Document Number: DSP1037

Date: 2008-09-04

Version: 1.0.0

DHCP Client Profile

Document Type: Specification

Document Status: Final Standard

Document Language: E

CONTENTS

Figures

Tables

Foreword

The *DHCP Client Profile* (DSP1037) was prepared by the Server Management Working Group of the DMTF.

DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and systems management and interoperability.

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.

DHCP Client Profile

1 Scope

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

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.

2.1 Approved References

DMTF DSP0200, *CIM Operations over HTTP 1.2.0*

DMTF DSP0004, *CIM Infrastructure Specification 2.3.0*

DMTF DSP1036, *IP Interface Profile*

DMTF DSP1033, *Profile Registration Profile*

DMTF DSP1000, *Management Profile Specification Template*

DMTF DSP1001, *Management Profile Specification Usage Guide*

2.2 Other References

ISO/IEC Directives, Part 2, *Rules for the structure and drafting of International Standards*

Unified Modeling Language (UML) from the Open Management Group (OMG)

IETF RFC 1208, *A Glossary of Networking Terms*, March 1991

IETF RFC 2131, *Dynamic Host Configuration Protocol*, March 1997

IETF RFC 3315, *Dynamic Host Configuration Protocol for IPv6 (DHCPv6)*, July 2003

IETF RFC 4291, *IP Version 6 Addressing Architecture*, February 2006

3 Terms and Definitions

For the purposes of this document, the terms and definitions in DSP1033 and DSP1001 and the following 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 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

Experimental Maturity Level

Some of the content considered for inclusion in *DHCP Client Profile* has yet to receive sufficient review to satisfy the adoption requirements set forth by the Technical Committee within the DMTF. This content is presented here as an aid to implementers who are interested in likely future developments within this specification. The content marked experimental may change as implementation experience is gained. There is a high likelihood that it will be included in an upcoming revision of the specification. Until that time, it is purely informational, and is clearly marked within the text.
A sample of the typographical convention for experimental content is included here:

EXPERIMENTAL

Experimental content appears here

EXPERIMENTAL

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: 1.0.0

Organization: DMTF

CIM Schema Version: 2.19

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	Relationship	Behavior
Profile Registration	DMTF	1.0.0	Mandatory	None
IP Interface	DMTF	1.0.0	Mandatory	See section 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 is modeled with an instance of CIM_DHCPProtocolEndpoint. The DHCP client's capabilities are modeled with an instance of CIM_DHCPCapabilities. Aspects of the DHCP client's configuration are modeled with properties of DHCPProtocolEndpoint as well as with CIM_DHCPSettingData.

