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Foreword

The *KVM Redirection Profile* (DSP1076) was prepared by the Physical Platform Profiles Working Group of the DMTF.

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Introduction

The information in this specification and referenced specifications is intended to be sufficient for a provider or consumer of this data to identify unambiguously the classes, properties, methods, and values that shall be instantiated and manipulated using the DMTF CIM core and common model definitions.

The target audience for this specification is implementers who are writing CIM based providers or consumers of management interfaces representing the components described in this document.

KVM Redirection Profile

1 Scope

The *KVM Redirection Profile* extends the management capabilities of referencing profiles and providing the capability to manage KVM (Keyboard, Video and Mouse) console redirections provided by the system.

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.

DMTF DSP0004, C*IM Infrastructure Specification 2.6*,
http://www.dmtf.org/standards/published_documents/DSP0004_2.6.pdf

DMTF DSP0200, *CIM Operations over HTTP 1.3*,
http://www.dmtf.org/standards/published_documents/DSP0200_1.3.pdf

DMTF DSP1001, *Management Profile Specification Usage Guide 1.0*,
http://www.dmtf.org/standards/published_documents/DSP1001_1.0.pdf

DMTF DSP1004, *Base Server Profile 1.0*,
http://www.dmtf.org/standards/published_documents/DSP1004_1.0.pdf

DMTF DSP1033, *Profile Registration Profile 1.0,*
http://www.dmtf.org/standards/published_documents/DSP1033_1.0.pdf

DMTF DSP1077, *USB Redirection Profile 1.0*,
http://www.dmtf.org/standards/published_documents/DSP1077_1.0.pdf

IETF RFC 5234, *Augmented BNF for Syntax Specifications: ABNF*
http://www.ietf.org/rfc/rfc5234.txt

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

3 Terms and Definitions

In this document, some terms have a specific meaning beyond the normal English meaning. Those terms are defined in this clause.

The terms "shall" ("required"), "shall not," "should" ("recommended"), "should not" ("not recommended"), "may," "need not" ("not required"), "can" and "cannot" in this document are to be interpreted as described in ISO/IEC Directives, Part 2, Annex H. The terms in parenthesis are alternatives for the preceding term, for use in exceptional cases when the preceding term cannot be used for linguistic reasons. Note that ISO/IEC Directives, Part 2, Annex H specifies additional alternatives. Occurrences of such additional alternatives shall be interpreted in their normal English meaning.

The terms "clause," "subclause," "paragraph," and "annex" in this document are to be interpreted as described in ISO/IEC Directives, Part 2, Clause 5.

The terms "normative" and "informative" in this document are to be interpreted as described in ISO/IEC Directives, Part 2, Clause 3. In this document, clauses, subclauses, or annexes labeled "(informative)" do not contain normative content. Notes and examples are always informative elements.

The terms defined in DSP0004, DSP0200, and DSP1001 apply to this document. The following additional terms are used in this document.

3.1
Original Destination
the destination of a KVM console flow prior to it being redirected. The Original Destination is modeled as instances of CIM_Keyboard, CIM_DisplayController and CIM_PointingDevice in this profile but could be potentially another type of logical device.

3.2
KVM Console Flow
a KVM console flow is the bidirectional KVM console stream which original flows to the Original Destination. The KVM console flow may be redirected to a new KVM Console Flow destination, which modeled as an instance of CIM_ProtocolEndpoint.

3.3
KVM Redirection
composed of an instance of CIM_RedirectionService, an instance of CIM_KVMRedirectionSAP and the instance of the CIM_ServiceAccessBySAP between the two

3.4
KVM Redirection Service
the instance of CIM_RedirectionService which is part of a KVM Redirection

3.5
KVM Redirection Session
the instance of CIM_KVMRedirectionSAP which is part of a KVM Redirection

3.6
Service
a KVM Redirection Service

3.7
Session
a KVM Redirection Session

3.8
Singular KVM Redirection
a KVM Redirection in which the MaxCurrentEnabledSAPs property of the CIM_RedirectionService instance has a value of 1

4 Symbols and Abbreviated Terms

4.1
KVM
Keyboard, Video and Mouse

5 Synopsis

Profile Name: KVM Redirection

Version: 1.0.1

Organization: DMTF

CIM Schema Version: 2.22

Central Class: CIM_RedirectionService

Scoping Class: CIM_ComputerSystem

The *KVM Redirection Profile* extends the management capability of the referencing profiles by adding the capability to describe KVM Redirections information.

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

CIM_RedirectionService shall be the Central Class of this profile. The instance of CIM_RedirectionService shall be the Central Instance of this profile.

CIM_ComputerSystem shall be the Scoping Class of this profile. The instance of CIM_ComputerSystem with which the Central Instance is associated via an instance of CIM_HostedService shall be the Scoping Instance of this profile.

Table 1 – Related Profiles

Profile Name	Organization	Version	Relationship	Behavior
Profile Registration	DMTF	1.0	Mandatory	

6 Description

The *KVM Redirection Profile* describes the necessary elements needed to provide the capability to manage the redirection of a keyboard, video and mouse (KVM) console flow. The following describes KVM redirection capabilities of typical computer systems which the profile could manage.

- Systems can have multiple sources of bidirectional KVM console flows which can be redirected. These include keyboards, pointing devices, display controllers or other representations of KVM Logical Devices.
- Prior to being redirected, the console flow has an Original Destination. This is typically a local keyboard, display controller and pointing device to which a terminal is connected in order to access the KVM console flow.
- A KVM console flow can be redirected to one or more destinations. A destination can be a network port. The network port facilitates remote access to the KVM console.
- The redirection of a KVM console flow can be accomplished while still delivering the KVM console flow to its Original Destination.
- This profile does not represent the state of the underlying session that facilitates the redirection. The representation of the underlying session is beyond the scope of this specification.

If the KVM devices are USB Devices and you wish to model them as such, you may use the *USB Redirection Profile* to manage their redirection instead of this profile.

Note that a redirected KVM console flow can be terminated by severing the connection over the transport protocol.

Figure 1 presents the class diagram for the *KVM Redirection Profile*. For simplicity, the prefix CIM_ has been removed from the name of the classes.

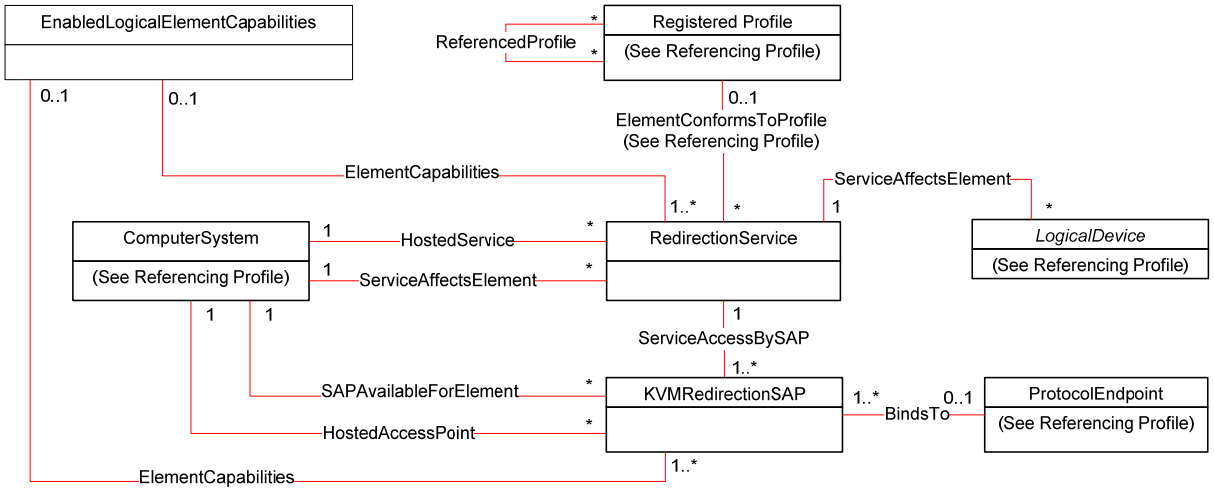


Figure 1 – KVM Redirection Profile Class Diagram

A KVM Redirection comprises a KVM Redirection Service, a KVM Redirection Session, and the relationship between them.

- The KVM Redirection Service, also referred to as Service in this profile, is represented by an instance of CIM_RedirectionService.
- The KVM Redirection Session, also referred to as Session in this profile, is represented by an instance of CIM_KVMRedirectionSAP.
- The relationship between the Service and the Session is represented by an instance of CIM_ServiceAccessBySAP.

A KVM Redirection can be in an active, inactive or available state. When the KVM Redirection is active, the KVM Console Flow is being actively redirected to a remote console.

The state management of the KVM Redirection can be performed using one of two mechanisms. The first mechanism is via state management of the Session only. The second mechanism is via state management of both the Service and the Session.

When state management of the Service is possible, the Service can be in an enabled or disabled state. When state management of the Session is possible, the Session can be in an enabled, disabled, or enabled but offline state.

An instance of CIM_RedirectionService can be associated to an instance of a concrete subclass of CIM_LogicalDevice which represents the Original Destination of the redirected KVM Console Flow. Examples of Original Destinations are keyboards, display controllers and pointing devices.

An instance of CIM_KVMRedirectionSAP can be associated to an instance of CIM_ProtocolEndpoint which represents the endpoint where the redirected KVM console flow can be accessed.

7 Implementation Requirements

This clause describes the classes required by the profile and the class properties required by the profile. Clause 8 describes the class methods required by the profile.

7.1 Representing a KVM Redirection

A KVM Redirection comprises an instance of CIM_RedirectionService, an instance of CIM_KVMRedirectionSAP and an instance of the CIM_ServiceAccessBySAP association.

An instance of CIM_ServiceAccessBySAP shall be used to associate the instance of CIM_RedirectionService to the instance of CIM_KVMRedirectionSAP.

The CIM_ServiceAccessBySAP association's Antecedent property shall reference the CIM_RedirectionService instance and its Dependent property shall reference the CIM_KVMRedirectionSAP instance.

7.2 CIM_RedirectionService.RedirectionServiceType

The CIM_RedirectionService.RedirectionServiceType property shall be set to 3 (KVM).

7.3 Representing the KVM Redirection Service

An instance of CIM_RedirectionService shall be used to represent the KVM Redirection Service, or Service.

There shall be an instance of the CIM_HostedService association that associates each instance of CIM_RedirectionService to a hosting CIM_ComputerSystem instance.

The CIM_HostedService association's Antecedent property shall reference the CIM_ComputerSystem instance and its Dependent property shall reference the CIM_RedirectionService instance.

7.3.1 Representing the Original Destination

The instance of CIM_RedirectionService may be associated to one or more instances of a concrete subclass of CIM_LogicalDevice which represents the Original Destination. The association shall use an instance of the CIM_ServiceAffectsElement association.

The CIM_ServiceAffectsElement association's ManagedElement property shall reference the instance of a concrete subclass CIM_LogicalDevice instance and its Service property shall reference the instance of CIM_RedirectionService.

