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PCI Device Profile

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Foreword

The *PCI Device Profile* (DSP1075) was prepared by the Server Management Working Group and 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 Common Information Model (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 that represent the components described in this document.

155 # PCI Device Profile

156 ## 1 Scope

157 The *PCI Device Profile* extends the management capabilities of referencing profiles by adding the
158 capability to represent PCI devices for manageability, including PCI, PCI-X, PCI Express, bridge and
159 switch devices. The PCI device as a logical device is modeled as referencing the physical package for
160 physical asset information and profile versioning for the schema implementation version information.

161 ## 2 Normative References

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

165 ### 2.1 Approved References

166 DMTF DSP0004, *CIM Infrastructure Specification 2.3*,
167 http://www.dmtf.org/standards/published_documents/DSP0004_2.3.pdf

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

170 DMTF DSP0215, *Server Management Managed Element Addressing Specification 1.0*,
171 http://www.dmtf.org/standards/published_documents/DSP0215_1.0.pdf

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

174 DMTF DSP1011, *Physical Asset Profile 1.0*,
175 http://www.dmtf.org/standards/published_documents/DSP1011_1.0.pdf

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

178 DMTF DSP1080, *Enabled Logical Element Profile 1.0*
179 http://www.dmtf.org/standards/published_documents/DSP1080_1.0.pdf

180 ### 2.2 Other References

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

183 Conventional PCI 2.3, PCI-X 2.0 and PCI Express 2.0 from the PCI Special Interest Group (PCI-SIG),
184 http://www.pcisig.com/specifications

185 ## 3 Terms and Definitions

186 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
PCI Device
indicates a logical Peripheral Component Interconnect or Peripheral Component Interconnect Express device

3.14
Logical PCI Device
indicates a PCI device that is represented by a PCI bus number, PCI device number, and PCI function number

3.15
PCI Port
indicates a PCI device port used to describe the connection between PCI devices

3.16
PCI Bridge
indicates a PCI device that provides the capability to connect two PCI busses

3.17
PCIe Switch
indicates a PCI Express switch device that provides the capability to connect multiple PCI Express devices

3.18
PCI Bus
indicates a bus subsystem that provides the capability to connect multiple PCI devices

4 Symbols and Abbreviated Terms

4.1
CIM
Common Information Model

4.2
PCI
Peripheral Component Interconnect

4.3
PCIe
Peripheral Component Interconnect Express

5 Synopsis

Profile Name: PCI Device

Version: 1.0.0

Organization: DMTF

CIM Schema Version: 2.22

Specializes: DMTF Enabled Logical Element 1.0

Central Class: CIM_PCIDevice

Scoping Class: CIM_ComputerSystem

The *PCI Device Profile* extends the management capability of the referencing profiles by adding the capability to describe PCI devices.

CIM_PCIDevice shall be the Central Class of this profile. The instances of CIM_PCIDevice shall be the Central Instances 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 through an instance of CIM_SystemDevice shall be the Scoping Instance of this profile.

Table 1 identifies profiles that are related to this profile.

Table 1 – Related Profiles

Profile Name	Organization	Version	Relationship
Physical Asset	DMTF	1.0	Optional
Profile Registration	DMTF	1.0	Mandatory
Enabled Logical Element	DMTF	1.0	Specializes

6 Description

The *PCI Device Profile* describes the necessary elements needed to represent PCI devices in a managed system, including PCI-X devices, PCI Express devices, PCI-to-PCI bridges and PCI Express switches. This profile can be used to represent the following:

- Logical PCI device inventory.
- PCI device topology.
- Relationship of PCI devices to other PCI devices and other logical devices that provide alternate aspects of the PCI devices.
- Configuration registers used to identify a PCI device.
- Physical manifestation of logical PCI devices.

Figure 1 represents the class diagram for the *PCI Device Profile*. For simplicity, the prefix CIM_ has been removed from the names of the classes.

The PCI device in a managed system is represented by an instance of CIM_PCIDevice, or one of its subclasses CIM_PCIBridge or CIM_PCIeSwitch.

The interconnectivity between PCI devices may be described using CIM_PCIPort and CIM_PCIPortGroup.

The PCI device's relationship with other logical devices that provide alternate aspects of the PCI device can be represented by one or more instances of CIM_LogicalDevice.

The PCI device's physical aspects can be represented by one or more instances of CIM_PhysicalElement.

The profile information is represented with the instance of CIM_RegisteredProfile.