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

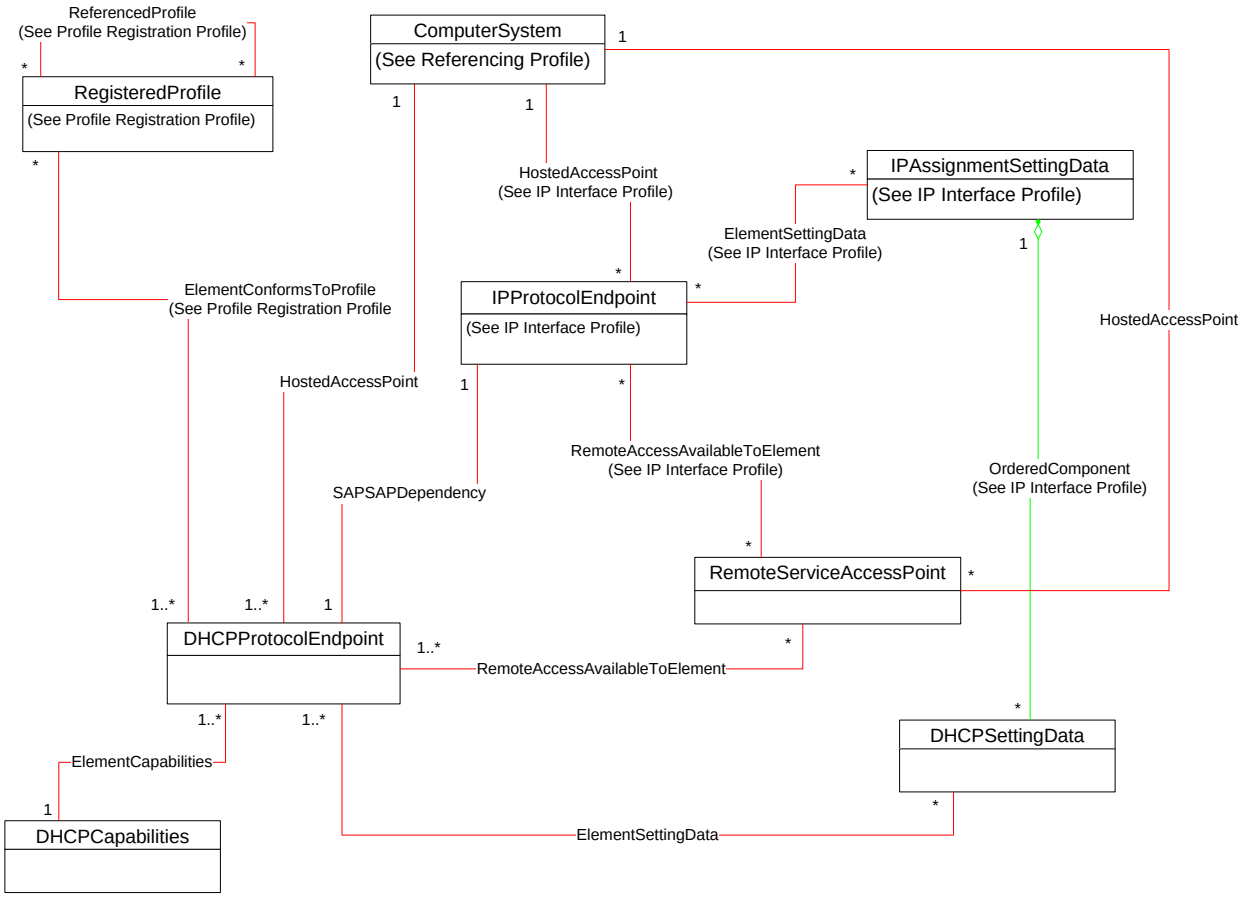


Figure 1 – DHCP Client Profile: Class Diagram

7 Implementation

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

7.1 DHCP Server Representation

When the DHCP client successfully acquires a configuration from a DHCP server, an instance of CIM_RemoteServiceAccessPoint shall represent the DHCP server from which the DHCP client received 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 RFC 1208.

EXPERIMENTAL

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 RFC 4291, section 2.2.

EXPERIMENTAL

7.1.2 CIM_RemoteServiceAccessPoint.InfoFormat

The value of the InfoFormat property shall be a value of 3 (IPv4 Address)

EXPERIMENTAL

or a value of 4 (IPv6 Address).

EXPERIMENTAL

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*. A single instance of CIM_SAPSAPDependency shall associate the Central Instance with the CIM_IPProtocolEndpoint defined in the *IP Interface Profile*.

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 section 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 RFC 2131.

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 section 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 section 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 *IP Interface Profile*. 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 section.

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 section 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

Support for operations for each profile class (including associations) is specified in the following subclauses. Each subclause includes either the statement “All operations in the default list in section 8.1 are supported as described by DSP0200 version 1.2” or a table listing all the operations that are not supported by this profile or where the profile requires behavior other than that described by DSP0200 version 1.2.

The default list of operations is as follows:

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

A compliant implementation shall support all the operations in the default list for each class, unless the “Requirement” column states something other than *Mandatory*.

8.2 CIM_DHCPCapabilities

All operations in the default list in section 8.1 are supported as described by DSP0200 version 1.2.

8.3 CIM_DHCPProtocolEndpoint

Table 2 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

Table 2 – Operations: CIM_DHCPProtocolEndpoint

Operation	Requirement	Messages
ModifyInstance	Optional. See section 8.3.1.	None

8.3.1 CIM_DHCPProtocolEndpoint—ModifyInstance Operation

This section 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 section 8.1 are supported as described by DSP0200 version 1.2.

8.5 CIM_ElementCapabilities

Table 3 lists operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

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 operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

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 operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

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 operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

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 operations that either have special requirements beyond those from DSP0200 version 1.2 or shall not be supported.

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 section 8.1 are supported as described by DSP0200 version 1.2.

9 Use Cases

This section 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 1.0.0.
- profile2 identifies the DMTF *IP Interface Profile* version 1.0.0.

The *IP Interface Profile* 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.

