State of SMI-S

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EMC

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Agenda

- SMI-S
- 10 Years of SMI-S
- Versions
- Content
- Adoption
- Current Versions
- Current Development Work
- Resources
The Storage Management Initiative Specification (SMI-S) standard enables interoperable management of storage networking equipment in heterogeneous environments:

- FC Switches
- Arrays (FC and iSCSI)
- NAS Devices
- Tape Libraries
- Host Profiles (including HBAs)

The supported management functionality covers:
- Discovery, Configuration, Monitoring, Events, etc

Based upon DMTF Common Information Model (CIM)
Model Based Management

Management Client

Common Information Model
Object Manager

Provider

Storage

Provider

Fabric

Provider

Host
10 Years of SMI-S

- **2002**: “Bluefin” spec donated to the SNIA and later publicly announced by the SNIA as SMI-S v1.0
- **2003**: SNIA spec development, interop testing, and conformance testing programs launched
- **2004**: SMI-S v1.0 becomes an ANSI standard, SMI-S v1.1 work is started
- **2006**: SMI-S v1.0 becomes an ISO standard, SMI-S v1.1 SNIA Technical Position released
- **2007-2010**: SNIA Technical Positions for SMI-S v1.2, v1.3, v1.4, and v1.5 released
- **2008**: SMI-S v1.1 becomes an ANSI standard
- **2011**: SMI-S v1.1 becomes an ISO standard, SMI-S v1.3 becomes an ANSI standard
- **2012**: SMI-S v1.6 becomes a SNIA Technical Position

(See: [www.snia.org/forums/smi/tech_programs/smis_home/10_Years_of_SMI-S](http://www.snia.org/forums/smi/tech_programs/smis_home/10_Years_of_SMI-S))
Versions

- To allow vendors to benefit from new content as soon as possible, schedule-driven development cycles were used for SMI-S v1.2 through v1.6
  - New functionality made it into a release only if the new spec content was ready in time; otherwise, it went into the next release
  - Spec releases were pipelined for ongoing additions
- SMI-S development work after v1.6 is being done on a content-driven basis
  - The same spec development steps are used
  - Releases happen when enough content is ready
## Spec Development Steps

- Scoping documents/presentations
- Initial Draft
- Full-Scope Draft
- Implementation Draft
- Final Draft

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scoping documents/presentations</td>
<td>Content developed in SMI-S Technical Working Groups, coordinated by the SMI Technical Steering Group</td>
</tr>
<tr>
<td>Initial Draft</td>
<td>SNIA Membership approved versions</td>
</tr>
<tr>
<td>Full-Scope Draft</td>
<td>SNIA Membership approved versions</td>
</tr>
<tr>
<td>Implementation Draft</td>
<td>National and International Standardization</td>
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<tr>
<td>Final Draft</td>
<td>National and International Standardization</td>
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<td>SNIA Technical Position</td>
<td>SNIA Membership approved versions</td>
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<td>SNIA Corrected Technical Position</td>
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<td>ANSI standardization</td>
<td>National and International Standardization</td>
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<td>ISO standardization</td>
<td>National and International Standardization</td>
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## Spec Development Pipeline

### SMI-S Release N-1

<table>
<thead>
<tr>
<th>Scoping</th>
<th>Initial</th>
<th>Full Scope</th>
<th>Implementation</th>
<th>Final</th>
<th>SNIA Tech Pos’n</th>
<th>SNIA Corrected Tech Pos’n</th>
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### SMI-S Release N

<table>
<thead>
<tr>
<th>Scoping</th>
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<th>Implementation</th>
<th>Final</th>
<th>SNIA Tech Pos’n</th>
<th>SNIA Corrected Tech Pos’n</th>
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### SMI-S Release N+1

<table>
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<tr>
<th>Scoping</th>
<th>Initial</th>
<th>Full Scope</th>
<th>Implementation</th>
<th>Final</th>
<th>SNIA Tech Pos’n</th>
<th>SNIA Corrected Tech Pos’n</th>
</tr>
</thead>
</table>
SMI-S is organized into multiple Books
- Overview
- Common Architecture
- Common Profiles
- Block Devices
- Filesystems
- Fabric
- Host Elements
- Media Libraries

