INTERNATIONAL STANDARD

ISO/IEC 24775-6

Second edition
2021-03

Information technology — Storage management —

Part 6: **Fabric**

Reference number
ISO/IEC 24775-6:2021(E)

© ISO/IEC 2021

COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see http://patents.iec.ch).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 6 Fabric, 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 24775-6:2014), 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).

© ISO/IEC 2021 – All rights reserved

- Annex: SMI-S Information Model.
- The CIM schema version was changed to 2.51 for V1.8.0 Rev3.
- Blades Profile
  - Added descriptions for References in CIM_ProductPhysicalComponent.
  - Changed the version to 1.7.0.
- Enhanced Zoning and Enhanced Zoning Control Profile (SMI TWG Reviews)
  - Fixed the version numbers on the Related Profiles to match what the profiles claim.
- Fabric Profile
  - Corrected the Related Profile for FabricVirtualFabrics to be Virtual Fabrics.
  - Fixed the version numbers on the Related Profiles to match what the profiles claim.
  - Deleted the MemberOfCollections in the CIM Elements for the filter collections that were deleted.
  - Defined the condition for Peer Zoning in CIM_ZoneSettingData ZoneMembershipSettingData to Zone).
- Fabric Views Profile
  - In FCSwitchView changed OperationalStatus to SwitchOperationalStatus and FCPortEnabledState to PortEnabledState.
  - In ConcreteComponentView changed Antecedent and Dependent to GroupComponent and PartComponent.
  - Changed the version of the profile to 1.7.0.
  - Changed the Central Class from FCTopologyView to CIM_ViewCapabilities (TSG-SMIS-SCR00333).
- FCoE Fabric (TSG-SMIS-SCR00331)
  - Reworked the profile to be a component profile of the Fabric Profile.
  - Removed the classes associated with experimental indications.
  - Added a definition of CIM_EthernetPort (which was missing).
  - Fixed a number of mifgen warnings.
- FDMI Profile
  - Changed the version of the Profile to be 1.8.0, since we expanded the Speed enumerations
- Inter Fabric Routing Profile
  - Added a SystemDevice between the IFR Switch and the IFR FCPort.
  - Changed the Profile version to 1.7.0.
  - Changed the Central Class from ComputerSystem to CIM_ComputerSystem (IFR Switch) (TSG-SMISSCR00333).
- N Port Virtualizer Profile
  - Fixed the version numbers on the Related Profiles to match what the profiles claim.
  - Changed the Central Class from FCPort to CIM_FCPort (Fabric NPIV) (TSG-SMIS-SCR00333).

 © ISO/IEC 2021 – All rights reserved

— Switch Partitioning Profile

  — Changed the name of the profile to "Switch Partitioning" to make the spec readable.
  — Changed “must” to “shall” in a number of CIM Element tables.
  — Changed the Central Class from ComputerSystem to CIM_ComputerSystem (Partitioning) (TSG-SMISSCR00333).

— Switch Profile

  — Fixed the version numbers on the Related Profiles to match what the profiles claim.
  — Changed the version of the profile to 1.8.0, due to changes to the enumeration of the Speed property.
  — Removed the Switch Configuration Data profile from Related Profiles table, since it has been removed from the spec.
  — Changed the name of the FabricSwitchPartitioning Profile to Switch Partitioning in the Related Profiles table.
  — Changed the Requirement for CIM_ElementSettingData (FCSwitchSettings to ComputerSystem) to Mandatory, since FCSwitchSettings and the Switch are Mandatory.

— Virtual Fabrics Profile

  — Changed the name of the profile to "Virtual Fabrics" to make the spec readable.

— Zone Control Profile

  — Changed the version of the Profile to be 1.8.0, since we added two methods.

— Annex B (Informative) Structure of Fabric Profiles (TSG-SMIS-SCR00331)

  — Updated Figure B.1 to show how FCoE Fabrics fits into the structure of Fabric profiles.

