatory	Key: Shall reference a CIM_RedundancySet instance.

28.6.8 CIM_IsSpare

CIM_IsSpare is used to associate CIM_Fan with CIM_RedundancySet that the CIM_Fan is a member of and where CIM_Fan represents a spare Fan.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 282 describes class CIM_IsSpare.

Table 282 - SMI Referenced Properties/Methods for CIM_IsSpare

Properties	Flags	Requirement	Description & Notes
SpareStatus		Mandatory	Shall be 0 (Unknown) or 3 (Cold Standby).
FailoverSupported		Mandatory	Shall be 2 (Automatic), 3 (Manual) or 4 (Both Manual and Automatic).
Antecedent		Mandatory	Key: Shall reference a CIM_RedundancySet instance of which a CIM_Fan instance is a member and where the CIM_Fan instance is a Spare Fan.
Dependent		Mandatory	Key: Shall reference the Spare Fan.

28.6.9 CIM_MemberOfCollection

CIM_MemberOfCollection associates CIM_Fan with the CIM_RedundancySet instance of which CIM_Fan is a member.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for Fan redundancy.

Table 283 describes class CIM_MemberOfCollection.

Table 283 - SMI Referenced Properties/Methods for CIM_MemberOfCollection

Properties	Flags	Requirement	Description & Notes
Collection		Mandatory	Key: Shall reference a CIM_RedundancySet instance of which a CIM_Fan instance is a member.
Member		Mandatory	Key: Shall reference a CIM_Fan instance.

28.6.10 CIM_NumericSensor

The CIM_NumericSensor class is defined by the Sensors Profile. The requirements denoted here are in addition to those mandated by the Sensors Profile.

Requirement: Optional

Table 284 describes class CIM_NumericSensor.

Table 284 - SMI Referenced Properties/Methods for CIM_NumericSensor

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	Key.
SystemName		Mandatory	Key.
CreationClassName		Mandatory	Key.
DeviceID		Mandatory	Key.
SensorType		Mandatory	Shall be set to 5 (Tachometer).
BaseUnits		Mandatory	Shall be 19 (RPM).
RateUnits		Mandatory	Shall be 0 (None).

28.6.11 CIM_OwningCollectionElement

SNIA makes this conditional on the existence of CIM_RedundancySet. The class definition specializes the CIM_OwningCollectionElement definition in the Fan profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for Fan redundancy.

Table 285 describes class CIM_OwningCollectionElement.

Table 285 - SMI Referenced Properties/Methods for CIM_OwningCollectionElement

Properties	Flags	Requirement	Description & Notes
OwnedElement		Mandatory	Key: Shall reference a CIM_RedundancySet instance.
OwningElement		Mandatory	Key: Shall reference a CIM_ComputerSystem instance of which a CIM_RedundancySet instance is a member.

28.6.12 CIM_RedundancySet (Fan Redundancy)

SNIA specializes this to further define the RedundancyStatus property. The class definition specializes the CIM_RedundancySet definition in the Fan profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 286 describes class CIM_RedundancySet (Fan Redundancy).

Table 286 - SMI Referenced Properties/Methods for CIM_RedundancySet (Fan Redundancy)

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	Key.
ElementName		Mandatory	shall be formatted as a free formed string of variable length (pattern ".*").
RedundancyStatus(overridden)		Mandatory	Shall be 2 (Fully Redundant), 3 (Degraded Redundancy), 4 (Redundancy Lost) or 5 (Overall Failure).
TypeOfSet		Mandatory	Shall be 2 (N+1), 3 (Load Balanced), 4 (Sparing) or 5 (Limited Sparing).
MinNumberNeeded		Mandatory	Shall be 0 when the minimum number of fans needed for the redundancy is unknown.
Failover()		Optional	

28.6.13 CIM_Sensor

The CIM_Sensor class is defined by the Sensors Profile. The requirements denoted here are in addition to those mandated by the Sensors Profile.

Requirement: Optional

Table 287 describes class CIM_Sensor.

Table 287 - SMI Referenced Properties/Methods for CIM_Sensor

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	Key.
SystemName		Mandatory	Key.
CreationClassName		Mandatory	Key.

Table 287 - SMI Referenced Properties/Methods for CIM_Sensor

Properties	Flags	Requirement	Description & Notes
DeviceID		Mandatory	Key.
SensorType		Mandatory	Shall be set to 5 (Tachometer).

28.6.14 CIM_SystemDevice

CIM_SystemDevice associates CIM_Fan with the CIM_ComputerSystem instance of which CIM_Fan is a member.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 288 describes class CIM_SystemDevice.

Table 288 - SMI Referenced Properties/Methods for CIM_SystemDevice

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Key: Shall reference a CIM_ComputerSystem instance of which a CIM_Fan instance is a member.
PartComponent		Mandatory	Key: Shall reference a CIM_Fan instance.

STABLE

EXPERIMENTAL
29 Sensors Profile**29.1 Synopsis****Profile Name:** Sensors (Component Profile)**Version:** 1.5.0**Organization:** SNIA**Specializes:** DMTF Sensors Profile**Central Class:** Sensor**Scoping Class:** ComputerSystem**Related Profiles:** Table 289 describes the related profiles for Sensors.**Table 289 - Related Profiles for Fan**

Profile Name	Organization	Version	Requirement	Description
Indications	DMTF	1.2.2	Mandatory	See DSP1054, version 1.2.2

The SNIA Sensors Profile specializes DSP1009: the DMTF Sensors Profile by adding indications.

29.2 Description

The SNIA Sensors Profile specializes the DMTF Sensors Profile by adding indications. No other changes are made to the DMTF Profile.

29.3 Implementation**29.3.1 Profile Basis**

See DSP1009: the DMTF Sensors Profile.

29.3.2 Health and Fault Management Consideration

Not defined in this document

29.3.3 Cascading Considerations

Not defined in this document

29.4 Methods

See DSP1009: the DMTF Sensors Profile.

29.5 Use Cases

See DSP1009: the DMTF Sensors Profile.

29.6 CIM Elements

29.6.1 Overview

Table 290 describes the CIM elements for Sensors.

Table 290 - CIM Elements for Sensors

Element Name	Requirement	Description
29.6.2 CIM_AssociatedSensor	Optional	This is used to associate the instance of Sensor (or NumericSensor) with the instance of a subclass of ManagedElement.
29.6.3 CIM_ElementCapabilities	Optional	This is used to associate Sensor (or NumericSensor) with an instance of EnabledLogicalElementCapabilities that describes the capabilities of Sensor.
29.6.4 CIM_EnabledLogicalElementCapabilities	Optional	This is used to represent the capabilities of the sensor as it applies to the properties of Sensor.
29.6.5 CIM_NumericSensor	Optional	
29.6.6 CIM_Sensor	Mandatory	The implementation shall instantiate an instance of Sensor, but this could be the subclass NumericSensor.
29.6.7 CIM_SystemDevice	Mandatory	SystemDevice is used to associate the instance of Sensor (or NumericSensor) with the instance of ComputerSystem of which the Sensor instance is a member.
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_Sensor	Mandatory	Creation of a Sensor instance.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_Sensor	Mandatory	Deletion of a Sensor instance.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_Sensor AND SourceInstance.CIM_Sensor::OperationalStatus <> PreviousInstance.CIM_Sensor::OperationalStatus	Mandatory	CQL -Change of Operational Status of a Sensor instance.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_Sensor AND SourceInstance.CIM_Sensor::EnabledState <> PreviousInstance.CIM_Sensor::EnabledState	Mandatory	CQL -Change of EnabledState of a Sensor instance.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_Sensor AND SourceInstance.CIM_Sensor::CurrentState <> PreviousInstance.CIM_Sensor::CurrentState	Mandatory	CQL -Change of Current State of a Sensor instance.
SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_NumericSensor AND SourceInstance.CIM_NumericSensor::CurrentReading <> PreviousInstance.CIM_NumericSensor::CurrentReading	Mandatory	CQL -Change of Current Reading of a NumericSensor instance.

29.6.2 CIM_AssociatedSensor

CIM_AssociatedSensor associates CIM_Sensor or CIM_NumericSensor with a subclass of CIM_ManagedSystemElement.

Requirement: Optional

Table 291 describes class CIM_AssociatedSensor.

Table 291 - SMI Referenced Properties/Methods for CIM_AssociatedSensor

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Shall be a reference to a specific instance of CIM_Sensor or CIM_NumericSensor.
Dependent		Mandatory	Shall reference an instance of a subclass of CIM_ManagedElement for which the sensor is monitoring.

29.6.3 CIM_ElementCapabilities

CIM_ElementCapabilities is used to associate CIM_Sensor with the CIM_EnabledLogicalElementCapabilities instance that describes the capabilities of the Sensor.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 292 describes class CIM_ElementCapabilities.

Table 292 - SMI Referenced Properties/Methods for CIM_ElementCapabilities

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to Sensor
Capabilities		Mandatory	Reference to EnabledLogicalElementCapabilities

29.6.4 CIM_EnabledLogicalElementCapabilities

CIM_EnabledLogicalElementCapabilities represents the capabilities of the Sensor.

Requirement: Optional

Table 293 describes class CIM_EnabledLogicalElementCapabilities.

Table 293 - SMI Referenced Properties/Methods for CIM_EnabledLogicalElementCapabilities

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	Key.
RequestedStatesSupported		Mandatory	This property is an array that contains the supported requested states for the instance of CIM_Sensor or CIM_NumericSensor. This property shall be the super set of the values to be used as the RequestedState parameter in the RequestStateChange() method. The valid values of the property shall be an empty array or contain any combination of the following values: 2 (Enabled), 3 (Disabled), or 11 (Reset).

Table 293 - SMI Referenced Properties/Methods for CIM_EnabledLogicalElementCapabilities

Properties	Flags	Requirement	Description & Notes
ElementNameEditSupported		Mandatory	This property shall have a value of TRUE when the implementation supports client modification of the ElementName property of the associated CIM_Sensor or CIM_NumericSensor instance.
MaxElementNameLen		Conditional	Conditional requirement: This property shall be implemented when the CIM_EnabledLogicalElementCapabilities.ElementNameEditSupported property has a value of TRUE.