7.3.2 Representing the System wherein the Original Destination Resides

The instance of CIM_RedirectionService shall be associated to an instance of CIM_ComputerSystem which represents the system wherein the Original Destination resides. The association shall use an instance of the CIM_ServiceAffectsElement association.

The CIM_ServiceAffectsElement association's ManagedElement property shall reference the CIM_ComputerSystem instance and its Service property shall reference the CIM_RedirectionService instance.

7.3.3 KVM Console Sharing Mode

When a KVM console flow is redirected, the redirection may be exclusive or shared. Shared redirection means the original destination of the KVM console is still receiving the KVM console flow. Exclusive redirection means that the original destination is no longer receiving the KVM console flow.

The CIM_RedirectionService.SharingMode property shall designate whether a KVM Redirection is exclusive or shared. A value of 2 (Exclusive) for the SharingMode property shall indicate exclusive redirection. A value of 3 (Shared) for the SharingMode property shall indicate shared redirection.

7.3.4 KVM Sharing Mode Control Capability

KVM Sharing Mode may be controlled.

When KVM Sharing Mode control is supported, an instance of CIM_RedirectionServiceCapabilities shall exist and the CIM_RedirectionServiceCapabilities.SharingModeSupported property shall designate whether a KVM Redirection is capable of being set to exclusive or shared mode.

A value of 2 (Exclusive) for the SharingMode property shall indicate that exclusive redirection may be set on the KVM Redirection.

A value of 3 (Shared) for the SharingModeSupported property shall indicate that shared redirection may be set on the KVM Redirection.

7.3.5 Maximum Number of Concurrent Redirections

A KVM console flow may be redirected to multiple access points; however, there may be a limitation to the number of concurrent redirections. The limitation could be the result of hardware or software resource limitations.

The CIM_RedirectionService.MaxCurrentEnabledSAPs property shall contain the maximum number of instances of CIM_KVMRedirectionSAP, whose EnabledState property is set to 2 (Enabled), which may be associated to the instance of CIM_RedirectionService. The Original Destination shall not be counted as one of the redirected KVM consoles.

A Singular KVM Redirection is a redirection whose instance of CIM_RedirectionService has a MaxCurrentEnabledSAPs property with a value of 1.

7.3.6 CIM_RedirectionService.ElementName

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

The ElementName property may support being modified via the ModifyInstance operation. See 8.11.1.1. This behavior is conditional. The following subclauses describe the CIM elements and behavior required to determine whether an implementation supports client modification of the ElementName property.

7.3.6.1 Modifying ElementName Is Supported — Conditional

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

There shall be an instance of CIM_RedirectionServiceCapabilities associated with the CIM_RedirectionService instance via an instance of the CIM_ElementCapabilities association.

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

The CIM_RedirectionServiceCapabilities.MaxElementNameLen property shall be implemented.

7.3.6.2 Modifying ElementName Is Not Supported

This subclause describes the CIM elements and behaviors that shall be implemented when the CIM_RedirectionService.ElementName does not support being modified via the ModifyInstance operation.

There may be an instance of CIM_RedirectionServiceCapabilities associated with the CIM__RedirectionServiceCapabilities instance via an instance of CIM_ElementCapabilities.

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

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

7.4 Representing the KVM Redirection Session

An instance of CIM_KVMRedirectionSAP shall be used to represent the KVM Redirection Session, or simply “Session” as defined in clause 3.

The Session is associated to computer systems via two associations. One is the computer system whose KVM console flow is being redirected. The other is the computer system which contains the endpoint where the redirected KVM console flow can be accessed.

The instance of CIM_KVMRedirectionSAP shall be associated to an instance of CIM_ComputerSystem, which represents the computer system whose KVM console flow is being redirected, via an instance of CIM_SAPAvailableForElement.

The CIM_SAPAvailableForElement association's ManagedElement property shall reference the CIM_ComputerSystem instance and its AvailableSAP property shall reference the CIM_KVMRedirectionSAP instance.

The instance of CIM_KVMRedirectionSAP shall be associated to an instance of CIM_ComputerSystem, which represents the computer system which contains the endpoint where the redirect KVM console flow can be accessed, via an instance of CIM_HostedAccessPoint.

The CIM_HostedAccessPoint association's Antecedent property shall reference the CIM_ComputerSystem instance and its Dependent property shall reference the CIM_KVMRedirectionSAP instance.

7.4.1 Representing the Destination of the Redirected KVM Console Flow

The instance of CIM_KVMRedirectionSAP may be associated to at most one instance of CIM_ProtocolEndpoint which represents the endpoint where the redirected KVM console flow is accessed. The association shall use an instance of the CIM_BindsTo association.

The CIM_BindsTo association's Antecedent property shall reference the CIM_ProtocolEndpoint instance and its Dependent property shall reference the CIM_KVMRedirectionSAP instance.

7.4.2 KVM Console Protocol Format

The redirected KVM console can be formatted. Examples of the KVM console formats are raw data stream and protocols such as RDP or VNC. In raw character stream format, the characters have no special meaning. In protocol mode format, the data stream is formatted to have special meaning according to the definition of the protocol.

The format of the redirection KVM console protocol shall be designated by the CIM_KVMRedirectionSAP.KVMProtocol property.

When the redirected KVM console protocol format is a raw data stream, the CIM_KVMRedirectionSAP.KVMProtocol property shall be set to a value of 2 (Raw).

When the redirected KVM console format is using the RDP protocol, the CIM_KVMRedirectionSAP.KVMProtocol property shall be set to a value of 3 (RDP).

When the redirected KVM console format is using the VNC protocol, the CIM_KVMRedirectionSAP.KVMProtocol property shall be set to a value of 4 (VNC).

When the redirected KVM console format is other than Raw, RDP or VNC, the CIM_KVMRedirectionSAP.KVMProtocol property shall be set to a value of 1 (Other) and the value of CIM_KVMRedirectionSAP.OtherKVMProcol shall contain a string which describes the format.

7.4.3 Terminate a Redirected KVM Console

A redirected KVM console session may be terminated via state management of the KVM Redirection Session. (See 7.5.)

7.4.4 CIM_KVMRedirectionSAP.ElementName

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

The ElementName property may support being modified via the ModifyInstance operation. See 8.12.1.1. This behavior is conditional. The following subclauses describe the CIM elements and behavior required to determine whether an implementation supports client modification of the ElementName property.

7.4.4.1 Modifying ElementName Is Supported — Conditional

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

There shall be an instance of CIM_EnabledLogicalElementCapabilities associated with the CIM_KVMRedirectionSAP instance via 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.

7.4.4.2 Modifying ElementName Is Not Supported

This subclause describes the CIM elements and behaviors that shall be implemented when the CIM_KVMRedirectionSAP.ElementName does not support being modified via the ModifyInstance operation.

There may be an instance of CIM_EnabledLogicalElementCapabilities associated with the CIM_KVMRedirectionSAP instance via an instance of CIM_ElementCapabilities.

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

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

7.5 State Management of a KVM Redirection

The KVM Redirection shall have the states inactive, available, or active:

- The KVM Redirection is inactive when the KVM Console Flow is not being redirected to the Session.
- The KVM Redirection is available when the KVM Console Flow is being redirected to the Session, but the session is not actively being used.
- The KVM Redirection is active when the KVM Console Flow is being actively redirected to the Session and the session is actively being used.

The state of a KVM Redirection shall be reported by the implementation using the combined states of the instance of CIM_RedirectionService (Service) and the instance of CIM_KVMRedirectionSAP (Session) associated via an instance of CIM_ServiceAccessBySAP, as follows:

- When the value of CIM_RedirectionService.EnabledState is 2 (Enabled) and the value of CIM_KVMRedirectionSAP.EnabledState is 2 (Enabled), the KVM Redirection shall be considered in active state.
- When the value of CIM_RedirectionService.EnabledState is 2 (Enabled) and the value of CIM_KVMRedirectionSAP.EnabledState is 6 (Enabled but Offline), the KVM Redirection shall be considered in available state.
- Otherwise, the KVM Redirection shall be considered in inactive state.

Table 2 provides details about conditions and KVM Redirection state.

Table 2 – Determining KVM Redirection State

Condition	State	Description
CIM_RedirectionService.EnabledState = 3 (Disabled) OR CIM_KVMRedirectionSAP.EnabledState = 3 (Disabled)	inactive	Service and Service Access Point have not both been enabled. KVM Console Flow is not being redirected.
CIM_RedirectionService.EnabledState = 2 (Enabled) AND CIM_KVMRedirectionSAP.EnabledState = 6 (Enabled but Offline)	available	Service and Service Access Point have both been enabled. KVM Console Flow is not currently being redirected.
CIM_RedirectionService.EnabledState = 2 (Enabled) AND CIM_KVMRedirectionSAP.EnabledState = 2 (Enabled)	active	Both Service and Service Access Point have been enabled. KVM Console Flow is currently being redirected and the session is actively being used.

The state of the KVM Redirection may be affected using: 1) state management of the Session only or 2) state management of both the Service and the Session. The state of the KVM Redirection may also be affected by external interactions and events (for example, when a management console application begins active use of a session). Note that a session may be considered as being actively used by the implementation even when the flow of data may appear “idle”.

The state management of the Service is discussed in 7.6. The state management of the Session is discussed in 7.7.

7.6 State Management of a KVM Redirection Service (Optional)

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

7.6.1 KVM Redirection Service State Management Is Supported — Conditional

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

7.6.1.1 CIM_RedirectionServiceCapabilities

When state management of the KVM Redirection Service is supported, exactly one instance of CIM_RedirectionServiceCapabilities shall be associated with the instance of CIM_RedirectionService through an instance of CIM_ElementCapabilities.

The CIM_ElementCapabilities association's ManagedElement property shall reference the CIM_RedirectionService instance and its Capabilities property shall reference the CIM_RedirectionServiceCapabilities instance.

7.6.1.1.1 CIM_RedirectionServiceCapabilities.RequestedStatesSupported

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

7.6.1.2 CIM_RedirectionService.RequestedState

When the CIM_RedirectionService.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_RedirectionService.RequestedState property shall have one of the values specified in the CIM_RedirectionServiceCapabilities.RequestedStatesSupported property or a value of 5 (No Change).

7.6.1.3 CIM_RedirectionService.EnabledState

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

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

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

7.6.2 KVM Redirection Service State Management Is Not Supported

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

7.6.2.1 CIM_RedirectionServiceCapabilities

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

The CIM_ElementCapabilities association's ManagedElement property shall reference the CIM_RedirectionService instance and its Capabilities property shall reference the CIM_RedirectionServiceCapabilities instance.

7.6.2.1.1 CIM_RedirectionServiceCapabilities.RequestedStatesSupported

The CIM_RedirectionServiceCapabilities.RequestedStatesSupported property shall not contain any values.