— References

  — Added DMTF DSP1054 v1.2.2, Indications Profile (and changed to V1.2.2 throughout book).
  — Removed SPC-2.
  — Moved SPC-3 reference from 2.2 to 2.1.

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.

© ISO/IEC 2021 – All rights reserved

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.

© ISO/IEC 2021 – All rights reserved

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.

EXPERIMENTAL

Experimental content appears here.

EXPERIMENTAL

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.

IMPLEMENTED

Implemented content appears here.

IMPLEMENTED

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

© ISO/IEC 2021 – All rights reserved

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

STABLE

Stable content appears here.

STABLE

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.

DEPRECATED

Content that has been deprecated appears here.

DEPRECATED

Figure 4 - Deprecated Tag

© ISO/IEC 2021 – All rights reserved

© ISO/IEC 2021 – All rights reserved

Contents

List of Figures 17
List of Tables 19
Foreword 25
1 Scope 27
2 Normative References 29
2.1 Approved references 29
2.2 References under development 29
2.3 Other references 29
3 Terms, Definitions, Symbols, Abbreviations, and Conventions 31
4 Fabric Profile 33
4.1 Synopsis 33
4.2 Description 34
4.3 Health and Fault Management 40
4.4 Cascading Considerations 40
4.5 Methods of this Profile 40
4.6 Use Cases 44
4.7 CIM Elements 46
5 Enhanced Zoning and Enhanced Zone Control Profile 73
5.1 Synopsis 73
5.2 Description 73
5.3 Health and Fault Management 73
5.4 Cascading Considerations 73
5.5 Methods of this Profile 73
5.6 Use Cases 74
5.7 CIM Elements 74
6 Zone Control Profile 77
6.1 Synopsis 77
6.2 Description 77
6.3 Durable Names and Correlatable IDs of the Profile 77
6.4 Instrumentation Requirements 77
6.5 Health and Fault Management 77
6.6 Cascading Considerations 77
6.7 Methods of this Profile 78
6.8 Use Cases 83
6.9 CIM Elements 83
7 FDMI Profile 87
7.1 Synopsis 87
7.2 Description 87
7.3 Health and Fault Management 88
7.4 Cascading Considerations 88
7.5 Methods of this Profile 88
7.6 Use Cases 88
7.7 CIM Elements 89
8 Fabric Views Profile 99
8.1 Description 99
8.2 Health and Fault Management Consideration 102
8.3 Cascading Considerations 103

© ISO/IEC 2021 – All rights reserved

8.4 Methods of the Profile 103
8.5 Use Cases 103
8.6 CIM Elements 103
9 Virtual Fabrics 109
9.1 Synopsis 109
9.2 Description 109
9.3 Health and Fault Management Consideration 112
9.4 Cascading Considerations 112
9.5 Methods of the Profile 112
9.6 Use Cases 112
9.7 CIM Elements 113
10 Switch Profile 115
10.1 Synopsis 115
10.2 Description 115
10.3 Health and Fault Management 120
10.4 Cascading Considerations 120
10.5 Methods of this Profile 120
10.6 Use Cases 120
10.7 CIM Elements 121
11 Blades Profile 139
11.1 Synopsis 139
11.2 Description 139
11.3 Instance Diagram 139
11.4 Health and Fault Management 139
11.5 Cascading Considerations 140
11.6 Methods of this Profile 140
11.7 Use Cases 140
11.8 CIM Elements 140
12 Switch Partitioning 145
12.1 Synopsis 145
12.2 Description 145
12.3 Health and Fault Management Consideration 147
12.4 Cascading Considerations 147
12.5 Methods of the Profile 147
12.6 Use Cases 147
12.7 CIM Elements 147
13 N Port Virtualizer Profile 155
13.1 Synopsis 155
13.2 Description 155
13.3 Implementation 156
13.4 Health and Fault Management Consideration 157
13.5 Cascading Considerations 157
13.6 Methods of the Profile 157
13.7 Use Cases 157
13.8 CIM Elements 157
14 Inter Fabric Routing Profile 165
14.1 Synopsis 165
14.2 Description 165
14.3 Health and Fault Management Consideration 168
14.4 Cascading Considerations 168