29.6.5 CIM_NumericSensor

CIM_NumericSensor is used to represent an analog sensor. The CIM_NumericSensor class is mandatory when the CIM_Sensor class is not implemented. The class definition specializes the CIM_NumericSensor definition in the Sensors profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 294 describes class CIM_NumericSensor.

Table 294 - SMI Referenced Properties/Methods for CIM_NumericSensor

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	Key.
SystemName		Mandatory	Key.
CreationClassName		Mandatory	Key.
DeviceID		Mandatory	Key.
BaseUnits		Mandatory	None.
UnitModifier		Mandatory	None.
RateUnits		Mandatory	None.
CurrentReading		Mandatory	None.
LowerThresholdNonCritical		Conditional	Conditional requirement: This property shall be mandatory when the CIM_NumericSensor.SupportedThresholds array contains a value of 0 (LowerThresholdNonCritical). This property shall be settable only if the CIM_NumericSensor.SettableThresholds array contains a value of 0 (LowerThresholdNonCritical).
UpperThresholdNonCritical		Conditional	Conditional requirement: This property shall be mandatory when the CIM_NumericSensor.SupportedThresholds array contains a value of 1 (UpperThresholdNonCritical). This property shall be settable only if the CIM_NumericSensor.SettableThresholds array contains a value of 1 (UpperThresholdNonCritical).
LowerThresholdCritical		Conditional	Conditional requirement: This property shall be mandatory when the CIM_NumericSensor.SupportedThresholds array contains a value of 2 (LowerThresholdCritical). This property shall be settable only if the CIM_NumericSensor.SettableThresholds array contains a value of 2 (LowerThresholdCritical).

Table 294 - SMI Referenced Properties/Methods for CIM_NumericSensor

Properties	Flags	Requirement	Description & Notes
UpperThresholdCritical		Conditional	Conditional requirement: This property shall be mandatory when the CIM_NumericSensor.SupportedThresholds array contains a value of 3 (UpperThresholdCritical). This property shall be settable only if the CIM_NumericSensor.SettableThresholds array contains a value of 3 (UpperThresholdCritical).
LowerThresholdFatal		Conditional	Conditional requirement: This property shall be mandatory when the CIM_NumericSensor.SupportedThresholds array contains a value of 4 (LowerThresholdFatal). This property shall be settable only if the CIM_NumericSensor.SettableThresholds array contains a value of 4 (LowerThresholdFatal).
UpperThresholdFatal		Conditional	Conditional requirement: This property shall be mandatory when the CIM_NumericSensor.SupportedThresholds array contains a value of 5 (UpperThresholdFatal). This property shall be settable only if the CIM_NumericSensor.SettableThresholds array contains a value of 5 (UpperThresholdFatal).
SupportedThresholds	N	Mandatory	This property is an array that contains the list of the implemented thresholds: 0 (LowerThresholdNonCritical), 1 (UpperThresholdNonCritical), 2 (LowerThresholdCritical), 3 (UpperThresholdCritical), 4 (LowerThresholdFatal), and 5 (UpperThresholdFatal). When the implementation does not support any of these threshold properties, the property shall be an empty array.
SettableThresholds	N	Mandatory	This property is an array that contains the list of the settable implemented thresholds: 0 (LowerThresholdNonCritical), 1 (UpperThresholdNonCritical), 2 (LowerThresholdCritical), 3 (UpperThresholdCritical), 4 (LowerThresholdFatal), and 5 (UpperThresholdFatal). The array shall contain the subset of values in the CIM_NumericSensor.SupportedThresholds array. When the implementation does not support any of the settable threshold properties, the property shall be an empty array.
SensorType		Mandatory	None.
PossibleStates		Mandatory	See section 7.3 of the DMTF Sensors Profile version 1.0.2.
CurrentState		Mandatory	The CIM_NumericSensor.CurrentState property shall have a value of one of the elements in the CIM_NumericSensor.PossibleStates array.
ElementName		Mandatory	The CIM_EnabledLogicalElementCapabilities.ElementNameEditSupported property shall have a value of TRUE when the implementation supports client modification of the ElementName property of the associated CIM_NumericSensor instance.
OtherSensorTypeDescription		Conditional	Conditional requirement: The OtherSensorTypeDescription property shall be mandatory when the SensorType property is set to a value of 1 (Other). The OtherSensorTypeDescription property shall be formatted as a free-formed string of variable length (pattern \.*\').
EnabledState		Mandatory	This property may have the values 2 (Enabled), 3 (Disabled) or 5 (Not Applicable).
RequestedState		Mandatory	The RequestedState property shall have a value of 12 (Not Applicable), a value of 5 (No Change), or a value that is contained in the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property array of the associated CIM_EnabledLogicalElementCapabilities instance (i.e., 2 (Enabled), 3 (Disabled) or 11(Reset)).
OperationalStatus		Mandatory	None.
HealthState		Mandatory	None.

Table 294 - SMI Referenced Properties/Methods for CIM_NumericSensor

Properties	Flags	Requirement	Description & Notes
RequestStateChange()		Conditional	Conditional requirement: When a CIM_EnabledLogicalElementCapabilities instance is associated with the Central Instance and the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property is a non-empty array, sensor state management shall be supported.
RestoreDefaultThresholds()		Conditional	Conditional requirement: The CIM_NumericSensor.RestoreDefaultThresholds() method shall be implemented and shall not return a value of 1 (Unsupported) when the CIM_NumericSensor.SettableThresholds property is a non-empty array.

29.6.6 CIM_Sensor

CIM_Sensor is used to represent a discrete sensor. Either the CIM_Sensor class (or its subclass) CIM_NumericSensor class is mandatory. The class definition specializes the CIM_Sensor definition in the Sensors profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 295 describes class CIM_Sensor.

Table 295 - SMI Referenced Properties/Methods for CIM_Sensor

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	Key.
SystemName		Mandatory	Key.
CreationClassName		Mandatory	Key.
DeviceID		Mandatory	Key.
SensorType		Mandatory	none.
PossibleStates		Mandatory	See section 7.2 of the DMTF Sensors Profile version 1.0.2.
CurrentState		Mandatory	The CIM_Sensor.CurrentState property shall have a value of one of the elements in the CIM_Sensor.PossibleStates array.
ElementName		Mandatory	The CIM_EnabledLogicalElementCapabilities.ElementNameEditSupported property shall have a value of TRUE when the implementation supports client modification of the ElementName property of the associated CIM_Sensor.
OtherSensorTypeDescription		Conditional	Conditional requirement: The OtherSensorTypeDescription property shall be mandatory when the SensorType property is set to a value of 1 (Other). The OtherSensorTypeDescription property shall be formatted as a free-formed string of variable length (pattern \.*\').
EnabledState		Mandatory	This property may have the values 2 (Enabled), 3 (Disabled) or 5 (Not Applicable).

Table 295 - SMI Referenced Properties/Methods for CIM_Sensor

Properties	Flags	Requirement	Description & Notes
RequestedState		Mandatory	The RequestedState property shall have a value of 12 (Not Applicable), a value of 5 (No Change), or a value that is contained in the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property array of the associated CIM_EnabledLogicalElementCapabilities instance (i.e., 2 (Enabled), 3 (Disabled) or 11(Reset)).
OperationalStatus		Mandatory	none.
HealthState		Mandatory	none.
RequestStateChange()		Conditional	Conditional requirement: When a CIM_EnabledLogicalElementCapabilities instance is associated with the Central Instance and the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property is a non-empty array, sensor state management shall be supported.

29.6.7 CIM_SystemDevice

CIM_SystemDevice is used to associate CIM_Sensor with CIM_ComputerSystem that the CIM_Sensor is a member of.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 296 describes class CIM_SystemDevice.

Table 296 - SMI Referenced Properties/Methods for CIM_SystemDevice

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Key: shall be a reference to the CIM_ComputerSystem instance of which the current CIM_Sensor (or CIM_NumericSensor) instance is a member.
PartComponent		Mandatory	Key: shall be a reference to the current CIM_Sensor (or CIM_NumericSensor) instance.

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30 Base Server Profile

30.1 Synopsis

Profile Name: Base Server (Autonomous Profile)

Version: 1.6.0

Organization: SNIA

Specializes: DMTF Base Server 1.0.1 to reference SNIA specialized referenced profiles.

Central Class: CIM_ComputerSystem

Scoping Class: CIM_ComputerSystem

Related Profiles: Table 297 describes the related profiles for Base Server.

Table 297 - Related Profiles for Base Server

Profile Name	Organization	Version	Requirement	Description
Computer System	DMTF	1.0.3	Mandatory	See DSP1052, version 1.0.3
Fan	SNIA	1.5.0	Optional	Experimental.
Physical Asset	DMTF	1.0.2	Mandatory	See DSP1011 version 1.0.2
Power Supply	SNIA	1.0.1	Optional	Experimental.
Record Log	DMTF	1.0.1	Optional	See DSP1010 version 1.0.1
Sensors	SNIA	1.5.0	Optional	Experimental.
Software Inventory	SNIA	1.0.0	Optional	Experimental.
Software Update	DMTF	1.0.0	Optional	See DSP1025, version 1.0.0
Storage HBA	SNIA	1.6.1	Optional	Experimental.
Host Discovered Resources	SNIA	1.7.0	Optional	Experimental.
Disk Partition	SNIA	1.6.0	Optional	Experimental.
SCSI Multipath Management	SNIA	1.6.0	Optional	Experimental.
Host Hardware RAID Controller	SNIA	1.5.0	Optional	
Storage Enclosure	SNIA	1.7.0	Optional	Experimental.
Launch In Context	DMTF	1.0.0	Optional	Experimental. See DSP1102 version 1.0.0
Host Filesystem	SNIA	1.6.0	Optional	Experimental.

The Base Server Profile models a customer server or storage system.

30.2 Description

The SNIA Base Server Profile models a customer server or storage system containing storage elements. This profile may be used to scope one or more HBAs (or other storage elements).

