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129

## Foreword

130 The *PCI Device Profile* (DSP1075) was prepared by the Server Management Working Group and  
131 Physical Platform Profiles Working Group of the DMTF.

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148

## Introduction

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

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

155

# PCI Device Profile

## 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.

## 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.

### 2.1 Approved References

166 DMTF DSP0004, *CIM Infrastructure Specification 2.3*,  
167 [http://www.dmtf.org/standards/published\\_documents/DSP0004\\_2.3.pdf](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](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](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](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](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](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](http://www.dmtf.org/standards/published_documents/DSP1080_1.0.pdf)

### 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>

## 3 Terms and Definitions

186 For the purposes of this document, the following terms and definitions apply.

- 187 **3.1**  
188 **can**  
189 used for statements of possibility and capability, whether material, physical, or causal
- 190 **3.2**  
191 **cannot**  
192 used for statements of possibility and capability, whether material, physical, or causal
- 193 **3.3**  
194 **conditional**  
195 indicates requirements to be followed strictly in order to conform to the document when the specified  
196 conditions are met
- 197 **3.4**  
198 **mandatory**  
199 indicates requirements to be followed strictly in order to conform to the document and from which no  
200 deviation is permitted
- 201 **3.5**  
202 **may**  
203 indicates a course of action permissible within the limits of the document
- 204 **3.6**  
205 **need not**  
206 indicates a course of action permissible within the limits of the document
- 207 **3.7**  
208 **optional**  
209 indicates a course of action permissible within the limits of the document
- 210 **3.8**  
211 **referencing profile**  
212 indicates a profile that owns the definition of this class and can include a reference to this profile in its  
213 "Related Profiles" table
- 214 **3.9**  
215 **shall**  
216 indicates requirements to be followed strictly in order to conform to the document and from which no  
217 deviation is permitted
- 218 **3.10**  
219 **shall not**  
220 indicates requirements to be followed strictly in order to conform to the document and from which no  
221 deviation is permitted
- 222 **3.11**  
223 **should**  
224 indicates that among several possibilities, one is recommended as particularly suitable, without  
225 mentioning or excluding others, or that a certain course of action is preferred but not necessarily required
- 226 **3.12**  
227 **should not**  
228 indicates that a certain possibility or course of action is deprecated but not prohibited



- 229 **3.13**  
230 **PCI Device**  
231 indicates a logical Peripheral Component Interconnect or Peripheral Component Interconnect Express  
232 device
- 233 **3.14**  
234 **Logical PCI Device**  
235 indicates a PCI device that is represented by a PCI bus number, PCI device number, and PCI function  
236 number
- 237 **3.15**  
238 **PCI Port**  
239 indicates a PCI device port used to describe the connection between PCI devices
- 240 **3.16**  
241 **PCI Bridge**  
242 indicates a PCI device that provides the capability to connect two PCI busses
- 243 **3.17**  
244 **PCIe Switch**  
245 indicates a PCI Express switch device that provides the capability to connect multiple PCI Express  
246 devices
- 247 **3.18**  
248 **PCI Bus**  
249 indicates a bus subsystem that provides the capability to connect multiple PCI devices

## 250 **4 Symbols and Abbreviated Terms**

- 251 **4.1**  
252 **CIM**  
253 Common Information Model
- 254 **4.2**  
255 **PCI**  
256 Peripheral Component Interconnect
- 257 **4.3**  
258 **PCIe**  
259 Peripheral Component Interconnect Express

## 260 **5 Synopsis**

- 261 **Profile Name:** PCI Device  
262 **Version:** 1.0.0  
263 **Organization:** DMTF  
264 **CIM Schema Version:** 2.22  
265 **Specializes:** DMTF Enabled Logical Element 1.0  
266 **Central Class:** CIM\_PCIDevice  
267 **Scoping Class:** CIM\_ComputerSystem

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

270 CIM\_PCIDevice shall be the Central Class of this profile. The instances of CIM\_PCIDevice shall be the  
 271 Central Instances of this profile.

272 CIM\_ComputerSystem shall be the Scoping Class of this profile. The instance of CIM\_ComputerSystem  
 273 with which the Central Instance is associated through an instance of CIM\_SystemDevice shall be the  
 274 Scoping Instance of this profile.

275 Table 1 identifies profiles that are related to this profile.

276 **Table 1 – Related Profiles**

Profile Name	Organization	Version	Relationship
<a href="#">Physical Asset</a>	DMTF	1.0	Optional
<a href="#">Profile Registration</a>	DMTF	1.0	Mandatory
<a href="#">Enabled Logical Element</a>	DMTF	1.0	Specializes

## 277 6 Description

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

- 281 • Logical PCI device inventory.
- 282 • PCI device topology.
- 283 • Relationship of PCI devices to other PCI devices and other logical devices that provide alternate  
 284 aspects of the PCI devices.
- 285 • Configuration registers used to identify a PCI device.
- 286 • Physical manifestation of logical PCI devices.

287 Figure 1 represents the class diagram for the *PCI Device Profile*. For simplicity, the prefix CIM\_ has been  
 288 removed from the names of the classes.

