

Microsoft Perspective on SMI-S

Deborah Jones - djones@microsoft.com
Senior Development Lead, Microsoft

Mohamed Lawindi - mlawindi@microsoft.com
Software Development Engineer, Microsoft

- ❑ Microsoft is working on adopting SMI-S standards for Windows storage components and services.
- ❑ Goals for this presentation
 - ❑ Share Microsoft thoughts about SMI-S profiles considered for Windows storage components and services.
 - ❑ Share insights into some Microsoft SMI-S compliant providers prototypes.

- ❑ Standards
- ❑ WS-Management
- ❑ SMI-S Providers on Windows
- ❑ SMI-S for Microsoft Windows Storage Components
- ❑ Microsoft SMI-S Prototypes currently under development:
 - ❑ File Sharing Management
 - ❑ iSCSI Target Management
 - ❑ Disk and Volume Management

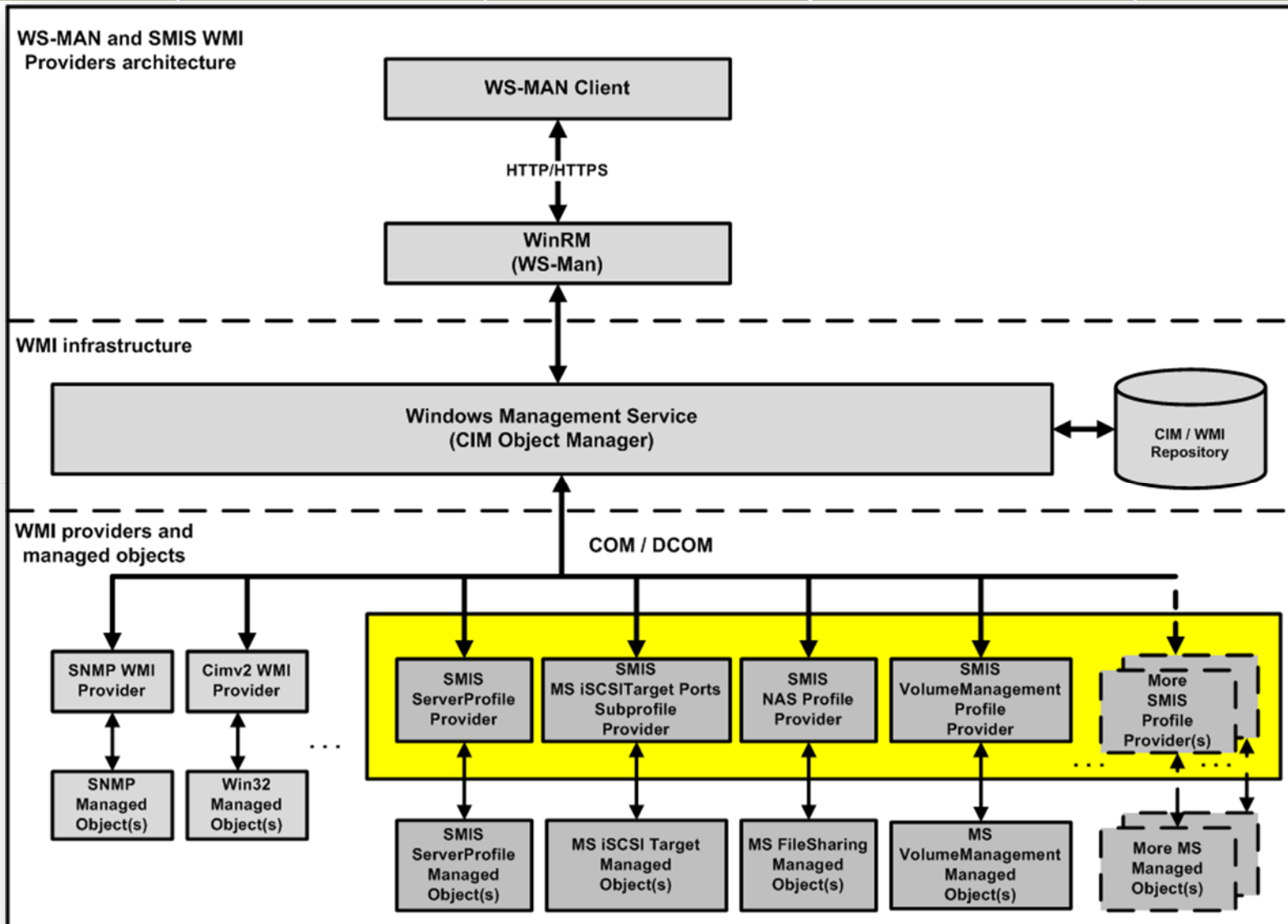
- Investigate adding SMI-S support based on
 - SMI-S v1.3
 - DMTF CIM 2.15
 - DMTF WS-Management Specifications.
 - WS-Management 1.0 [DMTF-DSP0226]
 - WS-CIM Mapping 1.0 [DMTF-DSP0230]
 - WS-Management – CIM binding [DMTF-DSP0227]