This profile may represent either a physical system or a virtual system.

30.3 Implementation

30.3.1 Profile Basis

See DSP1004, DMTF Base Server Profile for details on the model.

In a storage context, there are several related deployment options.

30.3.2 HBA Instrumentation

If an HBA vendor wishes to create HBA instrumentation that can be used with CIM instrumentation from a server vendor, they would implement the component Storage HBA Profile and work with the server vendor(s) to assure it integrates effectively with their autonomous server profile. If an HBA vendor wishes to deliver a free-standing implementation that does not rely on server-vendor software, they could implement this profile along with the Storage HBA Profile. Note that the HBA vendor could support both approaches and let a customer or installation script determine which is most appropriate.

30.3.3 Host Hardware RAID Instrumentation

Host Hardware RAID vendors have the same deployment options as HBA vendors (see 30.3.2)

30.3.4 Storage Enclosure Instrumentation

In configurations where the Storage Enclosure Profile is not used with a single autonomous profile, the Base Server may be used as the referencing profile for the Storage Enclosure and other component profiles.

30.3.5 Health and Fault Management Consideration

Not defined in this document

30.3.6 Cascading Considerations

Not defined in this document

30.4 Methods

See DSP1004, DMTF Base Server Profile.

30.5 Use Cases

See DSP1004, DMTF Base Server Profile.

30.6 CIM Elements

30.6.1 Overview

Table 298 describes the CIM elements for Base Server.

Table 298 - CIM Elements for Base Server

Element Name	Requirement	Description
30.6.2 CIM_ComputerSystem	Mandatory	The hosting system for the Storage Elements. Associated to RegisteredProfile.
30.6.3 CIM_ComputerSystemPackage	Mandatory	DSP1004 version 1.0.1, section 10.2.
30.6.4 CIM_ElementCapabilities	Optional	See DSP1052 version 1.0.3, section 10.2.
30.6.5 CIM_EnabledLogicalElementCapabilities	Optional	See DSP1052 version 1.0.3, section 10.3 and DSP1004 version 1.0.1, section 10.2.
30.6.6 CIM_HostedService	Optional	See DSP1052 version 1.0.3, section 10.4.
30.6.7 CIM_PhysicalPackage	Mandatory	DSP1004 version 1.0.1, section 10.4 and DSP1011 version 1.0.2, section 10.16.
30.6.8 CIM_ServiceAffectsElement	Optional	See DSP1052 version 1.0.3, section 10.5.
30.6.9 CIM_TimeService	Optional	Experimental. See DSP1052 version 1.0.3, section 10.6.

30.6.2 CIM_ComputerSystem

The hosting system for the Storage Elements. The class definition specializes the CIM_ComputerSystem definition in the Base Server profile. Properties or methods not inherited are marked accordingly as '(overridden)' or '(added)' in the left most column.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Shall be associated to RegisteredProfile using ElementConformsToProfile association. The RegisteredProfile instance shall have RegisteredName set to 'Base Server', RegisteredOrganization set to 'SNIA', and RegisteredVersion set to '1.6.0'.

Table 299 describes class CIM_ComputerSystem.

Table 299 - SMI Referenced Properties/Methods for CIM_ComputerSystem

Properties	Flags	Requirement	Description & Notes
CreationClassName		Mandatory	Key.
Name (overridden)		Mandatory	Unique identifier for the hosting system.
ElementName (overridden)		Mandatory	User friendly name.
OtherIdentifyingInfo (overridden)		Mandatory	
IdentifyingDescriptions		Optional	Required when OtherIdentifyingInfo is 1. See DSP1052 version 1.0.3, section 10.1.
Dedicated (overridden)		Mandatory	0 (Not Dedicated).

Table 299 - SMI Referenced Properties/Methods for CIM_ComputerSystem

Properties	Flags	Requirement	Description & Notes
OperationalStatus		Mandatory	See DSP1052 version 1.0.3, section 10.1.
HealthState		Mandatory	See DSP1052 version 1.0.3, section 10.1.
EnabledState		Mandatory	See DSP1052 version 1.0.3, section 10.1 and DSP1004 version 1.0.1, section 10.1.
RequestedState		Mandatory	See DSP1052 version 1.0.3, section 10.1 and DSP1004 version 1.0.1, section 10.1.
NameFormat (added)		Mandatory	
OtherDedicatedDescriptions (added)		Optional	
RequestStateChange()		Conditional	Conditional requirement: The CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property contains at least one value. See DSP1052 version 1.0.3, section 10.1.

30.6.3 CIM_ComputerSystemPackage

One or more instances of CIM_ComputerSystemPackage associate the CIM_ComputerSystem instance with the CIM_PhysicalPackage instances in which it resides. The constraints specified in this table are in addition to those specified in the Physical Asset Profile (DMTF DSP1011 Physical Asset Profile 1.0.2).

Requirement: Mandatory

Table 300 describes class CIM_ComputerSystemPackage.

Table 300 - SMI Referenced Properties/Methods for CIM_ComputerSystemPackage

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to PhysicalPackage
Dependent		Mandatory	Reference to ComputerSystem

30.6.4 CIM_ElementCapabilities

CIM_ElementCapabilities associates an instance of CIM_EnabledLogicalElementCapabilities with an instance of CIM_ComputerSystem.

Requirement: Optional

Table 301 describes class CIM_ElementCapabilities.

Table 301 - SMI Referenced Properties/Methods for CIM_ElementCapabilities

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	This property shall be a reference to an instance of CIM_ComputerSystem.
Capabilities		Mandatory	This property shall be a reference to the instance of CIM_EnabledLogicalElementCapabilities.

30.6.5 CIM_EnabledLogicalElementCapabilities

CIM_EnabledLogicalElementCapabilities indicates support for managing the state of the system.

Requirement: Optional

Table 302 describes class CIM_EnabledLogicalElementCapabilities.

Table 302 - SMI Referenced Properties/Methods for CIM_EnabledLogicalElementCapabilities

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	Key.
RequestedStatesSupported		Mandatory	See DSP1052 version 1.0.3, section 10.3 and DSP1004 version 1.0.1, section 10.3.
ElementNameEditSupported		Mandatory	See DSP1052 version 1.0.3, section 10.3.
MaxElementNameLen		Optional	See DSP1052 version 1.0.3, section 10.3.

30.6.6 CIM_HostedService

CIM_HostedService relates the CIM_TimeService to its scoping CIM_ComputerSystem instance.

Requirement: Optional

Table 303 describes class CIM_HostedService.

Table 303 - SMI Referenced Properties/Methods for CIM_HostedService

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	This property shall reference the Central Instance.
Dependent		Mandatory	This property shall reference TimeService.

30.6.7 CIM_PhysicalPackage

One or more instances of CIM_PhysicalPackage represent the physical packaging of the computer system. Other than the existence of at least one instance of CIM_PhysicalPackage, this profile does not specify any constraints for CIM_PhysicalPackage beyond those specified in the Physical Asset Profile.

Requirement: Mandatory

Table 304 describes class CIM_PhysicalPackage.

Table 304 - SMI Referenced Properties/Methods for CIM_PhysicalPackage

Properties	Flags	Requirement	Description & Notes
Tag		Mandatory	Key.
CreationClassName		Mandatory	Key.
PackageType		Mandatory	See DSP1011 version 1.0.2, section 10.16.
Manufacturer		Conditional	Conditional requirement: The CIM_PhysicalAssetCapabilities.FRUInfoSupported has a value of TRUE. See DSP1011 version 1.0.2, section 10.16.

Table 304 - SMI Referenced Properties/Methods for CIM_PhysicalPackage

Properties	Flags	Requirement	Description & Notes
Model		Conditional	Conditional requirement: The CIM_PhysicalAssetCapabilities.FRUInfoSupported has a value of TRUE. See DSP1011 version 1.0.2 section 10.16.
SerialNumber		Conditional	Conditional requirement: The CIM_PhysicalAssetCapabilities.FRUInfoSupported has a value of TRUE. See DSP1011 version 1.0.2, section 10.16.
PartNumber		Conditional	Conditional requirement: The CIM_PhysicalAssetCapabilities.FRUInfoSupported has a value of TRUE. See DSP1011 version 1.0.2, section 10.16.
SKU		Conditional	Conditional requirement: The CIM_PhysicalAssetCapabilities.FRUInfoSupported has a value of TRUE. See DSP1011 version 1.0.2, section 10.16.
VendorCompatibilityStrings		Optional	See DSP1011 version 1.0.2, section 10.16.
CanBeFRUed		Optional	This property should be implemented when the Physical Element can be replaced in the field.
Version		Optional	The property shall be the hardware version.
Name		Optional	
ElementName		Mandatory	This property shall be formatted as a free-form string of variable length.

30.6.8 CIM_ServiceAffectsElement

CIM_ServiceAffectsElement associates the CIM_TimeService instance with the Central Instance.

Requirement: Optional

Table 305 describes class CIM_ServiceAffectsElement.

Table 305 - SMI Referenced Properties/Methods for CIM_ServiceAffectsElement

Properties	Flags	Requirement	Description & Notes
ElementEffects		Mandatory	Matches 5 (Manages).
AffectedElement		Mandatory	This property shall be a reference to the Central Instance.
AffectingElement		Mandatory	This property shall be a reference to an instance of CIM_TimeService.

30.6.9 CIM_TimeService

Experimental: CIM_TimeService manages the current time on the system.

Requirement: Optional

Table 306 describes class CIM_TimeService.

Table 306 - SMI Referenced Properties/Methods for CIM_TimeService

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	Key.
SystemName		Mandatory	Key.
CreationClassName		Mandatory	Key.
Name		Mandatory	Key.
ElementName		Mandatory	See DSP1052 version 1.0.3, section 10.6.
ManageTime()		Mandatory	See DSP1052 version 1.0.3, section 10.6.

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31 Media Access Device Profile

31.1 Synopsis

Profile Name: Media Access Device (Component Profile)

Version: 1.7.0

Organization: SNIA

Central Class: MediaAccessDevice

Scoping Class: ComputerSystem

Related Profiles: Table 307 describes the related profiles for Media Access Device.

