# DHCP Service Management Profile

34

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101                                                     Foreword

102     The *DHCP Service Management* Profile (DSP1068) was prepared by the Network Services Management
103     Working Group of the DMTF.

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


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123

124 <div align="center"># Introduction</div>

125 The information in this specification should be sufficient for a provider or consumer of this data to identify
126 unambiguously the classes, properties, methods, and values that shall be instantiated and manipulated to
127 represent and manage Network Services and the associated configuration information. The target
128 audience for this specification is implementers who are writing CIM-based providers or consumers of
129 management interfaces that represent the component described in this document.

130 ## Document conventions

131 ### Typographical conventions

132 The following typographical conventions are used in this document:

133 • Document titles are marked in *italics*.
134 • ABNF rules are in `monospaced font`.

135

136    # DHCP Service Management Profile

137    ## 1   Scope

138    The *DHCP Service Management Profile* is a profile that specifies the CIM schema and use cases
139    associated with the general and common aspects of DHCP. This profile includes a specification of the
140    DHCP service configuration, DHCP server representation (protocol service, DHCP server protocol end-
141    point), allocated IP address (List) (each IP address represents a client), DHCP server status, and DHCP
142    server statistics. One of the objectives is to facilitate support of IPv4 and IPv6 addressing simultaneously.

143    ## 2   Normative references

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

148    DMTF DSP0004, *CIM Infrastructure Specification 2.6*,
149    http://www.dmtf.org/standards/published_documents/DSP0004_2.6.pdf

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

152    DMTF DSP0223, *Generic Operations 1.0*,
153    http://www.dmtf.org/standards/published_documents/DSP0223_1.0.pdf

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

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

158    DMTF DSP1097, *Virtual Ethernet Switch Profile 1.1*,
159    http://dmtf.org/sites/default/files/standards/documents/DSP1097_1.1.0.pdf

160    DMTF DSP1036 *IP Interface Profile 1.1.1,*
161    http://www.dmtf.org/sites/default/files/standards/documents/DSP1036_1.1.1.pdf

162    DMTF DSP1116 *IP Configuration Profile 1.0.0,*
163    http://dmtf.org/sites/default/files/standards/documents/DSP1116_1.0.0.pdf

164    DMTF DSP1037 *DHCP Client Profile 1.0.3,*
165    http://dmtf.org/sites/default/files/standards/documents/DSP1037_1.0.3.pdf

166    GIAC report on DHCP Server Security Audit, 2002,
167    http://www.giac.org/paper/gcux/27/dhcp-server-security-audit/100392

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

170    IETF RFC1918, *Address Allocation for Private Internets,* February 1996,
171    http://tools.ietf.org/html/rfc1918

172    IETF RFC2131, Dynamic Host Configuration Protocol, March 1997,
173    http://tools.ietf.org/html/rfc2131

174 IETF RFC2132, DHCP Options and BOOTP Vendor Extensions, March 1997,
175 http://tools.ietf.org/html/rfc2132

176 IETF RFC3118, Authentication for DHCP Messages, June 2001,
177 http://tools.ietf.org/html/rfc3118

178 IETF RFC3315, Dynamic Host Configuration Protocol for IPv6 (DHCPv6), July 2003,
179 http://tools.ietf.org/html/rfc3315

180 IETF RFC3442, The Classless Static Route Option for DHCPv4, Dec. 2002,
181 http://www.ietf.org/rfc/rfc3442.txt

182 IETF RFC3633, IPv6 Prefix Options for DHCP version 6, Dec. 2003,
183 http://tools.ietf.org/html/rfc3633

184 IETF RFC4291, IP version 6 Addressing Architecture, Feb. 2006,
185 http://tools.ietf.org/html/rfc4291

186 IETF RFC4361, Node-specific Client Identifiers for DHCPv4, Feb. 2006,
187 http://tools.ietf.org/html/rfc4361

188 IETF RFC6221, Lightweight DHCPv6 Relay Agent, May 2011,
189 http://tools.ietf.org/html/rfc6221

190 IETF RFC 6603, Prefix Exclude Option for DHCPv6-based Prefix Delegation, May 2012,
191 http://tools.ietf.org/html/rfc6603

192 IETF RFC6842, Client Identifier Option in DHCP Server Replies, January 2013,
193 http://tools.ietf.org/html/rfc6842

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

## 196    3   Terms and definitions

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

199 The terms "shall" ("required"), "shall not", "should" ("recommended"), "should not" ("not recommended"),
200 "may," "need not" ("not required"), "can" and "cannot" in this document are to be interpreted as described
201 in ISO/IEC Directives, Part 2, Annex H. The terms in parenthesis are alternatives for the preceding term,
202 for use in exceptional cases when the preceding term cannot be used for linguistic reasons. Note that
203 ISO/IEC Directives, Part 2, Annex H specifies additional alternatives. Occurrences of such additional
204 alternatives shall be interpreted in their normal English meaning.

205 The terms "clause", "subclause", "paragraph", and "annex" in this document are to be interpreted as
206 described in ISO/IEC Directives, Part 2, Clause 5.