© ISO/IEC 2021 – All rights reserved

14.5 Methods of the Profile 168
14.6 Use Cases 168
14.7 CIM Elements 169
15 FCoE Fabric 177
15.1 Synopsis 177
15.2 Description 177
15.3 Health and Fault Management Consideration 178
15.4 Methods of the Profile 178
15.5 Use Cases 178
15.6 CIM Elements 179
Annex A (informative) SMI-S Information Model 189
Annex B (Informative) Structure of Fabric Profiles 191

© ISO/IEC 2021 – All rights reserved

© ISO/IEC 2021 – All rights reserved

LIST OF FIGURES

Figure 1 - Experimental Maturity Level Tag 10
Figure 2 - Implemented Maturity Level Tag 10
Figure 3 - Stable Maturity Level Tag 11
Figure 4 - Deprecated Tag 11
Figure 5 - Fabric Instance 34
Figure 6 - NPIV Instance 36
Figure 7 - Zoning Instance (AdminDomain) 37
Figure 8 - Zoning Instance (ComputerSystem) 38
Figure 9 - Zoning Instance (Peer Zoning) 39
Figure 10 - FDMI Instance 88
Figure 11 - Class Diagram for Fabric View Classes 100
Figure 12 - Fabric View Class Capabilities 101
Figure 13 - FCTopology View Class 102
Figure 14 - FCSwitch View Class 102
Figure 15 - RegisteredProfile, AdminDomain, and ComputerSystem Relationships 110
Figure 16 - Two Virtual Fabric and Two Partitioning Systems 111
Figure 17 - Two Virtual Fabrics and One Partitioning System 112
Figure 18 - Switch Instance Diagram 117
Figure 19 - Trunking Instance Diagram 118
Figure 20 - Switch Blade Instance 139
Figure 21 - Switch ComputerSystem and Partitioning System 145
Figure 22 - Switch and Partitioning System and Partitioning Ports 146
Figure 23 - Underlying System Port Settings and Capabilities 146
Figure 24 - N Port Virtualizer 156
Figure 25 - IFR Switch Topology 166
Figure 26 - Inter Fabric Routing Ports 168
Figure 27 - FCoE Fabric Instance Diagram 178
Figure B.1 The structure of the Fabric Part Profiles 191
Figure B.2 AdminDomain Properties 194
Figure B.3 Associations on AdminDomains 196
Figure B.4 Properties of various Switches 198
Figure B.5 Associations on Switches 200
Figure B.6 General ComputerSystem Properties 202
Figure B.7 General ComputerSystem Associations 204
Figure B.8 Switch FCPort Properties 206
Figure B.9 Switch FCPort Associations 208
Figure B.10 Non-Switch Port Properties 210
Figure B.11 Non-Switch Port Associations 212

