

Independent Assessment

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Storage Management Initiative-Specification (SMI-S)

Managing storage through a single console

Introduction—the promise of Storage Resource Management (SRM)

Heterogeneous storage environments are a fact of life for most large and even midsize organizations. There are many legitimate reasons for this, and the situation is not any different on the server side of the IT house.

For the storage environment—the focus of this paper—heterogeneous storage results in two problems:

1. Lack of visibility—it is hard to determine how much storage an organization has across all its various storage systems and how it is being used
2. Inefficient management—administrators need to use different tools running on different consoles to perform the same tasks on different storage systems, which drive higher than necessary costs.

The solution to these two problems is the same, management standards. If the different storage systems would provide the same basic information in the same way any administrator tool could access the information and use it. It is a simple concept that works reasonably well for heterogeneous server environments due to generally broad compliance with a few basic standards. The Storage Networking Industry Association (SNIA) launched a similar effort for the storage industry called the Storage Management Initiative-Specification (SMI-S)

There is no shortage of standards and standards bodies in the information systems industry. The proliferation of standards, in fact, has provided the punch line of numerous jokes. The goal of standards for IT management is to usher in the era of information systems and storage resource management (SRM) efficiency where disparate systems from different vendors can seamlessly share information and ensure full management visibility through a single console.

Although server resource management works in the server environment, it is still not generally possible for a storage administrator to sit at a network connected console and see an entire heterogeneous storage infrastructure with sufficient visibility to know the status of the various elements and manage the infrastructure at a meaningful level. Storage situations where SRM works fully as intended remain the exceptions, not the rule.

SMI-S defines a set of storage standards for the purpose of making cross-platform/vendor SRM easier, more efficient, and more effective. Yet, despite the availability of SMI-S

and its seeming support among leading storage vendors, Independent Assessment has found that many IT storage managers are unaware of or unfamiliar with SMI-S. Only a few of the storage managers interviewed actively use SMI-S. It is important to note, however, that an SRM tool's use of SMI-S functionality may not be apparent to the user. Some SRM tool providers combine direct device support and SMI-S.

Although expectations for SMI-S were quite high the initial efforts apparently fell short of those expectations and failed to generate the enthusiasm necessary to drive widespread acceptance among storage users. Today, many of those storage managers who are familiar with SMI-S are unsatisfied with SMI-S. Others are skeptical. Some seem resentful that it has not achieved more, faster.

Today IT managers familiar with it cannot readily use SMI-S support as a key part of their storage acquisition process because not enough vendors put enough of their products through the SMI-S conformance testing (and certification) process. So, SMI-S has reached a crossroad. To become a useful and effective standard, it needs more storage vendors to put more of their products through the SMI-S conformance process. At the same time, more storage managers have to demand SMI-S conformance from their vendors as part of the storage acquisition process.

The paper that follows:

- Describes the SRM process in more detail and explains how SMI-S can meet the demands of SRM today
- Explains SMI-S in more detail
- Identifies the value SMI-S brings
- Addresses myths, misconceptions, and complaints about SMI-S
- Reviews alternative and complementary approaches to SMI-S
- Introduces the SMI-S conformance test program (CTP)
- Presents a summary of findings and lessons learned

Methodology

The research for this paper was conducted in the first half of 2010. It entailed interviews with about two dozen storage managers at a variety of large and midsize organizations. It also involved interviews with individuals who worked on various aspects of SMI-S. The content of this paper is based strictly on this qualitative research.

The SRM process today

SRM today is mainly about visibility into storage. At a minimum, IT managers want to quickly and easily know how much storage across all devices and platforms the organization has. Surprisingly, this is not an easy question to answer, especially in a heterogeneous storage environment.

Although SRM tools can do more than just collect information about storage IT managers and storage administrators deploy SRM tools to answer, at a minimum, four basic questions about their storage:

1. How much storage does the organization have across all storage platforms?
2. How much of that is used and how much is available?
3. What applications and business units are the biggest consumers of storage?
4. How fast is storage being consumed and when will the organization need more?

Without a heterogeneous SRM tool, the storage administrator must access each storage device through the vendor's device manager to collect the information, which is then copied and pasted into a spreadsheet. Often the information is not in a standard format so a certain amount of data normalization must be undertaken. This SRM process, without a standard storage information model across all platforms and devices, is slow, labor-intensive, and, as a result, more costly than it need be.

The intent of SMI-S was to give storage vendors and SRM tool developers a consistent standard information model that would facilitate the collection and exchange of this basic storage information to answer the most common questions about storage. In addition, SMI-S provides a common way to perform such basic functions as storage provisioning and LUN masking across heterogeneous arrays although Intelligent Assessment encountered no storage managers using SRM for that.