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

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

212 **3.1**
213 **conditional**
214 indicates requirements to be followed strictly to conform to the document when the specified conditions
215 are met

216   **3.2**
217   **mandatory**
218   indicates requirements to be followed strictly to conform to the document and from which no deviation is
219   permitted

220   **3.3**
221   **optional**
222   indicates a course of action permissible within the limits of the document

223   **3.4**
224   **pending configuration**
225   indicates the configuration that will be applied to an IP network connection the next time the IP network
226   connection accepts a configuration

227   **3.5**
228   **referencing profile**
229   indicates a profile that owns the definition of this class and can include a reference to this profile in its
230   "Referenced Profiles" table

231   **3.6**
232   **unspecified**
233   indicates that this profile does not define any constraints for the referenced CIM element or operation
234

# 4   Symbols and abbreviated terms

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

238   **4.1**
239   **IP**
240   Internet Protocol

241   **4.2**
242   **DHCP**
243   Dynamic Host Configuration Protocol

244   **4.3**
245   **UDP**
246    User Datagram Protocol
247

# 5   Synopsis

249   **Profile name:** DHCP Service Management Profile

250   **Version:** 1.0.0

251   **Organization:** DMTF

252   **CIM Schema version:** 2.44

253   **Central class:** CIM_ProtocolService

254   **Scoping class:** CIM_ComputerSystem

255 The *DHCP Service Management Profile* is a profile that specifies the CIM schema and use cases
256 associated with DHCP. This profile includes a specification of the DHCP service configuration, DHCP
257 server representation (protocol service, DHCP server protocol end-point), allocated IP address (List)
258 (each IP address represents a client), DHCP client (remote service access point), DHCP server status,
259 and DHCP server statistics.

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

261 **Table 1 – Referenced profiles**

| Profile Name | Organization | Version | Requirement | Description |
|---|---|---|---|---|
| Profile Registration | DMTF | 1.0 | Mandatory | None |
| IP Configuration | DMTF | 1.0 | Mandatory | DSP1116 |
| IP Interface | DMTF | 1.1.1 | Mandatory | DSP1036 |
| | | | | |
| Network Management | DMTF | 1.0 | Optional | None |
| | | | | |

## 6 Description

263 The *DHCP Service Management Profile* is a profile that will specify the CIM schema and use cases
264 associated with the general and common aspects of DHCP. This profile includes a specification of the
265 DHCP service configuration, DHCP server representation (protocol service, DHCP server protocol end-
266 point), allocated IP address (List) (each IP address represents a client), DHCP client (remote service
267 access point), DHCP server status, and DHCP server statistics.

268  **6.1   Class diagram**

269  Figure 1 represents the class schema for the *DHCP Service Management Profile.* For simplicity, the CIM_

270  prefix has been removed from the names of the classes.

271
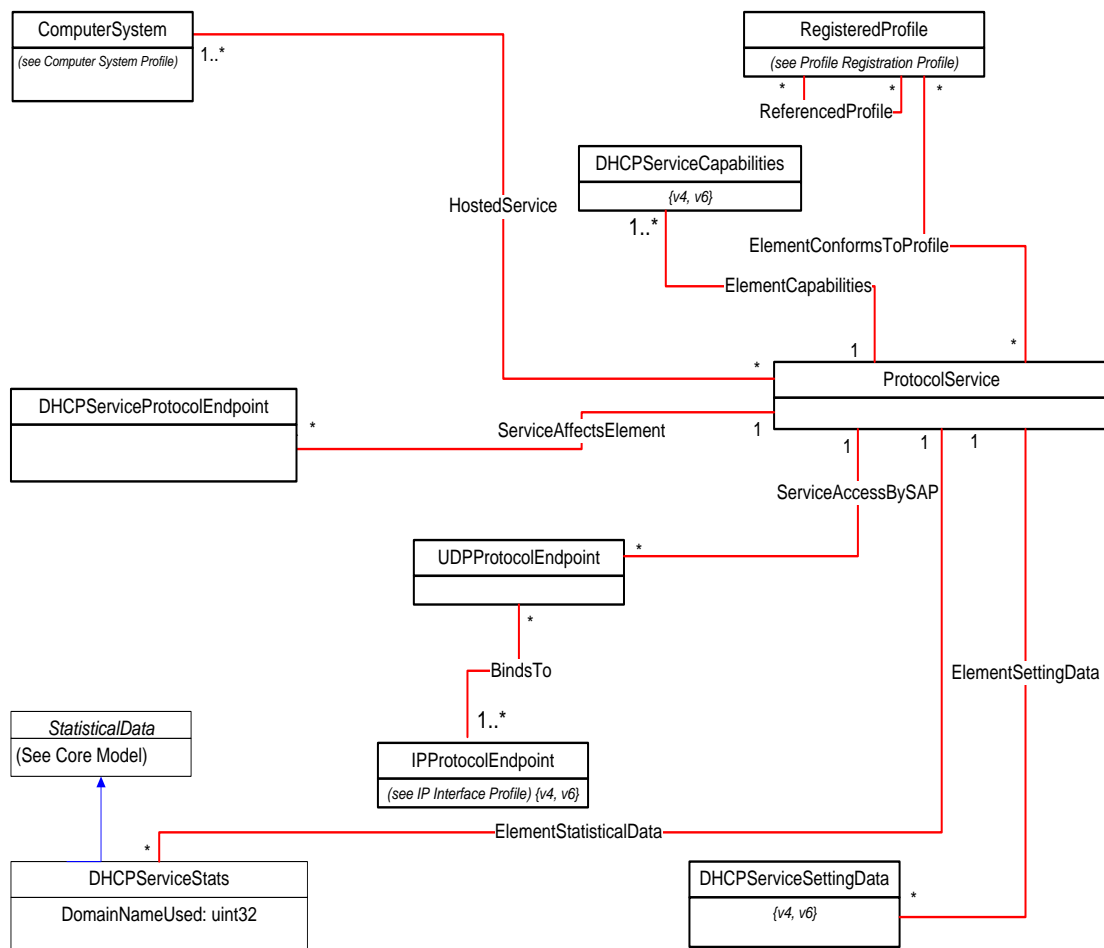


272
273

274                         **Figure 1 – DHCP Service Management Profile: Class diagram**

