Document Identifier: DSP1037

Date: 2019-01-29

Version: 1.0.4

DHCP Client Profile

Supersedes: 1.0.3

Document Class: Norrmative

Document Status: Published

Document Language: en-US

CONTENTS

Figures

Tables

Foreword

The *DHCP Client Profile* (DSP1037) was prepared by the Server Management Working Group, the Physical Platform Profiles Working Group and the Server Desktop Mobile Platforms Working Group of the DMTF.

DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and systems management and interoperability. For information about the DMTF, see http://www.dmtf.org.

Acknowledgments

The DMTF acknowledges the following individuals for their contributions to this document:

Editors:

- Jim Davis – WBEM Solutions
- Jeff Hilland – Hewlett Packard Enterprise
- Aaron Merkin – IBM
- Hemal Shah – Broadcom
- Satheesh Thomas – AMI

Contributors:

- Jon Hass – Dell
- Jeff Hilland – Hewlett Packard Enterprise
- John Leung – Intel
- Aaron Merkin – IBM
- Khachatur Papanyan – Dell
- Sivakumar Sathappan – AMD
- Hemal Shah – Broadcom
- Christina Shaw – Hewlett Packard Enterprise
- Enoch Suen – Dell
- Perry Vincent – Intel

Introduction

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

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.

Document conventions

Typographical conventions

The following typographical conventions are used in this document:

- Document titles are marked in *italics*.
- ABNF rules are in monospaced font.

ABNF usage conventions

Format definitions in this document are specified using ABNF (see RFC5234), with the following deviations:

- Literal strings are to be interpreted as case-sensitive Unicode characters, as opposed to the definition in RFC5234 that interprets literal strings as case-insensitive US-ASCII characters.

Deprecated material

Deprecated material is not recommended for use in new development efforts. Existing and new implementations may use this material, but they shall move to the favored approach as soon as possible. CIM service shall implement any deprecated elements as required by this document in order to achieve backwards compatibility. Although CIM clients may use deprecated elements, they are directed to use the favored elements instead.

Deprecated material should contain references to the last published version that included the deprecated material as normative material and to a description of the favored approach.

The following typographical convention indicates deprecated material:

DEPRECATED

Deprecated material appears here.

DEPRECATED

In places where this typographical convention cannot be used (for example, tables or figures), the "DEPRECATED" label is used alone.

Experimental material

Experimental material has yet to receive sufficient review to satisfy the adoption requirements set forth by the DMTF. Experimental material is included in this document as an aid to implementers who are interested in likely future developments. Experimental material may change as implementation experience is gained. It is likely that experimental material will be included in an upcoming revision of the document. Until that time, experimental material is purely informational.

The following typographical convention indicates experimental material:

EXPERIMENTAL

Experimental material appears here.

EXPERIMENTAL

In places where this typographical convention cannot be used (for example, tables or figures), the "EXPERIMENTAL" label is used alone.

186

187 # DHCP Client Profile

188 ## 1 Scope

189 The *DHCP Client Profile* extends the management capability of referencing profiles by adding the
190 capability to represent a DHCP client that is associated with an IP interface.

191 ## 2 Normative references

192 The following referenced documents are indispensable for the application of this document. For dated or
193 versioned references, only the edition cited (including any corrigenda or DMTF update versions) applies.
194 For references without a date or version, the latest published edition of the referenced document
195 (including any corrigenda or DMTF update versions) applies.

196 DMTF DSP0004, *CIM Infrastructure Specification 2.7*,
197 http://www.dmtf.org/standards/published_documents/DSP0004_2.7.pdf

198 DMTF DSP0200, *CIM Operations over HTTP 1.3,*
199 https://www.dmtf.org/sites/default/files/standards/documents/DSP0200_1.3.pdf

200 DMTF DSP1001, *Management Profile Specification Usage Guide 1.1*,
201 http://www.dmtf.org/standards/published_documents/DSP1001_1.1.pdf

202 DMTF DSP1033, *Profile Registration Profile 1.0,*
203 https://www.dmtf.org/sites/default/files/standards/documents/DSP1033_1.0.pdf

204 DMTF DSP1036, *IP Interface Profile 1.0*,
205 http://www.dmtf.org/standards/published_documents/DSP1036_1.0.pdf

206 IETF RFC2131, *Dynamic Host Configuration Protocol*, March 1997, http://www.ietf.org/rfc/rfc2131.txt

207 IETF RFC3315, *Dynamic Host Configuration Protocol for IPv6 (DHCPv6)*, July 2003,
208 http://www.ietf.org/rfc/rfc3315.txt

209 IETF RFC4291, *IP Version 6 Addressing Architecture*, February 2006, http://www.ietf.org/rfc/rfc4291.txt

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

212 ## 3 Terms and definitions

213 In this document, some terms have a specific meaning beyond the normal English meaning. Those terms
214 are defined in this clause.

215 The terms "shall" ("required"), "shall not", "should" ("recommended"), "should not" ("not recommended"),
216 "may", "need not" ("not required"), "can" and "cannot" in this document are to be interpreted as described
217 in ISO/IEC Directives, Part 2, Clause 7. The terms in parenthesis are alternatives for the preceding term,
218 for use in exceptional cases when the preceding term cannot be used for linguistic reasons. Note that
219 ISO/IEC Directives, Part 2, Clause 7 specifies additional alternatives. Occurrences of such additional
220 alternatives shall be interpreted in their normal English meaning.

221 The terms "clause", "subclause", "paragraph", and "annex" in this document are to be interpreted as
222 described in ISO/IEC Directives, Part 2, Clause 6.

The terms "normative" and "informative" in this document are to be interpreted as described in ISO/IEC Directives, Part 2, Clause 3. In this document, clauses, subclauses, or annexes labeled "(informative)" do not contain normative content. Notes and examples are always informative elements.

The terms defined in DSP0004, DSP0223, and DSP1001 apply to this document. The following additional terms are used in this document.

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 to conform to the document when the specified conditions are met

3.4
mandatory

indicates requirements to be followed strictly 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 “Referenced Profiles” table

3.9
shall

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

3.10
shall not

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

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

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

3.13
unspecified
indicates that this profile does not define any constraints for the referenced CIM element or operation

4 Symbols and abbreviated terms

The following abbreviations are used in this document.

4.1
DHCP
Dynamic Host Configuration Protocol

4.2
IP
Internet Protocol

5 Synopsis

Profile Name: DHCP Client

Version: 1.0.4

Organization: DMTF

CIM Schema Version: 2.27

Central Class: CIM_DHCPProtocolEndpoint

Scoping Class: CIM_ComputerSystem

The *DHCP Client Profile* extends the capability of referencing profiles by adding the capability to manage a DHCP client and its associated capabilities and configuration. Table 1 identifies profiles on which this profile has a dependency.

Table 1 – Referenced profiles

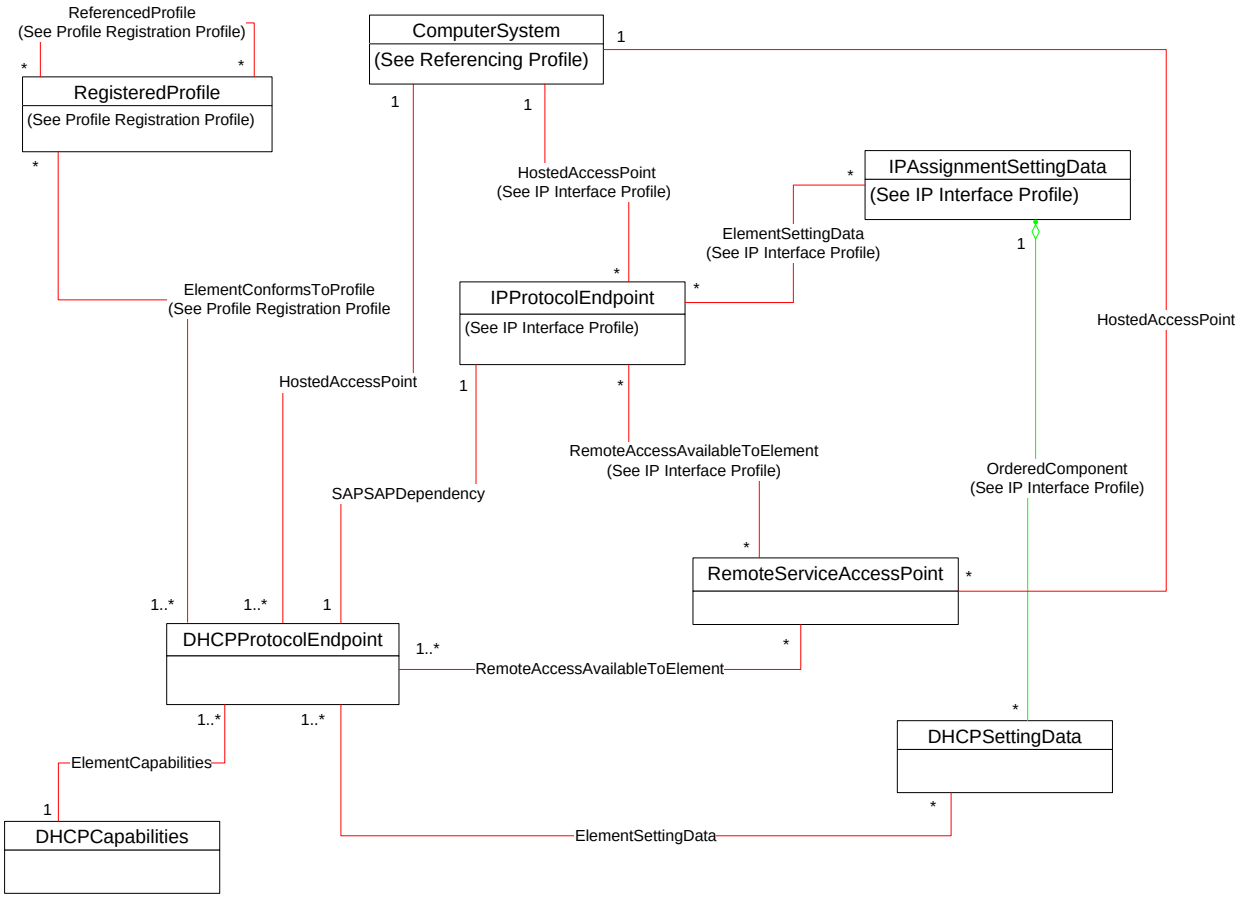
Profile Name	Organization	Version	Requirement	Description
Profile Registration	DMTF	1.0	Mandatory	None
IP Interface	DMTF	1.0	Mandatory	See 7.2.1.