© ISO/IEC 2021 – All rights reserved

© ISO/IEC 2021 – All rights reserved

LIST OF TABLES

Table 1 - Supported Profiles for Fabric....33
Table 2 - Port OperationalStatus....45
Table 3 - OperationalStatus for ComputerSystem....45
Table 4 - CIM Elements for Fabric....46
Table 5 - SMI Referenced Properties/Methods for CIM_ActiveConnection....48
Table 6 - SMI Referenced Properties/Methods for CIM_AdminDomain (Fabric)....49
Table 7 - SMI Referenced Properties/Methods for CIM_AdminDomain (SAN)....49
Table 8 - SMI Referenced Properties/Methods for CIM_Component (Platform to Fabric)....50
Table 9 - SMI Referenced Properties/Methods for CIM_Component (Switch to Fabric)....50
Table 10 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Host Platform)....51
Table 11 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Partitioned Switch)....51
Table 12 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Storage Platform)....52
Table 13 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Switch)....53
Table 14 - SMI Referenced Properties/Methods for CIM_ConnectivityCollection....53
Table 15 - SMI Referenced Properties/Methods for CIM_ContainedDomain....54
Table 16 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation (Non-Switch to FCPort)...54
Table 17 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation (Switch to FCPort)....55
Table 18 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (ZoneCapabilities to Fabric.)....55
Table 19 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (ZoneCapabilities to Switch.)....55
Table 20 - SMI Referenced Properties/Methods for CIM_ElementSettingData (ZoneMembershipSettingData to Zone)56
Table 21 - SMI Referenced Properties/Methods for CIM_FCActiveConnection....56
Table 22 - SMI Referenced Properties/Methods for CIM_FCPort (Host FCPort)....57
Table 23 - SMI Referenced Properties/Methods for CIM_FCPort (Host NPIV FCPort)....58
Table 24 - SMI Referenced Properties/Methods for CIM_FCPort (Partitioned Switch FCPort)....59
Table 25 - SMI Referenced Properties/Methods for CIM_FCPort (Storage FCPort)....60
Table 26 - SMI Referenced Properties/Methods for CIM_FCPort (Switch FCPort)....61
Table 27 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (AdminDomain to ProtocolEndpoint)62
Table 28 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (ComputerSystem to ProtocolEndpoint)63
Table 29 - SMI Referenced Properties/Methods for CIM_HostedCollection (Fabric to ConnectivityCollection)...63
Table 30 - SMI Referenced Properties/Methods for CIM_HostedCollection (System to LogicalPortGroup)....63
Table 31 - SMI Referenced Properties/Methods for CIM_HostedCollection (Zones or ZoneSets to Fabric)....64
Table 32 - SMI Referenced Properties/Methods for CIM_HostedCollection (Zones or ZoneSets to Switch)....64
Table 33 - SMI Referenced Properties/Methods for CIM_HostedDependency....65
Table 34 - SMI Referenced Properties/Methods for CIM_LogicalPortGroup....65
Table 35 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (ConnectivityCollection to ProtocolEndpoint)65
Table 36 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (LogicalPortGroup to FCPort)...66
Table 37 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (ZoneSet to Zone)....66
Table 38 - SMI Referenced Properties/Methods for CIM_ProtocolEndpoint....66
Table 39 - SMI Referenced Properties/Methods for CIM_SystemDevice (Non-Switch FCPort to Fabric)....67
Table 40 - SMI Referenced Properties/Methods for CIM_SystemDevice (Non-Switch FCPort to Platform)....67
Table 41 - SMI Referenced Properties/Methods for CIM_SystemDevice (Switch FCPort to Switch)....68
Table 42 - SMI Referenced Properties/Methods for CIM_Zone (Active)....68