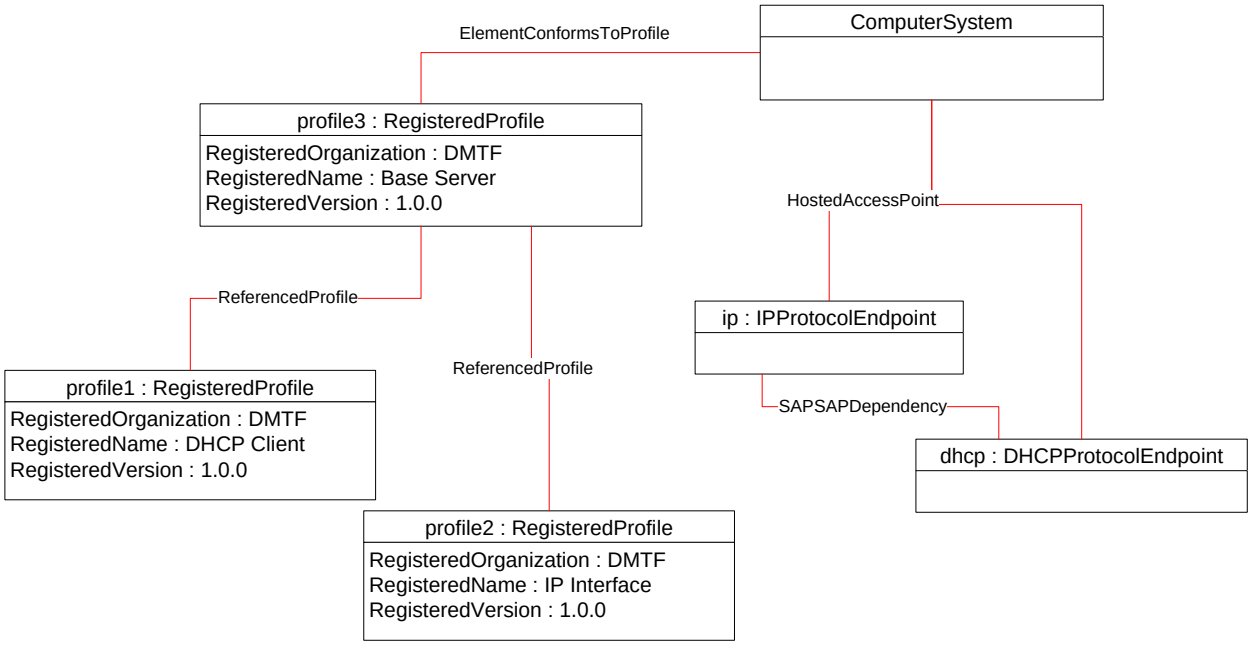


Figure 2 – Registered Profile

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.

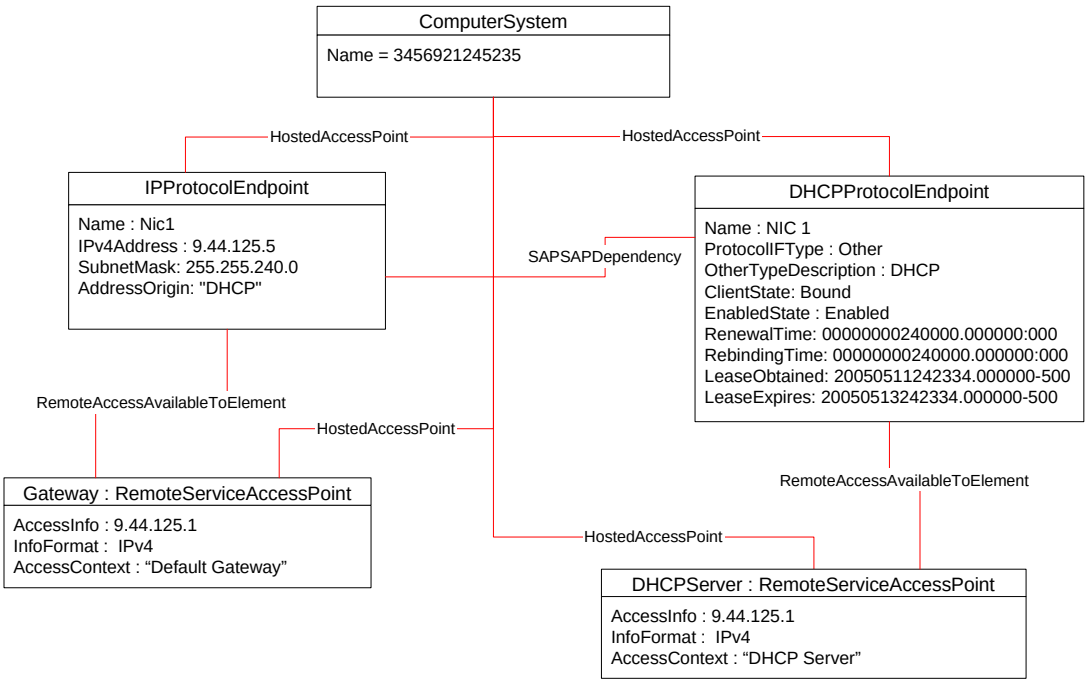


Figure 3 – DHCP Assigned IP Configuration

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 the *IP Interface Profile*. 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.