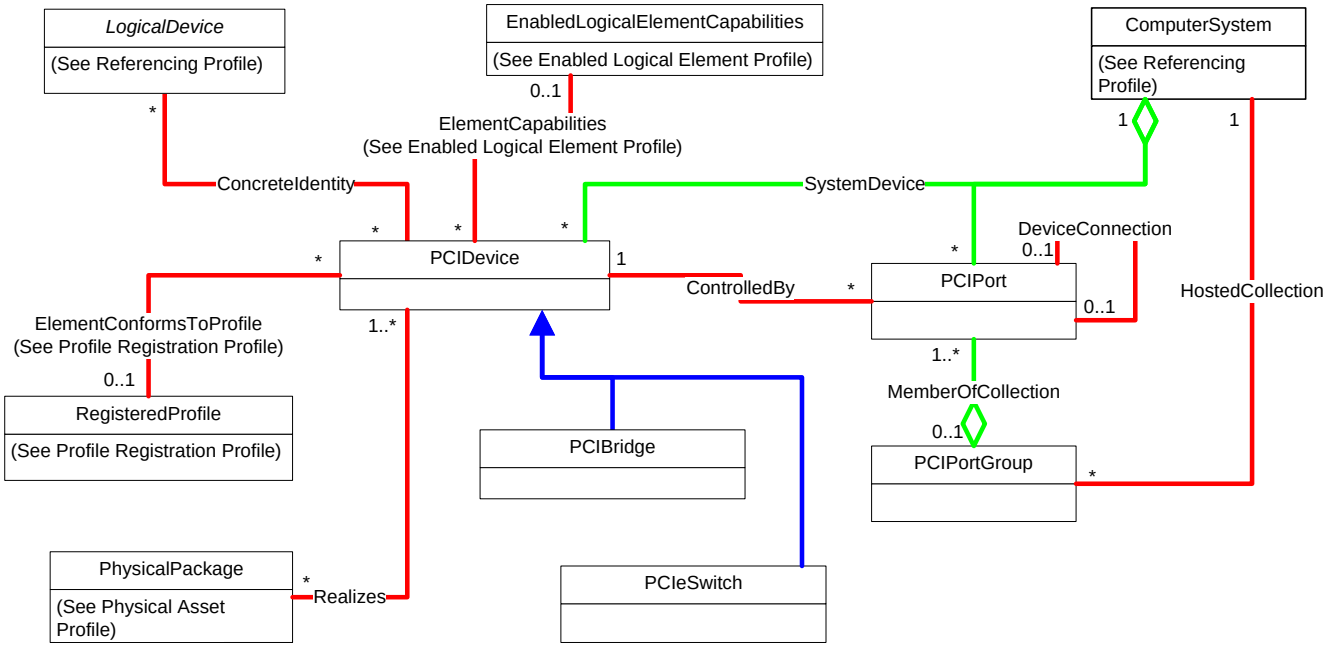


Figure 1 – PCI Device Profile: Class Diagram

7 Implementation Requirements

This section details the requirements related to the arrangement of instances and properties of instances for implementations of this profile. This profile models a logical PCI device that is represented by a PCI bus number, PCI device number, and PCI function number. Each logical PCI device resides on a physical PCI device. More than one logical PCI devices may reside on a single physical PCI device. The term PCI device referred in this section refers to the logical PCI device not the physical PCI device.

7.1 CIM_PCIDevice

Logical PCI devices in the computer system are represented using CIM_PCIDevice.

An instance of CIM_PCIDevice should be instantiated for each PCI device in the computer system.

7.1.1 CIM_PCIDevice.BusNumber

CIM_PCIDevice.BusNumber shall be set to the bus number where the PCI device resides. If the bus number for this PCI device is unknown or has not been assigned, CIM_PCIDevice.BusNumber shall not be set.

7.1.2 CIM_PCIDevice.DeviceNumber

CIM_PCIDevice.DeviceNumber shall be set to the device number assigned to the PCI device for this bus. If the device number for this PCI device is unknown or has not been assigned, CIM_PCIDevice.DeviceNumber shall not be set.

7.1.3 CIM_PCIDevice.FunctionNumber

CIM_PCIDevice.FunctionNumber shall be set to the function number for the PCI device.

7.1.4 CIM_PCIDevice.Capabilities (Optional)

CIM_PCIDevice.Capabilities contains the capabilities of the PCI device. If the PCI device that is modeled is a PCI Express device, this should contain the value 13 (Supports PCI Express). If the PCI device that is modeled is PCI-X capable device, this should contain the value 5 (PCI-X Capable). This property may contain other values describing the capabilities of the PCI device.

7.1.5 CIM_PCIDevice.SubsystemID (Optional)

CIM_PCIDevice.SubsystemID should be set to the Subsystem ID for the PCI device, as described in the configuration registers for the PCI device.

7.1.6 CIM_PCIDevice.SubsystemVendorID (Optional)

CIM_PCIDevice.SubsystemVendorID should be set to the Subsystem Vendor ID for the PCI device, as described in the configuration registers for the PCI device.

7.1.7 CIM_PCIDevice.PCIDeviceID (Optional)

CIM_PCIDevice.PCIDeviceID should be set to the PCI Device ID for the PCI device, as described in the configuration registers for the PCI device.

7.1.8 CIM_PCIDevice.VendorID (Optional)

CIM_PCIDevice.VendorID should be set to the Vendor ID for the PCI device, as described in the configuration registers for the PCI device.

7.1.9 CIM_PCIDevice.RevisionID (Optional)

CIM_PCIDevice.SubsystemRevisionID should be set to the Revision ID for the PCI device, as described in the configuration registers for the PCI device.

7.2 CIM_SystemDevice

CIM_SystemDevice is used to associate an instance of CIM_PCIDevice or CIM_PCIPort with the instance of CIM_ComputerSystem of which the CIM_PCIDevice or CIM_PCIPort instance is a member.

There shall be an instance of CIM_SystemDevice for each instance of CIM_PCIDevice and CIM_PCIPort.

7.3 CIM_ConcreteIdentity (Optional)

CIM_ConcreteIdentity is used to associate an instance of CIM_LogicalDevice with an instance of CIM_PCIDevice of which the CIM_LogicalDevice instance represents an alternate aspect of the PCI device.

For each CIM_PCIDevice instance, there may be instances of CIM_ConcreteIdentity for each instance of CIM_LogicalDevice that represents an alternate aspect of the CIM_PCIDevice instance.

7.4 CIM_PCIPort (Optional)

PCI device ports are modeled using CIM_PCIPort. Modeling of PCI device ports is optional.

If PCI device ports are modeled, there should be one or more instances of CIM_PCIPort for each PCI device port exposed for each PCI device.

7.4.1 CIM_PCIPort.PortType

CIM_PCIPort.PortType shall be set to a value representing the type of port connection for the PCI device.

7.4.2 CIM_PCIPort.OtherPortType (Conditional)

If the value of CIM_PCIPort.PortType is set to 1 (Other), then CIM_PCIPort.OtherPortType shall be set to a value representing the type of port connection for the PCI device.

7.5 CIM_ControlledBy (Conditional)

CIM_ControlledBy is used to associate an instance of CIM_PCIDevice with an instance of CIM_PCIPort representing the connection exposed by the PCI device.

If PCI device ports are modeled, there shall be an instance of CIM_ControlledBy for each instance of CIM_PCIPort.