Through SMI-S conformance testing, IT managers have a way to determine which vendors and products actually comply with this simple information model and use that knowledge as part of their storage acquisition decision. SNIA's Conformance Test Program (CTP), however, is not easy to access or intuitive for storage managers to use [see CTP Overview below].

The next step for storage managers using SRM is to not only review and analyze the storage information but to act on the information gained through the SMI-S conforming SRM tool. This might entail provisioning or reallocating storage capacity or even trouble shooting storage problems across disparate storage systems. No storage managers interviewed by Independent Assessment for this report are even interested in attempting this currently, preferring to use each vendor's device manager.

Without a widely adopted standard like SMI-S, the few SRM tools that promised to do this relied extensively on their own agents and proved costly and difficult to deploy. A new generation of SRM tools does not use conventional agents and take advantage of SMI-S where it is supported. These tools, however, are less ambitious in what they do and less broad in their multi-vendor scope.

SMI-S explained

As noted above, SMI-S defines a set of storage standards developed by SNIA for the purpose of making cross-platform/vendor SRM easier, more efficient, and more effective. It has been ratified as an ANSI standard, ANSI INCITS 388-2004. SMI-S is based on the Common Information Model (CIM) and the Web-based Enterprise Management (WBEM) standards defined by the Distributed Management Task Force (DMTF). The expectation from the outset was that SMI-S will do for storage management what CIM and DMTF do for server and desktop management.

The first release of SMI-S occurred in 2007. Today the specification is on Revision 6, demonstrating ongoing active development. The purpose from the start was to enable broad multi-vendor management interoperability in the hope of increasing storage management efficiency. To that end, the specification defines an open yet extensible interface that allows subsystems and devices within the global context of a large multi-vendor (heterogeneous) storage system to be reliably and securely managed by overlying presentation frameworks and continuously evolving management systems.

SMI-S defines a single common management interface, which enables SAN vendors and integrators to decrease the time required to bring new and more functional technology, products, and solutions to market all the while allowing storage management systems to reliably identify, classify, monitor, and control physical and logical resources in a storage system.

Ironically, the extensibility considered essential to preserve flexibility for vendors and system integrators has frustrated many IT managers who complain that vendor extensions hinder management interoperability. Maybe SMI-S was oversold or, more likely, misunderstood from the start. IT managers did not appreciate the need for extensions and felt betrayed when vendors claimed SMI-S compatibility for products with proprietary extensions.

Expectations for SMI-S among IT managers that ran very high at the start have since nosedived to the point where Independent Assessment found little enthusiasm for the standard today. Many IT managers have stopped even following the standard, feeling it has become captive to the vendors.

Clearly IT managers had unrealistic expectations for SMI-S at the outset. All IT standards efforts experience tension between the needs of the vendors who create technology to foster innovation and hope to preserve competitive advantage and IT users who prefer

things simple and plain (except, of course, when a really compelling innovation appears). SMI-S experiences those tensions and the adoption of extensions is the solution. It has the advantage that the extensions are identified and documented. At least it eliminates surprises, and the result is a balance between innovation/flexibility and consistency.

The value SMI-S brings SRM

The value of SMI-S becomes apparent as soon as the organization tries to manage a storage environment with different storage devices, a heterogeneous storage environment. The devices needn't even be from different storage vendors. Often a vendor's various storage products or even the same product but at a different release level must be managed differently. When that happens, SMI-S conformance can bring value.

If—and this is a big if today—the organization deploys SMI-S conforming products, then it should be able to perform basic management tasks through a single console across all the SMI-S conforming devices. These basic management tasks primarily involve monitoring storage devices and collecting data about storage usage and using the information to perform basic management of the storage capacity, such as provisioning. That is the key value proposition of SMI-S.

SNIA suggests such work constitutes about 80% of what a storage administrator does. Storage managers interviewed by Independent Assessment estimate it amounts to about half of what the administrator does. The other half revolves around provisioning, storage allocation, and monitoring and managing access (security). In truth, SMI-S defines methods to enable a management tool to perform these basic management functions across heterogeneous storage too, as well as collect information. They just have to be implemented and supported by the management tool.

In short SMI-S addresses the need for end-to-end storage visibility and makes efficient the gathering of cross-platform storage information. Whether it is 80% or 50% of the storage administrator's job, it provides indisputable management efficiency and value when conforming SMI-S storage elements are in place. The problem, voiced by storage managers, is that not enough of the products they buy conform to SMI-S, and they can't restrict their storage acquisitions at this point to only those products that do.

Ironically, a broad number of vendors claim SMI-S support at some level, but not for all their products. Similarly, some vendors did conformance testing at early levels of the conformance tests but have not retested the products for conformance with today's more recent versions of the conformance tests.

