

A PROPOSAL FOR INCITS FAST-TRACK PROCESSING

Storage Networking Industry Association (SNIA)
Storage Management Initiative Specification (SMI-S)

1 Source of the Proposed Project

- 1.1 **Title:** *SNIA Storage Management Initiative Specification (SNIA SMI-S) version 1.1.0.*
- 1.2 **Date Submitted:** 6/5/2006
- 1.3 **Proposer:** Storage Networking Industry Association (SNIA). A list of the members is available at http://www.snia.org/about/member_list.

2 Process Description for the Proposed Project

2.1 Project Type (R - Revision)

The project proposal revises ANSI/INCITS 388-2004 which can be found at http://www.incits.org/archive/2003/in030826/snia_proposal.pdf. It includes substantial background on the SMI-S technology.

2.2 Type of Document: Standard

2.3 Definitions of Concepts and Special Terms

Storage Management Initiative Specification (SNIA SMI-S) - is based on the Common Information Model (CIM) and Web Based Enterprise Management (WBEM) standards as pioneered by the Distributed Management Task Force (DMTF). SNIA SMI-S provides new features that extend CIM/WBEM technology. It was standardized as ANSI INCITS 388-2004.

Common Information Model (CIM) - An object oriented description of the entities and relationships in a business' management environment maintained by the Distributed Management Task Force. CIM is divided into a Core Model and Common Models. The Core Model addresses high-level concepts (such as systems and devices), as well as fundamental relationships (such as dependencies). The Common Models describe specific problem domains such as computer system, network, user or device management. The Common Models are subclasses of the Core Model and may also be subclasses of each other.

Web Based Enterprise Management (WBEM) - Web-Based Enterprise Management is an initiative in the DMTF. Abbreviated WBEM. It is a set of technologies that enables interoperable management of an enterprise. WBEM consists of CIM, an XML DTD defining the tags (XML encoding) to describe the CIM Schema and its data, and a set of HTTP operations for exchanging the XML-based information. CIM joins the XML data description language and HTTP transport protocol with an underlying information model, CIM to create a conceptual view of the enterprise.

Distributed Management Task Force (DMTF) - An industry standards body that develops management standards for computer system and enterprise environments. DMTF standards include WBEM, CIM, DMI, DEN and ARM. Abbreviated DMTF. The DMTF has a web site at www.dmtf.org.

Recipes – a required sequence of operations performed by a management client against a server to complete an atomic (whole) unit of work.

Profile - A proper subset of a standard that supports interoperability across a set of products or in a specific application. Profiles exist for FCP (FCSI and PLDA), IP, and other areas. A profile is a vertical slice through a standard containing physical, logical and behavioral elements required for interoperability.

Managed Object Format (MOF) - The syntax and formal description of the objects and associations in the CIM schemas. MOF can also be translated to XML using a Document Type definition published by the DMTF.

Storage Area Network (SAN) –

1. A network whose primary purpose is the transfer of data between computer systems and storage elements and among storage elements. Abbreviated SAN. A SAN consists of a communication infrastructure, which provides physical connections, and a management layer, which organizes the connections, storage elements, and computer systems so that data transfer is secure and robust. The term SAN is usually (but not necessarily) identified with block I/O services rather than file access services.
2. A storage system consisting of storage elements, storage devices, computer systems, and/or appliances, plus all control software, communicating over a network.

Note: The SNIA definition specifically does not identify the term SAN with Fibre Channel technology. When the term SAN is used in connection with Fibre Channel technology, use of a qualified phrase such as "Fibre Channel SAN" is encouraged. According to this definition an Ethernet-based network whose primary purpose is to provide access to storage elements would be considered a SAN. SANs are sometimes also used for system interconnection in clusters.

Network Attached Storage (NAS) –

1. A term used to refer to storage elements that connect to a network and provide file access services to computer systems. Abbreviated NAS. A NAS Storage Element consists of an engine, which implements the file services, and one or more devices, on which data is stored. NAS elements may be attached to any type of network. When attached to SANs, NAS elements may be considered to be members of the SAS class of storage elements.
2. A class of systems that provide file services to host computers. A host system that uses network attached storage uses a *file system device driver* to access data using file access protocols such as NFS or CIFS. NAS systems interpret these commands and perform the internal file and device I/O operations necessary to execute them. *cf.* storage area network.

The full definition of concepts and special terms for the Storage Management Initiative Specification (SNIA SMI-S) is included in the SNIA Dictionary of Storage and Storage Networking Terminology, located on the SNIA website at <http://www.snia.org/education/dictionary>.