7.6 CIM_DeviceConnection (Optional)

CIM_DeviceConnection is used to associate an instance of CIM_PCIPort with another instance of CIM_PCIPort representing ports that are connected.

There may be an instance of CIM_DeviceConnection for each instance of CIM_PCIPort connected to another instance of CIM_PCIPort.

7.7 CIM_PCIPortGroup (Optional)

The collection of PCI device ports on a single PCI bus is modeled using CIM_PCIPortGroup. Modeling PCI port collections is optional.

If PCI port collections are modeled, there shall be one or more instances of CIM_PCIPortGroup representing the aggregation of PCI ports for each PCI bus.

7.7.1 CIM_PCIPortGroup.BusNumber

CIM_PCIPortGroup.BusNumber shall be set to the bus number shared by the PCI or PCI Express device ports.

7.8 CIM_HostedCollection (Conditional)

CIM_HostedCollection is used to associate an instance of CIM_PCIPortGroup with the instance of CIM_ComputerSystem of which the CIM_PCIPortGroup instance is a member.

If any instances of CIM_PCIPortGroup exist, there shall be an instance of CIM_HostedCollection for each instance of CIM_PCIPortGroup.

7.9 CIM_MemberOfCollection (Conditional)

CIM_MemberOfCollection is used to associate an instance of CIM_PCIPort with an instance of CIM_PCIPortGroup of which the CIM_PCIPort instance is a member.

If any instances of CIM_PCIPortGroup exist, there shall be an instance of CIM_MemberOfCollection for each instance of CIM_PCIPort that is aggregated by an instance of CIM_PCIPortGroup for a PCI bus.

7.10 CIM_PCIBridge (Optional)

PCI devices that provide the capability to bridge two PCI busses are modeled using CIM_PCIBridge. Modeling of these devices is optional.

If PCI bridge devices are modeled, there should be one or more instances of CIM_PCIBridge for each PCI device with the capability to bridge two PCI busses in the computer system.

7.10.1 CIM_PCIBridge.BridgeType

CIM_PCIBridge.BridgeType shall be set to a value representing the type of bridge capability supported by the PCI bridge.

7.10.2 CIM_PCIBridge.SubordinateBusNumber (Optional)

CIM_PCIBridge.SubordinateBusNumber should be set to the highest bus number that exists behind the bridge.

7.10.3 CIM_PCIBridge.SecondaryBusNumber (Optional)

CIM_PCIBridge.SecondaryBusNumber should be set to the bus number to which the secondary interface is connected.

7.11 CIM_PCIeSwitch (Optional)

PCI Express switches are modeled using CIM_PCIeSwitch. Modeling of PCI Express switches is optional.

If PCI Express switches are modeled, there should be one or more instances of CIM_PCIeSwitch for each PCI device that provides PCI Express switch capability in the computer system.

7.11.1 CIM_PCIeSwitch.NumberOfPorts (Optional)

CIM_PCIeSwitch.SubordinateBusNumber should be set to the number of ports exposed by this switch.

7.11.2 CIM_PCIeSwitch.SecondaryBusNumbers (Optional)

CIM_PCIeSwitch.SecondaryBusNumbers should contain the bus numbers to which the secondary interfaces of the switch are connected.

7.12 Interpretation of State

This clause details constraints related to the interpretation of states specific to modeling PCI devices. These constraints are in addition to those specified for state management in DSP1080.

NOTE: When a PCI device is in a $D3_{Hot}$ state, it does not generate interrupts or participate in bus transactions. Refer to PCI 2.3, PCI-X 2.0 or PCI Express 2.0 specifications for more information regarding PCI device Power Management states.

7.12.1 Enabled State

The CIM_PCIDevice.EnabledState property shall have one the following values: 2 (Enabled), 3 (Disabled), 0 (Unknown), 5 (Not Applicable), or 9 (Quiesce).

Table 2 describes the mapping between values of the EnabledState property and the corresponding description of the state of the PCI device. Additional values have the semantics defined in DSP1080.

Table 2 – EnabledState Value Description

ValueMap	Value	Extended Description
0	Unknown	The PCI device state is unknown.
2	Enabled	The PCI device shall be enabled.
3	Disabled	The PCI device shall be disabled.
5	Not Applicable	The EnabledState property does not apply to this PCI device.
9	Quiesce	The PCI device shall be in a $D3_{Hot}$ state.

7.12.2 Requested State Transitions

The CIM_PCIDevice.RequestedState property may have one the following values: 2 (Enabled), 3 (Disabled), 0 (Unknown), or 9 (Quiesce).

Table 3 describes the mapping between values of the RequestedState property and the corresponding state transition initiated for the PCI device.

Table 3 – RequestedState Property Value Description

ValueMap	Value	Extended Description
2	Enabled	A request to enable the PCI device was received.
3	Disabled	A request to disable the PCI device was received.
9	Quiesce	A request to place the PCI device in a $D3_{Hot}$ state was received.

Table 4 describes the mapping between values of the RequestedState parameter and the corresponding state transition initiated for the PCI device.

Table 4 – RequestedState Parameter Value Description

ValueMap	Value	Extended Description
2	Enabled	Initiate enabling of the PCI device
3	Disabled	Initiate disabling of the PCI device
9	Quiesce	Initiate placing the PCI device in a $D3_{Hot}$ state

7.12.3 Representing In Progress Transitions

The CIM_PCIDevice.TransitioningToState property may have one the following values: 2 (Enabled), 3 (Disabled), or 9 (Quiesce).

Table 5 describes the mapping between values of the TransitioningToState property and the corresponding description of the state of the PCI device.

Table 5 – TransitioningToState Value Description

ValueMap	Value	Extended Description
2	Enabled	The PCI device shall be enabled.
3	Disabled	The PCI device shall be disabled.
9	Quiesce	The PCI device shall be in a $D3_{Hot}$ state.

7.12.4 Representing Available Requested States

The CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property may contain zero or more of the following values: 2 (Enabled), 3 (Disabled), or 9 (Quiesce).

