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5 **CIM Operations over HTTP**

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CONTENTS

| | | |
|----|--|----|
| 34 | Foreword | 6 |
| 35 | Introduction | 7 |
| 36 | 1 Scope | 9 |
| 37 | 2 Normative References..... | 9 |
| 38 | 2.1 Other References..... | 10 |
| 39 | 3 Terms and Definitions..... | 10 |
| 40 | 4 Abbreviated Terms and Document Conventions..... | 12 |
| 41 | 4.1 Abbreviated Terms..... | 12 |
| 42 | 4.2 Document Conventions..... | 12 |
| 43 | 5 CIM Message Syntax and Semantics | 12 |
| 44 | 5.1 Well-Formed, Valid, and Loosely Valid Documents | 13 |
| 45 | 5.2 Operational Semantics..... | 13 |
| 46 | 5.3 CIM Operation Syntax and Semantics..... | 15 |
| 47 | 5.3.1 Method Invocations..... | 15 |
| 48 | 5.3.1.1 Simple Operations | 15 |
| 49 | 5.3.1.2 Multiple Operations | 16 |
| 50 | 5.3.1.3 Status Codes | 16 |
| 51 | 5.3.2 Intrinsic Methods..... | 18 |
| 52 | 5.3.2.1 GetClass | 19 |
| 53 | 5.3.2.2 GetInstance..... | 20 |
| 54 | 5.3.2.3 DeleteClass..... | 22 |
| 55 | 5.3.2.4 DeleteInstance | 22 |
| 56 | 5.3.2.5 CreateClass | 23 |
| 57 | 5.3.2.6 CreateInstance..... | 24 |
| 58 | 5.3.2.7 ModifyClass | 25 |
| 59 | 5.3.2.8 ModifyInstance..... | 27 |
| 60 | 5.3.2.9 EnumerateClasses..... | 28 |
| 61 | 5.3.2.10 EnumerateClassNames..... | 29 |
| 62 | 5.3.2.11 EnumerateInstances | 30 |
| 63 | 5.3.2.12 EnumerateInstanceNames | 32 |
| 64 | 5.3.2.13 ExecQuery | 32 |
| 65 | 5.3.2.14 Associators | 33 |
| 66 | 5.3.2.15 AssociatorNames..... | 35 |
| 67 | 5.3.2.16 References..... | 36 |
| 68 | 5.3.2.17 ReferenceNames | 37 |
| 69 | 5.3.2.18 GetProperty..... | 38 |
| 70 | 5.3.2.19 SetProperty | 39 |
| 71 | 5.3.2.20 GetQualifier | 39 |
| 72 | 5.3.2.21 SetQualifier | 40 |
| 73 | 5.3.2.22 DeleteQualifier | 40 |
| 74 | 5.3.2.23 EnumerateQualifiers | 41 |
| 75 | 5.3.2.24 Pulled Enumeration Operations..... | 41 |
| 76 | 5.3.3 Namespace Manipulation Using the CIM_Namespace Class | 61 |
| 77 | 5.3.3.1 Namespace Creation | 61 |
| 78 | 5.3.3.2 Namespace Deletion | 62 |
| 79 | 5.3.3.3 Manipulation and Query of Namespace Information | 62 |
| 80 | 5.3.3.4 Use of the __Namespace Pseudo Class (DEPRECATED)..... | 62 |
| 81 | 5.3.4 Functional Profiles | 62 |
| 82 | 5.3.5 Extrinsic Method Invocation..... | 64 |
| 83 | 5.4 CIM Export Syntax and Semantics | 64 |
| 84 | 5.4.1 Export Method Invocations | 64 |
| 85 | 5.4.1.1 Simple Export..... | 65 |