Profiles in these Books define manageable functionality
Information is included about spec content maturity
# Version Page Counts

<table>
<thead>
<tr>
<th>SMI-S Version</th>
<th>v1.0</th>
<th>v1.1</th>
<th>v1.2</th>
<th>v1.3</th>
<th>v1.4</th>
<th>v1.5</th>
<th>v1.6</th>
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<tbody>
<tr>
<td>Overview Book</td>
<td>44</td>
<td>46</td>
<td>44</td>
<td>44</td>
<td>44</td>
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<tr>
<td>Common Architecture Book</td>
<td>144</td>
<td>156</td>
<td>184</td>
<td>214</td>
<td>300</td>
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<td></td>
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<tr>
<td>Common Profiles Book</td>
<td>702</td>
<td>708</td>
<td>598</td>
<td>596</td>
<td>678</td>
<td></td>
<td></td>
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<tr>
<td>Block Devices Book</td>
<td>614</td>
<td>624</td>
<td>792</td>
<td>966</td>
<td>1,162</td>
<td></td>
<td></td>
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<tr>
<td>Filesystems Book</td>
<td>298</td>
<td>370</td>
<td>402</td>
<td>462</td>
<td>484</td>
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<tr>
<td>Fabric</td>
<td>244</td>
<td>250</td>
<td>254</td>
<td>364</td>
<td>388</td>
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<td></td>
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<tr>
<td>Host Elements Book</td>
<td>194</td>
<td>164</td>
<td>172</td>
<td>172</td>
<td>188</td>
<td></td>
<td></td>
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<tr>
<td>Media Libraries Book</td>
<td>86</td>
<td>146</td>
<td>166</td>
<td>176</td>
<td>220</td>
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<td>ILM Book</td>
<td>76</td>
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<tr>
<td><strong>TOTAL PAGES</strong></td>
<td>641</td>
<td>1,474</td>
<td>2,402</td>
<td>2,464</td>
<td>2,612</td>
<td>2,994</td>
<td>3,464</td>
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</table>
What Changed Between Versions

- New Profiles were added in each version
  - SMI-S v1.0 had 28 Profiles
  - SMI-S v1.1 added 36 Profiles
  - SMI-S v1.2 added 27 Profiles
  - SMI-S v1.3 added 11 Profiles
  - SMI-S v1.4 added 8 Profiles
  - SMI-S v1.5 added 8 Profiles
  - SMI-S v1.6 added 5 Profiles
- Existing Profiles were also fixed and enhanced

(Numbers are only for the Profiles found in SMI-S v1.6)
## Spreadsheet Showing Changes