- ❑ WS-Management is a standard that has been ratified final by DMTF in April 2008.
- ❑ Builds on top of existing web service standards
 - ❑ SOAP, WSDL, WS-Addressing, WS-Transfer, WS-Enumeration.
 - ❑ Compatible with CIM (through WS-CIM mapping).
- ❑ WinRM (Windows Remote Management) is the Microsoft implementation of WS-Management Protocol.

SMI-S Providers on Windows

- SMI-S Profiles can be implemented as WMI (Windows Management Instrumentation) providers.
- WMI in combination with WinRM allows SMI-S profiles to be implemented as WMI Providers.

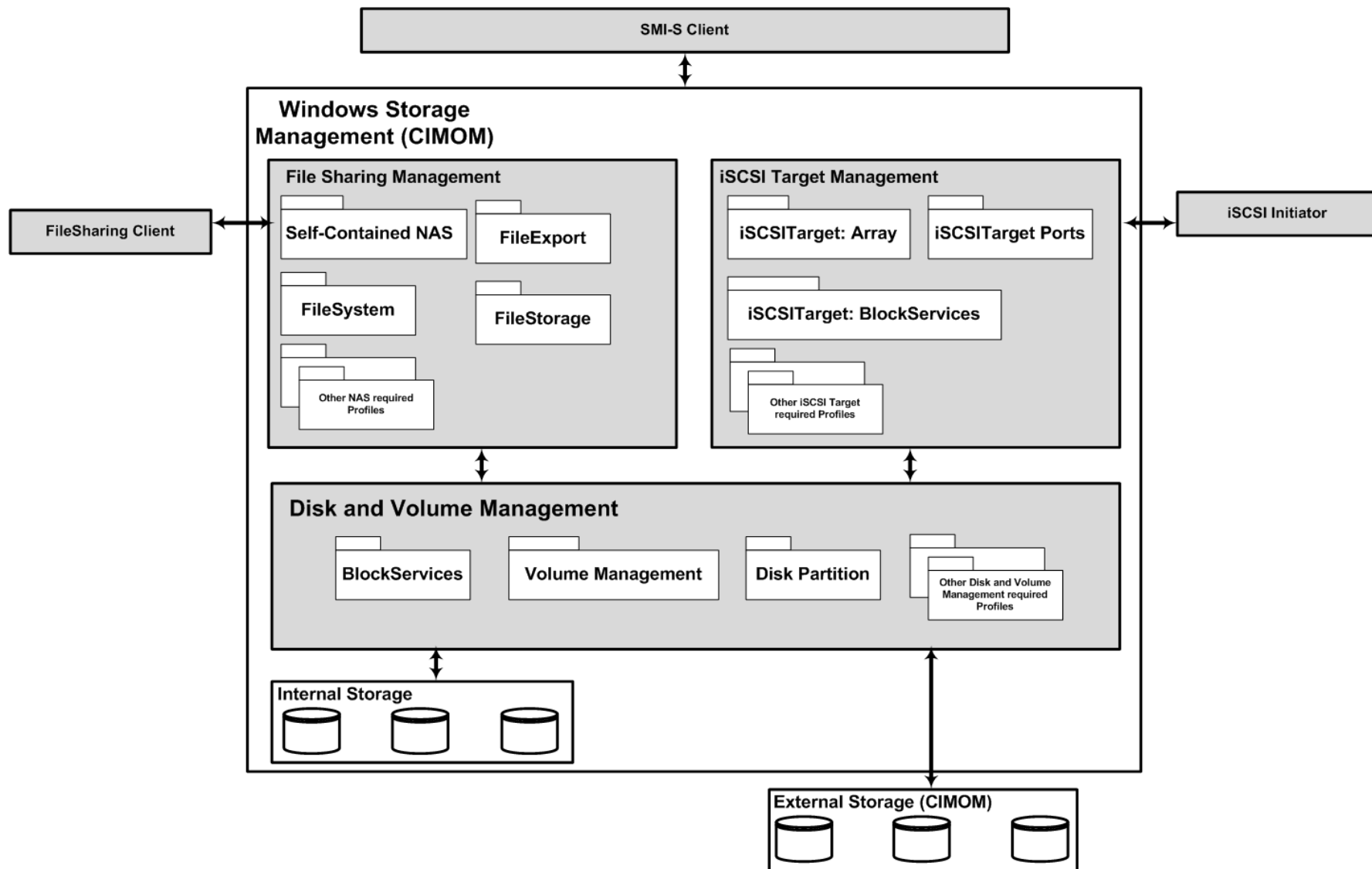
SMI-S WMI Providers



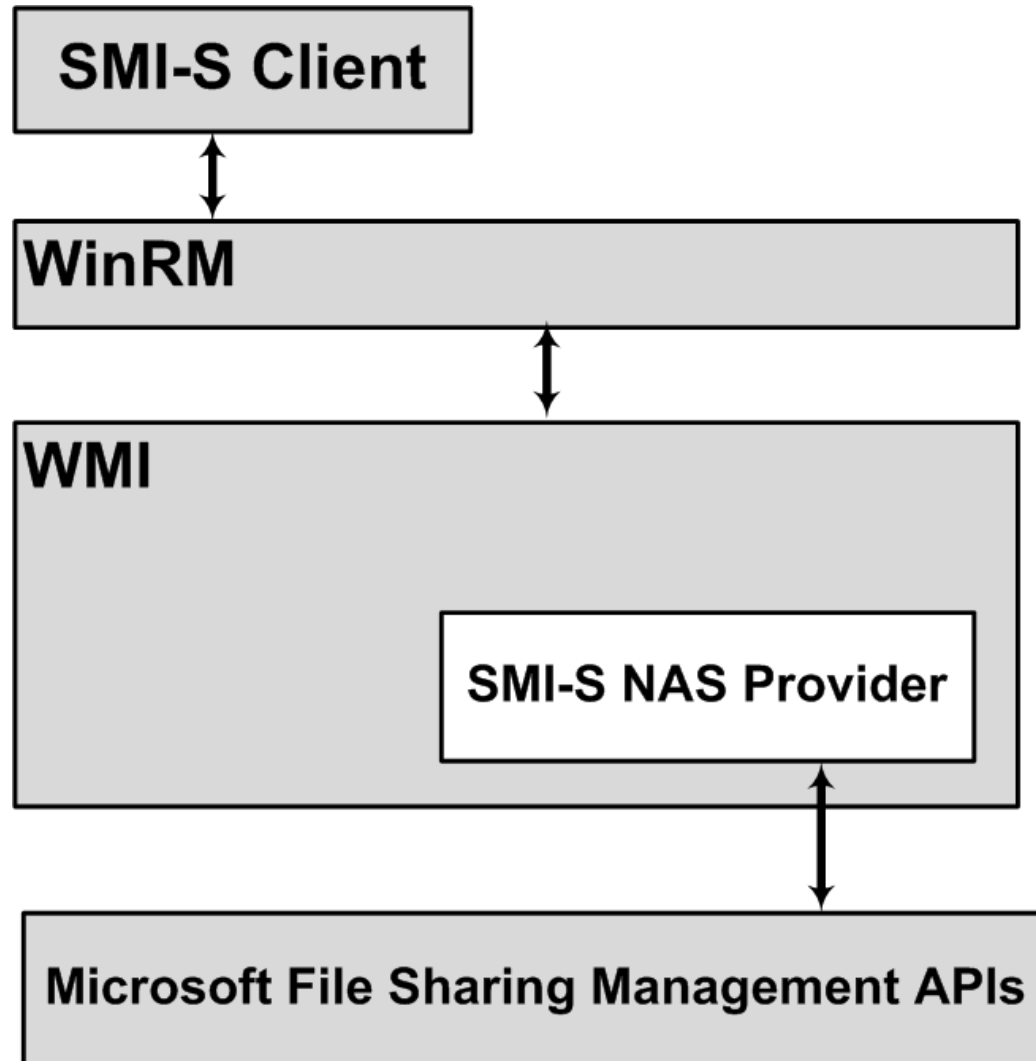
- ❑ **Windows storage components considered for SMI-S**
 - ❑ File Sharing
 - ❑ Microsoft iSCSI Target
 - ❑ Windows Disk and Volume Management
 - ❑ Initiator Ports
 - ❑ FC HBA
 - ❑ iSCSI Initiator
 - ❑ Storage in Windows Failover Cluster Environment

