Document Number: DSP1019

Date: 2009-06-10

Version: 1.0.0

Device Tray Profile

Document Type: Specification

Document Status: DMTF Standard

Document Language: E

CONTENTS

Figures

Tables

Foreword

The *Device Tray Profile* (DSP1019) was prepared by the Physical Platform Profiles Working Group and the Server Management Working Group of the DMTF.

DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and systems management and interoperability.

Acknowledgements

The authors wish to acknowledge the following people.

Editor:

- Aaron Merkin – IBM

Participants from the DMTF Server Management Working Group:

- Jon Hass – Dell
- Khachatur Papanyan – Dell
- Enoch Suen – Dell
- Jeff Hilland – HP
- Christina Shaw – HP
- Aaron Merkin – IBM
- Jeff Lynch – IBM
- Perry Vincent – Intel
- John Leung – Intel

Introduction

The information in this specification should 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 to represent and manage a device tray modeled using the DMTF Common Information Model (CIM) core and extended model definitions (see DSP0004). The target audience for this specification is implementers who are writing CIM based providers or consumers of management interfaces representing the component described in this document.

Device Tray Profile

1 Scope

The *Device Tray Profile* is a component profile for modeling a device tray of a modular 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.

2.1 Approved References

DMTF DSP0004, *CIM Infrastructure Specification 2.5,*
http://www.dmtf.org/standards/published_documents/DSP0004_2.5.0.pdf

DMTF DSP0200, *CIM Operations over HTTP 1.2,*
http://www.dmtf.org/standards/published_documents/DSP200.pdf

DMTF DSP0207, *WBEM URI Mapping Specification 1.0*,
http://www.dmtf.org/standards/published_documents/DSP0207.pdf

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

DMTF DSP1011, *Physical Asset Profile 1.0*,
http://www.dmtf.org/standards/published_documents/DSP1011_1.0.1.pdf

DMTF DSP1021, *Shared Device Management Profile 1.0*,
http://www.dmtf.org/standards/published_documents/DSP1021_1.0.0.pdf

DMTF DSP1033, *Profile Registration Profile 1.0*,
http://www.dmtf.org/standards/published_documents/DSP1033_1.0.0.pdf

2.2 Other References

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

3 Terms and Definitions

For the purposes of this document, the following terms and definitions 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 in order to conform to the document when the specified conditions are met

3.4

mandatory

indicates requirements to be followed strictly in order 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 “Related Profiles” table

3.9

shall

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

3.10

shall not

indicates requirements to be followed strictly in order 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

4 Symbols and Abbreviated Terms

The following symbols and abbreviations are used in this document.

4.1
CIM
Common Information Model

5 Synopsis

Profile Name: Device Tray

Version: 1.0.0

Organization: DMTF

CIM Schema Version: 2.22

Central Class: CIM_Processor

Scoping Class: CIM_ComputerSystem

The *Device Tray Profile* defines the management and modeling of a device tray.

Table 1 – Referenced Profiles

Profile Name	Organization	Version	Description
Profile Registration	DMTF	1.0	Mandatory
Physical Asset	DMTF	1.0	Optional. See 7.5.
Shared Device Management	DMTF	1.0	Optional. See 7.6.

5.1.1 Central Instance

CIM_LogicalModule shall be the central class of this profile. The instance of CIM_LogicalModule shall be the central instance of this profile.

5.1.2 Scoping Instance

CIM_ComputerSystem shall be the central class of this profile. The instance of CIM_ComputerSystem with which the central instance is associated via an instance of CIM_SystemDevice shall be the central instance of this profile.

6 Description

The *Device Tray Profile* describes a device tray. A device tray is a device which provides aggregation of other devices for the purposes of management. It is commonly used as an aggregation point for media devices in a modular system or rack configuration.

Figure 1 represents the class schema for the *Device Tray Profile*. For simplicity, the prefix CIM_ has been removed from the name of the classes.