6 Description

The *DHCP Client Profile* extends the management capability of referencing profiles by adding the capability to represent a DHCP client and its associated capabilities and configuration. The DHCP client

295 is modeled with an instance of CIM_DHCPProtocolEndpoint. The DHCP client's capabilities are modeled
296 with an instance of CIM_DHCPCapabilities. Aspects of the DHCP client's configuration are modeled with
297 properties of DHCPProtocolEndpoint as well as with CIM_DHCPSettingData.

298 Figure 1 represents the class schema for the *DHCP Client Profile*. For simplicity, the prefix CIM_ has
299 been removed from the names of the classes.



300

301 **Figure 1 – DHCP Client Profile: Class diagram**

302 7 Implementation

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

305 7.1 DHCP server representation

306 When the DHCP client successfully acquires a configuration from a DHCP server, an instance of
307 CIM_RemoteServiceAccessPoint shall represent the DHCP server from which the DHCP client received
308 its configuration.

7.1.1 CIM_RemoteServiceAccessPoint.AccessInfo

The value of the AccessInfo property of each instance of CIM_RemoteServiceAccessPoint shall be the IP address of the DHCP server. If the value of CIM_RemoteServiceAccessPoint.InfoFormat is 3 (IPv4 Address), then the value of the property shall be expressed in dotted decimal notation as defined in IETF RFC1208.

If the value of CIM_RemoteServiceAccessPoint.InfoFormat is 4 (IPv6 Address), then the value of the property shall be expressed in the notation as defined in IETF RFC4291, section 2.2.

7.1.2 CIM_RemoteServiceAccessPoint.InfoFormat

The value of the InfoFormat property shall be a value of 3 (IPv4 Address) or a value of 4 (IPv6 Address).

7.1.3 Representing multiple DHCP servers

An instance of CIM_RemoteServiceAccessPoint may represent each DHCP server that responded to the client's DHCPDISCOVER message.

7.2 DHCP client representation

The DHCP client shall be modeled using an instance of CIM_DHCPProtocolEndpoint.

7.2.1 Relationship with CIM_IPProtocolEndpoint

The DHCP client is associated with a single IP interface, which is instrumented according to *the IP Interface Profile* (DSP1036). A single instance of CIM_SAPSAPDependency shall associate the Central Instance with the CIM_IPProtocolEndpoint defined in DSP1036.

7.2.1.1 CIM_SAPSAPDependency.Dependent

A reference to the CIM_DHCPProtocolEndpoint instance shall be the value of the Dependent property of the CIM_SAPSAPDependency instance.

7.2.1.2 CIM_SAPSAPDependency.Antecedent

A reference to the CIM_IPProtocolEndpoint instance shall be the value of the Antecedent property of the CIM_SAPSAPDependency instance.

7.3 Managing the DHCP client's state

This clause describes the use of the EnabledState property to represent the state of an instance of CIM_DHCPProtocolEndpoint.

7.3.1 CIM_DHCPProtocolEndpoint.RequestedState

When the last configuration process of the associated IP interface includes the use of the DHCP client to acquire all or part of the configuration, the value of the RequestedState property of the CIM_DHCPProtocolEndpoint instance shall be 2 (Enabled), regardless of whether the configuration was successfully obtained. This value indicates that the configuration process included an attempt to use DHCP.

When the last configuration process of the associated IP interface does not include an attempt to use the DHCP client, the value of the RequestedState property of the CIM_DHCPProtocolEndpoint instance shall be 3 (Disabled). This value indicates that the configuration process did not include an attempt to use DHCP.

Before a configuration is applied to the associated IP interface, the value of the CIM_DHCPProtocolEndpoint.RequestedState property shall be 5 (No Change).

7.3.2 CIM_DHCPProtocolEndpoint.EnabledState

Valid values for the CIM_DHCPProtocolEndpoint.EnabledState property shall be 2 (Enabled), 3 (Disabled), or 6 (Enabled but Offline).

7.3.2.1 Enabled

The EnabledState property shall have a value of 2 (Enabled) when the CIM_DHCPProtocolEndpoint.ClientState property has a value of 8 (Bound).

7.3.2.2 Enabled but Offline

The EnabledState property shall have a value of 6 (Enabled but Offline) when the CIM_DHCPProtocolEndpoint.ClientState property has a value other than 8 (Bound) or 0 (Unknown). This value shall indicate that the DHCP client is actively attempting to acquire a configuration for the associated IP interface.

7.3.2.3 Disabled

The EnabledState property shall have a value of 3 (Disabled) when the DHCP client is disabled for the associated IP interface. This value is appropriate when the DHCP client is not actively attempting to acquire a configuration either because the last configuration applied to the associated IP interface did not use DHCP or because the DHCP client failed to acquire a configuration and was disabled.

7.3.3 CIM_DHCPProtocolEndpoint.ClientState

When the CIM_DHCPProtocolEndpoint.EnabledState property has a value other than 3 (Disabled), the CIM_DHCPProtocolEndpoint.ClientState property shall identify the current status of the DHCP client following the state diagram illustrated in Figure 5 of IETF RFC2131.

When the CIM_DHCPProtocolEndpoint.EnabledState property has a value of 3 (Disabled), the CIM_DHCPProtocolEndpoint.ClientState property shall have the value 0 (Unknown).

7.3.4 Modifying ElementName is supported

This clause describes the CIM elements and behaviors that shall be implemented when the CIM_DHCPProtocolEndpoint.ElementName property supports being modified by the ModifyInstance operation.

7.3.4.1 CIM_DHCPCapabilities

For the instance of CIM_DHCPCapabilities that is associated with the Central Instance through an instance of CIM_ElementCapabilities, the CIM_DHCPCapabilities.ElementNameEditSupported property shall have a value of TRUE when the implementation supports client modification of the CIM_DHCPProtocolEndpoint.ElementName property. The CIM_DHCPCapabilities.MaxElementNameLen property shall be implemented.

7.3.5 Modifying ElementName is not supported

This clause describes the CIM elements and behaviors that shall be implemented when the CIM_DHCPProtocolEndpoint.ElementName property does not support being modified by the ModifyInstance operation.

7.3.5.1 CIM_DHCPCapabilities

For the instance of CIM_DHCPCapabilities that is associated with the Central Instance through an instance of CIM_ElementCapabilities, the CIM_DHCPCapabilities.ElementNameEditSupported property shall have a value of FALSE when the implementation does not support client modification of the CIM_DHCPProtocolEndpoint.ElementName property. The CIM_DHCPCapabilities.MaxElementNameLen property may be implemented. The MaxElementNameLen property is irrelevant in this context.

7.4 DHCP client capabilities

Exactly one instance of CIM_DHCPCapabilities shall be associated with the Central Instance through an instance of CIM_ElementCapabilities.

7.5 DHCP client-server relationship

A DHCP client will receive its configuration from exactly one DHCP server. An instance of CIM_RemoteAccessAvailableToElement shall associate each CIM_RemoteServiceAccessPoint instance that represents a DHCP server to the CIM_DHCPProtocolEndpoint instance that represents the DHCP client. Instrumentation of CIM_RemoteAccessAvailableToElement is conditional upon instrumentation of CIM_RemoteServiceAccessPoint.

7.5.1 Identifying the DHCP server that provides configuration

When more than one instance of CIM_RemoteServiceAccessPoint is associated with the CIM_DHCPProtocolEndpoint instance through an instance of CIM_RemoteAccessAvailableToElement, the CIM_RemoteAccessAvailableToElement.OrderOfAccess property shall be implemented. For each instance of CIM_RemoteAccessAvailableToElement that associates the CIM_DHCPProtocolEndpoint instance with an instance of CIM_RemoteServiceAccessPoint that represents a DHCP server from which the DHCP client did not receive the IP configuration, the OrderOfAccess property shall have the value 0 (zero). For the instance of CIM_RemoteAccessAvailableToElement that associates the CIM_DHCPProtocolEndpoint instance with the instance of CIM_RemoteServiceAccessPoint that represents the DHCP server from which the DHCP client received the IP configuration, the OrderOfAccess property shall have the value 1.