Table 307 - Related Profiles for Media Access Device

Profile Name	Organization	Version	Requirement	Description
Software Inventory	SNIA	1.0.0	Mandatory	
Software Update	DMTF	1.0.0	Optional	See DSP1025, version 1.0.0
Indications	DMTF	1.2.2	Optional	See DSP1054, version 1.2.2

The Media Access Device Profile models media access devices - such as tape and CD drives.

31.2 Description

31.2.1 Overview

The Media Access Device Profile models media access devices - such as tape and CD drives.

31.2.2 Location Indicator

The implementation may optionally support a drive location indicator (such as an LED) using CIM_MediaAccessDevice.LocationIndicator. The client may set this to 2 (On) or 3 (Off). If the implementation does not support this feature, LocationIndicator shall have the value 4 (Not Supported).

31.2.3 Media Access Device Online/Offline

The drive may be started or stopped by setting the Starting and Stopping values in OperationalStatus using the RequestStateChange method. Figure 44 shows Media Access Device Class information.

See Table 308.

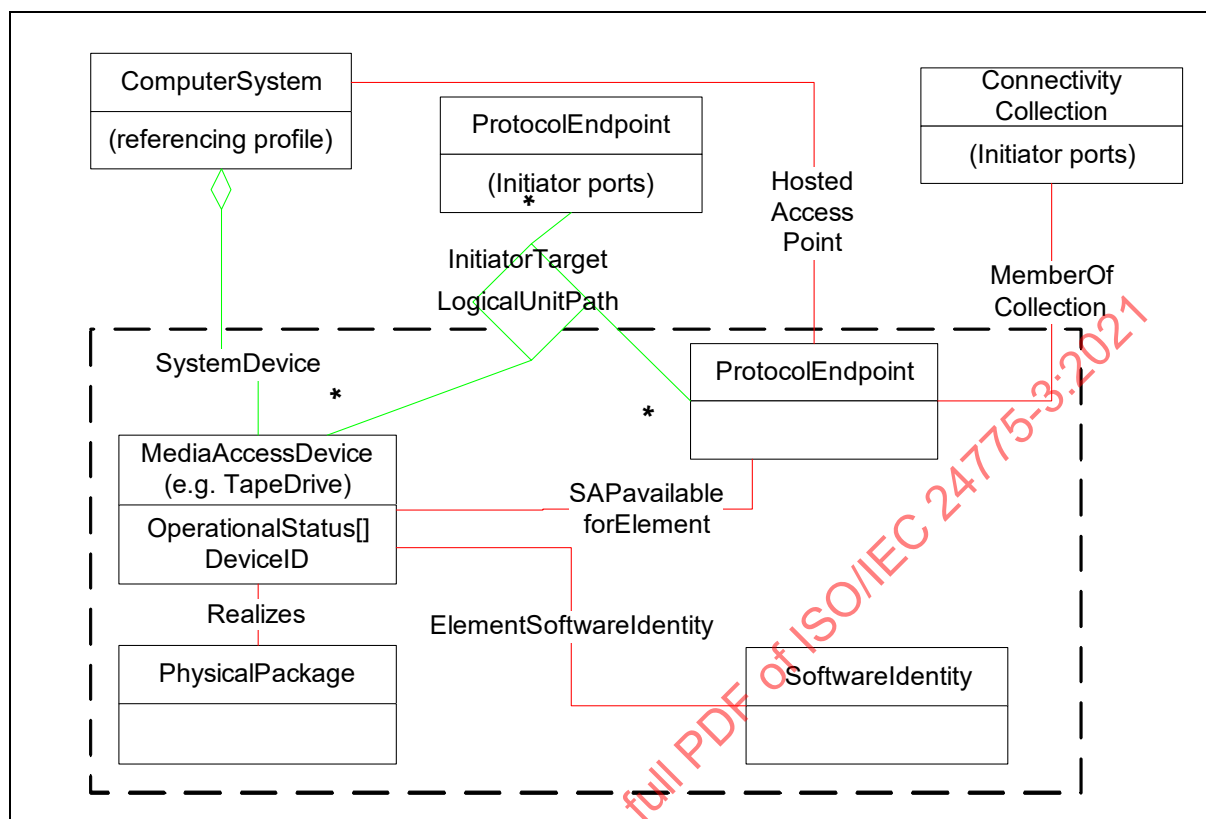


Figure 44 - Media Access Device Class Diagram

31.3 Implementation

31.3.1 Health and Fault Management Consideration

The MediaAccessDevice.OperationalStatus contains the overall status of the disk, summarized in Table 308.

Table 308 - OperationalStatus For MediaAccessDevice

Primary Operational Status	Subsidiary Operational Status	Description
2 "OK"		Media Access Device is enabled.
5 "Predictive Failure"		Media Access Device is functionality nominally but is predicting a failure
6 "Error"		Media Access Device is no longer functioning.
8 "Starting"		Media Access Device is becoming enabled.
9 "Stopping"		Media Access Device is being disabled.
10 "Stopped"		Media Access Device is disabled.

31.3.2 Cascading Considerations

Not defined in this document.

31.3.3 Hot swap insertion or Removal of Drives

Insertion of a drive shall cause an InstCreation indication for the MediaAccessDevice instance. Similarly, hot-swap removal shall cause an InstDelete indication. ProtocolEndpoint, PhysicalPackage, SoftwareInventory, and related associations will also be created and deleted when a drive is inserted or removed, but no indications shall be produced for these other classes.

31.4 Methods

31.4.1 Request State Change

```
uint32 RequestStateChange(
    [In] uint16 RequestedState,
    [Out] CIM_ConcreteJob REF Job,
    [In] datetime TimeoutPeriod)
```

The allowed state changes are indicated by the RequestedStatesSupported property of EnabledLogicalElementCapabilities. A Job shall be returned if the operation takes longer than the TimeoutPeriod. The Requested State of Offline makes a drives extents unavailable to the dependent volume.

The Job may represent a drive rebuild if the RequestedState of the drive is Offline and a failover shall be complete before the offline operation can finish.

31.5 Use Cases

Not defined in this document.

31.6 CIM Elements

31.6.1 Overview

Table 309 describes the CIM elements for Media Access Device.

Table 309 - CIM Elements for Media Access Device

Element Name	Requirement	Description
31.6.2 CIM_EnabledLogicalElementCapabilities	Mandatory	
31.6.3 CIM_HostedAccessPoint	Optional	ComputerSystem to storage ProtocolEndpoint.
31.6.4 CIM_MediaAccessDevice	Mandatory	Represents a tape or optical drive.
31.6.5 CIM_PhysicalPackage	Optional	The physical aspects of the drive. This is required when modeling physical drives and shall not be implemented for virtual drives in virtual system environments.
31.6.6 CIM_ProtocolEndpoint	Optional	
31.6.7 CIM_Realizes	Mandatory	Associates MediaAccessDevice and PhysicalPackage.
31.6.8 CIM_SAPAvailableForElement	Conditional	Conditional requirement: Support for ProtocolEndpoints. Associates MediaAccessDevice to ProtocolEndpoint.
31.6.9 CIM_SystemDevice	Mandatory	ComputerSystem to MediaAccessDevice.
31.6.10 CIM_ElementCapabilities	Mandatory	Associates an instance of CIM_EnabledLogicalElementCapabilities to an instance of CIM_MediaAccessDevice.

Table 309 - CIM Elements for Media Access Device

Element Name	Requirement	Description
SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_MediaAccessDevice	Optional	MediaAccessDevice Creation. See 31.3.3 Hot swap insertion or Removal of Drives.
SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_MediaAccessDevice	Optional	MediaAccessDevice Removal. See 31.3.3 Hot swap insertion or Removal of Drives.

31.6.2 CIM_EnabledLogicalElementCapabilities

Requirement: Mandatory

Table 310 describes class CIM_EnabledLogicalElementCapabilities.

Table 310 - SMI Referenced Properties/Methods for CIM_EnabledLogicalElementCapabilities

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	Key
RequestedStatesSupported		Mandatory	Possible states that can be requested when using the method RequestStateChange(). If RequestState and RequestStateChange are not implemented then RequestedStatesSupported would indicate none supported.

31.6.3 CIM_HostedAccessPoint

ComputerSystem to storage ProtocolEndpoint.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 311 describes class CIM_HostedAccessPoint.

Table 311 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to ComputerSystem
Dependent		Mandatory	Reference to ProtocolEndpoint

31.6.4 CIM_MediaAccessDevice

Represents a tape or optical drive.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 312 describes class CIM_MediaAccessDevice.

Table 312 - SMI Referenced Properties/Methods for CIM_MediaAccessDevice

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
DeviceID		Mandatory	
Name		Mandatory	
OperationalStatus		Mandatory	Shall be 2 5 6 8 10 11 (Okay or Predictive Failure or Error or Starting or Stopping or Stopped).
LocationIndicator		Mandatory	
EnabledState		Mandatory	Possible values: 2 (Enabled - drive is Spun up and online), 3 (Disabled - drive is spun down, and offline), 4 (Shutting down - drive is spinning down), 6 (Enabled but Offline - drive is spun up but offline), 10 (Starting - drive is spinning up).
RequestedState		Optional	Possible RequestedStates: 2 Enabled (Spin up drive if it was spun down and Online the drive if it was offline), 4 (Shut down - spin down drive), 6 (Offline - offline drive).
RequestStateChange()		Conditional	Conditional requirement: Support for online/offline.

31.6.5 CIM_PhysicalPackage

The physical aspects of the drive.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 313 describes class CIM_PhysicalPackage.

Table 313 - SMI Referenced Properties/Methods for CIM_PhysicalPackage

Properties	Flags	Requirement	Description & Notes
CreationClassName		Mandatory	
Manufacturer		Mandatory	The name of the organization responsible for producing the PhysicalElement.
Model		Mandatory	The name by which the PhysicalElement is generally known.
Version		Mandatory	The version of the physical element - not necessarily the same as a software/firmware version.
SerialNumber		Mandatory	
PartNumber		Mandatory	

31.6.6 CIM_ProtocolEndpoint

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 314 describes class CIM_ProtocolEndpoint.

