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Power Utilization Management Profile

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Foreword

The *Power Utilization Management Profile* (DSP1085) was prepared by the Physical Platform Profiles Working Group.

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Introduction

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

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

Power Utilization Management Profile

1 Scope

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

2 Normative References

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

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

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

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

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

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

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

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

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

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

3 Terms and Definitions

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

3.1
can
used for statements of possibility and capability, whether material, physical, or causal

3.2
cannot
used for statements of possibility and capability, whether material, physical, or causal

3.3
conditional
indicates requirements to be followed strictly in order to conform to the document when the specified conditions are met

3.4
mandatory
indicates requirements to be followed strictly in order to conform to the document and from which no deviation is permitted

3.5
may
indicates a course of action permissible within the limits of the document

3.6
need not
indicates a course of action permissible within the limits of the document

3.7
optional
indicates a course of action permissible within the limits of the document

3.8
referencing profile
indicates a profile that owns the definition of this class and can include a reference to this profile in its "Related Profiles" table

3.9
shall
indicates requirements to be followed strictly in order to conform to the document and from which no deviation is permitted

3.10
shall not
indicates requirements to be followed strictly in order to conform to the document and from which no deviation is permitted

3.11
should
indicates that among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required

3.12
should not
indicates that a certain possibility or course of action is deprecated but not prohibited

3.13
Power Managed Element
the computer system whose power utilization is being managed

3.14
Dynamic Power Savings Mode
power savings mode that relies on internal feedback to limit power consumption

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

4 Symbols and Abbreviated Terms

4.1
CIM
Common Information Model

5 Synopsis

Profile Name: Power Utilization Management

Version: 1.0.0

Organization: DMTF

CIM Schema Version: 2.21

Specializes: Enabled Logical Element Profile, Allocation Capabilities Profile, and Resource Allocation Profile