- ❑ **SMI-S prototypes currently under development for Windows storage component/services:**
 - ❑ File Sharing Management
 - ❑ iSCSI Target Management
 - ❑ Disk and Volume Management
 - ❑ SMI-S servers required profiles
 - ❑ Server
 - ❑ Profile Registration

Architectural View



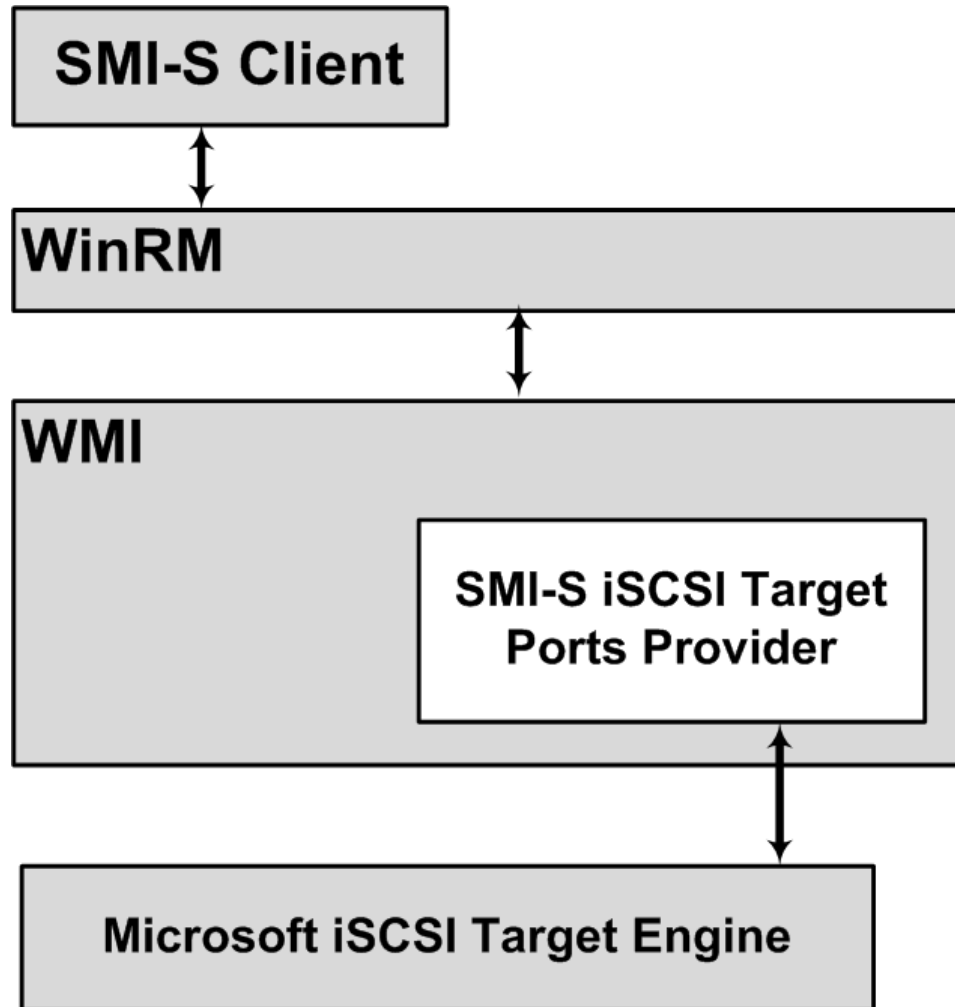
NAS Provider Architectural View



- ❑ **SMI-S Profiles being prototyped to provide management for Microsoft File Sharing:**
 - ❑ Self-Contained NAS
 - ❑ Indication
 - ❑ File System
 - ❑ File Storage
 - ❑ File Export
 - ❑ Physical Package
 - ❑ Block Services
 - ❑ Health
 - ❑ File Export Manipulation