275  Figure 1 is a class diagram for the DHCP service profile.

276  The following classes are pertinent to represent the management aspects of DHCP service

277              •   DHCPServiceProtocolEndpoint,

278              •   ProtocolService,

279              •   ~~IPAddressAllocationService~~,

280              •   DHCPServiceCapabilities, and

281              •   DHCPServiceSettingData

282

283  The DHCP Service is represented by an instance of CIM_ProtocolService. The capabilities of the DHCP

284  service are represented by an instance of CIM_DHCPServiceCapabilites. The access to the DHCP

285  service is represented by CIM_DHCPServiceProtocolEndPoint. Each DHCPServiceSettingData request is

286  resolved via an IPAddressAllocationService of the ProtocolService.,

287
288     DHCP service typically supports the following capabilities

289     • Have a range of IPv4 address (per RFC 1918) with a starting address and a list of exclusions, if
290         applicable, and assign one to a client
291     • Allocate a lease period in hours (default is eight days) for an IP address
292     • Default gateway address with specific IPv4 address and no-notify options
293     • A list of notify DNS servers (primary, secondary, and none)
294     • A list of WINS servers (primary, secondary, and none)
295     • A list of Domain names (assigned, specific, and none)

296     DHCP service responds to a DHCP-Discover message from the DHCP Relay Agent or DHCP Client
297     with DHCP-Offer message.

298     DHCP service receives to a DHCP-Request message from the DHCP Bridge or DHCP Client and
299     responds with DHCP-Ack message.

300     Support of IPv4 to/from IPv6 and dual (both IPv4 and IPv6) stack may be desirable and increasingly
301     becoming the norm.
302

## 6.2   Security Aspects of DHCP Service Operations

304     Note that DHCP server operates by offering (DHCPOFFER) to lease an IP address in response to DHCP
305     clients broadcast discovery messages (DHCPDISCOVER) containing their MAC addresses. The client
306     shall respond (DHCPREQUEST) to the first lease offer it receives and the server shall acknowledge
307     (DHCPACK) the request and shall mark the address as leased in the DHCP database. Because of the
308     simplicity of operation of the DCHP server, there are many authorization and security concerns. These
309     concerns may be addressed via the following practices:

310     • Use domain controller based authorization at the first at boot time to verify that the DHCP server's
311         IP address is white-listed.
312     • Use pre-authorization and authentication in order to determine which DHCP server may lease IP
313         address to which MAC address holders.
314     • Use authentication of DHCP messages per IETF RFC 3118 using either a token-based exchange
315         of messages or a shared symmetric key, which involves additional initial configuration of the
316         DHCP client.
317     • Use IPv6 to protect the DHCP traffic; IPv6 has been designed to offer end-to-end security.
318     • Routinely audit the database of the DHCP servers in order to verify that only the authorized
319         DHCP clients are leasing addresses from the server (see for example the GIAC report on DHCP
320         Server Security Audit, http://www.giac.org/paper/gcux/27/dhcp-server-security-audit/100392).

## 6.3   Representation of DHCP Service Usage Data (Statistics)

322     The DHCP service (server) usage data may include one or more of the following parameters:
323     • Maximum, average, and minimum number of clients served over a specific time period (e.g.,
324         twenty-four hour)
325     • Frequency with which the clients renew their leases
326     • Up-time (MTTF or mean –time-to-failure), down-time (MTTR or mean-time-to-repair), and
327         sustained overload time of the server
328     • Numbers of upstream/downstream servers for which a DHCP server being used as relay and/or
329         bridge server (beyond the scope of this version)
330     • Record of failure events and how — in terms of response,  response time, and capacity —  the
331         clients' requests were handled
332
333     The CIM_DHCPServiceProtocollEndpointStats represents statistics of operation of the DHCP service.
334

335 # 7   Implementation

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

338 ## 7.1   Representing a DHCP service

339 Exactly one instance of CIM_ProtcolService shall represent the DHCP service being modeled. In
340 CIM_ProtcolService.Protocol, the Protocol property of the CIM_ProtocolService instance shall have a
341 value of X (DHCP).

342 ### 7.1.1   CIM_DHCPServiceCapabilities

343 Exactly one instance of   CIM_DHCPServiceCapabilities shall be associated with the
344 CIM_ProtocolService instance through an instance of CIM_ElementCapabilities. This instance of
345 CIM_DHCPServiceCapabilities shall represent the capabilities of the DHCPservice.

346 #### 7.1.1.1   CIM_DHCPServiceCapabilities.RequestedStatesSupported

347 The RequestedStatesSupported property may contain zero or more of the following values: 2 (Enabled),
348 3 (Disabled), or 11 (Reset).

349 ### 7.1.2   CIM_ProtocolService.RequestedState

350 When the CIM_ProtocolService.RequestStateChange( ) method is successfully invoked, the value of the
351 RequestedState property shall be the value of the RequestedState parameter. If the method is not
352 successfully invoked, the value of the RequestedState property is indeterminate.

353 The CIM_ProtocolService.RequestedState property shall have one of the values specified in the
354 CIM_DHCPServiceCapabilities.RequestedStatesSupported property or a value of 5 (No Change).

355 ### 7.1.3   CIM_ProtocolService.EnabledState

356 When the RequestedState parameter has a value of 2 (Enabled) or 3 (Disabled) and the
357 CIM_ProtocolService.RequestStateChange( ) method completes successfully, the value of the
358 EnabledState property shall equal the value of the CIM_ProtocolService.RequestedState property.