8 Methods

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

8.1 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

8.2 CIM_ConcreteIdentity Operations

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 8.1 shall be implemented as defined in DSP0200.

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

Table 6 – CIM_ConcreteIdentity Operations

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

8.3 CIM_ControlledBy 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 8.1 shall be implemented as defined in DSP0200.

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

464 **Table 7 – CIM_ControlledBy Operations**

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

465 8.4 CIM_DeviceConnection Operations

466 Table 8 lists implementation requirements for operations. If implemented, these operations shall be
467 implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 8, all operations in
468 the default list in 8.1 shall be implemented as defined in DSP0200.

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

470 **Table 8 – CIM_DeviceConnection Operations**

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

471 8.5 CIM_ElementCapabilities Operations

472 Table 9 lists implementation requirements for operations. If implemented, these operations shall be
473 implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 9, all operations in
474 the default list in 8.1 shall be implemented as defined in DSP0200.

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

476 **Table 9 – CIM_ElementCapabilities Operations**

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

477 8.6 CIM_EnabledLogicalElementCapabilities Operations

478 Table 10 lists implementation requirements for operations. If implemented, these operations shall be
479 implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 10, all operations
480 in the default list in 8.1 shall be implemented as defined in DSP0200.

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

482 **Table 10 – CIM_EnabledLogicalElementCapabilities Operations**

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

483 8.7 CIM_HostedCollection Operations

484 Table 11 lists implementation requirements for operations. If implemented, these operations shall be
485 implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 11, all operations
486 in the default list in 8.1 shall be implemented as defined in DSP0200.

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

488 **Table 11 – CIM_HostedCollection Operations**

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

489 8.8 CIM_MemberOfCollection Operations

490 Table 12 lists implementation requirements for operations. If implemented, these operations shall be
491 implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 12, all operations
492 in the default list in 8.1 shall be implemented as defined in DSP0200.

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

494 **Table 12 – CIM_MemberOfCollection Operations**

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

8.9 CIM_PCIBridge Operations

All operations are supported as for CIM_EnabledLogicalElement in the *Enabled Logical Element Profile*.

8.10 CIM_PCIDevice Operations

All operations are supported as for CIM_EnabledLogicalElement in the *Enabled Logical Element Profile*.

8.11 CIM_PCIeSwitch Operations

All operations are supported as for CIM_EnabledLogicalElement in the *Enabled Logical Element Profile*.

8.12 CIM_PCIPort Operations

Table 13 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 13, all operations in the default list in 8.1 shall be implemented as defined in DSP0200.

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

Table 13 – CIM_PCIPort Operations

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

8.13 CIM_PCIPortGroup Operations

Table 14 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 14, all operations in the default list in 8.1 shall be implemented as defined in DSP0200.

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

Table 14 – CIM_PCIPortGroup Operations

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

8.14 CIM_SystemDevice 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 8.1 shall be implemented as defined in DSP0200.