Table 314 - SMI Referenced Properties/Methods for CIM_ProtocolEndpoint

Properties	Flags	Requirement	Description & Notes
SystemCreationClassName		Mandatory	
SystemName		Mandatory	
CreationClassName		Mandatory	
Name		Mandatory	

31.6.7 CIM_Realizes

Associates MediaAccessDevice and PhysicalPackage.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 315 describes class CIM_Realizes.

Table 315 - SMI Referenced Properties/Methods for CIM_Realizes

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Reference to PhysicalPackage
Dependent		Mandatory	Reference to MediaAccessDevice

31.6.8 CIM_SAPAvailableForElement

Associates MediaAccessDevice to ProtocolEndpoint.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for ProtocolEndpoints.

Table 316 describes class CIM_SAPAvailableForElement.

Table 316 - SMI Referenced Properties/Methods for CIM_SAPAvailableForElement

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	Reference to MediaAccessDevice
AvailableSAP		Mandatory	Reference to ProtocolEndpoint

31.6.9 CIM_SystemDevice

ComputerSystem to MediaAccessDevice.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 318 describes class CIM_SystemDevice.

Table 317 - SMI Referenced Properties/Methods for CIM_SystemDevice

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	Reference to ComputerSystem
PartComponent		Mandatory	Reference to MediaAccessDevice

31.6.10 CIM_ElementCapabilities

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 318 describes class CIM_ElementCapabilities.

Table 318 - SMI Referenced Properties/Methods for CIM_ElementCapabilities

Properties	Flags	Requirement	Description & Notes
Capabilities		Mandatory	The enabled logical element capabilities instance associated with the media access device instance.
ManagedElement		Mandatory	The media access device instance.

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32 Storage Enclosure Profile

32.1 Synopsis

Profile Name: Storage Enclosure (Component Profile)

Version: 1.7.0

Organization: SNIA

Central Class: Chassis

Scoping Class: ComputerSystem

Specialized: DMTF Physical Asset Profile

Related Profiles: Table 319 describes the related profiles for Storage Enclosure.

Table 319 - Related Profiles for Storage Enclosure

Profile Name	Organization	Version	Requirement	Description
Power Supply	SNIA	1.0.1	Optional	Experimental.
Fan	SNIA	1.5.0	Optional	Experimental.
Sensors	SNIA	1.5.0	Optional	Experimental.
Disk Drive Lite	SNIA	1.7.0	Optional	
Media Access Device	SNIA	1.7.0	Optional	
Switch	SNIA	1.6.0	Optional	

The Storage Enclosure Profile describes an enclosure that houses storage components.

32.2 Description

32.2.1 Overview

The Storage Enclosure Profile describes an enclosure that contains storage elements (e.g., disk or tape drives) and enclosure elements (e.g., fans and power supplies). The logical aspects of the storage and enclosure elements are defined in other profiles; this profile specializes the DMTF Physical Asset Profile adding implementation details for storage enclosures. This profile supports enclosures with a single type of storage component (such as an enclosure of disks) or a mixture of different components.

The following terms apply to this profile:

- **storage elements** are CIM logical classes that relate to storage - CIM_DiskDrive, CIM_ComputerSystem (representing a disk array or switch), etc.
- **enclosure elements** are CIM logical elements that relate to enclosure service and baseboard management - fans, power supplies, sensors, etc.
- **physical elements** are CIM physical classes that map to storage or enclosure elements, and perhaps physical hardware with no logical mapping.

32.2.2 Guidelines related to Referencing Profiles

32.2.2.1 Overview

The Storage Enclosure Profile is a component profile. The autonomous referencing profile may be Array, Storage Virtualizer, or Host Hardware RAID controller. The following guidelines apply to how this profile is referenced by other profiles:

32.2.2.2 Guideline 1 - enclosure elements dedicated to a single top-level system

If the components of the enclosure are all dedicated to a single top-level System, then the profile defining that system shall be the referencing profile for the enclosure. All components (storage elements, enclosure elements, physical elements) need to be dedicated. For example, if the enclosure is used by a disk array, the CIM_ComputerSystem from the Array profile serves as the scoping instance for all the elements of the enclosure.

Note that the top-level system may be part of an autonomous profile that supports the SNIA Multiple Computer System Profile.

Note that other autonomous profiles may be dedicated as a component of another autonomous profile. For example, a Fibre Channel switch may share an enclosure with, and be dedicated as, a component of an Array.

32.2.2.3 Guideline 2 - enclosure elements shared by multiple top-level systems

If the elements of the enclosure support use by multiple top-level systems, then the referencing profile shall be the Base Server profile.

Examples include a JBOD array access by multiple servers or multiple switch blades sharing an enclosure.

32.2.2.4 Guideline 3 - enclosure elements need not be scoped by the system as storage elements

CIM requires instantiation of all weak associations whenever the referenced elements are instantiated. For example, every CIM_LogicalDevice instance shall be referenced by a CIM_SystemDevice association. But it is possible to have devices scope to different systems associated to each other by non-weak associations. In particular, when guideline 2 applies, enclosure elements scoped to the enclosure top-level system may be associated to storage elements scoped to a different top-level system. For example, CIM_AssociatedCooling can reference a CIM_Fan scoped to the enclosure system and a CIM_DiskDrive scoped to a server. In another example, CIM_SuppliesPower references a CIM_PowerSupply scoped to an Array within an enclosure and a CIM_ComputerSystem representing a switch.

Figure 45 is an example of two arrays that each have their own enclosure but share cooling. The two array enclosures are contained in an enclosure that provides a fan shared by the array elements.

Enclosure Dedicated to a Disk Array

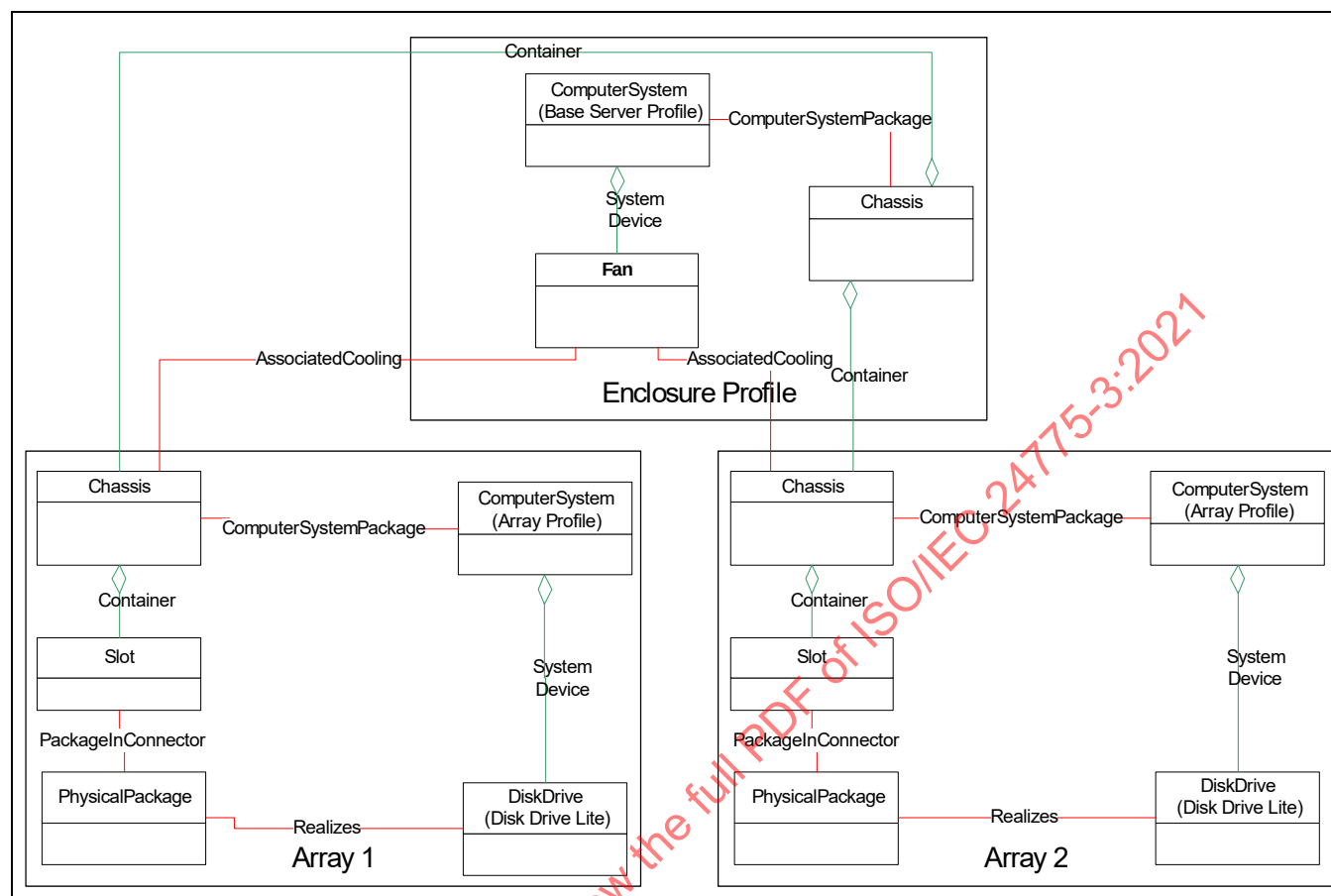


Figure 45 – Enclosure with Two Arrays

32.2.3 Examples of Storage Enclosure Configurations

32.2.3.1 Enclosure Dedicated to a Disk Array

The referencing profile is Array. Disk Drive Lite is a mandatory component profile. The physical model for disks as defined in 32.3.5.3 is mandatory.

32.2.3.2 Enclosure Dedicated to a RAID Host Controller

The referencing profile is the Host Hardware RAID Profile. Support for the Disk Drive Lite Profile is mandatory. The physical model for disks as defined in 32.3.5.3 is mandatory.