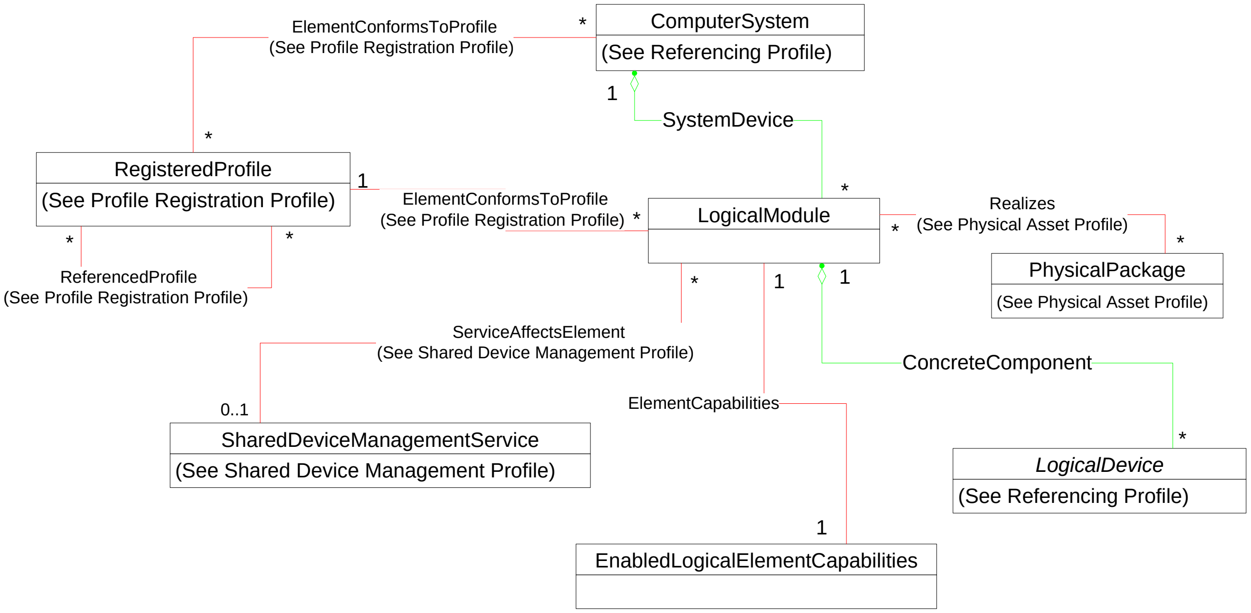
ComputerSystem
(See Referencing Profile)
ElementConformsToProfile
(See Profile Registration Profile)
RegisteredProfile
(See Profile Registration Profile)
SystemDevice
ElementConformsToProfile
(See Profile Registration Profile)
LogicalModule
Realizes
(See Physical Asset Profile)
PhysicalPackage
(See Physical Asset Profile)
ReferencedProfile
(See Profile Registration Profile)
ServiceAffectsElement
(See Shared Device Management Profile)
ConcreteComponent
ElementCapabilities
SharedDeviceManagementService
(See Shared Device Management Profile)
LogicalDevice
(See Referencing Profile)
EnabledLogicalElementCapabilities
*
1
0..1

Figure 1 – Device Tray Profile: Class Diagram

The device tray is modeled with an instance of CIM_LogicalModule. It is scoped to its owning system via an instance of the CIM_SystemDevice association. The physical aspects of the device tray can be optionally modeled using CIM_PhysicalPackage. Conformance with this profile is advertised using the CIM_RegisteredProfile class.

7 Implementation

The list of all required methods can be found in 8 (“Methods”) and properties in 10 (“CIM Elements”).

7.1 CIM_LogicalModule

A device tray aggregates one or more logical devices which are then managed as a group. There shall be an instance of CIM_LogicalModule to represent the device tray.