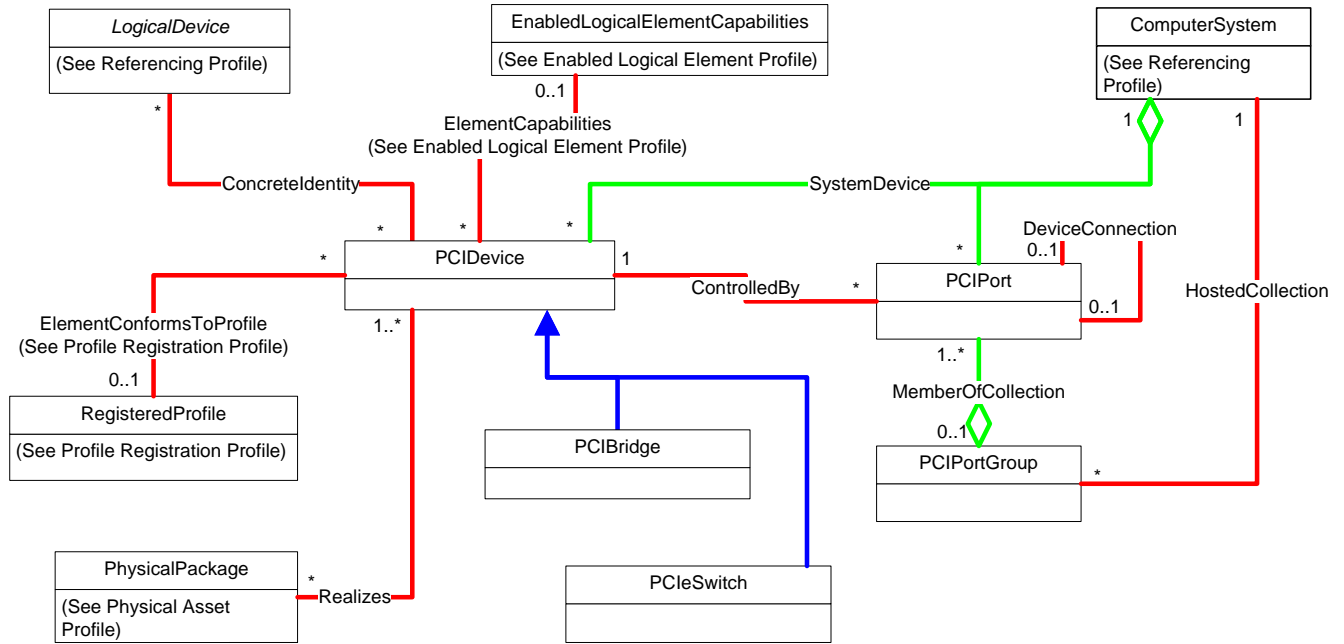
289 The PCI device in a managed system is represented by an instance of CIM\_PCIDevice, or one of its  
 290 subclasses CIM\_PCIBridge or CIM\_PCISwitch.

291 The interconnectivity between PCI devices may be described using CIM\_PCIPort and  
 292 CIM\_PCIPortGroup.

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

295 The PCI device's physical aspects can be represented by one or more instances of  
 296 CIM\_PhysicalElement.

297 The profile information is represented with the instance of CIM\_RegisteredProfile.



298

299

Figure 1 – PCI Device Profile: Class Diagram

## 300 7 Implementation Requirements

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

### 306 7.1 CIM\_PCIDevice

307 Logical PCI devices in the computer system are represented using CIM\_PCIDevice.

308 An instance of CIM\_PCIDevice should be instantiated for each PCI device in the computer system.

#### 309 7.1.1 CIM\_PCIDevice.BusNumber

310 CIM\_PCIDevice.BusNumber shall be set to the bus number where the PCI device resides. If the bus  
 311 number for this PCI device is unknown or has not been assigned, CIM\_PCIDevice.BusNumber shall not  
 312 be set.

#### 313 7.1.2 CIM\_PCIDevice.DeviceNumber

314 CIM\_PCIDevice.DeviceNumber shall be set to the device number assigned to the PCI device for this bus.  
 315 If the device number for this PCI device is unknown or has not been assigned,  
 316 CIM\_PCIDevice.DeviceNumber shall not be set.

#### 317 7.1.3 CIM\_PCIDevice.FunctionNumber

318 CIM\_PCIDevice.FunctionNumber shall be set to the function number for the PCI device.

#### 319 **7.1.4 CIM\_PCIDevice.Capabilities (Optional)**

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

#### 324 **7.1.5 CIM\_PCIDevice.SubsystemID (Optional)**

325 CIM\_PCIDevice.SubsystemID should be set to the Subsystem ID for the PCI device, as described in the  
326 configuration registers for the PCI device.

#### 327 **7.1.6 CIM\_PCIDevice.SubsystemVendorID (Optional)**

328 CIM\_PCIDevice.SubsystemVendorID should be set to the Subsystem Vendor ID for the PCI device, as  
329 described in the configuration registers for the PCI device.

#### 330 **7.1.7 CIM\_PCIDevice.PCIDeviceID (Optional)**

331 CIM\_PCIDevice.PCIDeviceID should be set to the PCI Device ID for the PCI device, as described in the  
332 configuration registers for the PCI device.