7.6.2.2 CIM_RedirectionService.RequestedState

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

7.6.2.3 CIM_RedirectionService.EnabledState

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

7.7 State Management of a KVM Redirection Session (Optional)

Support for managing the state of a KVM Redirection Session (Session) is optional behavior. The following subclauses describe the CIM elements and behaviors that allow the client to determine whether state management of the Session is supported.

7.7.1 Session State Management Is Supported — Conditional

This subclause describes the CIM elements and behaviors that shall be implemented when state management of the Session is supported.

7.7.1.1 CIM_EnabledLogicalElementCapabilities

When state management of the Session is supported, exactly one instance of CIM_EnabledLogicalElementCapabilities shall be associated with each instance of CIM_KVMRedirectionSAP through an instance of CIM_ElementCapabilities.

The CIM_ElementCapabilities association's ManagedElement property shall reference the CIM_KVMRedirectionSAP instance and its Capabilities property shall reference the CIM_EnabledLogicalElementCapabilities instance.

7.7.1.1.1 CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported

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

7.7.1.2 CIM_KVMRedirectionSAP.RequestedState

When the CIM_KVMRedirectionSAP.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_KVMRedirectionSAP.RequestedState property shall have one of the values specified in the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property or a value of 5 (No Change).

7.7.1.3 CIM_KVMRedirectionSAP.EnabledState

The EnabledState property shall have one of the following values: 2 (Enabled), 3 (Disabled) or 6 (Enabled but Offline). Note that the value of EnabledState is affected by the RequestStateChange( ) method and the current state of the KVM Redirection and Console Flow (see 7.5).

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

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

When the RequestedState parameter has a value of 3 (Disabled) and the CIM_KVMRedirectionSAP.RequestStateChange( ) method completes successfully, the value of the EnabledState property shall equal 3 (Disabled).

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

566 7.7.2 Session State Management Is Not Supported

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

569 7.7.2.1 CIM_EnabledLogicalElementCapabilities

570 When state management of the Session is not supported, an instance of
571 CIM_EnabledLogicalElementCapabilities may be associated with the CIM_KVMRedirectionSAP instance
572 through an instance of CIM_ElementCapabilities. The existence of the CIM_ElementCapabilities instance
573 is conditional on the existence of the CIM_EnabledLogicalElementCapabilities instance.

574 The CIM_ElementCapabilities association's ManagedElement property shall reference the
575 CIM_KVMRedirectionSAP instance and its Capabilities property shall reference the
576 CIM_EnabledLogicalElementCapabilities instance.

577 7.7.2.1.1 CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported

578 The CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property shall not contain any
579 values.

580 7.7.2.2 CIM_KVMRedirectionSAP.RequestedState

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

582 7.7.2.3 CIM_KVMRedirectionSAP.EnabledState

583 The EnabledState property shall have one of the following values: 2 (Enabled), 3 (Disabled), 5 (Not
584 Applicable), or 6 (Enabled but Offline). The value of 5 (Not Applicable) may be set when non-CIM
585 instrumentation has manipulated the instance of CIM_KVMRedirectionSAP.

586 8 Methods

587 8.1 CIM_RedirectionService.RequestStateChange()

588 Invocation of the RequestStateChange( ) method changes the element’s state to the value specified in the
589 RequestedState parameter. The 2 (Enabled), and 3 (Disabled) values of the RequestedState parameter
590 shall correspond to the enabled and disabled states of the KVM Redirection Service, respectively.

591 It is implementation specific whether the method will complete successfully if there are active sessions.

592 Detailed requirements of the RequestStateChange( ) method are specified in Table 3 and Table 4.

593 No standard messages are defined.

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

596 **Table 3 – CIM_RedirectionService.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

597 **Table 4 – CIM_RedirectionService.RequestStateChange( ) Method: Parameters**

Qualifiers	Name	Type	Description/Values
IN	RequestedState	uint16	Valid state values: 2 (Enabled) 3 (Disabled)
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

598 ### 8.1.1 CIM_RedirectionService.RequestStateChange( ) — Conditional Support

599 When an instance of CIM_RedirectionServiceCapabilities is associated with the CIM_RedirectionService
600 instance and the CIM_RedirectionServiceCapabilities.RequestedStatesSupported property contains at
601 least one value, the CIM_RedirectionService.RequestStateChange( ) method shall be implemented and
602 supported. The CIM_RedirectionService.RequestStateChange( ) method shall not return a value of 1 (Not
603 Supported).

604 ## 8.2 CIM_KVMRedirectionSAP.RequestStateChange( )

605 Invocation of the RequestStateChange( ) method changes the element's state to the value specified in the
606 RequestedState parameter. The 2 (Enabled), 3 (Disabled) and 6 (Enabled but Offline) values of the
607 RequestedState parameter shall correspond to enabling, disabling, and enabled but offline states the
608 Session, respectively.

609 Detailed requirements of the RequestStateChange( ) method are specified in Table 5 and Table 6.

610 No standard messages are defined.

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

613 **Table 5 – CIM_KVMRedirectionSAP.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

614 **Table 6 – CIM_KVMRedirectionSAP.RequestStateChange( ) Method: Parameters**

Qualifiers	Name	Type	Description/Values
IN	RequestedState	uint16	Valid state values: 2 (Enabled) 3 (Disabled) 6 (Enabled but Offline)
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

615 ### 8.2.1 CIM_KVMRedirectionSAP.RequestStateChange( ) — Conditional Support

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

622 ### 8.2.2 Enabling a Singular KVM Redirection

623 When multiple instances of CIM_KVMRedirectionSAP are associated with an instance of
624 CIM_RedirectionService, the service shall guarantee that the number of CIM_KVMRedirectionSAP with
625 the value of EnabledState as 2 (Enabled) do not exceed the MaxCurrentEnabledSAPs property value.
626 When CIM_KVMRedirectionSAP.RequestedState parameter has a value of 2 (Enabled) and there are
627 MaxCurrentEnabledSAPs instances of CIM_KVMRedirectionSAP with the value of EnabledState as 2
628 (Enabled), then CIM_KVMRedirectionSAP.RequestStateChange() shall complete with an error.

629 When the instance of CIM_KVMRedirectionSAP is associated to an instance of CIM_RedirectionService
630 whose MaxCurrentEnabledSAPs property has a value of 1, the method shall exhibit the following
631 additional behavior.

632 When the CIM_KVMRedirectionSAP.RequestedState parameter has a value of 2 (Enabled) and the
633 CIM_KVMRedirectionSAP.RequestedStateChange( ) method completes successfully, the value of the
634 EnabledState property of all other instances of CIM_KVMRedirectionSAP associated with the instance of
635 CIM_RedirectionService shall be set to 3 (Disabled).

636 ## 8.3 Profile Conventions for Operations

637 For each profile class (including associations), the implementation requirements for operations, including
638 those in the following default list, are specified in class-specific subclauses of this clause.

639 The default list of operations is as follows:

640 • GetInstance
641 • Associators
642 • AssociatorNames
643 • References
644 • ReferenceNames

- EnumerateInstances
- EnumerateInstanceNames

8.4 CIM_BindsTo Operations

Table 7 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 7, all operations in the default list in 8.3 shall be implemented as defined in DSP0200.

NOTE: Related profiles may define additional requirements on operations for the profile class.

Table 7 – CIM_BindsTo Operations

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

8.5 CIM_ElementCapabilities Operations

Table 8 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 8, all operations in the default list in 8.3 shall be implemented as defined in DSP0200.

NOTE: Related profiles may define additional requirements on operations for the profile class.

Table 8 – CIM_ElementCapabilities Operations

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

8.6 CIM_RedirectionServiceCapabilities Operations

Table 9 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 9, all operations in the default list in 8.3 shall be implemented as defined in DSP0200.

NOTE: Related profiles may define additional requirements on operations for the profile class.

664 **Table 9 – CIM_RedirectionServiceCapabilities Operations**

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

665 8.7 CIM_HostedService Operations

666 Table 10 lists implementation requirements for operations. If implemented, these operations shall be
667 implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 10, all operations
668 in the default list in 8.3 shall be implemented as defined in DSP0200.

669 NOTE: Related profiles may define additional requirements on operations for the profile class.

670 **Table 10 – CIM_HostedService Operations**

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

671 8.8 CIM_HostedAccessPoint Operations

672 Table 11 lists implementation requirements for operations. If implemented, these operations shall be
673 implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 11, all operations
674 in the default list in 8.3 shall be implemented as defined in DSP0200.

675 NOTE: Related profiles may define additional requirements on operations for the profile class.

676 **Table 11 – CIM_HostedAccessPoint Operations**

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

677 8.9 CIM_ServiceAffectsElement Operations

678 Table 12 lists implementation requirements for operations. If implemented, these operations shall be
679 implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 12, all operations
680 in the default list in 8.3 shall be implemented as defined in DSP0200.

681 NOTE: Related profiles may define additional requirements on operations for the profile class.

682 **Table 12 – CIM_ServiceAffectsElement Operations**

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

683 ## 8.10 CIM_ServiceAccessBySAP Operations

684 Table 13 lists implementation requirements for operations. If implemented, these operations shall be
685 implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 13, all operations
686 in the default list in 8.3 shall be implemented as defined in DSP0200.

687 NOTE: Related profiles may define additional requirements on operations for the profile class.

688 **Table 13 – CIM_ServiceAccessBySAP Operations**

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

689 ## 8.11 CIM_RedirectionService Operations

690 Table 14 lists implementation requirements for operations. If implemented, these operations shall be
691 implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 14, all operations
692 in the default list in 8.3 shall be implemented as defined in DSP0200.

693 NOTE: Related profiles may define additional requirements on operations for the profile class.

694 **Table 14 – CIM_RedirectionService Operations**

Operation	Requirement	Messages
GetInstance	Mandatory	None
ModifyInstance	Optional	See 8.11.1.
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

695 ### 8.11.1 CIM_RedirectionService — ModifyInstance Operation

696 This subclause details the specific requirements for the ModifyInstance operation applied to an instance
697 of CIM_RedirectionService.

8.11.1.1 CIM_RedirectionService.ElementName property

When there is an instance of CIM_RedirectionServiceCapabilities associated with the CIM_RedirectionService instance and the CIM_RedirectionServiceCapabilities.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_RedirectionService instance. The ModifyInstance operation shall enforce the length restriction specified in the MaxElementNameLen property of the CIM_RedirectionServiceCapabilities.

When there is not an instance of CIM_RedirectionServiceCapabilities associated with the CIM_RedirectionService instance, or the ElementNameEditSupported property of the CIM_RedirectionServiceCapabilities has a value of FALSE, the implementation shall not allow the ModifyInstance operation to change the value of the ElementName property of the CIM_RedirectionService instance.

8.12 CIM_KVMRedirectionSAP Operations

Table 15 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 15, all operations in the default list in 8.3 shall be implemented as defined in DSP0200.

NOTE: Related profiles may define additional requirements on operations for the profile class.