| | | | |
|-----|---------|---|----|
| 86 | 5.4.1.2 | Multiple Export | 65 |
| 87 | 5.4.1.3 | Status Codes | 65 |
| 88 | 5.4.2 | Export Methods..... | 66 |
| 89 | 5.4.2.1 | ExportIndication | 68 |
| 90 | 5.4.3 | Functional Profiles | 68 |
| 91 | 6 | Encapsulation of CIM Messages..... | 69 |
| 92 | 6.1 | CIM Clients, CIM Servers, and CIM Listeners..... | 69 |
| 93 | 6.2 | Use of M-POST..... | 70 |
| 94 | 6.2.1 | Use of the Ext Header | 70 |
| 95 | 6.2.2 | Naming of Extension Headers | 70 |
| 96 | 6.3 | Extension Headers Defined for CIM Message Requests and Responses..... | 71 |
| 97 | 6.3.1 | Encoding of CIM Element Names within HTTP Headers and Trailers..... | 71 |
| 98 | 6.3.2 | Encoding of CIM Object Paths within HTTP Headers and Trailers | 72 |
| 99 | 6.3.3 | CIMOperation..... | 73 |
| 100 | 6.3.4 | CIMExport..... | 74 |
| 101 | 6.3.5 | CIMProtocolVersion..... | 74 |
| 102 | 6.3.6 | CIMMethod | 75 |
| 103 | 6.3.7 | CIMObject..... | 75 |
| 104 | 6.3.8 | CIMExportMethod..... | 76 |
| 105 | 6.3.9 | CIMBatch | 77 |
| 106 | 6.3.10 | CIMExportBatch..... | 78 |
| 107 | 6.3.11 | CIMError | 78 |
| 108 | 6.3.12 | CIMRoleAuthenticate..... | 79 |
| 109 | 6.3.13 | CIMRoleAuthorization..... | 79 |
| 110 | 6.3.14 | CIMStatusCodeDescription | 79 |
| 111 | 6.3.15 | WBEMServerResponseTime..... | 80 |
| 112 | 7 | HTTP Requirements and Usage | 80 |
| 113 | 7.1 | HTTP Support | 80 |
| 114 | 7.2 | Use of Standard Headers | 80 |
| 115 | 7.2.1 | Accept..... | 80 |
| 116 | 7.2.2 | Accept-Charset | 80 |
| 117 | 7.2.3 | Accept-Encoding..... | 81 |
| 118 | 7.2.4 | Accept-Language..... | 81 |
| 119 | 7.2.5 | Accept-Ranges | 81 |
| 120 | 7.2.6 | Allow | 81 |
| 121 | 7.2.7 | Authorization | 82 |
| 122 | 7.2.8 | Cache-Control..... | 82 |
| 123 | 7.2.9 | Connection..... | 82 |
| 124 | 7.2.10 | Content-Encoding..... | 82 |
| 125 | 7.2.11 | Content-Language | 82 |
| 126 | 7.2.12 | Content-Range..... | 83 |
| 127 | 7.2.13 | Content-Type | 83 |
| 128 | 7.2.14 | Expires | 83 |
| 129 | 7.2.15 | If-Range | 83 |
| 130 | 7.2.16 | Proxy-Authenticate..... | 83 |
| 131 | 7.2.17 | Range | 83 |
| 132 | 7.2.18 | WWW-Authenticate..... | 83 |
| 133 | 7.3 | Errors and Status Codes | 84 |
| 134 | 7.4 | Security Considerations | 85 |
| 135 | 7.5 | Determining CIM Server Capabilities..... | 86 |
| 136 | 7.5.1 | Determining CIM Server Capabilities through CIM Classes..... | 86 |
| 137 | 7.5.2 | Determining CIM Server Capabilities through the HTTP Options | 88 |
| 138 | 7.5.2.1 | CIMSupportedFunctionalGroups | 89 |
| 139 | 7.5.2.2 | CIMSupportsMultipleOperations..... | 89 |
| 140 | 7.5.2.3 | CIMSupportedQueryLanguages | 90 |
| 141 | 7.5.2.4 | CIMValidation..... | 90 |

142 7.6 Other HTTP Methods..... 90
 143 7.7 Discovery and Addressing..... 90
 144 7.8 Internationalization Considerations..... 91
 145