359 If the method does not complete successfully, the value of the EnabledState property is indeterminate.

360 The EnabledState property shall have the value 2 (Enabled), 3 (Disabled), or 6 (Enabled but Offline).

361 ## 7.2   DHCP Service access representation

362 The access to DHCP service shall be modeled using at least one  instance of
363 CIM_DHCPServiceProtocolEndpoint class.

364 ### 7.2.1   Relationship with Service

365 An instance of CIM_ProvidesEndpoint shall associate the CIM_ProtocolService with the
366 CIM_DHCPServiceProtocolEndpoint.

367 ### 7.2.2   Port for DHCP Offer

368 An implementation may model the UDP port to which the DHCP resolution session is bound. When the
369 implementation models the UDP port, the following requirements apply.

370 **7.2.2.1 CIM_UDPProtocolEndpoint**

371 When the UDP port on which the DHCP resolution session is bound is modeled, the UDP port shall be
372 modeled using an instance of CIM_ UDPProtocolEndpoint.

373 **7.2.2.2 Relationship to DHCP Offer**

374 An instance of CIM_BindsTo shall associate the CIM_DHCPServiceProtocolEndpoint instance with the
375 CIM_UDPProtocolEndpoint.

## 376 **7.3 DHCP Service Default Configuration**

377 The default configuration is the configuration of the DHCP service when it was first installed on the
378 managed system. When an implementation exposes the default configuration, the default configuration
379 shall be represented by an instance of CIM_DHCPerviceSettingData associated with the
380 CIM_ProtocolService through an instance of CIM_ElementSettingData, where the IsDefault property of
381 the CIM_ElementSettingData instance has a value of 1 (Is Default).

### 382 **7.3.1 UDP Ports**

383 An implementation may model one or more UDP ports of the DHCP service. When the implementation
384 models the UDP ports, the following requirements shall apply for each UDP port.

385 **7.3.1.1 CIM_UDPProtocolEndpoint**

386 There shall be an instance of CIM_UDPProtocolEndpoint in which the PortNumber property of the
387 instance indicates the UDP port number on which the DHCP service is accessible.

388 **7.3.1.2 Relationship of UDP Port to the DHCP Service**

389 An instance of CIM_ServiceAccessBySAP shall associate the CIM_ProtocolService instance with the
390 CIM_UDPProtocolEndpoint instance.

391 **7.3.1.3 Managing UDP Ports**

392 The implementation may support managing the UDP ports on which the DHCP service is accessible. The
393 access method ( ) method  of the CIM_ProtocolService class can be used to add ports on which the
394 DHCP service will be accessible. The AssignUDPPort( ) method of the CIM_ProtocolService class can be
395 used to add UDP ports on which the DHCP service will be accessible.  Using the RemoveUDPPort( )
396 intrinsic operation to remove an instance of CIM_UDPProtocolEndpoint will stop the DHCP service from
397 being accessible.

## 398 **8 Methods**

### 399 **8.1 Profile conventions for operations**
400 For each profile class (including associations), the implementation requirements for operations, including
401 those in the following default list, are specified in class-specific sub-clauses of this clause.

402 The default list of operations is as follows:

403 • GetInstance
404 • EnumerateInstances
405 • EnumerateInstanceNames
406 • Associators
407 • AssociatorNames

408         • References
409         • ReferenceNames

## 8.2  CIM_DHCPServiceCapabilities
411   All operations in the default list in 8.1 shall be implemented as defined in DSP0200.
412   NOTE Related profiles may define additional requirements on operations for the profile class.

## 8.3  CIM_DHCPServiceProtocolEndpoint
414   All operations in the default list in 8.1 shall be implemented as defined in DSP0200.
415   NOTE Related profiles may define additional requirements on operations for the profile class.

## 8.4  CIM_DHCPServiceSettingData
417   All operations in the default list in 8.1 shall be implemented as defined in DSP0200.
418   NOTE Related profiles may define additional requirements on operations for the profile class.

## 8.5  CIM_RemoteServiceAccessPoint
420   All operations in the default list in 8.1 shall be implemented as defined in DSP0200.

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

## 8.6  CIM_ElementCapabilities
423   Table 2 lists implementation requirements for operations. If implemented, these operations shall be
424   implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 2, all operations in
425   the default list in 8.1 shall be implemented as defined in DSP0200.
426   NOTE Related profiles may define additional requirements on operations for the profile class.

427                     **Table 2 – Operations: CIM_ElementCapabilities**

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

## 8.7  CIM_ElementSettingData
429   Table 3 lists implementation requirements for operations. If implemented, these operations shall be
430   implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 3, all operations in
431   444 the default list in 8.1 shall be implemented as defined in DSP0200.