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

518 **Table 15 – CIM_SystemDevice Operations**

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

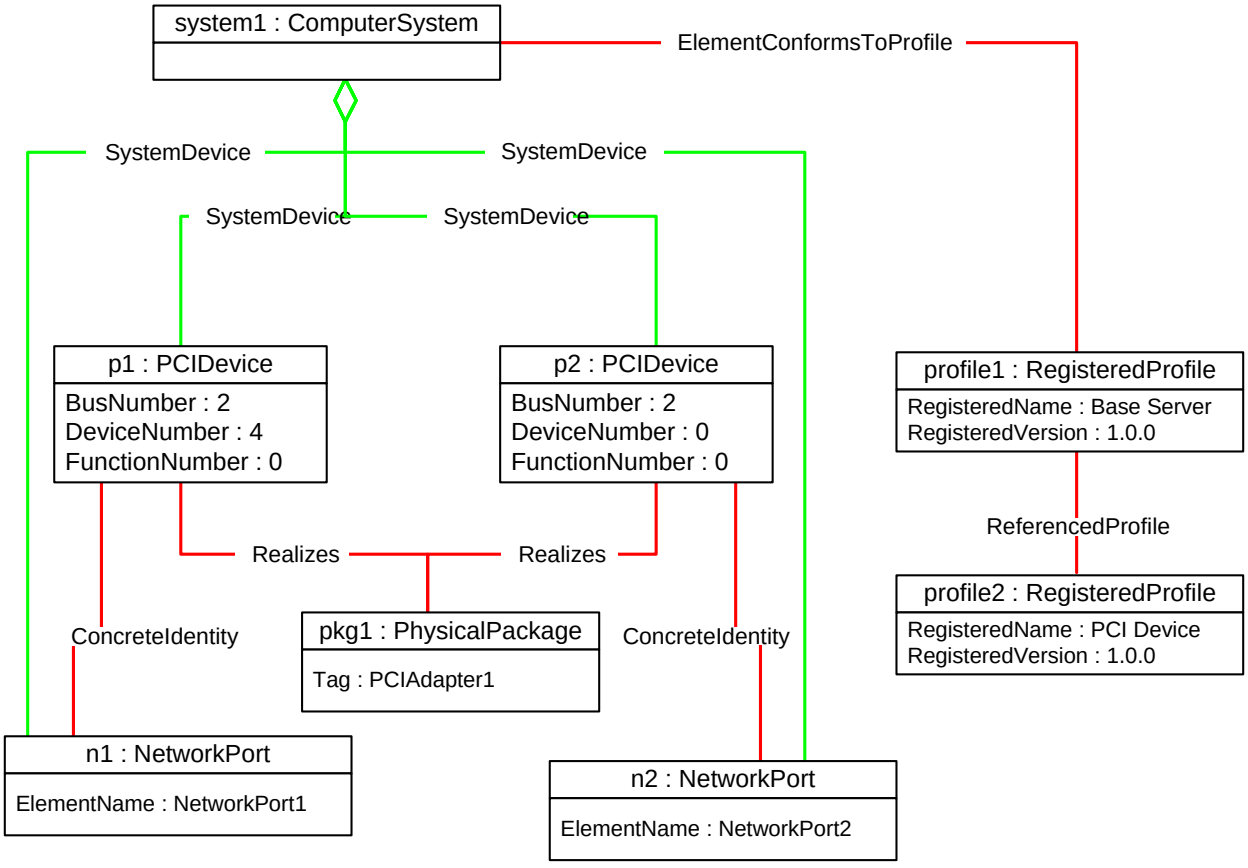
519 # 9 Use Cases

520 This section contains object diagrams and use cases for the *PCI Device Profile*.

521 ## 9.1 Object Diagrams

522 Figure 2 represents a possible instantiation of the *PCI Device Profile*. In this instantiation, the managed
523 system, system1, has two PCI devices, p1 and p2. Both PCI devices reside in bus number 2 and p1 is
524 assigned a device number 4 and p2 is assigned a device number 0. These devices are realized on
525 physical package pkg1 representing a PCI adapter. PCI devices p1 and p2 are associated to network
526 ports n1 and n2, via the LogicalIndentity association.

527 For simplicity, the prefix CIM_ has been removed from the names of the classes in the figure.



528

529 **Figure 2 – PCI Device Profile: Object Diagram**

Figure 3 represents a possible instantiation of the *PCI Device Profile* representing PCI devices connected to a PCI-to-PCI bridge. In this instantiation, PCI port groups bus1 and bus2 are collections of PCI ports representing PCI bus 1 and bus 2.

PCI bridge p0 is connected to PCI port group bus1 using PCI port l1 via the ControlledBy and MemberOfCollection associations. PCI device p1 is connected to PCI port group bus1 using PCI port l2 via the ControlledBy and MemberOfCollection associations. PCI bridge p0 and PCI device p1 reside in PCI bus 1.

PCI bridge p0 has a SecondaryBusNumber value of 2 indicating that this PCI-to-PCI bridge exposes PCI bus 2. PCI bridge p0 is connected to PCI port group bus2 using PCI port l3 and the ControlledBy and MemberOfCollection associations. PCI device p2 and PCI bridge p3 are connected to PCI port group bus2 using PCI ports l4 and l5 and the ControlledBy and MemberOfCollection associations. PCI device p2 and PCI bridge p3 reside in PCI bus 2.

PCI bridge p3 has a SecondaryBusNumber value of 3 indicating that this PCI-to-PCI bridge exposes PCI bus 3. PCI bridge p3 is connected to PCI port group bus3 using PCI port l6 and the ControlledBy and MemberOfCollection associations. There are no PCI devices that reside on PCI bus 3.

For simplicity, associations to CIM_ComputerSystem have been removed.