Table 15 – CIM_KVMRedirectionSAP Operations

Operation	Requirement	Messages
GetInstance	Mandatory	None
ModifyInstance	Optional	See 8.12.1.
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.12.1 CIM_KVMRedirectionSAP — ModifyInstance Operation

This subclause details the specific requirements for the ModifyInstance operation applied to an instance of CIM_KVMRedirectionSAP.

8.12.1.1 CIM_KVMRedirectionSAP.ElementName property

When there is an instance of CIM_EnabledLogicalElementCapabilities associated with the CIM_KVMRedirectionSAP 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_KVMRedirectionSAP instance. The ModifyInstance operation shall enforce the length restriction specified in the MaxElementNameLen property of the CIM_EnabledLogicalElementCapabilities.

When there is not an instance of CIM_EnabledLogicalElementCapabilities associated with the CIM_KVMRedirectionSAP instance, or the ElementNameEditSupported property of the CIM_EnabledLogicalElementCapabilities has a value of FALSE, the implementation shall not allow the ModifyInstance operation to change the value of the ElementName property of the CIM_KVMRedirectionSAP instance.

9 Use Cases

This subclause contains object diagrams and use cases specific to *KVM Redirection Profile*. The use cases are informative and are not intended to define the requirements for conformance.

9.1 Advertising the Profile Conformance

The object diagram in Figure 2 shows how instances of CIM_RegisteredProfile are used to identify the version of the *KVM Redirection Profile* with which an instance of CIM_RedirectionService and its associated instances are conformant.

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. The other instance identifies the DMTF *KVM Redirection Profile*, version 1.0.0. The Central Instance is the CIM_RedirectionService. The Scoping Instance is the CIM_ComputerSystem instance.

This instance of CIM_ComputerSystem is conformant with the DMTF *Base Server Profile* version 1.0.0 as indicated by the CIM_ElementConformsToProfile association to the CIM_RegisteredProfile instance.

This instance of CIM_RedirectionService is conformant with the DMTF *KVM Redirection Profile* version 1.0.0 as indicated by the CIM_ElementConformsToProfile association to the CIM_RegisteredProfile instance.

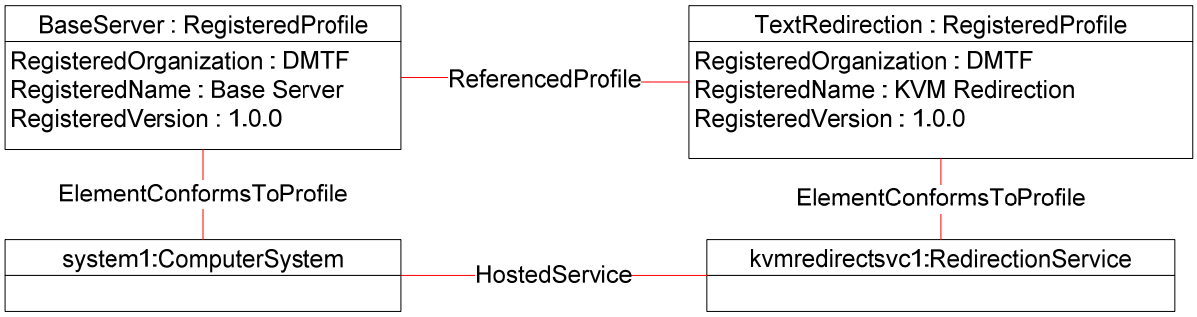


Figure 2 – Registered Profile

9.2 Object Diagram for a Monolithic Server

Figure 3 shows the object diagram for a monolithic server, *system1*, which has a Service which can redirect the KVM console devices to the network port. Both the KVM devices and the network port are part of *system1* and modeled by the instances of CIM_SystemDevice.

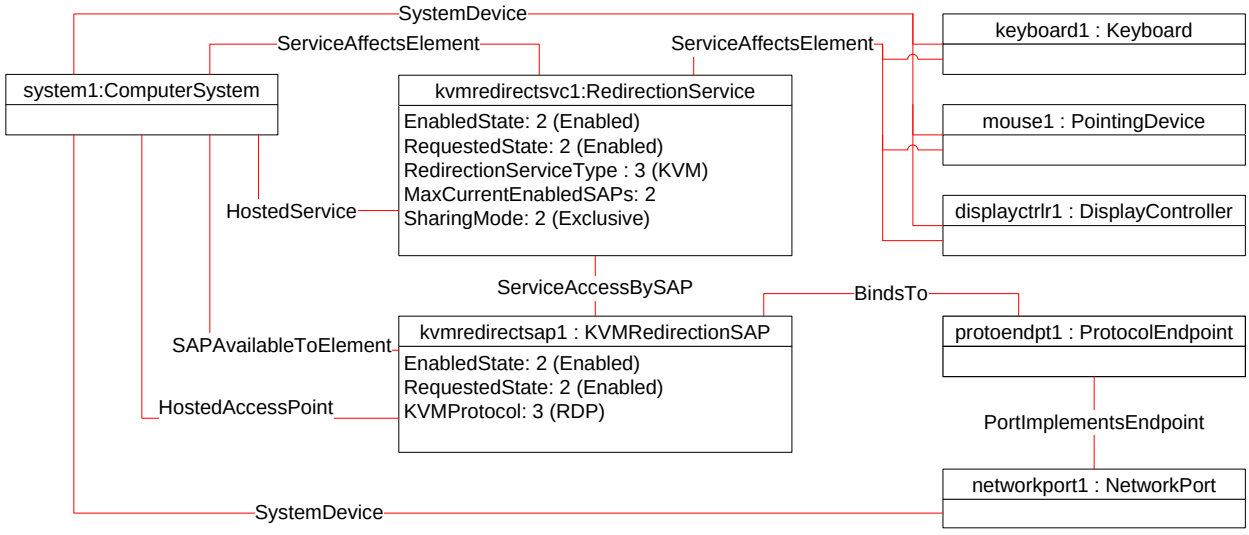
The KVM console session is represented with a source (*kvmredirectsvc1),* a destination *(kvmredirectsap1)* and the instance of CIM_ServiceAccessBySAP association between them. The KVM Redirection Service (*kvmredirectsvc1)* is hosted on *system1* as represented by the CIM_HostedService association between *system1* and *kvmredirectsvc1*. The service (*kvmredirectsvc1*) affects *system1* as represented by the CIM_ServiceAffectsElement association between *system1* and *kvmredirectsvc1*. This signifies that *system1* is the source of the KVM console which can be redirected.

The service also affects *keyboard1, displayctrlr1* and *mouse1* as represented by the CIM_ServiceAffectsElement association between *keyboard1, displayctrlr1* and *mouse1* and *kvmredirectsvc1*. *Keyboard1* is an instance of CIM_Keyboard*, displayctrlr1* is an instance of CIM_DisplayController and *mouse1* is an instance of CIM_PointingDevice, all of which are a concrete subclass of CIM_LogicalDevice. This signifies that keyboard1, displayctrlr1 and mouse1 are the Original Destination of a KVM console which can be redirected.

766 The KVM Redirection Session (*kvmredirectsap1*) is hosted on *system1* as represented by the
767 CIM_HostedAccessPoint association between *system1* and *kvmredirectsap1*. The Session
768 (*kvmredirectsap1*) provides a SAP for *system1* as represented by the CIM_SAPAvailableForElement
769 association between *system1* and *kvmredirectsap1*. Note that any properties, such as encryption
770 algorithms or settings, for the KVM Protocol's transport can be included on the Protocol Endpoint
771 *protoendpt1*.

772 From *kvmredirectsap1*, the CIM_BindsTo association can be traversed to the CIM_ProtocolEndpoint
773 (*protoendpt1*). From *protoendpt1*, the CIM_PortImplementsEndpoint association can be traversed to the
774 network port (*networkport1*), a device on *system1*.

775 In the figure, the KVM Redirection specified by *kvmredirectsvc1* and *kvmredirectsap1* is active, because
776 the state of the *kvmredirectsvc1* is 2 (Enabled) and the state of the *kvmredirectsap1* is 2 (Enabled).



777

778 **Figure 3 – Monolithic System Object Diagram**

779 9.3 Object Diagram for Monolithic Server with Service Processor

780 Figure 4 shows the object diagram for a monolithic server with a service processor.

781 The diagram is similar to Figure 3, except there is now an instance of CIM_ComputerSystem, *sp1*,
782 representing the service processor which has a network port.

783 The KVM Redirection Service (*kvmredirectsvc1)* is hosted on *sp1* as represented by the
784 CIM_HostedService association between *sp1* and *kvmredirectsvc1*.

785 The service affects *system1* as represented by the CIM_ServiceAffectsElement association between
786 *system1* and *kvmredirectsvc1*. This signifies that *system1* is the source of the KVM console which can be
787 redirected.

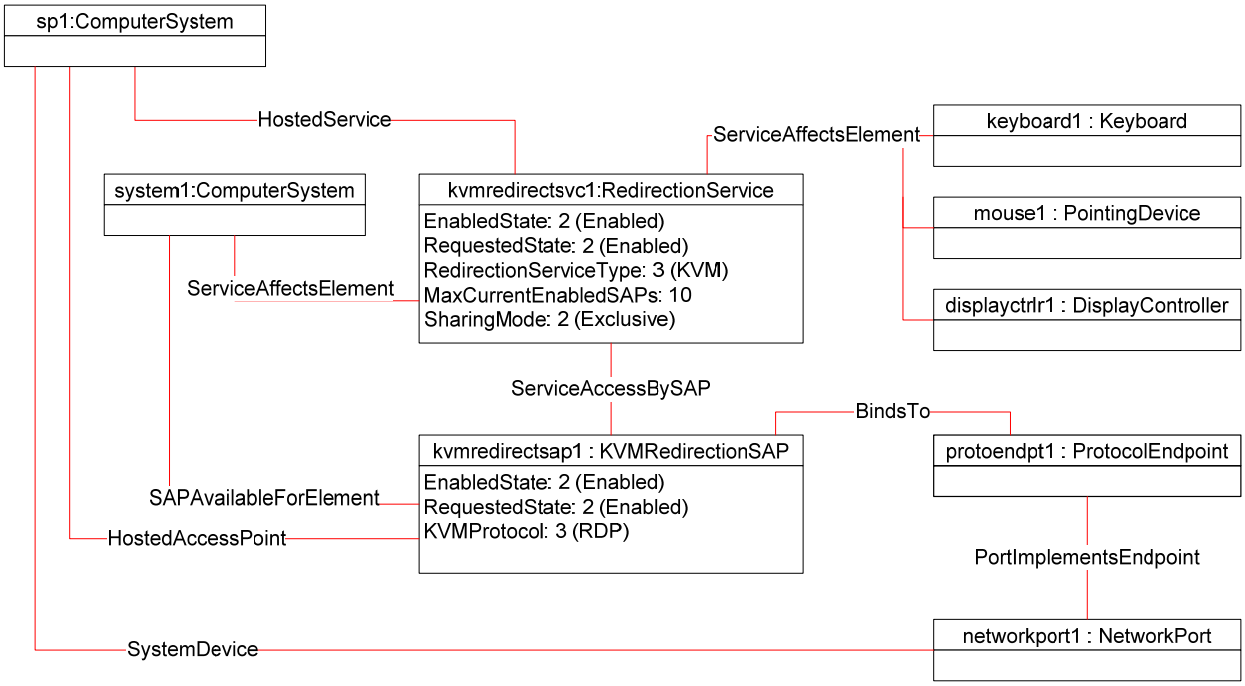
788 The service also affects *keyboard1, displayctrlr1* and *mouse1* as represented by the
789 CIM_ServiceAffectsElement association between *keyboard1, displayctrlr1* and *mouse1* and
790 *kvmredirectsvc1*. This signifies that *keyboard1, displayctrlr1* and *mouse1* are the Original Destination of a
791 KVM console which can be redirected. *keyboard1, displayctrlr1* and *mouse1* are associated to *system1*
792 through CIM_SystemDevice (not shown).