© ISO/IEC 2021 – All rights reserved

Table 43 - SMI Referenced Properties/Methods for CIM_Zone (Inactive) 68
Table 44 - SMI Referenced Properties/Methods for CIM_ZoneCapabilities 69
Table 45 - SMI Referenced Properties/Methods for CIM_ZoneMembershipSettingData 70
Table 46 - SMI Referenced Properties/Methods for CIM_ZoneSet (Active) 70
Table 47 - SMI Referenced Properties/Methods for CIM_ZoneSet (Inactive) 71
Table 48 - SMI Referenced Properties/Methods for CIM_ZoneSettingData (ZoneMembershipSettingData to Zone) 71
Table 49 - Supported Profiles for Enhanced Zoning and Enhanced Zoning Control 73
Table 50 - CIM Elements for Enhanced Zoning and Enhanced Zoning Control 74
Table 51 - SMI Referenced Properties/Methods for CIM_ElementSettingData (ZoneMembershipSettingData to NamedAddressCollection) 74
Table 52 - SMI Referenced Properties/Methods for CIM_HostedCollection (AdminDomain to Collection) 75
Table 53 - SMI Referenced Properties/Methods for CIM_HostedCollection (ComputerSystem to Collection) 75
Table 54 - SMI Referenced Properties/Methods for CIM_MemberOfCollection 75
Table 55 - SMI Referenced Properties/Methods for CIM_NamedAddressCollection 76
Table 56 - SMI Referenced Properties/Methods for CIM_ZoneService (Zone Service) 76
Table 57 - CIM Elements for Zone Control 83
Table 58 - SMI Referenced Properties/Methods for CIM_HostedService (Fabric (AdminDomain) to Zone-Service) 84
Table 59 - SMI Referenced Properties/Methods for CIM_HostedService (Switch (ComputerSystem) to ZoneService) 84
Table 60 - SMI Referenced Properties/Methods for CIM_ZoneService (Zone Service) 84
Table 61 - CIM Elements for FDMI 89
Table 62 - SMI Referenced Properties/Methods for CIM_Component (Host Server to Fabric) 90
Table 63 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Host Server) 90
Table 64 - SMI Referenced Properties/Methods for CIM_ControlledBy 90
Table 65 - SMI Referenced Properties/Methods for CIM_ElementSoftwareIdentity 91
Table 66 - SMI Referenced Properties/Methods for CIM_FCPort (Host FCPort) 91
Table 67 - SMI Referenced Properties/Methods for CIM_HostedCollection (System to LogicalPortGroup) 92
Table 68 - SMI Referenced Properties/Methods for CIM_InstalledSoftwareIdentity 93
Table 69 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (LogicalPortGroup to FCPort) 93
Table 70 - SMI Referenced Properties/Methods for CIM_PhysicalPackage (HBA Package) 93
Table 71 - SMI Referenced Properties/Methods for CIM_PortController 94
Table 72 - SMI Referenced Properties/Methods for CIM_Product (HBA Product) 94
Table 73 - SMI Referenced Properties/Methods for CIM_ProductPhysicalComponent 95
Table 74 - SMI Referenced Properties/Methods for CIM_Realizes 95
Table 75 - SMI Referenced Properties/Methods for CIM_SoftwareIdentity (Driver) 96
Table 76 - SMI Referenced Properties/Methods for CIM_SoftwareIdentity (Firmware) 96
Table 77 - SMI Referenced Properties/Methods for CIM_SoftwareIdentity (Option ROM) 97
Table 78 - SMI Referenced Properties/Methods for CIM_SystemDevice (ComputerSystem to FCPort) 97
Table 79 - SMI Referenced Properties/Methods for CIM_SystemDevice (ComputerSystem to PortController) 98
Table 80 - CIM Elements for Fabric Views 103
Table 81 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (View Capabilities) 104
Table 82 - SMI Referenced Properties/Methods for CIM_ElementView (View to FC Port) 104
Table 83 - SMI Referenced Properties/Methods for CIM_ElementView (View to Switch) 104
Table 84 - SMI Referenced Properties/Methods for CIM_ViewCapabilities 105
Table 85 - SMI Referenced Properties/Methods for CIM_ConcreteComponentView (FCSwitchView to Fab-ric) 105
Table 86 - SMI Referenced Properties/Methods for FC_ConcreteComponentView (FCTopologyView to Fab-ric) 106