7.2 Managing the Device Tray's State

This section describes the usage of the RequestedState and EnabledState properties to represent the state of an instance of CIM_LogicalModule.

7.2.1 Indicating Support for State Management

There shall be exactly one instance of CIM_EnabledLogicalElementCapabilities to indicate support for managing state of the Device Tray.

7.2.2 CIM_LogicalModule.EnabledState

When the RequestedState parameter has a value of Enabled or Disabled, upon successful completion of the CIM_LogicalModule.RequestStateChange( ) method, the value of the EnabledState property shall equal the value of the RequestedState property. If the method does not complete successfully, the value of the EnabledState property is indeterminate. The EnabledState property shall have the value 2 (Enabled) or 3 (Disabled).

7.3 State Management Supported

Support for managing the state of the device tray is conditional behavior. This section describes the CIM elements and behaviors that shall be implemented when this behavior is supported.

Conditional Determination: A client can determine whether state management is supported as follows:

1) Find the CIM_EnabledLogicalElementCapabilities instance associated with the CIM_LogicalModule instance.

2) Query the value of the RequestedStatesSupported property. If at least one value is specified, state management is supported.

7.3.1 CIM_LogicalModule.RequestStateChange( ) Supported

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

7.3.2 CIM_LogicalModule.RequestedState

When state management is supported, the RequestedState property shall be supported. When state management is not supported, the RequestedState property may be supported. If the RequestedState property is supported and state management is not supported, the RequestedState property shall have the value 12 (Not Applicable).

The RequestedState property shall have one of the following values: 2 (Enabled), 3 (Disabled), 11 (Reset), 5 (No Change), or 12 (Not Applicable). The initial value of the CIM_LogicalModule.RequestedState property shall be 5 (No Change).

Upon successful invocation of the CIM_LogicalModule.RequestStateChange( ) method, 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.

7.3.3 CIM_EnabledLogicalElementCapabilities

When state management is supported, the RequestedStatesSupported property of the CIM_EnabledLogicalElementCapabilities shall contain at least one value. The RequestedStatesSupported property may have zero or more of the following values: 2 (Enabled), 3 (Disabled), or11 (Reset).

7.4 ElementName Is Modifiable

Implementations may allow the CIM_LogicalModule.ElementName to be modifiable by a client. This is conditional behavior. This section describes the CIM elements and behavior requirements when an implementation supports client modification of the CIM_LogicalModule.ElementName property.

Client Determination: A client can determine whether the ElementName is modifiable as follows:

1) Find the CIM_EnabledLogicalElementCapabilities instance associated with the CIM_LogicalModule instance.

2) Query the value of the ElementNameEditSupported property of the instance. If the value is TRUE, the CIM_LogicalModule.ElementName property is modifiable by a client.

7.4.1 CIM_EnabledLogicalElementCapabilities.ElementNameEditSupported

This property shall have a value of TRUE when the implementation supports client modification of the CIM_LogicalModule.ElementName property.

7.4.2 CIM_EnabledLogicalElement.MaxElementNameLen

The MaxElementNameLen property shall be implemented when the ElementNameEditSupported property has a value of TRUE.

7.4.3 CIM_LogicalModule — ModifyInstance

When the ElementNameEditSupported property of the CIM_EnabledLogicalElementCapabilities has a value of true, the implementation shall allow the ModifyInstance operation to change the value of the ElementName property of the CIM_LogicalModule instance. The ModifyInstance operation shall enforce the length restriction specified in the MaxElementNameLen property of the CIM_EnabledLogicalElementCapabilities.

When 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_LogicalModule instance.

7.5 Physical Asset Profile

When an implementation instruments one or more instances of CIM_PhysicalElement to represent the physical aspects of the device tray, these instances may be conformant with the *Physical Asset Profile*.

Condition Determination: This profile places no restrictions on identifying conformance with the *Physical Asset Profile* beyond those specified in the *Physical Asset Profile* itself.

