



Education

# Solving Business-Oriented Goals with SMI-S

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## ➤ Solving Business-Oriented Goals with SMI-S

- This tutorial discusses how the SMI-S standard relates to business goals. SMI-S is a standard for storage management; the standard itself is targeted to developers and does not directly talk a lot about its relationship to businesses. This tutorial looks at the capabilities offered by SMI-S and presents them with a focus on how they apply in an IT environment. The tutorial looks at the functionality is SMI-S 1.0 to 1.2 (available in many shipping products), additional functionality added in the recently completed 1.3 version, and functionality planned for future releases. In addition to looking at the functionality in the standard itself, this tutorial also looks at end-user oriented aspects of the SMI ecosystem, including conformance testing and recent activity aimed at making it easier to install SMI-S solutions.

# What is SMI-S?

## ➤ SMI-S is a standard for storage management

- ◆ 'Management' includes monitoring (display status of devices) and active management (provisioning)
- ◆ The storage covered by SMI-S was originally Fibre Channel SAN components (switches, arrays, tape libraries, HBAs), but has expanded over time
- ◆ The standard relates to the interface between applications (such as SRM tools) and device management components



**Check out SNIA Tutorial:  
Introduction to Storage  
Management**

# What are Business-Oriented Goals?

- Standards (like SMI-S) are defined to allow interoperability between products from different companies
  - ◆ Defined in terms of how software or firmware components communicate
  - ◆ May not be clear how the standard helps with real work
- Example: SCSI standard defines how to move blocks of data between an initiator and target
  - ◆ Intended audience of standard is firmware and driver engineers
  - ◆ Accomplishes business goals related to saving and retrieving databases, filesystems, etc from disk and tape
    - But you won't find much discussion of databases and filesystems in SCSI standards

# SMI-S Standard and Business Goals

- SMI-S standardizes storage management
  - ◆ The intended audience for the SMI-S standard is the coders for management applications and instrumentation
    - › Logs of details on the communication between applications and devices
  - ◆ Storage management business goals include monitoring and provisioning
    - › This tutorial discusses the business goals enabled by SMI-S for common device types

# Storage Management Business Goals

- “I want to be able to determine ...”
  - ◆ What devices are available?
    - I thought I paid for six disk arrays, how come it looks five or seven are available?
    - How do I tell them apart?
  - ◆ Do I need to buy more soon?
    - How much capacity is still available?
  - ◆ Am I using the devices I have effectively
    - Can I re-connect things to get better throughput?
    - Do the devices have features I could use?
- These types of goals can be met by finding information about the devices (passive management)

# Storage Management Business Goals

- “I want to change something“
  - ◆ I want to use some more of the unused capacity
    - > I want to create a LUN
    - > I want to expand a LUN
  - ◆ I’m done using capacity and want to make it available for re-use
  - ◆ I want to control access
    - > LUN masking and Zoning
  - ◆ I want to change a configuration setting
    - > Disable a port
- These types of goals can be met by provisioning (active management)

# Storage Management Business Goals

- “I want to be notified (paged, emailed) when...”
  - ◆ Something has just broken
  - ◆ Running low on capacity
  - ◆ Something has unexpectedly changed
  - ◆ Something has unexpectedly shown up
    - Why is there a new HBA?
- These types of goals can be met by event reporting

# Overview of Presentation

- Will look at Arrays, FC Switches, HBAs
  - ◆ Will look at “essential” management functionality related to business goals
  - ◆ Note that SMI-S includes a *lot* more functionality
- Quick overview of things added to SMI-S in last couple of years
  - ◆ types of devices
  - ◆ Additional functionality
- Quick overview of types of devices and functionality being planned

# Storage Management Business Goals

- For a given type of device (for example, array)
  - ◆ Information about the device
  - ◆ Information about key components in the device
    - › For example, LUNs in an array
    - › Key components not always physical (zones in a switch)
  - ◆ Provisioning
    - › For example, creating LUNs in an array or Creating Zones in a switch
  - ◆ “Real Time” monitoring - asynchronous events
    - › Changes in key components
    - › Alerts (health, thresholds, capacity)

