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5 **Power Utilization Management Profile**

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126

Foreword

127 The *Power Utilization Management Profile* (DSP1085) was prepared by the Physical Platform Profiles
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146

Introduction

147 The information in this specification and referenced specifications should be sufficient for a provider or
148 consumer of this data to identify unambiguously the classes, properties, methods, and values that shall
149 be instantiated and manipulated to represent and manage a power utilization management service.

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

152

Power Utilization Management Profile

153 1 Scope

154 The *Power Utilization Management Profile* extends the management capabilities of referencing profiles by
155 adding the capability to represent and manage the power utilization configuration of a managed element
156 within a computer system.

157 2 Normative References

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

161 DMTF DSP0004, *CIM Infrastructure Specification 2.5*,
162 http://www.dmtf.org/standards/published_documents/DSP0004_2.5.pdf

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

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

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

169 DMTF DSP1041, *Resource Allocation Profile 1.1*,
170 http://www.dmtf.org/standards/published_documents/DSP1041_1.1.pdf

171 DMTF DSP1043, *Allocation Capabilities Profile 1.0*,
172 http://www.dmtf.org/standards/published_documents/DSP1043_1.0.pdf

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

175 DMTF DSP8016, *WBEM Operations Message Registry 1.0*,
176 <http://schemas.dmtf.org/wbem/messageregistry/1/dsp8016.xml>

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

179 3 Terms and Definitions

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

181 3.1

182 **can**

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

184 3.2

185 **cannot**

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

- 187 **3.3**
188 **conditional**
189 indicates requirements to be followed strictly in order to conform to the document when the specified
190 conditions are met
- 191 **3.4**
192 **mandatory**
193 indicates requirements to be followed strictly in order to conform to the document and from which no
194 deviation is permitted
- 195 **3.5**
196 **may**
197 indicates a course of action permissible within the limits of the document
- 198 **3.6**
199 **need not**
200 indicates a course of action permissible within the limits of the document
- 201 **3.7**
202 **optional**
203 indicates a course of action permissible within the limits of the document
- 204 **3.8**
205 **referencing profile**
206 indicates a profile that owns the definition of this class and can include a reference to this profile in its
207 "Related Profiles" table
- 208 **3.9**
209 **shall**
210 indicates requirements to be followed strictly in order to conform to the document and from which no
211 deviation is permitted
- 212 **3.10**
213 **shall not**
214 indicates requirements to be followed strictly in order to conform to the document and from which no
215 deviation is permitted
- 216 **3.11**
217 **should**
218 indicates that among several possibilities, one is recommended as particularly suitable, without
219 mentioning or excluding others, or that a certain course of action is preferred but not necessarily required
- 220 **3.12**
221 **should not**
222 indicates that a certain possibility or course of action is deprecated but not prohibited
- 223 **3.13**
224 **Power Managed Element**
225 the computer system whose power utilization is being managed
- 226 **3.14**
227 **Dynamic Power Savings Mode**
228 power savings mode that relies on internal feedback to limit power consumption

229 **3.15**
 230 **Power Capping**
 231 system function that is active power management based on dynamic and static configuration of system
 232 operation for a well defined goal: the system's power capping level

233 **4 Symbols and Abbreviated Terms**

234 **4.1**
 235 **CIM**
 236 Common Information Model

237 **5 Synopsis**

238 **Profile Name:** Power Utilization Management
 239 **Version:** 1.0.0
 240 **Organization:** DMTF
 241 **CIM Schema Version:** 2.21
 242 **Specializes:** Enabled Logical Element Profile, Allocation Capabilities Profile, and Resource Allocation
 243 Profile
 244 **Central Class:** CIM_PowerUtilizationManagementService
 245 **Scoping Class:** CIM_ComputerSystem

246 The *Power Utilization Management Profile* extends the management elements of referencing profiles by
 247 adding the capability to represent Power Consumption management to a Power Managed Element.

248 CIM_PowerUtilizationManagementService shall be the central class of this profile. The instance of
 249 CIM_PowerUtilizationManagementService shall be the Central Instance of this profile.

250 CIM_ManagedSystemElement shall be the scoping class of this profile. The instance of
 251 CIM_ManagedSystemElement with which the central instance is associated through an instance of
 252 CIM_HostedService shall be the scoping instance of this profile.