793 The KVM Redirection Session (*kvmredirectsap1*) is hosted on *sp1* as represented by the
794 CIM_HostedAccessPoint association between *sp1* and *kvmredirectsap1*. The Session (*kvmredirectsap1*)

795 provides a SAP for *system1* as represented by the CIM_SAPAvailableForElement association between
796 *system1* and *kvmredirectsap1*.

797 From *kvmredirectsap1*, the CIM_BindsTo association can be traversed to the CIM_ProtocolEndpoint
798 (*protoendpt1*). From *protoendpt1*, the CIM_PortImplementsEndpoint association can be traversed to the
799 network port (*networkport1*), a device on *sp1*.

800 In the figure, the KVM Redirection specified by *kvmredirectsvc1* and *kvmredirectsap1* is active, because
801 the state of the *kvmredirectsvc1* is 2 (Enabled) and the state of the *kvmredirectsap1* is 2 (Enabled).



802

803 **Figure 4 – Monolithic System with Service Processor Object Diagram**

804 9.4 Object Diagram for a Modular System

805 The Figure 5 shows a modular system which can redirect the KVM devices on a blade to the network port
806 of the chassis management module (CMM) or the network port of the blade. The chassis management
807 module is represented with an instance of CIM_ComputerSystem, *chassismgr1*. The blade is represented
808 with an instance of CIM_ComputerSystem, *blade1*.

809 The KVM Redirection Service (*kvmredirectsvc1)* is hosted on *chassismgr1* as represented by the
810 CIM_HostedService association between *chassismgr1* and *kvmredirectsvc1*. The service affects *blade1*
811 as represented by the CIM_ServiceAffectsElement association between *blade1* and *kvmredirectsvc1*.
812 This signifies that *blade1* is the source of the KVM console which can be redirected.

813 The service also affects *keyboard1, displayctrlr1* and *mouse1* as represented by the
814 CIM_ServiceAffectsElement association between *keyboard1, displayctrlr1* and *mouse1* and
815 *kvmredirectsvc1*. This signifies that *keyboard1, displayctrlr1* and *mouse1* are the Original Destination of a
816 KVM console which can be redirected. The instance *keyboard1, displayctrlr1* and *mouse1* are associated
817 to *blade1* via an instance of CIM_SystemDevice.

818 There are two KVM Redirection Sessions, *kvmredirectsap1* and *kvmredirectsap2*. Each is associated to
819 the Service via an instance of the CIM_ServiceAccessBySAP associations.

One KVM Redirection Session (*kvmredirectsap1*) is hosted on blade*1* as represented by the CIM_HostedAccessPoint association between *blade1* and *kvmredirectsap1*. This shows that the resources of *blade1* are used to host the redirection session. The Session (*kvmredirectsap1*) provides a SAP for *blade1* as represented by the CIM_SAPAvailableForElement association between *blade1* and *kvmredirectsap1*.

From *kvmredirectsap1*, the CIM_BindsTo association can be traversed to the CIM_ProtocolEndpoint (*protoendpt1*). From *protoendpt1*, the CIM_PortImplementsEndpoint association can be traversed to the network port (*networkport1*), a device on *blade1*.

The other KVM Redirection Session (*kvmredirectsap2*) is hosted on chassismgr*1* as represented by the CIM_HostedAccessPoint association between *chassismgr1* and *kvmredirectsap2*. This shows that the resources of *chassismgr1* are used to host the redirection session. The Session (*kvmredirectsap2*) also provides a SAP for *blade1* as represented by the CIM_SAPAvailableForElement association between *blade1* and *kvmredirectsap2*.

From *kvmredirectsap2*, the CIM_BindsTo association can be traversed to the CIM_ProtocolEndpoint (*protoendpt2*). From *protoendpt2*, the CIM_PortImplementsEndpoint association can be traversed to the network port (*networkport2*), a device on *chassismgr1*.

Note that both *kvmredirectsap1* and *kvmredirectsap2* are associated to *blade1* with the CIM_SAPAvailableForElement, because *blade1* is the source of the KVM Redirection regardless of whether the SAP is hosted on the *blade1* or *chassismgrr1*.

In Figure 5, the KVM Redirection specified by *kvmredirectsvc1* and *kvmredirectsap1* is active, because the state of *kvmredirectsvc1* is 2 (Enabled) and the state of *kvmredirectsap1* is 2 (Enabled). The state of *kvmredirectsap2* is 3 (Disabled), which means that the session specified by *kvmredirectsvc1* and *kvmredirectsap2* is not permitted to be made active.

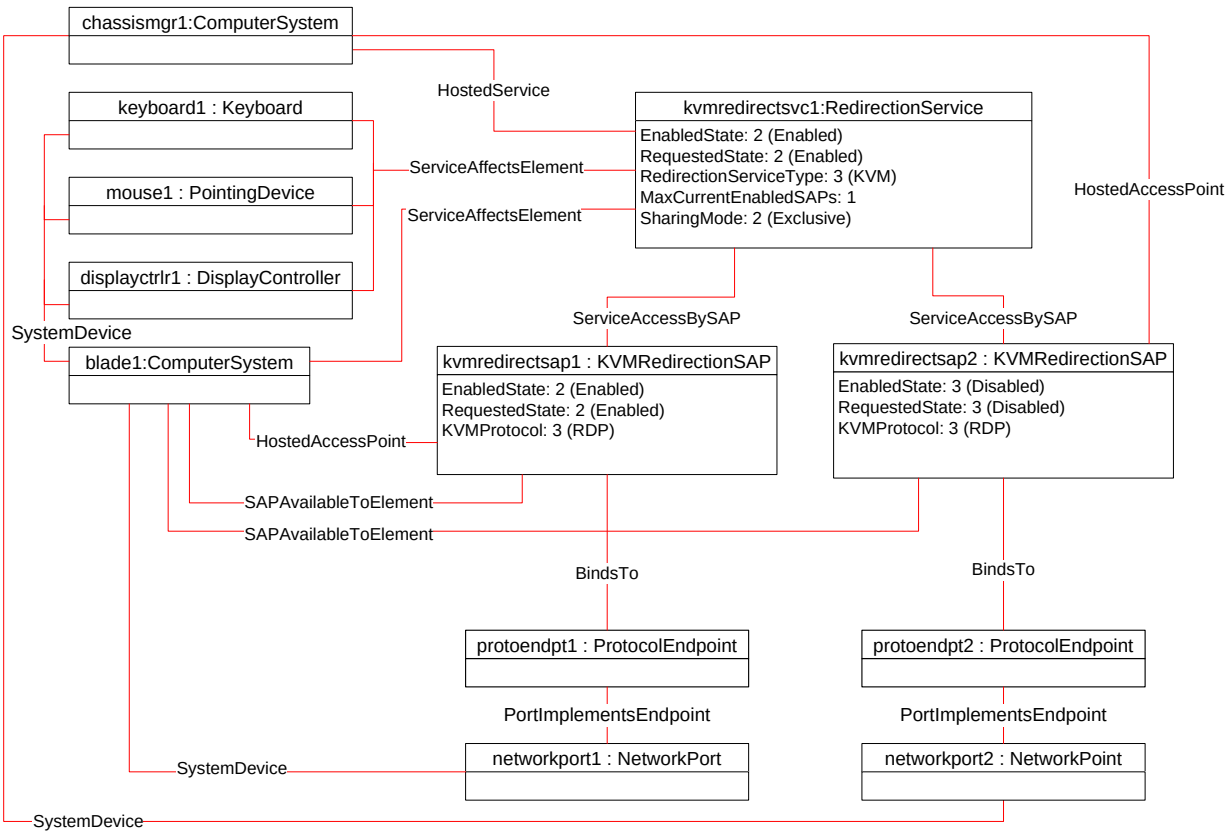


Figure 5 – Modular System Object Diagram

9.5 Determine Whether a System Has KVM Consoles That Can Be Redirected.

A client can determine whether a computer system of interest has KVM consoles that can be redirected as follows:

1) Start at the instance of CIM_ComputerSystem which represents the computer system whose KVM consoles are of interest.
2) Enumerate the instances of the CIM_RedirectionService which are associated to the CIM_ComputerSystem via an instance of the CIM_ServiceAffectsElement association.
3) If the enumeration is zero, the computer system has no KVM console that can be redirected.
4) Otherwise, the computer system has at least one KVM console that can be redirected. Each instance of CIM_RedirectionService so found represents a Service on the computer system.

9.6 Determine Whether a Keyboard, Display Controller or Pointing Device Can Be Redirected

A client can determine whether a keyboard, display controller or pointing device of interest can be redirected as follows:

1) Start at the instance of CIM_Keyboard, CIM_DisplayController and/or CIM_PointingDevice which represents the device(s) of interest.
2) Enumerate the instances of the CIM_RedirectionService which are associated to the CIM_Keyboard, CIM_DisplayController and/or CIM_PointingDevice via an instance of the CIM_ServiceAffectsElement association.
3) If the enumeration is zero, the KVM console cannot be redirected.
4) Otherwise, the keyboard, display controller or pointing device of interest is the Original Destination for at least one KVM Redirection. Each session can be found by using the CIM_RedirectionService, so found, as the Service.
5) It is advisable to enumerate the instances of any other CIM_LogicalDevice with which the CIM_RedirectionService is associated, because this service may affect more than one device. To do that, enumerate the instances of CIM_LogicalDevice, such as CIM_Keyboard, CIM_DisplayController and/or CIM_PointingDevice which are associated to the instance of CIM_RedirectionService via an instance of the CIM_ServiceAffectsElement association (other than the one found in step 2).

9.7 Find the KVM Redirection Services for a Computer System

A client can determine the KVM Redirection Service on a computer system of interest as follows:

1) Start at the instance of CIM_ComputerSystem which represents the computer system of interest.
2) Enumerate the instances of the CIM_RedirectionService which are associated to the CIM_ComputerSystem via an instance of the CIM_ServiceAffectsElement association and which have a CIMRedirectionService.RedirectionServiceType set to 3 (KVM).
3) Each instance of CIM_RedirectionService, so found, is a KVM Redirection Service for the computer system of interest.

