INTERNATIONAL STANDARD

ISO/IEC 24775-5

Second edition
2021-03

Information technology — Storage management —

Part 5: File systems

Reference number
ISO/IEC 24775-5:2021(E)

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Published in Switzerland

Foreword

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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).

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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 5 Filesystems, 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 24775-5:2014), 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— Indications have been replaced by DMTF Indications, and all affected clauses updated.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 Mo

— The CIM schema version was changed to 2.51 for V1.8.0 Rev3.

— Multiple profiles

  — Changed LocalAccessAvailable LocalAccessAvailableToFS, to respond to a DMTF change.

— File Export Profile (SMIS-170-Draft-SCR00004)

  — Removed the deprecated LogicalFile, ConcreteDependency and FileStorage from the diagrams.
  — Removed GetElementNameCapabilities from CIM_EnabledLogicalElementCapabilities (moved to the File Export Manipulation Profile).
  — Changed the FileShare reference in CIM_SAPAvailableForFileShare to ManagedElement to match the mof.
  — Added mandatory indications for FileShare.

— File Export Manipulation Profile

  — Added missing figure: FileShares and Simple Identity Management in Section 5.1.3.3.
  — Promoted all draft material to Experimental.
  — Promoted to Stable (TSG-SMIS-SCR00319).
  — Changed requirement to Mandatory and description for ProtocolVersions property in Tables 33-36.
  — Changed requirement to Mandatory for FileSharingProtocol property in Table 34.
  — Added material associated with the DMTF Simple Identity Management Profile (DS1034 rev 1.1.0 as it pertains to ACL manipulation on file shares. (TSG-SMIS-SCR00317).
  — Removed the deprecated LogicalFile, ConcreteDependency and FileStorage from the diagrams.
  — Fixed the duplicate entry for CIM_AccountManagementService (the second one was changed to CIM_AssociatedPrivilege).
  — Removed the deprecated CIM_ConcreteDependency, CIM_FileStorage and CIM_LogicalFile from the CIM Elements table.
  — Fixed the entries for CIM_ElementCapabilities in the CIM Elements table.
  — Added Key properties in the CIM_AccountManagementService CIM Elements table.
  — Added the method GetElementNameCapabilities to CIM_ExportedFileShareCapabilities.
  — Changed the FileShare reference in CIM_SAPAvailableForFileShare to ManagedElement to match the mof.
  — Added a Key property in the CIM_UserContact CIM Elements table.

— File Server Manipulation Profile

  — Changed CanConfigureNetworkVLSN in the class CIM_FileServerConfigurationCapabilities to CanConfigureNetworkVLAN to match the mof.
  — Fixed the PartComponent reference in CIM_SettingsDefineCapabilities (DNSSettingData) to refer to DNSSettingData.
  — Promoted to Stable (TSG-SMIS-SCR00319).

— File Storage Profile

  — Changed the Central Class from N/A to CIM_LogicalDisk (SMIS-180-Errata-SCR00003).
  — Changed the Scoping Class from ComputerSystem to CIM_LocalFileSystem (SMIS-180-Errata-SCR00003).

— Filesystem Profile

— Added mandatory indications for LocalFileSystem (SMIS-170-Draft-SCR00004).
— Material related to ElementCapabilities (naming) incl 8.1.2.3: Promoted to Stable (TSG-SMISSCR00319).
— Removed the deprecated LogicalFile, ConcreteDependency and FileStorage from the diagrams.
— Removed the deprecated CIM_ConcreteDependency, CIM_FileStorage and CIM_LogicalFile from the CIM Elements table.
— Removed GetElementNameCapabilities from CIM_EnabledLogicalElementCapabilities (moved to the Filesystem Manipulation Profile).

— Filesystem Manipulation Profile

— Material related to ElementCapabilities (naming) in 9.1.3.1: Promoted to Stable (TSG-SMIS-SCR00319).
— Fixed the version numbers on the Related Profiles to match what the profiles claim.
— Removed the deprecated LogicalFile, ConcreteDependency and FileStorage from the diagrams.
— Fixed the description of the Capabilities reference in CIM_ElementCapabilities (Local Access Configuration Capabilities).
— Added descriptions to the references and property in CIM_ElementCapabilities (Default).
— Added descriptions to the references in CIM_ElementCapabilities (Non-Default).
— Added the GetElementNameCapabilities() method to CIM_FileSystemCapabilities.

— Filesystem Performance Profile

— Changed FileSystemStorageStatisticalData to FileSystemStatisticalData in a diagram and the CIM Element table for CIM_FileSystemStatisticalData.

— Filesystem Quotas Profile

— Fixed queries in CIM table 173.
— Changed the name of the Profile from FileSystem Quotas to Filesystem Quotas.
— Added a missing ElementCapabilities between CIM_FSQuotaCapabilities and CIM_FSQuotaManagementService (as depicted in the instance diagram).
— Added a definition for CIM_LogicalFile which is depicted in the instance diagram, but is not in the CIM Elements table.

— Filesystem Replication Services Profile

— Changed the name of the Clause to match the name of the Profile.
— Fixed the method named GetReplicationRelationshipInstance to be GetReplicationRelationshipInstances.
— Added DESC to references in CIM_ElementCapabilities, CIM_FileSystemSynchronized, CIM_HostedCollection, CIM_MemberOfCollection, CIM_OrderedMemberOfCollection and CIM_ReplicaPoolForStorage.
— Added a CIM Element table to describe properties for CIM_FileSystemGroupSynchronized.
— Changed the DESC for the ManagedElement in SettingsDefineState.

— Filesystem Quotas Profile

— Changed the Central Class from LocalFileSystem to CIM_FSQuotaManagementService (TSG-SMISSCR00333).

