Virtual Media Profile

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Foreword

The *Virtual Media Profile* (DCIM1008) was prepared by the Dell CIM Review Board.

Introduction

This specification identifies the necessary classes, properties, methods, and values to be instantiated and manipulated to represent and manage virtual media modeled using the DMTF Common Information Model (CIM) core and extended model definitions.

This document is intended for implementers who write CIM-based providers or consumers of management interfaces representing the component described herein

Virtual Media Profile

1 Scope

The *Virtual Media Profile* extends the management capabilities of referencing profiles, and provides the capability to manage virtual media sessions and devices that utilize the USB redirection provided by the system.

For KVM (keyboard, video, and mouse) devices, this profile should be used if the devices are to be managed as USB devices. Otherwise, the KVM Redirection Profile should be used.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

2.1 Approved References

DMTF DSP0200, *CIM Operations over HTTP 1.2.0*

DMTF DSP0004, *CIM Infrastructure Specification 2.3.0*

DMTF DSP1000, *Management Profile Specification Template*

DMTF DSP1001, *Management Profile Specification Usage Guide*

DMTF DSP1033, *Profile Registration Profile 1.0.0*

2.2 References under Development

DMTF DSP1077, *Virtual Media Profile 1.0.0*

2.3 Other References

ISO/IEC Directives, Part 2, *Rules for the structure and drafting of International Standards*, http://isotc.iso.org/livelink/livelink.exe?func=ll&objId=4230456&objAction=browse&sort=subtype

Common Information Model (CIM) Specification, version 2.2, June 14, 1999, http://www.dmtf.org/spec/cims.html

Unified Modeling Language (UML) from the Open Management Group (OMG), http://www.uml.org

IETF RFC2234, *Augmented BNF for Syntax Specifications: ABNF*, http://www.ietf.org/rfc/rfc2234.txt

3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply. For the purposes of this document, the terms and definitions given in DSP1033 and DSP1001 also apply.

3.1

can

used for statements of possibility and capability, whether material, physical, or causal

3.2

cannot

used for statements of possibility and capability, whether material, physical, or causal

3.3

conditional

indicates requirements to be followed strictly to conform to the document when the specified conditions are met

3.4

mandatory

indicates requirements to be followed strictly to conform to the document, and from which no deviation is permitted

3.5

may

indicates a course of action permissible within the limits of the document

3.6

need not

indicates a course of action permissible within the limits of the document

3.7

optional

indicates a course of action permissible within the limits of the document

3.8

referencing profile

indicates a profile that owns the definition of this class and can include a reference to this profile in its “Referenced Profiles” table

3.9

shall

indicates requirements to be followed strictly to conform to the document, and from which no deviation is permitted

3.10

shall not

indicates requirements to be followed strictly to conform to the document, and from which no deviation is permitted

3.11

should

indicates that among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required

3.12

should not

indicates that a certain possibility or course of action is deprecated, but not prohibited

3.13

unspecified

indicates that this profile does not define any constraints for the referenced CIM element or operation

3.14
Emulated USB Device

the USB device locally emulated on the managed system, which can be redirected to a remote system which contains the physical USB device

3.15
Remote System

the system which contains the physical USB device, to which the managed system can establish a network connection for an Emulated USB Device

3.16
Virtual Media

composed of an instance of DCIM_OEMVirtualMediaService and an instance of CIM_USBRedirectionSAP. These two instances have an instance of CIM_ServiceAccessBySAP between them. Lastly, there is an instance(s) of CIM_TCPProtocolEndpoint associated to the instance of CIM_USBRedirectionSAP through a CIM_BindsTo association

3.17
USB Redirection SAP

the Service Access Point for a Virtual Media Session as modeled by an instance of CIM_USBRedirectionSAP that is part of Virtual Media

3.18
Virtual Media Service

the instance of DCIM_OEMVirtualMediaService that is part of Virtual Media

3.19
Virtual Media Session

The context and elements of a particular USB Redirection SAP as modeled by an instance of CIM_USBRedirectionSAP

4 Symbols and Abbreviated Terms

The following abbreviation is used in this document.

4.1
HID

Human Interface Device

4.2
MSD

Media Storage Device

4.3
SAP

Service Access Point

4.4
USB

Universal Serial Bus

5 Synopsis

Profile Name: Virtual Media

Version: 1.0.0

Organization: Dell

CIM Schema version: 2.17.0

Central Class: DCIM_OEMVirtualMediaService

Scoping Class: CIM_ComputerSystem

The *Virtual Media Profile* extends the management capabilities of referencing profiles, and provides the capability to manage virtual media sessions and devices that utilize the USB redirection provided by the system.

DCIM_OEMVirtualMediaService is the Central Class of this profile. The DCIM_OEMVirtualMediaService instance is the Central Instance of this profile.

CIM_ComputerSystem is the Scoping Class of this profile. The CIM_ComputerSystem instance, which is associated to the Central Instance through an instance of CIM_HostedService, is the Scoping Instance of this profile.

Table 1 identifies profile on which this profile has a dependency.

Table 1 – Referenced Profiles

Profile Name	Organization	Version	Relationship	Behavior
USB Redirection	DMTF	1.0	Specializes	
Profile Registration	DMTF	1.0	Mandatory	

6 Description (Informative)

The *Virtual Media Profile* specializes:

- Systems can redirect a locally-emulated USB Device to a physical USB Device, or non-USB device, present on a remote system using a network session
- Each USB Redirection SAP can have multiple locally-emulated USB devices and / or USB composite devices.
- Systems can support multiple USB Redirection SAPs concurrently
- An USB Redirection SAP can initiate the connection to the remote system, or listen for a connection request from the remote system
- USB Redirection SAPs and emulated USB Devices can be added.

A Virtual Media is represented by an instance of DCIM_OEMVirtualMediaService, an instance of USBRedirectionSAP, and an instance of the CIM_ServiceAccessBySAP association between them.

A Virtual Media can be in an active, inactive, or available state. When the Virtual Media is active, the USB devices are redirected. Virtual Media state management can be performed by managing the state of the USB Redirection SAP (as modeled by CIM_USBRedirectionSAP), and the state of the Virtual Media Service (as modeled by DCIM_OEMVirtualMediaService).

The Virtual Media capabilities are represented by an instance of CIM_USBRedirectionCapabilities connected to an instance of DCIM_OEMVirtualMediaService by a CIM_ElementCapablities association.

This includes capabilities such as the type and maximum number devices that can be redirected, and RequestStateChange method support among others.

Each instance of DCIM_OEMVirtualMediaService is connected to an instance of CIM_ComputerSystem that represents the Virtual Media Scoping Class by a CIM_HostedService association, and by a CIM_ServiceAffectsElement association.

Each instance of CIM_USBRedirectionSAP is connected to an instance of CIM_ComputerSystem that represents the Virtual Media Scoping Class by a CIM_SAPAvalableForElement association and by a CIM_HostedAccessPoint association.

Each CIM_USBDevice that is redirected to a USB Redirection SAP is connected to the instance of CIM_USBRedirectionSAP that represents the session by an instance of CIM_SAPAvailableForElement.

For each USB Redirection SAP, CIM_TCPProtocolEndpoint represents the port that either the Virtual Media connects through or listens on.

If an instance of a concrete subclass of CIM_LogicalDevice exists and provides another representation of the redirected USB Device, then an instance of CIM_LogicalIdentity is used to associate the instance of a concrete subclass of CIM_LogicalDevice and the instance of CIM_USBDevice.

CIM_EnabledLogicalElementCapabilities represents the capabilities of the USB Redirection SAP, then an instance of CIM_ElementCapabilities is used to associate the instance of CIM_USBRedirectionSAP to the instance of CIM_EnabledLogicalElementCapabilities.

Figure 1 presents the class diagram for the *Virtual Media Profile*. For simplicity, the prefix *CIM_* has been removed from the names of the classes.

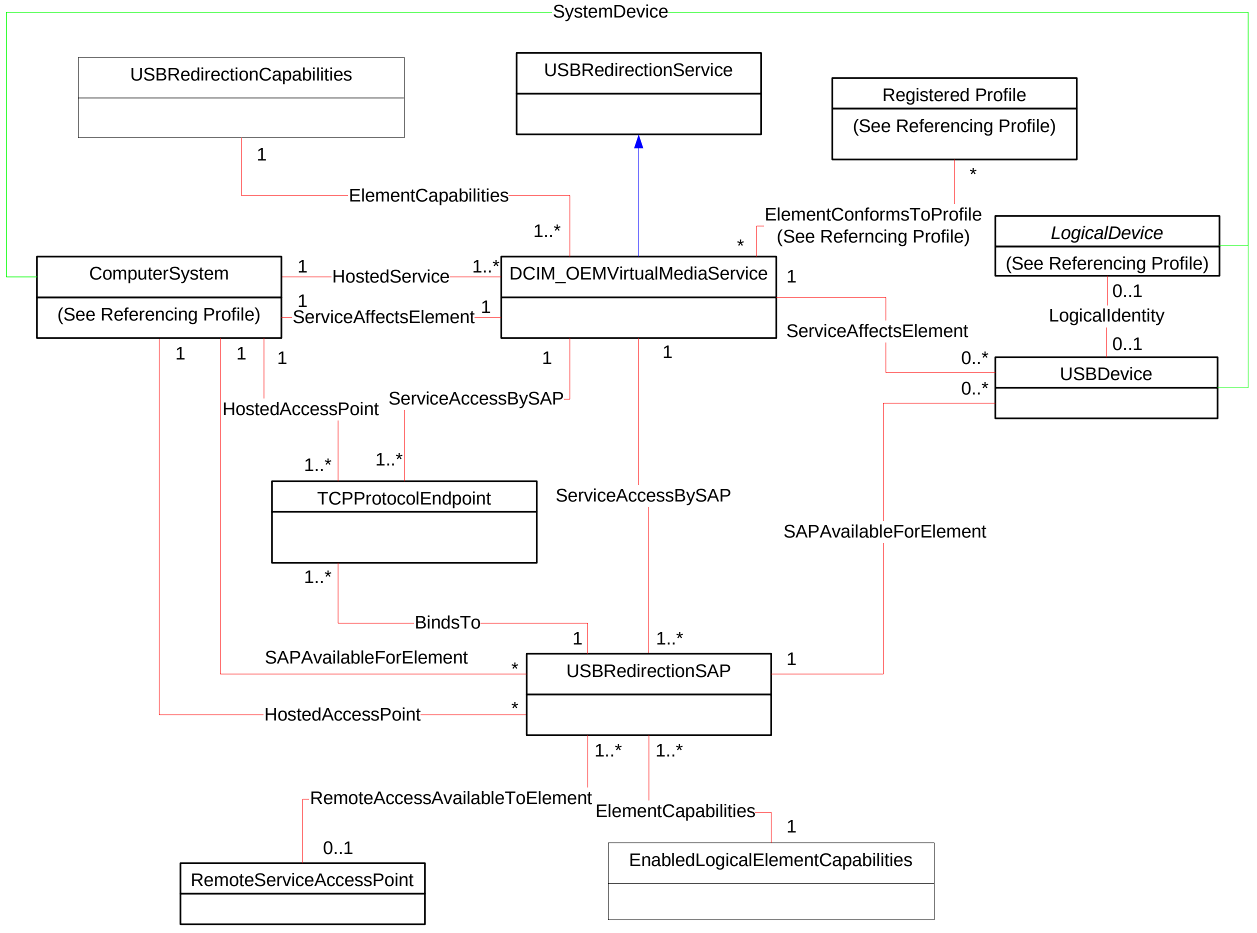

Figure 1 – Virtual Media Profile: Class Diagram

7 Implementation

This section details the requirements related to the arrangement of instances and their properties for implementation of this profile. Section 7.9.2 describes the class methods required by the profile.

7.1 Representing a Virtual Media

A Virtual Media is represented by an instance of DCIM_OEMVirtualMediaService, an instance of CIM_USBRedirectionSAP, an instance of the CIM_ServiceAccessBySAP association, and instance(s) of CIM_TCPProtocolEndpoint associated with the instance of CIM_USBRedirectionSAP through a CIM_BindsTo association.

An instance of CIM_ServiceAccessBySAP shall be used to associate the instance of DCIM_OEMVirtualMediaService with the instance of CIM_USBRedirectionSAP.

The CIM_ServiceAccessBySAP association's Antecedent property shall reference the DCIM_OEMVirtualMediaService instance, and its Dependent property shall reference the CIM_USBRedirectionSAP instance.

7.2 Representing a Virtual Media Service

A Virtual Media Service shall be represented by an instance of DCIM_OEMVirtualMediaService.

7.2.1 The Relationship to the Computer System Hosting the Service

The relationship between the Virtual Media Service and the computer system that hosts the Service shall be modeled with an instance of the CIM_HostedService association. When used in this way, the CIM_HostedService association's Antecedent property shall reference the CIM_ComputerSystem instance, and its Dependent property shall reference the DCIM_OEMVirtualMediaService instance.

7.2.2 The Relationship to the Computer System with the Emulated USB Devices

The relationship between the Virtual Media Service and the computer system that contains one or more emulated USB Devices shall be modeled with an instance of the CIM_ServiceAffectsElement association. When used in this way, the CIM_ServiceAffectsElement association's AffectingElement property shall reference the DCIM_OEMVirtualMediaService instance, and its AffectedElement property shall reference the CIM_ComputerSystem instance.

7.2.3 The Relationship to the Capabilities of the Service

The capabilities of a Virtual Media Service may be modeled by an instance of CIM_USBRedirectionCapabilities.

When an instance of CIM_USBRedirectionCapabilities exists for this purpose, its relationship to the Virtual Media Service shall be modeled with an instance of CIM_ElementCapabilities. When used in this way, the CIM_ElementCapabilities association's ManagedElement property shall reference the DCIM_OEMVirtualMediaService, and its Capabilities property shall reference CIM_USBRedirectionCapabilities.

7.2.4 DCIM_OEMVirtualMediaService.RedirectionServiceType

The RedirectionServiceType property shall match the value 4 (USB).

7.2.5 Maximum Number of Concurrently Enabled Redirection SAPs

The Virtual Media Service may support multiple USB Redirection SAPs; however, there may be a limitation to the number of concurrent redirections.

The DCIM_OEMVirtualMediaService.MaxCurrentEnabledSAPs property shall contain the maximum number of instances of CIM_USBRedirectionSAP's, whose EnabledState property is set to 2 (Enabled) that may be associated to the instance of DCIM_OEMVirtualMediaService.

7.2.6 DCIM_OEMVirtualMediaService.ElementName

The ElementName property shall be formatted as a free-form string of variable length (pattern ".*").

The ElementName property may support being modified by the ModifyInstance operation. See Clause 8.13.1.1. This behavior is conditional. The following sections describe the CIM elements and behavior required to determine whether an implementation supports client modification of the ElementName property.

7.2.6.1 Modifying ElementName Is Supported—Conditional

This section describes the CIM elements and behavior requirements when an implementation supports client modification of the DCIM_OEMVirtualMediaService.ElementName property.

An instance of CIM_USBRedirectionCapabilities shall be associated with the DCIM_OEMVirtualMediaService instance using an instance of the CIM_ElementCapabilities association.

The CIM_USBRedirectionCapabilities.ElementNameEditSupported property shall have a value of TRUE.

The CIM_USBRedirectionCapabilities.MaxElementNameLen property shall be implemented.

7.2.6.2 Modifying ElementName Is Not Supported

This section describes the CIM elements and behaviors that shall be implemented when the DCIM_OEMVirtualMediaService.ElementName does not support modification by the ModifyInstance operation.

There may be an instance of CIM_USBRedirectionCapabilities associated with the DCIM_OEMVirtualMediaService instance using an instance of CIM_ElementCapabilities.

When an instance of CIM_USBRedirectionCapabilities exists, its ElementNameEditSupported property shall have a value of FALSE.

When an instance of CIM_USBRedirectionCapabilities exists, its MaxElementNameLen property may be implemented. The MaxElementNameLen property is irrelevant in this context.

7.3 Representing the Capabilities of a Virtual Media Service

There shall be one instance of CIM_USBRedirectionCapabilities associated with the instance of DCIM_OEMVirtualMediaService.

The Virtual Media Service may constrain the number and type of USB Devices that can be redirected. These constraints are represented by properties in the instance of CIM_USBRedirectionCapabilities associated with the instance of DCIM_OEMVirtualMediaServices.

When there is an instance of CIM_USBRedirectionCapablities associated with the instance of DCIM_OEMVirtualMediaService and the Virtual Media Service does not support creating USB Redirection SAPs, then the properties of CIM_USBRedirectionCapabilities shall reflect the pre-configured USB Redirection SAPs for that service.

When there is an instance of CIM_USBRedirectionCapablities associated with the instance of DCIM_OEMVirtualMediaService and the Virtual Media Service does support creating USB Redirection SAPs, and then the properties of CIM_USBRedirectionCapabilities shall reflect the maximum values that can be supported across all the USB Redirection SAPs associated to the Virtual Media Service.

7.3.1 Supported Devices

When there is an instance of CIM_USBRedirectionCapabilities associated with the instance of DCIM_OEMVirtualMediaService, the CIM_USBRedirectionCapabilities.USBVersionsSupported and CIM_USBRedirectionCapabilities.ClassesSupported arrays shall contain values that identify the supported devices. CIM_USBRedirectionCapabilities.SubClasses may contain additional information identifying the devices supported. Each entry of the USBVersionsSupported array is related to the entry of ClassesSupported, SubClassesSupported, CIM_USBRedirectionCapabilities.MaxDevicesSupported, and CIM_USBRedirectionCapabilitiesMaxDevicesPerSAP arrays that are located at the same index.