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

254

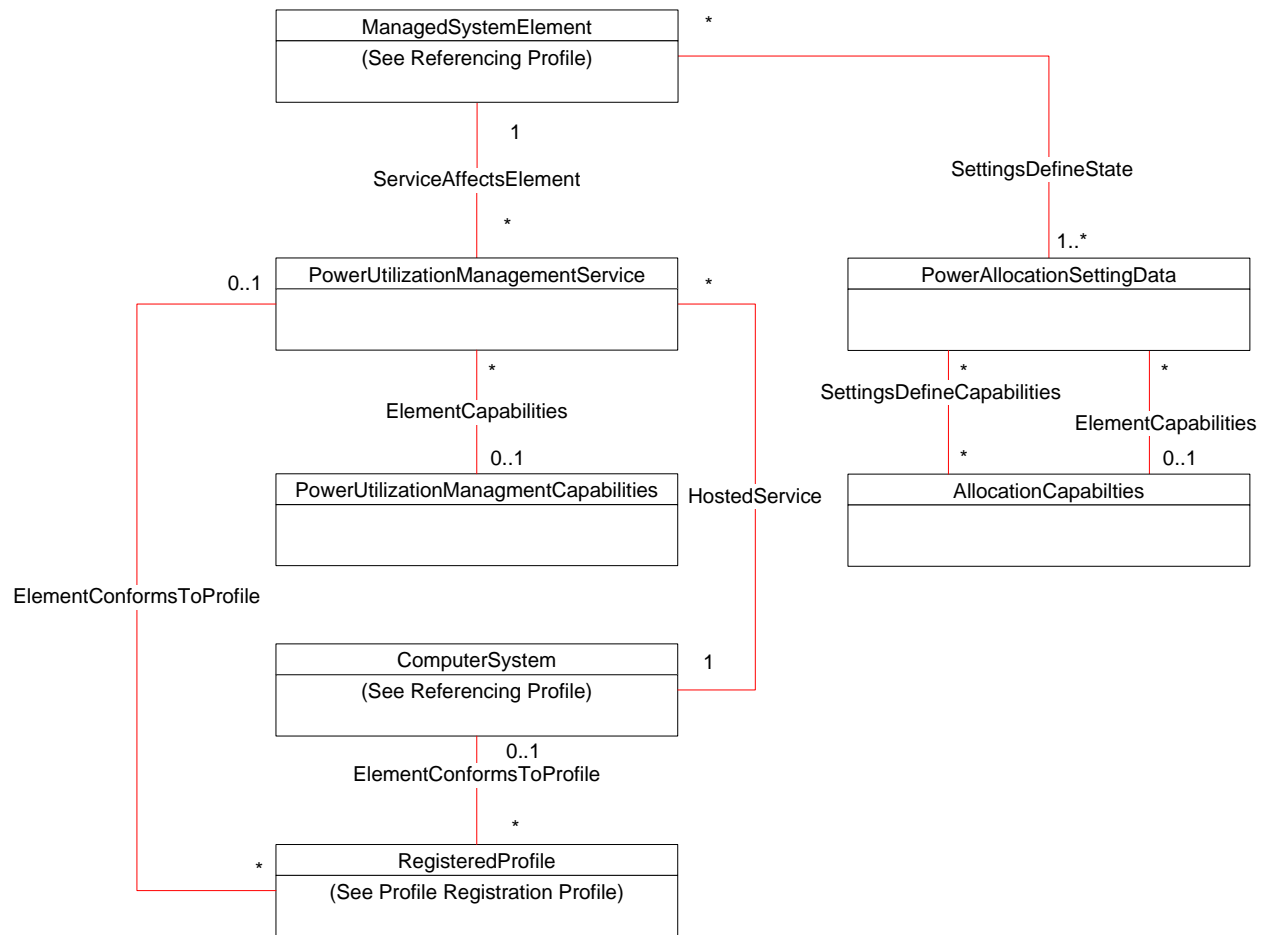
Table 1 – Related Profiles

Profile Name	Organization	Version	Relationship
Profile Registration	DMTF	1.0	Mandatory
Enabled Logical Element	DMTF	1.0	Specializes
Allocation Capabilities	DMTF	1.0	Specializes
Resource Allocation	DMTF	1.1	Specializes

255 **6 Description**

256 The *Power Utilization Management Profile* extends the management capabilities of referencing profiles by
 257 adding the capability to represent and manage the power utilization configuration of a managed element
 258 within a computer system. The configuration of the Power Managed Element includes power utilization
 259 modes, capping values and levels. See 6.1 and 6.2.

260 Figure 1 represents the class schema for the *Power Utilization Management Profile*. For simplicity, the
 261 prefix CIM_ has been removed from the names of the classes.



262
 263 **Figure 1 – Power Utilization Management Profile: Class Diagram**

264 **6.1 Power Utilization Modes**

265 The power management service represents the behavior of the power utilization management modes and
 266 related classes of a Power Managed Element.

267 Systems that support power management modes are capable of operating at different rates of power
 268 consumption. Each mode supported represents a different type of power utilization algorithm and hence
 269 rate of power consumption. For these systems a client can identify the static and dynamic modes
 270 supported, and, monitor and set the mode in use. Static Power Savings Mode is a fixed policy that limits
 271 power consumption. Dynamic Power Savings Mode relies on internal feedback to limit power
 272 consumption (for example, by minimizing power for a given measured workload).

273 The power management service provides the ability to monitor and set the current power utilization mode
274 and is represented by the CIM_PowerUtilizationManagementService class. The supported power
275 utilization modes of the Power Managed Element are represented by the
276 CIM_PowerUtilizationManagementCapabilities class, which is associated to the
277 CIM_PowerUtilizationManagementService class through the CIM_ElementCapabilities association.

278 **6.2 Capping Power Consumption**

279 Power capping system function is the active management based on dynamic and static configuration of
280 system operation for a well defined goal: the system's power capping level.

281 The power capping level is represented by the CIM_PowerAllocationSettingData class associated to the
282 Power Managed Element through the CIM_SettingsDefineState association. This instance represents the
283 power capping aspect of the system.

284 When there are one or more configurations/settings or a range of values which can constrain the power
285 cap of the Power Managed Element, those configurations/settings are represented by
286 CIM_PowerAllocationSettingData class associated to the CIM_AllocationCapabilities class through the
287 CIM_SettingsDefineCapabilities.

288 **7 Implementation**

289 This clause details the requirements related to the arrangement of instances and their properties for
290 implementations of this profile.

291 **7.1 Common Requirements**

292 This section provides normative requirements for representation and management of the power utilization
293 configuration. The requirements in this clause are mandatory.

294 **7.1.1 CIM_PowerUtilizationManagementService**

295 There shall be one instance of CIM_PowerUtilizationManagementService implemented.

296 There shall be one and only one instance of CIM_PowerUtilizationManagementService associated with
297 the instance of CIM_ManagedSystemElement that represents the Power Managed Element and
298 associated through an instance of CIM_ServiceAffectsElement.

299 The CIM_ManagedSystemElement, which represents the system that is hosting the power management
300 service, shall be associated to CIM_PowerUtilizationManagementService with an instance of
301 CIM_HostedService association.

302 **7.1.1.1 State Management of CIM_PowerUtilizationManagementService**

303 This clause describes constraints related to the interpretation of states specific to modeling power
304 utilization management services. An implementation may support management of
305 CIM_PowerUtilizationManagementService state. The abstract [DSP1080](#) (*Enabled Logical Element
306 Profile*) specifies requirements for supporting state management in sub-classes of
307 CIM_EnabledLogicalElement. The implementation of CIM_PowerUtilizationManagementService shall
308 meet the requirements of the Enabled Logical Element Profile, with
309 CIM_PowerUtilizationManagementService in place of CIM_EnabledLogicalElement and
310 CIM_PowerUtilizationManagementCapabilities in place of CIM_EnabledLogicalElementCapabilities.

311 **7.1.1.1.1 Enabled State**

312 The CIM_PowerUtilizationManagementService.EnabledState property shall have one the following
313 values: 0 (Unknown), 2 (Enabled), or 3 (Disabled).

314 Table 2 describes the mapping between values of the EnabledState property and the corresponding
 315 description of the state of the operating system. Additional values have the semantics defined in
 316 [DSP1080](#).

317 **Table 2 – EnabledState Value Descriptions**

ValueMap	Value	Description
0	Unknown	The state of PowerUtilizationManagementService is Unknown.
2	Enabled	PowerUtilizationManagementService is running.
3	Disabled	PowerUtilizationManagementService is not running.

318 7.1.1.1.2 Requested State Transitions

319 The CIM_PowerUtilizationManagementService.RequestedState property shall have one the following
 320 values: 0 (Unknown), 2 (Enabled), or 3 (Disabled).

321 Table 3 describes the mapping between values of the RequestedState property and the corresponding
 322 state transition initiated for the operating system.

323 **Table 3 – RequestedState Property Value Descriptions**

ValueMap	Value	Description
0	Unknown	The state of PowerUtilizationManagementService is Unknown.
2	Enabled	A request to start-up the service
3	Disabled	A request to shutdown the service

324 Table 4 describes the mapping between values of the RequestedState property or parameter and the
 325 corresponding state transition initiated for the operating system.

326 **Table 4 – RequestedState Parameter Value Descriptions**

ValueMap	Value	Description
2	Enabled	Initiate a start-up of the service
3	Disabled	Initiate a shutdown of the service
11	Reset	Initiate a restart of the service

327 7.1.1.1.3 Representing In-Progress Transitions (Optional)

328 The CIM_PowerUtilizationManagementService.TransitioningToState property shall have one the following
 329 values: 2 (Enabled) or 3 (Disabled).

330 **Table 5 – TransitioningToState Property Value Descriptions**

ValueMap	Value	Description
2	Enabled	The service shall be starting up.
3	Disabled	The service shall be shutting down.