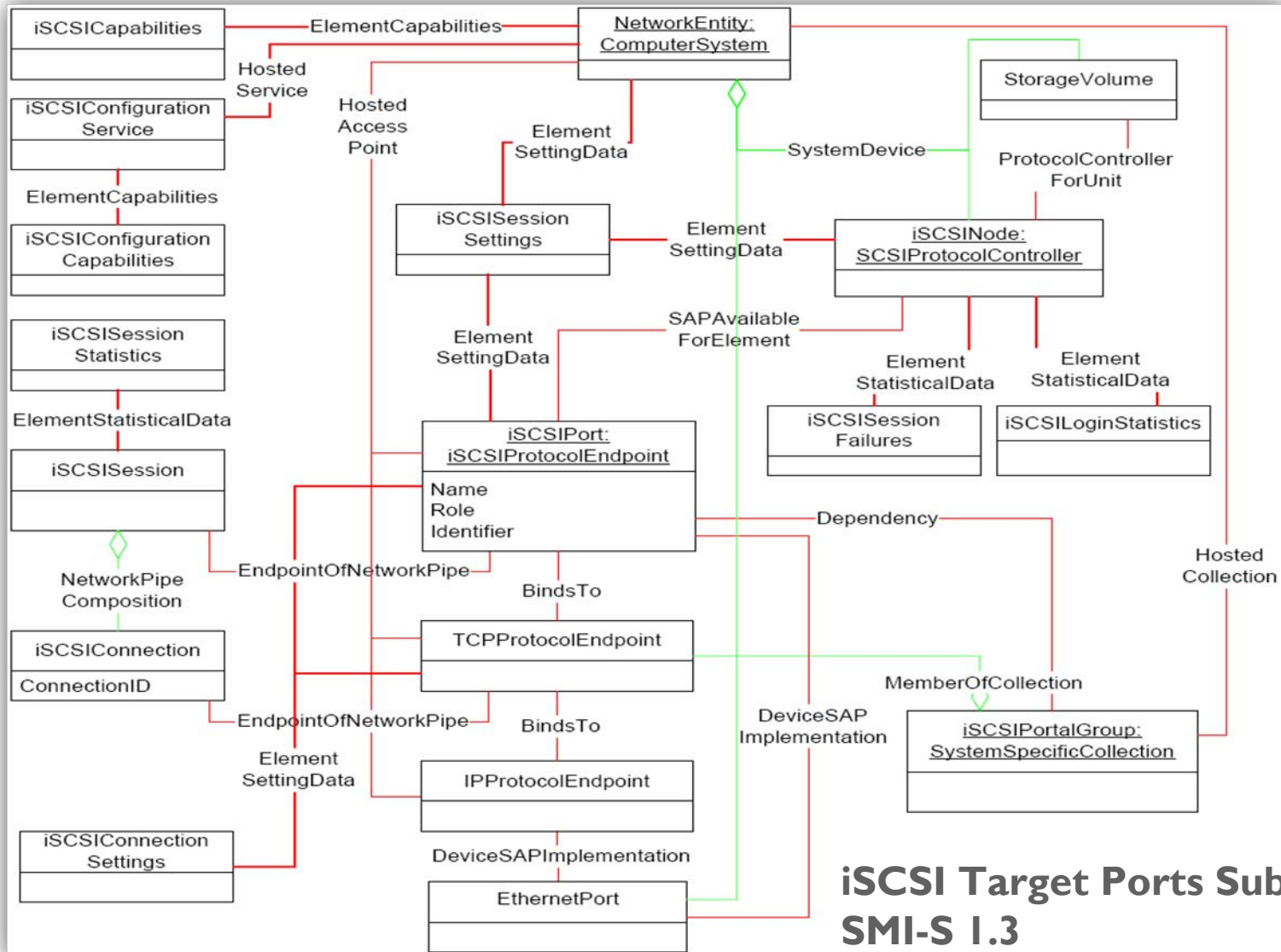
- ❑ **SMI-S methods being prototyped for Microsoft File Sharing:**
 - ❑ File Export Manipulation
 - ❑ CIM_FileExportService
 - ❑ CreateExportedShare
 - ❑ ModifyExportedShare
 - ❑ ReleaseExportedShare

Microsoft iSCSI Target Ports Provider Architectural View



- ❑ **SMI-S Profiles being prototyped to provide management for Microsoft iSCSI Target:**
 - ❑ Array
 - ❑ iSCSI Target Ports
 - ❑ Block Services
 - ❑ Physical Package
 - ❑ Health
 - ❑ Masking and Mapping

Microsoft iSCSI Target Management



iSCSI Target Ports SubProfile SMI-S 1.3

- ❑ **Microsoft iSCSI Target *StorageVolumes* and *StoragePools***
 - ❑ Microsoft iSCSI Target is a software iSCSI Target which resides on a Windows file system.
 - ❑ Microsoft iSCSI Target Disks (LUNs) are:
 - ❑ Represented as instances of CIM_StorageVolumes.
 - ❑ File based.
 - ❑ Created on top of File Systems which require healthy Windows Volumes.
 - ❑ Windows Volumes will form the Microsoft iSCSI Target SMI-S StoragePools (Concrete Pool and a Primordial Pool)