Instances of CIM_USBRedirectionSAP shall only be associated to instances of CIM_USBDevice that have USBVersion, ClassCode, and SubclassCode properties that match one of the set of values located at the same indexed entry of the USBVersionsSupported, ClassesSupported and SubClassesSupported properties.

7.3.1.1 USBVersionsSupported

When there is an instance of CIM_USBRedirectionCapabilities associated with the instance of DCIM_OEMVirtualMediaService, the CIM_USBRedirectionCapabilities.USBVersionsSupported shall include the USB specification version of the supported USB device corresponding to the USB device class and subclass values in the CIM_USBRedirectionCapabilities.ClassesSupported and CIM_USBRedirectionCapabilities.SubClassesSupported entries at the same index. The USBVersion is specified in Binary-Coded Decimal format where a decimal point is implied between the 2nd and 3rd digits. For example, a value of 0x0201 indicates that version 2.01 is supported.

7.3.1.2 ClassesSupported

When there is an instance of CIM_USBRedirectionCapabilities associated with the instance of DCIM_OEMVirtualMediaService, the CIM_USBRedirectionCapabilities.ClassesSupported shall include the USB device class code of the supported USB device corresponding to the USB specification version, the subclass code in the CIM_USBRedirectionCapabilities.USBVersionsSupported, and the CIM_USBRedirectionCapabilities.SubClassesSupported entries at the same index.

7.3.1.3 SubClassesSupported

When there is an instance of CIM_USBRedirectionCapabilities associated with the instance of DCIM_OEMVirtualMediaService, the CIM_USBRedirectionCapabilities.SubClassesSupported may include the USB device subclass code of the supported USB device corresponding to the USB specification version and device class code in the CIM_USBRedirectionCapabilities.USBVersionsSupported and CIM_USBRedirectionCapabilities.ClassesSupported entries at the same index.

7.3.2 MaxDevicesSupported

When there is an instance of CIM_USBRedirectionCapabilities associated with the instance of DCIM_OEMVirtualMediaService, the CIM_USBRedirectionCapabilities.MaxDevicesSupport array property shall contain the number of devices that are supported for the corresponding device specified in the entries of the CIM_USBRedirectionCapabilities.USBVersionsSupported, CIM_USBRedirectionCapabilities.ClassesSupported, and CIM_USBRedirectionCapabilities.SubClassesSupported array properties located at the same index.

7.3.3 SAPCapabilitiesSupported

When there is an instance of CIM_USBRedirectionCapabilities associated with the instance of DCIM_OEMVirtualMediaService, the CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported array property shall contain values that specify whether the static pre-configured USB Redirection SAPs exist.

This property can be used by the remote client to determine whether the static pre-configured USB Redirection SAPs that exist can be inspected and whose states can be managed, or whether the creation of a USB Redirection SAP is required. An implementation may have static pre-configured USB Redirection SAPs and still support the creation of more USB Redirection SAPs.

When the SAPCapabilitiesSupported array property contains a value of 2 (Pre-configured SAPs), then instances of CIM_USBRedirectionSAP and CIM_USBDevice shall exist and instances of CIM_ProtocolEndpoint and CIM_RemoteServiceAccessPoint may exist.

When the SAPCapabilitiesSupported array property contains a value of 3 (Create SAPs), then instances of CIM_USBRedirectionSAP, CIM_USBDevice, CIM_ProtocolEndpoint, and CIM_RemoteServiceAccessPoint may exist. In addition, the CreateUSBDevice(), CreateRedirectionSAP() and DeleteRedirectionSAP() shall be implemented and shall not return “NotSupported”.

When the SAPCapabilitiesSupported array property contains a value of 4 (Modify SAP), then the properties of instances of CIM_USBRedirectionSAP associated with the instance of DCIM_OEMVirtualMediaService may be modified by “ModifyInstance”.

If the SAPCapabilitiesSupported array property contains a value of 32768 (DCIM Modify TCPProtocolEndpoint), then the properties of CIM_TCPProtocolEndpoint instances associated with the instance of CIM_USBRedirectionSAP through a CIM_BindsTo association that is also associated with DCIM_OEMVirtualMediaService may be modified by “ModifyInstance”.

7.3.4 Requested states supported for created SAPs

When there is an instance of CIM_USBRedirectionCapabilities associated with the instance of DCIM_OEMVirtualMediaService, and CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported contains the value 3 (Create SAPs), the CIM_USBRedirectionCapabilities.RequestedStatesSupportedForCreatedSAP shall contain the enumerated values that the Virtual Media Service can support for the RequestedStatesSupported property of the CIM_EnabledLogicalElementCapabilties instance that will be associated with SAPs created by the DCIM_OEMVirtualMediaService.CreateRedirectionSAP method. See section 8.4 for details on how the RequestedStatusSupport property is set.

7.3.5 SingleClassPerSAP

When there is an instance of CIM_USBRedirectionCapabilities associated with the instance of DCIM_OEMVirtualMediaService, and the CIM_USBRedirectionCapabilities.SingleClassPerSAP has a value of TRUE, only instances of CIM_USBDevice whose ClassCode property have the same value as each other shall be associated with the same instance of CIM_USBRedirectionSAP.

7.3.6 MaxDevicesPerSAP

When there is an instance of CIM_USBRedirectionCapabilities associated with the instance of DCIM_OEMVirtualMediaService, the CIM_USBRedirectionCapabilities.MaxDevicesPerSAP property shall contain a value specifying the maximum number of devices that are supported by the Virtual Media Service for a single USB Redirection SAP. This value shall not exceed the value of CIM_USBRedirectionCapabilities.MaxDevicesSupported

7.3.7 ConnectionModesSupported

When there is an instance of CIM_USBRedirectionCapabilities associated with the instance of DCIM_OEMVirtualMediaService, the CIM_USBRedirectionCapabilities.ConnectionModesSupported array property shall contain values that specify which connection modes the service supports.

This property can be used by the remote client to determine whether Virtual Media Service supports initiating connections to a remote application for Virtual Medias, or if it waits for a remote application to initiate the Virtual Media connections.

When the ConnectionModesSupported array property contains a value of 2 (Listen), the Virtual Media Service supports waiting for remote applications to initiate network connections for Virtual Medias.

When the ConnectionModesSupported array property contains a value of 3 (Connect) the Virtual Media Service supports initiating network connections to the remote applications for Virtual Medias.

7.3.8 InfoFormatsSupported

The InfoFormatsSupported property may contain an enumeration of the AccessInfo formats available for the USB Redirection SAP. When the ConnectionModesSupported array property contains a value of 3 (Connect), this property shall contain an enumeration of the AccessInfo formats available for the USB Redirection SAP to connect to the remote service access point modeled by CIM_RemoteServiceAccessPoint.

7.3.9 RequestedStatesSupported

When there is an instance of CIM_USBRedirectionCapabilities associated with the instance of DCIM_OEMVirtualMediaService, the CIM_USBRedirectionCapabilities.RequestedStatesSupported property shall contain zero or more of the following values: 2 (Enabled) or 3 (Disabled). See section 7.9.1.1 for more information.

7.4 Representing a USB Redirection SAP

A USB Redirection SAP shall be represented by an instance of CIM_USBRedirectionSAP.

7.4.1 The Relationship to the Service

The relationship between the USB Redirection SAP and a Virtual Media Service shall be modeled for each instance of CIM_USBRedirectionSAP that exists.

The relationship shall be modeled with an instance of CIM_ServiceAccessBySAP. When used in this way, the CIM_ServiceAccessBySAP association's Antecedent property shall reference the DCIM_OEMVirtualMediaService instance, and its Dependent property shall reference the CIM_USBRedirectionSAP instance.

7.4.2 The Relationship to the Computer System with the Emulated USB Devices

The relationship between the USB Redirection SAP and the computer system that contains one or more emulated USB Devices may be modeled.

The relationship shall be modeled with an instance of the CIM_SAPAvailableForElement association. When used in this way, the CIM_SAPAvailableForElement association's ManagedElement property shall reference the CIM_ComputerSystem instance, and its AvailableSAP property shall reference the CIM_USBRedirectionSAP instance.

7.4.3 The Relationship to the Computer System with the SAP

The relationship between the USB Redirection SAP and the computer system that contains the endpoint for the USB Redirection SAP shall be modeled with an instance of CIM_HostedAccessPoint. When used in this way, the CIM_HostedAccessPoint association's Antecedent property shall reference the CIM_ComputerSystem instance, and its Dependent property shall reference the CIM_USBRedirectionSAP instance.

7.4.4 The Relationship to the Capabilities of the SAP

The state management capabilities of the USB Redirection SAP may be modeled.

The relationship shall be modeled with an instance of CIM_EnabledLogicalElementCapabilities.

When an instance of CIM_EnabledLogicalElementCapabilities exists, the relationship between the USB Redirection SAP and the capabilities of that SAP shall be modeled with an instance of CIM_ElementCapabilities. When used in this way, the CIM_EnabledLogicalElementCapabilities association's ManagedElement property shall reference the CIM_USBRedirectionSAP, and its Capabilities property shall reference CIM_EnabledLogicalElementCapabilities.

7.4.5 CIM_USBRedirectionSAP.ElementName

The CIM_USBRedirectionSAP.ElementName property shall be formatted as a free-form string of variable length (pattern “.*”).

The ElementName property may support being modified by the ModifyInstance operation. See section 8.20.1.1. This behavior is conditional. The following sections describe the CIM elements and behavior required to determine whether an implementation supports client modification of the ElementName property.

7.4.5.1 Modifying ElementName Is Supported—Conditional

This section describes the CIM elements and behavior requirements when an implementation supports client modification of the CIM_USBRedirectionSAP.ElementName property.

An instance of CIM_ EnabledLogicalElementCapabilities shall be associated with the CIM_USBRedirectionSAP instance using an instance of the CIM_ElementCapabilities association.

The CIM_ EnabledLogicalElementCapabilities.ElementNameEditSupported property shall have a value of TRUE.

The CIM_ EnabledLogicalElementCapabilities.MaxElementNameLen property shall be implemented.

7.4.5.2 Modifying ElementName Is Not Supported

This section describes the CIM elements and behaviors that shall be implemented when the CIM_USBRedirectionSAP.ElementName does not support being modified by the ModifyInstance operation.

There may be an instance of CIM_ EnabledLogicalElementCapabilities associated with the CIM_USBRedirectionSAP instance using an instance of CIM_ElementCapabilities.

When an instance of CIM_ EnabledLogicalElementCapabilities associated with CIM_USBRedirectionSAP using an instance of CIM_ElementCapabilities exists, its ElementNameEditSupported property shall have a value of FALSE.

When an instance of CIM_ EnabledLogicalElementCapabilities associated with CIM_USBRedirectionSAP using an instance of CIM_ElementCapabilities exists, its MaxElementNameLen property may be implemented. The MaxElementNameLen property is irrelevant in this context.

7.4.6 Session Connection Mode

Two connection modes are defined for USB Redirection SAPs: a) The USB Redirection SAP waits (listens) for an application on a Remote System to initiate a network connection for Virtual Media or b) the USB Redirection SAP initiates connecting to the applications on the Remote System for Virtual Media.

The connection mode of the USB Redirection SAP shall be represented by the CIM_USBRedirectionSAP.ConnectionMode property. The property shall have a value of 2 (listen) or 3 (connect), and when an instance of CIM_USBRedirectionCapabilities is associated to the instance of DCIM_OEMVirtualMediaService by an instance of CIM_ElementCapabilities, the value of the CIM_USBRedirectionSAP.ConnectionMode property shall be one of the values in the CIM_USBRedirectionCapabilities.ConnectionModesSupported property.

7.4.7 Reset Timeout

The Reset Timeout is the amount of time the session shall wait after sending a Reset to the Remote System before concluding that the Remote System is not responding in a timely fashion; it may be hung or busy. If the Reset Timeout is exceeded, the managed system closes the connection and tries to establish a new connection with the Remote System.

The CIM_USBRedirectionSAP.ResetTimeout shall have a value of the Reset Timeout.

7.4.8 Session Timeout

The Session Timeout is the amount of time the USB Redirection SAP will wait for a Remote System to establish a new connection before the USB Device is detached.

The CIM_USBRedirectionSAP.SessionTimeout shall have a value of the Session Timeout.

7.5 Representing the Locally Emulated USB Device

A locally emulated USB Device shall be represented by an instance of CIM_USBDevice.

7.5.1 The Relationship to the Virtual Media Service

The relationship between a locally emulated USB Device and the Virtual Media Service shall be modeled with an instance of the CIM_ServiceAffectsElement association. When used in this way, the CIM_ServiceAffectsElement association's AffectingElement property shall reference the instance of DCIM_OEMVirtualMediaService, and its AffectedElement property shall reference the CIM_USBDevice instance.

7.5.2 The Relationship to the USB Redirection SAP

The relationship between a locally emulated USB Device and a USB Redirection SAP may be modeled.

The relationship shall be modeled with an instance of the CIM_SAPAvailableForElement association. When used in this way, the CIM_SAPAvailableForElement association's Antecedent property shall reference the CIM_USBDevice instance, and its Dependent property shall reference the CIM_USBRedirectionSAP instance.

7.5.3 The Relationship to a Logical Device

The relationship between a locally emulated USB Device and an instance of a concrete subclass of CIM_LogicalDevice may be modeled.

The relationship shall be modeled when an instance of a concrete subclass of CIM_LogicalDevice that provides another representation of the locally emulated USB Device exists.

The relationship shall be modeled with an instance of the CIM_LogicalIdentity association. When used in this way, the CIM_LogicalIdentity association's SystemElement property shall reference the CIM_USBDevice instance, and its SameElement property shall reference the CIM_LogicalDevice instance.

7.5.4 Representing the USB Device Class

The USB Device Class shall be represented by the value of the CIM_USBDevice.ClassCode property.

The USB Version shall be represented by the value of the CIM_USBDevice.USBVersion property.

The USB Device subclass may be represented by the value of the CIM_USBDevice.SubClassCode.

7.5.5 Representing the Command Response Timeout

The Command Response Timeout is the amount of time the session shall wait for a response after sending a USB command. If the Command Response Timeout is exceeded, the USB device behaves as if the media was ejected and a Reset message is sent to the Remote System to terminate the previous command.

The CIM_USBDevice.Commandtimeout shall have the value of the Command Response Timeout.

7.6 The States of a Virtual Media

The state of a Virtual Media shall be determined by the state of the instance of DCIM_OEMVirtualMediaService and the state of the instance of CIM_USBRedirectionSAP that is associated though an instance of CIM_ServiceAccessBySAP.

The Virtual Media shall have the state *inactive*, *available*, or *active*

7.6.1 Active State

The Virtual Media is *active* when the USB Redirection SAP is connected to a Remote SAP.

If the Virtual Media is in the active state, the value of the EnabledState properties in DCIM_OEMVirtualMediaService shall be either 2(Enabled) or 6(Enabled but Offline) and CIM_USBRedirectionSAP shall be 2 (Enabled).

If the Virtual Media is in the active state, Virtual Media Session shall exist.

7.6.2 Available State

The Virtual Media is *available* when the USB Redirection SAP is available for connection at the protocol endpoint. The USB Redirection SAP is either waiting for a connection request (listen mode), or ready to initiate a connection (connect mode).

If the Virtual Media is in the available state, the value of the EnabledState property of DCIM_OEMVirtualMediaService shall be 2 (Enabled) or 6(Enabled but Offline), and value of the EnabledState property of CIM_USBRedirectionSAP shall be 6 (Enabled but Offline).

If the Virtual Media is in the active state, Virtual Media Session shall not exist.

7.6.3 Inactive State

The Virtual Media is *inactive* when virtual devices are unattached, or the USB Redirection SAP is unavailable for connection at the protocol endpoint; effectively, the USB Redirection SAP is neither waiting for a connection request (listen mode) nor ready to initiate a connection (connect mode).

If the Virtual Media is in inactive state, the value of the EnabledState property of DCIM_OEMVirtualMediaService may be 3 (Disabled), and the value of the EnabledState property of CIM_USBRedirectionSAP shall be 3 (Disabled).

If the Virtual Media is in the inactive state, Virtual Media Session shall not exist.

7.7 Representing the Destination of the USB Redirection (Optional)

The remote destination of USB Redirection may be modeled. When modeled, the requirements specified in the following sections shall be met.

7.7.1 CIM_RemoteServiceAccessPoint Instance

The remote destination of the USB Redirection may be represented by an instance of CIM_RemoteServiceAccessPoint.

Every instance CIM_USBRedirectionSAP that has a ConnectionMode property value of 3 (connect), shall be associated with exactly one instance of CIM_RemoteServiceAccessPoint using an instance of the CIM_RemoteAccessAvailableToElement association.

If an instance of CIM_USBRedirectionCapabilities is associated with the CIM_RedirectionService instance and CIM_USBRedirectionCapabilities.ConnectionModesSupported includes both 2 (listen) and 3 (connect), (see section 7.3.7) and CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported includes 4 (Modify SAP) (see section 7.3.3), the static pre-configured instances of CIM_USBRedirectionSAP shall have a CIM_RemoteAccessAvailableToElement association to an instance of CIM_RemoteServiceAccessPoint and a CIM_BindsTo association to an instance of CIM_ProtocolEndpoint.

7.7.1.1 AccessInfo

The CIM_RemoteServiceAccessPoint.AccessInfo property shall have a value that corresponds with the value of the CIM_RemoteServiceAccessPoint.InfoFormat property. The value shall contain network location information for the USB Redirection destination.