Central Class: CIM_PowerUtilizationManagementService

Scoping Class: CIM_ComputerSystem

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

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

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

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

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

6 Description

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

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

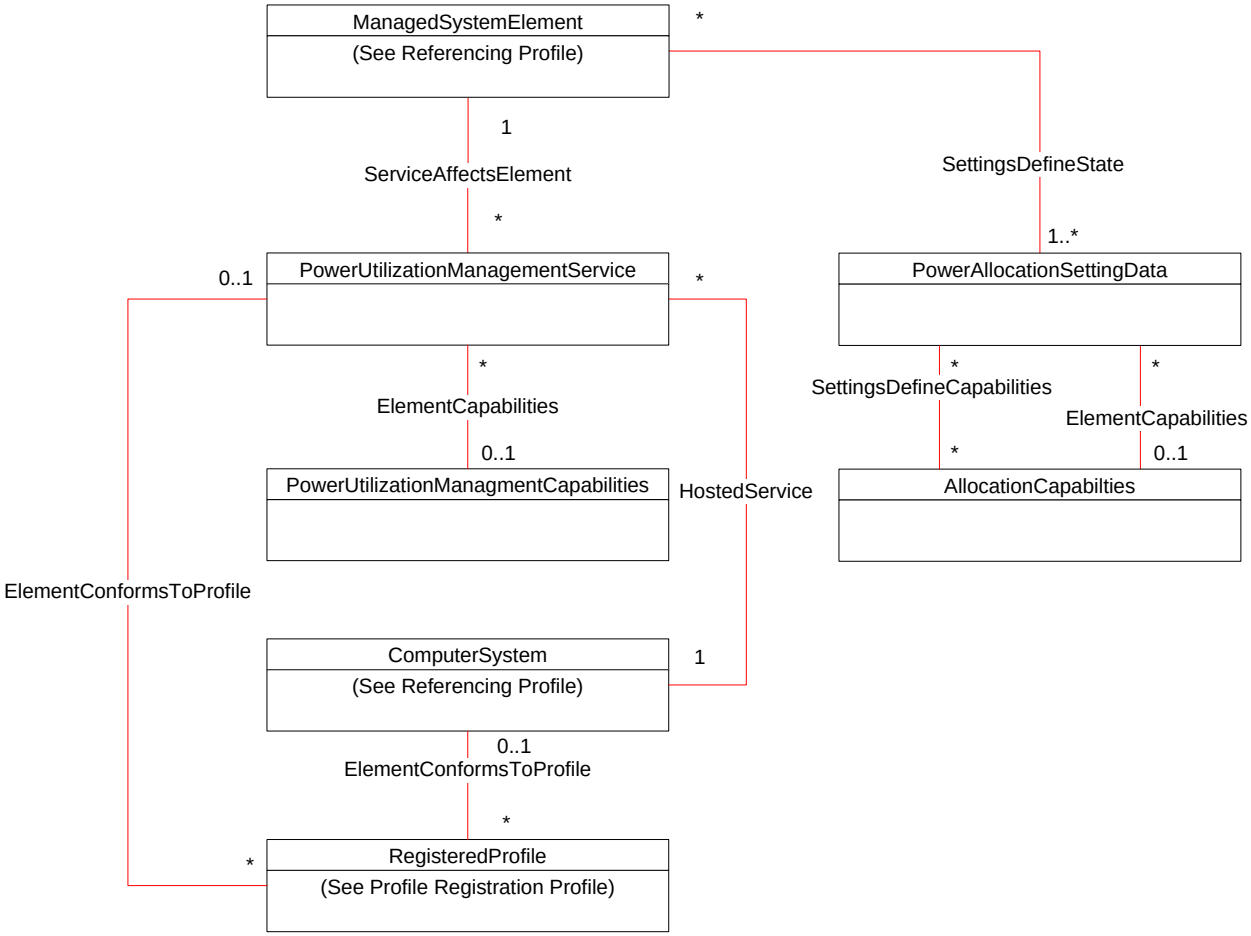


Figure 1 – Power Utilization Management Profile: Class Diagram

6.1 Power Utilization Modes

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

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

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

6.2 Capping Power Consumption

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

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

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

7 Implementation

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

7.1 Common Requirements

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

7.1.1 CIM_PowerUtilizationManagementService

There shall be one instance of CIM_PowerUtilizationManagementService implemented.

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

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

7.1.1.1 State Management of CIM_PowerUtilizationManagementService

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

7.1.1.1.1 Enabled State

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

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

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.

7.1.1.1.2 Requested State Transitions

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

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

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

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

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

7.1.1.1.3 Representing In-Progress Transitions (Optional)

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

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.

7.1.1.1.4 Representing Available Requested States (Optional)

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

7.1.2 CIM_PowerUtilizationManagementCapabilities

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

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

7.2 Power Capping

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

7.2.1 Power Aspect — CIM_PowerAllocationSettingData

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

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

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

7.3 Power Capping Levels

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

7.3.1 CIM_AllocationCapabilities

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

7.3.2 Power Configurations — CIM_PowerAllocationSettingData

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

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

8 Methods

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

8.1 CIM_PowerUtilizationManagementService.ApplyPowerAllocationSettings( )

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

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

Table 6 contains requirements for parameters of this method.

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.

8.1.1 Conditional Support

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

If this method is not implemented, the following applies:

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

8.1.2 PowerAllocationSettings Parameter

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

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

8.1.4 Method Results

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

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

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

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

- Set a return value of 4096 (Job Started).
- Set the value of the Job output parameter to refer to an instance of the CIM_ConcreteJob class that represents the asynchronous task.
- Set the values of the JobState and TimeOfLastStateChange properties in that instance to represent the state and last state change time of the asynchronous task.

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

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

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

8.1.5 Asynchronous Processing

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

8.1.5.1 Job Parameter

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

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

8.2 Profile Conventions for Operations

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

GetInstance( )
EnumerateInstances( )
EnumerateInstanceNames( )

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

Associators( )
AssociatorNames( )
References( )

ReferenceNames( )

8.3 CIM_PowerUtilizationManagementService

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

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

8.4 CIM_PowerUtilizationManagementCapabilities

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

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

8.5 CIM_PowerAllocationSettingData

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

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

8.6 CIM_AllocationSettingData

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

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

8.7 CIM_HostedService

Table 9 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless stated otherwise in Table 9, all operations in the default list in 8.2 shall be implemented as defined in DSP0200.

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

Table 9 – CIM_HostedService

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

8.8 CIM_ServiceAffectsElement

Table 10 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless stated otherwise in Table 10, all operations in the default list in 8.2 shall be implemented as defined in DSP0200.

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

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.