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

433                     **Table 3 – Operations: CIM_ElementSettingData**

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

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

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

439 **Table 4 – Operations: CIM_SAPSAPDependency**

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

## 440 8.9 CIM_HostedAccessPoint

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

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

445 **Table 5 – Operations: CIM_HostedAccessPoint**

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

## 446 8.10 CIM_RemoteAccessAvailableToElement

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

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

451 **Table 6 – Operations: CIM_RemoteAccessAvailableToElement**

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

452

453

### 454  9  Use cases

455  This clause contains object diagrams and use cases for the *DHCP Service Management Profile*.

### 456  9.1  Profile Registration

457  The object diagram in Figure 2 shows one possible method for advertising profile conformance. The
458  instances of CIM_RegisteredProfile are used to identify the version of the Network Service Management
459  – DHCP Server Profile with which an instance of CIM_ProtocolService is conformant. An instance of
460  CIM_RegisteredProfile exists for each profile that is instrumented in the computer system. One instance
461  of CIM_RegisteredProfile identifies the "DHCP service profile1.0.0". The other instance identifies the
462  "Network Service Management – DHCP Server Profile". The CIM_ProtocolService instance is scoped to
463  an instance of CIM_ComputerSystem.
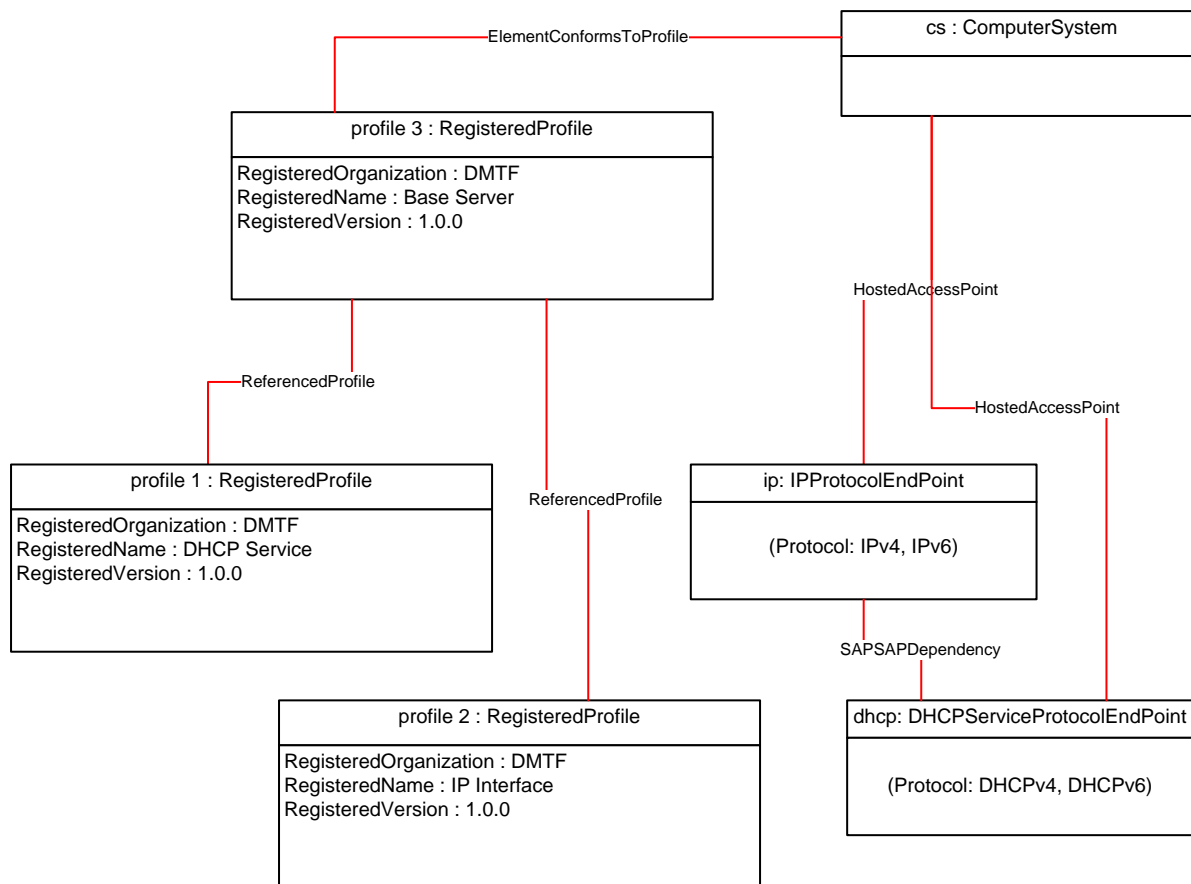


464
465

466                             **Figure 2 – Registered profile**

### 467  9.2  Adding a UDP port for the DHCP Service

468  An implementation can support adding and removing bindings between the DHCP service and UDP
469  ports. When an implementation supports adding bindings, a client can configure the service to be
470  accessible on all interfaces or a specific interface.

471  To have the DHCP service accessible on a UDP port across all IP interfaces of the system, the client can
472  invoke the AssignUDPPort method of the CIM_ProtocolService instance, specifying the desired
473  PortNumber.