7.7.1.2 InfoFormat

The CIM_RemoteServiceAccessPoint.InfoFormat property shall contain the correct valuemap value for the format of the CIM_RemoteServiceAccessPoint.AccessInfo information that designates the network location for the USB Redirection destination. When there is an instance of CIM_USBRedirectionCapabilities associated with the instance of CIM_USBRedirectionService and CIM_USBRedirectionCapabilities.InfoFormatsSupported is not empty then the value of the InforFormat property shall be one of the values of CIM_USBRedirectionCapabilites.InfoFormatsSupported.

7.7.1.3 OtherInfoFormatDescription

Describes the format when the property CIM_RemoteServiceAccessPoint.InfoFormat is set to 1 (Other).

7.7.1.4 AccessContext

The CIM_RemoteServiceAccessPoint.AccessContext property shall have a value of 1 (Other).

7.7.1.5 OtherAccessContext

The CIM_RemoteServiceAccessPoint.OtherAccessContext property shall have a value of "USB Redirection Destination".

7.8 State Management of a Virtual Media Service (Optional)

The following sections describe the CIM elements and behaviors that allow the client to determine whether state management of the Virtual Media Service is supported.

Support for managing the state of a Virtual Media Service is optional behavior. The following sections describe the CIM elements and behaviors that allow the client to determine whether state management of the Virtual Media Service is supported.

7.8.1 Virtual Media Service State Management Is Supported—Conditional

This section describes the CIM elements and behaviors that shall be implemented when state management of the Virtual Media Service is supported.

7.8.1.1 CIM_USBRedirectionCapabilities

When state management of the Service is supported, exactly one instance of CIM_USBRedirectionCapabilities shall be associated with the instance of DCIM_OEMVirtualMediaService through an instance of CIM_ElementCapabilities.

The CIM_ElementCapabilities association's ManagedElement property shall reference the DCIM_OEMVirtualMediaService instance, and its Capabilities property shall reference the CIM_USBRedirectionCapabilities instance.

7.8.1.1.1 CIM_USBRedirectionCapabilities.RequestedStatesSupported

The RequestedStatesSupported property shall contain one or more of the following values: 2 (Enabled) or 3 (Disabled) or 6 (Offline).

7.8.1.2 DCIM_OEMVirtualMediaService.RequestedState

When the DCIM_OEMVirtualMediaService.RequestStateChange( ) method is successfully invoked, the value of the RequestedState property shall be the value of the RequestedState parameter. If the method is not successfully invoked, the value of the RequestedState property is indeterminate.

The DCIM_OEMVirtualMediaService.RequestedState property shall have one of the values specified in the CIM_USBRedirectionCapabilities.RequestedStatesSupported property or a value of 0 (Unknown).

7.8.1.3 DCIM_OEMVirtualMediaService.EnabledState

The EnabledState property represents whether the virtual devices are attached to the system via the USB bus or not. The EnabledState property shall have one of the following values: 0(Unknown), 2 (Enabled), 3 (Disabled), or 6 (Enabled but Offline).

If the EnabledState property has a value of 2 (Enabled), then virtual devices shall be attached to the server and shall be recognized as valid USB Mass Storage devices. If the EnabledState property has a value of 2 (Enabled), the associated CIM_USBRedirectionSAP.EnabledState property may have a value 2(Enabled) representing that the virtual media redirection can be initiated.

If the EnabledState property has a value of 3 (Disabled), then virtual devices shall be detached from the server. If the EnabledState property has a value of 3 (Disabled), the associated CIM_USBRedirectionSAP.EnabledState property shall not have a value 2(Enabled) representing that the virtual media redirection cannot be initiated.

If the EnabledState property has a value of 6 (Enabled but Offline), then virtual devices may be attached to and recognized by the server as valid USB Mass Storage devices representing that Virtual Media is in an auto attach mode. If the EnabledState property has a value of 6 (Enabled but Offline), the associated CIM_USBRedirectionSAP.EnabledState property may have a value 2(Enabled) representing that the virtual media redirection can be initiated.

When the RequestedState parameter has a value of 2 (Enabled) or 3 (Disabled) or 6 (Offline) and the DCIM_OEMVirtualMediaService.RequestStateChange( ) method completes successfully, the value of the EnabledState property shall equal the value of the DCIM_OEMVirtualMediaService.RequestedState property.

If the method does not complete successfully, the value of the EnabledState property is indeterminate.

7.8.2 Virtual Media Service State Management Is Not Supported

This section describes the CIM elements and behaviors that shall be implemented when management of the Virtual Media Service state is not supported.

7.8.2.1 CIM_USBRedirectionCapabilities

When state management is not supported, an instance of CIM_USBRedirectionCapabilities may be associated with the DCIM_OEMVirtualMediaService instance through an instance of CIM_ElementCapabilities. The existence of the CIM_ElementCapabilities instance is conditional on the existence of the CIM_USBRedirectionCapabilities instance.

The CIM_ElementCapabilities association's ManagedElement property shall reference the DCIM_OEMVirtualMediaService instance, and its Dependent property shall reference the CIM_USBRedirectionCapabilities instance.

7.8.2.1.1 CIM_USBRedirectionCapabilities.RequestedStatesSupported

The CIM_USBRedirectionCapabilities.RequestedStatesSupported property shall not contain any values.

7.8.2.2 DCIM_OEMVirtualMediaService.RequestedState

The RequestedState property shall have the value of 12 (Not Applicable).

7.8.2.3 DCIM_OEMVirtualMediaService.EnabledState

The EnabledState property shall have one of the following values: 2 (Enabled), 3 (Disabled), or 0 (Unknown). The value 5 (Not Applicable) may be set when non-CIM instrumentation has manipulated the instance of DCIM_OEMVirtualMediaService.

7.9 State Management of a USB Redirection SAP

The following sections describe the CIM elements and behaviors that allow the client to determine whether state management of the USB Redirection SAP is supported.

Support for managing the state of a USB Redirection SAP is optional behavior. The following sections describe the CIM elements and behaviors that allow the client to determine whether state management of the USB Redirection SAP is supported.

7.9.1 USB Redirection SAP State Management Is Supported -- Conditional

This section describes the CIM elements and behaviors that shall be implemented when state management of the USB Redirection SAP is supported.

7.9.1.1 CIM_EnabledLogicalElementCapabilities

When state management of the USB Redirection SAP is supported, exactly one instance of CIM_ EnabledLogicalElementCapabilities shall be associated with the instance of CIM_USBRedirectionSAP through an instance of CIM_ElementCapabilities.

The CIM_ElementCapabilities association's ManagedElement property shall reference the CIM_USBRedirectionSAP instance, and its Capabilities property shall reference the CIM_ EnabledLogicalElementCapabilities instance.

7.9.1.1.1 CIM_ EnabledLogicalElementCapabilities.RequestedStatesSupported

The RequestedStatesSupported property shall contain one or more of the following values: 2 (Enabled), 3 (Disabled) or 6 (Offline).

7.9.1.2 CIM_USBRedirectionSAP.RequestedState

When the CIM_USBRedirectionSAP.RequestStateChange( ) method is successfully invoked, the value of the RequestedState property shall be the value of the RequestedState parameter. If the method is not successfully invoked, the value of the RequestedState property is indeterminate.

The CIM_USBRedirectionSAP.RequestedState property shall have one of the values specified in the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property or a value of 0 (Unknown).

7.9.1.3 CIM_USBRedirectionSAP.EnabledState

The EnabledState property shall have one of the following values: 2 (Enabled), 3 (Disabled), or 6 (Enabled but Offline).

If the EnabledState property has value of 2(Enabled), then the Virtual Media Session shall be active.

If the EnabledState property has value of 3(Disabled), then the Virtual Media Session shall be inactive.

When the RequestedState parameter has a value of 2 (Enabled), 3 (Disabled), or 6 (Offline) and the CIM_USBRedirectionSAP.RequestStateChange( ) method completes successfully, the value of the EnabledState property shall equal the value of the CIM_USBRedirectionSAP.RequestedState property.

If the method does not complete successfully, the value of the EnabledState property is indeterminate.

7.9.2 USB Redirection SAP State Management Is Not Supported

This section describes the CIM elements and behaviors that shall be implemented when management of the Session state is not supported.

7.9.2.1 CIM_EnabledLogicalElementCapabilities

When state management is not supported, an instance of CIM_EnabledLogicalElementCapabilities may be associated with the CIM_USBRedirectionSAP instance through an instance of CIM_ElementCapabilities. The existence of the CIM_ElementCapabilities instance is conditional on the existence of the CIM_EnabledLogicalElementCapabilities instance.

The CIM_ElementCapabilities association's ManagedElement property shall reference the CIM_USBRedirectionSAP instance, and its Dependent property shall reference the CIM_EnabledLogicalElementCapabilities instance.

7.9.2.1.1 CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported

The CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property shall not contain any values.

7.9.2.2 CIM_USBRedirectionSAP.RequestedState

The RequestedState property shall have the value of 12 (Not Applicable).

7.9.2.3 CIM_USBRedirectionSAP.EnabledState

The EnabledState property shall have one of the following values: 2 (Enabled), 3 (Disabled), 0 (Unknown), or 6 (Enabled but Offline). The value 0 (Unknown) may be set when non-CIM instrumentation has manipulated the instance of CIM_USBRedirectionSAP.

7.10 Representing Virtual Media Ports and Encryption

The ports that Virtual Media uses for USB Redirection SAP's connection with the remote system shall be represented by CIM_TCPProtocolEndpoint and shall be associated to the CIM_USBRedirectionSAP through CIM_BindsTo association.

CIM_TCPProtocolEndpoint.PortNumber shall represent the port number utilized by the Virtual Media.

CIM_TCPProtoclEndpoint.ProtocolIFType shall represent the data encryption and shall have the following values: 32768 (DCIM Unencrypted) or 32769 (DCIM Encrypted).

8 Methods

This section details the requirements for supporting intrinsic operations and extrinsic methods for the CIM elements defined by this profile.

8.1 DCIM_OEMVirtualMediaService.RequestStateChange( )

Invocation of the RequestStateChange( ) method changes the element's state to the value specified in the RequestedState parameter. The 2 (Enabled) and 3 (Disabled) values of the RequestedState parameter shall correspond to the enabled and disabled states of the Virtual Media Service, respectively.

Whether the method completes successfully if there are active sessions, depends upon the specifics of the implementation.

Detailed requirements of the RequestStateChange( ) method are specified in Table 2 and Table 3.

No standard messages are defined.

Invoking the RequestStateChange( ) method multiple times could result in earlier requests being overwritten or lost.

Table 2 – DCIM_OEMVirtualMediaService.RequestStateChange( ) Method: Return Code Values

Value	Description
0	Request was successfully executed.
1	Method is unsupported.
2	Error occurred.
4096	Job started: REF returned to started CIM_ConcreteJob.

Table 3 – DCIM_OEMVirtualMediaService.RequestStateChange( ) Method: Parameters

Qualifiers	Name	Type	Description/Values
IN	RequestedState	uint16	Valid state values: 2 (Enabled) – attach virtual media device 3 (Disabled) – detach virtual media device 6 (Offline) – auto attach virtual media device
OUT	Job	CIM_ConcreteJob REF	Returned if job started
IN	TimeoutPeriod	datetime	Client-specified maximum amount of time the transition to a new state is supposed to take: 0 or NULL – No time requirements <interval> – Maximum time allowed

8.1.1 DCIM_OEMVirtualMediaService.RequestStateChange( )—Conditional Support

When an instance of CIM_USBRedirectionCapabilities is associated with the DCIM_OEMVirtualMediaService instance and the CIM_USBRedirectionCapabilities.RequestedStatesSupported property contains at least one value, the DCIM_OEMVirtualMediaService.RequestStateChange( ) method shall be implemented and supported. The DCIM_OEMVirtualMediaService.RequestStateChange( ) method shall not return a value of 1 (Not Supported).

8.2 DCIM_OEMVirtualMediaService.ResetFlashKeySize( )

Invocation of the ResetFlashKeySize ( ) method requests a reset of the flash key size when the Emulated USB Device is surfaced as a USB mass storage flash key to the impacted managed system.

Return codes of the ResetFlashKeySize( ) method are specified in Table 2 and Table 3.

No standard messages are defined.

Table 4 – DCIM_OEMVirtualMediaService.RequestStateChange( ) Method: Return Code Values

Value	Description
0	Request was successfully executed.
1	Method is unsupported.
2	Error occurred.
4096	Job started: REF returned to started CIM_ConcreteJob.

8.2.1 DCIM_OEMVirtualMediaService.ResetFlashKeySize( ) —Conditional Support

If the DCIM_OEMVirtualMediaService.FlashKeyEnabled is not NULL, the DCIM_OEMVirtualMediaService.ResetFlashKeySize( ) method shall be implemented and shall not return a value of 1 (Not Supported).

If the DCIM_OEMVirtualMediaService.FlashKeyEnabled is NULL, the DCIM_OEMVirtualMediaService.ResetFlashKeySize( ) method shall not be implemented or shall return a value of 1 (Not Supported).

8.3 DCIM_OEMVirtualMediaService.CreateUSBDevice( )

This method is conditional on the CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property array containing a value of 2 (Create SAPs). For more information, see section 7.3.3.

If an instance of CIM_USBRedirectionCapabilites is not associated with an instance of DCIM_OEMVirtualMediaService by a CIM_ServiceAccessBySAP association, then this method shall not be supported.

Invocation of the CreateUSBDevice( ) method 1) creates an instance of CIM_USBDevice and 2) creates a CIM_ServiceAffectsElement association between the CIM_USBDevice and the DCIM_OEMVirtualMediaService.

The LogicalDevice parameter may be NULL. When the LogicalDevice parameter is not NULL, the method shall create a CIM_LogicalIdentity association between the CIM_USBDevice and the CIM_LogicalDevice.

Instances of CIM_USBDevice created by this method may be deleted by using the CIM_USBDevice class “Delete” intrinsic that will remove the CIM_USBDevice instance and all the associations that reference it.

Detailed requirements of the method are specified in Table 5 and Table 6.

No standard messages are defined.

Table 5 – DCIM_OEMVirtualMediaService.CreateUSBDevice( ) Method: Return Code Values

Value	Description
0	Request was successfully executed.
1	Method is unsupported.
2	Error occurred.
4096	Job started: REF returned to started CIM_ConcreteJob.

Table 6 – DCIM_OEMVirtualMediaService.CreateUSBDevice( ) Method: Parameters

Qualifiers	Name	Type	Description/Values
IN	NewUSBDevice	string	Encoded String-valued embedded instance of CIM_USBDevice
IN	RedirectedLogical Device	CIM_LogicalDevice REF	Reference to an instance of a concrete subclass of CIM_LogicalDevice.
OUT	Job	CIM_ConcreteJob REF	Returned if job started
OUT	USBDevice	CIM_USBDevice REF	

8.4 DCIM_OEMVirtualMediaService.CreateRedirectionSAP( )

This method is conditional on the CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property array containing a value of 2 (Creates SAP). For more information, see section 7.3.3.

If an instance of CIM_USBRedirectionCapabilites is not associated with an instance of DCIM_OEMVirtualMediaService by a CIM_ServiceAccessBySAP association, then this method shall not be supported.

Invocation of the CreateRedirectionSAP( ) method:

- Creates an instance of CIM_USBRedirectionSAP
- Creates a CIM_ServiceAccessBySAP association between the new CIM_USBRedirectionSAP and DCIM_OEMVirtualMediaService
- Creates an CIM_HostedAccessPoint between the new CIM_USBRedirectionSAP and the CIM_ComputerSystem instance that hosts the Virtual Media Service

- Creates a CIM_SAPAvailableForElement association between the new CIM_USBRedirectionSAP and the CIM_ComputerSystem instance that represents the source of the Virtual Media flow.
- Creates an instance of CIM_EnabledLogicalElementCapabilities and an instance of CIM_ElementCapablities associating the new instance of CIM_USBRedirectionSAP with the new instance of CIM_EnabledLogicalElementCapabilities. The properties of the new instance of CIM_EnabledLogicalElementCapabilities shall have the following values:
  a) ElementNameEditSupported shall be FALSE
  b) ElementName shall have a value consisting of the ElementName of the newly created CIM_USBRedirectionSAP with “capabilities” appended
  c) InstanceID shall have a value consisting of the value of the Name property of the newly created CIM_USBRedirectionSAP with “capabilities” appended.
  d) RequestedStatesSupported shall have the values specified in the NewSAPRequestedStatesSupported parameter that are limited to zero or more of the values in CIM_USBRedirectionCapabilities.RequestedStatesSupportedForCreatedSAP.
- For each instance of CIM_USBDevice referenced in the USBDevices input parameter, creates a CIM_ServiceAffectsElement association between the CIM_USBDevice and the DCIM_OEMVirtualMediaService.
- For each instance of CIM_USBDevice referenced in the USBDevices input parameter, creates an instance of CIM_SAPAvailableForElement associating the CIM_USBDevice and the new instance of CIM_USBRedirectionSAP

When the CIM_USBRedirectionSAP is created, its properties shall have the values specified in the string-valued embedded instance of CIM_USBRedirectionSAP specified in the CreateRedirectionSAP method’s NewUSBRedirectionSAP parameter.