— Host Filesystem Profile

— In the package diagram, changed Filesystem Copy Services to Filesystem Replication Services and deleted Experimental Indications.
— Added descriptions for references in CIM_HostedCollection (Remote Resources), NAS Head Profile (TSG-SMIS-SCR00333).
— Changed both the Central Class and Scoping Class from ComputerSystem to CIM_ComputerSystem (Top Level System).

— NAS Head Profile

— Promoted 12.1.3.8.1 to Stable (TSG-SMIS-SCR00319).
— Promoted the maturity level from DRAFT to EXPERIMENTAL: Updated profiles to remove SNIA_ classes and use DMTF CIM_ classes (TSG-SMIS-SCR00315.001).
— Revised CIM_AssociatedPrivilege; Added CIM_UserContact, CIM_Identity, CIM_AccountMapnagementService, CIM_AssignedIdentity.
— Fixed the version numbers on the Related Profiles to match what the profiles claim.
— In the package diagram, removed Cascading and added Filesystem Performance and Filesystem Replication Services.
— Removed the deprecated LogicalFile, ConcreteDependency and FileStorage from the instance diagram.

— NAS Network Port Profile

— Fixed the description of CIM_FSIPInterfaceSettingData in the CIM Elements table.
— Deleted the extra CIM_FSIPInterfaceSettingData from the CIM Elements table CIM_MemberOfCollection (Allocated Resources) and CIM_MemberOfCollection (Remote Resources).
— Changed the Central Class from ProtocolEndpoint to CIM_ProtocolEndpoint (CIFS or NFS) (TSG-SMISSCR00333).

— Self-Contained NAS Profile

— Promoted 13.1.3.1, 13.1.3. 2 (TSG-SMIS-SCR00319).
— Fixed the version numbers on the Related Profiles to match what the profiles claim.
— In the package diagram, changed Filesystem Copy Services to Filesystem Replication Services.
— Removed the deprecated LogicalFile, ConcreteDependency and FileStorage from the instance diagram.
— Added a CIM Element table for CIM_ElementCapabilities (ImplementationCapabilities to Service).
— Changed both the Central Class and Scoping Class from ComputerSystem to CIM_ComputerSystem (Top Level System) (TSG-SMIS-SCR00333).

— Annex A SMI-S Information Model

— Deleted “Most SMI-S Profiles are primarily based on the DMTF Final MOFs” per 5/22/15 TSG meeting consensus.
— DMTF’s CIM schema version changed to 2.45.0. (TSG meeting voice vote).

— References

— Added DMTF DSP1054 v1.2.2, Indications Profile (and changed version to 1.2.2 throughout book).
— Updated reference to DMTF DSP1054 Indications Profile.
— Removed DSP0214.
— Removed year from DSP1034del.

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.

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

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

Contents

List of Figures 17
List of Tables 19
Foreword 27
1 Scope 29
2 Normative References 31
2.1 General 31
2.2 References under development 31
2.3 Other references 31
3 Terms, Definitions, Symbols, Abbreviations, and Conventions 33
3.1 General 33
3.2 Terms and Definitions 33
4 File Export Profile 35
4.1 Description 35
4.2 Health and Fault Management Consideration 37
4.3 Cascading Considerations 37
4.4 Methods of the Profile 37
4.5 Use Cases 38
4.6 CIM Elements 38
5 File Export Manipulation Profile 45
5.1 Description 45
5.2 Health and Fault Management Considerations 52
5.3 Cascading Considerations 53
5.4 Methods of the Profile 53
5.5 Use Cases 65
5.6 File Export Manipulation Supported Capabilities Patterns 66
5.7 CIM Elements 66
6 File Server Manipulation Profile 81
6.1 Description 81
6.2 Health and Fault Management Consideration 86
6.3 Cascading Considerations 87
6.4 Methods of the Profile 87
6.5 Use Cases 95
6.6 CIM Elements 96
7 File Storage Profile 113
7.1 Description 113
7.2 Health and Fault Management Consideration 114
7.3 Cascading Considerations 114
7.4 Methods of the Profile 116
7.5 Client Considerations and Recipes 117
7.6 CIM Elements 117
8 Filesystem Profile 119
8.1 Description 119
8.2 Health and Fault Management Consideration 122
8.3 Methods of the Profile 123
8.4 Use Cases 123
8.5 CIM Elements 123
9 Filesystem Manipulation Profile 135

9.1 Description 135
9.2 Health and Fault Management Considerations 142
9.3 Methods of the Profile 144
9.4 Use Cases 163
9.5 CIM Elements 164
10 Filesystem Performance Profile 189
10.1 Description 189
10.2 Implementation 190
10.3 Methods of the Profile 195
10.4 Use Cases 200
10.5 CIM Elements 203
11 Filesystem Quotas Profile 229
11.1 Description 229
11.2 Health and Fault Management Considerations 232
11.3 Methods of the Profile 232
11.4 Use Cases 235
11.5 CIM Elements 241
12 NAS Head Profile 249
12.1 Description 249
12.2 Health and Fault Management Considerations 257
12.3 Methods of the Profile 258
12.4 Use Cases 259
12.5 CIM Elements 259
13 Self-Contained NAS Profile 267
13.1 Description 267
13.2 Health and Fault Management Considerations 275
13.3 Standard Messages used by this Profile 276
13.4 Cascading Considerations 276
13.5 Methods of the Profile 276
13.6 Use Cases 277
13.7 CIM Elements 277
14 NAS Network Port Profile 283
14.1 Description 283
14.2 Implementation 284
14.3 Health and Fault Management Considerations 288
14.4 Cascading Considerations 289
14.5 Methods 289
14.6 Use Cases 289
14.7 CIM Elements 290
15 Host Filesystem Profile 301
15.1 Description 301
15.2 Implementation 303
15.3 Methods of the Profile 306
15.4 Use Cases 307
15.5 CIM Elements 311
16 Filesystem Replication Services Profile 327
16.1 Description 327
16.2 Implementation 343
16.3 Methods 345