146 **Tables**

147 Table 1 – Status Codes Returned by an <Error> Subelement 17
 148 Table 2 – Mapping of Intrinsic Method Pseudo-Types to XML Elements..... 19
 149 Table 3 – Root-Directed Tree of Functional Profile Dependencies 63
 150 Table 4 – Symbolic Names for Referencing Error Codes..... 66
 151 Table 5 – Mapping of Export Method Pseudo-Types to XML Elements..... 68
 152 Table 6 – Functional Groups of Export Methods 69
 153 Table B-1 – Comparison of Properties Returned by GetInstance in Versions 1.0 and 1.1 116
 154 Table B-2 – Comparison of Properties Returned by a Call to GetInstance in Versions 1.0 and 1.1 117
 155

156

Foreword

157 *CIM Operations over HTTP* (DSP0200) was prepared by the DMTF CIM-XML Working Group.

158

Introduction

159 This document defines a mapping of CIM messages to the Hypertext Transfer Protocol (HTTP) so that
160 implementations of CIM can operate in an open, standardized manner. It also defines the notion of
161 *conformance* in the context of this mapping, and it describes the behavior an implementation of CIM shall
162 exhibit to be a conforming CIM implementation.

163 This document is structured as follows:

- 164 • [Clause 5](#) describes the CIM messages that form the HTTP payload using XML. It specifies the
165 syntax and semantics of the message requests and their corresponding responses.
- 166 • [Clause 6](#) describes the encapsulation of these messages in HTTP request and response
167 messages, with examples of each. It also describes the extension headers used to convey
168 additional CIM-specific semantics in the HTTP Header.
- 169 • [Clause 7](#) presents details of other aspects of the encapsulation:
 - 170 – HTTP version support
 - 171 – Use of standard HTTP headers
 - 172 – HTTP error codes
 - 173 – Security considerations

174 Requirements

175 There are many different ways CIM messages can be represented in XML and encapsulated within HTTP
176 messages. To attain interoperability among different implementations of CIM, both the XML
177 representation and the HTTP encapsulation must be standardized. The XML representation is defined in
178 [DSP0201](#) and [DSP0203](#). This document uses that XML representation to define the HTTP encapsulation.

179 The following criteria are applied to the representation of CIM messages in XML using [DSP0201](#) and
180 [DSP0203](#):

- 181 • Each CIM message is completely described in XML; completeness is favored over conciseness.
- 182 • The set of CIM messages provides enough functionality to enable implementations of CIM to
183 communicate effectively for management purposes. This release of the mapping does not
184 provide a *complete* set of messages. Rather, the goal is to define the mapping so that it admits
185 straightforward extension (by the addition of further features) in future versions.
- 186 • The set of CIM messages is classified into functional profiles to accommodate a range of
187 implementations varying from complete support of all messages to support of a minimal subset.
188 The number of functional profiles is kept as small as possible to encourage interoperability, and
189 mechanisms provided by different CIM implementations can declare their level of support.

190 The following criteria are applied to the HTTP encapsulation of CIM Messages herein:

- 191 • In recognition of the large installed base of HTTP/1.0 systems, the encapsulation is designed to
192 support both HTTP/1.0 and HTTP/1.1.
- 193 • The encapsulation does not introduce requirements that conflict with those stated in HTTP/1.0
194 or HTTP/1.1.
- 195 • Use of the encapsulation should be straightforward over the current base HTTP infrastructures.
196 Some features anticipate and exploit enhancements to this base, but no aspects of the
197 encapsulation require such enhancements as mandatory.

- 198 • The encapsulation avoids the use of pure HTTP tunneling or URL munging (for example, the
199 use of the "?" character) in favor of a mechanism that allows existing HTTP infrastructures to
200 control content safely.
- 201 • The encapsulation exposes key CIM message information in headers to allow efficient
202 firewall/proxy handling. The information is limited to essentials so that it does not have a
203 significant impact on the size of the header. All CIM-specific information in a header also
204 appears within the CIM message.
- 205 • There is a clear and unambiguous encapsulation of the CIM message payload within the HTTP
206 message. Conciseness of the encapsulation is of secondary importance.

207

CIM Operations over HTTP

208 1 Scope

209 The Common Information Model (CIM) ([DSP0004](#)) is an object-oriented information model defined by the
210 Distributed Management Task Force (DMTF) that provides a conceptual framework for describing
211 management data.