© ISO/IEC 2021 – All rights reserved

Table 87 - SMI Referenced Properties/Methods for CIM_FCSwitchView 106
Table 88 - SMI Referenced Properties/Methods for CIM_FCTopologyView 108
Table 89 - Supported Profiles for Virtual Fabrics 109
Table 90 - CIM Elements for FabricVirtualFabrics 113
Table 91 - SMI Referenced Properties/Methods for CIM_Component (AdminDomain to Partitioning CS) 113
Table 92 - SMI Referenced Properties/Methods for CIM_ElementConformsToProfile (SAN AdminDomain to Virtual Fabrics RegisteredProfile)114
Table 93 - Supported Profiles for Switch 115
Table 94 - DetailedPortState for FCPort 119
Table 95 - PortAvailability for FCPort 119
Table 96 - CIM Elements for Switch 121
Table 97 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Partitioned Switch) 122
Table 98 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Switch) 123
Table 99 - SMI Referenced Properties/Methods for CIM_ComputerSystemPackage 125
Table 100 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (FCPort to FCPortCapabilities)125
Table 101 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (System to FCSwitchCapabilities)125
Table 102 - SMI Referenced Properties/Methods for CIM_ElementSettingData (FCPortSettings to FCPort) 126
Table 103 - SMI Referenced Properties/Methods for CIM_ElementSettingData (FCSwitchSettings to ComputerSystem)126
Table 104 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (FCPortRateStatistics to FCPort)126
Table 105 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (FCPortStatistics to FCPort)127
Table 106 - SMI Referenced Properties/Methods for CIM_FCPort (Partitioned Switch FCPort) 127
Table 107 - SMI Referenced Properties/Methods for CIM_FCPort (Switch FCPort) 128
Table 108 - SMI Referenced Properties/Methods for CIM_FCPortCapabilities 130
Table 109 - SMI Referenced Properties/Methods for CIM_FCPortRateStatistics 131
Table 110 - SMI Referenced Properties/Methods for CIM_FCPortSettings 131
Table 111 - SMI Referenced Properties/Methods for CIM_FCPortStatistics 132
Table 112 - SMI Referenced Properties/Methods for CIM_FCSwitchCapabilities 134
Table 113 - SMI Referenced Properties/Methods for CIM_FCSwitchSettings 134
Table 114 - SMI Referenced Properties/Methods for CIM_HostedCollection (Redundancy Set) 135
Table 115 - SMI Referenced Properties/Methods for CIM_HostedCollection (Statistics Collection) 135
Table 116 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (FCPort to RedundancySet) ...136
Table 117 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (NetworkPortStatistics to StatisticalCollection)136
Table 118 - SMI Referenced Properties/Methods for CIM_ProtocolEndpoint 136
Table 119 - SMI Referenced Properties/Methods for CIM_RedundancySet 137
Table 120 - SMI Referenced Properties/Methods for CIM_StatisticsCollection 137
Table 121 - SMI Referenced Properties/Methods for CIM_SystemDevice 138
Table 122 - CIM Elements for Blades 140
Table 123 - SMI Referenced Properties/Methods for CIM_LogicalModule 141
Table 124 - SMI Referenced Properties/Methods for CIM_ModulePort 141
Table 125 - SMI Referenced Properties/Methods for CIM_PhysicalPackage (Logical Module) 141
Table 126 - SMI Referenced Properties/Methods for CIM_Product (Blade) 142
Table 127 - SMI Referenced Properties/Methods for CIM_ProductPhysicalComponent 142
Table 128 - SMI Referenced Properties/Methods for CIM_Realizes (Logical Module Package) 143
Table 129 - SMI Referenced Properties/Methods for CIM_SystemDevice (Logical Module) 143