7.6 Shared Device Management Profile

The CIM_LogicalModule is the focal point for management of the aggregated logical devices. In general, services which would directly manage the device if it was not aggregated will instead manage the CIM_LogicalModule instance. The instrumentation requirements in the following paragraph reflect these guidelines.

When the *Shared Device Management Profile* is instrumented for providing management of a CIM_LogicalModule which is conformant with this profile, there shall be an instance of the CIM_ServiceAffectsElement association which references the CIM_LogicalModule and the CIM_SharedDeviceManagementService. There shall not be an instance of the CIM_ServiceAffectsElement association which references the CIM_SharedDeviceManagementService and references an instance of CIM_LogicalDevice which is associated with the CIM_LogicalModule instance via an instance of the CIM_ConcreteComponent association.

Conditional Determination: This profile places no restrictions on advertising conformance with the *Shared Device Management Profile* beyond those specified in the *Shared Device Management Profile*.

7.7 Aggregated Devices Modeled

Support for modeling devices aggregated into the device tray is conditional behavior.

Client Determination: A client can determine whether aggregated devices are being modeled as follows:

1) Query for instances of CIM_ConcreteComponent where a reference to the CIM_LogicalModule instance is the value of the GroupComponent property and a reference to a CIM_LogicalDevice instance is the value of the PartComponent.

7.7.1 Relationship between Device Tray and Components

For each aggregated CIM_LogicalDevice instance, there shall be exactly one instance of CIM_ConcreteComponent which associates the CIM_LogicalDevice instance with a CIM_LogicalModule instance.

7.7.2 CIM_ConcreteComponent.GroupComponent

The instance of CIM_LogicalModule which represents the device tray shall be the value of the GroupComponent.

7.7.3 CIM_ConcreteComponent.PartComponent

An instance of CIM_LogicalDevice which represents an aggregated device shall be the value of the PartComponent.

8 Methods

8.1 Method: CIM_LogicalModule.RequestStateChange( )

CIM_LogicalModule.RequestStateChange( ) method invocation will change the element’s state to the value specified in the RequestedState parameter. The “Enabled”/”Disabled” values of the RequestedState parameter will correspond to enabling or disabling the module represented by the instance of CIM_LogicalModule on/off accordingly. The value 11 (Reset) shall correspond to initiating a reset of the device tray.

See 7.3.2 for information about the effect of this method on the RequestedState property.

The method shall be considered successful if the availability of the module upon completion of the method corresponds to the desired availability indicated by the RequestedState parameter. It is not necessary that an actual change in state occur for the method to be considered successful. It is sufficient that the resultant state be equal to the requested state. Upon successful completion of the method, the Return Value shall be zero.

See 7.2.2 for information about the effect of this method on the EnabledState property.

RequestStateChange( ) method’s detailed requirements are specified in Table 2 and Table 3.

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

Value	Description
0	Request was successfully executed.
2	Error occurred.
3	Request timed out.
4	Failed
0x1000	Job started: REF returned to started CIM_ConcreteJob.

No standard messages are defined.

Table 3 – CIM_LogicalModule.RequestStateChange( ) Method: Parameters

Qualifiers	Name	Type	Description/Values
IN, REQ	RequestedState	uint16	Valid state values : 2 (Enabled) 3 (Disabled) 11 (Reset)
OUT	Job	CIM_ConcreteJob REF	Returned if job started.
IN, REQ	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.

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

8.2 Profile Conventions for Operations

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

The default list of operations is as follows:

- GetInstance
- Associators
- AssociatorNames
- References
- ReferenceNames
- EnumerateInstances
- EnumerateInstanceNames

8.3 CIM_ConcreteComponent

Table 4 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 4, all operations in the default list in 8.2 shall be implemented as defined in DSP0200.