When exactly one instance of CIM_RemoteServiceAccessPoint is associated with the instance of CIM_DHCPProtocolEndpoint through an instance of CIM_RemoteAccessAvailableToElement, the CIM_RemoteAccessAvailableToElement.OrderOfAccess property may be implemented. If the CIM_RemoteAccessAvailableToElement.OrderOfAccess property is implemented, the property shall have the value 1.

7.6 Alternate DHCP configuration

An implementation may support the management of alternate configurations for the associated IP interface that uses DHCP. The representation of alternate configurations is described in general in the DSP1036. The configuration of the DHCP client as part of an alternate configuration for the associated IP interface is optional behavior that is defined in this clause.

When an alternate configuration for the associated IP interface includes the configuration of the DHCP client, at least one instance of CIM_DHCPSettingData shall be associated with the CIM_DHCPProtocolEndpoint instance through an instance of CIM_ElementSettingData. The CIM_ElementSettingData instance is conditional on the existence of an instance of CIM_DHCPSettingData.

7.6.1 Applying an alternate configuration

When an instance of CIM_DHCPSettingData is applied to the CIM_DHCPProtocolEndpoint instance, the DHCP client shall transition to the INIT state and the value of the ClientState property of the

CIM_DHCPProtocolEndpoint instance shall be 2 (Init). The values specified in applicable properties of the CIM_DHCPSettingData shall be used by the DHCP client during the binding acquisition process.

7.6.1.1 Successful application of settings

DHCP settings shall be considered to be successfully applied if the DHCP client transitions to a client state of Bound and the ClientState property of the CIM_DHCPProtocolEndpoint has the value 8 (Bound).

8 Methods

This clause details the requirements for supporting intrinsic operations for the CIM elements defined by this profile. No extrinsic methods are specified by this profile.

8.1 Profile conventions for operations

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

The default list of operations is as follows:

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

8.2 CIM_DHCPCapabilities

All operations in the default list in 8.1 shall be implemented as defined in DSP0200.

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

8.3 CIM_DHCPProtocolEndpoint

Table 2 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 2, all operations in the default list in 8.1 shall be implemented as defined in DSP0200.

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

Table 2 – Operations: CIM_DHCPProtocolEndpoint

Operation	Requirement	Messages
ModifyInstance	Optional. See 8.3.1.	None

8.3.1 CIM_DHCPProtocolEndpoint — ModifyInstance operation

This clause details the specific requirements for the ModifyInstance operation applied to an instance of CIM_DHCPProtocolEndpoint.

8.3.1.1 CIM_DHCPProtocolEndpoint.ElementName property

When an instance of CIM_DHCPCapabilities is associated with the CIM_DHCPProtocolEndpoint instance and the CIM_DHCPCapabilities.ElementNameEditSupported property has a value of TRUE, the implementation shall allow the ModifyInstance operation to change the value of the ElementName property of the CIM_DHCPProtocolEndpoint instance. The ModifyInstance operation shall enforce the length restriction specified in the MaxElementNameLen property of the CIM_DHCPCapabilities instance.

When no instance of CIM_DHCPCapabilities is associated with the CIM_DHCPProtocolEndpoint instance, or the ElementNameEditSupported property of the CIM_DHCPCapabilities has a value of FALSE, the implementation shall not allow the ModifyInstance operation to change the value of the ElementName property of the CIM_DHCPProtocolEndpoint instance.

8.4 CIM_DHCPSettingData

All operations in the default list in 8.1 shall be implemented as defined in DSP0200.

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

8.5 CIM_ElementCapabilities

Table 3 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 3, all operations in the default list in 8.1 shall be implemented as defined in DSP0200.

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

Table 3 – Operations: CIM_ElementCapabilities

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

8.6 CIM_ElementSettingData

Table 4 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 4, all operations in the default list in 8.1 shall be implemented as defined in DSP0200.

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

Table 4 – Operations: CIM_ElementSettingData

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

8.7 CIM_SAPSAPDependency

Table 5 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 5, all operations in the default list in 8.1 shall be implemented as defined in DSP0200.

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

Table 5 – Operations: CIM_SAPSAPDependency

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

8.8 CIM_HostedAccessPoint

Table 6 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 6, all operations in the default list in 8.1 shall be implemented as defined in DSP0200.

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

Table 6 – Operations: CIM_HostedAccessPoint

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

8.9 CIM_RemoteAccessAvailableToElement

Table 7 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 7, all operations in the default list in 8.1 shall be implemented as defined in DSP0200.

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

Table 7 – Operations: CIM_RemoteAccessAvailableToElement

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

8.10 CIM_RemoteServiceAccessPoint

All operations in the default list in 8.1 shall be implemented as defined in DSP0200.

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

9 Use cases

This clause contains object diagrams and use cases for the *DHCP Client Profile*.

9.1 Object diagrams

The object diagram in Figure 2 shows one method for advertising conformance with the *DHCP Client Profile*. The instance of CIM_RegisteredProfile is used to identify the version of the *DHCP Client Profile* with which an instance of CIM_DHCPProtocolEndpoint and its associated instances are conformant. An instance of CIM_RegisteredProfile exists for each profile instrumented in the system.

- profile3 identifies the DMTF *Base Server Profile* version 1.0.0.
- profile1 identifies the DMTF *DHCP Client Profile* version 1.0.2.
- profile2 identifies the DMTF *IP Interface Profile* version 1.0.0.

The *IP Interface Profile* (DSP1036) is specified as mandatory to be implemented when this profile is implemented. The CIM_DHCPProtocolEndpoint instance is scoped to an instance of CIM_ComputerSystem. This instance of CIM_ComputerSystem is conformant with the DMTF *Base Server Profile* version 1.0.0 as indicated by the CIM_ElementConformsToProfile association with the CIM_RegisteredProfile instance. The CIM_ComputerSystem instance is the Scoping Instance for the CIM_DHCPProtocolEndpoint. By following the CIM_ReferencedProfile association, a client can determine that the CIM_DHCPProtocolEndpoint instance is conformant with the version of the *DHCP Client Profile* identified by profile1.

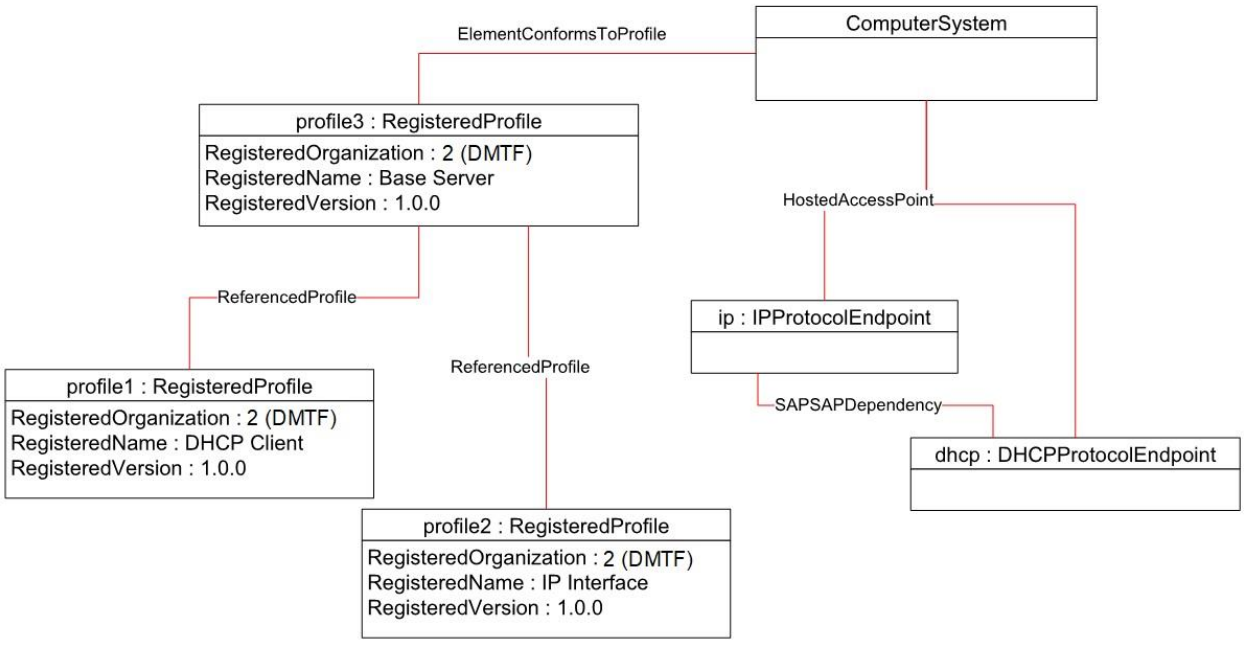


Figure 2 – Registered profile

The object diagram in Figure 3 illustrates an implementation in which an IP interface was successfully configured through DHCP. The CIM_DHCPProtocolInstance.ClientState property has a value of "Bound" indicating that a configuration was successfully obtained. DHCPServer is the instance of CIM_RemoteServiceAccessPoint that represents the DHCP server contacted by the DHCP client. The value of the CIM_IPProtocolEndpoint.AddressOrigin property is "DHCP" indicating that the IP configuration was obtained through DHCP.