9.1.1 Power Utilization Modes

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

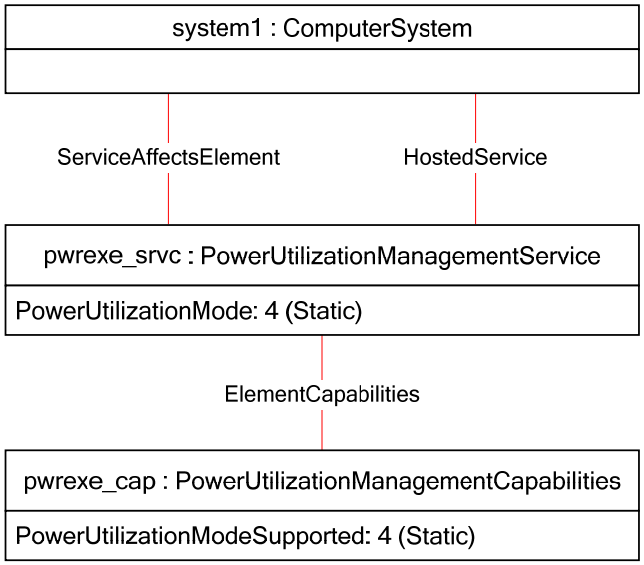


Figure 2 – Power Utilization Modes

9.1.2 Power Capping