2.4 Expected Relationship with Approved Reference Models, Frameworks, Architectures, etc.

Standards referenced by ANSI INCITS 388-2004 are the Small Computer Systems Interconnect (SCSI) as maintained by the INCITS T10 work group and the Fibre Channel interface standard maintained by the INCITS T11 work group.

ANSI INCITS 388-2004 is also closely related to the DMTF CIM/WEBM *de facto* standards, as further explained in section 3.1.

2.5 Recommended INCITS Development Technical Committee (Existing or New)

No new committee is requested. The document being submitted is a revision of ANSI INCITS 388-2004, and is intended to use the Fast Track process in keeping with the initial project proposal for SNIA SMI-S.

Further, the SNIA has put in place an agreement with INCITS Technical Committee T11.5 (Draft Principles of Cooperation (Rev 3) between INCITS/T11.5 and The Storage Networking Industry Association (SNIA) for Consideration) to allow for T11.5 consideration of SNIA SMI-S standards in regard to various T11.5 projects, and specifically with regard to efforts between the two organizations to ensure the consistency of management information.

2.6 Anticipated Frequency and Duration of Meetings

Committees will meet to discuss any issues or concerns as needed.

2.7 Target Date for Initial Public Review (Milestone 4)

The SNIA SMI-S document is expected to be submitted for public review shortly after acceptance of the Proposal by the INCITS EB.

2.8 Estimated Useful Life of Standard or Technical Report

Indefinite. Since this was developed by a large consortium, SMI-S is expected to have a relatively long life, with periodic revisions like this one, which are intended to extend the standard to additional storage technologies and keep it aligned with emerging conventions and methodologies in the network storage industry.

3 Business Case for Developing the Proposed Standard or Technical Report

3.1 Description

SNIA Storage Management Initiative Specification (SNIA SMI-S) version 1.1.0 is the latest version of an open, vendor-neutral API for discovering, monitoring and managing devices in a Storage Network. Efficiently managing multi-vendor Storage Area Networks (SANs) is a key concern for end-users and integrators alike. In mid-2002 the Storage Networking Industry Association (SNIA) launched the Storage Management Initiative (SMI) to create and foster the universal adoption of a highly functional open interface for the management of storage networks. ANSI/INCITS 388-2004, an outgrowth of that effort, provided the first management initiative standard to address that concern. The broad adoption of the SMI-S interface and the number of compliant products that are either in development or already in the marketplace is a demonstration of the value that vendors and customers place on that standard and its benefits.

Since the introduction of ANSI/INCITS 388-2004, there have been a number of changes in the storage networking industry. The proposed revision to ANSI/INCITS 388-2004 addresses those changes while assuring that vendors and end-users continue to benefit from a standardized interface for storage management by providing:

- **Broader device coverage:** The proposed update expands the scope of SMI-S, adding support for event notification between managed objects, security and NAS devices -- keeping pace with the evolving storage networking industry while protecting the investment of the adopters of ANSI/INCITS 388-2004 through rigorous support for backward compatibility.
- **Updated device modeling:** The proposed revision conforms to the 2.11 release of the DMTF's Common Information Model (CIM), which represents a significant enhancement to the 2.8 version used for the initial standard.
- **Enhanced Conformance Testing:** The proposed revision includes expanded recipes, providing developers with more robust definitions of compliance and higher assurances of interoperability between products developed to the standard.
- **Tighter integration with *de facto* standards:** By driving much of the specification development directly from the CIM object model, the proposed revision assures tighter coordination between the SMI standard and its underlying object models.

In addition, the proposed revision reflects myriad clarifications, corrections and enhancements, addressing a number of shortcomings and deficiencies that have come to light as more and more vendors have developed and shipped products that were designed to the initial release of the standard.

With the original standard now widely adopted, SNIA SMI-S is streamlining the way that the entire storage industry deals with management. Management application developers no longer have to integrate incompatible feature-poor interfaces into their products. Component developers no longer have to "push" their unique interface functionality at applications developers. Instead, both are better able to concentrate on developing features and functions that have value to end-users. Ultimately, as improved applications and interfaces result in reduced costs for management, end-users will be able to adopt storage-networking technology faster and build larger more powerful networks.

3.2 Existing Practice and the Need for a Standard:

Since the introduction of ANSI/INCITS 388-2004, eighteen vendors have certified twenty-five software products designed to the SMI-S standard that provide management for 200 storage products. Dozens more products from an increasing number of vendors are in development or awaiting certification. This broad adoption is testament both to the need that was identified in justifying the development of the initial standard, and the value that vendors and customers are deriving from the standard.