# Arrays –Information about the Array

- Manufacturer
- Model
- Serial Number (or similar array ID)
- Firmware Version
- Ports and Connectivity
  - ◆ Ports connected (or connectable) to hosts
  - ◆ Ports connected to disks
  - ◆ Ports connected to other arrays (remote copy)

# Arrays – LUN & Disk Information

- LUN Names/IDs
  - ◆ SMI-S requires names based on standards (like SCSI)
  - ◆ Allows application software or admin to determine LUNs used by file-systems, databases, ...
- Which LUNs are mapped (and unmapped) to hosts
- Which pools (RAID sets) are LUNs carved from
- LUN/HBA mapping information
  - ◆ Which HBAs are permitted to access each LUN
- RAID and Spare information
- Physical Disks
  - ◆ Disk Sizes
  - ◆ Which disks are associated to LUNs

# Arrays – Provisioning & Alerts

- Create a Pool – select RAID type, spares, capacity, other characteristics that define ‘quality of service’
- Expand a pool by adding more disks
- Remove a pool
- Create a LUN (and expand and remove)
- LUN masking – specify HBAs allowed to see LUN
- LUN masking – Add/Remove HBAs
- Events sent when anything in the previous ‘information’ slides changes

# Switches – Information about Switches

- Manufacturer
- Model
- Serial Number
- Firmware Version
- Switch WWN
- Ports – available and in-use
- Port Types

# Switches/Fabric - Provisioning

## ➤ Zones

- ◆ Create and delete a zone
- ◆ Add and delete members

## ➤ Zonesets

- ◆ Similar to zones plus Activate and Deactivate

## ➤ Switches

- ◆ Disable, Enable, Reset
- ◆ Set name, domain

## ➤ Switch Ports

- ◆ Set speed and type

# Fabric/Switch Events

- Events sent when anything in the previous ‘information’ slides changes
- Modification of zone database
- Zoneset activated

- Information about HBAs
  - ◆ Manufacturer
  - ◆ Model
  - ◆ Serial Number (or similar HBA ID)
  - ◆ Firmware Version
  - ◆ Port count, status, WWNs
- No provisioning
- Events sent when anything above in ‘information’ changes

# SMI-S benefits for end users

- Minimize vendor lock-in
- Allow applications (SRM, CRM, ...) to operate across more storage quickly