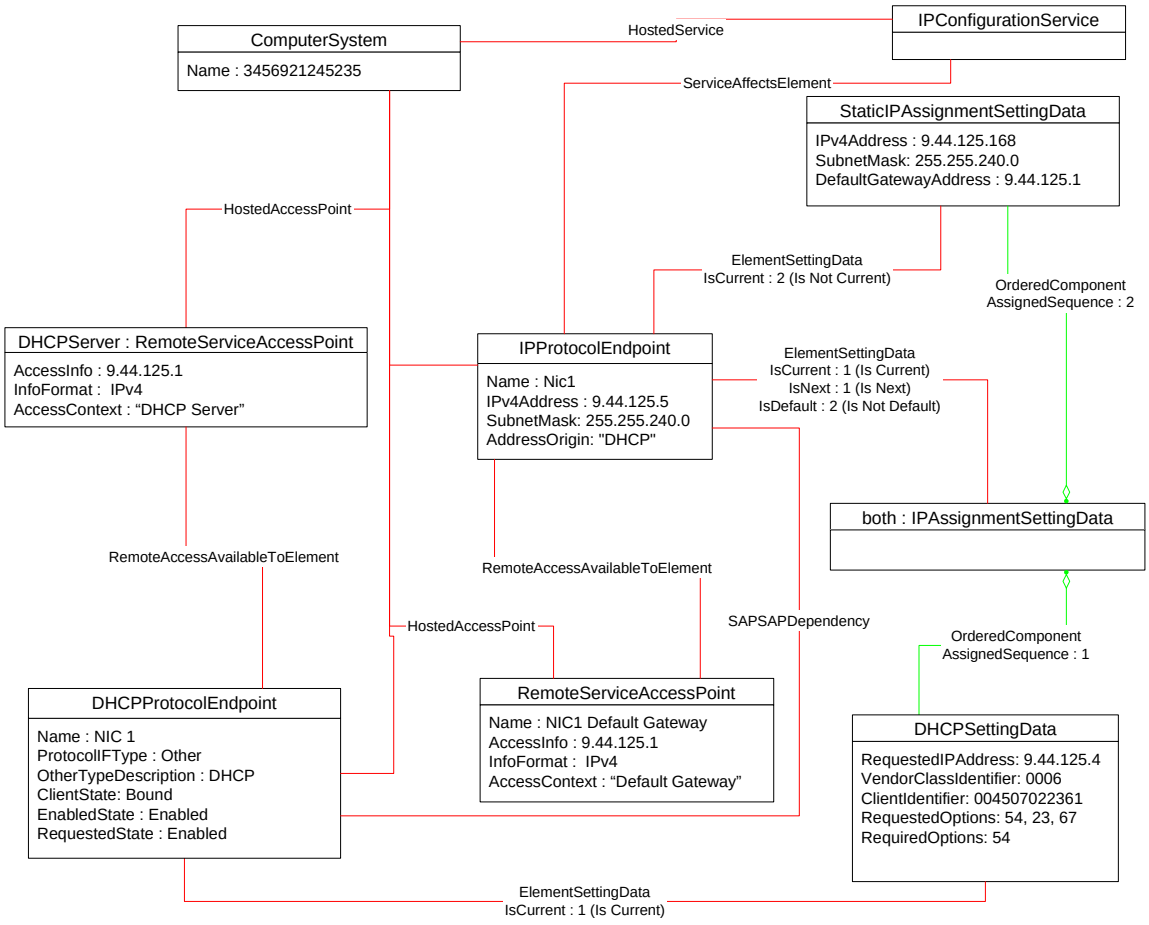


Figure 4 – DHCP Assigned IP Configuration with Configuration Management

The object diagram in Figure 5 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. In this implementation, configuration management is not supported, so no instance of CIM_IPAssignmentSettingData is associated with the CIM_IPProtocolEndpoint instance to represent the configuration that was applied to the IP interface.

The RequestedState property of the CIM_DHCPProtocolEndpoint has a value of "Enabled", indicating that the DHCP client did attempt to acquire a configuration. 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 instance because the DHCP client failed to communicate with a DHCP server.

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

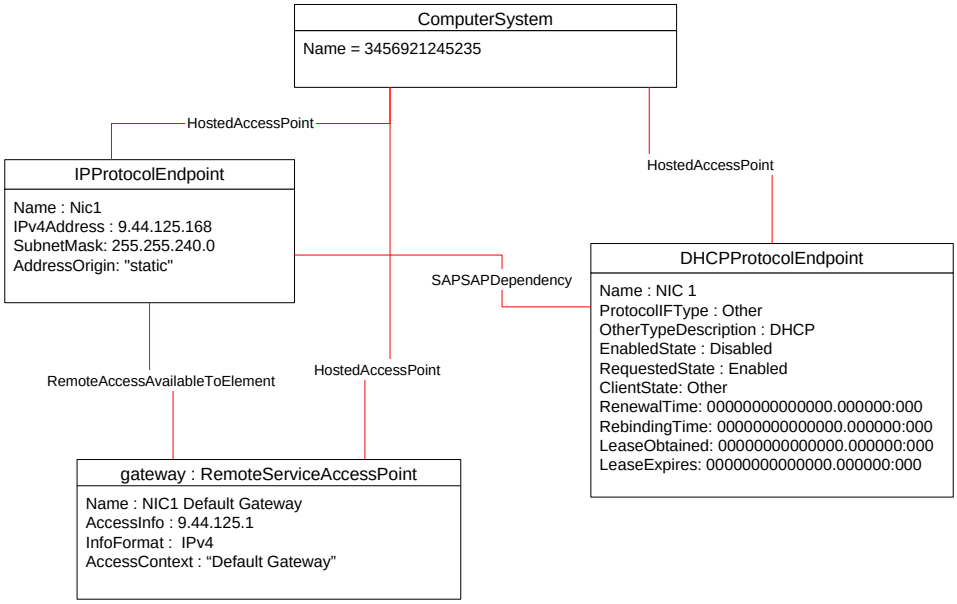


Figure 5 – DHCP Timeout to Static

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.