9.8 Find the Original Destinations on a Computer System

A client can determine the sources of KVM Console Flows (or Original Destinations) on a computer system of interest as follows:

1) Start at the instance of CIM_ComputerSystem which represents the computer system of interest.

2) Determine the KVM Redirection Services for the computer system using the use case in 9.7.

3) From each instance of CIM_RedirectionService so found, determine if there is an instance of CIM_LogicalDevice which is associated to the instance of CIM_RedirectionService via an instance of the CIM_ServiceAffectsElement association.

4) If an instance of CIM_LogicalDevice does not exist, there may be no further information to determine the Original Destination of the KVM Redirection Service.

5) Each instance of CIM_LogicalDevice, so found, is a Original Destination for the computer system of interest.

9.9 Find the KVM Redirection Sessions for a Service

A client can determine the KVM Redirection Sessions for a Service of interest as follows:

1) Start at the instance of CIM_RedirectionService of interest. (The instance could be found using the use case in 9.6).

2) Enumerate the instances of CIM_KVMRedirectionSAP which are associated via an instance of CIM_ServiceAccessBySAP.

3) Each instance of CIM_KVMRedirectionSAP, so found, is a KVM Redirection Session for the computer system of interest.

9.10 Find the Destinations for the Redirected KVM Console Flow for a Service

A client can determine the KVM Redirection destinations redirected from a Service of interest as follows:

1) Start at the instance of CIM_RedirectionService of interest. (The instance could be found using the use case in 9.6.)

2) Determine the KVM Redirection Sessions using the use case in 9.9.

3) From each instance of CIM_KVMRedirectionSAP, determine if there is an instance of a subclass of CIM_ProtocolEndpoint which is associated to the instance of CIM_KVMRedirectionSAP via an instance of the CIM_BindsTo association.

4) If an instance of CIM_ProtocolEndpoint does not exist, there may be no further information to determine the Destination of the KVM RedirectionSession.

5) Otherwise, for each instance of CIM_ProtocolEndpoint, so found, traverse the CIM_PortImplementsEndpoint association to the instance of CIM_NetworkPort.

6) Each instance of CIM_NetworkPort, so found, is a destination of the redirected KVM Console Flow for the Service.

9.11 Find a KVM Redirection

Finding a KVM Redirection involves finding the KVM Redirection Service and the KVM Redirection Session.

A client can find a KVM Redirection as follows:

1) Use the steps described in 9.7 to find the instance of CIM_RedirectionService of interest.

2) Use the steps described in 9.9 to find the instance of CIM_KVMRedirectionSAP of interest.

3) The instance of CIM_RedirectionService and instance of CIM_KVMRedirectionSAP, so found, are components the KVM Redirection of interest.

9.12 Determine the Type of KVM Redirection State Management Supported

A client can determine whether a KVM Redirection is managed via the state of Session only or via the states of both the Service and Session as follows:

1) Start at the instance of CIM_RedirectionService which is a part of the KVM Redirection of interest.
2) Determine if an instance if CIM_ElementCapabilities exists which associates the instance of CIM_RedirectionService to an instance of CIM_RedirectionServiceCapabilities.
3) If the instance does not exist, the KVM Redirection Session is managed via the state of the Session only.
4) Otherwise, on the instance of CIM_RedirectionServiceCapabilities so found, query the value of the RequestedStateSupported property array.
5) If the RequestedStatesSupported property array contains no values, the KVM Redirection is managed via the state of the Session only.
6) Otherwise, the KVM Redirection can be managed via the state of both Service and Session.

9.13 Activate a KVM Redirection — Session Only

When the KVM Redirection is managed via the state of the Session only, a client can start a KVM Redirection as follows:

1) Start at the instance of the CIM_KVMRedirectionSAP which is a component of the KVM Redirection of interest.
2) Invoke the RequestStateChange() method with the RequestedState parameter set to 2 (Enabled).
3) Verify that the CIM_KVMRedirectionSAP.EnabledState property is set to a value of 6 (Enabled but Offline) or 2 (Enabled).
4) The KVM Redirection is now available, and may be active.

Figure 6 shows an initial state of the KVM Redirection as inactive, because the state of *kvmredirectsvc1* is 2 (Enabled), but the state of *kvmredirectsap1* is 3 (Disabled). The steps described above will change the state of the *kvmredirectsap1* to 6 (Enabled but Offline), thereby activating the KVM Redirection specified by *kvmredirectsvc1* and *kvmredirectsap1*. When the implementation detects that KVM Redirection Flow is active, the diagram of the active KVM Redirection will look like Figure 3.

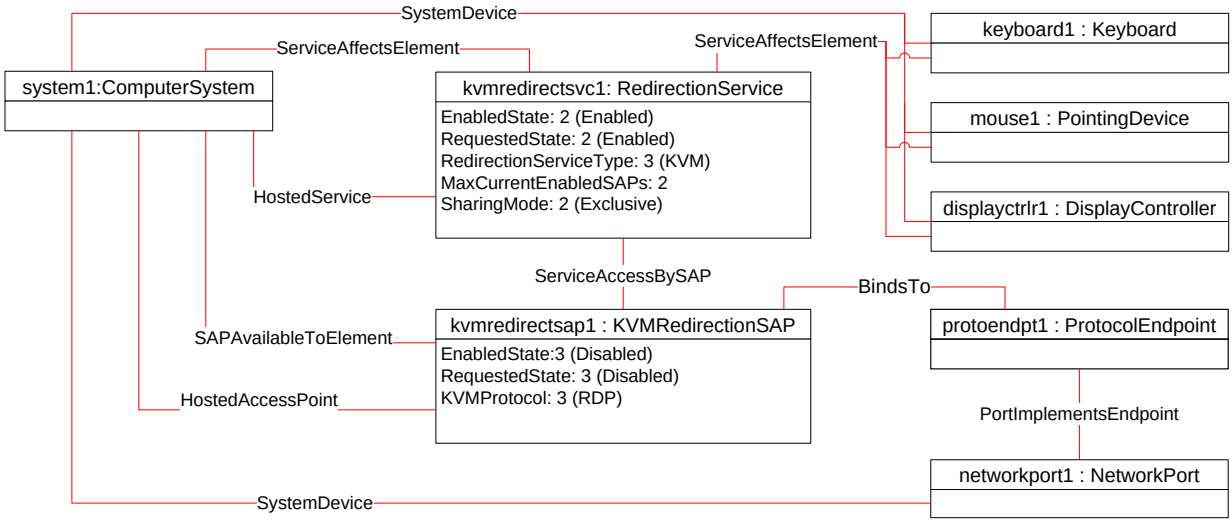


Figure 6 – An Initial State of a Session Managed via the Session State Only

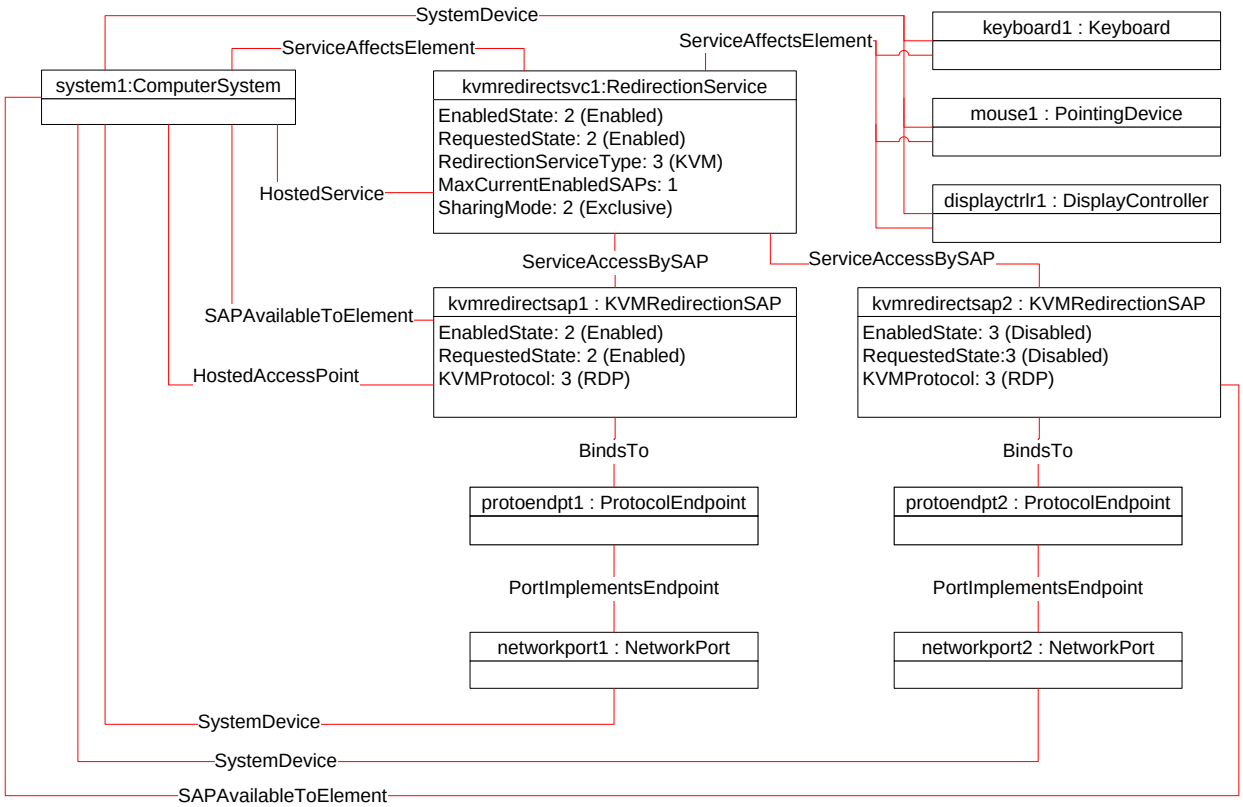
9.14 Activate a Singular KVM Redirection

When the KVM Redirection is a Singular KVM Redirection, a client can atomically activate a KVM Redirection and deactivate a previously activated KVM Redirection (see 8.2.2).

This above behavior is accomplished as follows:

1) Start at the instance of the CIM_KVMRedirectionSAP which is a component of the KVM Redirection of interest.
2) Invoke the RequestStateChange() method with the RequestedState parameter set to 2 (Enabled).
3) Verify that the CIM_KVMRedirectionSAP.EnabledState property is set to a value of 6 (Enabled but Offline) or 2 (Enabled).
4) The KVM Redirection is now available and may be active and any previously active session is now inactive.

Figure 7 shows the object diagram of the initial state of a Singular KVM Redirection. Note that the MaxCurrentEnabledSAPs property of kvmredirectsvc1 is 1, by definition. The state of the Singular KVM Redirection, specified by *kvmredirectsvc1* and *kvmredirectsap1*, is active, because the state of *kvmredirectsvc1* is 2 (Enabled) and the state of *kvmredirectsap1* is 2 (Enabled).