When the CreateUSBDevices parameter is TRUE, the CreateRedirectionSAP method shall perform the following for each encoded string-valued embedded instance of CIM_USBDevice referenced in the NewUSBDevices input parameter:

- Create the instance of CIM_USBDevice
- Create an instance of CIM_SAPAvailableForElement associating the CIM_USBDevice and the new instance of CIM_USBRedirectionSAP
- Create an instance of CIM_ServiceAffectsElement associating the CIM_USBDevice and the DCIM_OEMVirtualMediaService.
- Create a CIM_LogicalIdentity association between the CIM_USBDevice and the concrete subclass of CIM_LogicalDevice referenced in Model Correspondence in the RedirectedLogicalDevices parameter, if the CIM_LogicalDevice REF in the RedirectedLogicalDevices parameter is not NULL.

If the ConnectionMode parameter has a value of 2 (listen), an instance of CIM_ProtocolEndpoint shall be associated to the CIM_USBRedirectionSAP using an instance of the CIM_BindsTo association. The CIM_ProtocolEndpoint may be created if needed, or an existing CIM_ProtocolEndpoint may be used. The CIM_ProtocolEndpoint properties values are determined and set by the redirection service implementation.

If the ConnectionMode parameter has a value of 3 (connect), an instance of CIM_RemoteServiceAccessPoint shall be created based on the string-valued embedded instance encoded in the NewRemoteServiceAccessPoint parameter and associated to the new CIM_USBRedirectionSAP using an instance of the CIM_RemoteAccessAvailableToElement association. The value of the newly created CIM_RemoteServiceAccessPoint.InfoFormat property shall be the same as one of the values specified in CIM_USBRedirectionCapabilities.InfoFormatsSupported.

Detailed requirements of the method are specified in Table 7 and Table 8.

No standard messages are defined.

Table 7 – DCIM_OEMVirtualMediaService.CreateRedirectionSAP( ) Method: Return Code Values

Value	Description
0	Request was successfully executed.
1	Method is unsupported.
2	Error occurred.
4096	Job started: REF returned to started CIM_ConcreteJob.

Table 8 – DCIM_OEMVirtualMediaService.CreateRedirectionSAP( ) Method: Parameters

Qualifiers	Name	Type	Description/Values
IN	NewUSBRedirection SAP	string	Encoded String-valued embedded instance of CIM_USBRedirectionSAP
IN	NewSAPRequested StatesSupported[]	uint16	Array of RequestedStates to be supported in the capabilities of the new SAP
IN	USBDevices[]	CIM_USBDevice REF	Device to redirect to the SAP
IN	CreateDevices	boolean	Create USB Devices
IN	NewUSBDevices[]	Encoded string-valued embedded instances of CIM_USBDevice	New devices to be created and redirected to the SAP
IN	RedirectedLogicalDevices[]	CIM_LogicalDevice REF	Devices to be redirected to SAP via NewUSBDevices.
IN	NewRemoteService AccessPoint	string	When ConnectionMode = 3, presents the encoded string-valued embedded instance of CIM_RemoteServiceAccessPoint that represents the remote redirection service that the new SAP should connect to
OUT	SAP	CIM_USBRedirectionSAP REF	
OUT	Job	CIM_ConcreteJob REF	Returned if job started

8.5 DCIM_OEMVirtualMediaService.DeleteRedirectionSAP( )

This method is conditional on the CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property array containing a value of 2 (Creates SAP). For more information, see clause 7.3.3.

If an instance of CIM_USBRedirectionCapabilites is not associated with an instance of DCIM_OEMVirtualMediaService by a CIM_ServiceAccessBySAP association, then this method shall not be supported.

Invocation of the DeleteRedirectionSAP( ) method

- Deletes all associations that reference the CIM_USBRedirectionSAP being deleted, including:
    a) the CIM_ServiceAccessBySAP association between the CIM_USBRedirectionSAP and DCIM_OEMVirtualMediaService

    b) the CIM_SAPAvailableForElement association and the CIM_HostedAccessPoint between the CIM_USBRedirectionSAP and CIM_ComputerSystem

c) the CIM_SAPAvailableForElement associations between CIM_USBRedirectionSAP and CIM_USBDevice

d) any CIM_BindsTo associations between CIM_USBRedirectionSAP and CIM_ProtocolEndpoint.

e) any CIM_RemoteAccessAvailableToElement association between CIM_USBRedirectionSAP and CIM_RemoteServiceAccessPoint

- If the CIM_USBRedirectionSAP was associated to an instance of CIM_ProtocolEndpoint, and the instance of CIM_ProtocolEndpoint was created by DCIM_OEMVirtualMediaService.CreateRedirectionSAP(), delete the instance of CIM_ProtocolEndpoint.
- If the CIM_USBRedirectionSAP is associated to an instance of CIM_RemoteServiceAccessPoint and the instance of CIM_RemoteServiceAccessPoint was created by DCIM_OEMVirtualMediaService.CreateRedirectionSAP(), delete the instance of CIM_RemoteServiceAccessPoint.
- Deletes the instance of CIM_USBRedirectionSAP

When the DeleteUSBDevices parameter is TRUE, the method shall perform the following for each instance of CIM_USBDevice created by DCIM_OEMVirtualMediaService.CreateRedirectionSAP method and associated to the instance of CIM_USBRedirectionSAP referenced by the parameter RedirectionSAP

- Delete the instance of CIM_ServiceAffectsElement association between the CIM_USBDevice and the DCIM_OEMVirtualMediaService.
- Delete the instance of USBDevice

Detailed requirements of the method are specified in Table 7 and Table 8.

No standard messages are defined.

Table 9 – DCIM_OEMVirtualMediaService.DeleteRedirectionSAP( ) Method: Return Code Values

Value	Description
0	Request was successfully executed.
1	Method is unsupported.
2	Error occurred.
4096	Job started: REF returned to started CIM_ConcreteJob.

Table 10 – DCIM_OEMVirtualMediaService.DeleteRedirectionSAP( ) Method: Parameters

Qualifiers	Name	Type	Description/Values
IN	RedirectionSAP	CIM_USBRedirectionSAP REF	Redirection SAP to delete.
IN	DeleteUSBDevices	boolean	Delete USB Devices associated through session.
OUT	Job	CIM_ConcreteJob REF	Returned if job started

8.6 CIM_USBRedirectionSAP.RequestStateChange( )

Invocation of the RequestStateChange( ) method changes the element’s state to the value specified in the RequestedState parameter. The 2 (Enabled), 3 (Disabled), and 6 (Offline) values of the RequestedState parameter shall correspond to enabled, disabled, and offline requested states for the SAP, respectively.

Detailed requirements of the RequestStateChange( ) method are specified in Table 11 and Table 12.

No standard messages are defined.

Invoking the RequestStateChange( ) method multiple times could result in earlier requests being overwritten or lost.

Table 11 – CIM_USBRedirectionSAP.RequestStateChange( ) Method: Return Code Values

Value	Description
0	Request was successfully executed.
1	Method is unsupported.
2	Error occurred.
4096	Job started: REF returned to started CIM_ConcreteJob.

Table 12 – CIM_USBRedirectionSAP.RequestStateChange( ) Method: Parameters

Qualifiers	Name	Type	Description/Values
IN	RequestedState	uint16	Valid state values: 2 (Enabled) – activate Virtual Media Session 3 (Disabled) – disconnect Virtual Media Session 6 (Offline) – ready to activate Virtual Media Session
IN	TimeoutPeriod	datetime	Client-specified maximum amount of time the transition to a new state is supposed to take: 0 or NULL – No time requirements <interval> – Maximum time allowed
OUT	Job	CIM_ConcreteJob REF	Returned if job started

8.6.1 CIM_USBRedirectionSAP.RequestStateChange( )—Conditional Support

When an instance of CIM_EnabledLogicalElementCapabilities is associated with the CIM_USBRedirectionSAP instance and the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property contains at least one value, the CIM_USBRedirectionSAP.RequestStateChange( ) method shall be implemented and supported. The CIM_USBRedirectionSAP.RequestStateChange( ) method shall not return a value of 1 (Not Supported).

8.7 Profile Conventions for Operations

Support for operations for each profile class (including associations) is specified in the following subclauses. Each subclause includes either the statement “All operations in the default list in clause 8.7 are supported as described by DSP0200 version 1.2 or a table listing all of the operations that are not supported by this profile or where the profile requires behavior other than that described by DSP0200 version 1.2.

The default list of operations is as follows:

- GetInstance
- Associators
- AssociatorNames

- References
- ReferenceNames
- EnumerateInstances
- EnumerateInstanceNames

A compliant implementation shall support all of the operations in the default list for each class, unless the “Requirement” column states something other than *Mandatory*.

8.8 CIM_BindsTo

Table 13 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 13 – Operations: CIM_BindsTo

Operation	Requirement	Messages
GetInstance	Mandatory	None
EnumerateInstances	Unspecified	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.9 CIM_ElementCapabilities

Table 14 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 14 – Operations: CIM_ElementCapabilities

Operation	Requirement	Messages
GetInstance	Mandatory	None
EnumerateInstances	Unspecified	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.10 CIM_EnabledLogicalElementCapabilities

Table 15 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 15 – Operations: CIM_EnabledLogicalElementCapabilities

Operation	Requirement	Messages
GetInstance	Mandatory	None
EnumerateInstances	Mandatory	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.11 CIM_HostedService

Table 16 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 16 – Operations: CIM_HostedService

Operation	Requirement	Messages
GetInstance	Mandatory	None
EnumerateInstances	Unspecified	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.12 CIM_HostedAccessPoint

Table 17 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 17 – Operations: CIM_HostedAccessPoint

Operation	Requirement	Messages
GetInstance	Mandatory	None
EnumerateInstances	Unspecified	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.13 DCIM_OEMVirtualMediaService

Table 18 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 18 – Operations: DCIM_OEMVirtualMediaService

Operation	Requirement	Messages
GetInstance	Mandatory	None
ModifyInstance	Optional	See clause 8.13.1.
EnumerateInstances	Mandatory	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.13.1 DCIM_OEMVirtualMediaService—ModifyInstance

This section details the specific requirements for the ModifyInstance operation applied to an instance of DCIM_OEMVirtualMediaService.

8.13.1.1 DCIM_OEMVirtualMediaService.ElementName Property

When an instance of CIM_USBRedirectionCapabilities is associated with the DCIM_OEMVirtualMediaService instance and the CIM_USBRedirectionCapabilities.ElementNameEditSupported property has a value of TRUE, the implementation shall allow the ModifyInstance operation to change the value of the ElementName property of the DCIM_OEMVirtualMediaService instance. The ModifyInstance operation shall enforce the length restriction specified in the MaxElementNameLen property of the CIM_USBRedirectionCapabilities instance.

When no instance of CIM_USBRedirectionCapabilities is associated with the DCIM_OEMVirtualMediaService instance, or the ElementNameEditSupported property of the CIM_USBRedirectionCapabilities instance has a value of FALSE, the implementation shall not allow the ModifyInstance operation to change the value of the ElementName property of the DCIM_OEMVirtualMediaService instance.

8.14 CIM_RemoteAccessAvailableToElement

Table 17 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 19 – Operations: CIM_RemoteAccessAvailableToElement

Operation	Requirement	Messages
GetInstance	Mandatory	None
EnumerateInstances	Unspecified	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.15 CIM_RemoteServiceAccessPoint

Table 15 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 20 – Operations: CIM_RemoteServiceAccessPoint

Operation	Requirement	Messages
GetInstance	Mandatory	None
ModifyInstance	Optional	See clause 8.15.1.
EnumerateInstances	Mandatory	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.15.1 CIM_RemoteServiceAccessPoint—ModifyInstance

This section details the specific requirements for the ModifyInstance operation applied to an instance of CIM_RemoteServiceAccessPoint.

8.15.1.1 CIM_RemoteServiceAccessPoint.InfoFormat Property

When an instance of CIM_USBRedirectionCapabilities is associated with the DCIM_OEMVirtualMediaService instance and the CIM_USBRedirectionCapabilities.InfoFormatsSupported is not empty, the implementation shall allow the ModifyInstance operation to change the value of the InfoFormat property of the CIM_RemoteServiceAccessPoint instance. The new InfoFormat value shall be one of the values in CIM_USBRedirectionCapabilities.InfoFormatsSupported.

8.15.1.2 CIM_RemoteServiceAccessPoint.AccessInfo Property

When an instance of CIM_USBRedirectionCapabilities is associated with the DCIM_OEMVirtualMediaService instance and the

CIM_USBRedirectionCapabilities.InfoFormatsSupported is not empty, the implementation shall allow the ModifyInstance operation to change the value of the AccessInfo property of the CIM_RemoteServiceAccessPoint instance.

8.15.1.3 CIM_RemoteServiceAccessPoint.OtherInfoFormatDescription Property

When an instance of CIM_USBRedirectionCapabilities is associated with the DCIM_OEMVirtualMediaService instance and the CIM_USBRedirectionCapabilities.InfoFormatsSupported property has a value of 1 (Other), the implementation shall allow the ModifyInstance operation to change the value of the OtherInfoFormatDescription property of the CIM_RemoteServiceAccessPoint instance.

8.16 CIM_ServiceAffectsElement

Table 21 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 21 – Operations: CIM_ServiceAffectsElement

Operation	Requirement	Messages
GetInstance	Mandatory	None
EnumerateInstances	Unspecified	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.17 CIM_ServiceAccessBySAP

Table 22 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 22 – Operations: CIM_ServiceAccessBySAP

Operation	Requirement	Messages
GetInstance	Mandatory	None
EnumerateInstances	Unspecified	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.18 CIM_USBDevice

Table 15 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 23 – Operations: CIM_USBDevice

Operation	Requirement	Messages
GetInstance	Mandatory	None
DeleteInstance	Conditional. See 8.18.1	None
EnumerateInstances	Mandatory	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.18.1 CIM_USBDevice--DeleteInstance

This method is conditional on the CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property array containing a value of 2 (Creates SAP). For more information, see clause 7.3.3

The DeleteInstance operation shall delete all instances of associations that reference the instance of CIM_USBDevice and the instance of CIM_USBDevice.

8.19 CIM_USBRedirectionCapabilities

Table 15 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 24 – Operations: CIM_USBRedirectionCapabilities

Operation	Requirement	Messages
GetInstance	Mandatory	None
EnumerateInstances	Mandatory	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.20 CIM_USBRedirectionSAP

Table 25 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 25 – Operations: CIM_USBRedirectionSAP

Operation	Requirement	Messages
GetInstance	Mandatory	None
ModifyInstance	Optional	See clause 8.20.1.
EnumerateInstances	Mandatory	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.20.1 CIM_USBRedirectionSAP—ModifyInstance

This section details the specific requirements for the ModifyInstance operation applied to an instance of CIM_USBRedirectionSAP.

8.20.1.1 CIM_USBRedirectionSAP.ElementName Property

When an instance of CIM_EnabledLogicalElementCapabilities is associated with the CIM_USBRedirectionSAP instance and the CIM_EnabledLogicalElementCapabilities.ElementNameEditSupported property has a value of TRUE, the implementation shall allow the ModifyInstance operation to change the value of the ElementName property of the CIM_USBRedirectionSAP instance. The ModifyInstance operation shall enforce the length restriction specified in the MaxElementNameLen property of the CIM_EnabledLogicalElementCapabilities instance.

When no instance of CIM_EnabledLogicalElementCapabilities is associated with the CIM_USBRedirectionSAP instance, or the ElementNameEditSupported property of the CIM_EnabledLogicalElementCapabilities instance has a value of FALSE, the implementation shall not allow the ModifyInstance operation to change the value of the ElementName property of the CIM_USBRedirectionSAP instance.

8.20.1.2 Modifying CIM_USBRedirectionSAP properties

When an instance of CIM_USBRedirectiontCapabilities is associated with the DCIM_OEMVirtualMediaService instance and the CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property has a value of 4 (Modify SAP), the implementation shall allow the ModifyInstance operation to change the value of the properties of the CIM_USBRedirectionSAP instance.

When no instance of CIM_USBRedirectionCapabilities is associated with the DCIM_OEMVirtualMediaService instance, or the SAPCapabilitiesSupported property of the CIM_USBRedirectionCapabilities instance does not have a value of 4 (Modify SAP), the implementation shall not allow the ModifyInstance operation to change the value of the properties of the CIM_USBRedirectionSAP instance.

8.21 CIM_TCPProtocolEndpoint

Table 25 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 26 – Operations: CIM_TCPProtocolEndpoint

Operation	Requirement	Messages
GetInstance	Mandatory	None
ModifyInstance	Optional	See clause 8.20.1.
EnumerateInstances	Mandatory	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.21.1 CIM_TCPProtocolEndpoint—ModifyInstance

This section details the specific requirements for the ModifyInstance operation applied to an instance of CIM_TCPProtocolEndpoint.

If the associated instance of CIM_USBRedirectiontCapabilities (through DCIM_OEMVirtualMediaService and CIM_TCPProtocolEndpoint) and the CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property has a value of 32768 (DCIM Modify TCPProtocolEndpoint), the implementation shall allow the ModifyInstance operation to change the value of the properties of the CIM_TCPProtocolEndpoint instance except for the ProtoclFType property.

If the associated instance of CIM_USBRedirectiontCapabilities (through DCIM_OEMVirtualMediaService and CIM_TCPProtocolEndpoint) and the CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property does not contain value of 32768 (DCIM Modify TCPProtocolEndpoint), the implementation shall not allow the ModifyInstance operation to change the value of the properties of the CIM_TCPProtocolEndpoint instance or shall not support the ModifyInstance operation on the CIM_TCPProtocolEndpoint instance.

9 Use Cases

This section contains object diagrams and use cases specific to the *Virtual Media Profile*. The use cases are informative and are not intended to define the requirements for conformance.