© ISO/IEC 2021 – All rights reserved

Table 130 - Supported Profiles for SwitchPartitioning 145
Table 131 - CIM Elements for SwitchPartitioning 147
Table 132 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Partitioned) 148
Table 133 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Partitioning)....149
Table 134 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (Association between NetworkPort and NetworkPortCapabilities)149
Table 135 - SMI Referenced Properties/Methods for CIM_ElementConformsToProfile (Partitioning ComputerSystem to Switch Partitioning RegisteredProfile)149
Table 136 - SMI Referenced Properties/Methods for CIM_ElementSettingData (Association between NetworkPort and NetworkPortSettings)150
Table 137 - SMI Referenced Properties/Methods for CIM_FCPort (Partitioned)....150
Table 138 - SMI Referenced Properties/Methods for CIM_HostedDependency (NetworkPort to FCPort)....151
Table 139 - SMI Referenced Properties/Methods for CIM_HostedDependency (Partitioning CS to Partitioned CS)151
Table 140 - SMI Referenced Properties/Methods for CIM_NetworkPort (Partitioning)....152
Table 141 - SMI Referenced Properties/Methods for CIM_NetworkPortCapabilities 152
Table 142 - SMI Referenced Properties/Methods for CIM_NetworkPortSettings....153
Table 143 - SMI Referenced Properties/Methods for CIM_SystemDevice (FCPort to Partitioned ComputerSystem)153
Table 144 - SMI Referenced Properties/Methods for CIM_SystemDevice (NetworkPort to ComputerSystem)..153
Table 145 - Supported Profiles for N Port Virtualizer....155
Table 146 - CIM Elements for N Port Virtualizer....157
Table 147 - SMI Referenced Properties/Methods for CIM_Component (N Port Virtualizer to Fabric)....158
Table 148 - SMI Referenced Properties/Methods for CIM_ComputerSystem (N Port Virtualizer) 158
Table 149 - SMI Referenced Properties/Methods for CIM_ComputerSystemPackage (N Port Virtualizer to Physical Package)159
Table 150 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation (ProtocolEndpoint to Gateway FCPort)159
Table 151 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation (ProtocolEndpoint to NPIV FCPort)159
Table 152 - SMI Referenced Properties/Methods for CIM_FCActiveConnection (Gateway) 160
Table 153 - SMI Referenced Properties/Methods for CIM_FCActiveConnection (N Port Virtualiztion)....160
Table 154 - SMI Referenced Properties/Methods for CIM_FCPort (Fabric NPIV)....161
Table 155 - SMI Referenced Properties/Methods for CIM_FCPort (Gateway)....162
Table 156 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (N Port Virtualizer System to ProtocolEndpoint)163
Table 157 - SMI Referenced Properties/Methods for CIM_LogicalIdentity (NPIV Port to Switch Port) 163
Table 158 - SMI Referenced Properties/Methods for CIM_ProtocolEndpoint (N Port Virtualizer)....163
Table 159 - SMI Referenced Properties/Methods for CIM_SystemDevice (N Port Virtualizer Gateway FCPort to Gateway System)164
Table 160 - SMI Referenced Properties/Methods for CIM_SystemDevice (N Port Virtualizer NPIV FCPort to Gateway System)164
Table 161 - CIM Elements for Inter Fabric Routing 169
Table 162 - SMI Referenced Properties/Methods for CIM_Component (Backbone Switch to Fabric) 169
Table 163 - SMI Referenced Properties/Methods for CIM_Component (IFR Switch to Fabric) 170
Table 164 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Backbone Switch)....170
Table 165 - SMI Referenced Properties/Methods for CIM_ComputerSystem (IFR Switch) 171
Table 166 - SMI Referenced Properties/Methods for CIM_FCActiveConnection 172
Table 167 - SMI Referenced Properties/Methods for CIM_FCPort (IFR FCPort)....173
Table 168 - SMI Referenced Properties/Methods for CIM_ProtocolEndpoint 174
Table 169 - SMI Referenced Properties/Methods for CIM_SystemDevice....175