16.4 Use Cases 376
16.5 CIM Elements 377
Annex A (informative) SMI-S Information Model 405

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 - File Export Instance 36
Figure 6 - File Export Manipulation Profile Instance 46
Figure 7 - Capabilities and Settings for Exported File Share Creation 49
Figure 8 - FileShares and Simple Identity Management 51
Figure 9 - File Server Classes and Associations (Read only view) 83
Figure 10 - File Server Configuration classes and association 85
Figure 11 - File Storage Instance 113
Figure 12 - Cascading File Storage 115
Figure 13 - Filesystem Instance 120
Figure 14 - LocalFileSystem Creation Instance Diagram 136
Figure 15 - Capabilities and Settings for Filesystem Creation 141
Figure 16 - Filesystem Performance Profile Summary Instance Diagram 191
Figure 17 - Filesystem Quotas Instance Diagram 232
Figure 18 - NAS Head Profiles 251
Figure 19 - NAS Head Instance 252
Figure 20 - NAS Storage Instance 254
Figure 21 - Self-Contained NAS Profiles 269
Figure 22 - Self-Contained NAS Instance 270
Figure 23 - NAS Storage Instance 272
Figure 24 - NAS Support for Front-end Network Ports 284
Figure 25 - Optional NAS TCP Interface Modeling 285
Figure 26 - Mandatory NAS Ethernet Port Modeling 286
Figure 27 - Host Filesystem Profiles and Package 302
Figure 28 - Host Filesystem Instance Diagram 303
Figure 29 - Host Filesystem support for Cascading 305
Figure 30 - Replication Service Discovery 329
Figure 31 - Local File System Replication 331
Figure 32 - Remote File System Replication 332
Figure 33 - Group Instance Diagram 333
Figure 34 - Associated Group and Elements 334
Figure 35 - One-to-Many Association 335
Figure 36 - Sample CopyState and ProgressStatus Transitions 338
Figure 37 - Local Replication with ReplicationEntity 339
Figure 38 - Remote replication with ReplicationEntity 340
Figure 39 - Multi-Hop Replication 341
Figure 40 - SettingDefineState 341
Figure 41 - SynchronizationAspect Instance Diagram 342
Figure 42 - Filesystem Replication Service support for Cascading 344

Figure 43 - Cascading and Replication Groups 345

LIST OF TABLES

Table 1 - Related Profiles for File Export 35
Table 2 - FileShare OperationalStatus 37
Table 3 - CIM Elements for File Export 38
Table 4 - SMI Referenced Properties/Methods for CIM_CIFSShare (Exported File Share) 39
Table 5 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (EnabledLogicalElementCapabilities to FileShare) 40
Table 6 - SMI Referenced Properties/Methods for CIM_EnabledLogicalElementCapabilities (FileShare) 40
Table 7 - SMI Referenced Properties/Methods for CIM_ExportedFileShareSetting (Setting) 41
Table 8 - SMI Referenced Properties/Methods for CIM_FileShare (Exported File Share) 41
Table 9 - SMI Referenced Properties/Methods for CIM_FileShareSettingData (FileShare) 42
Table 10 - SMI Referenced Properties/Methods for CIM_HostedShare 42
Table 11 - SMI Referenced Properties/Methods for CIM_NFSShare (Exported File Share) 43
Table 12 - SMI Referenced Properties/Methods for CIM_SAPAvailableForFileShare 43
Table 13 - SMI Referenced Properties/Methods for CIM_SharedElement 44
Table 14 - Related Profiles for File Export Manipulation 45
Table 15 - Operational Status for FileExport Service 52
Table 16 - FileExportManipulation Methods 53
Table 17 - Parameters for Extrinsic Method ExportedFileShareCapabilities.CreateGoalSettings 55
Table 18 - Parameters for Extrinsic Method FileExportService.CreateExportedShare 57
Table 19 - Parameters for Extrinsic Method FileExportService.ModifyExportedShare 60
Table 20 - Parameters for Extrinsic Method FileExportService.ReleaseExportedShare 63
Table 21 - Parameters for Extrinsic Method FileExportService.AssignPrivilegeToExportedShare 64
Table 22 - Parameters for Extrinsic Method AccountManagementService.CreateUserContact 64
Table 23 - Parameters for Extrinsic Method AccountManagementService.GetUserContacts 65
Table 24 - SMI-S File Export Supported Capabilities Patterns 66
Table 25 - CIM Elements for File Export Manipulation 66
Table 26 - SMI Referenced Properties/Methods for CIM_AccountManagementService 68
Table 27 - SMI Referenced Properties/Methods for CIM_AssignedIdentity 68
Table 28 - SMI Referenced Properties/Methods for CIM_AssociatedPrivilege 69
Table 29 - SMI Referenced Properties/Methods for CIM_CIFSShare (Exported File Share) 69
Table 30 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (FES Configuration) 70
Table 31 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (FES Capabilities) 70
Table 32 - SMI Referenced Properties/Methods for CIM_ElementSettingData (FileShare Setting) 70
Table 33 - SMI Referenced Properties/Methods for CIM_ExportedFileShareCapabilities (FES Capabilities) 71
Table 34 - SMI Referenced Properties/Methods for CIM_ExportedFileShareSetting (FileShare Setting) 72
Table 35 - SMI Referenced Properties/Methods for CIM_ExportedFileShareSetting (Pre-defined) 73
Table 36 - SMI Referenced Properties/Methods for CIM_FileExportCapabilities (FES Configuration) 74
Table 37 - SMI Referenced Properties/Methods for CIM_FileExportService 75
Table 38 - SMI Referenced Properties/Methods for CIM_FileShare (Exported File Share) 76
Table 39 - SMI Referenced Properties/Methods for CIM_HostedService 76
Table 40 - SMI Referenced Properties/Methods for CIM_HostedShare 77
Table 41 - SMI Referenced Properties/Methods for CIM_Identity 77
Table 42 - SMI Referenced Properties/Methods for CIM_NFSShare (Exported File Share) 77
Table 43 - SMI Referenced Properties/Methods for CIM_SAPAvailableForFileShare 78
Table 44 - SMI Referenced Properties/Methods for CIM_ServiceAffectsElement 78
Table 45 - SMI Referenced Properties/Methods for CIM_SettingsDefineCapabilities (Pre-defined) 79
Table 46 - SMI Referenced Properties/Methods for CIM_SharedElement 79