9.1 Advertising the DCIM Profile Extension Conformance

Figure 2 shows how instances of CIM_RegisteredProfile are used to identify the version of the *Virtual Media Profile* that an instance of DCIM_OEMVirtualMediaService and its associated instances conform.

An instance of CIM_RegisteredProfile exists for each profile that is instrumented in the system. One instance of CIM_RegisteredProfile identifies the DMTF *Base Server Profile*, version 1.0.0 and DMTF *Service Processor Profile*, version 1.0.0. The other instance identifies the *Virtual Media Profile*, version 1.0.0 of DCIM extension profile. The Central Instance is the DCIM_OEMVirtualMediaService. The Scoping Instance is the CIM_ComputerSystem instance.

This instance of CIM_ComputerSystem conforms to the *Service Processor Profile* version 1.0.0 as indicated by the CIM_ElementConformsToProfile association with the CIM_RegisteredProfile instance.

This instance of DCIM_OEMVirtualMediaService conforms to the *Virtual Media Profile* version 1.0.0 as indicated by the CIM_ElementConformsToProfile association with the CIM_RegisteredProfile instance.

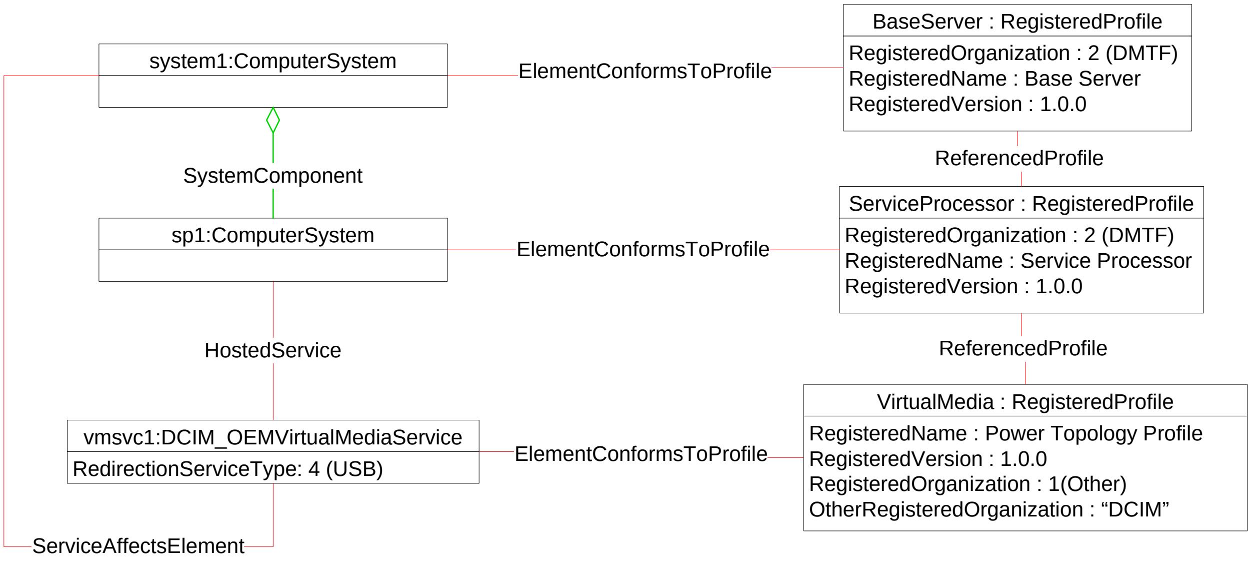
system1:ComputerSystem
ElementConformsToProfile
BaseServer : RegisteredProfile
RegisteredOrganization : 2 (DMTF)
RegisteredName : Base Server
RegisteredVersion : 1.0.0
ReferencedProfile
SystemComponent
sp1:ComputerSystem
ElementConformsToProfile
ServiceProcessor : RegisteredProfile
RegisteredOrganization : 2 (DMTF)
RegisteredName : Service Processor
RegisteredVersion : 1.0.0
HostedService
ReferencedProfile
VirtualMedia : RegisteredProfile
vmsvc1:DCIM_OEMVirtualMediaService
RedirectionServiceType: 4 (USB)
ElementConformsToProfile
RegisteredName : Power Topology Profile
RegisteredVersion : 1.0.0
RegisteredOrganization : 1(Other)
OtherRegisteredOrganization : "DCIM"
ServiceAffectsElement

Figure 2 – Registered Profile

9.2 DCIM Service Processor Virtual Media

Figure 3 shows a possible implementation of the service processor's Virtual Media capabilities. Usbredirectcap represents the capabilities of Virtual Media. The ConnectionModesSupported property represents that the only mode Virtual Media supports is listening on the ports. The SAPCapabilities property represents that ModifyInstance is supported on usbredirectsap1, port1 and port2. The RequestedStatesSupported property on the usbredirectcap advertises that the Virtual Media Service can be requested attach(enable), detach(disable), or auto-attach(offline) the Virtual Media through the use of the RequestStateChange method on vmsvc1.

Virtual Media is currently in available state because both vmsvc1 and usbredirectsap1 EnabledState property has value of 6 (Enabled but Offline), and additionally this value on vmsvc1 represents that the Virtual Media is in auto-attach virtual media mode. MaxCurrentEnabledSAP property on vmsvc1 has a value of one, identifying that Virtual Media supports only one concurrent Virtual Media Session at a time. The sapcap.RequestedStatesSupported property represents that the Virtual Media Session, when active, can be disconnected using a RequestStateChange() method with a RequestedState parameter value of 3(Disabled).

Virtual Media is currently listening on two ports represented by port1 and port2, with the respective PortNumber property representing the port number. ProtocolIFType property on port1 and port2 represents whether SSL is enabled, and data flowing through the port will be encrypted or not.

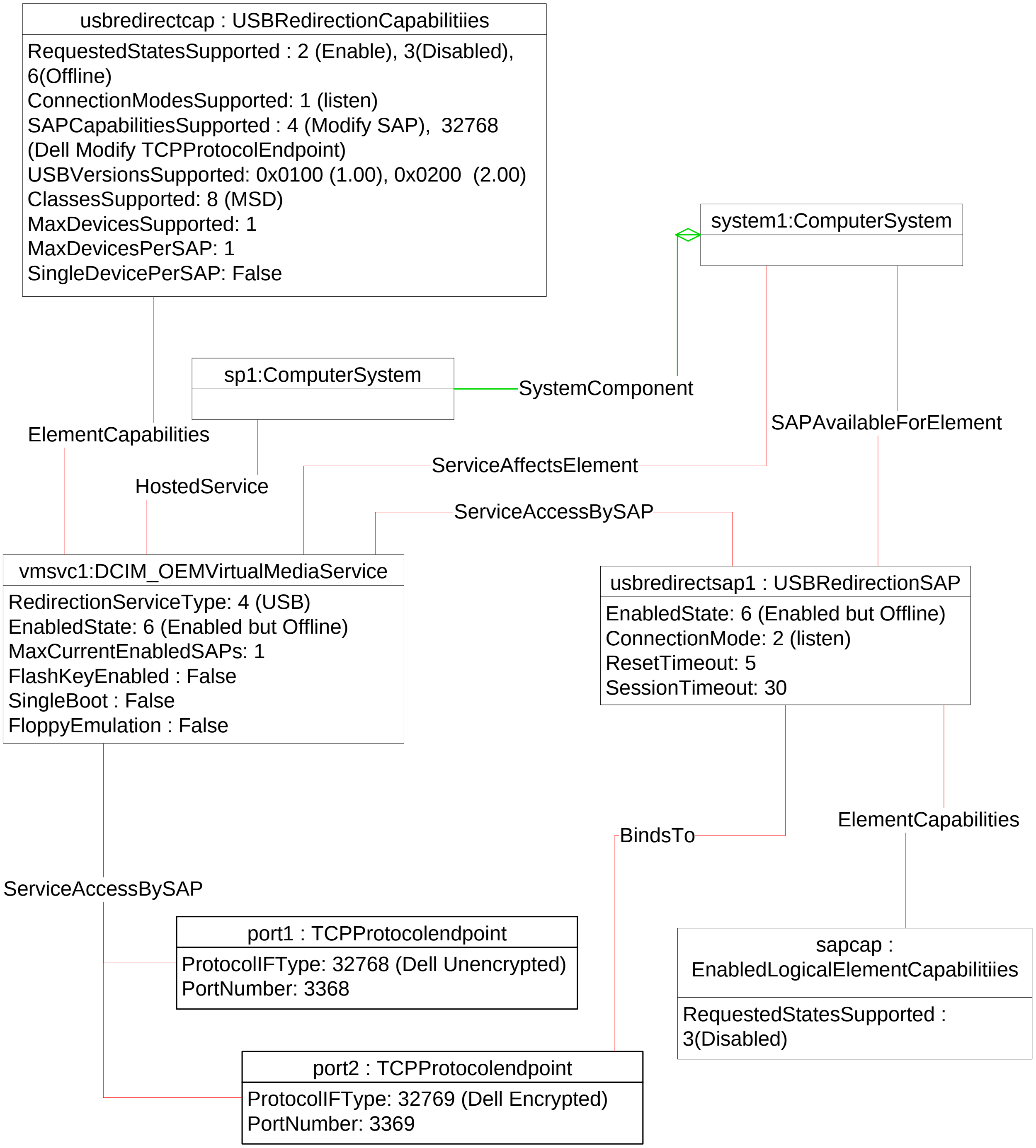
usbredirectcap : USBRedirectionCapabilitiies
RequestedStatesSupported : 2 (Enable), 3(Disabled), 6(Offline)
ConnectionModesSupported: 1 (listen)
SAPCapabilitiesSupported : 4 (Modify SAP), 32768 (Dell Modify TCPProtocolEndpoint)
USBVersionsSupported: 0x0100 (1.00), 0x0200 (2.00)
ClassesSupported: 8 (MSD)
MaxDevicesSupported: 1
MaxDevicesPerSAP: 1
SingleDevicePerSAP: False
system1:ComputerSystem
sp1:ComputerSystem
SystemComponent
SAPAvailableForElement
ElementCapabilities
ServiceAffectsElement
HostedService
ServiceAccessBySAP
vmsvc1:DCIM_OEMVirtualMediaService
RedirectionServiceType: 4 (USB)
EnabledState: 6 (Enabled but Offline)
MaxCurrentEnabledSAPs: 1
FlashKeyEnabled : False
SingleBoot : False
FloppyEmulation : False
usbredirectsap1 : USBRedirectionSAP
EnabledState: 6 (Enabled but Offline)
ConnectionMode: 2 (listen)
ResetTimeout: 5
SessionTimeout: 30
ElementCapabilities
BindsTo
ServiceAccessBySAP
port1 : TCPProtocolendpoint
ProtocolIFType: 32768 (Dell Unencrypted)
PortNumber: 3368
sapcap : EnabledLogicalElementCapabilitiies
RequestedStatesSupported : 3(Disabled)
port2 : TCPProtocolendpoint
ProtocolIFType: 32769 (Dell Encrypted)
PortNumber: 3369

Figure 3 – DCIM Service Processor Virtual Media

9.3 Object Diagram for a Monolithic Server – Create SAPs

Figure 4 shows a monolithic server, system1, with no pre-configured USB Redirection SAPs. The client is expected to create the USB Redirection SAPs.

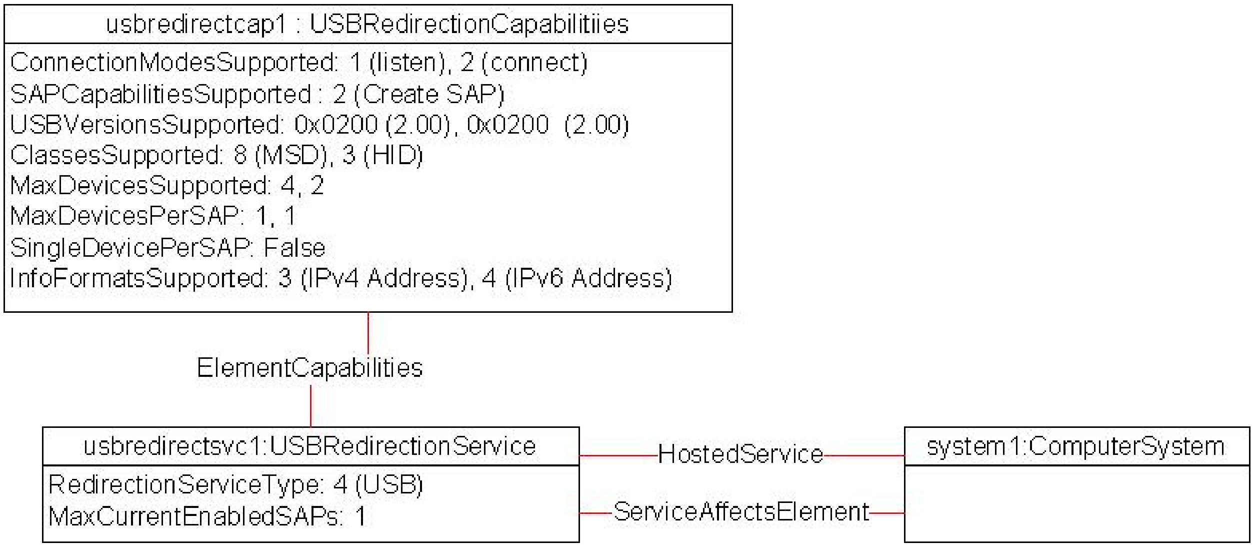
usbredirectcap1 : USBRedirectionCapabilitiies
ConnectionModesSupported: 1 (listen), 2 (connect)
SAPCapabilitiesSupported : 2 (Create SAP)
USBVersionsSupported: 0x0200 (2.00), 0x0200 (2.00)
ClassesSupported: 8 (MSD), 3 (HID)
MaxDevicesSupported: 4, 2
MaxDevicesPerSAP: 1, 1
SingleDevicePerSAP: False
InfoFormatsSupported: 3 (IPv4 Address), 4 (IPv6 Address)
ElementCapabilities
usbredirectsvc1:USBRedirectionService
RedirectionServiceType: 4 (USB)
MaxCurrentEnabledSAPs: 1
HostedService
ServiceAffectsElement
system1:ComputerSystem

Figure 4 – Monolithic System – Create SAPs

The Virtual Media Service is represented by usbredirectsvc1. The service (usbredirectsvc1) is hosted on system1 as represented by the CIM_HostedService association between system1 and usbredirectsvc1.

There is an instance of CIM_USBRedirectionCapabilities, usbredirectcap1, associated to usbredirectsvc1 using an instance of CIM_ElementCapabilities. The CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property has value 3 (Create SAPs) that specifies that USB Redirection SAPs can be created. The value of the ConnectionModesSupported property specifies that the created USB Redirection SAPs may be placed in "listen" or "connect" mode.

The value of the USBVersionsSupported property specifies that the locally-emulated USB devices that are created must be USB version 2.00.

The value of the USBClassesSupported property specifies that the locally-emulated USB devices that are created must be either a Media Storage Device (MSD), or a USB 1.0/2.0 Human Interface Device (HID).

The value of the SingleDevicePerSAP property specifies that MSD and HID devices may be contained in the same SAP.

The value of the MaxDevicesSupported property specifies that across all of the created USB Redirection SAPs, at most 4 MSD and 2 HID may be used.

The value of the MaxDevicesPerSAP property specifies that each created USB Redirection SAP can contain at most 1 MSD and 1 HID.

The value of the InfoFormatsSupported property specifies that when the ConnectionMode is 3 (connect) and a CIM_RemoteServiceAccessPoint is created and associated with the newly created USB Redirection SAP, the Remote Service Access Point AccessInfo property can be set to either 3 (IPv4 Address) or 4 (IPv6 Address).

The client should conform to these requirements when invoking the CreateRedirectionSAP() method to create new SAPs.

9.4 Object Diagram for a Monolithic Server – Pre-configured SAPs - Connect

Figure 5 shows a monolithic server, system1, with a static pre-configured USB Redirection SAP for a USB storage device.