331 **7.1.1.1.4 Representing Available Requested States (Optional)**

332 The CIM_PowerUtilizationManagementCapabilities.RequestedStatesSupported property may contain
333 zero or more of the following values: 2 (Enabled), 3 (Disabled), or 11 (Reset).

334 **7.1.2 CIM_PowerUtilizationManagementCapabilities**

335 The capabilities of the power management service shall be represented by an instance of
336 CIM_PowerUtilizationManagementCapabilities.

337 There shall be an instance of CIM_PowerUtilizationManagementCapabilities associated with an instance
338 of CIM_PowerUtilizationManagementService through the CIM_ElementCapabilities association.

339 **7.2 Power Capping**

340 This clause details requirement for representation and management of the power capping. If the power
341 capping of the managed element within a computer system is supported, the requirements specified in
342 this clause shall be met.

343 **7.2.1 Power Aspect — CIM_PowerAllocationSettingData**

344 There may be one or more instances of CIM_PowerAllocationSettingData associated with a Power
345 Managed Element through an instance of CIM_SettingsDefinedState. These instances shall represent the
346 power consumption characteristics of the Power Managed Element. The characteristics include power
347 capping and reservation.

348 The power cap of the Power Managed Element shall be represented by the Limit property in units
349 described by the AllocationUnits property of the CIM_PowerAllocationSettingData instance.

350 If the power cap for the Power Managed Element is disabled, the Limit property shall be set to NULL.

351 **7.3 Power Capping Levels**

352 This subclause details requirement for representation and management of the power capping levels. If
353 the representation of power capping levels of the managed element within a computer system is
354 supported, the requirements specified in this subclause shall be met.

355 **7.3.1 CIM_AllocationCapabilities**

356 There shall be one or more instances of CIM_AllocationCapabilities associated to the
357 CIM_PowerAllocationSettingData that represents the power consumption characteristics of the Power
358 Managed Element (see 7.2) through the CIM_ElementCapabilities association. See [DSP1043](#) for detailed
359 requirements on supporting multiple CIM_AllocationCapabilities.

360 **7.3.2 Power Configurations — CIM_PowerAllocationSettingData**

361 There shall be one or more instances of CIM_PowerAllocationSettingData associated through the
362 CIM_SettingsDefineCapabilities association to an instance of CIM_AllocationCapabilities. These
363 instances of CIM_PowerAllocationSettingData shall represent the different power capping levels of the
364 Power Managed Element or information that constrains the possible custom power capping levels.

365 The actual power cap level shall be represented by the Limit property in units described by the
366 AllocationUnits property of the CIM_PowerAllocationSettingData instance. The AllocationUnits property
367 shall contain “watts” or “percent.” If percent is used it is intended to express a range of power capping
368 from a state of no capping, 0 percent, to the state of maximum capping, 100 percent. It is intended to
369 allow power-capping control without quantifiable power values being expressed.

370 8 Methods

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

373 8.1 CIM_PowerUtilizationManagementService.ApplyPowerAllocationSettings()

374 A successful execution of the CIM_PowerUtilizationManagementService.ApplyPowerAllocationSettings()
375 method shall modify the power settings in the managed environment that are represented by an instance
376 of class CIM_PowerAllocationSettings that is identified by the value of the
377 PowerAllocationSettings.InstanceId property, such that:

- 378 • non-NULL values of properties of the embedded instance of the
379 CIM_PowerAllocationSettingData class that is provided through the PowerAllocationSettings
380 parameter, shall update the settings in the managed environment that are represented by that
381 CIM_PowerAllocationSettings instance.
- 382 • a NULL value of the PowerAllocationSettings.Limit and AllocationUnits properties shall disable
383 Power Capping in the the settings in the managed environment that are represented by that
384 CIM_PowerAllocationSettings instance.

385 Table 6 contains requirements for parameters of this method.

386 **Table 6 – ApplyPowerAllocationSettings() Method: Parameters**

Qualifiers	Name	Type	Description/Values
IN	PowerAllocationSettings	EmbeddedInstance ("CIM_PowerAllocationSettingData") String	See 8.1.2.
OUT	Job	CIM_ConcreteJob REF	See 8.1.4 and 8.1.5.

387 8.1.1 Conditional Support

388 This method is conditional on the CIM_PowerUtilizationManagementService.SupportedMethods property
389 array containing a value of 2 (ApplyPowerAllocationSettings). For more information, see 7.2.1.

390 If this method is not implemented, the following applies:

- 391 • If standard messages are not implemented for this method, the method shall return a value of 1
392 (Method is not supported).
- 393 • If standard messages are implemented for this method, the method invocation shall fail with
394 message WIPG0219 (Method not supported by class implementation).

395 8.1.2 PowerAllocationSettings Parameter

396 If standard messages are not implemented for this method, the following applies:

- 397 • If the PowerAllocationSettings parameter is NULL or is not specified, the method shall indicate
398 an error by returning a return value of 2 (Method execution failed).
- 399 • If the value of the PowerAllocationSettings.InstanceId property is NULL or does not identify an
400 existing instance of CIM_PowerAllocationSettingData, the method shall indicate an error by
401 returning a return value of 2 (Method execution failed).
- 402 • If the value of the PowerAllocationSettings.Limit property is non-NULL and the value of the
403 PowerAllocationSettings.AllocationUnits property is NULL, the method shall indicate an error by
404 returning a return value of 2 (Method execution failed).

405 If standard messages are implemented for this method, the following applies:

- 406 • If the PowerAllocationSettings parameter is not specified, the method shall indicate an error by
407 failing with error message WIPG0205 (Missing input parameter).
- 408 • If the PowerAllocationSettings parameter is NULL, the method shall indicate an error by failing
409 with error message WIPG0208 (Invalid input parameter value), indicating
410 PowerAllocationSettings as the invalid parameter.
- 411 • If the value of the PowerAllocationSettings.InstanceId property is NULL or does not identify an
412 existing instance of CIM_PowerAllocationSettingData, the method shall indicate an error by
413 failing with error message WIPG0208 (Invalid input parameter value), indicating
414 PowerAllocationSettings.InstanceId as the invalid parameter.
- 415 • If the value of the PowerAllocationSettings.Limit property is non-NULL and the value of the
416 PowerAllocationSettings.AllocationUnits property is NULL the method shall indicate an error by
417 failing with error message WIPG0208 (Invalid input parameter value), indicating
418 PowerAllocationSettings.AllocationUnits as the invalid parameter.

419 If the method indicates an error, no existing instance of CIM_PowerAllocationSettingData shall have been
420 modified.

421 **8.1.3 Method Return Codes**

422 An implementation shall indicate the result of the method execution by using the return code values speci-
423 fied in Table 7.

424 **Table 7 – ApplyPowerAllocationSettings() Method: Return Code Values**

Value	Description
0	Method was successfully executed.
1	Method is not supported. Only used if standard messages are not implemented.
2	Method execution failed. Only used if standard messages are not implemented.
4096	Method execution is performed asynchronously. The specifications given in 8.1.5 apply.