Table 47 - SMI Referenced Properties/Methods for CIM_UserContact....80
Table 48 - Supported Profiles for File Server Manipulation....81
Table 49 - Operational Status for File Server ComputerSystem....87
Table 50 - Array Element Mappings for TemplateGoalSettings and SupportedGoalSettings....88
Table 51 - Parameters for Extrinsic Method FileServerCapabilities.CreateGoalSettings....89
Table 52 - Parameters for Extrinsic Method FileServerConfigurationService.CreateFileServer....90
Table 53 - Parameters for Extrinsic Method FileServerConfigurationService.ModifyFileServer....92
Table 54 - Parameters for Extrinsic Method FileServerConfigurationService.DeleteFileServer....93
Table 55 - Parameters for Extrinsic Method FileServerConfigurationService.AddIPInterface....93
Table 56 - Parameters for Extrinsic Method FileServerConfigurationService.ModifyIPInterface....94
Table 57 - Parameters for Extrinsic Method FileServerConfigurationService.DeleteIPInterface....95
Table 58 - CIM Elements for File Server Manipulation....96
Table 59 - SMI Referenced Properties/Methods for CIM_CIFSSettingData....98
Table 60 - SMI Referenced Properties/Methods for CIM_ConcreteComponent (FileServerSettings to CIFS-SettingData)99
Table 61 - SMI Referenced Properties/Methods for CIM_ConcreteComponent (FileServerSettings to DNS-SettingData)100
Table 62 - SMI Referenced Properties/Methods for CIM_ConcreteComponent (FileServerSettings to FSIPIn-terfaceSettingDat)100
Table 63 - SMI Referenced Properties/Methods for CIM_ConcreteComponent (FileServerSettings to NFS-SettingData)100
Table 64 - SMI Referenced Properties/Methods for CIM_ConcreteComponent (FileServerSettings to NIS-SettingData)101
Table 65 - SMI Referenced Properties/Methods for CIM_DNSSettingData....101
Table 66 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (FileServerConfigurationSer-vice to FileServerCapabilities)101
Table 67 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (FileServerConfigurationSer-vice to FileServerConfigurationCapabilities)102
Table 68 - SMI Referenced Properties/Methods for CIM_ElementSettingData (ComputerSystem FileServer to FileServerSettings)102
Table 69 - SMI Referenced Properties/Methods for CIM_ElementSettingData (FSIPInterfaceSettingData to IPProtocolEndpoint)102
Table 70 - SMI Referenced Properties/Methods for CIM_FileServerCapabilities....103
Table 71 - SMI Referenced Properties/Methods for CIM_FileServerConfigurationCapabilities....104
Table 72 - SMI Referenced Properties/Methods for CIM_FileServerConfigurationService....104
Table 73 - SMI Referenced Properties/Methods for CIM_FileServerSettings....105
Table 74 - SMI Referenced Properties/Methods for CIM_HostedDependency....106
Table 75 - SMI Referenced Properties/Methods for CIM_HostedService (Hosting Computer System to File-ServerConfigurationService)106
Table 76 - SMI Referenced Properties/Methods for CIM_FSIPInterfaceSettingData....106
Table 77 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (The IPProtocolEndpoint to NetworkVLAN.)107
Table 78 - SMI Referenced Properties/Methods for CIM_NetworkVLAN....108
Table 79 - SMI Referenced Properties/Methods for CIM_NFSSettingData....108
Table 80 - SMI Referenced Properties/Methods for CIM_NISSettingData....109
Table 81 - SMI Referenced Properties/Methods for CIM_SettingsDefineCapabilities (CIFSettingData)....109
Table 82 - SMI Referenced Properties/Methods for CIM_SettingsDefineCapabilities (DNSSettingData)....109
Table 83 - SMI Referenced Properties/Methods for CIM_SettingsDefineCapabilities (FileServerSettings)....110
Table 84 - SMI Referenced Properties/Methods for CIM_SettingsDefineCapabilities (FSIPInterfaceSettingDa-ta)110
Table 85 - SMI Referenced Properties/Methods for CIM_SettingsDefineCapabilities (NFSSettingData)....110