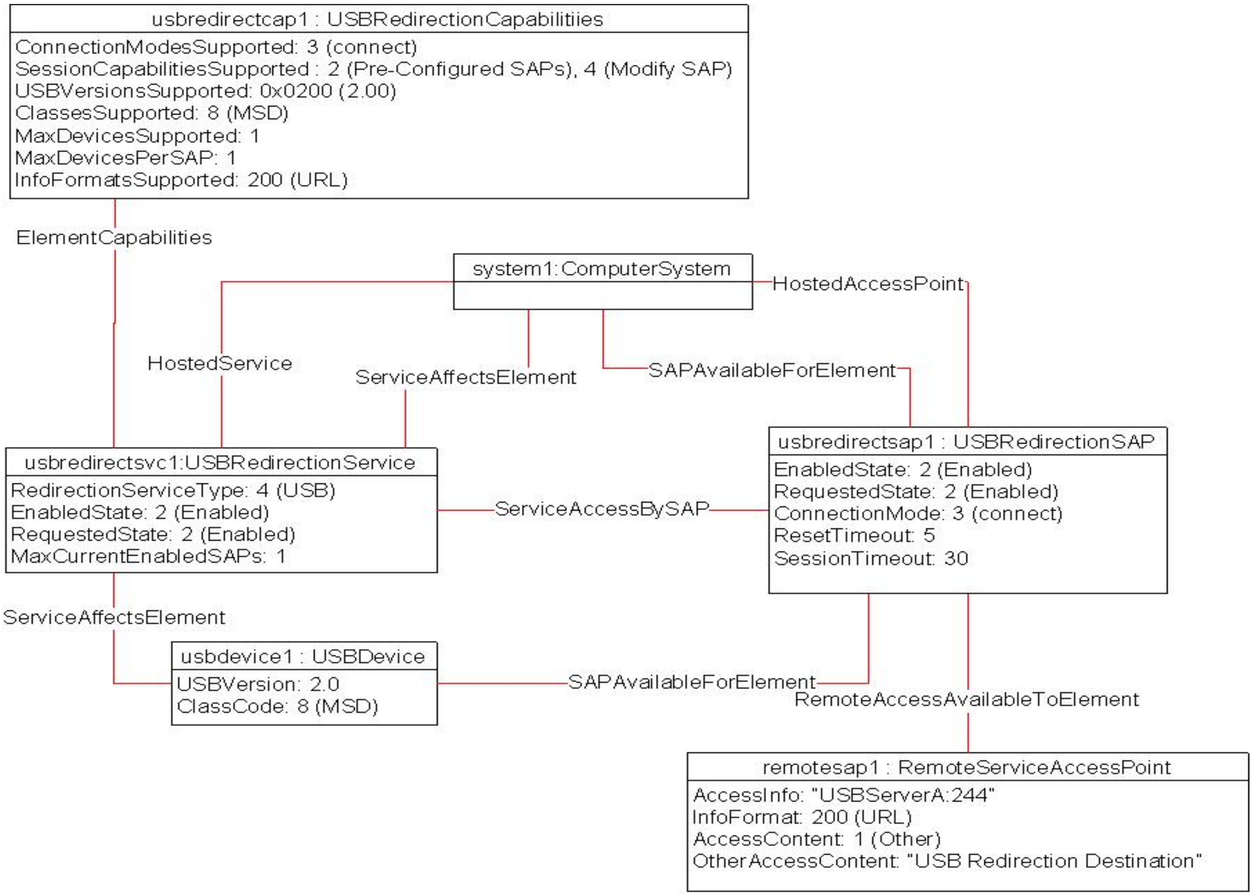
usbredirectcap1 : USBRedirectionCapabilitiies
ConnectionModesSupported: 3 (connect)
SessionCapabilitiesSupported : 2 (Pre-Configured SAPs), 4 (Modify SAP)
USBVersionsSupported: 0x0200 (2.00)
ClassesSupported: 8 (MSD)
MaxDevicesSupported: 1
MaxDevicesPerSAP: 1
InfoFormatsSupported: 200 (URL)
ElementCapabilities
system1:ComputerSystem
HostedAccessPoint
HostedService
ServiceAffectsElement
SAPAvailableForElement
usbredirectsvc1:USBRedirectionService
RedirectionServiceType: 4 (USB)
EnabledState: 2 (Enabled)
RequestedState: 2 (Enabled)
MaxCurrentEnabledSAPs: 1
ServiceAccessBySAP
usbredirectsap1 : USBRedirectionSAP
EnabledState: 2 (Enabled)
RequestedState: 2 (Enabled)
ConnectionMode: 3 (connect)
ResetTimeout: 5
SessionTimeout: 30
ServiceAffectsElement
usbdevice1 : USBDevice
USBVersion: 2.0
ClassCode: 8 (MSD)
SAPAvailableForElement
RemoteAccessAvailableToElement
remotesap1 : RemoteServiceAccessPoint
AccessInfo: "USBServerA:244"
InfoFormat: 200 (URL)
AccessContent: 1 (Other)
OtherAccessContent: "USB Redirection Destination"

Figure 5 – Monolithic System – Pre-configured SAPs - Connect

The Virtual Media Service is represented by usbredirectsvc1. The USB Redirection SAP is represented by usbredirectsap1.

The instance of CIM_USBRedirectionCapabilities, usbredirectcap1, describes the capabilities of the Virtual Media Service. The SAPCapabilitiesSupported property value of 2 (Pre-configured SAPs) determines that at least one static pre-configured Virtual MediaSAP exists. The absence of the property value 3 (Create SAPs) determines that additional SAPs cannot be created. The state of the pre-configured USB Redirection SAPs can be managed, but new Virtual Medias cannot be created. The SAPCapabilitiesSupported property value of 4 (Modify SAP) determines that the SAP properties can be modified.

The ConnectionModesSupported property determines that the Virtual Media Service only supports “listen” mode. The USBVersionsSupported and ClassesSupported properties determine that the Emulated USB Devices being redirected are emulated as a USB 2.0 MSD (Media Storage Device).

The InfoFormatsSupported property determines that the SAP can support URLs to initiate the redirected session connection to the remote SAP.

The CIM_ServiceAccessBySAP association between usbredirectsvc1 and usbredirectsap1 determines that the usbredirectsvc1 is available at usbredirectsap1. The USBRedirectionSAP.ConnectionMode property is set to "connect" which determines that the SAP will initiate a session to a remote SAP. The instance of CIM_RemoteServiceAccessPoint, remotesap1, has been configured with the access information needed to initiate a session with the remote SAP.

The CIM_HostedService association between system1 and usbredirectsvc1 determines that the Virtual Media Service is hosted on system1.

The CIM_ServiceAffectsElement association between usbredirectsvc1 and usbdevice1 determines that the Virtual Media Service is configured to redirect the session of the locally emulated USB Device. The USBVersion and ClassCode property of usbdevice1 conforms to the constraints of the CIM_USBRedirectionCapabilities.USBVersionsSupported and CIM_USBRedirectionCapabilities.ClassesSupported properties.

The CIM_HostedAccessPoint association between usbredirectionsap1 and system1 determines that usbredirectsap1 is hosted on system1.

The CIM_SAPAvailableForElement association between system1 and usbredirectsap1 determines that usbredirectionsap provides a SAP for at least one USB device residing on system1.

The Virtual Media is active because the state of the usbredirectsvc1 is 2 (Enabled) and the state of the usbredirectsap1 is 2 (Enabled).

9.5 Object Diagram for a Monolithic Server – Pre-configured SAPs - Listen

Figure 6 shows a monolithic server, system1, with a static pre-configured USB Redirection SAP for a USB storage device, configured for the USB Redirection SAP to listen for a connection request from the Remote System.

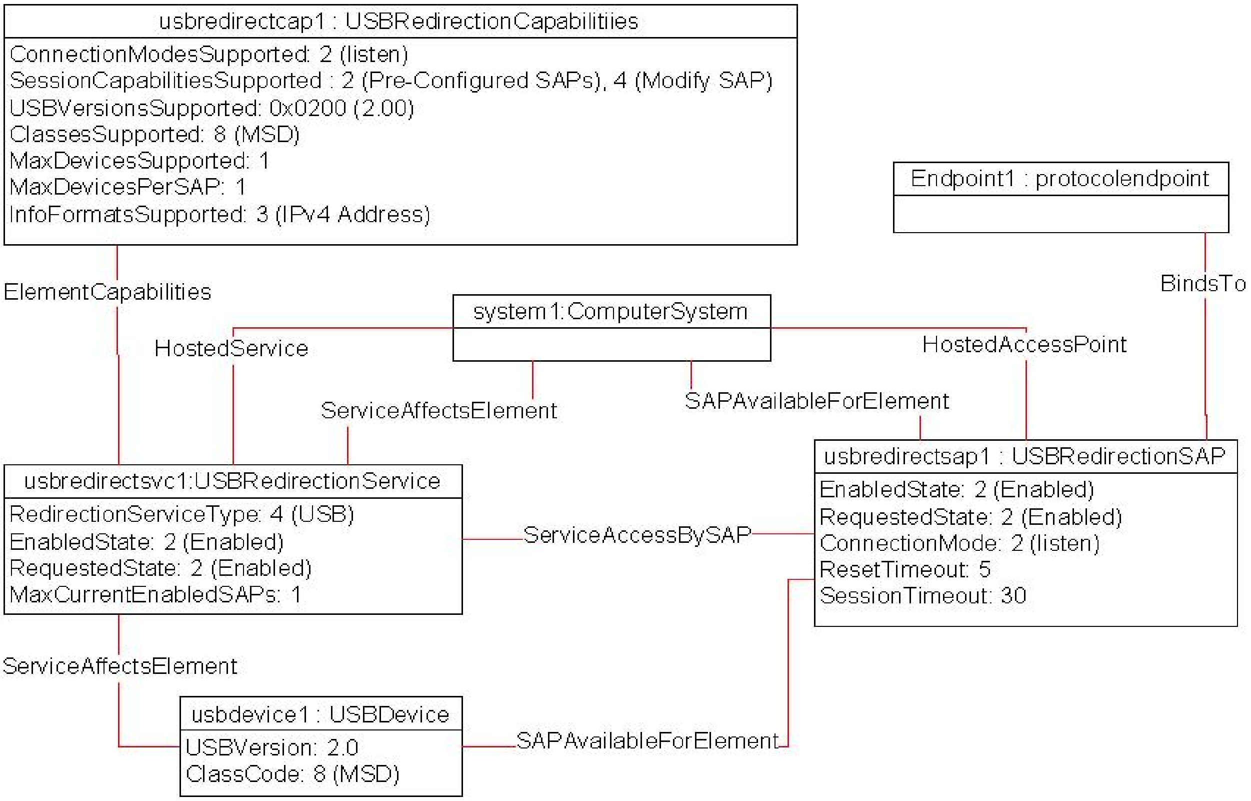
usbredirectcap1 : USBRedirectionCapabilitiies
ConnectionModesSupported: 2 (listen)
SessionCapabilitiesSupported : 2 (Pre-Configured SAPs), 4 (Modify SAP)
USBVersionsSupported: 0x0200 (2.00)
ClassesSupported: 8 (MSD)
MaxDevicesSupported: 1
MaxDevicesPerSAP: 1
InfoFormatsSupported: 3 (IPv4 Address)
Endpoint1 : protocolendpoint
ElementCapabilities
BindsTo
system1:ComputerSystem
HostedService
HostedAccessPoint
ServiceAffectsElement
SAPAvailableForElement
usbredirectsap1 : USBRedirectionSAP
EnabledState: 2 (Enabled)
RequestedState: 2 (Enabled)
ConnectionMode: 2 (listen)
ResetTimeout: 5
SessionTimeout: 30
usbredirectsvc1:USBRedirectionService
RedirectionServiceType: 4 (USB)
EnabledState: 2 (Enabled)
RequestedState: 2 (Enabled)
MaxCurrentEnabledSAPs: 1
ServiceAccessBySAP
ServiceAffectsElement
usbdevice1 : USBDevice
USBVersion: 2.0
ClassCode: 8 (MSD)
SAPAvailableForElement

Figure 6– Monolithic System – Pre-configured SAPs - Listen

The model shown is similar to that in section 9.4 with the exceptions noted in the remainder of this section.

The ConnectionModesSupported property of the instance of CIM_USBRedirectionCapabilities shows that the Virtual Media Service only supports the ‘listen” mode for its SAPs. The CIM_ServiceAccessBySAP association between usbredirectsvc1 and usbredirectsap1 determines that the usbredirectsvc1 is available at usbredirectsap1. The ConnectionMode property of CIM_USBRedirectionSAP is set to "listen" that determines that the SAP will wait for the Remote System to initiate a session. The instance of CIM_ProtocolEndpoint,Endpoint1, contains the information the Remote System needs to initiate a session with the local USB Redirection SAP

9.6 Object Diagram for a Monolithic Server – Pre-configured SAPs – Listen or Connect

Figure 7 shows a monolithic server, system1, with a static pre-configured USB Redirection SAP for a USB storage device.

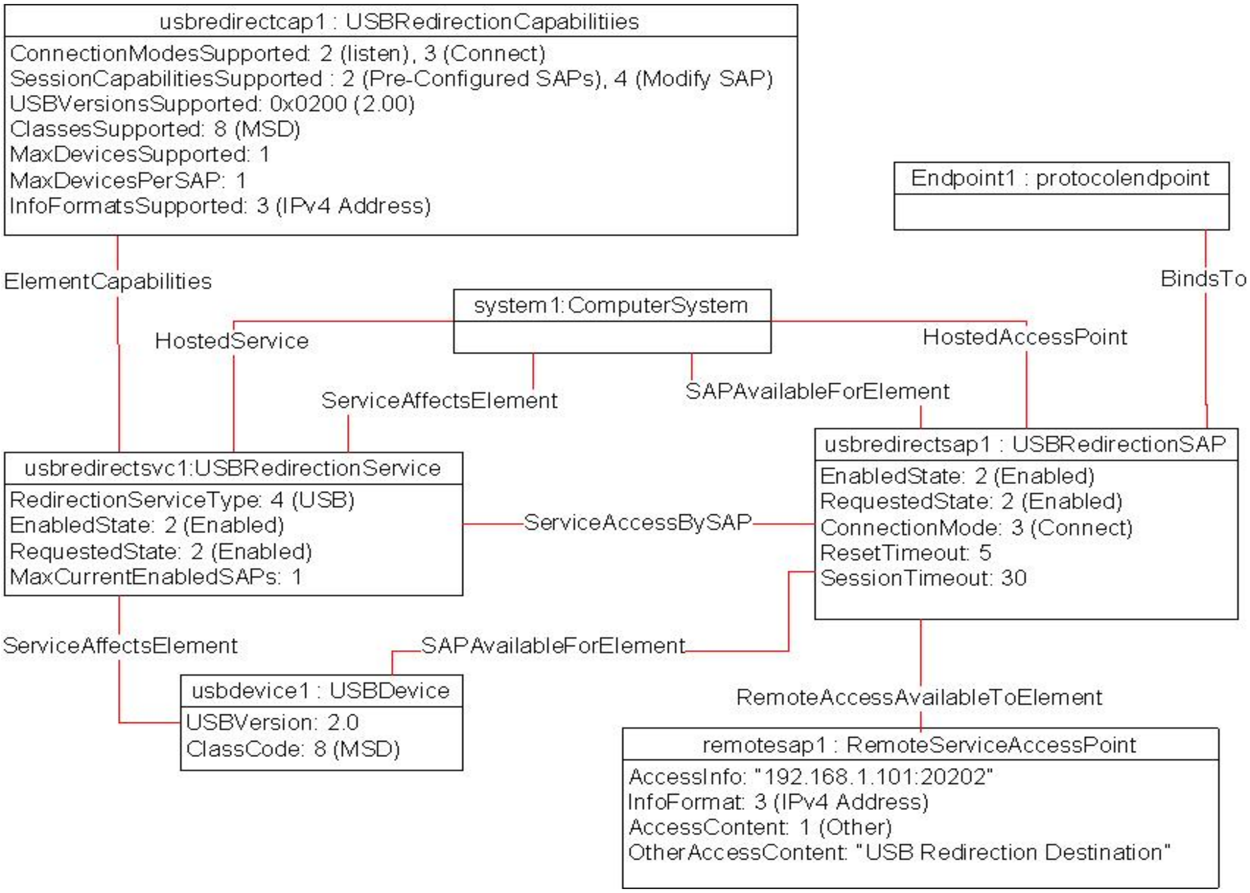
usbredirectcap1 : USBRedirectionCapabilitiies
ConnectionModesSupported: 2 (listen), 3 (Connect)
SessionCapabilitiesSupported : 2 (Pre-Configured SAPs), 4 (Modify SAP)
USBVersionsSupported: 0x0200 (2.00)
ClassesSupported: 8 (MSD)
MaxDevicesSupported: 1
MaxDevicesPerSAP: 1
InfoFormatsSupported: 3 (IPv4 Address)
Endpoint1 : protocolendpoint
ElementCapabilities
BindsTo
system1:ComputerSystem
HostedService
HostedAccessPoint
ServiceAffectsElement
SAPAvailableForElement
usbredirectsap1 : USBRedirectionSAP
EnabledState: 2 (Enabled)
RequestedState: 2 (Enabled)
ConnectionMode: 3 (Connect)
ResetTimeout: 5
SessionTimeout: 30
usbredirectsvc1:USBRedirectionService
RedirectionServiceType: 4 (USB)
EnabledState: 2 (Enabled)
RequestedState: 2 (Enabled)
MaxCurrentEnabledSAPs: 1
ServiceAccessBySAP
ServiceAffectsElement
SAPAvailableForElement
usbdevice1 : USBDevice
USBVersion: 2.0
ClassCode: 8 (MSD)
RemoteAccessAvailableToElement
remotesap1 : RemoteServiceAccessPoint
AccessInfo: "192.168.1.101:20202"
InfoFormat: 3 (IPv4 Address)
AccessContent: 1 (Other)
OtherAccessContent: "USB Redirection Destination"

Figure 7 – Monolithic System – Pre-configured SAPs – Listen or Connect

The model shown is similar to that in section 9.4 with the exceptions noted in the remainder of this section.

The ConnectionModesSupported property of the instance of CIM_USBRedirectionCapabilities shows that the Virtual Media Service supports both the ‘listen” and “connect” mode for its SAPs. The SAPCapabilitiesSupported property of CIM_USBRedirectionCapabilities shows that the properties of the SAP may be modified; this might be to change the timeout properties or to reconfigure the SAP from “listen” to “connect” mode.

The CIM_ServiceAccessBySAP association between USBredirectsvc1 and USBredirectsap1 determines that the usbredirectsvc1 is available at usbredirectsap1. Since the SAP may be configured to be in either “listen” or “connect” mode, it has both an instance of CIM_ProtocolEndpoint associated to it by CIM_BindsTo, and an instance of CIM_RemoteServiceAccessPoint associated to it by CIM_RemoteAccessAvailableToElement.