#### 333 **7.1.8 CIM\_PCIDevice.VendorID (Optional)**

334 CIM\_PCIDevice.VendorID should be set to the Vendor ID for the PCI device, as described in the  
335 configuration registers for the PCI device.

#### 336 **7.1.9 CIM\_PCIDevice.RevisionID (Optional)**

337 CIM\_PCIDevice.SubsystemRevisionID should be set to the Revision ID for the PCI device, as described  
338 in the configuration registers for the PCI device.

### 339 **7.2 CIM\_SystemDevice**

340 CIM\_SystemDevice is used to associate an instance of CIM\_PCIDevice or CIM\_PCIPort with the instance  
341 of CIM\_ComputerSystem of which the CIM\_PCIDevice or CIM\_PCIPort instance is a member.

342 There shall be an instance of CIM\_SystemDevice for each instance of CIM\_PCIDevice and CIM\_PCIPort.

### 343 **7.3 CIM\_ConcretelDentity (Optional)**

344 CIM\_ConcretelDentity is used to associate an instance of CIM\_LogicalDevice with an instance of  
345 CIM\_PCIDevice of which the CIM\_LogicalDevice instance represents an alternate aspect of the PCI  
346 device.

347 For each CIM\_PCIDevice instance, there may be instances of CIM\_ConcretelDentity for each instance of  
348 CIM\_LogicalDevice that represents an alternate aspect of the CIM\_PCIDevice instance.

### 349 **7.4 CIM\_PCIPort (Optional)**

350 PCI device ports are modeled using CIM\_PCIPort. Modeling of PCI device ports is optional.

351 If PCI device ports are modeled, there should be one or more instances of CIM\_PCIPort for each PCI  
352 device port exposed for each PCI device.

#### 353 **7.4.1 CIM\_PCIPort.PortType**

354 CIM\_PCIPort.PortType shall be set to a value representing the type of port connection for the PCI device.

#### 355 **7.4.2 CIM\_PCIPort.OtherPortType (Conditional)**

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

#### 358 **7.5 CIM\_ControlledBy (Conditional)**

359 CIM\_ControlledBy is used to associate an instance of CIM\_PCIDevice with an instance of CIM\_PCIPort  
360 representing the connection exposed by the PCI device.

361 If PCI device ports are modeled, there shall be an instance of CIM\_ControlledBy for each instance of  
362 CIM\_PCIPort.

#### 363 **7.6 CIM\_DeviceConnection (Optional)**

364 CIM\_DeviceConnection is used to associate an instance of CIM\_PCIPort with another instance of  
365 CIM\_PCIPort representing ports that are connected.

366 There may be an instance of CIM\_DeviceConnection for each instance of CIM\_PCIPort connected to  
367 another instance of CIM\_PCIPort.

#### 368 **7.7 CIM\_PCIPortGroup (Optional)**

369 The collection of PCI device ports on a single PCI bus is modeled using CIM\_PCIPortGroup. Modeling  
370 PCI port collections is optional.

371 If PCI port collections are modeled, there shall be one or more instances of CIM\_PCIPortGroup  
372 representing the aggregation of PCI ports for each PCI bus.

##### 373 **7.7.1 CIM\_PCIPortGroup.BusNumber**

374 CIM\_PCIPortGroup.BusNumber shall be set to the bus number shared by the PCI or PCI Express device  
375 ports.

#### 376 **7.8 CIM\_HostedCollection (Conditional)**

377 CIM\_HostedCollection is used to associate an instance of CIM\_PCIPortGroup with the instance of  
378 CIM\_ComputerSystem of which the CIM\_PCIPortGroup instance is a member.

379 If any instances of CIM\_PCIPortGroup exist, there shall be an instance of CIM\_HostedCollection for each  
380 instance of CIM\_PCIPortGroup.

#### 381 **7.9 CIM\_MemberOfCollection (Conditional)**

382 CIM\_MemberOfCollection is used to associate an instance of CIM\_PCIPort with an instance of  
383 CIM\_PCIPortGroup of which the CIM\_PCIPort instance is a member.

384 If any instances of CIM\_PCIPortGroup exist, there shall be an instance of CIM\_MemberOfCollection for  
385 each instance of CIM\_PCIPort that is aggregated by an instance of CIM\_PCIPortGroup for a PCI bus.

#### 386 **7.10 CIM\_PCIBridge (Optional)**

387 PCI devices that provide the capability to bridge two PCI busses are modeled using CIM\_PCIBridge.  
388 Modeling of these devices is optional.

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

### 391 7.10.1 CIM\_PCIBridge.BridgeType

392 CIM\_PCIBridge.BridgeType shall be set to a value representing the type of bridge capability supported by  
393 the PCI bridge.

### 394 7.10.2 CIM\_PCIBridge.SubordinateBusNumber (Optional)

395 CIM\_PCIBridge.SubordinateBusNumber should be set to the highest bus number that exists behind the  
396 bridge.

### 397 7.10.3 CIM\_PCIBridge.SecondaryBusNumber (Optional)

398 CIM\_PCIBridge.SecondaryBusNumber should be set to the bus number to which the secondary interface  
399 is connected.