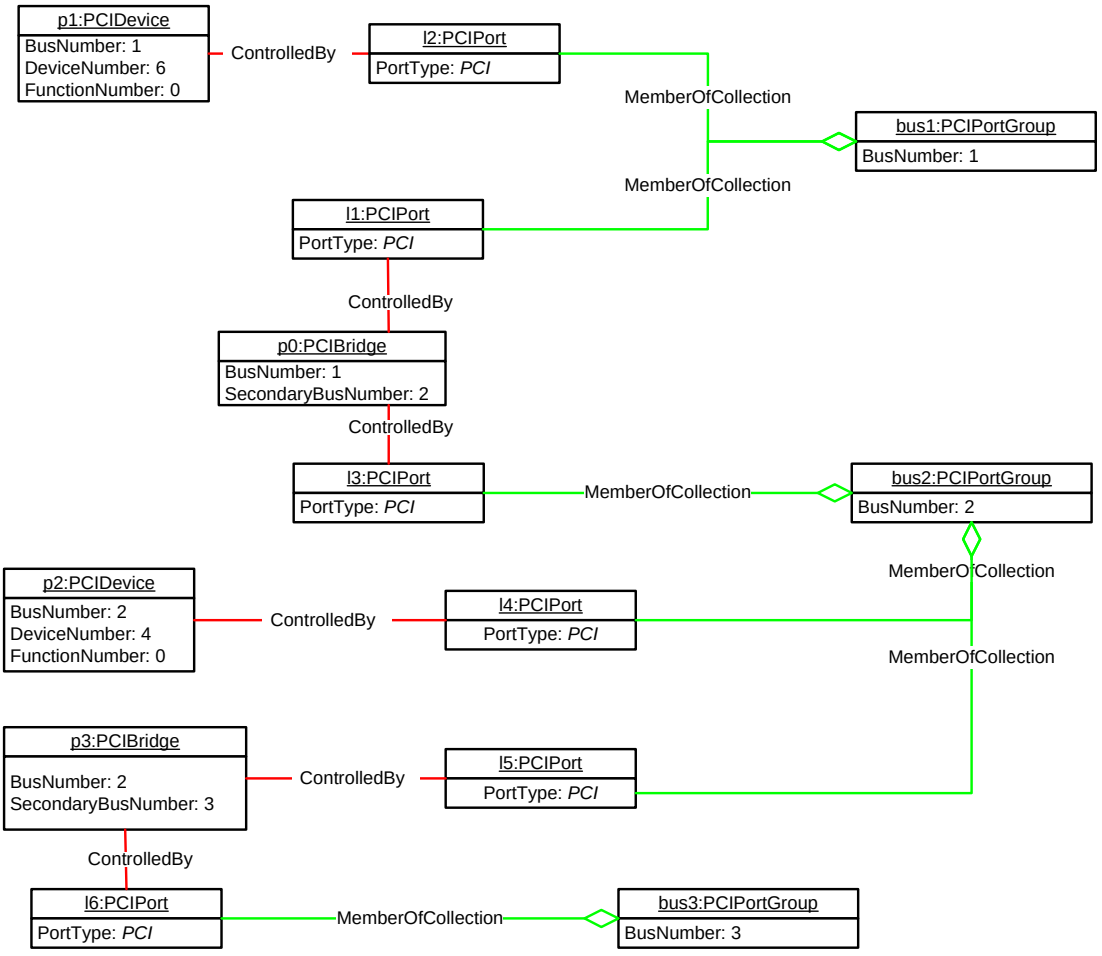
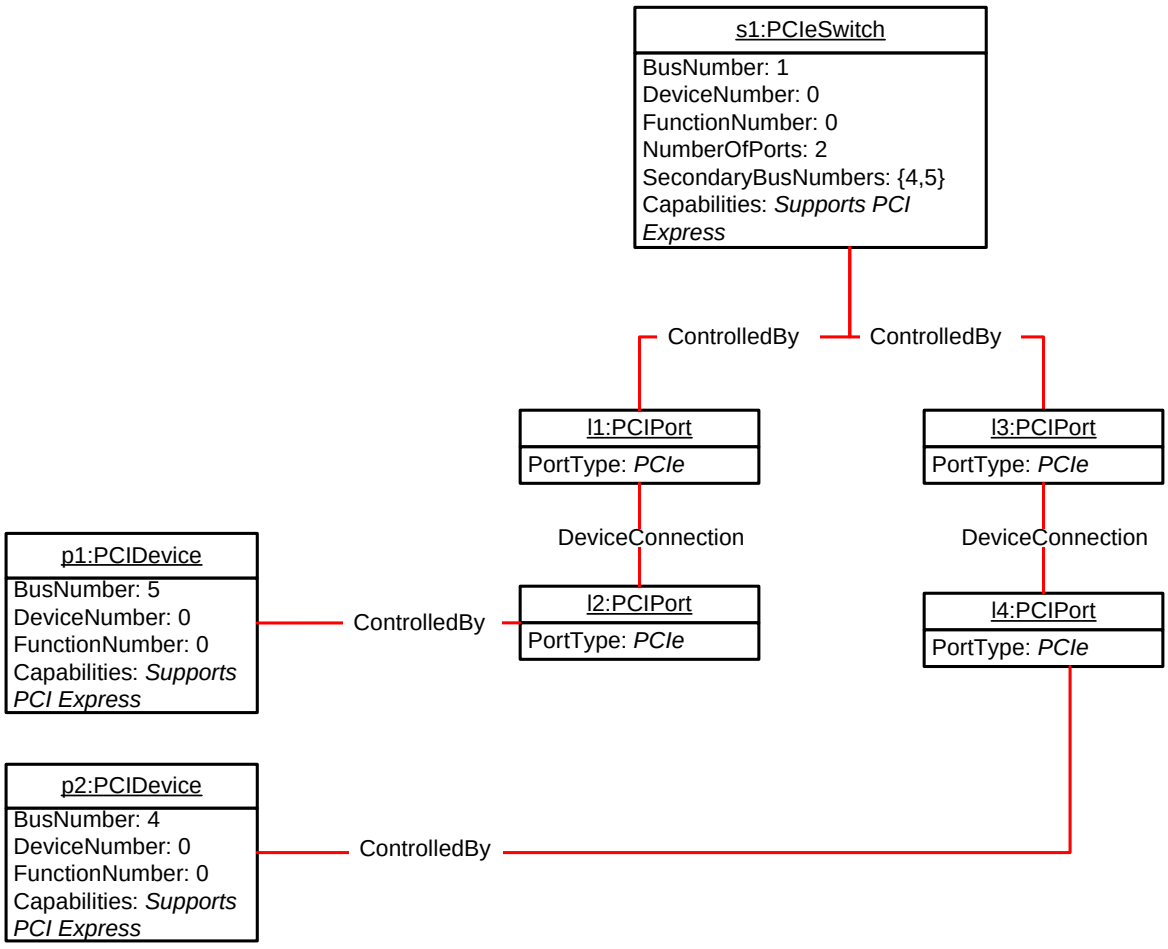


Figure 3 – PCI Device Profile: PCI Devices

548 Figure 4 shows a possible instantiation of the *PCI Device Profile* representing PCI Express devices
549 connected to a PCI Express switch. In this diagram, the PCI Express switch s1 has a BusNumber value of
550 1, indicating that this switch resides in PCI bus 1. Furthermore, PCI Express switch s1 has a
551 NumberOfPorts value of 2 and SecondaryBusNumber values of 4 and 5, indicating that this switch has
552 two ports exposing PCI bus 4 and PCI bus 5. The PCI ports exposed by this switch, l1 and l3, are
553 associated to the switch using the ControlledBy association.

554 PCI Express device p1 exposes PCI port l2, which is connected to the PCI port l1, exposed by PCI
555 Express Switch s1, using the DeviceConnection association. PCI Express device p1 has a BusNumber
556 value of 5, indicating that this device resides in PCI bus 5.

557 Similarly, PCI device p2 exposes PCI port l4, which is connected to PCI port l3, exposed by PCI Express
558 switch s1, using the DeviceConnection association. PCI Express device p2 has a BusNumber value of 4,
559 indicating that this device resides in PCI bus 4.



560

561 **Figure 4 – PCI Device Profile: PCI Express Devices**

9.2 Find PCI Devices that Are Assigned to a PCI Bus Number

A client can determine which PCI devices are assigned to a PCI bus number *n* as follows:

1) Find all of the CIM_PCIDevice instances, where the value of CIM_PCIDevice.BusNumber equals PCI bus number *n*.
2) If no matching CIM_PCIDevice instances are found, then no PCI device is assigned PCI bus number *n*.

If PCI port collections are modeled, a client can alternatively determine which PCI devices are assigned to a PCI bus number *n* as follows:

1) Find the CIM_PCIPortGroup instance where the value of CIM_PCIPortGroup.BusNumber equals PCI bus number *n*.
2) If no matching CIM_PCIPortGroup instance is found, then no PCI device is assigned PCI bus number *n*. Otherwise, find the instances of CIM_PCIPort associated to the matching instance of CIM_PCIPortGroup through instances of CIM_MemberOfCollection.
3) Find all of the PCIDevice instances associated to the matching instances of CIM_PCIPort through instances of CIM_ControlledBy.