The ConnectionMode property of CIM_USBRedirectionSAP has been set to "connect", so the instance of CIM_RemoteServiceAccessPoint, remotesap1, has been configured with information about how to access the remote SAP.

9.7 Object Diagram for a Monolithic Server with Service Processor

Figure 8 shows a monolithic server with a service processor. The diagram is similar to Figure 6, but Figure 8 contains an instance of CIM_ComputerSystem, sp1, that represents the service processor.

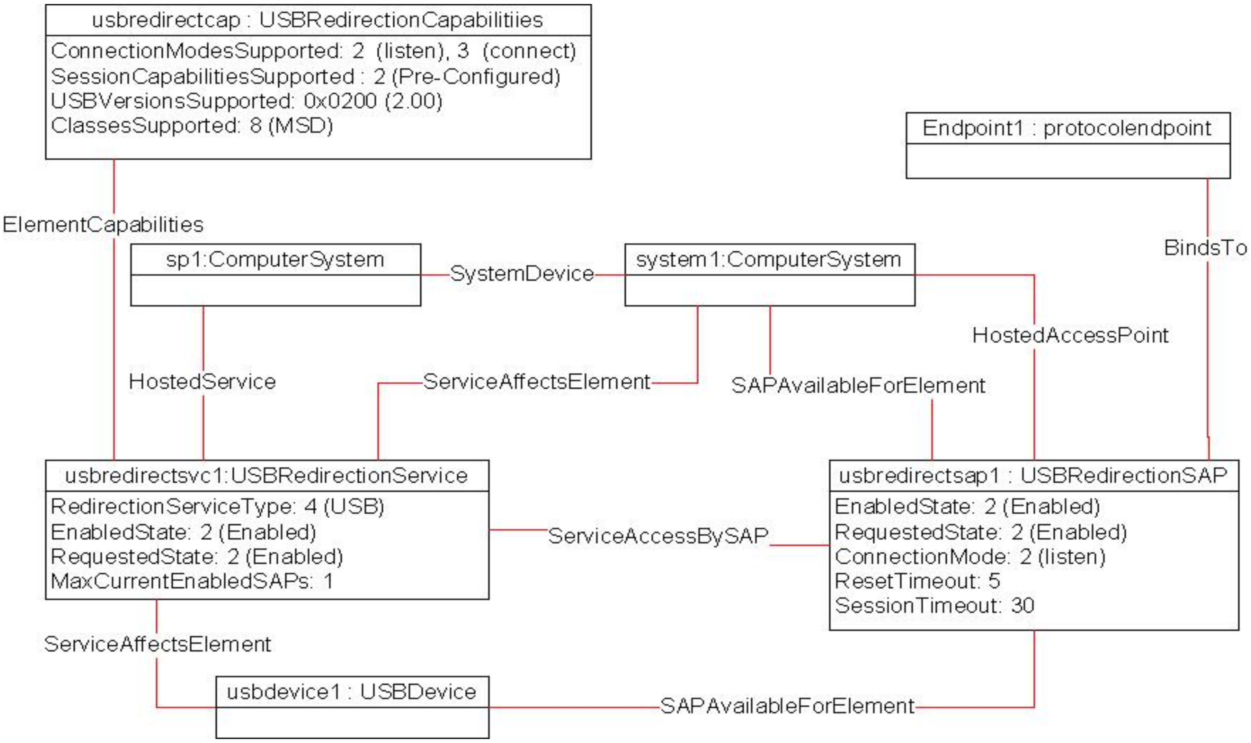
usbredirectcap : USBRedirectionCapabilitiies
ConnectionModesSupported: 2 (listen), 3 (connect)
SessionCapabilitiesSupported : 2 (Pre-Configured)
USBVersionsSupported: 0x0200 (2.00)
ClassesSupported: 8 (MSD)
Endpoint1 : protocolendpoint
ElementCapabilities
BindsTo
sp1:ComputerSystem
SystemDevice
system1:ComputerSystem
HostedAccessPoint
HostedService
ServiceAffectsElement
SAPAvailableForElement
usbredirectsvc1:USBRedirectionService
RedirectionServiceType: 4 (USB)
EnabledState: 2 (Enabled)
RequestedState: 2 (Enabled)
MaxCurrentEnabledSAPs: 1
ServiceAccessBySAP
usbredirectsap1 : USBRedirectionSAP
EnabledState: 2 (Enabled)
RequestedState: 2 (Enabled)
ConnectionMode: 2 (listen)
ResetTimeout: 5
SessionTimeout: 30
ServiceAffectsElement
usbdevice1 : USBDevice
SAPAvailableForElement

Figure 8 – Monolithic System with Service Processor

9.8 Determine whether a System supports Virtual Media

A client can determine whether a computer system of interest supports Virtual Media as follows:

1) Start at the instance of CIM_ComputerSystem that represents the computer system of interest
2) Enumerate the instances of DCIM_OEMVirtualMediaService that are associated to the instance of CIM_ComputerSystem using an instance of the CIM_ServiceAffectsElement association.
3) If such an instance of DCIM_OEMVirtualMediaService is not found, the computer system does not support Virtual Media. Otherwise, the computer system does support Virtual Media.

9.9 Determine whether Static Pre-configured USB Redirection SAPs Exist

A client can determine whether a computer system of interest has static pre-configured USB Redirection SAPs as follows:

1) Start at the instance of DCIM_OEMVirtualMediaService found using the use case in section 9.8.
2) Traverse the instance of CIM_ElementCapabilities to find the instance of CIM_USBRedirectionCapabilities.

3) For the instance of CIM_USBRedirectionCapabilities that is found, if the SAPCapabilitiesSupported array contains a value of 1 (Pre-configured SAPs), then at least one pre-configured USB Redirection SAP exists.

9.10 Determine whether USB Redirection SAPs can be Created

A client can determine whether USB Redirection SAPs can be created on the computer system of interest as follows:

1) Start at the instances of DCIM_OEMVirtualMediaService found using the use case in section 9.8.

2) Traverse the instance of CIM_ElementCapabilities to find the instance of CIM_USBRedirectionCapabilities.

3) For the instance of CIM_USBRedirectionCapabilities that is found, if the SAPCapabilitiesSupported array contains a value of 2 (Create SAPs), then USB Redirection SAPs can be created.

9.11 Determine the Emulated USB Devices Already Available via a USB Redirection SAP

A client can determine the USB Redirection SAP Destinations managed by a Service as follows:

1) Start at the instance of DCIM_OEMVirtualMediaService of interest. (The instance can be found using the use case in clause 9.8.)

2) Enumerate the instances of CIM_USBRedirectionSAP that are associated through an instance of CIM_ServiceAccessBySAP.

3) For each instance of CIM_USBRedirectionSAP, enumerate the instances CIM_USBDevice associated to the CIM_USBRedirectionSAP through an instance of CIM_SAPAvailableForElement.

4) Each instance of CIM_USBDevice represents a locally-emulated USB device that is available through a SAP.

9.12 Determine if a USB Device is Redirected

A client can determine whether an Emulated USB Device of interest is configured to be redirected to a USB Redirection SAP as follows:

1) Start at the instance of CIM_USBDevice that represents the device of interest.

2) Find the instance of CIM_USBRedirectionSAP that is associated through an instance of CIM_SAPAvailableForElement.

3) If an instance of CIM_USBRedirectionSAP is not found, the instance of CIM_USBDevice is not redirected.

4) Otherwise, the USB device is redirected and the instance of CIM_USBRedirectionSAP, if found, represents the SAP.

9.13 Determine how the Virtual Media State is Managed

A client can determine whether a Virtual Media is managed through the state of the SAP only, or through the Service and SAP states as follows:

1) Start at the instance of DCIM_OEMVirtualMediaService of interest using the use case described in section 9.8.

2) Select the CIM_USBRedirectionSAP that represents the USB Redirection SAP of interest using the use case described in section 9.11.

3) From the instance of DCIM_OEMVirtualMediaService, find the instance of CIM_USBRedirectionCapabilities that is associated through an instance of CIM_ElementCapabilities.

   If an instance of CIM_USBRedirectionCapabilities is not found, the Virtual Media cannot be managed through the state of the Virtual Media Service.

4) For the CIM_USBRedirectionCapabilities instance that is found, obtain the values of the RequestedStatesSupported property.

5) From the instance of CIM_USBRedirectionSAP, find the CIM_EnabledLogicalElementCapabilities that is associated through an instance of CIM_ElementCapabilities.

   If an instance of CIM_EnabledLogicalElementCapabilities is not found, the Virtual Media cannot be managed through the state of the USB Redirection SAP.

6) For the CIM_EnabledLogicalElementCapabilities that is found, obtain the values of the RequestedStatesSupported property.

7) If the CIM_USBRedirectionCapabilities.RequestedStatesSupported property contains no values and the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported contains no values, then no state management of the Virtual Media is possible.

   If the CIM_USBRedirectionCapabilities.RequestedStatesSupported property contains no values and the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported contains values, then state management of the Virtual Media is performed via state management of the SAP only.

   If the CIM_USBRedirectionCapabilities.RequestedStatesSupported property contains values and the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported contains values, then state management of the Virtual Media is possible via state management of both the Service and the SAP.

9.14 Activate a Virtual Media —SAP State Management

When the Virtual Media is managed through the state of the USB Redirection SAP only, a client can start a Virtual Media as follows:

1) Start at the instance of the CIM_USBRedirectionSAP that is a component of the USB Redirection SAP of interest.

2) Invoke the RequestStateChange( ) method with the RequestedState parameter set to 2 (Enabled).

3) Verify that the CIM_USBRedirectionSAP.EnabledState property is set to a value of 2 (Enabled).

   The Virtual Media is now active.

9.15 Activate a Virtual Media —Service and SAP State Management

When the Virtual Media is managed through the states of both the Virtual Media Service and USB Redirection SAP, a client can start a Virtual Media as follows:

1) Start at the DCIM_OEMVirtualMediaService instance of interest.

2) Invoke the RequestStateChange( ) method with the RequestedState parameter set to 2 (Enabled).

3) Verify that the DCIM_OEMVirtualMediaService.EnabledState property is set to a value of 2 (Enabled).

4) Invoke the CIM_USBRedirectionSAP.RequestStateChange( ) method with the RequestedState parameter set to 2 (Enabled).

5) Verify that the CIM_USBRedirectionSAP.EnabledState property is set to a value of 2 (Enabled).

   The Virtual Media is now active.

9.16 Stop All Virtual Medias Associated with the Service – SAP State Management

In the following use case, it is assumed that the client knows the instance of DCIM_OEMVirtualMediaService of interest.

When the Virtual Media is managed through the state of the USB Redirection SAP only, a client can stop all Virtual Medias as follows:

1) Start at the instance of the DCIM_OEMVirtualMediaService that represents the Virtual Media Service of interest.

2) Enumerate the instances of CIM_USBRedirectionSAP that are associated with the instance of DCIM_OEMVirtualMediaService through an instance of CIM_ServiceAccessBySAP.

3) For each instance of CIM_USBRedirectionSAP found, query the value of the EnabledState property.

4) If the state of each CIM_USBRedirectionSAP is 2 (Enabled), invoke the RequestStateChange( ) method with each RequestedState parameter set to 6 (Offline).

5) Verify that each CIM_USBRedirectionSAP.EnabledState property is set to a value of 6 (Enabled but Offline).

   All Virtual Medias associated with the DCIM_OEMVirtualMediaService instance are now inactive.

9.17 Stop All Virtual Medias Associated with a Service—Service and SAP State Management

When the Virtual Media is managed through the states of both the Virtual Media Service and USB Redirection SAP, a client can stop all Virtual Medias associated with the Virtual Media Service as follows:

1) Start at the instance of the DCIM_OEMVirtualMediaService that represents the Virtual Media Service of interest.

2) Change the state of the DCIM_OEMVirtualMediaService instance by invoking the RequestStateChange( ) method with the RequestedState parameter set to 3 (Disabled).

   All Virtual Medias associated with the DCIM_OEMVirtualMediaService instance are now inactive.

9.18 Find the Number of Active USB Redirection SAPs for a Service

A client can find the number of active USB Redirection SAPs for a Virtual Media Service of interest as follows:

1) Start at the DCIM_OEMVirtualMediaService instance of interest.

2) Query the value of the EnabledState property; if the EnabledState property is 3 (Disabled), the number of active Redirection SAPs is zero.

3) If the EnabledState property is 2 (Enabled), find all instances of CIM_USBRedirectionSAP associated with the DCIM_OEMVirtualMediaService through an instance of CIM_ServiceAccessBySAP.

4) For each found CIM_USBRedirectionSAP instance, query the value of the EnabledState property.

5) Count all the CIM_USBRedirectionSAP.EnabledState properties whose value is 2 (Enabled).

9.19 Creating a USB Redirection SAP in Connect Mode

A client can create a USB Redirection SAP as follows:

1) Start at the DCIM_OEMVirtualMediaService instance of interest

2) Inspect the SAPCapabilitiesSupported for the value 2 (Create SAPs) to confirm that creating a new SAP is supported

3) Invoke the CreateUSBDevice() method with the USB Class and Device Type to create an instance of a redirected USB device on the system. This invocation returns a reference to an instance of CIM_USBDevice (usbdevice1); multiple invocations of CreateUSBDevice() can be made.

4) Invoke the CreateRedirectionSAP() method with an array of references to the CIM_USBDevice instances from the USBDevices parameter, along with information to create the SAP. The NewRemoteServiceAccessPoint parameter must have the access information needed to determine the remote service access point. The NewSAPRequestedStatesSupported parameter must have the enumeration of the Requested States that will be supported for the SAP, which will be used to initialize the RequestedStatesSupported property of a new instance of CIM_EnabledLogicalElementCapabilties that will be associated with the new USB Redirection SAP by an instance of CIM_ElementCapabilities.

5) When the CreateDevices Boolean parameter is TRUE, in addition to the USB device references in the USBDevices parameter, CreateRedirectionSAP() method will create new instances of CIM_USBDevices as specified in the NewUSBDevices parameter and associate them with the new SAP. Each instance of a concrete subclass of CIM_LogicalDevice specified in the RedirectedLogicalDevices[] parameter that is not NULL will be associated with the new instance of CIM_USBDevices that was specified in the same entry in the NewUSBDevices parameter by a CIM_LogicalIdentity association.

   The client starts Virtual Media on the managed node, by performing state management of the Virtual Media. When enabled, the managed node will attempt to establish a session with the remote service access point.

9.20 Creating a USB Redirection SAP in Listen Mode

A client can create a USB Redirection SAP as follows:

1) Start at the DCIM_OEMVirtualMediaService instance of interest.

2) Inspect the SAPCapabilitiesSupported for the value 2 (Create SAPs) to confirm that creating a new SAP is supported.

3) Invoke the CreateUSBDevice() method with the USB Class and Device Type to create an instance of a redirected USB device on the system. This invocation returns a reference to an instance of CIM_USBDevice (usbdevice1). Multiple invocations of CreateUSBDevice() can be made.

4) Invoke the CreateRedirectionSAP() method with an array of references to the CIM_USBDevice instances, along with information to create the SAP. The NewSAPRequestedStatesSupported parameter must have the enumeration of the Requested States that will be supported for the SAP, which will be used to initialize the RequestedStatesSupported property of a new instance of CIM_EnabledLogicalElementCapabilties that will be associated with the new USB Redirection SAP by an instance of CIM_ElementCapabilities.

5) When the CreateDevices Boolean parameter is TRUE, in addition to the USB device references in the USBDevices parameter, the CreateRedirectionSAP() method will create new instances of CIM_USBDevices as specified in the NewUSBDevices parameter and associate them with the new SAP. Each instance of the concrete subclass of CIM_LogicalDevice specified in the RedirectedLogicalDevices[] parameter that is not NULL will be associated with the new instance of CIM_USBDevices that was specified in the same entry in the NewUSBDevices parameter by a CIM_LogicalIdentity association.

   The client starts Virtual Media on the remote node; the remote node will attempt to establish a session with the protocol endpoint of the managed node.

9.21 Deleting a USB Redirection SAP and associated USB devices

A client can delete a USB Redirection SAP and the instances of CIM_USBDevice that have been created as follows:

1) Start at the DCIM_OEMVirtualMediaService instance of interest.
2) Inspect the SAPCapabilitiesSupported for the value 2 (Create SAPs) to confirm that creating a new SAP is supported.
3) Invoke the DeleteRedirectionSAP() method specifying the SAP to be deleted in the SAP parameter, and specifying TRUE for the DeleteUSBDevices parameter. If the SAP was not pre-configured, it will be deleted. The instances of CIM_USBDevice that are associated with the SAP that were not pre-configured will be deleted. The associations referencing the deleted SAP and deleted USB devices will also be deleted. Pre-configured SAPs and USB devices will not be deleted.

9.22 Deleting a USB Redirection SAP and associated USB devices

A client can delete a USB Redirection SAP that has been created without deleting the instances created by CIM_USBDevice as follows:

1) Start at the DCIM_OEMVirtualMediaService instance of interest.
2) Inspect the SAPCapabilitiesSupported for the value 2 (Create SAPs) to confirm that creating a new SAP is supported.
3) Invoke the DeleteRedirectionSAP() method specifying the SAP to be deleted in the SAP parameter. If the SAP was not pre-configured, it will be deleted. The associations referencing the deleted SAP will also be deleted. Pre-configured SAPs will not be deleted. Instances of CIM_USBDevice that have been created by CreateUSBDevice or CreateRedirectionSAP may be deleted later using the CIM_USBDevice class “Delete” intrinsic, which will delete the previously created instances of CIM_USBDevice and all the associations that reference the instance being deleted. Pre-configured instances of CIM_USBDevice may not be deleted by the class Delete intrinsic.