425 Implementation of standard messages for this method is optional. If standard messages are implemented,
426 as defined in [DSP8016](#), for this method, the return values stated in Table 7 apply unless excluded.
427 Table 8 states the requirement for implementing standard messages for this method for those cases
428 excluded in Table 7.

429 **Table 8 – ApplyPowerAllocationSettings() Method: Standard Messages**

Message ID	Requirement	Description
WIPG0208	Mandatory	Invalid method input parameter value (see 8.1.2)
WIPG0213	Mandatory	CIM_PowerUtilizationManagementService instance not found
WIPG0219	Mandatory	Method not supported by class implementation
WIPG0243	Optional	Timeout
WIPG0227	Mandatory	Other failure

430 **8.1.4 Method Results**

431 If the implementation does not support a method, it shall set a return value of 1 (Not Supported).

432 If synchronous execution of a method succeeds, the implementation shall set a return value of
433 0 (Completed with No Error).

434 If synchronous execution of a method fails, the implementation shall set a return value of 2 (Error
435 Occurred).

436 If a method is executed as an asynchronous task, the implementation shall perform all of the following
437 actions:

- 438 • Set a return value of 4096 (Job Started).
- 439 • Set the value of the Job output parameter to refer to an instance of the CIM_ConcreteJob class
440 that represents the asynchronous task.
- 441 • Set the values of the JobState and TimeOfLastStateChange properties in that instance to repre-
442 sent the state and last state change time of the asynchronous task.

443 In addition, the implementation may present state change indications as task state changes occur.

444 If the method execution as an asynchronous task succeeds, the implementation shall perform all of the
445 following actions:

446 If the method execution as an asynchronous task fails, the implementation shall set the value of the
447 JobState property to 9 (Killed) or 10 (Exception).

448 **8.1.5 Asynchronous Processing**

449 An implementation may support asynchronous processing of the ApplyPowerAllocationsSettings method
450 specified in the CIM_PowerUtilizationManagementService class.

451 **8.1.5.1 Job Parameter**

452 The implementation shall set the value of the Job parameter as a result of an asynchronous execution of
453 a method of the CIM_PowerUtilizationManagementService as follows:

- 454 • If the method execution is performed synchronously, the implementation shall set the value to
455 NULL.
- 456 • If the method execution is performed asynchronously, the implementation shall set the value to
457 refer to the instance of the CIM_ConcreteJob class that represents the asynchronous task.

458 **8.2 Profile Conventions for Operations**

459 This profile defines intrinsic operations in terms of [DSP0200](#). For each profile class (including
460 associations), the implementation requirements for operations, including those in the following default list,
461 are specified in class-specific subclauses of this clause. The default list of operations is as follows:

462 GetInstance()
463 EnumerateInstances()
464 EnumerateInstanceNames()

465 For classes that are referenced by an association, the default list of operations includes the following
466 operations in addition:

467 Associators()
468 AssociatorNames()
469 References()

470 ReferenceNames()

471 **8.3 CIM_PowerUtilizationManagementService**

472 All operations in the default list in 8.2 shall be implemented as defined in [DSP1080](#) (*Enabled Logical*
473 *Element Profile*).

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

475 **8.4 CIM_PowerUtilizationManagementCapabilities**

476 All operations in the default list in 8.2 shall be implemented as defined in [DSP1080](#) (*Enabled Logical*
477 *Element Profile*).

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

479 **8.5 CIM_PowerAllocationSettingData**

480 All operations in the default list in 8.2 shall be implemented as defined in [DSP1041](#) (*Resource Allocation*
481 *Profile*).

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

483 **8.6 CIM_AllocationSettingData**

484 All operations in the default list in 8.2 shall be implemented as defined in [DSP1043](#) (*Allocation*
485 *Capabilities Profile*).

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

487 **8.7 CIM_HostedService**

488 Table 9 lists implementation requirements for operations. If implemented, these operations shall be
489 implemented as defined in [DSP0200](#). In addition, and unless stated otherwise in Table 9, all operations in
490 the default list in 8.2 shall be implemented as defined in [DSP0200](#).

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

492 **Table 9 – CIM_HostedService**

Operation	Requirements	Messages
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

493 **8.8 CIM_ServiceAffectsElement**

494 Table 10 lists implementation requirements for operations. If implemented, these operations shall be
495 implemented as defined in [DSP0200](#). In addition, and unless stated otherwise in Table 10, all operations
496 in the default list in 8.2 shall be implemented as defined in [DSP0200](#).

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

498

Table 10 – CIM_ServiceAffectsElement

Operation	Requirements	Messages
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

499 8.9 CIM_ElementCapabilities

500 Table 11 lists implementation requirements for operations. If implemented, these operations shall be
 501 implemented as defined in [DSP0200](#). In addition, and unless stated otherwise in Table 11, all operations
 502 in the default list in 8.2 shall be implemented as defined in [DSP0200](#).

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

504

Table 11 – CIM_ElementCapabilities

Operation	Requirements	Messages
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

505 8.10 CIM_SettingsDefineState

506 Table 12 lists implementation requirements for operations. If implemented, these operations shall be
 507 implemented as defined in [DSP0200](#). In addition, and unless stated otherwise in Table 12, all operations
 508 in the default list in 8.2 shall be implemented as defined in [DSP0200](#).

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

510

Table 12 – CIM_SettingsDefineState

Operation	Requirements	Messages
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

511 8.11 CIM_SettingsDefineCapabilities

512 Table 13 lists implementation requirements for operations. If implemented, these operations shall be
 513 implemented as defined in [DSP0200](#). In addition, and unless stated otherwise in Table 13, all operations
 514 in the default list in 8.2 shall be implemented as defined in [DSP0200](#).

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

516

Table 13 – CIM_SettingsDefineCapabilities

Operation	Requirements	Messages
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

517

8.12 CIM_ElementCapabilities

518 Table 14 lists implementation requirements for operations. If implemented, these operations shall be
 519 implemented as defined in [DSP0200](#). In addition, and unless stated otherwise in Table 14, all operations
 520 in the default list in 8.2 shall be implemented as defined in [DSP0200](#).

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

522

Table 14 – CIM_ElementCapabilities

Operation	Requirements	Messages
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

523

8.13 CIM_ElementConformsToProfile

524 Table 15 lists implementation requirements for operations. If implemented, these operations shall be
 525 implemented as defined in [DSP0200](#). In addition, and unless stated otherwise in Table 15, all operations
 526 in the default list in 8.2 shall be implemented as defined in [DSP0200](#).