## 400 7.11 CIM\_PClSwitch (Optional)

401 PCI Express switches are modeled using CIM\_PClSwitch. Modeling of PCI Express switches is optional.

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

### 404 7.11.1 CIM\_PClSwitch.NumberOfPorts (Optional)

405 CIM\_PClSwitch.SubordinateBusNumber should be set to the number of ports exposed by this switch.

### 406 7.11.2 CIM\_PClSwitch.SecondaryBusNumbers (Optional)

407 CIM\_PClSwitch.SecondaryBusNumbers should contain the bus numbers to which the secondary  
408 interfaces of the switch are connected.

## 409 7.12 Interpretation of State

410 This clause details constraints related to the interpretation of states specific to modeling PCI devices.  
411 These constraints are in addition to those specified for state management in [DSP1080](#).

412 NOTE: When a PCI device is in a D3<sub>Hot</sub> state, it does not generate interrupts or participate in bus transactions. Refer  
413 to PCI 2.3, PCI-X 2.0 or PCI Express 2.0 specifications for more information regarding PCI device Power  
414 Management states.

### 415 7.12.1 Enabled State

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

418 Table 2 describes the mapping between values of the EnabledState property and the corresponding  
419 description of the state of the PCI device. Additional values have the semantics defined in [DSP1080](#).

420

**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 <sub>Hot</sub> state.

421 **7.12.2 Requested State Transitions**

422 The CIM\_PCIDevice.RequestedState property may have one the following values: 2 (Enabled), 3  
 423 (Disabled), 0 (Unknown), or 9 (Quiesce).

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

426 **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 <sub>Hot</sub> state was received.

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

429 **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 <sub>Hot</sub> state

430 **7.12.3 Representing In Progress Transitions**

431 The CIM\_PCIDevice.TransitioningToState property may have one the following values: 2 (Enabled), 3  
 432 (Disabled), or 9 (Quiesce).

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

435 **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 <sub>Hot</sub> state.

436 **7.12.4 Representing Available Requested States**

437 The CIM\_EnabledLogicalElementCapabilities.RequestedStatesSupported property may contain zero or  
 438 more of the following values: 2 (Enabled), 3 (Disabled), or 9 (Quiesce).

439 **8 Methods**

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

442 **8.1 Profile Conventions for Operations**

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

445 The default list of operations is as follows:

- 446 • GetInstance
- 447 • Associators
- 448 • AssociatorNames
- 449 • References
- 450 • ReferenceNames
- 451 • EnumerateInstances
- 452 • EnumerateInstanceNames

453 **8.2 CIM\_ConcreteIdentity Operations**

454 Table 6 lists implementation requirements for operations. If implemented, these operations shall be  
 455 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 6, all operations in  
 456 the default list in 8.1 shall be implemented as defined in [DSP0200](#).

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

458 **Table 6 – CIM\_ConcreteIdentity Operations**

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

459 **8.3 CIM\_ControlledBy Operations**

460 Table 7 lists implementation requirements for operations. If implemented, these operations shall be  
 461 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 7, all operations in  
 462 the default list in 8.1 shall be implemented as defined in [DSP0200](#).

463 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

495 **8.9 CIM\_PCIBridge Operations**

496 All operations are supported as for CIM\_EnabledLogicalElement in the [Enabled Logical Element Profile](#).

497 **8.10 CIM\_PCIDevice Operations**

498 All operations are supported as for CIM\_EnabledLogicalElement in the [Enabled Logical Element Profile](#).

499 **8.11 CIM\_PClSwitch Operations**

500 All operations are supported as for CIM\_EnabledLogicalElement in the [Enabled Logical Element Profile](#).

501 **8.12 CIM\_PCIPort Operations**

502 Table 13 lists implementation requirements for operations. If implemented, these operations shall be  
 503 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 13, all operations  
 504 in the default list in 8.1 shall be implemented as defined in [DSP0200](#).

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

506 **Table 13 – CIM\_PCIPort Operations**

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

507 **8.13 CIM\_PCIPortGroup Operations**

508 Table 14 lists implementation requirements for operations. If implemented, these operations shall be  
 509 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 14, all operations  
 510 in the default list in 8.1 shall be implemented as defined in [DSP0200](#).

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

512 **Table 14 – CIM\_PCIPortGroup Operations**

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

513 **8.14 CIM\_SystemDevice Operations**

514 Table 15 lists implementation requirements for operations. If implemented, these operations shall be  
 515 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 15, all operations  
 516 in the default list in 8.1 shall be implemented as defined in [DSP0200](#).