10 CIM Elements

Table 16 shows the instances of CIM Elements for this profile. Instances of the CIM Elements shall be implemented as described in Table 16. Sections 7 ("Implementation Requirements") and 8 ("Methods") may impose additional requirements on these elements.

Table 16 – CIM Elements: PCI Device Profile

Element Name	Requirement	Description
Classes		
CIM_ConcreteIdentity	Optional	See sections 7.3 and 10.1.
CIM_ControlledBy	Conditional	See sections 7.5 and 10.2.
CIM_DeviceConnection	Optional	See sections 7.6 and 10.3.
CIM_ElementCapabilities	Conditional	See section 10.4.
CIM_EnabledLogicalElementCapabilities	Optional	See section 10.5.
CIM_HostedCollection	Conditional	See sections 7.8 and 10.6.
CIM_MemberOfCollection	Conditional	See sections 7.9 and 10.7.
CIM_PCIBridge	Optional	See sections 7.10 and 10.8.
CIM_PCIDevice	Mandatory	See sections 7.1 and 10.9.
CIM_PCIeSwitch	Optional	See sections 7.11 and 10.10.
CIM_PCIPort	Optional	See sections 7.4 and 10.11.
CIM_PCIPortGroup	Optional	See sections 7.7 and 10.12.
CIM_RegisteredProfile	Mandatory	See section 10.13.
CIM_SystemDevice	Mandatory	See sections 7.2 and 10.14.
Indications		
None defined in this profile		

10.1 CIM_ConcreteIdentity

CIM_ConcreteIdentity is used to associate an instance of CIM_LogicalDevice with an instance of CIM_PCIDevice of which the CIM_LogicalDevice instance represents an alternate aspect of the PCI device.

Table 17 – Class: CIM_ConcreteIdentity

Properties	Requirement	Notes
SameElement	Mandatory	**Key:** Shall reference the CIM_LogicalDevice instance which represents an alternate aspect of the CIM_PCIDevice instance. Cardinality is "*".
SystemElement	Mandatory	**Key:** Shall reference the CIM_PCIDevice instance. Cardinality is "*".

10.2 CIM_ControlledBy

CIM_ControlledBy is used to associate an instance of CIM_PCIPort with the instance of CIM_PCIDevice of which the CIM_PCIPort instance is a member.

Table 18 – Class: CIM_ControlledBy

Properties	Requirement	Notes
Antecedent	Mandatory	**Key:** Shall reference the CIM_PCIDevice instance of which the CIM_PCIPort instance is a member. Cardinality is "1".
Dependent	Mandatory	**Key:** Shall reference the CIM_PCIPort instance. Cardinality is "*".

10.3 CIM_DeviceConnection

CIM_DeviceConnection is used to associate an instance of CIM_PCIPort with another instance of CIM_PCIPort representing ports that are connected.

Table 19 – CIM_DeviceConnection

Properties	Requirement	Notes
Antecedent	Mandatory	**Key:** Shall reference the CIM_PCIPort instance that is connected to the Dependent CIM_PCIPort. Cardinality is "0..1".
Dependent	Mandatory	**Key:** Shall reference the CIM_PCIPort instance that is connected to the Antecedent CIM_PCIPort. Cardinality is "0..1".

10.4 CIM_ElementCapabilities

CIM_ElementCapabilities is used to associate a CIM_PCIDevice instance with an instance of CIM_EnabledLogicalElementCapabilities that describes the capabilities of the CIM_PCIDevice instance. CIM_ElementCapabilities is mandatory if the CIM_EnabledLogicalElementCapabilities instance is instantiated.

Table 20 – CIM_ElementCapabilities

Properties	Requirement	Notes
ManagedElement	Mandatory	**Key**: Shall reference the PCIDevice instance Cardinality is "*".
Capabilities	Mandatory	**Key**: Shall reference the instance of CIM_EnabledLogicalElementCapabilities Cardinality is "0..1".

10.5 CIM_EnabledLogicalElementCapabilities

CIM_EnabledLogicalElementCapabilities represents the capabilities of the enabled logical element.

Table 21 – CIM_EnabledLogicalElementCapabilities

Properties	Requirement	Notes
InstanceID	Mandatory	**Key**
RequestedStatesSupported	Mandatory	
ElementNameEditSupported	Mandatory	
MaxElementNameLen	Conditional	
ElementNameMask	Conditional	

10.6 CIM_HostedCollection

CIM_HostedCollection is used to associate an instance of CIM_PCIPortGroup with the instance of CIM_ComputerSystem of which the CIM_PCIPortGroup instance is a member.

Table 22 – CIM_HostedCollection

Properties	Requirement	Notes
Antecedent	Mandatory	**Key:** Shall reference the CIM_ComputerSystem instance of which the CIM_PCIPortGroup instance is a member. Cardinality is "1".
Dependent	Mandatory	**Key:** Shall reference the CIM_PCIPortGroup instance. Cardinality is "*".

10.7 CIM_MemberOfCollection

CIM_MemberOfCollection is used to associate an instance of CIM_PCIPort with the instance of CIM_PCIPortGroup of which the CIM_PCIPort instance is a member.

Table 23 – Class: CIM_MemberOfCollection

Properties	Notes	Description
Collection	Mandatory	**Key:** Shall reference the CIM_PCIPortGroup instance of which the CIM_PCIPort instance is a member. Cardinality is "0..1".
Member	Mandatory	**Key:** Shall reference the CIM_PCIPort instance. Cardinality is "1..*".

10.8 CIM_PCIBridge

CIM_PCIBridge is used to represent a PCI device that provides the capability to bridge two PCI busses.