© ISO/IEC 2021 – All rights reserved

Table 170 - CIM Elements for FCoE Fabric....179
Table 171 - SMI Referenced Properties/Methods for CIM_AdminDomain (Ethernet Network)....180
Table 172 - SMI Referenced Properties/Methods for CIM_Component (Switch to Ethernet Network) 180
Table 173 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Ethernet Switch) 181
Table 174 - SMI Referenced Properties/Methods for CIM_ConnectivityCollection (LANEndpoints to Ethernet-Network)181
Table 175 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation (Ethernet Switch EthernetPort to LANEndpoint)182
Table 176 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation (Non-Switch Ethernet-Port to LANEndpoint)182
Table 177 - SMI Referenced Properties/Methods for CIM_ActiveConnection (Links transported over Ethernet (FCoE))182
Table 178 - SMI Referenced Properties/Methods for CIM_EthernetPort (Host EthernetPort)....183
Table 179 - SMI Referenced Properties/Methods for CIM_EthernetPort (Storage EthernetPort)) 183
Table 180 - SMI Referenced Properties/Methods for CIM_EthernetPort (Switch EthernetPort)) 184
Table 181 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (AdminDomain to LANEndpoint)184
Table 182 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (ComputerSystem to LANEndpoint)185
Table 183 - SMI Referenced Properties/Methods for CIM_HostedCollection (Ethernet Network AdminDomain to ConnectivityCollection)185
Table 184 - SMI Referenced Properties/Methods for CIM_HostedDependency (ComputerSystem (Ethernet Switch) to Partitioning ComputerSystem)186
Table 185 - SMI Referenced Properties/Methods for CIM_HostedDependency (FCPort to EthernetPort) 186
Table 186 - SMI Referenced Properties/Methods for CIM_LANEndpoint (Ethernet ProtocolEndpoint) 186
Table 187 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (ConnectivityCollection to LANEndpoint)187
Table 188 - SMI Referenced Properties/Methods for CIM_SystemDevice (Switch EthernetPort to Switch)....187
Table 189 - SMI Referenced Properties/Methods for CIM_SystemDevice (non-Switch EthernetPort to Ethernet AdminDomain)188
Table B.1 AdminDomain Properties 193
Table B.2 AdminDomain Associations 194
Table B.3 Switch ComputerSystem Properties 197
Table B.4 Switch ComputerSystem Associations 198
Table B.5 Non-Switch ComputerSystem Properties 201
Table B.6 Non-Switch ComputerSystem Associations 202
Table B.7 Switch FCPort Properties 205
Table B.8 Switch FCPort Associations 206
Table B.9 Non-Switch Port Properties 209
Table B.10 Non-Switch Port Associations 210

© ISO/IEC 2021 – All rights reserved

© ISO/IEC 2021 – All rights reserved

FOREWORD

The Fabric Part of the *Storage Management Technical Specification* defines management profiles for Autonomous (top level) profiles for programs and devices whose central function is providing support for storage networking. The Fabric Part includes fabric management including topology and device management for switches. The Fabric part also provides management of extenders that pass fibre channel frames over other protocols as well as a gateway that maps and translates iSCSI to Fibre Channel. As part of fabric management, this specification also has controls for fibre channel zoning and fibre channel security.

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.

© ISO/IEC 2021 – All rights reserved

© ISO/IEC 2021 – All rights reserved

1 Scope

The *Storage Management Technical Specification, Part 6 Fabric* defines management profiles for Autonomous (top level) profiles for programs and devices whose central function is providing support for storage networking. This version of *Storage Management Technical Specification, Part 6 Fabric* includes these autonomous profiles:

- Fabric

  This profile defines the model and functions of a storage network including topology and zoning control.

- Switch

  This profile defines the model and functions of a Fibre Channel Switch including state, status, and control of the device and it’s connections and product information,

- Extender

  This profile defines the model and functions of a networking device that allows for fibre channel to be extended over other networks, and specifically over IP (FCIP).

© ISO/IEC 2021 – All rights reserved

© ISO/IEC 2021 – All rights reserved

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 14776-452 SCSI Primary Commands - 3 (SPC-3) [ANSI INCITS 408-2005]

2.2 References under development

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

2.3 Other references

DMTF DSP1054 Indications Profile 1.2.2
http://www.dmtf.org/sites/default/files/standards/documents/DSP1054_1.2.2.pdf

© ISO/IEC 2021 – All rights reserved