- **Microsoft iSCSI Target Management UML Diagrams:**
 - UML: Microsoft iSCSI Target StorageVolumes and StoragePools
 - UML: Microsoft iSCSI Target File-Based Disks (LUNs) and StorageVolumes
 - UML: Microsoft iSCSI Target StorageVolumes – The Big Picture

Microsoft iSCSI Target Management

Microsoft Object	SMI-S/CIM Object
Microsoft iSCSI Target Disk (LUN) <ul style="list-style-type: none">▪ Backed by a file on a Windows Volume	CIM_StorageVolume (iSCSI Target Ports Subprofile)
Microsoft iSCSI Target <i>Target</i> (iSCSI Node)	CIM_SCSIProtocolController (iSCSI Target Ports Subprofile)

□ SMI-S methods being prototyped for Microsoft iSCSI Target:

□ iSCSI Target Ports

□ CIM_iSCSIConfigurationService

- CreateiSCSINode
- DeleteiSCSINode

□ BlockServices

□ CIM_StorageConfigurationService

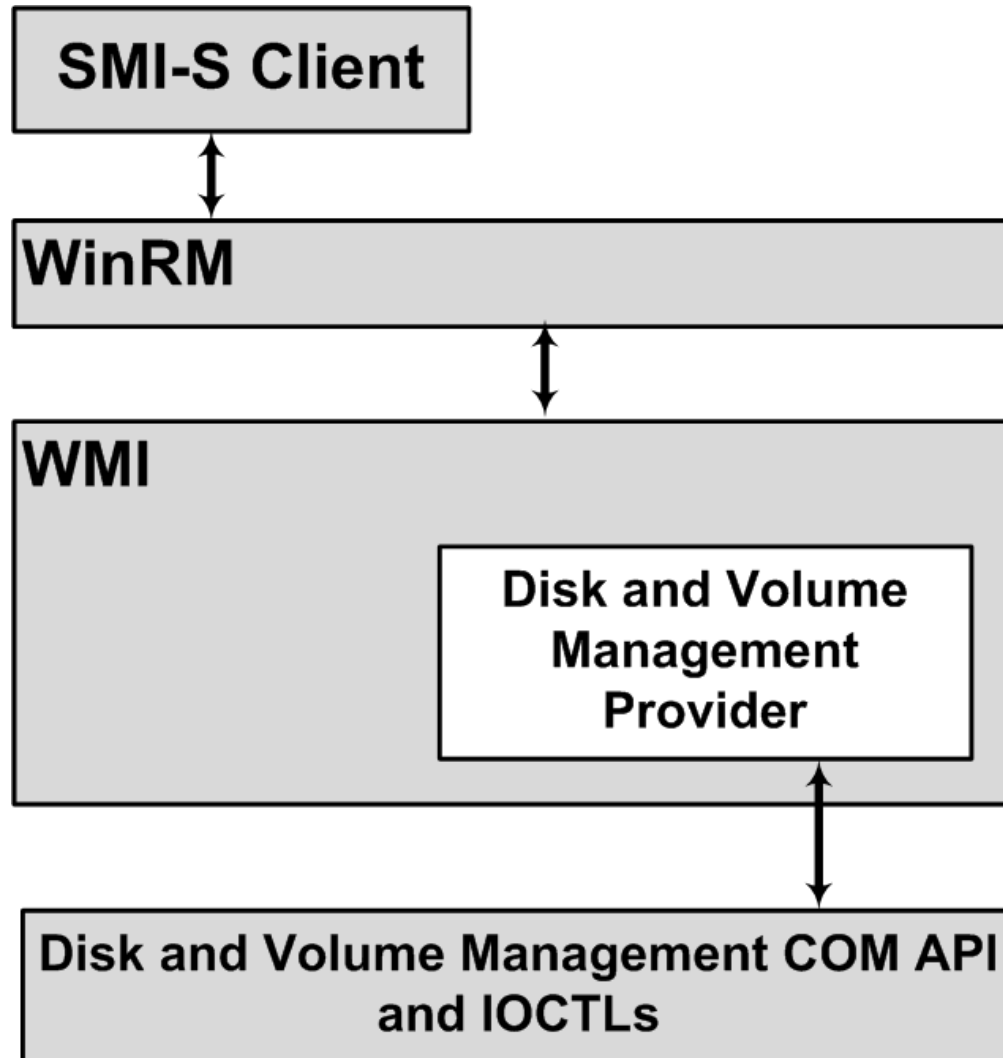
- CreateOrModifyElementFromStoragePool
- ReturnToStoragePool