212 The Hypertext Transfer Protocol (HTTP) ([RFC 1945](#), [RFC 2068](#), [RFC 2616](#)) is an application-level
213 protocol for distributed, collaborative, hypermedia information systems. This generic stateless protocol
214 can be used for many tasks through extension of its request methods, error codes, and headers.

215 The [Extensible Markup Language \(XML\)](#) is a simplified subset of SGML that offers powerful and
216 extensible data modeling capabilities. An *XML document* is a collection of data represented in XML. An
217 *XML schema* is a grammar that describes the structure of an XML document.

218 This document defines a mapping of CIM messages onto HTTP that allows implementations of CIM to
219 interoperate in an open, standardized manner. It is based on the *CIM XML DTD* ([DSP0201](#) and
220 [DSP0203](#)) that defines the XML schema for CIM objects and messages.

221 2 Normative References

222 The following referenced documents are indispensable for applying the information in this document while
223 developing an implementation of CIM. For dated references, only the edition cited applies. For undated
224 references, the latest edition applies, including any amendments.

225 DMTF DSP0004, *Common Information Model (CIM) Infrastructure 2.5*,
226 http://www.dmtf.org/standards/published_documents/DSP0004_2.5.pdf

227 DMTF DSP0201, *Specification for the Representation of CIM in XML 2.3*,
228 http://www.dmtf.org/standards/published_documents/DSP0201_2.3.pdf

229 DMTF DSP0203, *CIM XML DTD 2.3*,
230 http://www.dmtf.org/standards/published_documents/DSP0203_2.3.dtd

231 IETF RFC 1766, *Tags for the Identification of Languages*, March 1995, <http://www.ietf.org/rfc/rfc1766.txt>

232 IETF RFC 1945, *Hypertext Transfer Protocol – HTTP/1.0*, May 1996, <http://www.ietf.org/rfc/rfc1945.txt>

233 IETF RFC 2068, *Hypertext Transfer Protocol – HTTP/1.1*, January 1997, <http://www.ietf.org/rfc/rfc2068.txt>

234 IETF RFC 2069, *An Extension to HTTP: Digest Access Authentication*, January 1997,
235 <http://www.ietf.org/rfc/rfc2069.txt>

236 IETF RFC 2277, *IETF Policy on Character Sets and Languages*, January 1998,
237 <http://www.ietf.org/rfc/rfc2277.txt>

238 IETF RFC 2279, *UTF-8, a transformation format of Unicode and ISO 10646*, January 1998,
239 <http://www.ietf.org/rfc/rfc2279.txt>

240 IETF RFC 2376, *XML Media Types*, July 1998, <http://www.ietf.org/rfc/rfc2376.txt>

241 IETF RFC 2396, *Uniform Resource Identifiers (URI): Generic Syntax*, August 1998,
242 <http://www.ietf.org/rfc/rfc2396.txt>

- 243 IETF RFC 2616, *Hypertext Transfer Protocol – HTTP/1.1*, June 1999, <http://www.ietf.org/rfc/rfc2616.txt>
- 244 IETF RFC 2617, *HTTP Authentication: Basic and Digest Access Authentication*, June 1999,
245 <http://www.ietf.org/rfc/rfc2617.txt>
- 246 IETF RFC 2774, *HTTP Extension Framework*, February 2000, <http://www.ietf.org/rfc/rfc2774.txt>
- 247 W3C Recommendation, *Extensible Markup Language (XML)*, Version 1.0, August 2006,
248 <http://www.w3.org/TR/REC-xml-names/>
- 249 W3C Recommendation, *Namespaces in XML*, Jan 1999, <http://www.w3.org/TR/1999/REC-xml-names-19990114/>
- 251 W3C, *XML Schema Part 1: Structures*, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/>
- 252
- 253 W3C, *XSL Transformations (XSLT)*, Version 1.0, November 1999, <http://www.w3.org/TR/xslt>

254 2.1 Other References

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

257 3 Terms and Definitions

258 Throughout this document, the following terms and definitions apply. This specification uses the same
259 notational conventions and basic parsing constructs that are defined in [RFC 2068](#).