**Check out SNIA Tutorial:  
SRM: Can you Get What you  
Want?**

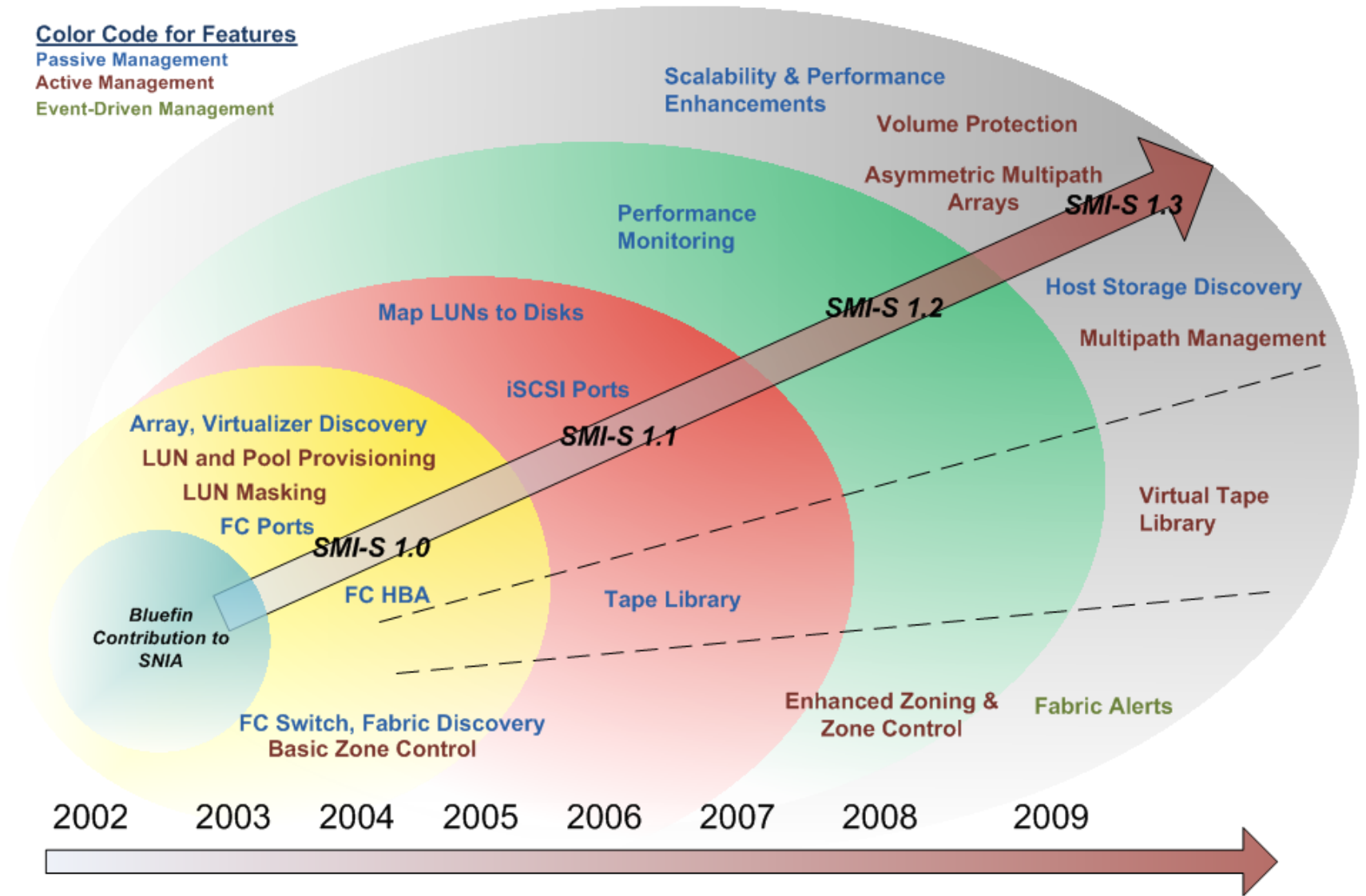
- How to get vendors to support SMI-S
  - ◆ Include SMI-S in RFQs/RFPs
  - ◆ Let vendors know your goals for storage management (and SMI-S)
  - ◆ Let vendors know that SMI-S may now apply to them
    - has increased scope, and is minimizing gaps

# CTP Conformant Implementations

(CTP is the SMI-S Conformance Testing Program)

Color Code for Features

- Passive Management
- Active Management
- Event-Driven Management



## ➤ Additional Devices & Features in Standard

- ◆ NAS appliances
  - › Monitoring, provisioning, performance monitoring
  - › Virtual file server provisioning
- ◆ Storage Enclosure, Fan, Power Supply
- ◆ iSCSI Controllers (and Software Initiators)
- ◆ Fabric Scalability & Performance Enhancements
- ◆ Virtual Tape Library
- ◆ Host RAID Controllers
- ◆ Local Array Snapshot and mirror copies
- ◆ And many more...

- Enhancements being developed
  - Remote Array Snapshot and mirror copies
  - Thin Provisioning
  - Mainframe ports
  - FCoE
  - Power Monitoring
  - Partitioned Tape Libraries
  - NAS remote copies

- Promoting ease of installation and configuration
  - ◆ Tutorials, white papers for developers
  - ◆ Adding standardization of management of the management environment
  - ◆ Ease of access to installation documentation
- Business Goals in Conformance Tests (CTP)
  - ◆ Starting this year, results will be reported as features from business perspective (e.g. LUN Creation)
  - ◆ Distinguishing Active, Passive, and Event-Driven feature support
- Comprehensive Alert Reporting

- Please send any questions or comments on this presentation to SNIA:  
*track-virtualization@snia.org*

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