□ Masking and Mapping

□ CIM_ControllerConfigurationService

- ExposePaths
- HidePaths

Disk and Volume Management



SMI-S Profiles being prototyped for Disks and Volumes:

- ❑ Host Elements
 - ❑ Disk Partition
- ❑ Block Devices
 - ❑ Block Services Package
 - ❑ Disk Drive
 - ❑ Disk Drive Lite
 - ❑ Extent Composition

- ❑ Block Devices (Cont.)
 - ❑ Extent Mapping
 - ❑ Pool Management Policy
 - ❑ Storage Virtualizer
 - ❑ Volume Composition
 - ❑ Block Storage Views
 - ❑ Block Server Performance
 - ❑ Copy Services

Disk and Volume Management

- ❑ Block Devices (Cont.)
 - ❑ Disk Sparing
 - ❑ Block Server Performance
 - ❑ PoolManagement Policy
- ❑ File Systems
 - ❑ File Storage
 - ❑ File System Quota

Disk and Volume Management

Windows Object	SMI-S/CIM Object
<p>Disk Pack or Disk Group</p> <ul style="list-style-type: none">• A logical grouping of disks. For basic disks, the relationship between a disk and its pack is one to one. For dynamic disks, a pack may contain multiple disks.	<p>CIM_StoragePool (Concrete)</p>
<p>Disk</p> <ul style="list-style-type: none">• An OS disk device exposed by Windows PNP. May be backed by an internal disk drive, direct attached storage, or, a LUN exposed by a HW array.	<p>CIM_StorageExtent CIM_SystemDevice</p>
<p>Disk Partition</p> <ul style="list-style-type: none">• A contiguous set of bytes on an OS disk device. May be a Primary partition or and Extended partition.	<p>CIM_GenericDiskPartition CIM_StorageVolume (on basic disks only) CIM_SystemDevice</p>

Disk and Volume Management

Windows Object

Logical Disk

- A contiguous set of bytes on an OS disk device. A type of disk partition with the characteristic that it is contained within an Extended partition.

SMI-S/CIM Object

CIM_LogicalDisk
CIM_StorageVolume
CIM_SystemDevice

Disk and Volume Management

Windows Object	SMI-S/CIM Object
<p>Volume</p> <ul style="list-style-type: none">• A volume object as seen by the Windows operating system. Windows volumes are composed of disk extents. A basic disk volume is composed of a set of contiguous bytes on a single disk. A dynamic disk volume may have multiple extents located on multiple disks.	<p>CIM_StorageExtent CIM_StorageVolume CIM_SystemDevice</p>
<p>LUN</p> <ul style="list-style-type: none">• A logical unit of storage exposed by a HW array or PCI RAID card.	<p>CIM_StorageExtent (OS provider view) CIM_StorageVolume (HW array provider view)</p>