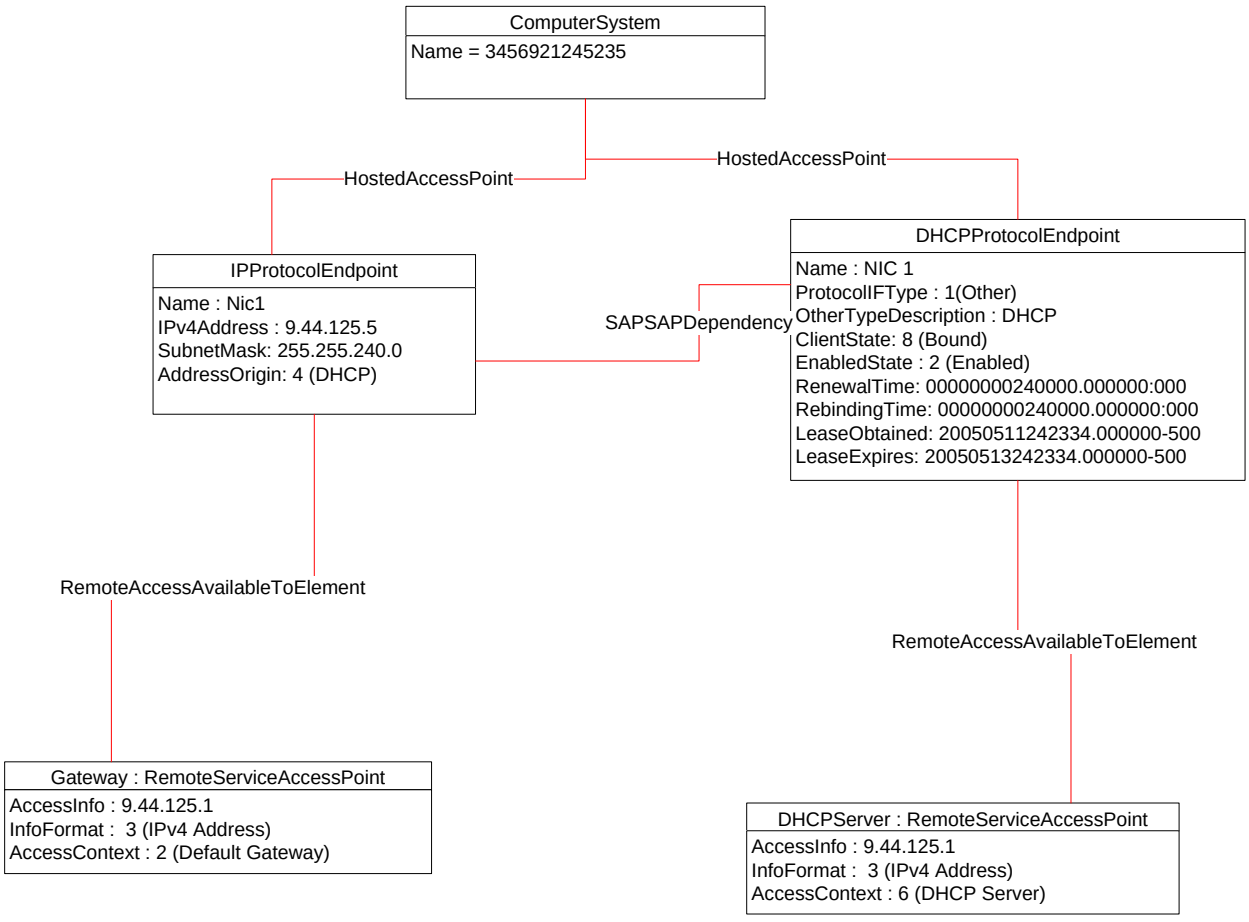
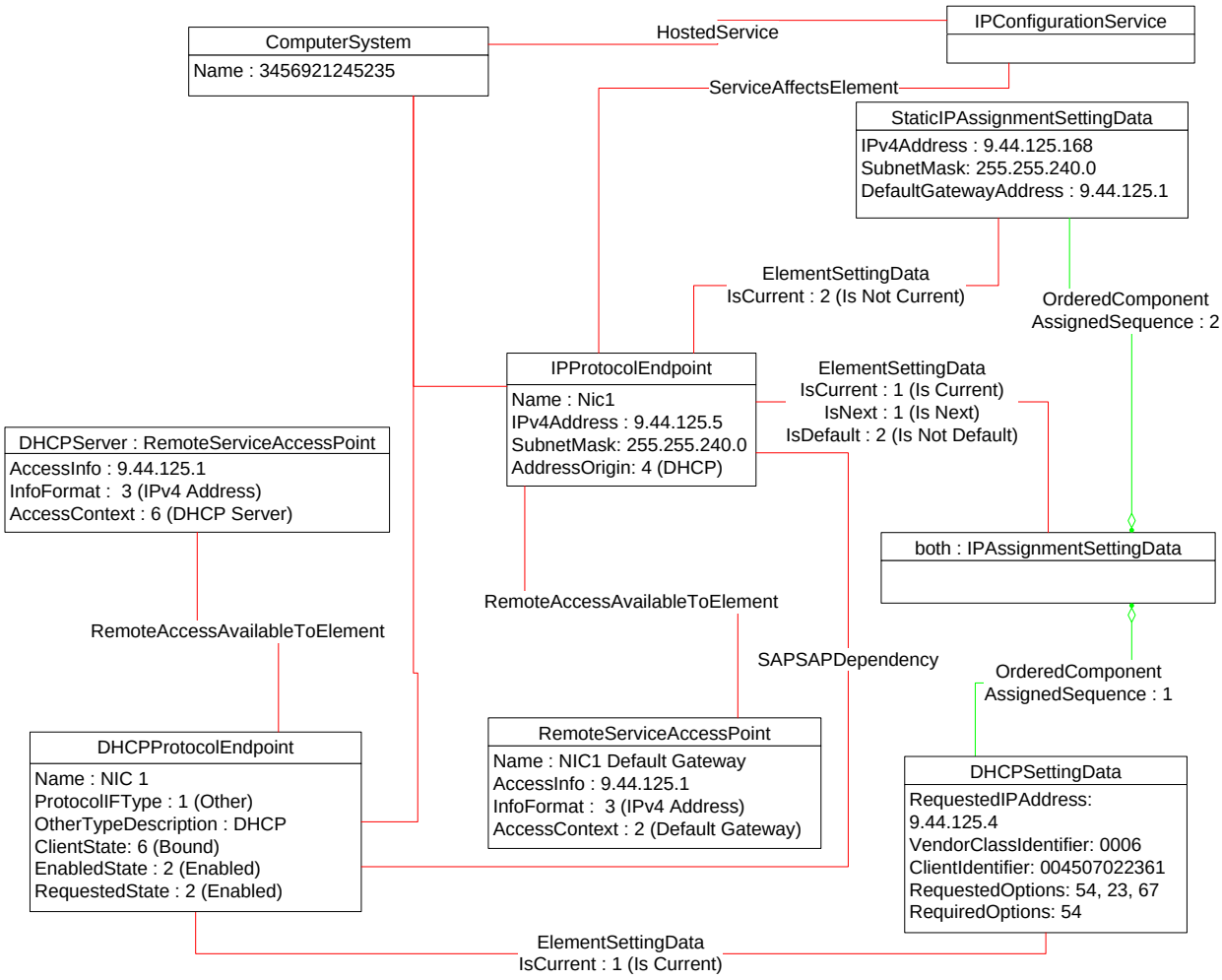


Figure 3 – DHCP assigned IP configuration

The object diagram in Figure 4 illustrates an implementation similar to that of Figure 3, with the addition of the optional configuration management functionality of DSP1036. The CIM_DHCPProtocolEndpoint.ClientState property has a value of "Bound", indicating that a configuration was successfully obtained. DHCPServer is the instance of CIM_RemoteServiceAccessPoint that represents the DHCP server contacted by the DHCP client. The value of the CIM_IPProtocolEndpoint.AddressOrigin property is "DHCP", indicating that the IP configuration was obtained through DHCP. The IsCurrent property of the CIM_ElementSettingData instance that associates the CIM_StaticIPAssignmentSettingData instance with the CIM_IPProtocolEndpoint instance has a value of 2 (Is Not Current). This value indicates that the static configuration was not applied for the IP interface. The IsCurrent property of the instance of CIM_ElementSettingData that associates the CIM_DHCPSettingData instance with the CIM_DHCPProtocolEndpoint instance has a value of 1 (Is Current), indicating that the CIM_DHCPSettingData was applied.



545

546 **Figure 4 – DHCP assigned IP configuration with configuration management**

547 The object diagram in Figure 5 provides an example of an IP interface that was configured to default to a
548 statically assigned IP configuration if the DHCP client failed to obtain a configuration from a DHCP server.
549 In this implementation, configuration management is not supported, so no instance of
550 CIM_IPAssignmentSettingData is associated with the CIM_IPProtocolEndpoint instance to represent the
551 configuration that was applied to the IP interface.