**SMI-S Profiles, as of 1.6 Rev 4**

<table>
<thead>
<tr>
<th>Profile Name</th>
<th>Profile Description</th>
<th>Profile Type</th>
<th>Spec Deck</th>
<th>Spec Class</th>
<th>Spec Port</th>
<th>Profile Maturity</th>
<th>Release 1st introduced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generic Target Ports Profile</td>
<td>Models the generic behavior of target ports in storage systems such as disk arrays and tape libraries. Separate profiles specialize this abstract profile for Fibre Channel, iSCSI and other transports.</td>
<td>Component</td>
<td>Common Profiles</td>
<td>6</td>
<td>2</td>
<td>Experimental</td>
<td>1.2</td>
</tr>
<tr>
<td>Parallel SCSI (SPI) Target Ports Profile</td>
<td>Models the SPI aspects of a target device. Specializes the Generic Target Ports Profile.</td>
<td>Component</td>
<td>Common Profiles</td>
<td>7</td>
<td>2</td>
<td>Experimental</td>
<td>1.1</td>
</tr>
<tr>
<td>FC Target Ports Profile</td>
<td>Models the Fibre Channel specific aspects of a target storage system. Specializes the Generic Target Ports Profile.</td>
<td>Component</td>
<td>Common Profiles</td>
<td>8</td>
<td>2</td>
<td>Stable</td>
<td>1.1</td>
</tr>
<tr>
<td>iSCSI Target Ports Subprofile</td>
<td>Models the iSCSI specific aspects of a target device. Specializes the Generic Target Ports Profile.</td>
<td>Component</td>
<td>Common Profiles</td>
<td>9</td>
<td>2</td>
<td>Stable</td>
<td>1.1</td>
</tr>
<tr>
<td>Serial Attached SCSI (SAS) Target Port Subprofile</td>
<td>Models the SAS specific aspects of a target device. Specializes the Generic Target Ports Profile.</td>
<td>Component</td>
<td>Common Profiles</td>
<td>10</td>
<td>2</td>
<td>Experimental</td>
<td>1.2</td>
</tr>
<tr>
<td>Serial ATA (SATA) Target Ports Profile</td>
<td>Models the SATA specific aspects of a target device. Specializes the Generic Target Ports Profile.</td>
<td>Component</td>
<td>Common Profiles</td>
<td>11</td>
<td>2</td>
<td>Experimental</td>
<td>1.2</td>
</tr>
<tr>
<td>DD Target Port Profile</td>
<td>Models the CD (Single Disk) Fibre Channel specific aspects of a target storage system. Specializes the Generic Target Ports Profile.</td>
<td>Component</td>
<td>Common Profiles</td>
<td>12</td>
<td>2</td>
<td>Experimental</td>
<td>1.2</td>
</tr>
<tr>
<td>Direct Attach (DA) Ports Profile</td>
<td>Models storage systems that attach directly to a host system. Behaves as both an initiator port and a target port.</td>
<td>Component</td>
<td>Common Profiles</td>
<td>13</td>
<td>2</td>
<td>Experimental</td>
<td>1.1</td>
</tr>
<tr>
<td>Generic Initiator Ports Profile</td>
<td>Models the generic behavior of initiator ports in host adapters. Separate profiles specialize this abstract profile for Fibre Channel (iSCSI), and other transports.</td>
<td>Component</td>
<td>Common Profiles</td>
<td>14</td>
<td>2</td>
<td>Experimental</td>
<td>1.2</td>
</tr>
<tr>
<td>Parallel SCSI (SPI) Initiator Ports Profile</td>
<td>Models the SPI specific aspects of an initiator port. Specializes the Generic Initiator Ports Profile.</td>
<td>Component</td>
<td>Common Profiles</td>
<td>15</td>
<td>2</td>
<td>Experimental</td>
<td>1.1</td>
</tr>
<tr>
<td>iSCSI Initiator Port Subprofile</td>
<td>Models the iSCSI aspects of an initiator port. Specializes the Generic Initiator Ports Profile.</td>
<td>Component</td>
<td>Common Profiles</td>
<td>16</td>
<td>2</td>
<td>Experimental</td>
<td>1.1</td>
</tr>
<tr>
<td>FC Initiator Ports Profile</td>
<td>Models the Fibre Channel specific aspects of an initiator port. Specializes the Generic Initiator Ports Profile.</td>
<td>Component</td>
<td>Common Profiles</td>
<td>17</td>
<td>2</td>
<td>Stable</td>
<td>1.1</td>
</tr>
<tr>
<td>SAS Initiator Ports Profile</td>
<td>Models the SAS specific aspects of an initiator port. Specializes the Generic Initiator Ports Profile.</td>
<td>Component</td>
<td>Common Profiles</td>
<td>18</td>
<td>2</td>
<td>Experimental</td>
<td>1.2</td>
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</tbody>
</table>

- Spreadsheet covers all Profiles in SMI-S v1.6
- Download: [SMI-S_Profiles_120801.xlsx](www.snia.org/sites/default/files/SMI-S_Profiles_120801.xlsx)
Adoption