517 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

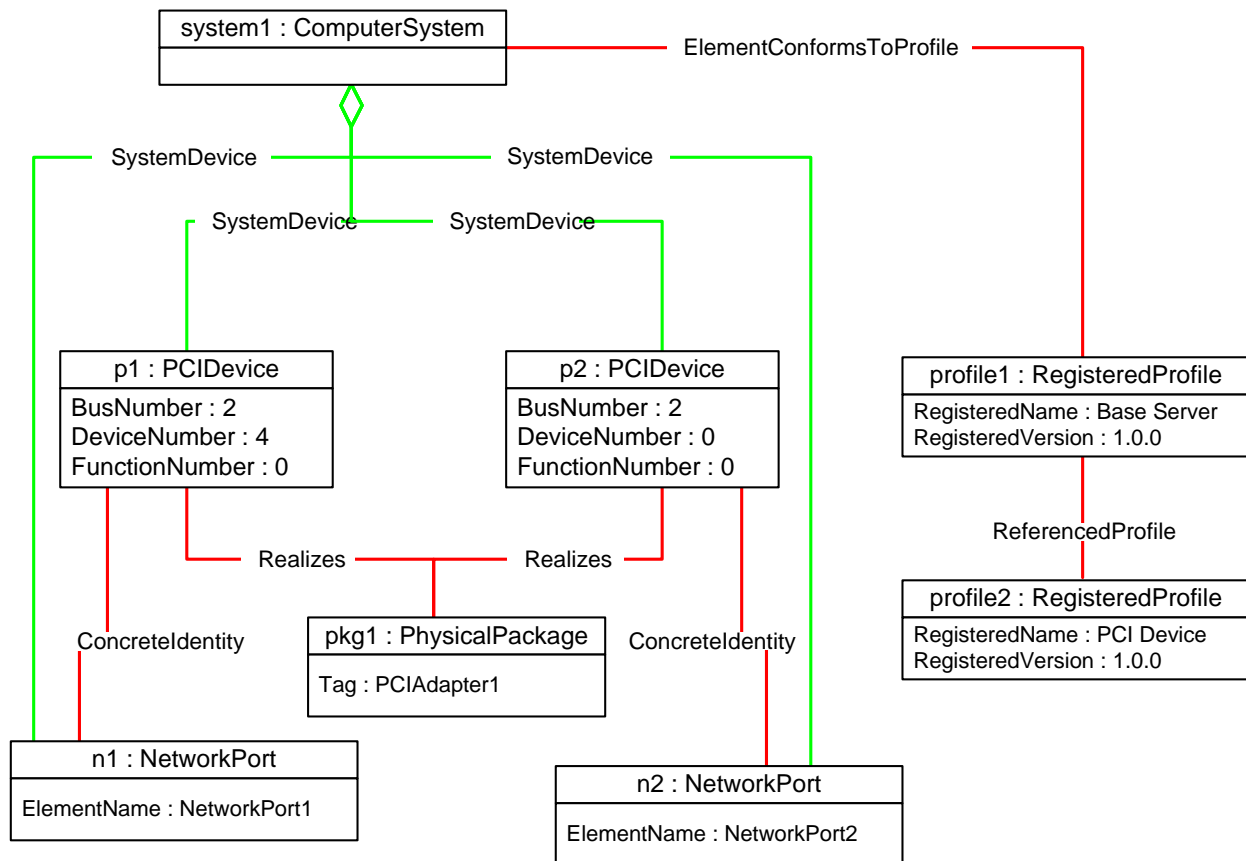
519 **9 Use Cases**

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 LogicalIdentity 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**

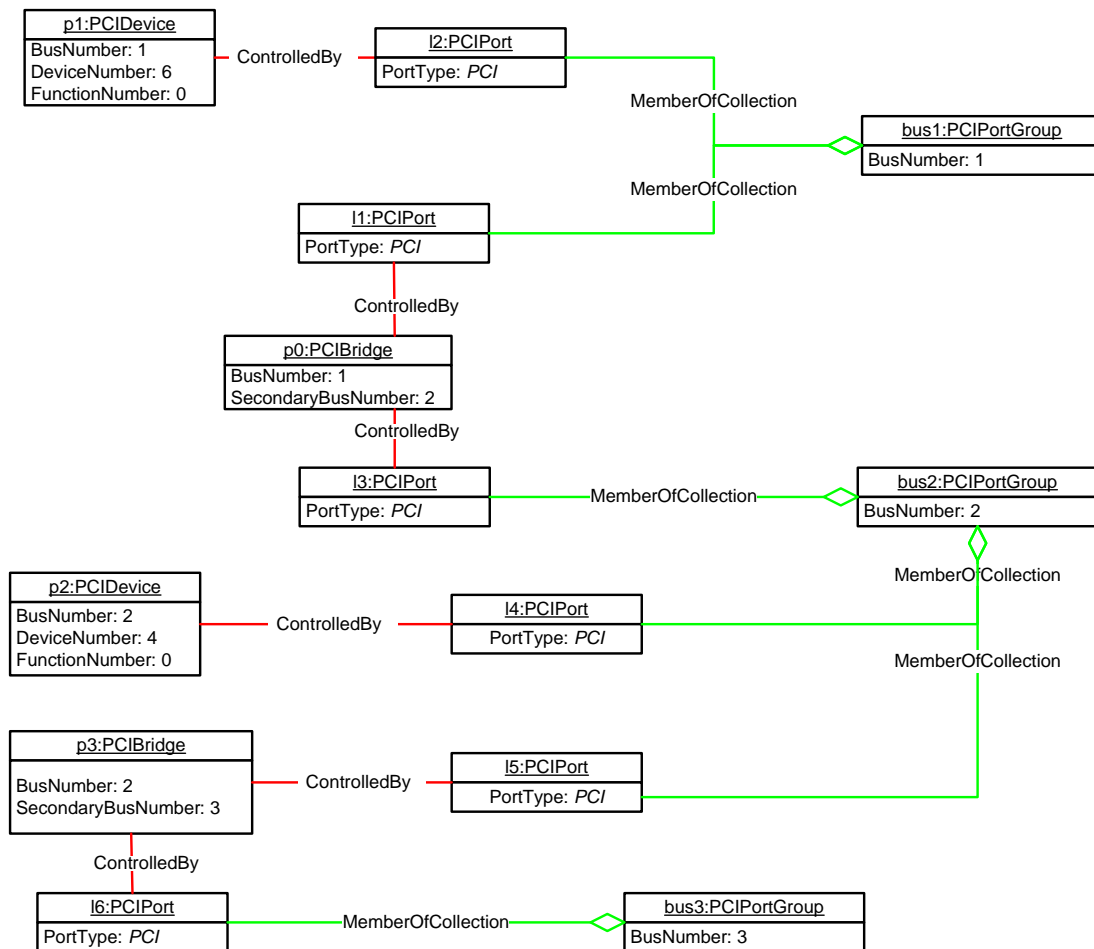
530 Figure 3 represents a possible instantiation of the *PCI Device Profile* representing PCI devices connected  
 531 to a PCI-to-PCI bridge. In this instantiation, PCI port groups bus1 and bus2 are collections of PCI ports  
 532 representing PCI bus 1 and bus 2.