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

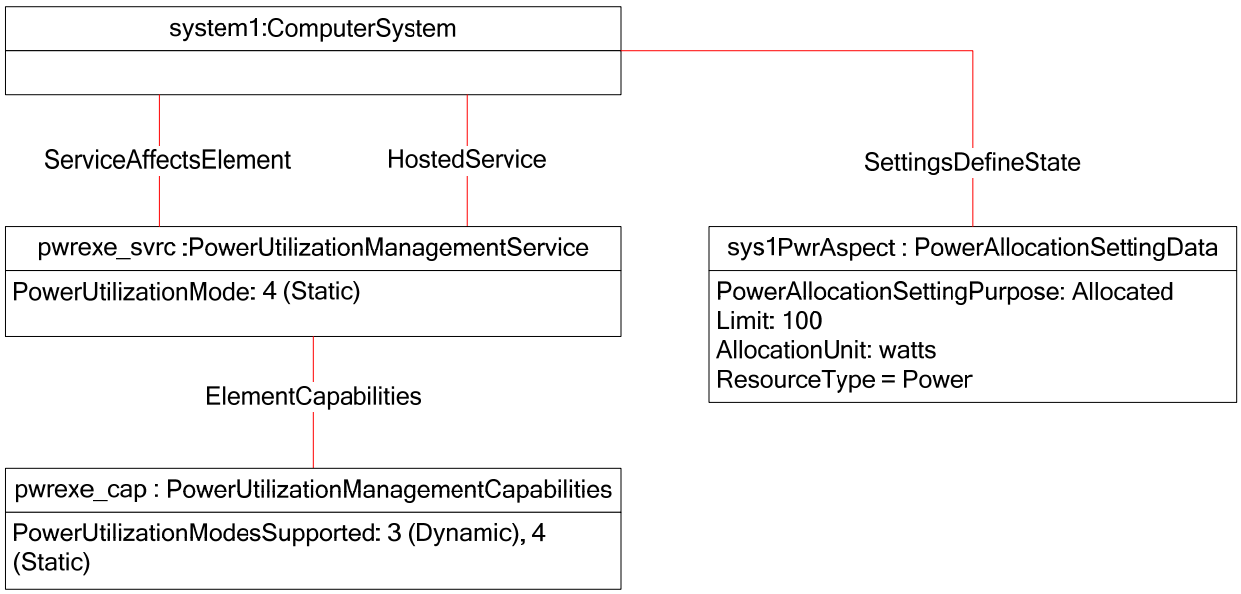


Figure 3 – Power Capping

9.1.3 Power Capping Configuration