32.2.3.3 Enclosure Dedicated to non-RAID Controllers on a Single Server

The referencing profile is the Base Server Profile referencing the Storage HBA Profile (or the FC HBA Profile).

32.2.3.4 Enclosure Dedicated to non-RAID Controllers on Multiple Servers

Guideline 2 applies. The referencing profile is the Base Server profile.

Guideline 3 may apply.

32.2.3.5 FC Switch as a Component of an Array

The Array and FC Switch share an enclosure, but the FC Switch is functionally a sub-component of the array receiving cooling and power from the enclosure. In this configuration, Array is the referencing profile to the Storage Enclosure. Guideline 3 may apply;

32.2.3.6 Enclosure containing multiple FC Switches (Director)

The enclosure is a director class switch which contains one or more switches and other devices including a FCIP Extenders and iSCSI Gateway. The referencing profile is the Base Server profile. Guideline 2 applies. Guideline 3 may apply.

32.3 Implementation

32.3.1 Health and Fault Management Consideration

Not defined in this document.

32.3.2 Cascading Considerations

Not defined in this document.

32.3.3 Enclosure Elements

32.3.3.1 Power Supplies

A storage enclosure may be modeled with one or more power supplies for device powering.

The CIM_SystemDevice association is used in the Power Supply Profile to connect the power supply to the managed system. The CIM_SuppliesPower association may be used to represent device powering to other enclosure elements of the top-level system as well as logical devices scoped to other systems.

32.3.3.2 Fans

A storage enclosure may be modeled with one or more fans for device cooling.

The CIM_SystemDevice association is used in the Fan Profile to connect the fan to the managed system. The CIM_AssociatedCooling association may be used to represent device powering to other enclosure elements of the top-level system as well as logical devices scoped to other systems.

32.3.3.3 Sensors

A storage enclosure may be modeled with one or more sensors for monitoring such factors as temperature or fan speed.

The CIM_SystemDevice association is used in the Sensors Profile to connect the sensor to the managed system. The CIM_AssociatedSensor association may be used to associate the sensor to other enclosure elements of the top-level system as well as logical devices scoped to other systems.

32.3.4 Storage Elements

32.3.4.1 Considerations for Media Access Devices in a Storage Enclosure

A storage enclosure may contain devices such as disk drives or switches. Each media access device is described by a corresponding device class as described in the corresponding profile. Each device may be associated to a physical bay or slot. The physical model for a disk drive describes a CIM_MediaAccessDevice associated to CIM_PhysicalPackage via CIM_Realizes, and CIM_Slot associated to the CIM_PhysicalPackage via CIM_PackageInConnector. If the implementation also supports hierarchical packaging, the CIM_Slot shall be associated to the CIM_PhysicalPackage realizing the referencing system or an enclosure nested in the system CIM_PhysicalPackage.

32.3.4.2 Disk Drive Considerations

If the implementation also supports the Disk Drive Lite Profile, the individual drives in the storage enclosure shall be described by an instance of CIM_DiskDrive subclassed from CIM_MediaAccessDrive. CIM_PhysicalPackage and CIM_Realizes from the Disk Drive Lite Profile shall provide the instances described in 32.3.4.1.

32.3.4.3 Media Access Devices and the Fan Profile

The Fan Profile describes fans used for device cooling and includes an AssociatedCooling association that references a CIM_ManagedSystemElement. If the implementation supports both the Fan and Disk Drive Lite Profiles, and utilizes the CIM_AssociatedCooling association, the CIM_AssociatedCooling association shall reference an instance of CIM_DiskDrive or an instance of CIM_Chassis.

32.3.4.4 Media Access Devices and the Power Supply Profile

The Power Supply Profile describes power supplies used for device powering and includes a CIM_SuppliesPower association that references a CIM_LogicalDevice. If the implementation supports both the Fan and Disk Drive Lite Profiles, and utilizes the CIM_SuppliesPower association, the CIM_SuppliesPower association shall reference an instance of CIM_DiskDrive or an instance of CIM_Chassis.

32.3.4.5 Configuration Reporting Service

The CIM_ConfigurationReportingService may be used to query for the CIM_MediaAccessDevice or CIM_LogicalPort subclasses supported within the enclosure, the supported total count and the currently installed count. In this way the total number of supported device slots, storage devices or connection ports may be retrieved. See the service method definitions in 32.4.1.

32.3.5 Physical Assets

32.3.5.1 Overview

The physical representation of the storage enclosure is mandatory. The core frame of the storage enclosure is described by CIM_Chassis.

32.3.5.2 Physical Package Hierarchy Considerations

A hierarchy of enclosures may be represented. The physical structure of a single enclosure, described by CIM_Chassis, may be associated with a variety of enclosure components and media devices. Any number of CIM_Packages may be used to group physical components. These packages may in turn be associated to one or more CIM_Chassis instances. In this case the CIM_PackageInChassis association shall be used.

32.3.5.3 Disk Drive or Media Access Device

If the implementation models slots within the enclosure, CIM_Slot shall be used to describe the slot. The instance of CIM_PhysicalPackage that describes the physical characteristics of the CIM_DiskDrive instance shall be associated to CIM_Slot by the CIM_PackageInConnector association. If the instance of

CIM_Slot is aggregated to an instance of CIM_Chassis, the CIM_ConnectorOnPackage association shall be used. Figure 46 illustrates the model.

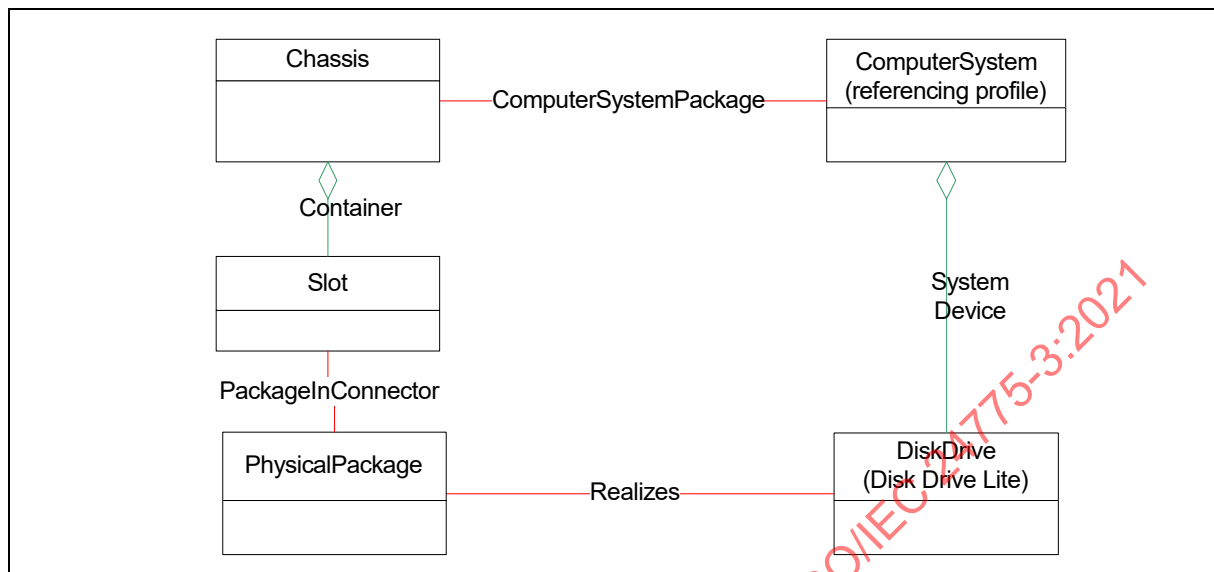


Figure 46 - Model for Disk in Enclosure

32.4 Methods

32.4.1 Extrinsic Methods of the Profile

32.4.1.1 CIM_ConfigurationReportingService GetClassTypes

GetClassTypes is used to query for the supported or currently installed device classes contained in the enclosure such as a CIM_DiskDrive or CIM_SASPort. Reporting of MediaAccessDevice derived classes directly contained within the enclosure (Recursive = False) is mandatory. Reporting of LogicalPort derived classes is optional.

The instrumentation shall support InquiryType parameter values of 2 (Supports) and 3 (Installed).

The instrumentation shall support a Recursive parameter value of false.

The instrumentation shall accept a reference to the top-level ComputerSystem in the Target parameter.

32.4.1.2 CIM_ConfigurationReportingService GetUnitTypes

GetUnitTypes is used to query for the supported or currently installed type of devices contained in the enclosure.

The instrumentation shall support InquiryType parameter values of 2 (Supports) and 3 (Installed).

The instrumentation shall support a Recursive parameter value of false.

The parameter UnitTypes may be set to "Contained", "StorageMediaLocation", "Front Side" or "Back Side". Support of the type "Contained" and "StorageMediaLocation" is mandatory. Support of "Front Side" or "Back Side" is optional. Types "Front Side" or "Back Side" are used to query for the count of the respective LogicalPorts.

32.4.1.3 CIM_ConfigurationReportingService ReportCapacity

ReportCapacity is used after GetClassTypes or GetUnitTypes is issued to find what subclasses and types are available in the enclosure, the ReportCapacity can be used to request the total supported or currently installed storage device slot count or data connection ports for the enclosure.

The instrumentation shall support InquiryType parameter values of 2 (Supports) and 3 (Installed).

The instrumentation shall support a Recursive parameter value of false.

32.4.2 Intrinsic Methods of this Profile

The profile supports read methods and association traversal. Specifically, the list of intrinsic operations supported are as follows:

- GetInstance
- Associators
- AssociatorNames
- References
- ReferenceNames
- EnumerateInstances
- EnumerateInstanceNames

32.5 Use Cases

Not defined in this document

32.6 CIM Elements**32.6.1 Overview**

Table 320 describes the CIM elements for Storage Enclosure.