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

528

Table 15 – CIM_ElementConformsToProfile

Operation	Requirements	Messages
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

529

9 Use Cases

530 This clause contains object diagrams and use cases for the *Power Utilization Management Profile*.

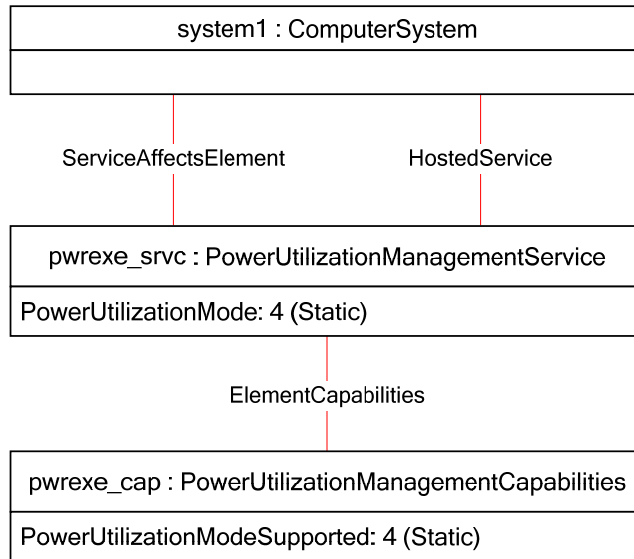
531

9.1 Object Diagrams

532 This subclause contains object diagrams for the *Power State Management Profile*. For simplicity, the
 533 prefix CIM_ has been removed from the names of the classes in the diagrams.

534 **9.1.1 Power Utilization Modes**

535 Figure 2 shows the CIM instances required to represent a Power Managed Element capable of power
 536 management. The computer system, system1, hosts power management service, pwrexr_svr, to control
 537 the power utilization mode.

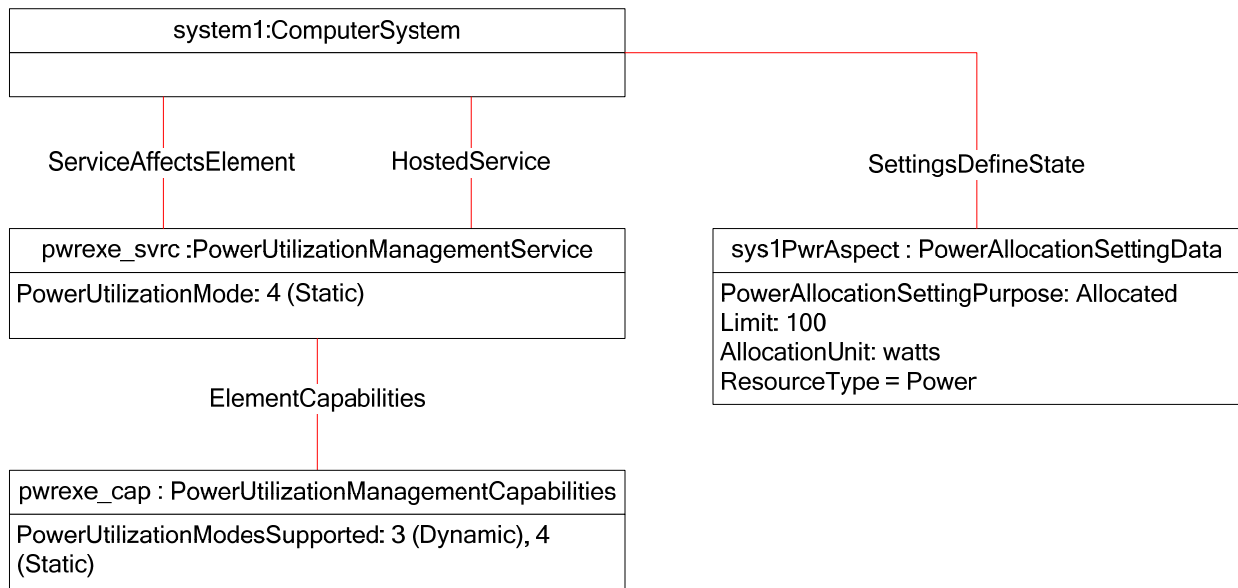


538

539 **Figure 2 – Power Utilization Modes**

540 **9.1.2 Power Capping**

541 Figure 3 shows the CIM instances required to represent a Power Managed Element capable of power
 542 capping. The power capping aspect, sys1PwrAspect, is associated to the Power Managed Element,
 543 system1, through the SettingsDefineState association.