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

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

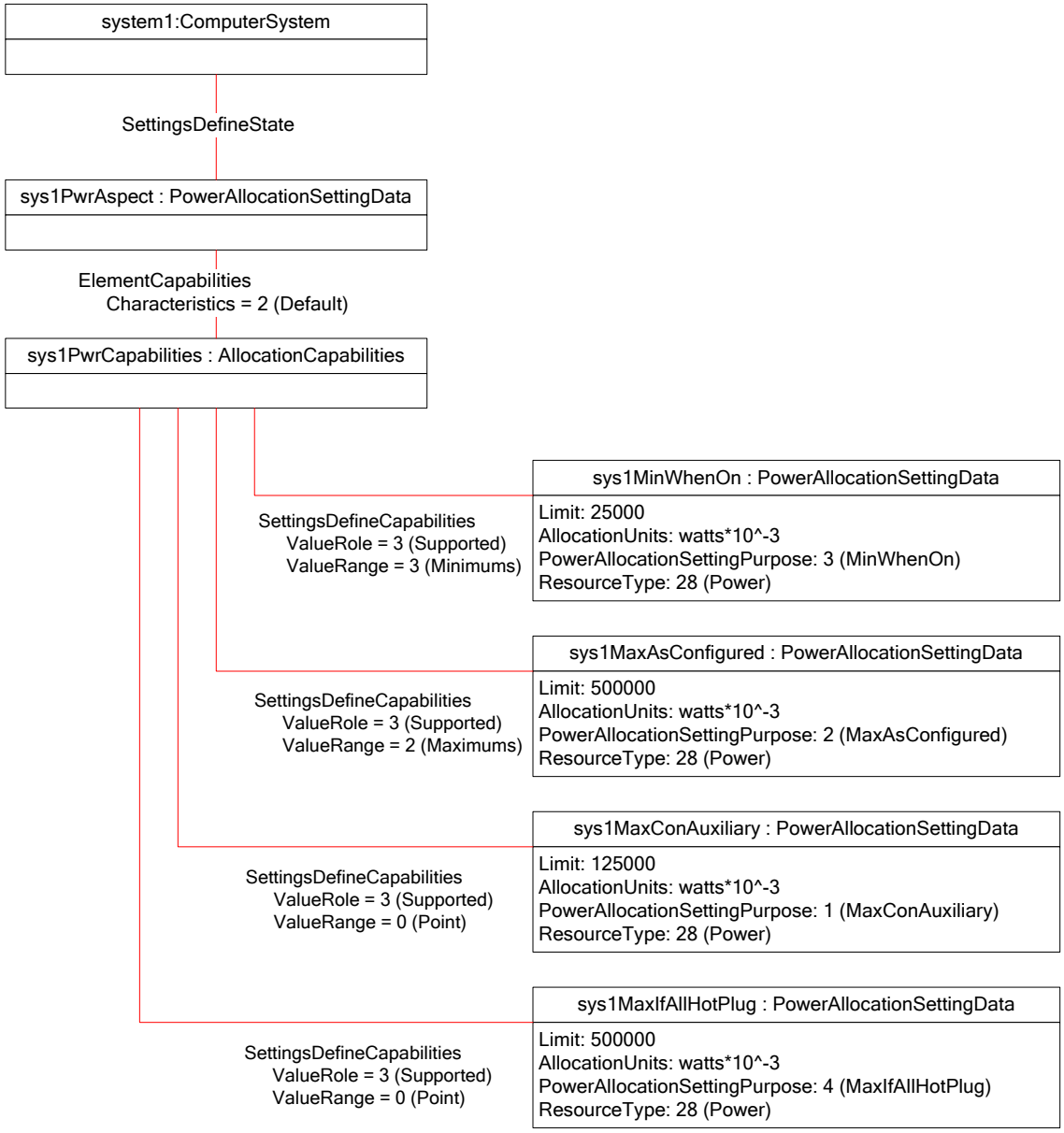
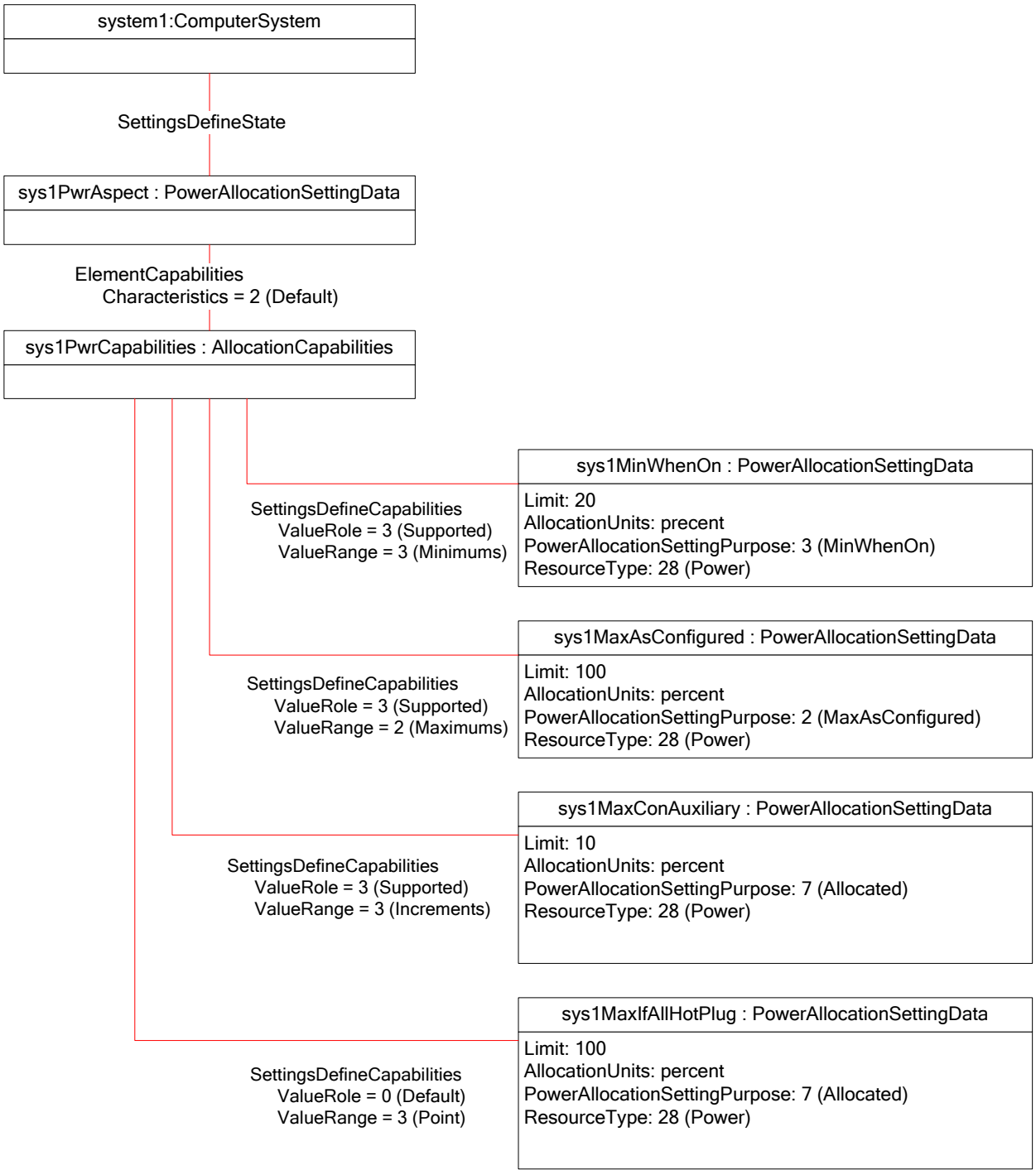