Table 320 - CIM Elements for Storage Enclosure

Element Name	Requirement	Description
32.6.2 CIM_Card	Optional	CIM_Card is used to represent the card and its FRU data.
32.6.3 CIM_Chassis	Mandatory	The Chassis for the storage enclosure.
32.6.4 CIM_Chip	Optional	CIM_Chip is used to represent the chip and its FRU data.
32.6.5 CIM_ComputerSystemPackage	Mandatory	Associates a system and the Storage Enclosure Chassis.
32.6.6 CIM_ConfigurationCapacity	Optional	
32.6.7 CIM_ConfigurationReportingService	Mandatory	
32.6.8 CIM_ConnectedTo	Optional	
32.6.9 CIM_Container	Optional	CIM_Container is used to associate a Physical Package with Physical Elements representing the physical elements that reside within the package.
32.6.10 CIM_ElementCapabilities	Conditional	Conditional requirement: Support for a PhysicalAssetCapabilities instance.

Table 320 - CIM Elements for Storage Enclosure

Element Name	Requirement	Description
32.6.11 CIM_ElementCapacity	Conditional	Conditional requirement: Support for a ConfigurationCapacity instance.
32.6.12 CIM_HostedService	Mandatory	Associates the CIM_ConfigurationReportingService to the System in the referencing profile.
32.6.13 CIM_PackageInConnector	Optional	CIM_PackageInConnector is used to associate a CIM_PhysicalConnector or CIM_Slot instance, representing the connector or slot, with Physical Packages.
32.6.14 CIM_PhysicalAssetCapabilities	Optional	
32.6.15 CIM_PhysicalComponent	Optional	CIM_PhysicalComponent is used to represent any physical element that cannot be further decomposed, such as ASIC or tape, and its FRU data.
32.6.16 CIM_PhysicalConnector	Optional	CIM_PhysicalConnector is used to represent the physical connector.
32.6.18 CIM_PhysicalFrame	Optional	CIM_PhysicalFrame is used to represent the frame and its FRU data.
32.6.19 CIM_PhysicalMemory	Optional	CIM_PhysicalMemory is used to represent the physical memory and its FRU data.
32.6.20 CIM_PhysicalPackage	Mandatory	For the Storage Enclosure Profile, this is CIM_Chassis. See CIM_Chassis.
32.6.21 CIM_Rack	Optional	CIM_Rack is used to represent the rack and its FRU data.
32.6.22 CIM_Realizes	Optional	
32.6.23 CIM_Slot	Optional	CIM_Slot is used to represent the slot and its FRU data.
32.6.24 CIM_SystemPackaging	Optional	Associates a system and its physical components. The ComputerSystemPackage subclass should be used if the referenced system is subclassed as ComputerSystem.

32.6.2 CIM_Card

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 321 describes class CIM_Card.

Table 321 - SMI Referenced Properties/Methods for CIM_Card

Properties	Flags	Requirement	Description & Notes
Tag		Mandatory	
CreationClassName		Mandatory	
HostingBoard		Mandatory	
PackageType		Mandatory	

Table 321 - SMI Referenced Properties/Methods for CIM_Card

Manufacturer		Conditional	Conditional requirement: FRU Info.
Model		Conditional	Conditional requirement: FRU Info.
SerialNumber		Conditional	Conditional requirement: FRU Info.
PartNumber		Conditional	Conditional requirement: FRU Info.
SKU		Conditional	Conditional requirement: FRU Info.
CanBeFRUed		Optional	
VendorCompatibilityStrings		Mandatory	
ElementName		Mandatory	

32.6.3 CIM_Chassis

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 322 describes class CIM_Chassis.

Table 322 - SMI Referenced Properties/Methods for CIM_Chassis

Properties	Flags	Requirement	Description & Notes
Tag		Mandatory	
CreationClassName		Mandatory	
PackageType		Mandatory	Shall be 3 (Chassis/Frame).
ChassisPackageType		Mandatory	
Manufacturer		Conditional	Conditional requirement: FRU Info.
Model		Conditional	Conditional requirement: FRU Info.
SerialNumber		Conditional	Conditional requirement: FRU Info.
PartNumber		Conditional	Conditional requirement: FRU Info.
SKU		Conditional	Conditional requirement: FRU Info.
CanBeFRUed		Optional	should be implemented when the PhysicalElement can be field replaced.
VendorCompatibilityStrings		Mandatory	
ElementName		Mandatory	

32.6.4 CIM_Chip

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 323 describes class CIM_Chip.

Table 323 - SMI Referenced Properties/Methods for CIM_Chip

Properties	Flags	Requirement	Description & Notes
Tag		Mandatory	
CreationClassName		Mandatory	
Manufacturer		Conditional	Conditional requirement: FRU Info.
Model		Conditional	Conditional requirement: FRU Info.
SerialNumber		Conditional	Conditional requirement: FRU Info.
PartNumber		Conditional	Conditional requirement: FRU Info.
SKU		Conditional	Conditional requirement: FRU Info.
CanBeFRUed		Optional	
ElementName		Mandatory	

32.6.5 CIM_ComputerSystemPackage

CIM_ComputerSystemPackage is used to associate CIM_ComputerSystem, representing the managed system, with a System Chassis.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for a Chassis instance.

Table 324 describes class CIM_ComputerSystemPackage.

Table 324 - SMI Referenced Properties/Methods for CIM_ComputerSystemPackage

Properties	Flags	Requirement	Description & Notes
PlatformGUID		Mandatory	
Antecedent		Mandatory	Shall reference the System Chassis.
Dependent		Mandatory	

32.6.6 CIM_ConfigurationCapacity

CIM_ConfigurationCapacity is used to advertise the possible configuration of a System Chassis.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 325 describes class CIM_ConfigurationCapacity.

Table 325 - SMI Referenced Properties/Methods for CIM_ConfigurationCapacity

Properties	Flags	Requirement	Description & Notes
Name		Mandatory	
ElementName		Mandatory	
ObjectType		Mandatory	
OtherTypeDescription		Conditional	Conditional requirement: ConfigurationCapacity ObjectType set to 0 (Other).\.
MinimumCapacity		Optional	
MaximumCapacity		Mandatory	
Increment		Mandatory	
VendorCompatibilityStrings		Mandatory	

32.6.7 CIM_ConfigurationReportingService

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 326 describes class CIM_ConfigurationReportingService.

Table 326 - SMI Referenced Properties/Methods for CIM_ConfigurationReportingService

Properties	Flags	Requirement	Description & Notes
ElementName		Mandatory	
Name		Mandatory	
CreationClassName		Mandatory	
GetClassTypes()		Mandatory	
GetUnitTypes()		Mandatory	
ReportCapacity()		Mandatory	

32.6.8 CIM_ConnectedTo

CIM_ConnectedTo is used to associate the CIM_PhysicalConnector or CIM_Slot instances that represent connectors that are connected together.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 327 describes class CIM_ConnectedTo.

Table 327 - SMI Referenced Properties/Methods for CIM_ConnectedTo

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	
Dependent		Mandatory	

32.6.9 CIM_Container

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 328 describes class CIM_Container.

Table 328 - SMI Referenced Properties/Methods for CIM_Container

Properties	Flags	Requirement	Description & Notes
GroupComponent		Mandatory	
PartComponent		Mandatory	

32.6.10 CIM_ElementCapabilities

CIM_ElementCapabilities is used to associate Physical Elements with the CIM_PhysicalAssetCapabilities instances that advertise the physical capabilities. CIM_ElementCapabilities shall be instantiated when an instance of CIM_PhysicalAssetCapabilities exists.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for a PhysicalAssetCapabilities instance.

Table 329 describes class CIM_ElementCapabilities.

Table 329 - SMI Referenced Properties/Methods for CIM_ElementCapabilities

Properties	Flags	Requirement	Description & Notes
ManagedElement		Mandatory	
Capabilities		Mandatory	

32.6.11 CIM_ElementCapacity

CIM_ElementCapacity is used to associate CIM_ConfigurationCapacity instances with a System Chassis.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Support for a ConfigurationCapacity instance.

Table 330 describes class CIM_ElementCapacity.

Table 330 - SMI Referenced Properties/Methods for CIM_ElementCapacity

Properties	Flags	Requirement	Description & Notes
Capacity		Mandatory	
Element		Mandatory	

32.6.12 CIM_HostedService

Associates the CIM_ConfigurationReportingService to the System in the referencing profile.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 331 describes class CIM_HostedService.

Table 331 - SMI Referenced Properties/Methods for CIM_HostedService

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	The reference to the System.
Dependent		Mandatory	The reference to the Service.

32.6.13 CIM_PackageInConnector

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 332 describes class CIM_PackageInConnector.

Table 332 - SMI Referenced Properties/Methods for CIM_PackageInConnector

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	
Antecedent		Mandatory	

32.6.14 CIM_PhysicalAssetCapabilities

CIM_PhysicalAssetCapabilities is used to advertise whether the associated instance of subclass of CIM_PhysicalElement contains FRU data.

Requirement: Optional

Table 333 describes class CIM_PhysicalAssetCapabilities.

Table 333 - SMI Referenced Properties/Methods for CIM_PhysicalAssetCapabilities

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
ElementName		Mandatory	
FRUInfoSupported		Mandatory	

32.6.15 CIM_PhysicalComponent

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 334 describes class CIM_PhysicalComponent.

Table 334 - SMI Referenced Properties/Methods for CIM_PhysicalComponent

Properties	Flags	Requirement	Description & Notes
Tag		Mandatory	
CreationClassName		Mandatory	
Manufacturer		Conditional	Conditional requirement: FRU Info.
Model		Conditional	Conditional requirement: FRU Info.
SerialNumber		Conditional	Conditional requirement: FRU Info.
PartNumber		Conditional	Conditional requirement: FRU Info.
SKU		Conditional	Conditional requirement: FRU Info.
CanBeFRUed		Optional	
ElementName		Mandatory	

32.6.16 CIM_PhysicalConnector

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 335 describes class CIM_PhysicalConnector.