Disk and Volume Management

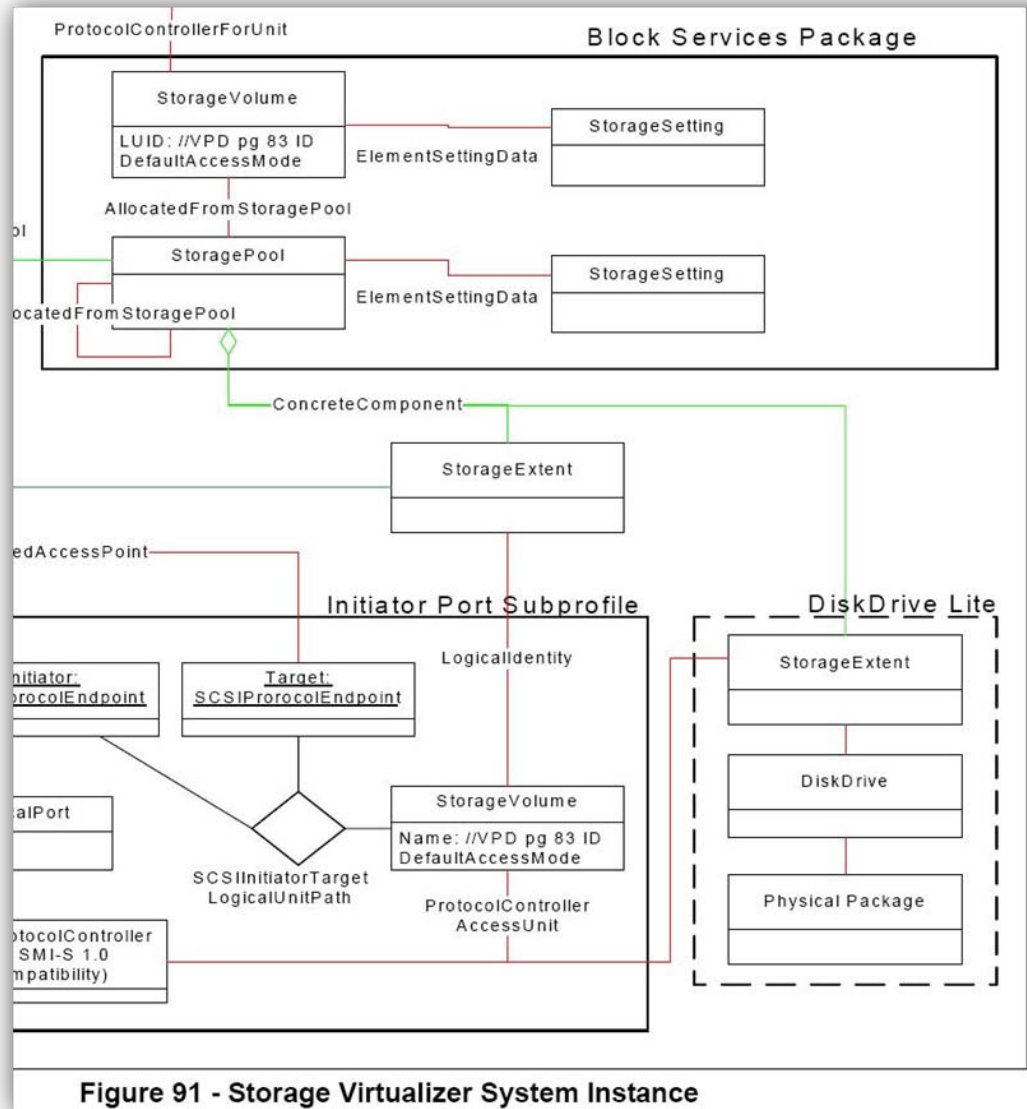


Figure 91 - Storage Virtualizer System Instance

Disk and Volume Management

- ❑ UML OS_01, LUN to Disk to StoragePool.
- ❑ UML OS_06, Disk, partition and volume devices.
- ❑ UML01, Shows Disk and Volume Management to NAS, and to iSCSI

□ Transition Points Between Providers

□ LUN to OS Disk

- LUNs are represented as instances of CIM_StorageVolumes by the HW providers.
- Disk and Volume Management provider storage pools will be composed of extents associated with LUNs and IDE disks.
- LUNs are represented using the CIM_StorageExtent object by the Disk and Volume Management provider.
- OS Disks are mapped to LUNs using the CIM_LogicalIdentity association.
 - The Disk and Volume Management provider will build the CIM_LogicalIdentity association by matching OS disks to their underlying LUNs using the mode page 80/83 information.

- ❑ **Transition Points Between Providers (Cont.)**
 - ❑ OS Volume to iSCSI Target LUN
 - ❑ OS Volumes are represented as using the CIM_StorageExtent object by the iSCSI Target provider.
 - ❑ iSCSI Target provider storage pools will be composed of extents associated with OS Volumes.
 - ❑ OS Volume extents are represented using the CIM_LogicalDisk and CIM_StorageVolume objects by the Disk and Volume Management provider.
 - ❑ OS Volumes are mapped to iSCSI Target provider LUNs using the CIM_LogicalIdentity association.
 - ❑ The iSCSI Target provider will build the CIM_LogicalIdentity association by querying the Disk and Volume Management provider for lists of LogicalDisks and StorageVolumes.

□ Transition Points Between Providers (Cont.)

□ OS Volume to NAS File System Directory

- OS Volume directories are represented using the CIM_LogicalFile object by the NAS provider.
- OS Volume extents are represented using the CIM_LogicalDisk and CIM_StorageVolume objects by the Disk and Volume Management provider .
- OS Volumes may be associated with a CIM_LocalFileSystem object. The Disk and Volume Management provider makes this association when it is present.
- CIM_LocalFileSystem objects are mapped to the NAS provider's CIM_LogicalFile using the FileStorage association.

Q & A