474   To have the DHCP service accessible on a UDP port for a specific interface, the client can invoke the
475   AssignUDPPort( ) method of the CIM_ProtocolService instance, specifying a reference to the
476   CIM_IPProtocolEndpoint instance that represents the specific IP interface.
477
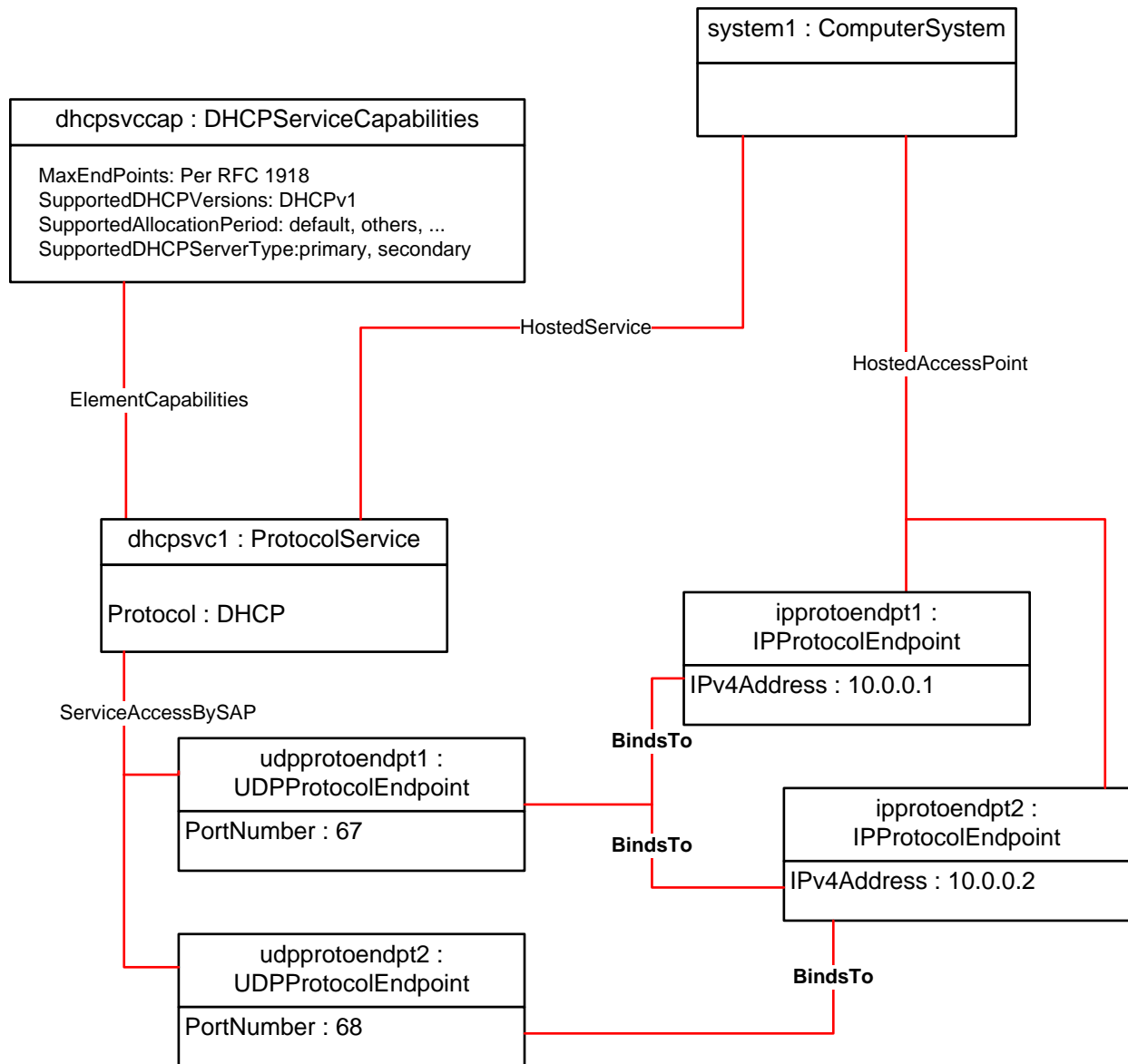


478

479                    **Figure 3 – UDP port configuration to specific interface**

480   Figure 3 reflects the configuration where the AssignUDPPort( ) method was invoked with the IPEndpoint
481   parameter containing a reference to ipprotoendpt2 and a PortNumber parameter of 68. The instance
482   udpprotoendpt2 is created and associated with ipprotoendpt2

483 **9.3    Obtain DHCP Service Configuration**
484    A client may view information about the DHCP server that granted the lease to the DHCP client as
485 follows:
486        1)   Find all instances of CIM_RemoteAccessAvailableToElement that associate an instance of
487             CIM_RemoteServiceAccessPoint with the CIM_DHCPProtocolEndpoint instance.
488             •    If more than one instance exists, find the instance of
489                  CIM_RemoteAccessAvailableToElement in which the OrderOfAccess property has the
490                  value 1. Find the referenced CIM_RemoteServiceAccessPoint instance.
491             •    If exactly one instance exists, find the referenced CIM_RemoteServiceAccessPoint
492                  instance.
493             •    If no instances exist, no DHCP server is currently modeled for the DHCP client.
494        2)   View the AccessInfo property of the CIM_RemoteServiceAccessPoint instance.
495

496 **9.4    Perform DHCP Service Configuration**

497 **9.4.1    Determine Which IP address versions Are Supported**

498 Both version 4 and version 6 of IP address scheme should be supported simultaneously. For IP version 6
499 (IPv6) operations, the client (or device) may use stateless address auto-configuration alternatively.  For
500 IPv4 operations, it is desirable to restrict addresses to local network link.

501 View the DHCPType property of the CIM_DHCPServiceCapabilities instance to determine the support for
502 IPv4 (IN-ADDR.ARPA) and IPv6(IP6.ARPA) addresses.

503 IN-ADDR.ARPA property represents a domain that is defined to look up a record given an IPv4 address.

504 In addition, IP6.ARPA property represents a special domain that is defined to look up a record given an
505 IPv6 address.

506 **9.5    Obtain DHCP Service Statistics**

507 Obtaining and viewing of the DHCP service statistics are discussed in this section. This includes viewing
508 the management of a set of timers for leasing, monitoring-the use-of, monitoring-idle-time, renewing, etc.
509 of the IP addresses that are issued and managed by a DHCP server.

510 **9.5.1    View Default Address Lease Time**

511 This can be viewed by examining the properties of the associated instance of
512 CIM_DHCPServiceSettingData.

513 **9.5.2    View Allocation Range and  Allocated IP Addresses**

514 A client can view the active configuration of the DHCP server as follows: (a) Find all instances of
515 CIM_ElementSettingData that associate an instance of CIM_DHCPServiceSettingData with the
516 CIM_DHCPServiceProtocolEndpoint instance, and (b) For each instance of CIM_ElementSettingData,
517 see the value of the IsCurrent property.