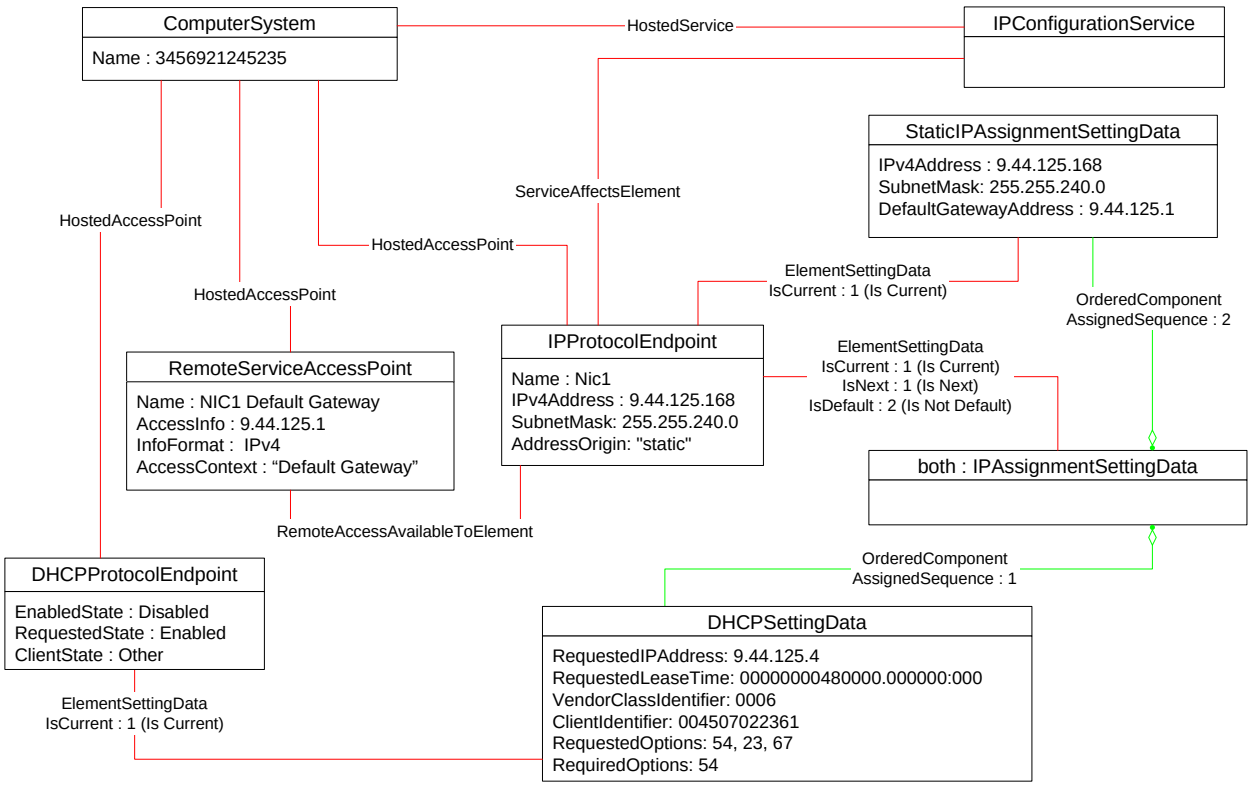


Figure 6 – DHCP Timeout to Static with Configuration Management

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.