While the efficiency and flexibility afforded to the development and end-user communities by the creation and adoption of the standard has helped to speed up the adoption of SAN technologies, it has also increased the importance of a robust, interoperable, open standard for the management of networked storage devices. The proposed revision enhances the value and relevance of the standard by assuring that it continues to reflect current methodologies and practices, while addressing the increased

breadth of network storage products and protecting the investment and compatibility with devices and management interfaces that have already been deployed.

3.3 Implementation Impacts of the Proposed Standard

3.3.1 Development Costs

Development costs are reduced by adherence to a common interface standard and the cooperation of vendors to develop within that standard. The proposed revision is intended to accelerate the adoption of the standard and broaden the range of vendors and developers that have the opportunity to benefit from these efficiencies.

3.3.2 Impact on Existing or Potential Markets

The availability and adoption of ANSI INCITS 388-2004 greatly expands potential markets for storage networking technology, particularly in the IT, consumer/retail, and Internet markets. The adoption of ANSI INCITS 388-2004 by more and more of the storage network industry provides a common interface, making implementation of management functionality simpler, less costly, and ultimately, more robust. By expanding the scope of devices that are addressed by the standard, this revision protects the investment already made in the interface, and lays the groundwork for direct management of network storage resources by applications such as file systems and database managers.

3.3.3 Costs and Methods for Conformity Assessment

Conformance to the standard is determined by a test suite being actively developed and maintained by the SNIA's Interoperability Conformance and Test Program (ICTP). The costs to test against the standard are borne by vendors wishing to advertise compliance with the standard.

Conformance is also demonstrated by vendor participation in the SNIA 'CIM-SAN' demonstration of products forming a storage area network (SAN). This demonstration is in conjunction with Storage Networking World (SNW) events and is permanently located at the SNIA Technology Center in Colorado Springs. Vendor participation in the demo and tech center SAN are paid activities, require membership in SNIA and are optional.

3.3.4 Return on Investment

The SMI-S standard directly affects 3 classes of people.

- Storage companies that build storage products that can be managed by a storage management application,
- Storage companies that develop a storage management application that manages storage products,
- and IT Users.

For the companies that build storage products, the ROI comes in the form of increased support for their product by a wider range of Storage Management applications. For small storage companies, who in the past have had a difficult time getting the large storage management applications to support their product, support of the standardized SMI-S interface provides an opportunity for faster, broader adoption..

For companies that develop Storage Management applications, the ROI comes in the form of reduced need to write custom software for each proprietary storage device's

management interface. By implementing the SMI-S standard, Storage Management applications only need to support a single management interface, which greatly reduces development time and maintenance costs.

For the IT User, the ROI comes in the form of a wider choice of storage management applications for the storage devices they wish to manage. The standard helps to greatly reduce the lead time in getting a new storage device supported by an existing storage management application by removing the need to develop custom software. Broader, more timely support for emerging storage technology means that the IT User can now select a single Storage Management application instead of having to learn multiple proprietary management interfaces to manage their storage. The result is reduced operating costs, without having to forego the adoption of new and improved technology.

3.4 Legal Considerations

3.4.1 Patent Assertions

The proposer is not aware of any patent assertions that may be made at this time.

3.4.2 Dissemination of the Standard or Technical Report

The proposer is not aware of any IPR assertions that will hinder the distribution of this standard.

4 Related Standards Activities

4.1 Existing Standards

ANSI INCITS 388-2004 is based on the Common Information Model (CIM) and Web Based Enterprise Management (WBEM) standards as pioneered by the Distributed Management Task Force (DMTF) and will be guided, as appropriate, by the DMTF.

SNIA SMI-S provides new features that extend CIM/WBEM technology. The technical workgroups of the SNIA work closely with the DMTF to ensure that SNIA SMI-S follows and builds off of and correctly augments the CIM and WBEM standards. The technical workgroups ensure this by submitting Change Requests (CRs) to the DMTF that explain the new features that will be developed off of the CIM and WBEM standards. The CIM and WBEM standards are on a release schedule that is coordinated with but distinct from the release of ANSI INCITS 388-2004.

4.2 Related Standards Activity

No other standards are known to reference ANSI INCITS 388-2004.

4.3 Recommendations for Close Liaison

INCITS T11 - The SNIA liaison for T11.5 is Roger Cummings.

5 Units of Measurement used in the Standard

Not measurement sensitive.