552 The RequestedState property of the CIM_DHCPProtocolEndpoint has a value of "Enabled", indicating
553 that the DHCP client did attempt to acquire a configuration. The EnabledState and ClientState properties
554 of the CIM_DHCPProtocolEndpoint instance indicate that the DHCP client is now disabled. No instance of
555 CIM_RemoteServiceAccessPoint is associated with the CIM_DHCPProtocolEndpoint instance because
556 the DHCP client failed to communicate with a DHCP server.

557 The AddressOrigin property of the CIM_IPProtocolEndpoint instance reflects that the address was
558 assigned statically.

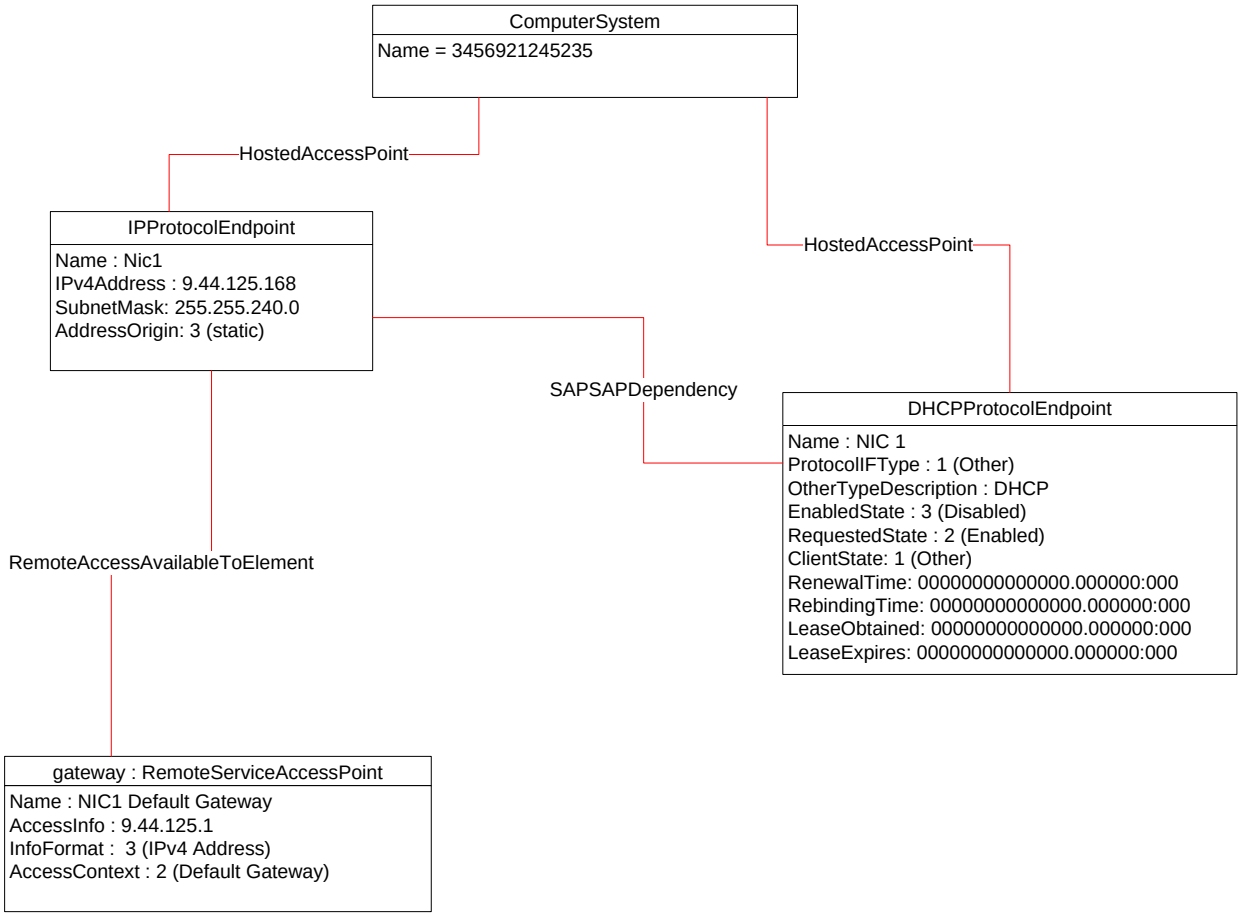


Figure 5 – DHCP timeout to static

The object diagram in Figure 6 provides an example of an IP interface that was configured to default to a statically assigned IP configuration if the DHCP client failed to obtain a configuration from a DHCP server. The instance of CIM_IPAssignmentSettingData associated with the CIM_IPProtocolEndpoint instance is for a configuration in which the CIM_DHCPSettingData is applied first, resulting in the DHCP client being enabled.

The DHCP client failed to acquire a configuration from the DHCP server. The EnabledState and ClientState properties of the CIM_DHCPProtocolEndpoint instance indicate that the DHCP client is now disabled. No instance of CIM_RemoteServiceAccessPoint is associated with the CIM_DHCPProtocolEndpoint because the DHCP client failed to communicate with a DHCP server.

The CIM_StaticIPAssignmentSettingData was then used to configure the IP interface, which is indicated by the IsCurrent property of the referencing instance of CIM_ElementSettingData having a value of 1 (Is Current).

The AddressOrigin property of the CIM_IPProtocolEndpoint instance reflects that the address was assigned statically.

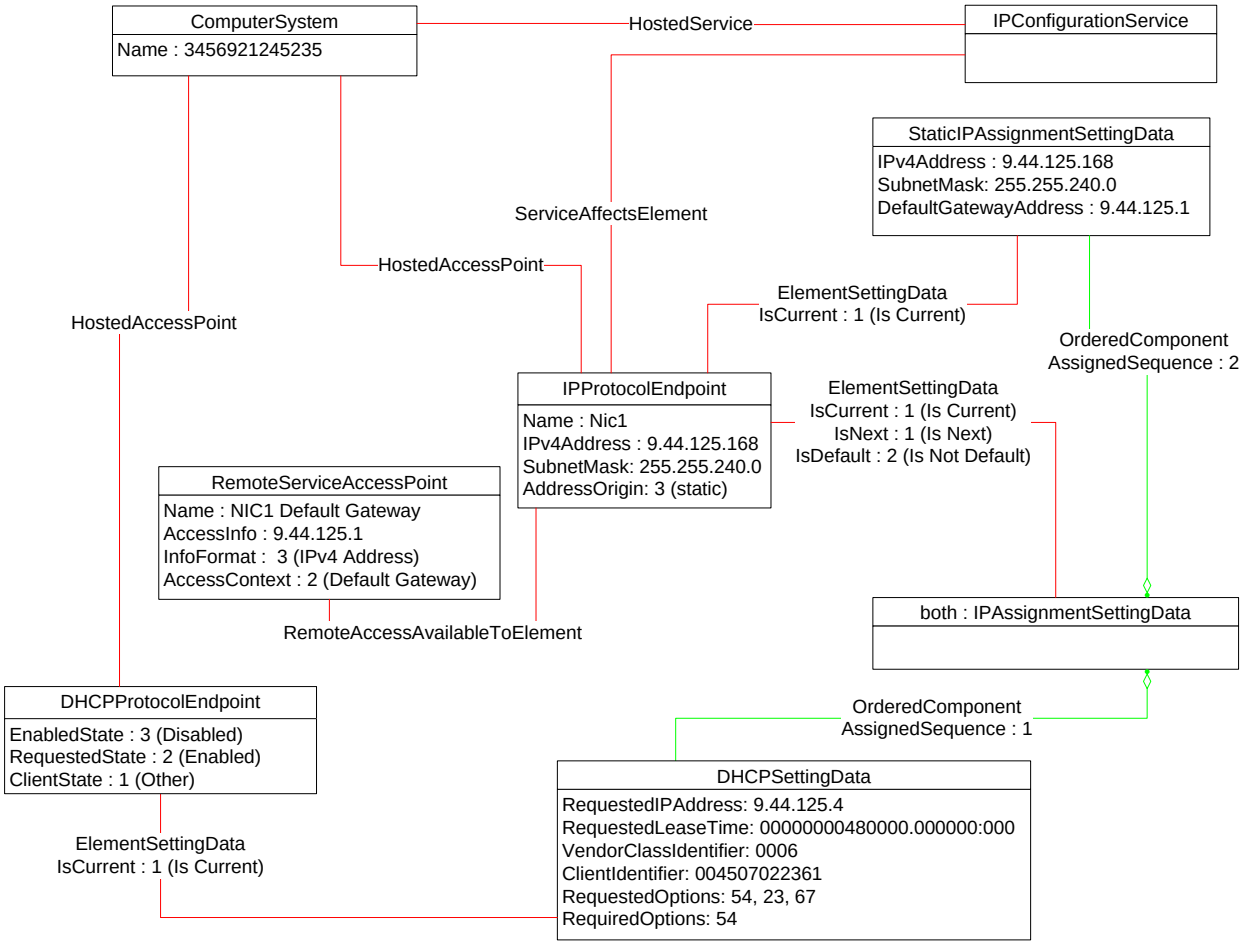
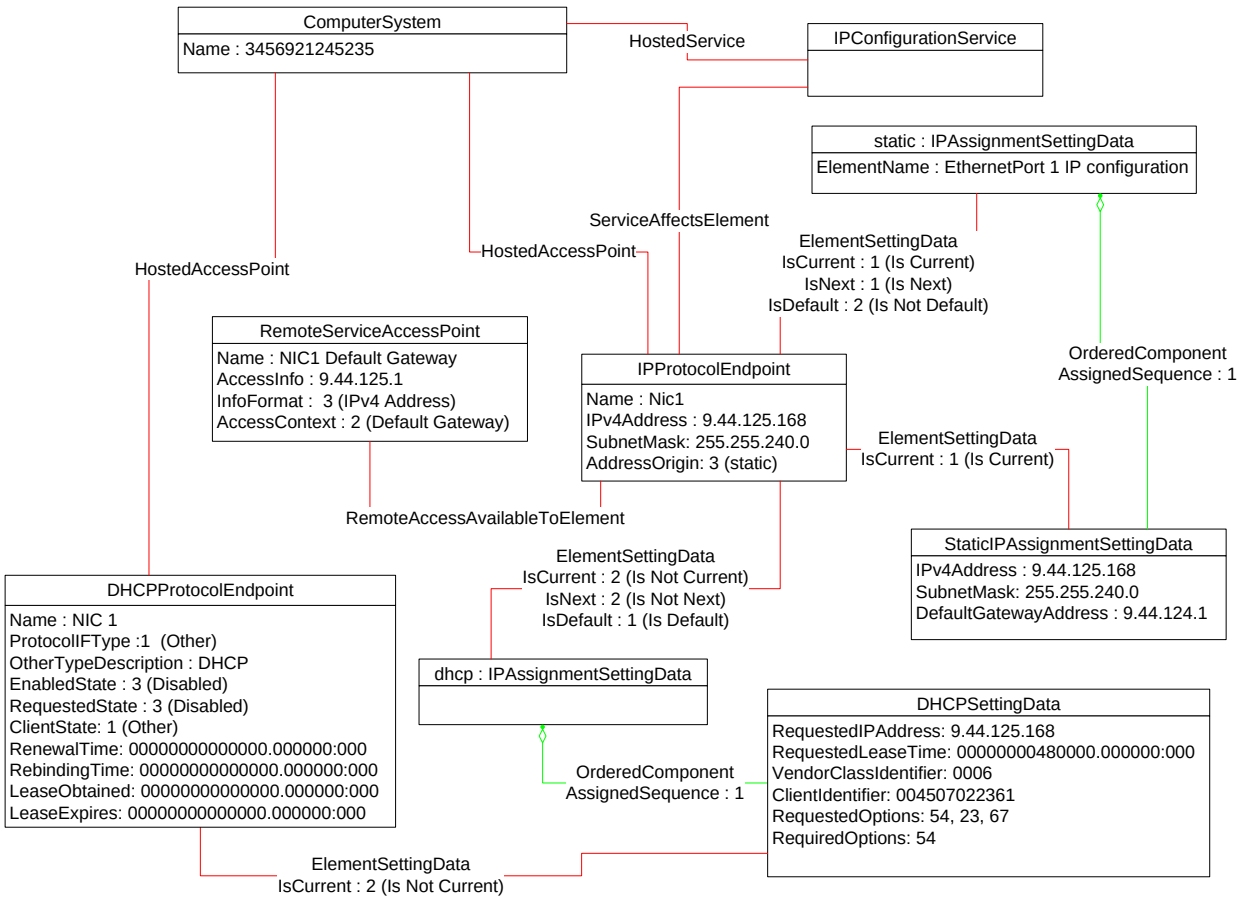