Table 24 – Class: CIM_PCIBridge

Properties and Methods	Requirement	Description
SystemCreationClassName	Mandatory	**Key**
SystemName	Mandatory	**Key**
CreationClassName	Mandatory	**Key**
DeviceID	Mandatory	**Key**
BridgeType	Mandatory	See section 7.10.1.
SecondaryBusNumber	Optional	See section 7.10.3.
SubordinateBusNumber	Optional	See section 7.10.2.
BusNumber	Mandatory	See section 7.1.1.
DeviceNumber	Mandatory	See section 7.1.2.
FunctionNumber	Mandatory	See section 7.1.3.
Capabilities	Optional	See section 7.1.4.
ElementName	Mandatory	Shall be formatted as a free-form string of variable length (pattern ".*")
EnabledState	Mandatory	See section 7.12.
RequestedState	Mandatory	See section 7.12.
AvailableRequestedStates	Optional	
TransitioningToState	Optional	See section 7.12.
PrimaryStatus	Mandatory	
HealthState	Mandatory	
RequestedStateChange( )	Conditional	

10.9 CIM_PCIDevice

CIM_PCIDevice is used to represent a PCI device.

Table 25 – Class: CIM_PCIDevice

Properties and Methods	Requirement	Description
SystemCreationClassName	Mandatory	**Key**
SystemName	Mandatory	**Key**
CreationClassName	Mandatory	**Key**
DeviceID	Mandatory	**Key**
BusNumber	Mandatory	See section 7.1.1.
DeviceNumber	Mandatory	See section 7.1.2.
FunctionNumber	Mandatory	See section 7.1.3.
Capabilities	Optional	See section 7.1.4.
SubsystemID	Optional	See section 7.1.5.
SubsystemVendorID	Optional	See section 7.1.6.
PCIDeviceID	Optional	See section 7.1.7.
VendorID	Optional	See section 7.1.8.
RevisionID	Optional	See section 7.1.9.
ElementName	Mandatory	Shall be formatted as a free-form string of variable length (pattern ".*")
EnabledState	Mandatory	See section 7.12.
RequestedState	Mandatory	See section 7.12.
AvailableRequestedStates	Optional	
TransitioningToState	Optional	See section 7.12.
PrimaryStatus	Mandatory	
HealthState	Mandatory	
RequestedStateChange( )	Conditional	

10.10 CIM_PCIeSwitch

CIM_PCIeSwitch is used to represent a device that provides PCI Express switch capability.

Table 26 – Class: CIM_PCIeSwitch

Properties and Methods	Requirement	Description
SystemCreationClassName	Mandatory	**Key**
SystemName	Mandatory	**Key**
CreationClassName	Mandatory	**Key**
DeviceID	Mandatory	**Key**
NumberOfPorts	Optional	See section 7.11.1.
SecondaryBusNumbers	Optional	See section 7.11.2.
BusNumber	Mandatory	See section 7.1.1.
DeviceNumber	Mandatory	See section 7.1.2.
FunctionNumber	Mandatory	See section 7.1.3.

Properties and Methods	Requirement	Description
Capabilities	Optional	See section 7.1.4.
ElementName	Mandatory	Shall be formatted as a free-form string of variable length (pattern ".*")
EnabledState	Mandatory	See section 7.12.
RequestedState	Mandatory	See section 7.12.
AvailableRequestedStates	Optional	
TransitioningToState	Optional	See section 7.12.
PrimaryStatus	Mandatory	
HealthState	Mandatory	
RequestedStateChange( )	Conditional	

10.11 CIM_PCIPort

CIM_PCIPort is used to represent PCI device ports.

Table 27 – Class: CIM_PCIPort

Properties and Methods	Requirement	Description
SystemCreationClassName	Mandatory	**Key**
SystemName	Mandatory	**Key**
CreationClassName	Mandatory	**Key**
DeviceID	Mandatory	**Key**
PortType	Mandatory	See section 7.4.1.
OtherPortType	Conditional	See section 7.4.2.
ElementName	Mandatory	Shall be formatted as a free-form string of variable length (pattern ".*")
EnabledState	Mandatory	This property shall match 2 (Enabled).
RequestedState	Mandatory	This property shall match 12 (Not Applicable).

10.12 CIM_PCIPortGroup

CIM_PCIPortGroup is used to represent the aggregation of PCI ports.

Table 28 – Class: CIM_PCIPortGroup

Properties and Methods	Requirement	Description
InstanceID	Mandatory	**Key**
BusNumber	Mandatory	See section 7.7.1.
ElementName	Mandatory	Shall be formatted as a free-form string of variable length (pattern ".*")

10.13 CIM_RegisteredProfile

The CIM_RegisteredProfile class is defined by the *Profile Registration Profile*. The requirements denoted in Table 29 are in addition to those mandated by the *Profile Registration Profile*.

Table 29 – Class: CIM_RegisteredProfile

Properties	Requirement	Description
RegisteredName	Mandatory	This property shall have a value of “PCI Device”.
RegisteredVersion	Mandatory	This property shall have a value of “1.0.0”.
RegisteredOrganization	Mandatory	This property shall have a value of 2 (DMTF).

10.14 CIM_SystemDevice

CIM_SystemDevice is used to associate an instance of CIM_PCIDevice or CIM_PCIPort with the instance of CIM_ComputerSystem of which the CIM_PCIDevice or CIM_PCIPort instance is a member.

Table 30 – Class: CIM_SystemDevice

Properties	Requirement	Description
GroupComponent	Mandatory	**Key:** Shall reference the CIM_ComputerSystem instance of which the CIM_PCIDevice or CIM_PCIPort instance is a member Cardinality is “1”.
PartComponent	Mandatory	**Key:** Shall reference the CIM_PCIDevice instance Cardinality is “*”. Or Shall reference the CIM_PCIPort instance. Cardinality is “*”.

ANNEX A
(informative)

Change Log

Version	Date	Description
1.0.0b	09/06/2007	Preliminary Standard
1.0.0	06/16/2009	DMTF Standard Release