9.23 Determine Whether DCIM_OEMVirtualMediaService.ElementName Can Be Modified

A client can determine whether the ElementName property can be modified as follows:

1) Start at the instance of DCIM_OEMVirtualMediaService.
2) Find the CIM_USBRedirectionCapabilities instance that it is associated with by the CIM_ElementCapabilities association.
3) Query the value of the ElementNameEditSupported property of the CIM_USBRedirectionCapabilities instance.

If the value is TRUE, the DCIM_OEMVirtualMediaService.ElementName property can be modified by a client. If no instance of CIM_USBRedirectionCapabilities is associated with the DCIM_OEMVirtualMediaService instance, modifying the DCIM_OEMVirtualMediaService.ElementName property is not supported.

10 CIM Elements

Table 27 shows the instances of CIM Elements for this profile. Instances of the CIM Elements shall be implemented as described in Table 27. Sections 7 (“Implementation”) and 7.9.2 (“Methods”) may impose additional requirements on these elements.

Table 27 – CIM Elements: Virtual Media Profile

Element Name	Requirement	Description
CIM_RegisteredProfile	Mandatory	See section 10.1.
CIM_BindsTo	Conditional	See section 10.2.
CIM_ElementCapabilities	Conditional	Referencing DCIM_OEMVirtualMediaService. See section 10.3
CIM_ElementCapabilities	Conditional	Referencing CIM_USBRedirectionSAP. See section 10.4.
CIM_EnabledLogicalElementCapabilities	Optional	See section 10.5.
CIM_HostedAccessPoint	Mandatory	See section 10.6.
CIM_HostedService	Mandatory	See section 10.7.
CIM_LogicalIdentity	Conditional	See section 10.8.
CIM_RemoteAccessAvailableToElement	Conditional	See section 10.9
CIM_RemoteServiceAccessPoint	Conditional	Conditional on the session ConnectionMode. See section 10.10
CIM_SAPAvailableForElement	Mandatory	Referencing CIM_ComputerSystem. See section 10.11
CIM_SAPAvaiableForElement	Optional	Referencing CIM_USBDevice. See section 10.12
CIM_ServiceAccessBySAP	Mandatory	See section 10.13.
CIM_ServiceAffectsElement	Mandatory	Referencing CIM_ComputerSystem. See section 10.14.
CIM_ServiceAffectsElement	Optional	Referencing CIM_USBDevice. See section 10.15.
CIM_USBDevice	Mandatory	See section 10.16.
CIM_USBRedirectionCapabilities	Mandatory	See section 10.17.
CIM_USBRedirectionSAP	Mandatory	See section 10.18.
DCIM_OEMVirtualMediaService	Mandatory	See section 10.19
CIM_TCPProtocolEndpoint	Mandatory	See section 10.20

10.1 CIM_RegisteredProfile

CIM_RegisteredProfile identifies the *Virtual Media Profile* in order for a client to determine whether an instance of CIM_ComputerSystem conforms to this profile. The CIM_RegisteredProfile class is defined by the *Profile Registration Profile*. With the exception of the mandatory values specified for the properties in Table 28, the behavior of the CIM_RegisteredProfile instance is in accordance with the *Profile Registration Profile*.

Table 28 – Class: CIM_RegisteredProfile

Elements	Requirement	Notes
RegisteredName	Mandatory	This property shall have a value of "Virtual Media".
RegisteredVersion	Mandatory	This property shall have a value of "1.0.0".
RegisteredOrganization	Mandatory	This property shall have a value of 1 (Other).
OtherRegisteredOrganization	Mandatory	This property shall have a value of "Dell".

10.2 CIM_BindsTo

The CIM_BindsTo association is used to relate the CIM_USBRedirectionSAP instance to the CIM_ProtocolEndpoint instance that represents the endpoint where USB Redirection SAP is available. Table 29 contains the requirements for elements of this class.

Table 29 – Class: CIM_BindsTo

Elements	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to an instance of the CIM_TCPProtocolEndpoint class. See clause 7.10. Cardinality is "1".
Dependent	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionSAP. See clause See section 7.10. Cardinality is "1..*".

10.3 CIM_ElementCapabilities Relating DCIM_OEMVirtualMediaService to CIM_USBRedirectionCapabilities

The CIM_ElementCapabilities association is used to relate an instance of CIM_USBRedirectionCapabilities with an instance of DCIM_OEMVirtualMediaService. Table 30 contains the requirements for elements of this class.

Table 30 – Class: CIM_ElementCapabilities Referencing DCIM_OEMVirtualMediaService

Elements	Requirement	Notes
ManagedElement	Mandatory	This property shall be a reference to an instance of DCIM_OEMVirtualMediaService. See section 7.2.3. Cardinality is "1..*".
Capabilities	Mandatory	This property shall be a reference to an instance of CIM_USBRedirectionCapabilities. See section 7.2.3. Cardinality is "0..1".

10.4 CIM_ElementCapabilities Relating CIM_USBRedirectionSAP to CIM_EnabledLogicalElementCapabilities

The CIM_ElementCapabilities association is used to relate an instance of CIM_EnabledLogicalElementCapabilities with an instance of CIM_USBRedirectionSAP. Table 31 contains the elements requirements for this class.

Table 31 – Class: CIM_ElementCapabilities Referencing CIM_USBRedirectionSAP

Elements	Requirement	Notes
ManagedElement	Mandatory	This property shall be a reference to an instance of CIM_USBRedirectionSAP. See section 7.4.4. Cardinality is "1..*".
Capabilities	Mandatory	This property shall be a reference to an instance of CIM_EnabledLogicalElementCapabilities. See section 7.4.4. Cardinality is "0..1".

10.5 CIM_EnabledLogicalElementCapabilities

CIM_EnableLogicalElementCapabilities represents the capabilities of the USB Redirection SAP. Table 32 contains the elements requirements for this class.

Table 32 – Class: CIM_EnabledLogicalElementCapabilities

Elements	Requirement	Notes
InstanceID	Mandatory	**Key**
ElementName	Mandatory	**Key**
RequestedStatesSupported	Mandatory	See section 7.9.1.
ElementNameEditSupported	Mandatory	See section 7.4.5.
MaxElementNameLen	Conditional	See section 7.4.5. Conditional on ElementNameEditSupported

10.6 CIM_HostedAccessPoint

The CIM_HostedAccessPoint association is used to relate the CIM_USBRedirectionSAP instance to the CIM_ComputerSystem instance that the USB is redirected. Table 33 contains the elements requirements for this class.

Table 33 – Class: CIM_HostedAccessPoint

Elements	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to an instance of the CIM_ComputerSystem class. See section 7.4.3. Cardinality is "1".
Dependent	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionSAP. See section 7.4.3. Cardinality is "*".

10.7 CIM_HostedService

The CIM_HostedService association is used to relate the DCIM_OEMVirtualMediaService instance to the CIM_ComputerSystem instance on which it is hosted. Table 34 contains the elements requirements for this class.

Table 34 – Class: CIM_HostedService

Elements	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to an instance of the CIM_ComputerSystem class. See section 7.2.1. Cardinality is "1".
Dependent	Mandatory	This property shall be a reference to an instance of the DCIM_OEMVirtualMediaService. See section 7.2.1. Cardinality is "*".

10.8 CIM_LogicalIdentity

The CIM_LogicalIdentity association is used to relate the CIM_USBDevice instance to the instance of a concrete subclass of CIM_LogicalDevice that provides another representation. Table 35 contains the elements requirements for this class.

Table 35 – Class: CIM_LogicalIdentity

Elements	Requirement	Notes
SystemElement	Mandatory	This property shall be a reference to an instance of the CIM_USBDevice class. See section 7.5.3. Cardinality is "1".
SameElement	Mandatory	This property shall be a reference to an instance of a concrete subclass of the CIM_LogicalDevice. See section 7.5.3. Cardinality is "1".

10.9 CIM_RemoteAccessAvailableToElement

The CIM_RemoteAccessAvailableToElement association is used to relate the instance of CIM_USBRedirectionSAP to the instance of CIM_RemoteServiceAccessPoint. Table 36 contains the elements requirements for this class.

Table 36 – Class: CIM_RemoteAccessAvailableToElement

Elements	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to an instance of the CIM_RemoteServiceAccessPoint class. See section 7.7.1. Cardinality is "*".
Dependent	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionSAP. See section 7.7.1. Cardinality is "1".

10.10 CIM_RemoteServiceAccessPoint

The CIM_RemoteServiceAccessPoint class represents the SAP on the remote system. Table 37 contains the elements requirements for this class.

Table 37 – Class: CIM_RemoteServiceAccessPoint

Elements	Requirement	Notes
SystemCreationClassName	Mandatory	**Key**
SystemName	Mandatory	**Key**
Name	Mandatory	**Key**
CreationClassName	Mandatory	**Key**
AccessContext	Mandatory	The property shall match the value 1 (Other)
AccessInfo	Mandatory	See section 7.7.1.1
InfoFormat	Mandatory	See section 7.7.1.2
OtherAccessContext	Mandatory	The property shall match the value "Virtual Media Destination"
OtherInfoFormatDescription	Conditional	See section 7.7.1.3 Conditional on InfoFormat value.

10.11 CIM_SAPAvailableForElement Relating CIM_USBRedirectionSAP to CIM_ComputerSystem

The CIM_SAPAvailableForElement association is used to relate the instance of CIM_ComputerSystem on which the Emulated USB Devices resides to the instances of CIM_USBRedirectionSAP that are available as access points for the redirected USB Devices. Table 38 contains the elements requirements for this class.

Table 38 – Class: CIM_SAPAvailableForElement

Elements	Requirement	Notes
AvailableSAP	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionSAP class. See section 7.4.2. Cardinality is "*".
ManagedElement	Mandatory	This property shall be a reference to an instance of the CIM_ComputerSystem. See section 7.4.2. Cardinality is "1".

10.12 CIM_SAPAvailableForElement Relating CIM_USBRedirectionSAP to CIM_USBDevice

The CIM_SAPAvailableForElement association is used to relate the instance of CIM_USBRedirectionSAP to the instance of CIM_USBDevice that represents the Emulated USB Device accessible through the USB Redirection SAP. Table 39 contains the elements requirements for this class.

Table 39 – Class: CIM_SAPAvailableForElement

Elements	Requirement	Notes
AvailableSAP	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionSAP class. See section 7.5.2. Cardinality is "1".
ManagedElement	Mandatory	This property shall be a reference to an instance of the CIM_USBDevice. See section 7.5.2. Cardinality is "0..*".

10.13 CIM_ServiceAccessBySAP

The CIM_ServiceAccessBySAP association is used to relate the instance of DCIM_OEMVirtualMediaService with the instances of CIM_USBRedirectionSAP that are enabled by the service. Table 40 contains the elements requirements for this class.

Table 40 – Class: CIM_ServiceAccessBySAP

Elements	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to an instance of the DCIM_OEMVirtualMediaService class. See section 7.4.1. Cardinality is "1".
Dependent	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionSAP. See section 7.4.1. Cardinality is "1..*".

10.14 CIM_ServiceAffectsElement Relating DCIM_OEMVirtualMediaService to CIM_ComputerSystem

The CIM_ServiceAffectsElement association is used to relate the instance of DCIM_OEMVirtualMediaService to the instance of CIM_ComputerSystem that represents the source of the Virtual Media Flow. Table 41 contains the elements requirements for this class.

Table 41 – Class: CIM_ServiceAffectsElement Referencing CIM_ComputerSystem

Elements	Requirement	Notes
AffectingElement	Mandatory	This property shall be a reference to an instance of the DCIM_OEMVirtualMediaService class. See section 7.2.2. Cardinality is "*".
AffectedElement	Mandatory	This property shall be a reference to an instance of the CIM_ComputerSystem. See section 7.2.2. Cardinality is "1".

10.15 CIM_ServiceAffectsElement Relating DCIM_OEMVirtualMediaService to CIM_USBDevice

The CIM_ServiceAffectsElement association is used to relate the instance of DCIM_OEMVirtualMediaService to the local emulated USB Device that can be redirected. Table 42 contains the elements requirements for this class.

Table 42 – Class: CIM_ServiceAffectsElement Referencing CIM_USBDevice

Elements	Requirement	Notes
AffectingElement	Mandatory	This property shall be a reference to an instance of the DCIM_OEMVirtualMediaService class. See section 7.5.1. Cardinality is "1".
AffectedElement	Mandatory	This property shall be a reference to an instance of CIM_USBDevice. See section 7.5.1. Cardinality is "0..1".

10.16 CIM_USBDevice

CIM_USBDevice represents the locally-emulated USB device that can be redirected to a remote system. Table 43 contains the elements requirements for this class.

Table 43 – Class: CIM_USBDevice

Elements	Requirement	Notes
CreationClassName	Mandatory	**Key**
DeviceID	Mandatory	**Key**
USBVersion	Optional	See section 7.5.4.
ClassCode	Mandatory	See section 7.5.4.
SubclassCode	Optional	See section 7.5.4.
CommandTimeout	Mandatory	New property. If the command times out, the USB Device emulates a media eject and tries to “Reset” the connection.

10.17 CIM_USBRedirectionCapabilities

CIM_USBRedirectionCapabilities represents the capabilities of the Virtual Media Service. Table 44 contains the elements requirements for this class.

Table 44 – Class: CIM_USBRedirectionCapabilities

Elements	Requirement	Notes
InstanceID	Mandatory	**Key**
ElementName	Mandatory	**Key**
RequestedStatesSupported	Mandatory	See section 7.3.8, 7.8.1.1 and 7.8.2.1.
ElementNameEditSupported	Mandatory	See section 7.2.6.
MaxElementNameLen	Conditional	See section 7.2.6. This property is Conditional on ElementNameEditSupported
USBVersionsSupported[]	Mandatory	See section 7.3.1.1.
ClassesSupported[]	Mandatory	See section 7.3.1.2.

Elements	Requirement	Notes
SubClassesSupported[]	Optional	See section 7.3.1.3.
MaxDevicesSupported[]	Mandatory	See section 7.3.2.
SAPCapabilitiesSupported[]	Mandatory	See section 7.3.3.
RequestedStatesSupportedForCreatedSAP	Conditional	See section 7.3.4. This property is Conditional on SAPCapabilitiesSupported including 3 (CreateSAPs)
InfoFormatsSupported	Conditional	See section 8.15.1.1. This property is Conditional on ConnectionModesSupported including 3 (Connect)
SingleClassPerSAP	Mandatory	See section 7.3.5.
MaxDevicesPerSAP	Mandatory	See section 7.3.6
ConnectionModesSupported[]	Mandatory	See section 7.3.7.

10.18 CIM_USBRedirectionSAP

The CIM_USBRedirectionSAP class represents a USB Redirection SAP. Table 45 contains the elements requirements for this class.

Table 45 – Class: CIM_USBRedirectionSAP

Elements	Requirement	Notes
SystemCreationClassName	Mandatory	**Key**
SystemName	Mandatory	**Key**
Name	Mandatory	**Key**
CreationClassName	Mandatory	**Key**
ElementName	Mandatory	See section 7.4.5.
EnabledState	Mandatory	See section 7.9.1.3.
RequestedState	Mandatory	See section 7.9.1.2.
ConnectionMode	Mandatory	See section 7.4.6.
ResetTimeout	Mandatory	See section 7.4.7.
SessionTimeout	Mandatory	See section 7.4.8.
RequestStateChange( )	Mandatory	See section 8.6.

10.19 DCIM_OEMVirtualMediaService

The DCIM_OEMVirtualMediaService class represents the ability to manage the Virtual Media capabilities of a computer system. Table 46 contains the elements requirements for this class.

Table 46 – Class: DCIM_OEMVirtualMediaService

Elements	Requirement	Notes
SystemCreationClassName	Mandatory	**Key**
SystemName	Mandatory	**Key**
CreationClassName	Mandatory	**Key**
Name	Mandatory	**Key**
ElementName	Mandatory	See section 7.2.6.
MaxCurrentEnabledSAPs	Mandatory	See section 7.2.5.
EnabledState	Mandatory	See section 7.8.1.3.
RedirectionServiceType	Mandatory	The property shall match 4 (USB)
RequestedState	Mandatory	See section 7.8.1.2.
FlashKeyEnabled	Optional	See section 8.2.1
RequestStateChange( )	Mandatory	See section 8.1. Conditional on RequestedStatesSupported
CreateUSBDevice()	Conditional	See section 8.3. Conditional on SAPCapabilitiesSupported
CreateRedirectionSAP()	Conditional	See section 8.4. Conditional on SAPCapabilitiesSupported
DeleteRedirectionSAP()	Conditional	See section 8.5. Conditional on SAPCapabilitiesSupported

10.20 CIM_TCPProtocolEndpoint

The CIM_TCPProtocolEndpoint class represents the port information for the Virtual Media of a computer system. Table 47 contains the elements requirements for this class.

Table 47 – Class: CIM_TCPProtocolEndpoint

Elements	Requirement	Notes
SystemCreationClassName	Mandatory	**Key**
SystemName	Mandatory	**Key**
CreationClassName	Mandatory	**Key**
Name	Mandatory	**Key**
PortNumber	Mandatory	See section 7.10.
ProtocolIFType	Mandatory	See section 7.10.

ANNEX A
(informative)

Change Log

Version	Date	Description
0.9.0	10/31/2007	First draft

ANNEX B
(informative)

Acknowledgments

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