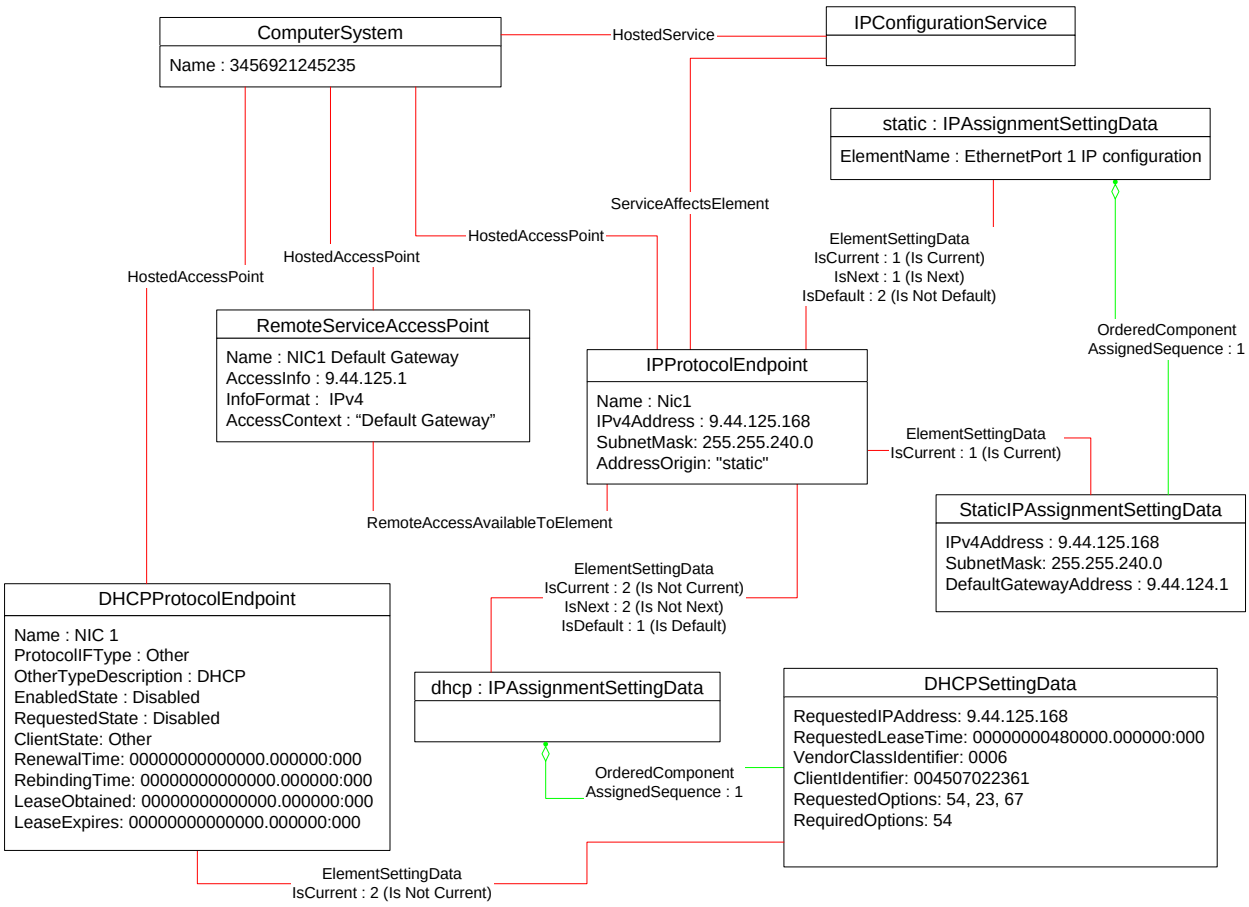


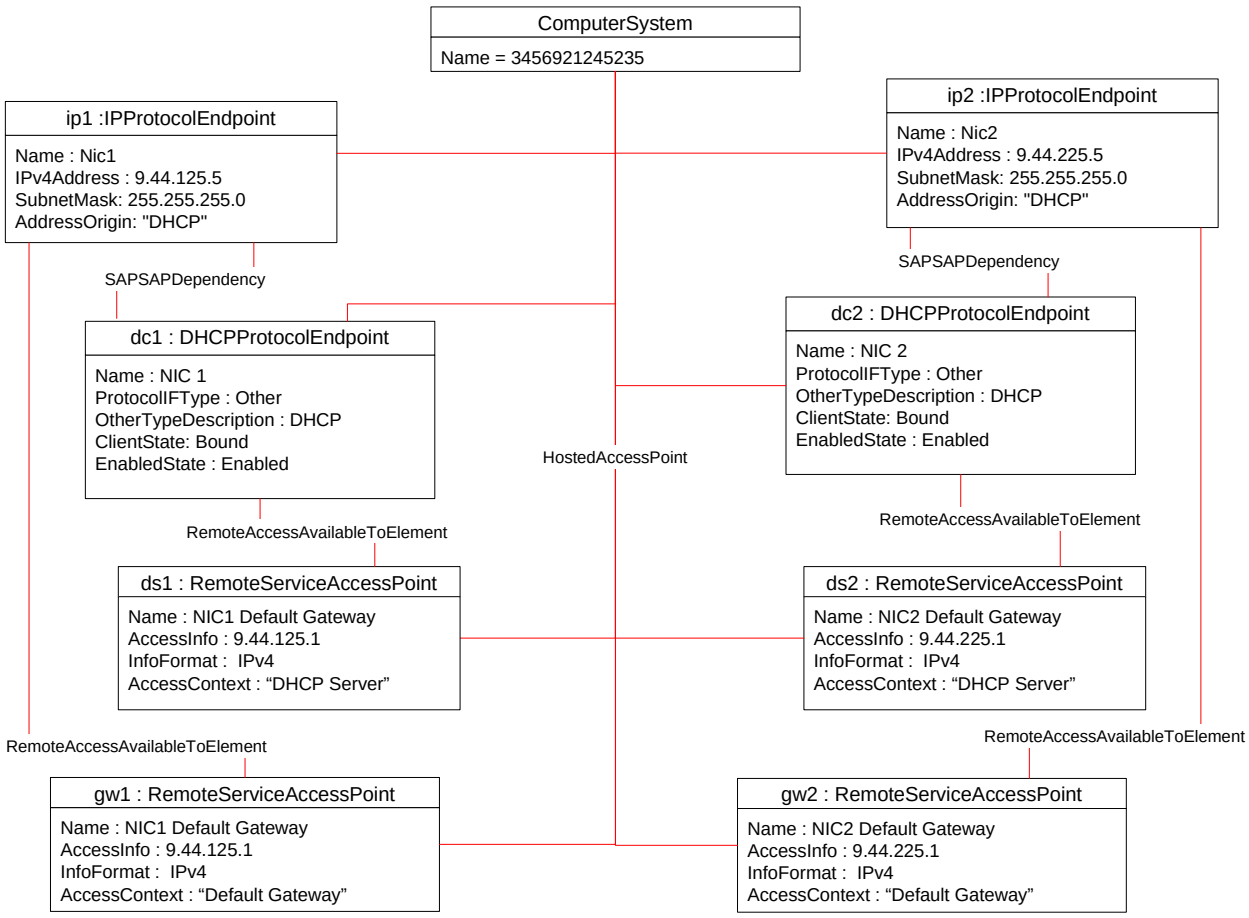
Figure 7 – Static or DHCP Pending Configurations