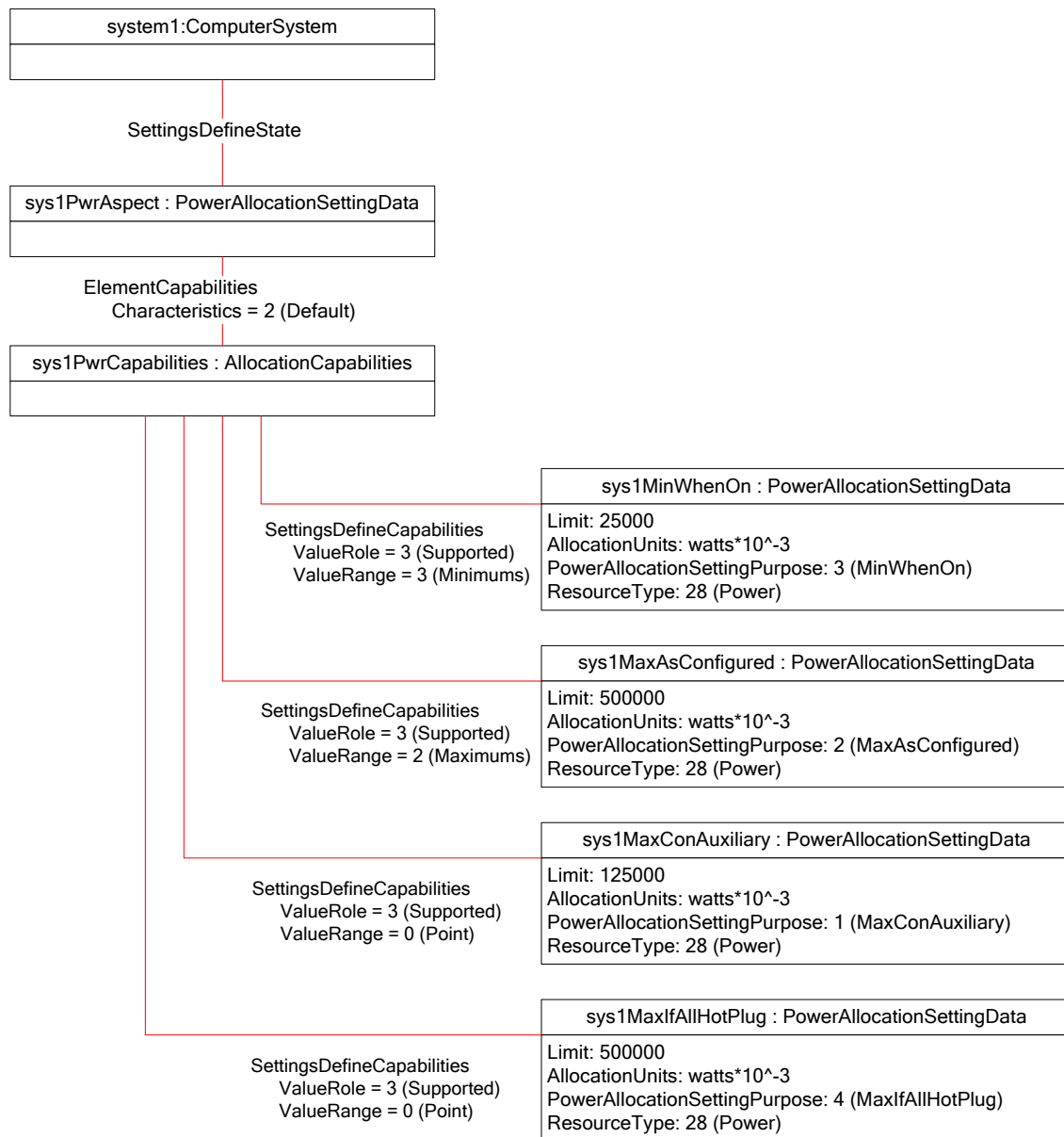
544

545 **Figure 3 – Power Capping**

546 **9.1.3 Power Capping Configuration**

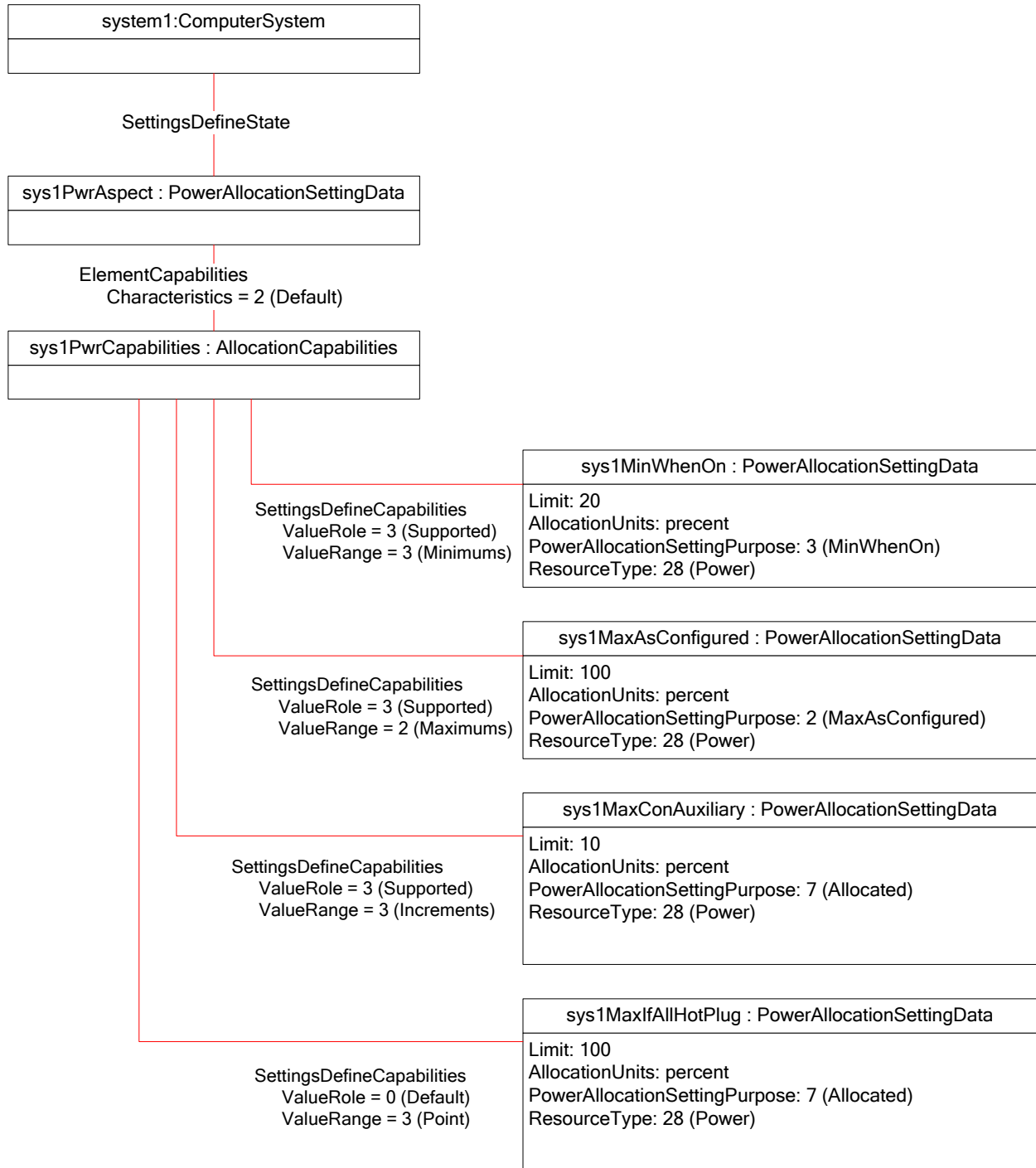
547 Figure 4 shows the CIM instances required to represent a Power Managed Element capable of showing
 548 power capping configuration information. The power capping configuration(s),
 549 sys1MaxConAuxiliary...sys1MinWithoutDegradation, is associated to the system power capping
 550 capabilities, sys1PwrCapabilities, through the SettingsDefineCapabilities association. The Power capping
 551 capabilities, sys1PwrCapabilities, is associated to the system power capping aspect, sys1PwrAspect,
 552 through the ElementCapabilities association.

553 Figure 5 shows an alternate implementation where a provider represents the power capping as a range
 554 representing the percentage of the total system power a system is able to utilize. In this case four
 555 instances of CIM_PowerAllocationSettingData, associated to the shown instance of
 556 CIM_AllocationCapabilities through the associator SettingsDefineCapabilities, represents the valid range
 557 and the default setting for the system power capping aspect.



558

559 **Figure 4 – Power Capping Configuration Using Watts**



560

561

Figure 5 – Power Capping Configuration Using Percent Power

562 **9.2 Find the Power Utilization Management Service for a Power Managed** 563 **Element**

564 A client can find the power management service for a Power Managed Element as follows:

565 For the Power Managed Element enumerate the instances of the ServiceAffectsElement association and
566 identify the instance that associates the instance of CIM_PowerUtilizationManagementService.

567 **9.3 Determining If State Management Is Supported**

568 For a given instance of CIM_PowerUtilizationManagementService, a client can determine whether state
569 management is supported as follows:

- 570 1) Find the CIM_PowerUtilizationManagementCapabilities instance that is associated with the
571 instance.
- 572 2) Query the value of the RequestedStatesSupported property. If at least one value is specified,
573 state management is supported.

574 **9.4 Determine the Power Utilization Mode in use by a Power Managed Element**

575 A client can determine the power state of the Power Managed Element as follows:

576 For the Power Managed Element enumerate the instances of the CIM_ServiceAffectsElement
577 association and identify the instance that associates the instance of
578 CIM_PowerUtilizationManagementService. The PowerSavingsMode property of the
579 CIM_PowerUtilizationManagementService represents the power utilization modes.

580 **9.5 Change the Power Utilization Mode of a Power Managed Element**

581 A client can change the power utilization mode of the Power Managed Element as follows:

- 582 1) For the Power Managed Element enumerate the instances of the CIM_ServiceAffectsElement
583 association and identify the instance that associates the instance of
584 CIM_PowerUtilizationManagementService.
- 585 2) Change the value of the PowerSavingsMode property to the appropriate mode.