Figure 6 – DHCP timeout to static with configuration management

The object diagram in Figure 7 illustrates an IP interface with two supported alternate configurations. Two discrete IP configuration options are available for the IP interface. Each option is represented by an instance of CIM_IPAssignmentSettingData. One configuration option represents the ability to statically assign the IP configuration. This option is indicated by the instance of CIM_OrderedComponent that associates the CIM_IPAssignmentSettingData instance with an instance of CIM_StaticIPAssignmentSettingData. The other configuration option represents the ability to obtain the configuration through a DHCP client. This option is indicated by the instance of CIM_OrderedComponent that associates the CIM_IPAssignmentSettingData instance with an instance of CIM_DHCPSettingData.



585

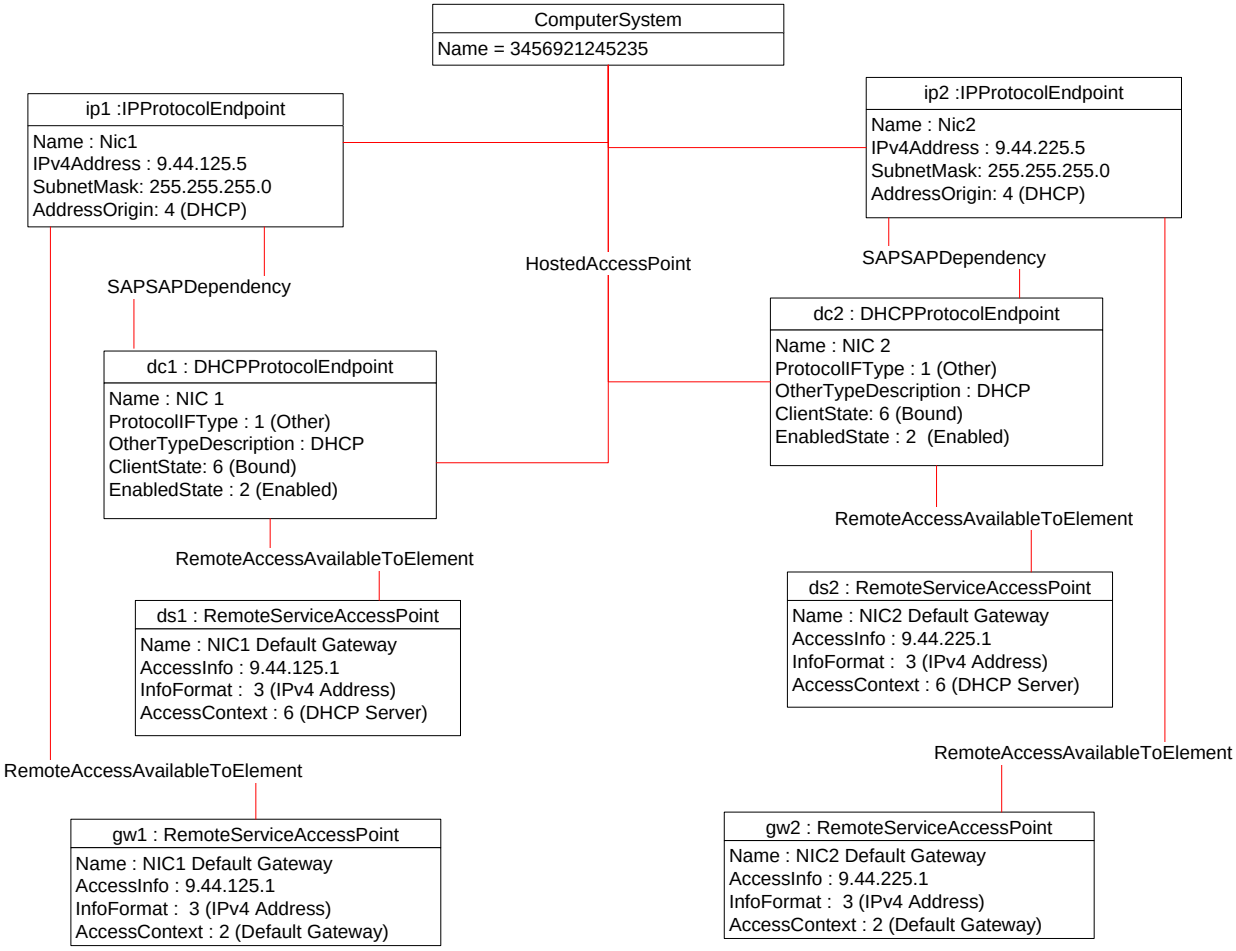
586 **Figure 7 – Static or DHCP pending configurations**

587 Each configuration option consists of a single instance of a subclass of CIM_IPAssignmentSettingData.
588 Therefore, the value of the AssignedSequence property of the CIM_OrderedComponent instances is
589 irrelevant.

590 The default configuration is to attempt to obtain a configuration through DHCP. This default is indicated
591 by the IsDefault property having a value of 1 (Is Default) on the CIM_ElementSettingData instance that
592 associates the CIM_IPAssignmentSettingData instance with the CIM_IPProtocolEndpoint instance.

593 However, the current configuration of the IP interface was statically assigned using the configuration
594 identified by the CIM_IPAssignmentSettingData instance *static*. This configuration is indicated by the
595 value of the CIM_ElementSettingData.IsCurrent property on the instance of CIM_ElementSettingData that
596 associates the CIM_IPAssignmentSettingData instance *static* to the CIM_IPProtocolEndpoint instance
597 and is also indicated by the value of the AddressOrigin property on the CIM_IPProtocolEndpoint instance.
598 Note that configuration through DHCP was not used or even attempted; thus the
599 CIM_DHCPProtocolEndpoint.RequestedState property has a value of 3 (Disabled).

600 Upon the next restart of the interface, the static configuration will be used again for the IP interface. This
601 is indicated by the value of the CIM_ElementSettingData.IsNext property on the instance of
602 CIM_ElementSettingData that associates the CIM_IPAssignmentSettingData instance *static* to the
603 CIM_IPProtocolEndpoint instance. The object diagram in Figure 8 is for a dual NIC system in which the
604 associated IP interfaces for both NICs have been configured through DHCP.