Myths, misconceptions, and complaints

A number of myths, misconceptions, and complaints quickly arose around SMI-S, which may have been the result of wishful thinking or over-promising by some or unrealistically high expectations by others. Standards, however, take time to evolve, establish themselves, and achieve widespread adoption.

In just a few years, SMI-S has progressed to Release 6. It lists almost three dozen large vendors on its roster, about a dozen and a half midsize vendors, and over two dozen small vendors participating at various levels. In addition, it identifies dozens of non-profit institutions and channel affiliates involved. In short, almost every storage vendor of any significance has some involvement. Unfortunately, not all of these players have submitted products for SMI-S conformance testing or have tested their products for the latest test version.

Despite the public acceptance by the storage industry, myths, misperceptions, and complaints persist:

- SMI-S doesn't work—numerous IT managers say this although many haven't even tried it. The myth alone is enough to discourage them. In truth, it does work when all the pieces are correctly aligned. Differences as slight as product release levels, however, can hinder its effectiveness.
- SMI-S is costly—this is not true. From the standpoint of the IT manager, SMI-S is free. The cost of SMI-S participation to the vendor is small in the overall pricing picture and can't have more than negligible impact in product pricing if any.
- SMI-S is too limited—this is a fair complaint. Not enough vendors have submitted their products for SMI-S testing and many others don't retest their products as the standard advances. If IT managers demand SMI-S compliant products more choices will quickly appear.
- Conformance Test Program (CTP) isn't comprehensive—correct, it is still evolving. However, it is a good starting point as a tool for measuring the capabilities that are being tested.
- CTP results are difficult to find and use—this is a fair complaint. SMI-S and CTP were developed by engineers primarily for use by other storage engineers. CTP staff say they are working to make the CTP results Web pages easier to find and navigate and the results easier to understand by rank-and-file IT and storage managers.
- CTP results don't cover my storage—see above; too few vendors are submitting their products to the latest conformance tests. Make your storage vendors aware that future orders will require SMI-S conformance testing.

- SMI-S is controlled by big vendors—maybe not controlled but big vendors do have considerable input; this is a fact of economics. The same can be said for the IT industry in general; big vendors have more clout. That big vendors feel SMI-S is important enough to want input generally is a good thing for the future of SMI-S. IT managers should encourage their vendors to increase their participation.
- Nothing in SMI-S is for storage managers—not so. CTP can be of significant value to storage managers if they would cruise the site and use it. Certainly more product results need to be posted, but for the products there it can be informative and guide more informed product selection.
- Visibility but not administrative control—this is correct to a point. It can do more but it is not being used that way. SMI-S today is most used to enable visibility into storage products and to collect information about storage usage. It will gain more capabilities but it certainly does not replace the vendors’ device managers and was never intended to.

Complementary and alternative options

SMI-S is not the only option when looking to streamline SRM in a heterogeneous storage environment. The following table identifies five options and their advantages/disadvantages.

SMI-S Alternatives	Advantages/Disadvantages
SNMP	Well established, widely used, well known Gives network info, not about storage
Scripting	Proven way to automate data collection Requires scriptwriting skills Scripts must change when storage changes
Virtualized storage pools	Requires virtualization management tools Limited visibility beyond the virtualization layer
Proprietary management interfaces	Need an element/device manager for each storage product Scripting still required for an aggregated view of all storage elements
Transparent cloud storage	A nascent offering that does not yet replace the need for efficient, multi-vendor SRM and may never More like virtualized storage pools

CTP overview

To make SMI-S meaningful, SNIA set up the Conformance Test Program (CTP). Through CTP SNIA provides an impartial validation of a storage management software product and affirms that an item of storage networking infrastructure conforms to a particular version of SMI-S. SNIA makes a point of emphasizing that SMI-S and CTP are vendor-neutral.

Vendors test their products through CTP to validate conformance with the management specification and prove they can interoperate on a management level with other SMI-S conforming products at that level. Products that post CTP results have passed the test and are valid. SNIA does not list products that have been tested and failed.

It is important to note that CTP validates a product to conform to a particular version of

the specification. SMI-S, however, supports backward compatibility. A product tested for version 1.0 still will work for devices tested for v1.4, but it won't recognize capabilities added in the more recent releases. For management interoperability to work seamlessly, it is best that all products involved be validated for the same SMI-S version.

CTP began in March of 2004 and has released multiple versions of test suites to validate conformance of SMI-S enabled products since the program's beginning. CTP consists of vendor neutral master test suites that are developed, owned, and operated by the SNIA. CTP offers testing for SAN device management software that conforms to SMI-S. This set of tests is known as the SMI-Provider test. CTP also provides testing for software that manages the overall SAN using SMI-S, known as the SMI-Client test.