586 **9.6 Determine the Power Utilization Modes Supported by a Power Managed** 587 **Element**

588 A client can determine whether power utilization modes are supported for a Power Managed Element as
589 follows:

- 590 1) Navigate from the target instance of CIM_ManagedSystemElement to the instance of
591 CIM_PowerUtilizationManagementService that represents the service that manages that
592 system by using the CIM_ServiceAffectsElement association.
- 593 2) Using the instance of CIM_PowerUtilizationManagementService, navigate to the instance of
594 CIM_PowerUtilizationManagementCapabilities through the CIM_ElementCapabilities
595 association. The PowerUtilizationModesSupported property array contains the modes
596 supported.

597 **9.7 Determine Whether Power Capping Is Supported by a Power Managed** 598 **Element**

599 A client can determine whether power utilization modes are supported for a Power Managed Element as
600 follows:

- 601 1) From the instance of CIM_ManagedSystemElement that represents the Power Managed
602 Element, identify the instance of CIM_PowerUtilizationManagementService associated via an
603 instance of CIM_ServiceAffectsElement.
- 604 2) From the instance of CIM_PowerUtilizationManagementService, find the instance of
605 CIM_PowerUtilizationManagementCapabilities associated via CIM_ElementCapabilities.
606 Evaluate the SupportedMethods property to determine if the power capping is supported.

607 **9.8 Determine the Power Capping value for a Power Managed Element**

608 Select the instance of CIM_PowerAllocationSettingData that represents the power capping aspect of the
609 Power Managed Element.

- 610 1) From the instance of CIM_ManagedSystemElement that represents the Power Managed
611 Element identify the instance of CIM_PowerAllocationSettingData associated via an instance of
612 CIM_SettingsDefineState.
- 613 2) The Limit property of the instance so found represents the current capping value.

614 **9.9 Change the Power Capping value for a Power Managed Element**

615 Select the instance of CIM_PowerAllocationSettingData that represents the power capping aspect of the
616 Power Managed Element.

- 617 1) From the instance of CIM_ManagedSystemElement that represents the Power Managed
618 Element identify the instance of CIM_PowerAllocationSettingData associated via an instance of
619 CIM_SettingsDefineState.
- 620 2) Using ApplyPowerAllocationSettings method with an embedded instance parameter of
621 PowerAllocationSettingData that has its limit and AllocationUnits properties set to the
622 appropriate value change the power capping of the system. See 9.10 and 9.11 in determining
623 the supported AllocationUnits.

624 **9.10 Determine the Power Capping Configuration Parameters for a Power** 625 **Managed Element Expressed in Watts**

626 A client can determine whether watts of power utilization are supported and valid configuration
627 parameters for a Power Managed Element as follows:

- 628 1) From the instance of CIM_ManagedSystemElement that represents the Power Managed
629 Element, identify the instance of CIM_PowerAllocationSettingData associated via an instance of
630 CIM_SettingsDefineState.
- 631 2) From the instance of CIM_PowerAllocationSettingData find the instance(s) of
632 CIM_AllocationCapabilities that are each associated via an instance of
633 CIM_ElementCapabilities.
- 634 3) Find all instances of CIM_PowerAllocationSettingData associated to the instance(s) of
635 CIM_AllocationCapabilities through CIM_SettingsDefineCapabilities association where the
636 AllocationUnit property is equal to "Watts."
- 637 4) Evaluate, as described in [DSP1043](#) (*AllocationCapabilities Profile*) the set of instances so found
638 in step three to determine the valid range and any supported point settings for the power
639 capping configuration parameters.

640 **9.11 Determine the Power Capping Configuration Parameters for a Power**
 641 **Managed Element Expressed as a Range of Percentages**

642 A client can determine whether percentage of power utilization is supported and valid configuration
 643 parameters for a Power Managed Element as follows:

- 644 1) From the instance of CIM_ManagedSystemElement that represents the Power Managed
 645 Element, identify the instance of CIM_PowerAllocationSettingData associated via an instance of
 646 CIM_SettingsDefineState.
- 647 2) From the instance of CIM_PowerAllocationSettingData find the instance(s) of
 648 CIM_AllocationCapabilities that are each associated via an instance of
 649 CIM_ElementCapabilities.
- 650 3) Find all instances of CIM_PowerAllocationSettingData associated to the instance(s) of
 651 CIM_AllocationCapabilities through CIM_SettingsDefineCapabilities association where the
 652 AllocationUnit property is equal to "Percent."
- 653 4) Evaluate, as described in [DSP1043](#) (*AllocationCapabilities Profile*) the set of instances so found
 654 in step three to determine the valid range and any supported point settings for the power
 655 capping configuration parameters.

656 **10 CIM Elements**

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

660 **Table 16 – CIM Elements: Power Utilization Management Profile**

Element Name	Requirement	Description
Classes		
CIM_PowerUtilizationManagementService	Mandatory	See 7.1 and 10.1.
CIM_PowerUtilizationManagementCapabilities	Mandatory	See 7.1.2 and 10.2.
CIM_ServiceAffectsElement	Mandatory	See 10.3.
CIM_HostedService	Mandatory	See 10.4.
CIM_ElementCapabilities (CIM_PowerUtilizationManagementService)	Mandatory	See 10.5.
CIM_PowerAllocationSettingData (CIM_ManagedSystemElement)	Optional	See 7.2 and 10.6.
CIM_SettingsDefineState	Conditional	See 10.7.
CIM_AllocationCapabilities	Optional	See 10.8.
CIM_ElementCapabilities (CIM_AllocationCapabilities)	Conditional	See 10.9.
CIM_PowerAllocationSettingData (CIM_AllocationCapabilities)	Conditional	See 7.3 and 10.10.
CIM_SettingsDefineCapabilities	Conditional	See 10.11.
CIM_RegisteredProfile	Mandatory	See 10.12.
Indications		
None defined in this profile		

661 10.1 CIM_PowerUtilizationManagementService

662 CIM_PowerUtilizationManagementService represents the power utilization management service
 663 responsible for controlling the power utilization mode of a Power Managed Element. Table 17 contains
 664 the requirements for elements of this class. The constraints specified for
 665 CIM_PowerUtilizationManagementService are in addition to those specified for
 666 CIM_EnabledLogicalElement in the [Enabled Logical Element Profile](#).

667 **Table 17 – Class: CIM_PowerUtilizationManagementService**

Properties	Requirement	Notes
CreationClassName	Mandatory	Key
Name	Mandatory	Key
PowerUtilizationMode	Mandatory	
EnabledState	Mandatory	See 7.1.1.1.1.
RequestedState	Mandatory	See 7.1.1.1.2.
ApplyPowerAllocationSettings()	Conditional	See 8.1.1.

668 10.2 CIM_PowerUtilizationManagementCapabilities

669 CIM_PowerUtilizationManagementCapabilities represents the power utilization modes capabilities of a
 670 Power Managed Element. Table 18 contains the requirements for elements of this class. See [DSP1080](#)
 671 for further requirements.