Table 86 - SMI Referenced Properties/Methods for CIM_SettingsDefineCapabilities (NISSettingData) 111
Table 87 - SMI Referenced Properties/Methods for CIM_SettingsDefineState (ComputerSystem FileServer to FileServerSettings)111
Table 88 - Cascaded Storage.....116
Table 89 - CIM Elements for File Storage 117
Table 90 - SMI Referenced Properties/Methods for CIM_ResidesOnExtent.....117
Table 91 - Related Profiles for Filesystem.....119
Table 92 - Filesystem OperationalStatus.....122
Table 93 - CIM Elements for Filesystem.....123
Table 94 - SMI Referenced Properties/Methods for CIM_Dependency (Uses Directory Services From) 125
Table 95 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (EnabledLogicalElementCapabilities to LocalFileSystem)125
Table 96 - SMI Referenced Properties/Methods for CIM_ElementSettingData (FileSystem) 126
Table 97 - SMI Referenced Properties/Methods for CIM_ElementSettingData (Local Access Required) 126
Table 98 - SMI Referenced Properties/Methods for CIM_EnabledLogicalElementCapabilities (LocalFileSystem)126
Table 99 - SMI Referenced Properties/Methods for CIM_FileSystemSetting.....127
Table 100 - SMI Referenced Properties/Methods for CIM_HostedDependency (Local Access Required).....128
Table 101 - SMI Referenced Properties/Methods for CIM_HostedFileSystem (LocalFileSystem).....129
Table 102 - SMI Referenced Properties/Methods for CIM_LocalAccessAvailableToFS 129
Table 103 - SMI Referenced Properties/Methods for CIM_LocallyAccessibleFileSystemSetting 129
Table 104 - SMI Referenced Properties/Methods for CIM_LocalFileSystem 133
Table 105 - Related Profiles for Filesystem Manipulation.....135
Table 106 - LocalFileSystem OperationalStatus.....142
Table 107 - Filesystem Manipulation Methods that cause Instance Creation, Deletion or Modification 144
Table 108 - Parameters for Extrinsic Method FileSystemCapabilities.CreateGoalSettings.....146
Table 109 - Parameters for Extrinsic Method FileSystemCapabilities.GetRequiredStorageSize 148
Table 110 - Parameters for Extrinsic Method LocallyAccessibleFileSystemCapabilities.CreateGoalSettings 151
Table 111 - Parameters for Extrinsic Method FileSystemConfigurationService.CreateFileSystem.....154
Table 112 - Parameters for Extrinsic Method FileSystemConfigurationService.ModifyFileSystem.....159
Table 113 - Parameters for Extrinsic Method FileSystemConfigurationService.DeleteFileSystem 162
Table 114 - Filesystem Manipulation Supported Capabilities Patterns.....163
Table 115 - CIM Elements for Filesystem Manipulation 164
Table 116 - SMI Referenced Properties/Methods for CIM_Dependency (Uses Directory Services From) 167
Table 117 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (FS Configuration Capabilities)168
Table 118 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (Local Access Configuration Capabilities)168
Table 119 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (Default) 168
Table 120 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (Non-Default) 169
Table 121 - SMI Referenced Properties/Methods for CIM_ElementSettingData (Attached to Filesystem).....169
Table 122 - SMI Referenced Properties/Methods for CIM_ElementSettingData (Local Access Required).....169
Table 123 - SMI Referenced Properties/Methods for CIM_FileSystemCapabilities 170
Table 124 - SMI Referenced Properties/Methods for CIM_FileSystemConfigurationCapabilities 170
Table 125 - SMI Referenced Properties/Methods for CIM_FileSystemConfigurationService.....173
Table 126 - SMI Referenced Properties/Methods for CIM_FileSystemSetting (Attached to FileSystem) 174
Table 127 - SMI Referenced Properties/Methods for CIM_FileSystemSetting (Predefined FS Settings) 176
Table 128 - SMI Referenced Properties/Methods for CIM_HostedDependency (Attached to File System).....177
Table 129 - SMI Referenced Properties/Methods for CIM_HostedDependency (Predefined Capabilities).....177
Table 130 - SMI Referenced Properties/Methods for CIM_HostedDependency (Predefined Setting) 178

Table 131 - SMI Referenced Properties/Methods for CIM_HostedFileSystem....178
Table 132 - SMI Referenced Properties/Methods for CIM_HostedService....178
Table 133 - SMI Referenced Properties/Methods for CIM_LocalAccessAvailableToFS....179
Table 134 - SMI Referenced Properties/Methods for CIM_LocalFileSystem....179
Table 135 - SMI Referenced Properties/Methods for CIM_LocallyAccessibleFileSystemCapabilities....181
Table 136 - SMI Referenced Properties/Methods for CIM_LocallyAccessibleFileSystemSetting....183
Table 137 - SMI Referenced Properties/Methods for CIM_SettingsDefineCapabilities (Predefined FS Settings)186
Table 138 - SMI Referenced Properties/Methods for CIM_SettingsDefineCapabilities (Predefined Local Access Settings)187
Table 139 - Related Profiles for Filesystem Performance....189
Table 140 - Summary of Element Types by Profile....192
Table 141 - Creation, Deletion and Modification Methods in the Filesystem Performance Profile....195
Table 142 - Summary of Statistics Support by Element....200
Table 143 - Formulas and Calculations - Calculated Statistics for a Time Interval....202
Table 144 - Filesystem Performance Profile Supported Capabilities Patterns....203
Table 145 - CIM Elements for Filesystem Performance....203
Table 146 - SMI Referenced Properties/Methods for CIM_AssociatedFileSystemStatisticsManifestCollection (Client defined collection)206
Table 147 - SMI Referenced Properties/Methods for CIM_AssociatedFileSystemStatisticsManifestCollection (Provider defined collection)206
Table 148 - SMI Referenced Properties/Methods for CIM_ElementCapabilities....207
Table 149 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (Exported File Share Stats)207
Table 150 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (Exporting Port Stats)....208
Table 151 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (Local Filesystem Stats)....208
Table 152 - SMI Referenced Properties/Methods for CIM_ElementStatisticalData (OTHER Element Type Stats)209
Table 153 - SMI Referenced Properties/Methods for CIM_FileSystemStatisticalData....209
Table 154 - SMI Referenced Properties/Methods for CIM_FileSystemStatisticsCapabilities....215
Table 155 - SMI Referenced Properties/Methods for CIM_FileSystemStatisticsManifest (Client Defined)....216
Table 156 - SMI Referenced Properties/Methods for CIM_FileSystemStatisticsManifest (Provider Support)....219
Table 157 - SMI Referenced Properties/Methods for CIM_FileSystemStatisticsManifestCollection (Client Defined)221
Table 158 - SMI Referenced Properties/Methods for CIM_FileSystemStatisticsManifestCollection (Provider Defined)222
Table 159 - SMI Referenced Properties/Methods for CIM_FileSystemStatisticsService....222
Table 160 - SMI Referenced Properties/Methods for CIM_HostedCollection (Client Defined)....224
Table 161 - SMI Referenced Properties/Methods for CIM_HostedCollection (Default)....224
Table 162 - SMI Referenced Properties/Methods for CIM_HostedCollection (Provider Supplied)....225
Table 163 - SMI Referenced Properties/Methods for CIM_HostedService....225
Table 164 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (Member of client defined collection)226
Table 165 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (Member of predefined collection)226
Table 166 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (Member of statistics collection)226
Table 167 - SMI Referenced Properties/Methods for CIM_StatisticsCollection....227
Table 168 - Related Profiles for Filesystem Quotas....229
Table 169 - CIM Elements for Filesystem Quotas....241
Table 170 - SMI Referenced Properties/Methods for CIM_FSDomainIdentity....242