518 **9.5.3    View all Clients who Request IP address**

519 A client can find the DHCP server IP address as follows: (a) Find the instance of
520 CIM_DHCPServiceProtocolEndpoint associated with the CIM_UDPProtocolEndpoint through an instance
521 of CIM_BindsTo, (b) Find the instance of CIM_IPProtocolEndpoint associated with the
522 CIM_UDPProtocolEndpoint through an instance of CIM_BindsTo, and (c) View the IPv4Address and
523 IPv6Address properties of the CIM_IPProtocolEndpoint instance to find the IP address of the DHCP
524 server.

525 **9.5.4 View all Clients offered with IP address**

526 A client can find the DHCP request resolution policy of the DHCP server as follows: (a) Find the instance
527 of CIM_DHCPServiceSettingData associated with the CIM_DHCPServiceProtocolEndpoint through an
528 instance of CIM_ElementCapabilities, and (b) View the value of DHCPResolutionPolicy property of the
529 CIM_DHCPServiceSettingData instance to find the DHCP request resolution policy of the DHCP server.

530 # 10 CIM Elements

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

534 **Table 7 – CIM Elements: DHCP Service Management Profile**

| Element Name | Requirement | Description |
|---|---|---|
| **Classes** | | |
| CIM_DHCPServiceCapabilities | Mandatory | See Sec.8.2 and Sec.10.1 |
| CIM_ DHCPServiceProtocolEndpoint | Mandatory | See Sec.8.3 and Sec.10.2 |
| CIM_DHCPServiceSettingData | Mandatory | See Sec.8.4 and Sec.10.3 |
| CIM_ RemoteServiceAccessPoint | Mandatory | See Sec.10.4 |
| | | |
| CIM_ ProtocolService | Mandatory | See Sec.7.1 |
| ~~CIM_ IPAddressAllocationService~~ | ~~Mandatory~~ | |
| | | |
| CIM_RegisteredProfile | Optional | See clauses and Sec.10.5 (Table 12) |
| **Indications** | | |
| None defined in this profile | | |

535 ## 10.1 CIM_DHCPServiceCapabilities

536 CIM_DHCPServiceCapabilities represents the capabilities of DHCP service as supported and managed
537 by the DHCP server in association with Address Allocation Server (AAS) and DHCP bridge and relay
538 agent if/when applicable. Table 8 contains the requirements for elements of this class

539 **Table 8 – Class: CIM_DHCPServiceCapabilities**

| Element Name | Requirement | Description |
|---|---|---|
| InstanceID | Mandatory | Key |
| ElementName | Mandatory | Pattern ".*" |
| AddressOrigin | Mandatory | This property shall have a value of 4 ("DHCPv4") or 7 ("DHCPv6"). |
| ProtocolIFType | Mandatory | This property shall have a value of 4096 (IPv4) or 4097 (IPv6). |
| | | |
| | | |
| | | |

| Element Name | Requirement | Description |
|---|---|---|
| DomainType | Mandatory | This property shall have a value of 1 (IPv4/ IN-ADDR.ARPA) or 2 (IPv6/IP6.ARPA). |
|  |  |  |
| NameServerType | Mandatory | This property indicates role of the server and shall have a value of 1 (Primary name server), (Secondary name server), or 3 (Caching-only name server). |
| DHCPDiscoverSupport | Mandatory | This property allows the DHCP server to assemble (using configuration file and global options, subnet-specific options, class-specific options, and client-specific options) and respond to Discover message received from a DHCP client (per RFC2131). |
| DHCPRequestSupport | Mandatory | This property allows the DHCP server to (a) request for an IP address (from the address allocation server or AAS) for a client who sends an empty configuration file over Discover message, and (b) wait for a request from client accepting the configuration and IP address (per RFC2131). |
| DHCPOfferSupport | Mandatory | This property allows the DHCP server to construct an "offer" message and send it to the client. The message contains a valid IP address and may contain client's configuration (per RFC2131). |
| DHCPRenewSupport | Mandatory | This property allows the DHCP server process IP address renewal request from a client (per RFC2131). |
| DHCPACKNACKSupport | Mandatory | This property allows the DHCP server to receive and process ACK (success or process complete) and NACK (negative ACK means process failure) messages from client, bridge and relay agent (per RFC2131). |
| DHCPAASOptionSupport | Mandatory | This property allows the DHCP server to directly  or indirectly (using a separate Address allocation server or AAS) allocate IP address dynamically from a subnet-specific pool(per RFC2131). |
|  |  |  |
| DHCPServerManagerOptions | Mandatory | Two Options are supported: **Global** and **Generic**. Global DHCP options are usually the same for all hosts, e.g., list of DNS name servers and the name of the local domain. Generic DHCP options always override the globally defined option and are defined for sets of subnet, vendor class, user class, and client options (per RFC2131). The allocated IP address can be specific per client's request, a previously used one or random. |
|  |  |  |
| DHCPv6OptionsSupport | Optional | DHCPv6 server behavior are as discussed in Sec.17.2, Sec.18.2, and Sec.19.1 of the IETF draft, DHCP for IPv6 ( DHCPv6, RFC3315). |

540   ## 10.2 CIM_DHCPServiceProtocolEndpoint

541   CIM_DHCPServiceProtocolEndpoint represents the DHCP server protocol endpoint (essentially a DHCP
542   client) that is associated with an IP interface. Table 9 contains the requirements for elements of this class.