974

975 **Figure 7 – The Initial State of a Singular KVM Redirection**

976 If the CIM_KVMRedirectionSAP described in step one above is *kvmredirectsap2*, then the steps
977 described above will change the state of the *kvmredirectsap1* to 3 (Disabled) and the state of the
978 *kvmredirectsap2* to 6 (Enabled but Offline) or 2 (Enabled) because MaxCurrentEnabledSAPs is set to 1.
979 This will result in the KVM Redirection Session specified by *kvmredirectsvc1* and *kvmredirectsap2* being
980 available or active, while the session specified by *kvmredirectsvc1* and *kvmredirectsap1* is inactive.

981 Figure 8 is an object diagram of the final state of the Singular KVM Redirection, when the call to the
982 RequestedStateChange() method completes successfully and the implementation detects that the KVM
983 Redirection Flow is active..

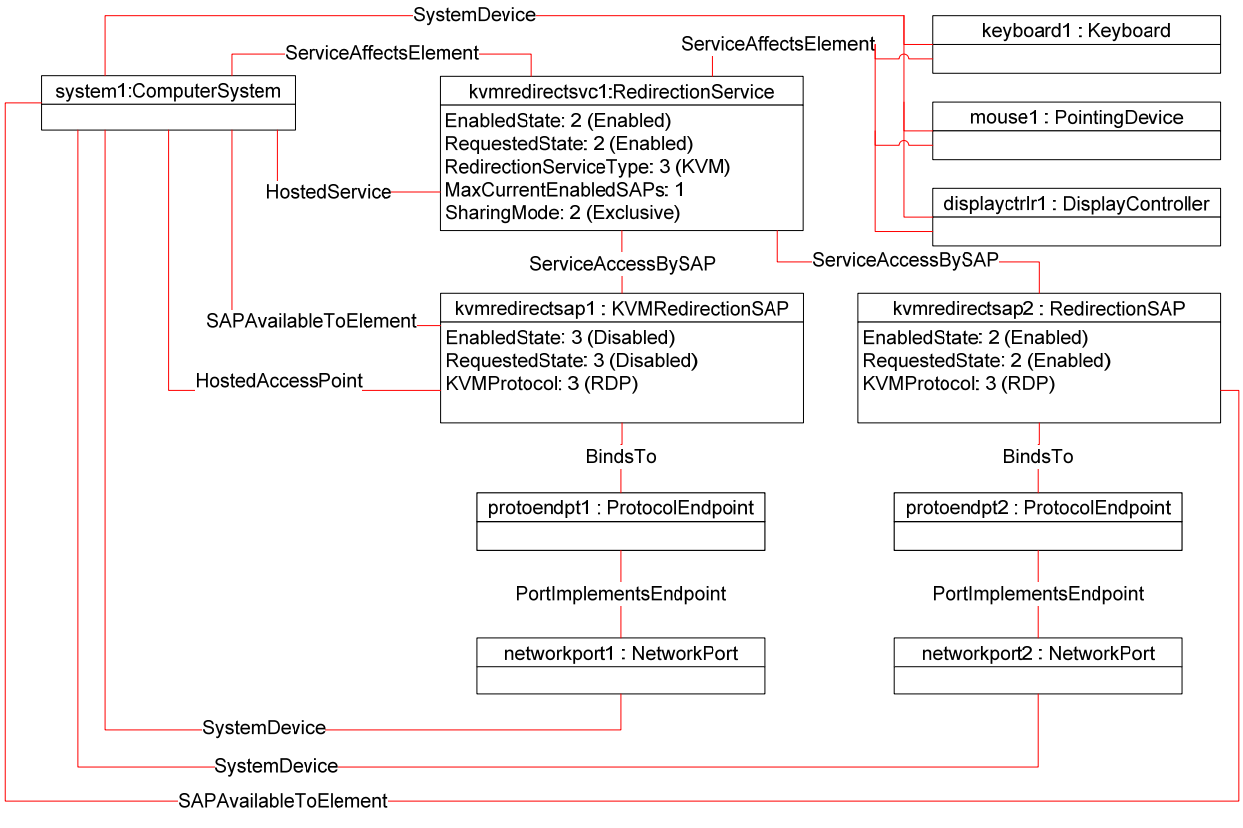


Figure 8 – The Final State of a Singular KVM Redirection

9.15 Stop All KVM Redirection Associated with the Source — Session Only

In the following use case, it is assumed that the client knows the instance of CIM_RedirectionService which specify the KVM Redirection Source of interest.

When the KVM Redirection is managed via the state of the Session only, a client can stop all KVM Redirection as follows:

1) Start at the instance of the CIM_RedirectionService which represents the KVM Redirection Service of interest.
2) Enumerate the instances of CIM_KVMRedirectionSAP which are associated to the instance of CIM_RedirectionService via an instance of CIM_ServiceAccessBySAP.
3) For each instance of CIM_KVMRedirectionSAP so found, query the value of the EnabledState property.
4) If the state of the CIM_KVMRedirectionSAP is not 3 (Disabled), invoke the RequestStateChange() method with the RequestedState parameter set to 3 (Disabled).
5) Verify that the CIM_KVMRedirectionSAP.EnabledState property is set to a value of 3 (Disabled)).
6) Each KVM Redirection redirected from the Service is now inactive.

9.16 Activate a KVM Redirection — Service and Session State Management

When the KVM Redirection is managed via the states of both the Service and Session, a client can start a KVM Redirection as follows:

1) Start at the instance of CIM_RedirectionService of interest.
2) Invoke the CIM_RedirectionService.RequestStateChange() method with the RequestedState parameter set to 2 (Enabled).
3) Verify that the CIM_RedirectionService.EnabledState property is set to a value of 2 (Enabled).
4) Invoke the CIM_KVMRedirectionSAP.RequestStateChange() method with the RequestedState parameter set to 2 (Enabled).
5) Verify that the CIM_KVMRedirectionSAP.EnabledState property is set to a value of 6 (Enabled but Offline) or 2 (Enabled).
6) The KVM Redirection is now available or, if KVM Redirection Flow has started, active.

Figure 9 shows an initial state of the KVM Redirection as inactive, because the state of *kvmredirectsvc1* is 3 (Disabled), and the state of *kvmredirectsap1* is 3 (Disabled) The steps described above will change the state of *kvmredirectsap1* to 6 (Enabled but Offline) and the state of *kvmredirectsvc1* to 2 (Enabled), thereby enabling the KVM Redirection specified by *kvmredirectsvc1* and *kvmredirectsap1* for use. When the implementation detects that the KVM Redirection Flow has started, the diagram of the active KVM Redirection will look like Figure 3.

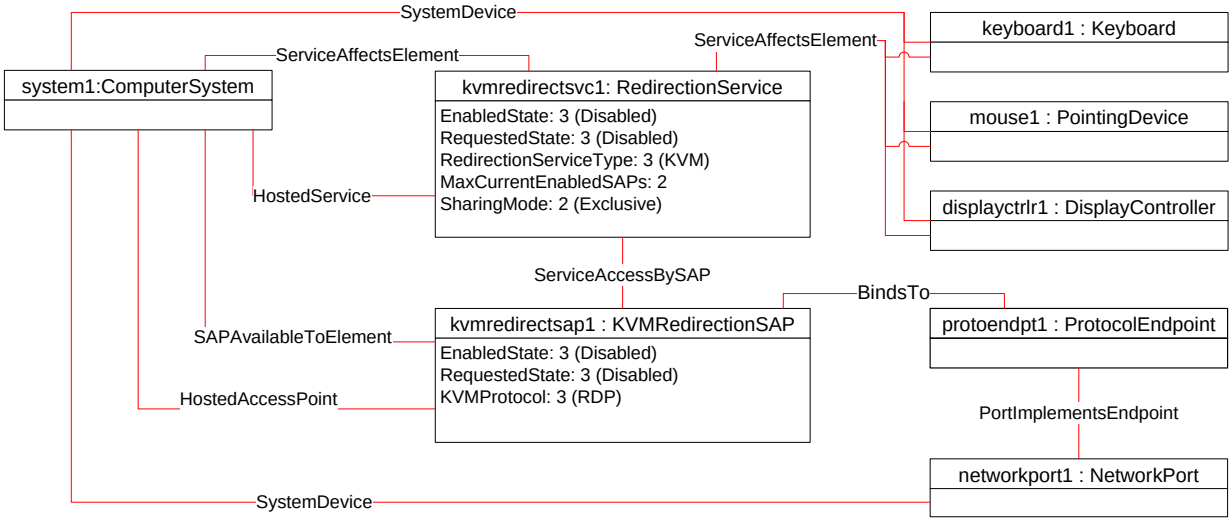


Figure 9 – An Initial State of a Session Managed via the Service and Session State

9.17 Stop All KVM Redirection — Service and Session State Management

When the KVM Redirection is managed via the states of both the Service and Session, a client can stop all KVM Redirections associated with the Service as follows:

1) Start at the instance of the CIM_RedirectionService which represents the KVM Redirection Service of interest.
2) Change the state of the CIM_RedirectionService by invoking the RequestStateChange() method with the RequestedState parameter set to 3 (Disabled).
3) All KVM Redirections with the CIM_RedirectionService as the Service is now inactive.

9.18 Find the Number of Active KVM Redirection Access Points

A client can find the number of active KVM Redirections for a Service of interest as follows:

1) Start at the instance of CIM_RedirectionService of interest.
2) Query the value of the EnabledState property.
3) If the EnabledState property is 3 (Disabled), then the number of active KVM Redirection is zero.
4) If the EnabledState property is 2 (Enabled), then find all instances of CIM_KVMRedirectionSAP associated via an instance of CIM_ServiceAccessBySAP.
5) For each CIM_KVMRedirectionSAP query the value of the EnabledState property.
6) Count all the CIM_KVMRedirectionSAP.EnabledState properties whose value is 2 (Enabled).

9.19 Determine Whether CIM_RedirectionService.ElementName Can Be Modified

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

1) Start at the instance of CIM_RedirectionService.
2) Get the CIM_RedirectionServiceCapabilities instance associated by traversing the CIM_ElementCapabilities association.
3) Query the value of the ElementNameEditSupported property of the instance.
4) If the value is TRUE, the CIM_RedirectionService.ElementName property can be modified by a client.

If there is not an instance of CIM_RedirectionServiceCapabilities associated with the CIM_RedirectionService instance, modifying the CIM_RedirectionService.ElementName property is not supported.

10 CIM Elements

This clause lists the required properties and method for each class required for this profile. Additional requirements on these elements may have been imposed in clauses 7 (“Implementation Requirements”) and 8 (“Methods”).

Table 16 lists the CIM Elements which are required for this profile. The subsequent subclauses contain those CIM Elements where additional normative statements can be made.

Table 16 – CIM Elements: KVM Redirection Profile

Element Name	Requirement	Description
CIM_RegisteredProfile	Mandatory	See 10.1.
CIM_BindsTo	Optional	See 10.2.
CIM_ElementCapabilities	Conditional	Referencing CIM_RedirectionService. See 10.3.
CIM_ElementCapabilities	Conditional	Referencing CIM_KVMRedirectionSAP. See 10.4.
CIM_RedirectionServiceCapabilities	Optional	Associated to CIM_RedirectionService. See 10.5.
CIM_EnabledLogicalElementCapabilities	Optional	Associated to CIM_KVMRedirectionSAP. See 10.6.