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

Table 4 – Operations: CIM_ConcreteComponent

Operation	Requirement	Messages
ModifyInstance	Not Supported	None
Associators	Not Supported	None
AssociatorNames	Not Supported	None
References	Not Supported	None
ReferenceNames	Not Supported	None

8.4 CIM_ElementCapabilities

Table 5 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 5, all operations in the default list in 8.2 shall be implemented as defined in DSP0200.

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

Table 5 – Operations: CIM_ElementCapabilities

Operation	Requirement	Messages
ModifyInstance	Not Supported	None
Associators	Not Supported	None
AssociatorNames	Not Supported	None
References	Not Supported	None
ReferenceNames	Not Supported	None

8.5 CIM_EnabledLogicalElementCapabilities

Table 6 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 6, all operations in the default list in 8.2 shall be implemented as defined in DSP0200.

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

Table 6 – Operations: CIM_EnabledLogicalElementCapabilities

Operation	Requirement	Messages
ModifyInstance	Not Supported	None

8.6 CIM_LogicalModule

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 8.2 shall be implemented as defined in DSP0200.

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

Table 7 – Operations: CIM_LogicalModule

Operation	Requirement	Messages
GetInstance	Mandatory	None
ModifyInstance	Optional (see 8.6.1)	None
Associators	Mandatory	None
AssociatorNames	Mandatory	None
References	Mandatory	None
ReferenceNames	Mandatory	None
EnumerateInstances	Mandatory	None
EnumerateInstanceNames	Mandatory	None

8.6.1 ModifyInstance

There is conditional behavior which affects the requirements for implementing the ModifyInstance operation for CIM_LogicalModule (see 7.4.3).

8.7 CIM_SystemDevice

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 8.2 shall be implemented as defined in DSP0200.

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

Table 8 – Operations: CIM_SystemDevice

Operation	Requirement	Messages
ModifyInstance	Not Supported	None
Associators	Not Supported	None
AssociatorNames	Not Supported	None
References	Not Supported	None
ReferenceNames	Not Supported	None

9 Use Cases

This section outlines the use cases of a device tray. Use cases are informative and not intended to define the requirements for conformance.

9.1 Object Diagrams

Figure 2 illustrates a device or media tray which serves as the focal point for management of the shared CD-Rom and disk drives. Ownership of, or access to, the CIM_LogicalModule instance imparts access to the associated shared components. The CIM_SharedDeviceManagementService instance is associated with the CIM_LogicalModule instance via the ServiceAffectsElement association because ownership of the CIM_LogicalModule instance is managed, rather than ownership of the individual shared devices. The properties on the associated CIM_EnabledLogicalElementCapabilities instance indicate that changing states on the device tray is not supported. Changing the ElementName property is not supported either.