Table 171 - SMI Referenced Properties/Methods for CIM_FSQuotaAppliesToElement 242
Table 172 - SMI Referenced Properties/Methods for CIM_FSQuotaAppliesToPrincipal....242
Table 173 - SMI Referenced Properties/Methods for CIM_FSQuotaAppliesToTree 243
Table 174 - SMI Referenced Properties/Methods for CIM_FSQuotaCapabilities....243
Table 175 - SMI Referenced Properties/Methods for CIM_FSQuotaConfigEntry....244
Table 176 - SMI Referenced Properties/Methods for CIM_FSQuotaIndication 244
Table 177 - SMI Referenced Properties/Methods for CIM_FSQuotaManagementService 245
Table 178 - SMI Referenced Properties/Methods for CIM_FSQuotaReportRecord 245
Table 179 - SMI Referenced Properties/Methods for CIM_ElementCapabilities 246
Table 180 - SMI Referenced Properties/Methods for CIM_LogicalFile....247
Table 181 - Related Profiles for NAS Head 249
Table 182 - InstModification Events for ComputerSystem....255
Table 183 - InstModification Events for LogicalDisk 256
Table 184 - Bellwether AlertIndication Events for ComputerSystem 256
Table 185 - Bellwether AlertIndication Events for LogicalDisk....257
Table 186 - Standard Messages used by NAS Head 258
Table 187 - CIM Elements for NAS Head....259
Table 188 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Top Level System)....261
Table 189 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Virtual File Server) 261
Table 190 - SMI Referenced Properties/Methods for CIM_ConcreteComponent....262
Table 191 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (ImplementationCapabilities to Service)262
Table 192 - SMI Referenced Properties/Methods for CIM_HostedDependency 262
Table 193 - SMI Referenced Properties/Methods for CIM_ImplementationCapabilities (ImplementationCapabilities)263
Table 194 - SMI Referenced Properties/Methods for CIM_LogicalDisk (LD for FS)....263
Table 195 - SMI Referenced Properties/Methods for CIM_StorageExtent (Primordial Imported Extent) 264
Table 196 - SMI Referenced Properties/Methods for CIM_SystemDevice (Logical Disks) 265
Table 197 - SMI Referenced Properties/Methods for CIM_SystemDevice (Storage Extents)....265
Table 198 - Related Profiles for Self-contained NAS System....267
Table 199 - InstModification Events for ComputerSystem....273
Table 200 - InstModification Events for LogicalDisk 274
Table 201 - Bellwether AlertIndication Events for ComputerSystem 275
Table 202 - Bellwether AlertIndication Events for LogicalDisk....275
Table 203 - Standard Messages used by NAS Head 276
Table 204 - CIM Elements for Self-contained NAS System....277
Table 205 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Top Level System)....279
Table 206 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Virtual File Server) 279
Table 207 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (ImplementationCapabilities to Service)280
Table 208 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (ImplementationCapabilities to Service)280
Table 209 - SMI Referenced Properties/Methods for CIM_ImplementationCapabilities (ImplementationCapabilities)281
Table 210 - SMI Referenced Properties/Methods for CIM_LogicalDisk (Disk for FS) 281
Table 211 - SMI Referenced Properties/Methods for CIM_SystemDevice (Logical Disks) 282
Table 212 - Related Profiles for NAS Network Port....283
Table 213 - InstModification Events for NetworkPort....286
Table 214 - InstModification Events for ProtocolEndpoint 287
Table 215 - Bellwether AlertIndication Events for NetworkPort 288