Figure 4 – Power Capping Configuration Using Watts



560

561 **Figure 5 – Power Capping Configuration Using Percent Power**

9.2 Find the Power Utilization Management Service for a Power Managed Element

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

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

9.3 Determining If State Management Is Supported

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

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

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

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

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

9.5 Change the Power Utilization Mode of a Power Managed Element

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

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

9.6 Determine the Power Utilization Modes Supported by a Power Managed Element

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

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

9.7 Determine Whether Power Capping Is Supported by a Power Managed Element

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

1) From the instance of CIM_ManagedSystemElement that represents the Power Managed Element, identify the instance of CIM_PowerUtilizationManagementService associated via an instance of CIM_ServiceAffectsElement.

2) From the instance of CIM_PowerUtilizationManagementService, find the instance of CIM_PowerUtilizationManagementCapabilities associated via CIM_ElementCapabilities. Evalute the SupportedMethods property to determine if the power capping is supported.

9.8 Determine the Power Capping value for a Power Managed Element

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

1) From the instance of CIM_ManagedSystemElement that represents the Power Managed Element identify the instance of CIM_PowerAllocationSettingData associated via an instance of CIM_SettingsDefineState.

2) The Limit property of the instance so found represents the current capping value.

9.9 Change the Power Capping value for a Power Managed Element

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

1) From the instance of CIM_ManagedSystemElement that represents the Power Managed Element identify the instance of CIM_PowerAllocationSettingData associated via an instance of CIM_SettingsDefineState.

2) Using ApplyPowerAllocationSettings method with an embedded instance parameter of PowerAllocationSettingData that has its limit and AllocationUnits properties set to the appropriate value change the power capping of the system. See 9.10 and 9.11 in determining the supported AllocationUnits.

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

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

1) From the instance of CIM_ManagedSystemElement that represents the Power Managed Element, identify the instance of CIM_PowerAllocationSettingData associated via an instance of CIM_SettingsDefineState.

2) From the instance of CIM_PowerAllocationSettingData find the instance(s) of CIM_AllocationCapabilities.that are each associated via an instance of CIM_ElementCapabilities.

3) Find all instances of CIM_PowerAllocationSettingData associated to the instance(s) of CIM_AllocationCapabilities through CIM_SettingsDefineCapabilities association where the AllocationUnit property is equal to “Watts.”

4) Evaluate, as described in DSP1043 (*AllocationCapabilities Profile*) the set of instances so found in step three to determine the valid range and any supported point settings for the power capping configuration parameters.

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

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

1) From the instance of CIM_ManagedSystemElement that represents the Power Managed Element, identify the instance of CIM_PowerAllocationSettingData associated via an instance of CIM_SettingsDefineState.

2) From the instance of CIM_PowerAllocationSettingData find the instance(s) of CIM_AllocationCapabilities.that are each associated via an instance of CIM_ElementCapabilities.

3) Find all instances of CIM_PowerAllocationSettingData associated to the instance(s) of CIM_AllocationCapabilities through CIM_SettingsDefineCapabilities association where the AllocationUnit property is equal to “Percent.”

4) Evaluate, as described in DSP1043 (*AllocationCapabilities Profile*) the set of instances so found in step three to determine the valid range and any supported point settings for the power capping configuration parameters.

10 CIM Elements

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

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		

10.1 CIM_PowerUtilizationManagementService

CIM_PowerUtilizationManagementService represents the power utilization management service responsible for controlling the power utilization mode of a Power Managed Element. Table 17 contains the requirements for elements of this class. The constraints specified for CIM_PowerUtilizationManagementService are in addition to those specified for CIM_EnabledLogicalElement in the *Enabled Logical Element Profile*.

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.

10.2 CIM_PowerUtilizationManagementCapabilities

CIM_PowerUtilizationManagementCapabilities represents the power utilization modes capabilities of a Power Managed Element. Table 18 contains the requirements for elements of this class. See DSP1080 for further requirements.

Table 18 – Class: CIM_PowerUtilizationManagementCapabilities

Properties	Requirement	Notes
InstanceID	Mandatory	**Key**
PowerUtilizationModesSupported	Mandatory	
SupportedMethods	Mandatory	

10.3 CIM_ServiceAffectsElement

CIM_ServiceAffectsElement associates the CIM_ManagedSystemElement instance that represents the target Power Managed Element with the CIM_PowerUtilizationManagementService instance that represents the service responsible for controlling the power utilization modes of a Power Managed 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

10.6 CIM_PowerAllocationSettingData (CIM_ManagedSystemElement)

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

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)

10.7 CIM_SettingsDefineState

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

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

10.8 CIM_AllocationCapabilities

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

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).

10.9 CIM_ElementCapabilities (CIM_AllocationCapabilities)

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

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

10.10 CIM_PowerAllocationSettingData (CIM_AllocationCapabilities)

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

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

10.11 CIM_SettingsDefineCapabilities

CIM_SettingsDefineCapabilities instance associates the CIM_AllocationCapabilities instance, which represents the type of the allocation allowed by the Power Managed Element, with the CIM_PowerAllocationSettingData instances that represent the configuration and operational parameters associated with the power capping aspect of a Power Managed Element. Table 27 contains the 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 # ANNEX A
730 # (Informative)
731
732 # Change Log

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

733