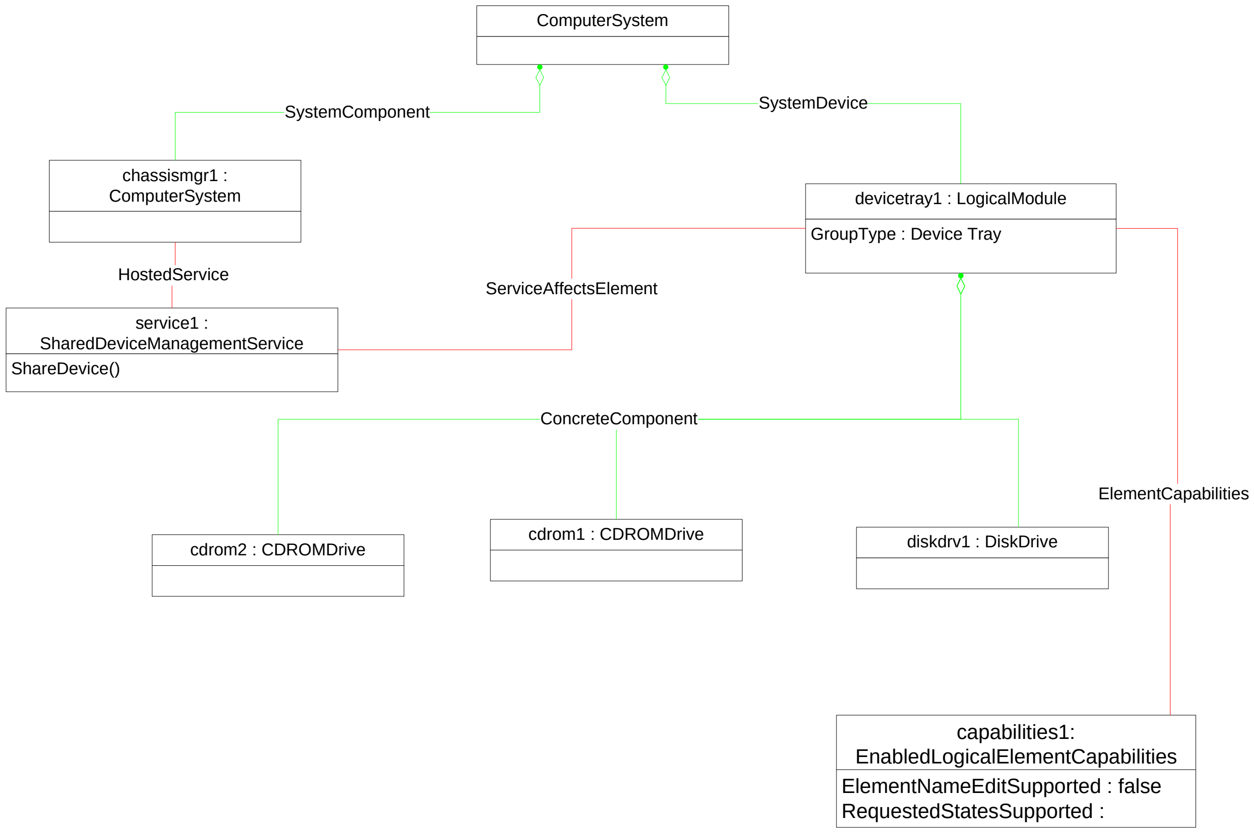

Figure 2 – Device Tray Object Diagram

Figure 3 is a class diagram indicating how an implementation would advertise conformance with the *Device Tray Profile*. Note that the instance of CIM_RegisteredProfile would be created in the Interop namespace while the CIM_ComputerSystem instance would be created in a namespace of the instrumentation's choosing.