Element Name	Requirement	Description
CIM_HostedAccessPoint	Mandatory	See 10.7.
CIM_HostedService	Mandatory	See 10.8.
CIM_SAPAvailableForElement	Mandatory	See 10.9.
CIM_ServiceAccessBySAP	Mandatory	See 10.10.
CIM_ServiceAffectsElement	Mandatory	Referencing CIM_ComputerSystem. See 10.11.
CIM_ServiceAffectsElement	Optional	Referencing CIM_LogicalDevice. See 10.12.
CIM_RedirectionService	Mandatory	See 10.13.
CIM_KVMRedirectionSAP	Mandatory	See 10.14.

10.1 CIM_RegisteredProfile

CIM_RegisteredProfile identifies the *KVM Redirection Profile* in order for a client to determine whether an instance of CIM_ComputerSystem is conformant with 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 17, the behavior of the RegisteredProfile instance is per the *Profile Registration Profile*.

Table 17 – Class: CIM_RegisteredProfile

Properties	Requirement	Notes
RegisteredName	Mandatory	This property shall have a value of "KVM Redirection".
RegisteredVersion	Mandatory	This property shall have a value of "1.0.1".
RegisteredOrganization	Mandatory	This property shall have a value of 2 (DMTF).

10.2 CIM_BindsTo

The CIM_BindsTo association is used to relate the CIM_KVMRedirectionSAP to the CIM_ProtocolEndpoint which is the destination of the redirected KVM console.

Table 18 contains the requirements for elements of this class.

Table 18 – Class: CIM_BindsTo

Properties	Requirement	Notes
Antecedent	Mandatory	This shall be a reference to an instance of the CIM_ProtocolEndpoint class. See 7.4.1. Cardinality is "0..1".
Dependent	Mandatory	This shall be a reference to an instance of the CIM_KVMRedirectionSAP. See 7.4.1. Cardinality is "1..*".

10.3 CIM_ElementCapabilities Relating CIM_RedirectionService to CIM_RedirectionServiceCapabilities

The CIM_ElementCapabilities association is used to relate an instance of CIM_RedirectionServiceCapabilities with the instance of CIM_RedirectionService.

Table 19 contains the requirements for elements of this class.

Table 19 – Class: CIM_ElementCapabilities Referencing CIM_RedirectionService

Properties	Requirement	Description
ManagedElement	Mandatory	This shall be a reference to an instance of CIM_RedirectionService. See 7.6.1.1 and 7.6.2.1. Cardinality is "1..*".
Capabilities	Mandatory	This shall be a reference to an instance of CIM_RedirectionServiceCapabilities. See 7.6.1.1 and 7.6.2.1. Cardinality is "0..1".

10.4 CIM_ElementCapabilities Relating CIM_KVMRedirectionSAP to CIM_EnabledLogicalElementCapabilities

The CIM_ElementCapabilities association is used to relate an instance of CIM_EnabledLogicalElementCapabilities with the instance of CIM_KVMRedirectionSAP.

Table 20 contains the requirements for elements of this class.

Table 20 – Class: CIM_ElementCapabilities Referencing CIM_KVMRedirecitonSAP

Properties	Requirement	Description
ManagedElement	Mandatory	This shall be a reference to an instance of CIM_KVMRedirectionSAP. See 7.7.1.1 and 7.7.2.1. Cardinality is "1..*".
Capabilities	Mandatory	This shall be a reference to an instance of CIM_EnabledLogicalElementCapabilities. See 7.7.1.1 and 7.7.2.1. Cardinality is "0..1".

10.5 CIM_RedirectionServiceCapabilities Associated to CIM_RedirectionService

CIM_RedirectionServiceCapabilities indicates support for managing the KVM Redirection Service.

Table 21 contains the requirements for elements of this class.

Table 21 – Class: CIM_RedirectionServiceCapabilities Associated to CIM_RedirectionService

Elements	Requirement	Notes
InstanceID	Mandatory	**Key**
RequestedStatesSupported	Mandatory	See 7.6.1.1 and 7.6.2.1.
ElementNameEditSupported	Mandatory	See 7.3.6.1 and 7.3.6.2.
MaxElementNameLen	Conditional	See 7.3.6.1 and 7.3.6.2.
SharingModeSupported	Mandatory	See 7.3.3.

10.6 CIM_EnabledLogicalElementCapabilities Associated to CIM_KVMRedirectionSAP

CIM_EnabledLogicalElementCapabilities indicates support for managing the KVM Redirection Session.

Table 22 contains the requirements for elements of this class.

Table 22 – Class: CIM_EnabledLogicalElementCapabilities Associated to CIM_KVMRedirectionSAP

Elements	Requirement	Notes
InstanceID	Mandatory	**Key**
RequestedStatesSupported	Mandatory	See 7.7.1.1 and 7.7.2.1.
ElementNameEditSupported	Mandatory	See 7.4.4.1 and 7.4.4.2.
MaxElementNameLen	Conditional	See 7.4.4.1 and 7.4.4.2.

10.7 CIM_HostedAccessPoint

The CIM_HostedAccessPoint association is used to relate the CIM_KVMRedirectionSAP to the CIM_ComputerSystem to which the KVM console is redirected.

Table 23 contains the requirements for elements of this class.

Table 23 – Class: CIM_HostedAccessPoint

Properties	Requirement	Notes
Antecedent	Mandatory	This shall be a reference to an instance of the CIM_ComputerSystem class. See 7.4. Cardinality is "1".
Dependent	Mandatory	This shall be a reference to an instance of the CIM_KVMRedirectionSAP. See 7.4. Cardinality is "*".

10.8 CIM_HostedService

The CIM_HostedService association is used to relate the CIM_RedirectionService to the CIM_ComputerSystem on which it is hosted.

Table 24 contains the requirements for elements of this class.

Table 24 – Class: CIM_HostedService

Properties	Requirement	Notes
Antecedent	Mandatory	This shall be a reference to an instance of the CIM_ComputerSystem class. See 7.2. Cardinality is "1".
Dependent	Mandatory	This shall be a reference to an instance of the CIM_RedirectionService. See 7.2. Cardinality is "*".

10.9 CIM_SAPAvailableForElement

The CIM_SAPAvailableForElement association is used to relate the instance of CIM_ComputerSystem to the instances of CIM_KVMRedirectionSAP which are available as access points for the redirected KVM console.

Table 25 contains the requirements for elements of this class.

Table 25 – Class: CIM_SAPAvailableForElement

Properties	Requirement	Notes
AvailableSAP	Mandatory	This shall be a reference to an instance of the CIM_KVMRedirectionSAP class. See 7.4. Cardinality is "*".
ManagedElement	Mandatory	This shall be a reference to an instance of the CIM_ComputerSystem. See 7.4. Cardinality is "1".

10.10 CIM_ServiceAccessBySAP

The CIM_ServiceAccessBySAP association is used to relate the instance of CIM_RedirectionService to the instances of CIM_KVMRedirectionSAP which are enabled by the service.

Table 26 contains the requirements for elements of this class.

Table 26 – Class: CIM_ServiceAccessBySAP

Properties	Requirement	Notes
Antecedent	Mandatory	This shall be a reference to an instance of the CIM_RedirectionService class. See 7.17.1. Cardinality is "1".
Dependent	Mandatory	This shall be a reference to an instance of the CIM_KVMRedirectionSAP. See 7.17.1. Cardinality is "1..*".

10.11 CIM_ServiceAffectsElement Relating CIM_RedirectionService to CIM_ComputerSystem

The CIM_ServiceAffectsElement association is used to relate the instance of CIM_RedirectionService to the instance of CIM_ComputerSystem which represent the source of the KVM console flow.

Table 27 contains the requirements for elements of this class.

Table 27 – Class: CIM_ServiceAffectsElement Referencing CIM_ComputerSystem

Properties	Requirement	Notes
AffectingElement	Mandatory	This shall be a reference to an instance of the CIM_RedirectionService class. See 7.1. Cardinality is "*".
AffectedElement	Mandatory	This shall be a reference to an instance of the CIM_ComputerSystem. See 7.1. Cardinality is "1".

10.12 CIM_ServiceAffectsElement Relating CIM_RedirectionService to a Concrete Subclass of CIM_LogicalDevice

The CIM_ServiceAffectsElement association is used to relate the instance of CIM_RedirectionService to the instance of a concrete class of CIM_LogicalDevice which represent the source of the KVM console flow.

Table 28 contains the requirements for elements of this class.

Table 28 – Class: CIM_ServiceAffectsElement Referencing CIM_LogicalDevice

Properties	Requirement	Notes
AffectingElement	Mandatory	This shall be a reference to an instance of the CIM_RedirectionService class. See 7.3.2. Cardinality is "1".
AffectedElement	Mandatory	This shall be a reference to an instance of CIM_LogicalDevice. See 7.3.2. Cardinality is "0..1".

10.13 CIM_RedirectionService

The CIM_RedirectionService class represents the ability to manage the KVM Redirection capabilities of a computer system.

Table 29 contains the requirements for elements of this class.

Table 29 – Class: CIM_RedirectionService

Properties	Requirement	Description
SystemCreationClassName	Mandatory	**Key**
SystemName	Mandatory	**Key**
CreationClassName	Mandatory	**Key**
Name	Mandatory	**Key**
ElementName	Mandatory	See 7.3.6.
MaxCurrentEnabledSAPs	Mandatory	See 7.3.5.
EnabledState	Mandatory	See 7.6.
RequestedState	Mandatory	See 7.6.
RedirectionServiceType	Mandatory	See 7.2.
SharingMode	Mandatory	See 7.3.3.
RequestStateChange( )	Mandatory	See 8.1.

10.14 CIM_KVMRedirectionSAP

The CIM_KVMRedirectionSAP class represents a KVM Redirection capability which is possible on a computer system.

Table 30 contains the requirements for elements of this class.

Table 30 – Class: CIM_KVMRedirectionSAP

Properties	Requirement	Description
SystemCreationClassName	Mandatory	**Key**
SystemName	Mandatory	**Key**
Name	Mandatory	**Key**
CreationClassName	Mandatory	**Key**
ElementName	Mandatory	See 7.4.4.
EnabledState	Mandatory	See 7.7.1.3.
RequestedState	Mandatory	See 7.7.1.2.
KVMProtocol	Mandatory	See 7.4.2.
OtherKVMProtocol	Conditional	See 7.4.2.
RequestStateChange( )	Mandatory	See 8.2.

ANNEX A
(informative)

Change Log

Version	Date	Description
1.0.0a	2007-08-06	Initial Preliminary Version
1.0.0	2009-06-16	DMTF Standard Release
1.0.1	2010-11-15	Initial Errata Revision for 1.0.1