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

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

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

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



532

533 **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.

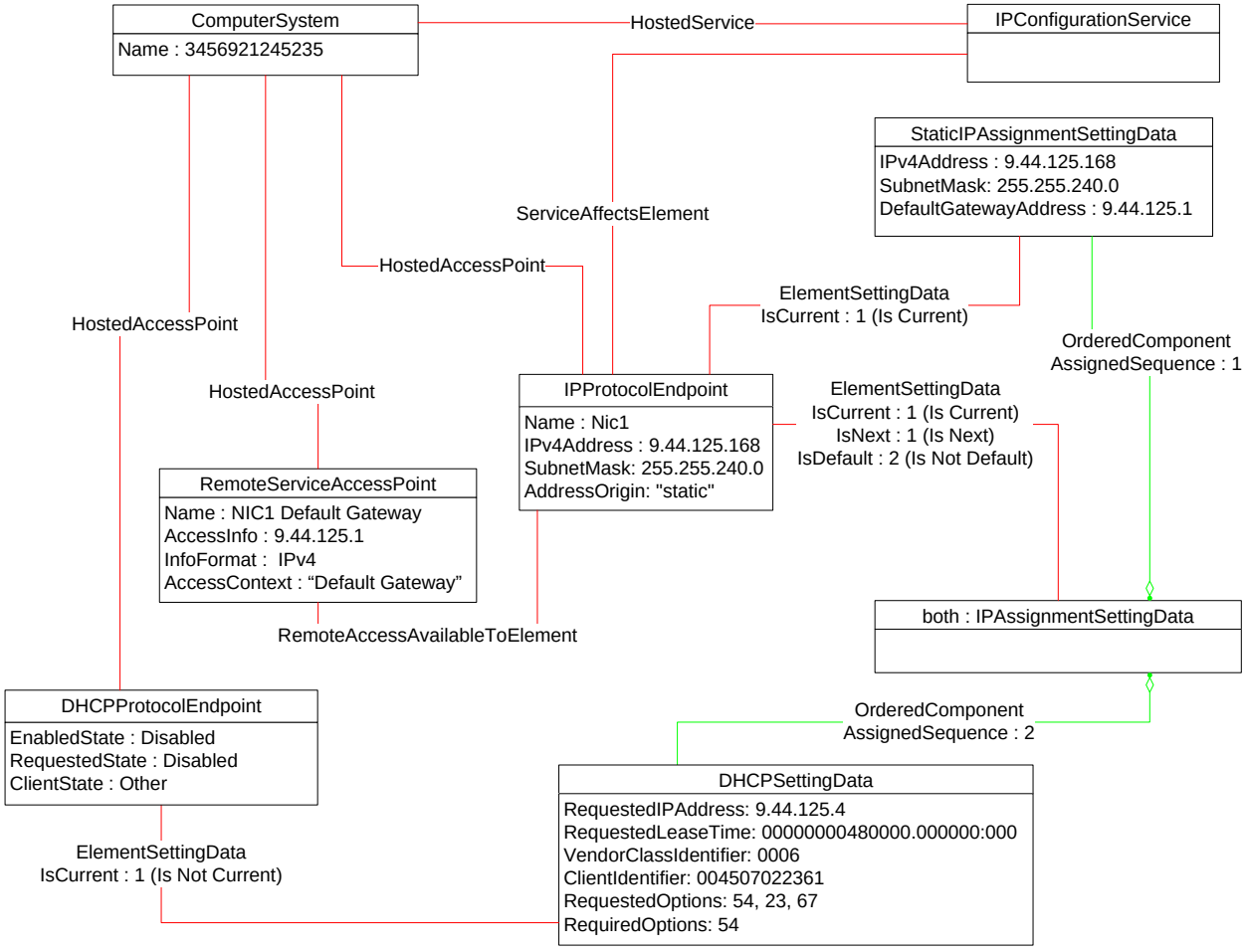


Figure 9 – Static Then DHCP

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 If 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.