533 PCI bridge p0 is connected to PCI port group bus1 using PCI port I1 via the ControlledBy and  
 534 MemberOfCollection associations. PCI device p1 is connected to PCI port group bus1 using PCI port I2  
 535 via the ControlledBy and MemberOfCollection associations. PCI bridge p0 and PCI device p1 reside in  
 536 PCI bus 1.

537 PCI bridge p0 has a SecondaryBusNumber value of 2 indicating that this PCI-to-PCI bridge exposes PCI  
 538 bus 2. PCI bridge p0 is connected to PCI port group bus2 using PCI port I3 and the ControlledBy and  
 539 MemberOfCollection associations. PCI device p2 and PCI bridge p3 are connected to PCI port group  
 540 bus2 using PCI ports I4 and I5 and the ControlledBy and MemberOfCollection associations. PCI device  
 541 p2 and PCI bridge p3 reside in PCI bus 2.

542 PCI bridge p3 has a SecondaryBusNumber value of 3 indicating that this PCI-to-PCI bridge exposes PCI  
 543 bus 3. PCI bridge p3 is connected to PCI port group bus3 using PCI port I6 and the ControlledBy and  
 544 MemberOfCollection associations. There are no PCI devices that reside on PCI bus 3.

545 For simplicity, associations to CIM\_ComputerSystem have been removed.



546

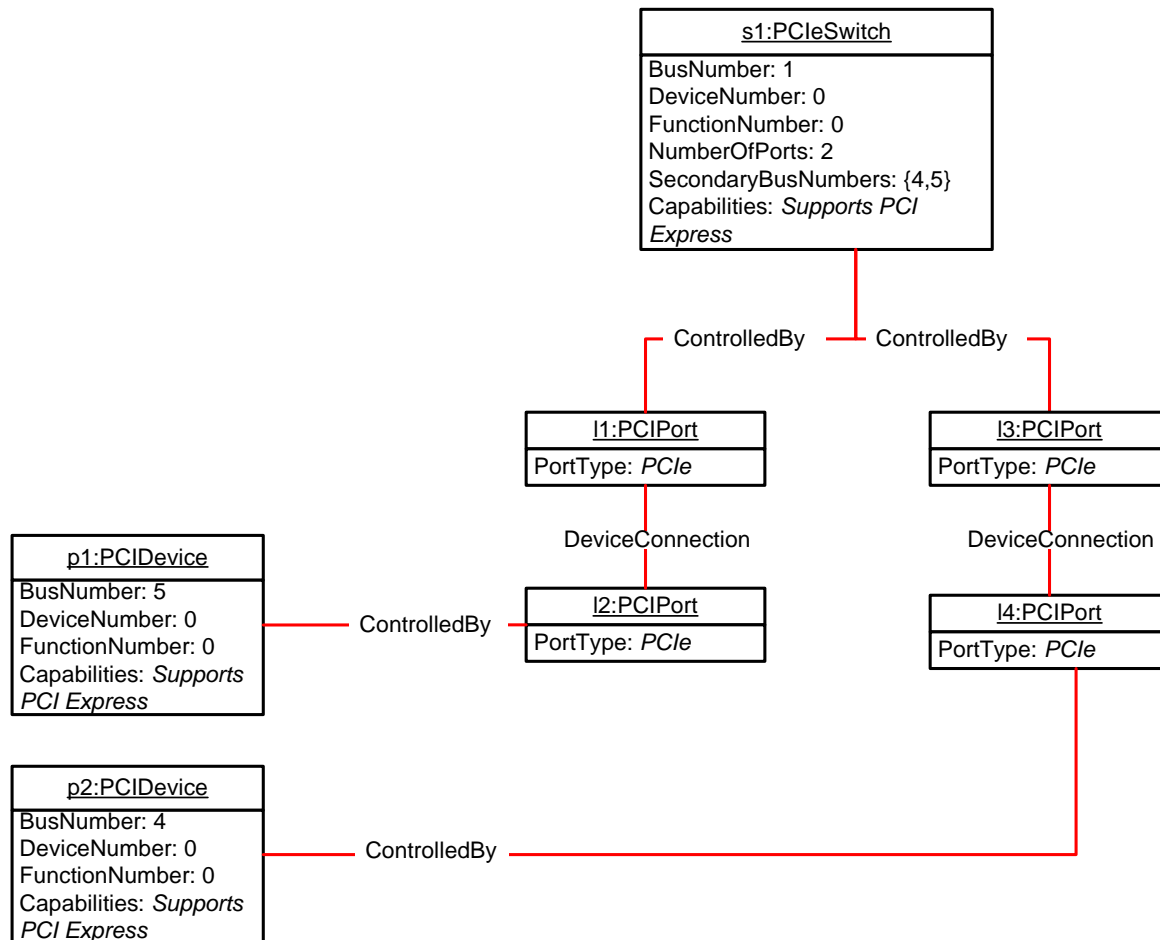
547

**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 SecondaryBusNumbers 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, I1 and I3, are  
 553 associated to the switch using the ControlledBy association.

554 PCI Express device p1 exposes PCI port I2, which is connected to the PCI port I1, 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 I4, which is connected to PCI port I3, 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**

562 **9.2 Find PCI Devices that Are Assigned to a PCI Bus Number**

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

- 564 1) Find all of the CIM\_PCIDevice instances, where the value of CIM\_PCIDevice.BusNumber  
565 equals PCI bus number *n*.
- 566 2) If no matching CIM\_PCIDevice instances are found, then no PCI device is assigned PCI bus  
567 number *n*.

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

- 570 1) Find the CIM\_PCIPortGroup instance where the value of CIM\_PCIPortGroup.BusNumber  
571 equals PCI bus number *n*.
- 572 2) If no matching CIM\_PCIPortGroup instance is found, then no PCI device is assigned PCI bus  
573 number *n*. Otherwise, find the instances of CIM\_PCIPort associated to the matching instance of  
574 CIM\_PCIPortGroup through instances of CIM\_MemberOfCollection.