Table 335 - SMI Referenced Properties/Methods for CIM_PhysicalConnector

Properties	Flags	Requirement	Description & Notes
Tag		Mandatory	
CreationClassName		Mandatory	
ConnectorLayout		Mandatory	
Manufacturer		Conditional	Conditional requirement: FRU Info.
Model		Conditional	Conditional requirement: FRU Info.
SerialNumber		Conditional	Conditional requirement: FRU Info.
PartNumber		Conditional	Conditional requirement: FRU Info.
SKU		Conditional	Conditional requirement: FRU Info.
ElementName		Mandatory	

32.6.18 CIM_PhysicalFrame

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 336 describes class CIM_PhysicalFrame.

Table 336 - SMI Referenced Properties/Methods for CIM_PhysicalFrame

Properties	Flags	Requirement	Description & Notes
Tag		Mandatory	
CreationClassName		Mandatory	
PackageType		Mandatory	
Manufacturer		Conditional	Conditional requirement: FRU Info.
Model		Conditional	Conditional requirement: FRU Info.
SerialNumber		Conditional	Conditional requirement: FRU Info.
PartNumber		Conditional	Conditional requirement: FRU Info.
SKU		Conditional	Conditional requirement: FRU Info.
VendorCompatibilityStrings		Mandatory	
ElementName		Mandatory	

32.6.19 CIM_PhysicalMemory

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 337 describes class CIM_PhysicalMemory.

Table 337 - SMI Referenced Properties/Methods for CIM_PhysicalMemory

Properties	Flags	Requirement	Description & Notes
Tag		Mandatory	
CreationClassName		Mandatory	
FormFactor		Mandatory	
MemoryType		Mandatory	
Speed		Mandatory	
Capacity		Mandatory	
BankLabel		Mandatory	
Manufacturer		Conditional	Conditional requirement: FRU Info.
Model		Conditional	Conditional requirement: FRU Info.
SerialNumber		Conditional	Conditional requirement: FRU Info.
PartNumber		Conditional	Conditional requirement: FRU Info.
SKU		Conditional	Conditional requirement: FRU Info.
CanBeFRUed		Optional	
ElementName		Mandatory	

32.6.20 CIM_PhysicalPackage

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 338 describes class CIM_PhysicalPackage.

Table 338 - SMI Referenced Properties/Methods for CIM_PhysicalPackage

Properties	Flags	Requirement	Description & Notes
Tag		Mandatory	
CreationClassName		Mandatory	
Manufacturer		Conditional	Conditional requirement: FRU Info.
Model		Conditional	Conditional requirement: FRU Info.

Table 338 - SMI Referenced Properties/Methods for CIM_PhysicalPackage

SerialNumber		Conditional	Conditional requirement: FRU Info.
PartNumber		Conditional	Conditional requirement: FRU Info.
SKU		Conditional	Conditional requirement: FRU Info.
VendorCompatibilityStrings		Mandatory	
CanBeFRUed		Optional	
ElementName		Mandatory	

32.6.21 CIM_Rack

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 339 describes class CIM_Rack.

Table 339 - SMI Referenced Properties/Methods for CIM_Rack

Properties	Flags	Requirement	Description & Notes
Tag		Mandatory	
CreationClassName		Mandatory	
TypeOfRack		Mandatory	
PackageType		Mandatory	
Manufacturer		Conditional	Conditional requirement: FRU Info.
Model		Conditional	Conditional requirement: FRU Info.
SerialNumber		Conditional	Conditional requirement: FRU Info.
PartNumber		Conditional	Conditional requirement: FRU Info.
SKU		Conditional	Conditional requirement: FRU Info.
VendorCompatibilityStrings		Mandatory	
ElementName		Mandatory	

32.6.22 CIM_Realizes

CIM_Realizes is used to associate an instance of subclass of CIM_LogicalDevice, representing the logical device, with a Physical Element.

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 340 describes class CIM_Realizes.

Table 340 - SMI Referenced Properties/Methods for CIM_Realizes

Properties	Flags	Requirement	Description & Notes
Antecedent		Mandatory	Shall reference the System Chassis.
Dependent		Mandatory	

32.6.23 CIM_Slot

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 341 describes class CIM_Slot.

Table 341 - SMI Referenced Properties/Methods for CIM_Slot

Properties	Flags	Requirement	Description & Notes
Tag		Mandatory	
CreationClassName		Mandatory	
Number		Mandatory	
ConnectorLayout		Mandatory	
Manufacturer		Conditional	Conditional requirement: FRU Info.
Model		Conditional	Conditional requirement: FRU Info.
SerialNumber		Conditional	Conditional requirement: FRU Info.
PartNumber	Antecedent		Conditional requirement: FRU Info.
SKU		Conditional	Conditional requirement: FRU Info.

Table 341 - SMI Referenced Properties/Methods for CIM_Slot

VendorCompatibilityStrings		Mandatory	
ElementName		Mandatory	

32.6.24 CIM_SystemPackaging

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Optional

Table 342 describes class CIM_SystemPackaging.

Table 342 - SMI Referenced Properties/Methods for CIM_SystemPackaging

Properties	Flags	Requirement	Description & Notes
Dependent		Mandatory	
Antecedent		Mandatory	

EXPERIMENTAL

STABLE**33 Software Profile****33.1 Synopsis****Profile Name:** Software (Component Profile)**Version:** 1.4.0**Organization:** SNIA**Central Class:** SoftwareIdentity**Scoping Class:** a ComputerSystem in a separate autonomous profile**Related Profiles:** Not defined in this document.**33.2 Description**

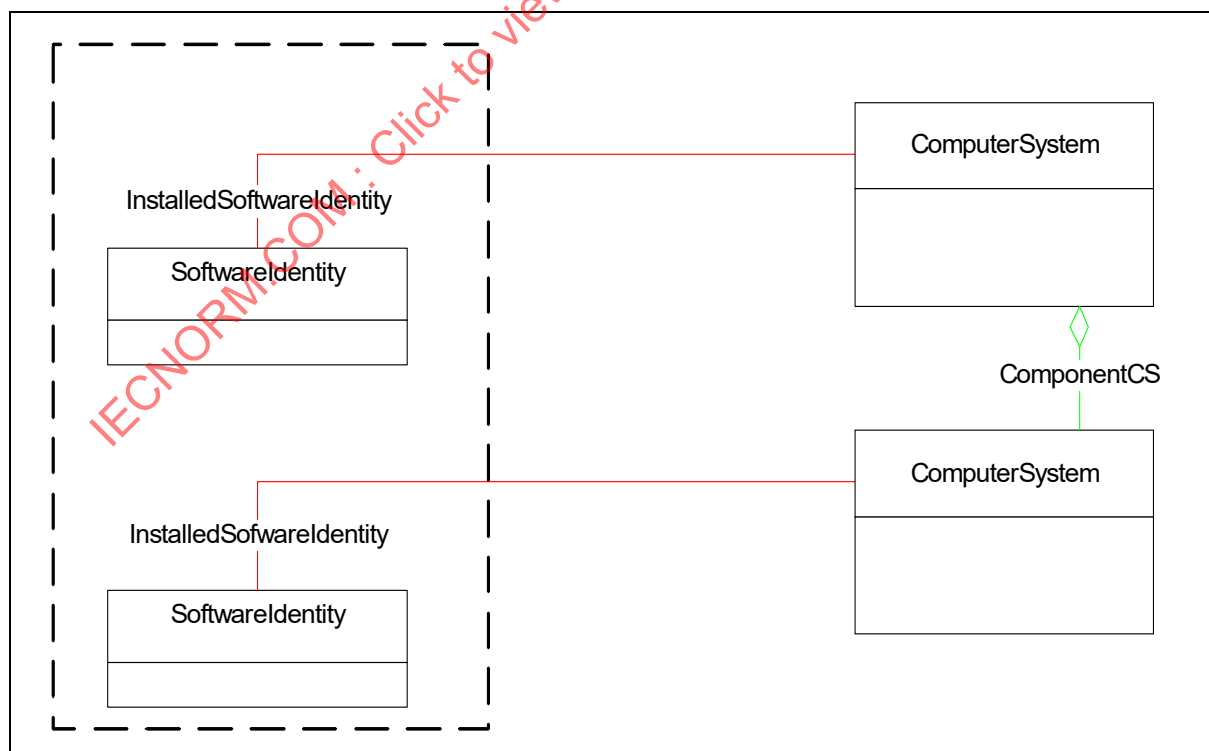
The Software Profile models software or firmware installed on a computer system.

Information on the installed software is given using the SoftwareIdentity class. This is linked to the system using a InstalledSoftwareIdentity association.

Software information may be associated with the “top” level ComputerSystem (if all components are using the same software) or a component ComputerSystem if the software loaded can vary by processor.

Firmware is modeled as SoftwareIdentity. InstalledSoftwareIdentity is used for firmware associated with a System.

Figure 47 contains the instance diagram for the Software Profile.

**Figure 47 - Software Instance Diagram**

33.3 Health and Fault Management Considerations

Not defined in this document.

33.4 Cascading Considerations

Not defined in this document.

33.5 Methods of the Profile

Not defined in this document

33.6 Use Cases

Not defined in this version of the standard.

33.7 CIM Elements**33.7.1 Overview**

Table 343 describes the CIM elements for Software.

Table 343 - CIM Elements for Software

Element Name	Requirement	Description
33.7.2 CIM_InstalledSoftwareIdentity	Mandatory	
33.7.3 CIM_SoftwareIdentity	Mandatory	

33.7.2 CIM_InstalledSoftwareIdentity

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 344 describes class CIM_InstalledSoftwareIdentity.

Table 344 - SMI Referenced Properties/Methods for CIM_InstalledSoftwareIdentity

Properties	Flags	Requirement	Description & Notes
System		Mandatory	
InstalledSoftware		Mandatory	

33.7.3 CIM_SoftwareIdentity

Created By: Static

Modified By: Static

Deleted By: Static

Requirement: Mandatory

Table 345 describes class CIM_SoftwareIdentity.

Table 345 - SMI Referenced Properties/Methods for CIM_SoftwareIdentity

Properties	Flags	Requirement	Description & Notes
InstanceID		Mandatory	
VersionString		Mandatory	
Manufacturer		Mandatory	
BuildNumber		Optional	
MajorVersion		Optional	
RevisionNumber		Optional	
MinorVersion		Optional	

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