9.7 Select DHCP Options for DHCP Pending Configuration

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

1) Determine the supported DHCP options as specified in section 9.2.
2) Find the instance of CIM_DHCPSettingData that is associated with the CIM_DHCPProtocolEndpoint instance through an instance of CIM_ElementSettingData.
3) If an option is required, assign the value to the RequiredOptions property.
4) If an option is desired but not required, assign the value to the RequestedOptions property.

9.8 Determine Whether ElementName Can Be Modified

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

1) Find the CIM_DHCPCapabilities instance that is associated with the CIM_DHCPProtocolEndpoint instance.
2) Query the value of the ElementNameEditSupported property of the CIM_DHCPCapabilities instance. If the value is TRUE, the client can modify the ElementName property of the target instance.

10 CIM Elements

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

Table 8 – CIM Elements: DHCP Client Profile

Element Name	Requirement	Description
Classes		
CIM_DHCPCapabilities	Mandatory	See sections 7.4 and 10.1.
CIM_DHCPProtocolEndpoint	Mandatory	See sections 7.2, 7.3, and 10.2.
CIM_DHCPSettingData	Optional	See sections 7.6 and 10.3.
CIM_ElementCapabilities	Mandatory	See section 10.4.
CIM_ElementSettingData	Conditional	See sections 7.6 and 10.5.
CIM_SAPSAPDependency	Mandatory	See sections 7.2 and 10.6.
CIM_HostedAccessPoint	Mandatory	See section 10.7.
CIM_RemoteAccessAvailableToElement	Conditional	See sections 7.5 and 10.8.
CIM_RemoteServiceAccessPoint	Optional	See sections 7.1 and 10.9.
CIM_RegisteredProfile	Optional	See section 10.10.
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	Notes
InstanceID	Mandatory	**Key**
ElementName	Mandatory	Pattern ".*"
ElementNameEditSupported	Mandatory	See sections 7.3.4.1 and 7.3.5.1.
MaxElementNameLen	Conditional	See sections 7.3.4.1 and 7.3.5.1.
OptionsSupported	Mandatory	None
IPv6OptionsSupported	Optional	EXPERIMENTAL

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	Notes
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 section 7.3.1.
EnabledState	Mandatory	See section 7.3.2.
ClientState	Mandatory	See section 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	Notes
InstanceID	Mandatory	**Key**
AddressOrigin	Mandatory	Matches 4 (“DHCP”)
ElementName	Mandatory	Pattern ".*"

627 ## 10.4 CIM_ElementCapabilities

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

630 **Table 12 – Class: CIM_ElementCapabilities**

Elements	Requirement	Notes
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

631 ## 10.5 CIM_ElementSettingData

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

635 **Table 13 – Class: CIM_ElementSettingData**

Elements	Requirement	Notes
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)

636 ## 10.6 CIM_SAPSAPDependency

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

639 **Table 14 – Class: CIM_SAPSAPDependency**

Elements	Requirement	Notes
Antecedent	Mandatory	See section 7.2.1.2. Cardinality 1
Dependent	Mandatory	See section 7.2.1.1. Cardinality 1

10.7 CIM_HostedAccessPoint

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	Notes
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_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 16 contains the requirements for elements of this class.

Table 16 – Class: CIM_RemoteAccessAvailableToElement

Elements	Requirement	Notes
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 section 7.5.1.

10.9 CIM_RemoteServiceAccessPoint

CIM_RemoteServiceAccessPoint represents the managed system's view of the DHCP server. Table 17 contains the requirements for elements of this class.

Table 17 – Class: CIM_RemoteServiceAccessPoint

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

10.10 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*. With the exception of the mandatory values specified for the properties in Table 18, the behavior of the CIM_RegisteredProfile instance is in accordance with the *Profile Registration Profile*.

Table 18 – Class: CIM_RegisteredProfile

Elements	Requirement	Notes
RegisteredName	Mandatory	This property shall have a value of "DHCP Client".
RegisteredVersion	Mandatory	This property shall have a value of "1.0.0".
RegisteredOrganization	Mandatory	This property shall have a value of "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
1.0.0a	2006/06/12	Preliminary Release
1.0.0	2008/08/10	Final Release

ANNEX B
(informative)

Acknowledgments

The authors wish to acknowledge the following people.

Editor:

- Aaron Merkin – IBM
- Jeff Hilland – HP

Contributors:

- Jon Hass – Dell
- Khachatur Papanyan – Dell
- Enoch Suen – Dell
- Jeff Hilland – HP
- Christina Shaw – HP
- Aaron Merkin – IBM
- Perry Vincent – Intel
- John Leung – Intel