605

606 **Figure 8 – DHCP supported on dual NIC system**

The object diagram in Figure 9 illustrates an IP interface that supports an alternate configuration in which a static configuration will first be applied, and if the implementation determines it to be invalid, DHCP will be used. This configuration is indicated by the relative values of the AssignedSequence property on the instances of CIM_OrderedComponent that associate the CIM_DHCPSettingData and CIM_StaticIPAssignmentSettingData instances with the CIM_IPAssignmentSettingData instance.

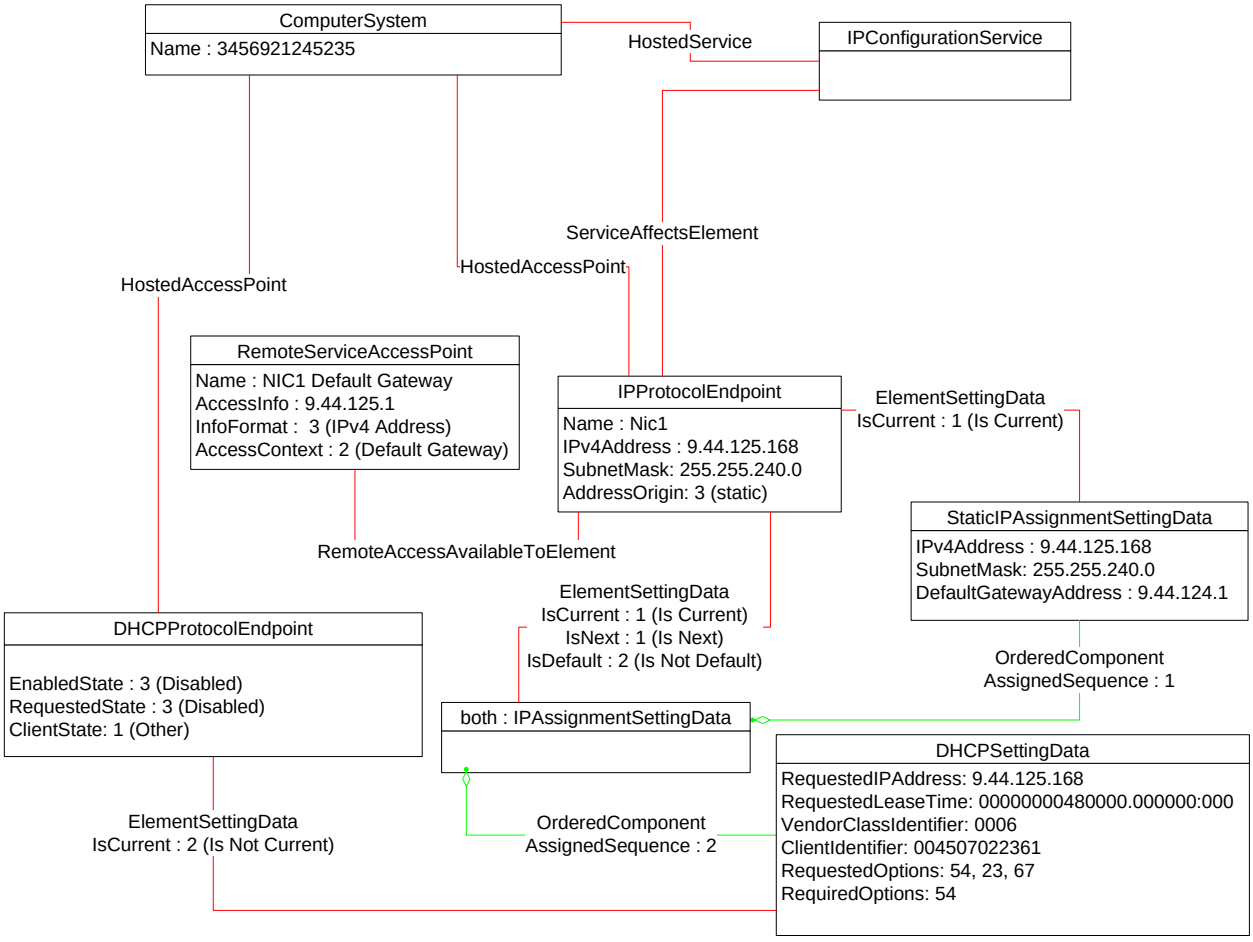


Figure 9 – Static then DHCP

9.2 Determine which DHCP options are supported

A client can determine the DHCP options that are supported by a DHCP client as follows:

1) Find the instance of CIM_DHCPCapabilities that is associated with the Central Instance.
2) Query the OptionsSupported property.

9.3 Determine whether IP configuration originated through DHCP

A client can determine if the configuration for an IP interface was assigned through DHCP as follows:

1) Find the instance of CIM_IPProtocolEndpoint that is associated with the CIM_DHCPProtocolEndpoint instance through an instance of CIM_SAPSAPDependency.
2) Query the CIM_IPProtocolEndpoint.AddressOrigin property. If the value is 4 (DHCP), the configuration was assigned through DHCP.

9.4 View the DHCP server IP address

A client can view information about the DHCP server that granted the lease to the DHCP client as follows:

1) Find all instances of CIM_RemoteAccessAvailableToElement that associate an instance of CIM_RemoteServiceAccessPoint with the CIM_DHCPProtocolEndpoint instance.
   - If more than one instance exists, find the instance of CIM_RemoteAccessAvailableToElement in which the OrderOfAccess property has the value 1. Find the referenced CIM_RemoteServiceAccessPoint instance.
   - If exactly one instance exists, find the referenced CIM_RemoteServiceAccessPoint instance.
   - If no instances exist, no DHCP server is currently modeled for the DHCP client.
2) View the AccessInfo property of the CIM_RemoteServiceAccessPoint instance.

9.5 Determine whether alternate DHCP configuration is supported

A client can determine whether an implementation supports an alternate configuration that uses DHCP to acquire its configuration as follows:

1) Find the CIM_IPProtocolEndpoint instance with which the CIM_DHCPProtocolEndpoint instance is associated through an instance of CIM_SAPSAPDependency.
2) Find all instances of CIM_IPAssignmentSettingData (the parent class and not subclasses) that are associated with the CIM_IPProtocolEndpoint instance.
3) For each instance of CIM_IPAssignmentSettingData, look for at least one instance of CIM_DHCPSettingData that is associated through an instance of CIM_OrderedComponent.
4) If at least one instance of CIM_IPAssignmentSettingData is found that satisfies the preceding constraints, the implementation supports a configuration that uses DHCP to acquire a configuration.

9.6 Determine whether DHCP then static is supported

An implementation can support attempting to acquire its IP configuration through a DHCP client and defaulting to a static configuration if the client fails to acquire a configuration from a DHCP server. A client can determine whether this functionality is supported as follows:

1) Find the CIM_IPProtocolEndpoint instance with which the CIM_DHCPProtocolEndpoint instance is associated through an instance of CIM_SAPSAPDependency.
2) Find all instances of CIM_IPAssignmentSettingData (the parent class and not subclasses) that are associated with the CIM_IPProtocolEndpoint instance.
3) For each instance of CIM_IPAssignmentSettingData:
   a) Find all instances of CIM_DHCPSettingData that are associated through an instance of CIM_OrderedComponent.
   b) Find all instances of CIM_StaticIPAssignmentSettingData that are associated through an instance of CIM_OrderedComponent.
   c) Determine if an instance of CIM_DHCPSettingData exists such that the value of the AssignedSequence property of the CIM_OrderedComponent instance that associates the instance of CIM_DHCPSettingData with the instance of CIM_IPAssignmentSettingData is less than the value of the AssignedSequence property of an instance of CIM_OrderedComponent that associates the CIM_StaticIPAssignmentSettingData instance with the instance of CIM_IPAssignmentSettingData.
4) If such an instance of CIM_DHCPSettingData is found, DHCP then Static is supported.

667 ## 9.7 Select DHCP options for DHCP pending configuration

668 When the implementation supports pending configuration management, a client can configure the DHCP
669 options that will be used by the DHCP client when the pending configuration is applied as follows:

670 1) Determine the supported DHCP options as specified in 9.2.

671 2) Find the instance of CIM_DHCPSettingData that is associated with the
672 CIM_DHCPProtocolEndpoint instance through an instance of CIM_ElementSettingData.

673 3) If an option is required, assign the value to the RequiredOptions property.

674 4) If an option is desired but not required, assign the value to the RequestedOptions property.

675 ## 9.8 Determine whether ElementName can be modified

676 A client can determine whether it can modify the ElementName property of an instance of
677 CIM_DHCPProtocolEndpoint as follows:

678 1) Find the CIM_DHCPCapabilities instance that is associated with the
679 CIM_DHCPProtocolEndpoint instance.

680 2) Query the value of the ElementNameEditSupported property of the CIM_DHCPCapabilities
681 instance. If the value is TRUE, the client can modify the ElementName property of the target
682 instance.