260 3.1

261 can

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

263 3.2

264 cannot

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

266 3.3

267 conditional

268 indicates requirements that must be strictly followed to conform to the document when the specified
269 conditions are met

270 3.4

271 mandatory

272 indicates requirements that must be strictly followed to conform to the document, with no permitted
273 deviations

274 3.5

275 may

276 indicates a course of action permissible within the limits of the document

277 3.6

278 need not

279 indicates a course of action permissible within the limits of the document

- 280 **3.7**
281 **optional**
282 indicates a course of action permissible within the limits of the document
- 283 **3.8**
284 **shall**
285 indicates requirements that must be strictly followed to conform to the document, with no permitted
286 deviations
- 287 **3.9**
288 **shall not**
289 indicates requirements that must be strictly followed to conform to the document, with no permitted
290 deviations
- 291 **3.10**
292 **should**
293 indicates that among several possibilities, one is recommended as particularly suitable, without
294 mentioning or excluding others, or that a certain course of action is preferred but not necessarily required
- 295 **3.11**
296 **should not**
297 indicates that a certain possibility or course of action is deprecated but not prohibited
- 298 **3.12**
299 **unspecified**
300 indicates that this profile does not define any constraints for the referenced CIM element or operation
- 301 **3.13**
302 **CIM Message**
303 a well-defined request or response data packet used to exchange information among CIM products
- 304 **3.14**
305 **CIM Operation Message**
306 a CIM message used to invoke an operation on the target namespace
- 307 **3.15**
308 **CIM Export Message**
309 a CIM message used to communicate information about a CIM namespace or element that is foreign to
310 the target
- 311 **3.16**
312 **Operation Request Message**
313 an XML document that is [loosely valid](#) with respect to the CIM XML DTD and that contains a
314 <MESSAGE> subelement under the root <CIM> node that has a <MULTIREQ> or <SIMPLEREQ>
315 subelement under this subelement

316 4 Abbreviated Terms and Document Conventions

317 4.1 Abbreviated Terms

318 The following symbols and abbreviations are used in this document.

319 4.1.1

320 CIM

321 Common Information Model

322 4.1.2

323 DTD

324 document type definition

325 4.1.3

326 HTTP

327 Hypertext Transfer Protocol

328 4.1.4

329 XML

330 Extensible Markup Language

331 4.2 Document Conventions

332 Throughout this document, any deprecated element is indicated by one of the following labels:

- 333 • The “**DEPRECATION NOTE:**” label preceding a paragraph indicates that the paragraph explains a
334 deprecated element.
- 335 • The “**DEPRECATED.**” label before a list item indicates that the information in that list item is
336 deprecated.
- 337 • The “**(DEPRECATED)**” label after a heading applies to the entire clause for that heading.
- 338 • The “**(DEPRECATED)**” label at the end of a line in a code fragment or an example indicates that the
339 particular line of the code fragment or example is deprecated.

340 5 CIM Message Syntax and Semantics

341 This specification defines all interactions among CIM products as CIM messages. A *CIM message* is a
342 well-defined request or response data packet for exchanging information among CIM products. The two
343 types of *CIM messages* are as follows:

- 344 • *CIM operation message*. This type of message is used to invoke an operation on the target
345 namespace.
- 346 • *CIM export message*. This type of message is used to communicate information about a CIM
347 namespace or element that is foreign to the target. It is informational only and does not define
348 an operation on the target CIM namespace or even imply the existence of a target namespace.

349 This clause describes the syntax and semantics of CIM messages independently of their encapsulation
350 within a particular protocol such as HTTP. XML is used as the basis for this description, and in particular
351 the CIM XML DTD ([DSP0201](#) and [DSP0203](#)).

352 5.1 Well-Formed, Valid, and Loosely Valid Documents

353 In this discussion, any reference to well-formed or valid XML documents has the standard meaning
354 defined in [Extensible Markup Language \(XML\)](#).