- First phase: Adoption by SMI-S Provider companies
  - SAN products needed to become SMI-S enabled
  - This took longer than expected
  - Spec work was mostly Provider oriented

- Second phase: Adoption by SMI-S Client companies
  - SMI-S enabled products had to be in the field first
  - This is happening now
  - Spec work is becoming more Client oriented
Companies Using SMI-S (Partial List)

- APTARE
- BROCADE
- CISCO
- Compuserve
- Cumulus Systems
- DELL
- dotHILL
- EMC
- Fujitsu
- HP
- Hitachi
- Huawei
- IBM
- IntelliMagic
- LSI
- Microsoft
- NetApp
- OPNET
- Oracle
- Quest Software
- service
- solarwinds
- ZTE
SMI-Lab Plugfest At Microsoft

On August 6-9, 2012, the SMI-Lab held its fourth plugfest of the year. Microsoft hosted this plugfest at the Enterprise Engineering Center (EEC) at their Redmond, Washington campus. With 43 people registered, word is that the plugfest was a success!

August Plugfest Themes
- NAS ACL Security
- Security

Participating Companies
- Brocade
- Cisco
- Dell - Compellent
- Dot Hill Systems
- EMC
- Fujitsu
- Hewlett-Packard
- Hitachi Data Systems
- Huawei
- Inova Development
- IntelliMagic
- Microsoft
- NetApp
- WBEM Solutions

Report is at this link:

Current Versions

- Current SNIA Technical Position: SMI-S v1.6
- Current ANSI Standard version: SMI-S v1.3
- Current ISO Standard version: SMI-S v1.1
  - Next ISO Standard version: SMI-S v1.5
Current Development Work

- SMI-S Addenda are being worked on
  - This work augments SMI-S v1.6
- SMI-S 2.0 development work has also started
SMI-S Addenda (Examples)

- Common Profiles Book
  - FCoE Target Ports
  - Proxy vs Embedded in Model

- Block Devices Book
  - Storage Compression
  - Automated Storage Tiering Policy
  - Automated Storage Tiering Enhancements
  - Enhancements to Replication Services
  - Replication Services Tokenized Clone
SMI-S Addenda (More Examples)

- Filesystems Book
  - SMB2 support in File Export Manipulation
  - SMB2 support in File Server Manipulation
  - Filesystem Performance Enhancements
- Fabric Book
  - Additional Indications
  - Compute Blade Model
- Host Elements Book
  - FC HBA Diagnostics
SMI-S 2.0

- Planned updates
  - Make SMI-S DMTF protocol agnostic
  - Remove deprecated content from the spec
  - Switch to SLP Version 2 Template
  - Will include SMI-S Addenda where possible
  - Will likely include other new material as well

- Plan is to minimize any backward incompatibilities
Resources

- **SNIA Technical Positions for SMI-S**
  - Download any official SNIA version of SMI-S, from v1.0 to v1.6
  - Link: [www.snia.org/tech_activities/standards/curr_standards/smi](http://www.snia.org/tech_activities/standards/curr_standards/smi)

- **Storage Management Initiative (SMI)**
  - SNIA organization that supports all SNIA SMI-S activities
  - Link: [www.snia.org/forums/smi](http://www.snia.org/forums/smi)

- **Storage Management Initiative Specification (SMI-S)**
  - SMI page for SMI-S information and relevant links
  - Link: [www.snia.org/forums/smi/tech_programs/smis_home](http://www.snia.org/forums/smi/tech_programs/smis_home)
SMI-Lab Program
- Provides a lab environment and a community that supports SMI-S implementation bring-up and interoperability testing
- Link: www.snia.org/forums/smi/tech_programs/lab_program

SMI-S Conformance Testing Program
- Provides impartial validation that an SMI-S implementation passes an established set of tests for an identified set of SMI-S profiles
- Link: www.snia.org/ctp

SMI-S Developers Google Group
- Public SMI-S discussion forum for developers
- Link: http://groups.google.com/forum/?fromgroups#!forum/smi-s-developers-group
Thank You!