683 # 10 CIM Elements

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

687 **Table 8 – CIM Elements: DHCP client profile**

Element Name	Requirement	Description
Classes		
CIM_DHCPCapabilities	Mandatory	See 7.4 and 10.1.
CIM_DHCPProtocolEndpoint	Mandatory	See 7.2, 7.3, and 10.2.
CIM_DHCPSettingData	Optional	See 7.6 and 10.3.
CIM_ElementCapabilities	Mandatory	See 10.4.
CIM_ElementSettingData	Conditional	See 7.6 and 10.5.
CIM_SAPSAPDependency	Mandatory	See 7.2 and 10.6.
CIM_HostedAccessPoint (DHCPProtocolEndpoint)	Mandatory	See 10.7.
CIM_HostedAccessPoint (RemoteServiceAccessPoint)	Conditional	See 10.7.
CIM_RemoteAccessAvailableToElement	Conditional	See 7.5 and 10.8.
CIM_RemoteServiceAccessPoint	Optional	See 7.1 and 10.10.
CIM_RegisteredProfile	Optional	See 10.11.
Indications		
None defined in this profile		

10.1 CIM_DHCPCapabilities

CIM_DHCPCapabilities represents the capabilities of a DHCP client. Table 9 contains the requirements for elements of this class.

Table 9 – Class: CIM_DHCPCapabilities

Elements	Requirement	Description
InstanceID	Mandatory	**Key**
ElementName	Mandatory	Pattern ".*"
ElementNameEditSupported	Mandatory	See 7.3.4.1 and 7.3.5.1.
MaxElementNameLen	Conditional	See 7.3.4.1 and 7.3.5.1.
OptionsSupported	Mandatory	None
IPv6OptionsSupported	Optional	None

10.2 CIM_DHCPProtocolEndpoint

CIM_DHCPProtocolEndpoint represents the DHCP client that is associated with an IP interface. Table 10 contains the requirements for elements of this class.

Table 10 – Class: CIM_DHCPProtocolEndpoint

Elements	Requirement	Description
SystemCreationClassName	Mandatory	**Key**
CreationClassName	Mandatory	**Key**
SystemName	Mandatory	**Key**
Name	Mandatory	**Key**
NameFormat	Mandatory	Pattern ".*"
ProtocolIFType	Mandatory	This property shall have a value of 1 (Other).
OtherTypeDescription	Mandatory	This property shall have a value of “DHCP”.
RequestedState	Mandatory	See 7.3.1.
EnabledState	Mandatory	See 7.3.2.
ClientState	Mandatory	See 7.2.
ElementName	Mandatory	Pattern ".*"

10.3 CIM_DHCPSettingData

CIM_DHCPSettingData indicates that the IP configuration should be obtained through the DHCP client if possible. Table 11 contains the requirements for elements of this class.

Table 11 – Class: CIM_DHCPSettingData

Elements	Requirement	Description
InstanceID	Mandatory	**Key**
AddressOrigin	Mandatory	Matches 4 (“DHCP”)
ElementName	Mandatory	Pattern ".*"

10.4 CIM_ElementCapabilities

CIM_ElementCapabilities associates an instance of CIM_DHCPCapabilities with the CIM_DHCPProtocolEndpoint instance. Table 12 contains the requirements for elements of this class.

Table 12 – Class: CIM_ElementCapabilities

Elements	Requirement	Description
ManagedElement	Mandatory	This property shall be a reference to the Central Instance. Cardinality 1..*
Capabilities	Mandatory	This property shall be a reference to an instance of CIM_DHCPCapabilities. Cardinality 1

10.5 CIM_ElementSettingData

CIM_ElementSettingData associates instances of CIM_DHCPSettingData with the CIM_DHCPProtocolEndpoint instance for which they provide configuration. Table 13 contains the requirements for elements of this class.

Table 13 – Class: CIM_ElementSettingData

Elements	Requirement	Description
ManagedElement	Mandatory	This property shall be a reference to the Central Instance. Cardinality 1..*
SettingData	Mandatory	This property shall be a reference to an instance of CIM_DHCPSettingData. Cardinality *
IsCurrent	Mandatory	Matches 1 (Is Current) or 2 (Is Not Current)

10.6 CIM_SAPSAPDependency

CIM_SAPSAPDependency relates the CIM_DHCPProtocolEndpoint instance with the CIM_IPProtocolEndpoint instance. Table 14 contains the requirements for elements of this class.

Table 14 – Class: CIM_SAPSAPDependency

Elements	Requirement	Description
Antecedent	Mandatory	See 7.2.1.2. Cardinality 1
Dependent	Mandatory	See 7.2.1.1. Cardinality 1

10.7 CIM_HostedAccessPoint — CIM_DHCPProtocolEndpoint reference

CIM_HostedAccessPoint relates the CIM_DHCPProtocolEndpoint instance to the scoping CIM_ComputerSystem instance. Table 15 contains the requirements for elements of this class.

Table 15 – Class: CIM_HostedAccessPoint

Elements	Requirement	Description
Antecedent	Mandatory	The value shall be a reference to the Scoping Instance. Cardinality 1
Dependent	Mandatory	The value shall be a reference to the Central Instance. Cardinality 1..*

10.8 CIM_HostedAccessPoint — CIM_RemoteServiceAccessPoint reference

An instance of CIM_HostedAccessPoint Association between an instance of CIM_DHCPProtocolEndpoint and CIM_RemoteServiceAccessPoint shall only be instantiated if CIM_RemoteServiceAccessPoint is supported.

CIM_HostedAccessPoint relates the CIM_RemoteServiceAccessPoint instance that represents the default gateway with its scoping CIM_ComputerSystem instance. Table 16 provides information about the properties of CIM_HostedAccessPoint.

Table 16 – Class: CIM_HostedAccessPoint — CIM_RemoteServiceAccessPoint

Elements	Requirement	Description
Antecedent	Mandatory	**Key:** This shall be a reference to the Scoping Instance. Cardinality 1
Dependent	Mandatory	**Key:** This shall be a reference to an instance of CIM_RemoteServiceAccessPoint. Cardinality *

10.9 CIM_RemoteAccessAvailableToElement

CIM_RemoteAccessAvailableToElement represents the relationship between a DHCP client and a DHCP server. This class associates an instance of CIM_DHCPProtocolEndpoint with an instance of CIM_RemoteServiceAccessPoint. Table 17 contains the requirements for elements of this class.

Table 17 – Class: CIM_RemoteAccessAvailableToElement

Elements	Requirement	Description
Antecedent	Mandatory	This property shall be a reference to an instance of CIM_RemoteServiceAccessPoint. Cardinality *
Dependent	Mandatory	This property shall be a reference to the Central Instance. Cardinality 1..*
OrderOfAccess	Optional	See 7.5.1.

10.10 CIM_RemoteServiceAccessPoint

CIM_RemoteServiceAccessPoint represents the managed system's view of the DHCP server. Table 18 contains the requirements for elements of this class.

Table 18 – Class: CIM_RemoteServiceAccessPoint

Elements	Requirement	Description
SystemCreationClassName	Mandatory	**Key**
CreationClassName	Mandatory	**Key**
SystemName	Mandatory	**Key**
Name	Mandatory	**Key**
AccessContext	Mandatory	Matches 7 (DHCP Server)
AccessInfo	Mandatory	See 7.1.1.
InfoFormat	Mandatory	See 7.1.2.
ElementName	Mandatory	Pattern ".*"

10.11 CIM_RegisteredProfile

CIM_RegisteredProfile identifies the *DHCP Client Profile* in order for a client to determine whether an instance of CIM_IPProtocolEndpoint is conformant with this profile. The CIM_RegisteredProfile class is defined by the *Profile Registration Profile* (DSP1033). With the exception of the mandatory values specified for the properties in Table 19, the behavior of the CIM_RegisteredProfile instance is in accordance with the DSP1033.

Table 19 – Class: CIM_RegisteredProfile

Elements	Requirement	Description
RegisteredName	Mandatory	This property shall have a value of "DHCP Client".
RegisteredVersion	Mandatory	This property shall have a value of "1.0.4".
RegisteredOrganization	Mandatory	This property shall have a value of 2 (DMTF).

NOTE Previous versions of this document included the suffix "Profile" for the RegisteredName value. If implementations querying for the RegisteredName value find the suffix "Profile", they should ignore the suffix, with any surrounding white spaces, before any comparison is done with the value as specified in this document.

ANNEX A
(informative)

Change log

Version	Date	Description
1.0.0	2008-08-10	
1.0.1	2009-09-26	Errata Release
1.0.2	2010-09-15	Version 1.0.1 of the Final Standard formatted for DMTF Standard release
1.0.3	2012-01-09	Errata 1.0.3 • Clause 9 - Correction in association for CIM_RemoteServiceAccessPoint. • Clause 10 – Removed duplicate entry for CIM_RemoteServiceAccessPoint.InfoFormat.
1.0.4	2019-01-29	This errata addresses these issues: • Updated RegisteredVersion to reflect errata version number in clause 10.2. • Updated RegisteredOrganization description to reflect correct value for DMTF in clause 10.2. • Updated use cases to reflect the above fixes.

Bibliography

DMTF DSP4014, *DMTF Process for Working Bodies 2.6*, https://www.dmtf.org/sites/default/files/standards/documents/DSP4014_2.6.pdf

IETF RFC1208, *A Glossary of Networking Terms*, March 1991, https://tools.ietf.org/html/rfc1208