543   **Table 9 – Class: CIM_DHCPServiceProtocolEndpoint**

| Element Name | 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 of DSP1037 |
| EnabledState | Mandatory | See 7.3.2 of DSP1037 |
| ClientState | Mandatory | See 7.2 of DSP1037 |
| ElementName | Mandatory | Pattern ".*" |

544

545   ## 10.3 CIM_DHCPServiceSettingData

546   CIM_DHCPServiceSettingData indicates that the IP configuration should be obtained through the DHCP
547   server if possible. Table 10 contains the requirements for elements of this class.

548   **Table 10 – Class: CIM_DHCPServiceSettingData**

| Element Name | Requirement | Description |
|---|---|---|
| InstanceID | Mandatory | Key |
| AddressOrigin | Mandatory | This property shall have a value of 4 ("DHCP") or 7 ("DHCPv6"). |
| ElementName | Mandatory | Pattern ".*" |
| ProtocolIFType | Mandatory | This property shall have a value of 4096 (IPv4) or 4097 (IPv6). |
| DomainType | Mandatory | This property shall have a value of 1 (IPv4/ IN-ADDR.ARPA) or 2 (IPv6/IP6.ARPA). |
| IPv6OptionsSupported | Optional | This property shall be set to IPv4/ IN-ADDR.ARPA (for DomainType 1) or IPv6/IP6.ARPA (for DomainType 2) |
|  |  |  |
| LocalAddressAllocationServer | Mandatory | This property sets the Address Allocation Server (AAS) to run on the same DHCP server |

| Element Name | Requirement | Description |
| --- | --- | --- |
| RemoteAddressAllocationServer | Optional | If set, this property requires IP address of the remote AAS server in addition to the credential for DHCP server including requirements for authentication to the AAS server. |
| IPv4AddressRangePool | Mandatory | This property allows setting up of a pool consist of a range of IPv4 addresses. A range is specified by two addresses separated by only a dash (RFC1918). |
| | | |
| InitialLeasTime | Optional | This property allows defining the initial lease reservation time in seconds. The default value is 180 seconds. |
| InitialLeaseReservationTime | Mandatory | This property allows defining the time in minutes for which an address is reserved while the server offers it to a client. The lease begins when the client accepts the address. This reservation period prevents an address from being offered to more than one client at the same time. The default value is 10 minutes |
| DefaultLeaseTime | Mandatory | This property allows defining the default lease period in days for the subnet. A value of *infinite* means that there is no limit. |
| MaximumLeaseTime | Mandatory | This property allows defining the maximum lease period in days for the subnet. A value of *infinite* means that there is no limit |
| | | |
| LeaseRenewalTime | Mandatory | This property allows defining the lease renewal time in units of 0.1%. For example, a value of 500 indicates that the lease should be renewed after 50% of its lease had expired. |
| LeaseRebindTime | Optional | This property allows defining the rebind time in units of 0.1%. Option values for a subnet can be assigned within the scope of the subnet definition. |
| LeaseTimePadding | Optional | This property allows defining the lease padding. This is the amount of extra time the server allocates above the client lease time. It is defined in units of 0.1% of the client lease time. The default value of 10 adds 1% to the client lease time for the server lease time. The DHCP server knows the padded lease in order to preventing the server from assuming that the lease has expired before the client finds it out. |
| ProbeAddress | Optional | This property allows defining whether an address that is about to be allocated should be tested using *ping*. By default, this is enabled. |

| Element Name | Requirement | Description |
|---|---|---|
| OptionOverload | Mandatory | This property allows defining whether option overloading is allowed. If its value is non-zero, it is allowed. By default it is not allowed. |

549

## 10.4 CIM_RemoteServiceAccessPoint

551 CIM_RemoteServiceAccessPoint represents the managed system's view of the DHCP server. Table 11
552 contains the requirements for elements of this class.

553 **Table 11 – Class: CIM_RemoteServiceAccessPoint**

| Element Name | Requirement | Description |
|---|---|---|
| InstanceID | Mandatory | **Key** |
| ElementName | Mandatory | Pattern ".*" |
| ElementNameEditSupported | Mandatory | See 7.1 |
| MaxElementNameLen | Conditional | See 7.3 |
| OptionsSupported | Mandatory | None |
| IPv6OptionsSupported | Optional | None |

554

## 10.5 CIM_RegisteredProfile

556 CIM_RegisteredProfile identifies the DHCP Server Profile in order for a server to determine whether an
557 instance of CIM_IPProtocolEndpoint is conformant with this profile. The CIM_RegisteredProfile class is
558 DHCP Service Management Profile (DSP1068) defined by the Profile Registration Profile. With the
559 exception of the mandatory values specified for the properties in Table 12, the behavior of the
560 CIM_RegisteredProfile instance is in accordance with the  Profile Registration Profile.

561 **Table 12 – Class: CIM_RegisteredProfile**

| Element Name | Requirement | Description |
|---|---|---|
| RegisteredName | Mandatory | This property shall have a value of "DHCP Service Management Profile". |
| RegisteredVersion | Mandatory | This property shall have a value of "1.0.0". |
| RegisteredOrganization | Mandatory | This property shall have a value of "DMTF". |

562
563

564 <div align="center">**ANNEX A**</div>

565 <div align="center">**(informative)**</div>

566

567 <div align="center">**Change log**</div>

| Version | Date | Description |
|---------|------|-------------|
| 1.0.0a | 2015-06-19 | DMTF Work in Progress |

568

569 # Bibliography