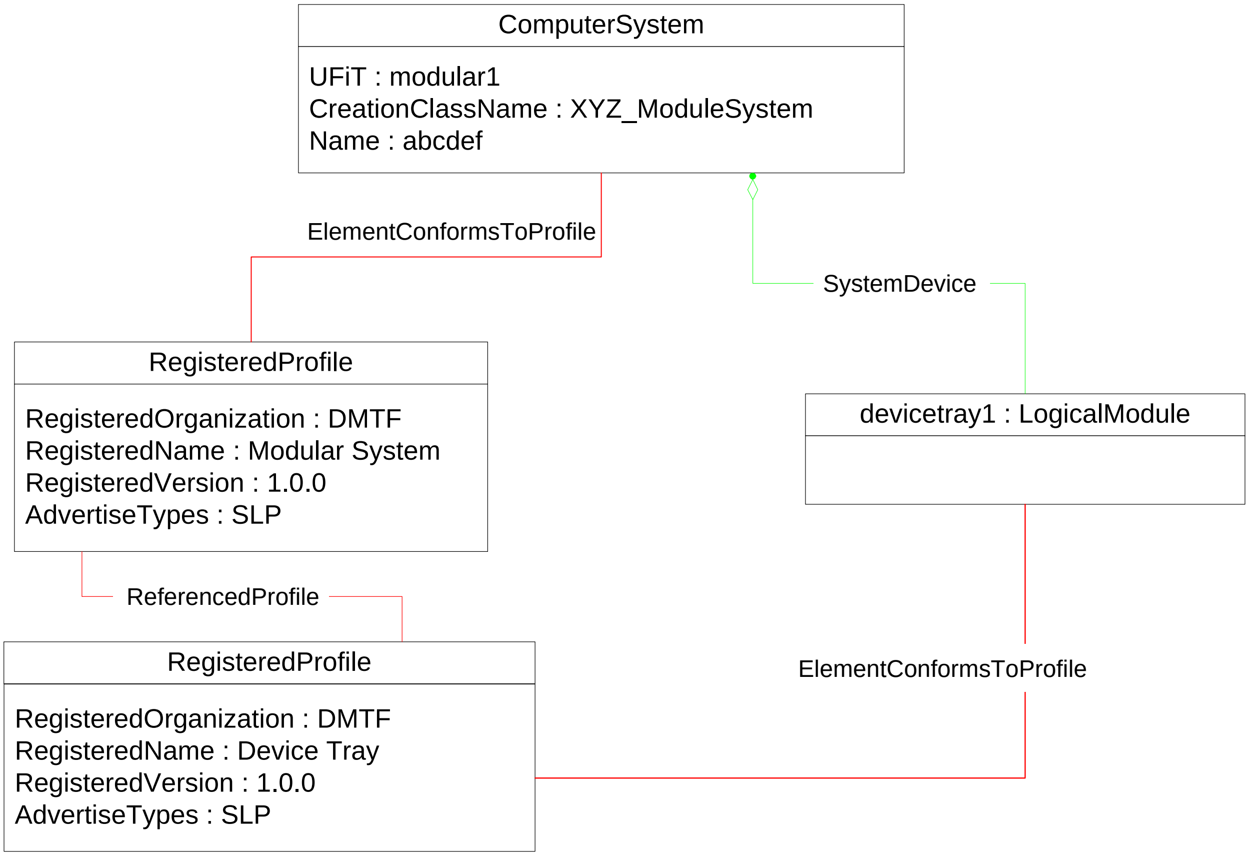
ComputerSystem
UFiT : modular1
CreationClassName : XYZ_ModuleSystem
Name : abcdef
ElementConformsToProfile
SystemDevice
RegisteredProfile
RegisteredOrganization : DMTF
RegisteredName : Modular System
RegisteredVersion : 1.0.0
AdvertiseTypes : SLP
devicetray1 : LogicalModule
ReferencedProfile
RegisteredProfile
RegisteredOrganization : DMTF
RegisteredName : Device Tray
RegisteredVersion : 1.0.0
AdvertiseTypes : SLP
ElementConformsToProfile

Figure 3 – Registered Profile

9.2 Determine Aggregated Devices

A client can determine which logical devices are aggregated into a device tray as follows:

1) Find all instances of CIM_LogicalDevice associated with the CIM_LogicalModule instance via an instance of CIM_ConcreteComponent where the GroupComponent property is a reference to the CIM_LogicalModule instance.

9.3 Find FRU Information

FRU information can be provided by for a device tray. A client can determine the FRU information if provided as follows:

1) Find an instance of CIM_PhysicalPackage associated with the CIM_LogicalModule instance via an instance of the CIM_Realizes association.

2) View the FRU information as indicated by the *Physical Asset Profile*.

10 CIM Elements

Table 9 shows the instances of CIM Elements for this profile. Instances of the CIM Elements shall be implemented as described in Table 9. Sections 7 (“Implementation”) and 8 (“Methods”) may impose additional requirements on these elements.