672 **Table 18 – Class: CIM_PowerUtilizationManagementCapabilities**

Properties	Requirement	Notes
InstanceID	Mandatory	Key
PowerUtilizationModesSupported	Mandatory	
SupportedMethods	Mandatory	

673 10.3 CIM_ServiceAffectsElement

674 CIM_ServiceAffectsElement associates the CIM_ManagedSystemElement instance that represents the
 675 target Power Managed Element with the CIM_PowerUtilizationManagementService instance that
 676 represents the service responsible for controlling the power utilization modes of a Power Managed
 677 Element. Table 19 contains the requirements for elements of this class.

678

Table 19 – Class: CIM_ServiceAffectsElement

Properties	Requirement	Notes
AffectedElement	Mandatory	Key This property shall be a reference to the instance of CIM_ManagedSystemElement. Cardinality 1
AffectingElement	Mandatory	Key This property shall be a reference to the instance of CIM_PowerManagementService. Cardinality 1
ElementEffects	Mandatory	This property shall be set to a value of 5 (Manages).

679 **10.4 CIM_HostedService**

680 CIM_HostedService associates the CIM_ManagedSystemElement instance with the
681 CIM_PowerUtilizationManagementService instance that it hosts. Table 20 contains the requirements for
682 elements of this class.

683

Table 20 – Class: CIM_HostedService

Properties	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to the instance of CIM_ManagedSystemElement. Cardinality 1..*
Dependent	Mandatory	This property shall be a reference to the instance of CIM_PowerManagementService. Cardinality *

684 **10.5 CIM_ElementCapabilities (CIM_PowerUtilizationManagementCapabilities)**

685 CIM_ElementCapabilities associates the CIM_PowerUtilizationManagementService instance that
686 represents the service responsible for controlling the power utilization modes of a Power Managed
687 Element with the CIM_PowerUtilizationManagementCapabilities instance that represents the power
688 utilization modes capabilities of a Power Managed Element. Table 21 contains the requirements for
689 elements of this class.

690

Table 21 – CIM_ElementCapabilities

Properties	Requirement	Notes
ManagedElement	Mandatory	This property shall be a reference to the instance of CIM_PowerUtilizationManagementService. Cardinality *
Capabilities	Mandatory	This property shall be a reference to the instance of CIM_PowerUtilizationManagementCapabilities. Cardinality 0..1

691 10.6 CIM_PowerAllocationSettingData (CIM_ManagedSystemElement)

692 CIM_PowerAllocationSettingData instance represents the power capping aspect of a Power Managed
693 Element. Table 22 contains the requirements for the elements of this class.

694 **Table 22 – CIM_PowerAllocationSettingData**

Properties	Requirement	Notes
InstanceID	Mandatory	Key
ElementName	Mandatory	
ResourceType	Mandatory	This property shall be set to a value of 28 (Power).
AllocationUnits	Mandatory	
Limit	Mandatory	This property shall be represent the power capping (see 7.2)

695 10.7 CIM_SettingsDefineState

696 CIM_SettingsDefineState instance associates the CIM_ManagedSystemElement instance, which
697 represents the target Power Managed Element, with the CIM_PowerAllocationSettingData instance,
698 which represents the power capping aspect of the target Power Managed Element. Table 23 contains the
699 requirements for elements of this class.

700 **Table 23 – CIM_SettingDefinesState**

Properties	Requirement	Notes
ManagedElement	Mandatory	This property shall be a reference to the instance of CIM_ManagedSystemElement. Cardinality 1
SettingData	Mandatory	This property shall be a reference to the instance of CIM_PowerAllocationSettingData. Cardinality 1

701 10.8 CIM_AllocationCapabilities

702 CIM_AllocationCapabilities instance represents the type of the allocation capabilities reported by the
703 Power Managed Element. Table 24 contains the requirements for the elements of this class. The
704 constraints defined in Table 24 are in addition to those placed on CIM_AllocationCapabilities in the
705 Allocation Capabilities Profile.

706 **Table 24 – CIM_AllocationCapabilities**

Properties	Requirement	Notes
InstanceID	Mandatory	Key
ElementName	Mandatory	
ResourceType	Mandatory	This property shall be set to a value of 28 (Power).

707 **10.9 CIM_ElementCapabilities (CIM_AllocationCapabilities)**

708 CIM_ElementCapabilities associates the CIM_PowerAllocationSettingData instance that represents the
 709 power capping aspect of a Power Managed Element with the CIM_AllocationCapabilities instance that
 710 represents the type of the allocation allowed for the Power Managed Element. Table 25 contains the
 711 requirements for elements of this class.

712 **Table 25 – CIM_ElementCapabilities**

Properties	Requirement	Notes
ManagedElement	Mandatory	This property shall be a reference to the instance of CIM_PowerAllocationSettingData. Cardinality 1
Capabilities	Mandatory	This property shall be a reference to the instance of CIM_AllocationCapabilities. Cardinality 1

713 **10.10 CIM_PowerAllocationSettingData (CIM_AllocationCapabilities)**

714 CIM_PowerAllocationSettingData instance represents the configuration and operational parameters
 715 associated with the power capping aspect of a Power Managed Element. Table 26 contains the
 716 requirements for the elements of this class.

717 **Table 26 – CIM_PowerAllocationSettingData**

Properties	Requirement	Notes
InstanceID	Mandatory	Key
ElementName	Mandatory	
ResourceType	Mandatory	This property shall be set to a value of 28 (Power).
PowerAllocationSettingPurpose	Mandatory	See 7.3
OtherSettingPurpose	Conditional	This property shall be implemented if the PowerAllocationSettingPurpose has value 1 (Other).
Limit	Mandatory	See 7.2.1

718 **10.11 CIM_SettingsDefineCapabilities**

719 CIM_SettingsDefineCapabilities instance associates the CIM_AllocationCapabilities instance, which
 720 represents the type of the allocation allowed by the Power Managed Element, with the
 721 CIM_PowerAllocationSettingData instances that represent the configuration and operational parameters
 722 associated with the power capping aspect of a Power Managed Element. Table 27 contains the
 723 requirements for elements of this class.

724

Table 27 – CIM_SettingsDefineCapabilities

Properties	Requirement	Notes
GroupComponent	Mandatory	This property shall be a reference to the instance of CIM_AllocationCapabilities. Cardinality 1
PartComponent	Mandatory	This property shall be a reference to the instances of CIM_PowerAllocationSettingData. Cardinality 1

725 **10.12 CIM_RegisteredProfile**

726 CIM_RegisteredProfile is defined by the [Profile Registration Profile](#). The requirements denoted in
727 Table 28 are in addition to those mandated by the [Profile Registration Profile](#).

728

Table 28 – Class: CIM_RegisteredProfile

Properties	Requirement	Notes
RegisteredName	Mandatory	This property shall have a value of "Power Utilization Management".
RegisteredValue	Mandatory	This property shall have a value of "1.0.0".
RegisteredOrganization	Mandatory	This property shall have a value of 2 (DMTF).

729
730
731
732

**ANNEX A
(Informative)**
Change Log

Version	Date	Description
1.0.0	01/12/2010	DMTF Standard Release

733