Table 216 - NetworkPort OperationalStatus 288
Table 217 - ProtocolEndpoint OperationalStatus....288
Table 218 - Standard Messages used by NAS Head 289
Table 219 - CIM Elements for NAS Network Port....290
Table 220 - SMI Referenced Properties/Methods for CIM_BindsTo (CIFS or NFS)....292
Table 221 - SMI Referenced Properties/Methods for CIM_BindsTo (TCP) 292
Table 222 - SMI Referenced Properties/Methods for CIM_BindsToLANEndpoint 292
Table 223 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation (CIFS or NFS to NetworkPort)293
Table 224 - SMI Referenced Properties/Methods for CIM_DeviceSAPImplementation (LANEndpoint to NetworkPort)293
Table 225 - SMI Referenced Properties/Methods for CIM_ElementSettingData (FSIPInterfaceSettingData to IPProtocolEndpoint)293
Table 226 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (CIFS or NFS)....294
Table 227 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (IP)....294
Table 228 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (LAN) 294
Table 229 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (TCP) 295
Table 230 - SMI Referenced Properties/Methods for CIM_FSIPInterfaceSettingData 295
Table 231 - SMI Referenced Properties/Methods for CIM_IPProtocolEndpoint 295
Table 232 - SMI Referenced Properties/Methods for CIM_LANEndpoint....296
Table 233 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (The IPProtocolEndpoint to NetworkVLAN.)297
Table 234 - SMI Referenced Properties/Methods for CIM_NetworkPort 298
Table 235 - SMI Referenced Properties/Methods for CIM_NetworkVLAN 299
Table 236 - SMI Referenced Properties/Methods for CIM_ProtocolEndpoint (CIFS or NFS) 299
Table 237 - SMI Referenced Properties/Methods for CIM_SystemDevice (Network Ports)....300
Table 238 - SMI Referenced Properties/Methods for CIM_TCPProtocolEndpoint 300
Table 239 - Related Profiles for Host Filesystem....301
Table 240 - Discovery of the Filesystem Volumes....307
Table 241 - Expansion of a Filesystem....308
Table 242 - Replication of a Filesystem....308
Table 243 - Quiesce a Filesystem 309
Table 244 - Unquiesce a Filesystem....309
Table 245 - Filesystem quiesce timeout 310
Table 246 - Retrieve File Information....310
Table 247 - CIM Elements for Host Filesystem 311
Table 248 - SMI Referenced Properties/Methods for CIM_AllocatedResources....313
Table 249 - SMI Referenced Properties/Methods for CIM_ComputerSystem (Shadow)....314
Table 250 - SMI Referenced Properties/Methods for CIM_Dependency (Systems) 314
Table 251 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (FS Configuration Capabilities)315
Table 252 - SMI Referenced Properties/Methods for CIM_ElementCapabilities (ImplementationCapabilities to Service)315
Table 253 - SMI Referenced Properties/Methods for CIM_ElementConformsToProfile (FilesystemConfigurationService to Host Filesystem RegisteredProfile)315
Table 254 - SMI Referenced Properties/Methods for CIM_FileSystemConfigurationCapabilities 316
Table 255 - SMI Referenced Properties/Methods for CIM_FileSystemConfigurationService....317
Table 256 - SMI Referenced Properties/Methods for CIM_HostedCollection (Allocated Resources) 317
Table 257 - SMI Referenced Properties/Methods for CIM_HostedCollection (Remote Resources) 318
Table 258 - SMI Referenced Properties/Methods for CIM_HostedService 318

Table 259 - SMI Referenced Properties/Methods for CIM_ImplementationCapabilities (ImplementationCapabilities)319
Table 260 - SMI Referenced Properties/Methods for CIM_LocalFileSystem 319
Table 261 - SMI Referenced Properties/Methods for CIM_LogicalDisk (Shadow) 320
Table 262 - SMI Referenced Properties/Methods for CIM_LogicalFile 321
Table 263 - SMI Referenced Properties/Methods for CIM_LogicalIdentity (LogicalDisk) 322
Table 264 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (Allocated Resources) 322
Table 265 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (Remote Resources) 323
Table 266 - SMI Referenced Properties/Methods for CIM_RemoteServiceAccessPoint (Shadow) 323
Table 267 - SMI Referenced Properties/Methods for CIM_RemoteResources 324
Table 268 - SMI Referenced Properties/Methods for CIM_ResidesOnExtent 324
Table 269 - SMI Referenced Properties/Methods for CIM_SAPAvailableForElement 325
Table 270 - SMI Referenced Properties/Methods for CIM_ServiceAffectsElement 325
Table 271 - SMI Referenced Properties/Methods for CIM_StorageExtent (Primordial Imported Extent) 325
Table 272 - SMI Referenced Properties/Methods for CIM_SystemDevice (LogicalDisks) 326
Table 273 - Related Profiles for Filesystem Replication Services 327
Table 274 - Key Components 328
Table 275 - Comparing SyncTypes 330
Table 276 - CopyStatus Values 336
Table 277 - Indications 343
Table 278 - Extrinsic Method for Group Management 346
Table 279 - Extrinsic Method for Replication Management 346
Table 280 - Extrinsic Method for Getting Supported Capabilities 347
Table 281 - Selected CreateElementReplica optional parameters 351
Table 282 - Selected CreateGroupReplica optional parameters 353
Table 283 - Selected CreateListReplica optional parameters 355
Table 284 - SyncTypes 365
Table 285 - Mode 365
Table 286 - Locality 365
Table 287 - ReplicationTypes 365
Table 288 - Features 366
Table 289 - Group Features 368
Table 290 - Consistency 369
Table 291 - Operations 369
Table 292 - Comparison of Similar Operations 371
Table 293 - SettingsDefineState Operations 372
Table 294 - Thin Provisioning Features 372
Table 295 - Components 373
Table 296 - Default Consistency 373
Table 297 - Default Group Persistency 374
Table 298 - Copy Methodologies 374
Table 299 - Target Element Suppliers 374
Table 300 - ThinProvisioningPolicy 375
Table 301 - Connection Features 375
Table 302 - Storage Compression Features 376
Table 303 - CIM Elements for Filesystem Replication Services 377
Table 304 - SMI Referenced Properties/Methods for CIM_AllocatedResources 381
Table 305 - SMI Referenced Properties/Methods for CIM_ElementCapabilities 381
Table 306 - SMI Referenced Properties/Methods for CIM_FileSystemGroupSynchronized 382