Table 9 – CIM Elements: Device Tray Profile

Element Name	Requirement	Description
Classes		
CIM_ConcreteComponent	Conditional	See 10.1 and 7.7.
CIM_ElementCapabilities	Mandatory	See 10.2.
CIM_EnabledLogicalElementCapabilities	Mandatory	See 10.3.
CIM_LogicalModule	Mandatory	See 10.4.
CIM_RegisteredProfile	Mandatory	See 10.5.
CIM_SystemDevice	Mandatory	See 10.6.
Indications		
None defined in this profile		

10.1 CIM_ConcreteComponent

CIM_ConcreteComponent is used to associate an instance of CIM_LogicalModule with a CIM_LogicalDevice which is aggregated into the device tray. Table 10 contains the requirements for elements of this class.

Table 10 – Class: CIM_ConcreteComponent

Properties	Requirement	Description
GroupComponent	Mandatory	See 7.7.2.
PartComponent	Mandatory	See 7.7.3.

10.2 CIM_ElementCapabilities

CIM_ElementCapabilities is used to associate an instance of CIM_EnabledLogicalElementCapabilities with the CIM_LogicalModule. Table 11 contains the requirements for elements of this class.

Table 11 – Class: CIM_ElementCapabilities

Properties	Requirement	Notes
ManagedElement	Mandatory	This shall be a reference to the CIM_LogicalModule instance.
Capabilities	Mandatory	This shall be a reference to the instance of CIM_EnabledLogicalElementCapabilities.

10.3 CIM_EnabledLogicalElementCapabilities

CIM_EnabledLogicalElementCapabilities is used to indicate support for managing the Device Tray. Table 12 contains the requirements for elements of this class.

Table 12 – Class: CIM_EnabledLogicalElementCapabilities

Properties	Requirement	Notes
InstanceID	Mandatory	**Key**
RequestedStatesSupported	Mandatory	See 7.3.3.
ElementNameEditSupported	Mandatory	See 7.4.1.
MaxElementNameLen	Conditional	See 7.4.2.

10.4 CIM_LogicalModule

CIM_LogicalModule is used to represent components such as a device or media tray which serve as an aggregation point for the management of shared devices. Table 13 contains the requirements for elements of this class.

Table 13 – Class: CIM_LogicalModule

Properties	Requirement	Description
ModuleNumber	Mandatory	
SystemCreationClassName	Mandatory	**Key**
SystemName	Mandatory	**Key**
CreationClassName	Mandatory	**Key**
DeviceID	Mandatory	**Key**
EnabledState	Mandatory	See 7.2.2.
RequestedState	Conditional	See 7.3.2.
EnabledDefault	Mandatory	Matches 3 (Disabled) or 2 (Enabled)
OperationalStatus	Mandatory	
StatusDescriptions	Conditional	If the OperationalStatus property has a value of 0 (Other), this property shall be supported.
LogicalModuleType	Mandatory	This property shall have a value of 2 ("Device Tray").
RequestStateChange( )	Conditional	See 7.3.

10.5 CIM_RegisteredProfile

CIM_RegisteredProfile identifies the *Device Tray Profile* in order for a client to determine whether an instance of CIM_LogicalModule 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 below, the behavior of the CIM_RegisteredProfile instance is per the *Profile Registration Profile*. Table 14 contains the requirements for elements of this class.

Table 14 – Class: CIM_RegisteredProfile

Properties	Requirement	Description
RegisteredName	Mandatory	This property shall have a value of "Device Tray".
RegisteredVersion	Mandatory	This property shall have a value of "1.0.0".
RegisteredOrganization	Mandatory	This property shall have a value of "DMTF".

10.6 CIM_SystemDevice

CIM_SystemDevice is used to associate an instance of CIM_LogicalModule with an instance of CIM_ComputerSystem representing a modular enclosure. Table 15 contains the requirements for elements of this class.

Table 15 – Class: CIM_SystemDevice

Properties	Requirement	Description
GroupComponent	Mandatory	Scoping system defined outside of this specification.
PartComponent	Mandatory	This property shall be a reference to the instance of CIM_LogicalModule.

ANNEX A
(informative)

Change Log

Version	Date	Author	Description
1.0.0	06-10-2009		DMTF Standard Release