CTP is constantly evolving and improving with each release. The current version is release 1.4. SNIA reports that the tests get stronger with each release. Validation of products based on CTP releases before 1.3 or 1.4 is probably not very meaningful. It is in the vendors' interests to update their validation for each new release even if they are not taking advantage of the latest capabilities.

SNIA's goal is to make CTP validation a must-have for any storage product. Ideally CTP validation would play a role in storage purchase decision similar to the role of CARFAX in providing authoritative vehicle history in used car purchase decisions.

Applying CTP—a storage manager's view

Given its high hopes for CTP, SNIA makes it surprisingly difficult for storage managers to use it. As of this writing, there is no direct link to CTP or CTP results from the SNIA home page. The easiest way to find it is to type CTP into the search box on the [SNIA home page](http://www.snia.org) [<http://www.snia.org>]. Or, you can follow this [link](http://www.snia.org/forums/smi/tech_programs/ctp/). [http://www.snia.org/forums/smi/tech_programs/ctp/]

You can find vendor testing results [here](#) and [here](#).

The results aren't easy to navigate. Every product listed has passed CTP at some release level. As noted above, these pages were designed for use by storage engineers working at vendors. Note that not every participating vendor's product has been tested. You will have to look closely to see if the particular product you are considering is listed. If there, make sure to note which release version it tested for.

Independent Assessment recommends that SNIA follow the example of the [Desktop Management Task Force](http://www.dmft.org) [<http://www.dmft.org>] where conformance testing programs are front and center on the landing page.

Findings—Lesson learned

It is clear from discussions with IT and storage managers that there is a need for something like SMI-S for the increasingly heterogeneous storage world organizations inhabit. At a time when organizations are pressured to do more with less, the costly inefficiencies involved in trying to manage heterogeneous storage across midsize and large enterprises are unacceptable. IT managers should be embracing SMI-S and demanding their vendors participate.

However, SNIA has done a weak job communicating the purpose and value of SMI-S and CTP, which is the crucial piece that makes it all worthwhile. Many IT managers simply are unaware of SMI-S or what it can do for them. Many don't even realize there is a conformance program or that test results are available to the public for free. Those who are familiar with SMI-S and CTP are disappointed in its lack of impact to date and frustrated by the sparse set of current CTP-validated products.

In addition, the storage managers interviewed by Independent Assessment consider SMI-S a vendor-dominated process intended to serve the interests of the vendors more than the buyers and users of the technology.

It is difficult to pinpoint blame. SNIA certainly has been far too lax in promoting the existence and value of SMI-S to storage vendors, tool vendors, and storage users. The website is far too difficult to use and CTP results too hard to find and understand. In addition, SNIA must begin to build the business value case for vendor participation.

However, IT managers also share some of the blame. They have been given access for free to what could be a powerful lever when buying storage but they have failed to agitate at SNIA and among their vendors for it. CTP results should be one of the most powerful levers a storage manager can push when negotiating storage prices and selecting among vendors. But again, SNIA has not provided a mechanism by which storage managers can easily make their views known.

Conclusion—Work in progress

Maybe in the future, the Cloud will make cross-vendor storage management transparent or unnecessary, but that isn't the case yet and probably not ever (The storage behind the cloud must be managed too.). Still, there exists today a clear need for multi-vendor SRM and SMI-S remains as the most likely choice to enable it. With too few products validated through CTP, however, SMI-S still must be considered a work in progress. SNIA reports that development work, indeed, continues.

Beyond standards development more work needs to be done to drive vendor and storage manager involvement. Vendors, without a compelling business case, are unlikely to do much beyond giving lip service to the specification until their customers demand SMI-S

conformance in the products they buy. Storage managers that want standards-based cross-platform SRM, with all the efficiencies that delivers, need to put pressure on the vendors to demonstrate their SM I-S conformance or risk losing their business.

Ideally, CTP must evolve into the storage equivalent of CARFAX, where used car buyers insist on seeing the CARFAX report before they buy the car (or they risk buying a car that was, say, buried under Hurricane Katrina flood waters or such). In effect, storage managers must demand to see the latest CTP validation before they buy the product. The use of CTP results is where the value of SMI-S conformance finally pays off. Only when IT managers use CTP results to make buying decisions will vendors rush to ensure all their products pass the latest version of CTP. When that happens SMI-S finally will be in a position to achieve its full potential.

About Independent Assessment

Independent Assessment is the IT and business assessment, analysis, and writing service of Alan Radding, an independent business and IT analyst/writer for over 20 years. It provides independent ROI and TCO analysis, competitive assessment and positioning reports, case studies, white papers, and Web content.

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