- 575 3) Find all of the PCIDevice instances associated to the matching instances of CIM\_PCIPort  
576 through instances of CIM\_ControlledBy.

577 **10 CIM Elements**

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

581 **Table 16 – CIM Elements: PCI Device Profile**

Element Name	Requirement	Description
<b>Classes</b>		
CIM_ConcretelDentity	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_PCISwitch	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.
<b>Indications</b>		
None defined in this profile		

582 **10.1 CIM\_ConcretelDentity**

583 CIM\_ConcretelDentity is used to associate an instance of CIM\_LogicalDevice with an instance of  
 584 CIM\_PCIDevice of which the CIM\_LogicalDevice instance represents an alternate aspect of the PCI  
 585 device.

586 **Table 17 – Class: CIM\_ConcretelDentity**

Properties	Requirement	Notes
SameElement	Mandatory	<b>Key:</b> Shall reference the CIM_LogicalDevice instance which represents an alternate aspect of the CIM_PCIDevice instance. Cardinality is “*”.
SystemElement	Mandatory	<b>Key:</b> Shall reference the CIM_PCIDevice instance. Cardinality is “*”.

587 **10.2 CIM\_ControlledBy**

588 CIM\_ControlledBy is used to associate an instance of CIM\_PCIPort with the instance of CIM\_PCIDevice  
 589 of which the CIM\_PCIPort instance is a member.

590 **Table 18 – Class: CIM\_ControlledBy**

Properties	Requirement	Notes
Antecedent	Mandatory	<b>Key:</b> Shall reference the CIM_PCIDevice instance of which the CIM_PCIPort instance is a member. Cardinality is “1”.
Dependent	Mandatory	<b>Key:</b> Shall reference the CIM_PCIPort instance. Cardinality is “*”.

591 **10.3 CIM\_DeviceConnection**

592 CIM\_DeviceConnection is used to associate an instance of CIM\_PCIPort with another instance of  
 593 CIM\_PCIPort representing ports that are connected.

594 **Table 19 – CIM\_DeviceConnection**

Properties	Requirement	Notes
Antecedent	Mandatory	<b>Key:</b> Shall reference the CIM_PCIPort instance that is connected to the Dependent CIM_PCIPort. Cardinality is “0..1”.
Dependent	Mandatory	<b>Key:</b> Shall reference the CIM_PCIPort instance that is connected to the Antecedent CIM_PCIPort. Cardinality is “0..1”.



595 **10.4 CIM\_ElementCapabilities**

596 CIM\_ElementCapabilities is used to associate a CIM\_PCIDevice instance with an instance of  
 597 CIM\_EnabledLogicalElementCapabilities that describes the capabilities of the CIM\_PCIDevice instance.  
 598 CIM\_ElementCapabilities is mandatory if the CIM\_EnabledLogicalElementCapabilities instance is  
 599 instantiated.