Table 307 - SMI Referenced Properties/Methods for CIM_FileSystemReplicationServiceCapabilities.....383
Table 308 - SMI Referenced Properties/Methods for CIM_FileSystemSynchronized 385
Table 309 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (ForProtocolEndpoint) 388
Table 310 - SMI Referenced Properties/Methods for CIM_HostedAccessPoint (ForRemoteServiceAccess-Point)389
Table 311 - SMI Referenced Properties/Methods for CIM_HostedCollection (Allocated Resources) 389
Table 312 - SMI Referenced Properties/Methods for CIM_HostedCollection (Between ComputerSystem and RemoteReplicationCollection)390
Table 313 - SMI Referenced Properties/Methods for CIM_HostedCollection (Between ComputerSystem and ReplicationGroup)390
Table 314 - SMI Referenced Properties/Methods for CIM_HostedCollection (Remote Resources) 391
Table 315 - SMI Referenced Properties/Methods for CIM_HostedService 391
Table 316 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (Allocated Resources).....391
Table 317 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (ProtocolEndpoints to Re-moteReplicationCollection)392
Table 318 - SMI Referenced Properties/Methods for CIM_MemberOfCollection (Remote Resources).....392
Table 319 - SMI Referenced Properties/Methods for CIM_OrderedMemberOfCollection.....392
Table 320 - SMI Referenced Properties/Methods for CIM_ProtocolEndpoint 393
Table 321 - SMI Referenced Properties/Methods for CIM_RemoteReplicationCollection.....394
Table 322 - SMI Referenced Properties/Methods for CIM_RemoteResources 394
Table 323 - SMI Referenced Properties/Methods for CIM_RemoteServiceAccessPoint 395
Table 324 - SMI Referenced Properties/Methods for CIM_ReplicaPoolForStorage.....395
Table 325 - SMI Referenced Properties/Methods for CIM_ReplicationEntity 396
Table 326 - SMI Referenced Properties/Methods for CIM_ReplicationGroup 396
Table 327 - SMI Referenced Properties/Methods for CIM_ReplicationService 397
Table 328 - SMI Referenced Properties/Methods for CIM_ReplicationSettingData 398
Table 329 - SMI Referenced Properties/Methods for CIM_SAPAvailableForElement 401
Table 330 - SMI Referenced Properties/Methods for CIM_ServiceAffectsElement (Between ReplicationSer-vice and RemoteReplicationCollection)401
Table 331 - SMI Referenced Properties/Methods for CIM_ServiceAffectsElement (Between ReplicationSer-vice and ReplicationEntity)401
Table 332 - SMI Referenced Properties/Methods for CIM_ServiceAffectsElement (Between ReplicationSer-vice and ReplicationGroup)402
Table 333 - SMI Referenced Properties/Methods for CIM_SettingsDefineState (Between ReplicationGroup and SynchronizationAspect)402
Table 334 - SMI Referenced Properties/Methods for CIM_SettingsDefineState (Between storage object and SynchronizationAspect)403
Table 335 - SMI Referenced Properties/Methods for CIM_SharedSecret.....403
Table 336 - SMI Referenced Properties/Methods for CIM_SynchronizationAspect 404

FOREWORD

The Filesystems part of the *Storage Management Technical Specification* contains Profiles and other clauses for management of devices and programs that support filesystems. A filesystem is a specific formatting of storage for storing and accessing files on external storage. This part describes how filesystems are created, modified and deleted, as well as how they can be found and reported. This part also describe modeling for how filesystems are exported for access from remote systems. The filesystem profiles use information from other parts of the Storage Management Technical Specifications. Specifically, they reference profiles in the Common Profiles and the Block Devices parts of the specification. This part describes how these profiles are used in filesystem profiles.

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.

1 Scope

The Filesystems 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 and access to file data. In addition, it provides documentation of component profiles that deal with filesystems and management interface functions that may be used by other autonomous profiles not included in this part of the specification.

There is an informative annex that describes how storage is mapped from block storage to file shares exported by the filesystem and the mechanisms involved in that establishing those mappings. This annex is recommended for getting an overview of how the filesystem models work.

This version of the Filesystems part of the Storage Management Technical Specification includes two autonomous profiles:

- The NAS Head Profile

  This profile defines the model and functions of a NAS device that exports file shares to remote users and gets its storage from a SAN (array devices attached to the NAS Head device).

- The Self-Contained NAS Profile

  This profile defines the model and functions of a NAS device that exports file shares to remote users, but gets its storage from disk drives that are internal to the NAS device (instead of externally attached arrays).

In addition to these autonomous profiles, this part of the specification defines a number of component profiles, which are used by the autonomous NAS profiles and might also be used by other autonomous profiles that feature filesystem elements and services. The component profiles defined in this version of the specification include:

- The File Export (component) Profile

  This component profile defines the elements used to model the exporting of filesystems or directories for any autonomous profile that exports file data to remote systems.

- The File Export Manipulation (component) Profile

  This component profile defines the elements used to model the services for creating, modifying and deleting the file shares (the representation of exported filesystems or directories) for any autonomous profile that provides manipulation of exported filesystems or directories.

- The File Storage (component) Profile

  This component profile defines the elements used to model the storage of filesystems on logical disks. This profile does not have services for maintaining the mapping of filesystems to logical disks. These services are addressed in the Filesystem Manipulation Profile.

- The Filesystem (component) Profile

  This component profile defines the elements used to model filesystems and its related elements, such as logical files, directories and information on how the filesystem is addressed when mounted to a specific system. The services for defining and maintaining the information in the Filesystem Profile are contained in the Filesystem Manipulation Profile.

- The Filesystem Manipulation (component) Profile

  This component profile defines the elements used to model the services for creating, modifying and deleting filesystems and their related elements.

- The Filesystem Quotas (component) Profile

  This component profile defines the elements used to model the elements associated with creating, maintaining and reporting on quotas on various filesystem elements.

2 Normative References

2.1 General

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.

2.2 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

Storage Management Technical Specification, Part 4 Block Devices, 1.8.0 Rev 4

2.3 Other references

DMTF DSP1034 Simple Identity Management Profile 1.1.0
http://dmtf.org/sites/default/files/standards/documents/DSP1034_1.1.0.pdf

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

MS-SMB2: Server Message Block (SMB) Protocol Versions 2 and 3
https://msdn.microsoft.com/en-us/library/cc246482.aspx

IETF ISSN: 2070-1721, Network File System (NFS) Version 4 Minor Version 1 Protocol,
https://tools.ietf.org/html/rfc5661

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