600 **Table 20 – CIM\_ElementCapabilities**

Properties	Requirement	Notes
ManagedElement	Mandatory	<b>Key:</b> Shall reference the PCIDevice instance Cardinality is “**”.
Capabilities	Mandatory	<b>Key:</b> Shall reference the instance of CIM_EnabledLogicalElementCapabilities Cardinality is “0..1”.

601 **10.5 CIM\_EnabledLogicalElementCapabilities**

602 CIM\_EnabledLogicalElementCapabilities represents the capabilities of the enabled logical element.

603 **Table 21 – CIM\_EnabledLogicalElementCapabilities**

Properties	Requirement	Notes
InstanceID	Mandatory	<b>Key</b>
RequestedStatesSupported	Mandatory	
ElementNameEditSupported	Mandatory	
MaxElementNameLen	Conditional	
ElementNameMask	Conditional	

604 **10.6 CIM\_HostedCollection**

605 CIM\_HostedCollection is used to associate an instance of CIM\_PCIPortGroup with the instance of  
 606 CIM\_ComputerSystem of which the CIM\_PCIPortGroup instance is a member.

607 **Table 22 – CIM\_HostedCollection**

Properties	Requirement	Notes
Antecedent	Mandatory	<b>Key:</b> Shall reference the CIM_ComputerSystem instance of which the CIM_PCIPortGroup instance is a member. Cardinality is “1”.
Dependent	Mandatory	<b>Key:</b> Shall reference the CIM_PCIPortGroup instance. Cardinality is “**”.

608 **10.7 CIM\_MemberOfCollection**

609 CIM\_MemberOfCollection is used to associate an instance of CIM\_PCIPort with the instance of  
 610 CIM\_PCIPortGroup of which the CIM\_PCIPort instance is a member.

611 **Table 23 – Class: CIM\_MemberOfCollection**

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

612 **10.8 CIM\_PCIBridge**

613 CIM\_PCIBridge is used to represent a PCI device that provides the capability to bridge two PCI busses.

614 **Table 24 – Class: CIM\_PCIBridge**

Properties and Methods	Requirement	Description
SystemCreationClassName	Mandatory	<b>Key</b>
SystemName	Mandatory	<b>Key</b>
CreationClassName	Mandatory	<b>Key</b>
DeviceID	Mandatory	<b>Key</b>
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	

615 **10.9 CIM\_PCIDevice**

616 CIM\_PCIDevice is used to represent a PCI device.

617 **Table 25 – Class: CIM\_PCIDevice**

Properties and Methods	Requirement	Description
SystemCreationClassName	Mandatory	<b>Key</b>
SystemName	Mandatory	<b>Key</b>
CreationClassName	Mandatory	<b>Key</b>
DeviceID	Mandatory	<b>Key</b>
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	

618 **10.10 CIM\_PCleSwitch**

619 CIM\_PCleSwitch is used to represent a device that provides PCI Express switch capability.

620 **Table 26 – Class: CIM\_PCleSwitch**

Properties and Methods	Requirement	Description
SystemCreationClassName	Mandatory	<b>Key</b>
SystemName	Mandatory	<b>Key</b>
CreationClassName	Mandatory	<b>Key</b>
DeviceID	Mandatory	<b>Key</b>
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	

621 **10.11 CIM\_PCIPort**

622 CIM\_PCIPort is used to represent PCI device ports.

623 **Table 27 – Class: CIM\_PCIPort**

Properties and Methods	Requirement	Description
SystemCreationClassName	Mandatory	<b>Key</b>
SystemName	Mandatory	<b>Key</b>
CreationClassName	Mandatory	<b>Key</b>
DeviceID	Mandatory	<b>Key</b>
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).

624 **10.12 CIM\_PCIPortGroup**

625 CIM\_PCIPortGroup is used to represent the aggregation of PCI ports.

626 **Table 28 – Class: CIM\_PCIPortGroup**

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

627 **10.13 CIM\_RegisteredProfile**

628 The CIM\_RegisteredProfile class is defined by the [Profile Registration Profile](#). The requirements denoted  
 629 in Table 29 are in addition to those mandated by the [Profile Registration Profile](#).

630 **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).

631 **10.14 CIM\_SystemDevice**

632 CIM\_SystemDevice is used to associate an instance of CIM\_PCIDevice or CIM\_PCIPort with the instance  
 633 of CIM\_ComputerSystem of which the CIM\_PCIDevice or CIM\_PCIPort instance is a member.

634 **Table 30 – Class: CIM\_SystemDevice**

Properties	Requirement	Description
GroupComponent	Mandatory	<b>Key:</b> Shall reference the CIM_ComputerSystem instance of which the CIM_PCIDevice or CIM_PCIPort instance is a member Cardinality is "1".
PartComponent	Mandatory	<b>Key:</b> Shall reference the CIM_PCIDevice instance Cardinality is "**". Or Shall reference the CIM_PCIPort instance. Cardinality is "**".

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**ANNEX A**  
(informative)  
**Change Log**

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

639