355 XML document type definitions (DTDs) are restricted to be either well-formed or valid. However, this
356 document also uses the term *loosely valid* to apply to XML that removes any attributes or elements in the
357 XML document that do not appear in the [CIM XML DTD](#). The resulting document is valid with respect to
358 the [CIM XML DTD](#) and is therefore loosely valid.

359 In effect, a loosely valid document is valid with respect to the [CIM XML DTD](#) apart from having additional
360 attributes or elements not defined by that DTD. The concept is very similar to that of an *open content*
361 *model* as defined by the working draft on [XML Schemas](#), expressed within the more limited scope of
362 DTDs. One corollary of this definition is that any XML document that is valid with respect to the [CIM XML](#)
363 [DTD](#) is also loosely valid.

364 The motivation for introducing the loosely valid class of XML documents is to relax the restrictions on a
365 [DefCIMClient](#), [CIM server](#), or [CIM listener](#) when parsing received XML documents defined within the
366 scope of this mapping. Not all clients (including their respective CIM servers or CIM listeners) should be
367 required to validate each received CIM message response (or its respective CIM message request)
368 because such a requirement would place too heavy a processing burden on the validating entity at the
369 expense of footprint and performance, most notably in communication between robust and conformant
370 implementations of this mapping.

371 Instead, the following requirements are set forth in this specification. In all cases, a CIM client has a
372 respective alternative CIM server or CIM listener, and a received CIM message response has a
373 respective alternative CIM message request:

- 374 • A CIM client may include a DOCTYPE element in a CIM message request. If so, an external
375 declaration should be used. In-lining of the complete DTD within a message is discouraged.
- 376 • A CIM client may elect to validate a received CIM message response.
- 377 • If a CIM client elects not to validate a received CIM message, then loose validation shall be
378 enforced.

379 The behavior of a CIM server or CIM listener with respect to a received CIM message request is covered
380 in detail in 7.3.

381 5.2 Operational Semantics

382 The CIM XML DTD ([DSP0201](#) and [DSP0203](#)) defines a subelement under the root <CIM> element called
383 <MESSAGE>, which contains one of the following subelements:

- 384 • CIM operation message subelements
 - 385 – <SIMPLEREQ>
 - 386 – <SIMPLERSP>
 - 387 – <MULTIREQ>
 - 388 – <MULTIRSP>
- 389 • CIM export message subelements
 - 390 – <SIMPLEXPREQ>
 - 391 – <SIMPLEXPRES>
 - 392 – <MULTIEXPREQ>
 - 393 – <MULTIEXPRSP>

394 In the remainder of this document, the following terms denote an XML document that is loosely valid with
395 respect to the CIM XML DTD:

- 396 • *Operation request message*. Contains under the root <CIM> node a <MESSAGE> subelement
397 that has a <MULTIREQ> or <SIMPLEREQ> subelement under it.
- 398 • *Operation response message*. Contains under the root <CIM> node a <MESSAGE>
399 subelement that has a <MULTIRSP> or <SIMPLERSP> subelement under it.
- 400 • *Export request message*. Contains under the root <CIM> node a <MESSAGE> subelement that
401 has a <MULTIEXPREQ> or <SIMPLEEXPREQ> subelement under it.
- 402 • *Export response message*. Contains under the root <CIM> node a <MESSAGE> subelement
403 that has a <MULTIEXPRSP> or <SIMPLEEXPRSP> subelement under it.

404 The phrase *CIM message request* refers to either an operation request message or an export request
405 message. The phrase *CIM message response* refers to either an operation response message or an
406 export response message.

407 A CIM message request shall contain a non-empty value for the ID attribute of the <MESSAGE> element.
408 The corresponding CIM message response shall supply the same value for that attribute. Clients should
409 employ a message ID scheme that minimizes the chance of receiving a stale CIM message response.

410 Any CIM message conforming to this specification shall have a minimum value of "1.0" and a maximum
411 value that is equal to the latest version of this specification for the `PROTOCOLVERSION` attribute of the
412 <MESSAGE> element.

413 An operation response message sent in response to an operation request message shall specify the
414 same value for the ID attribute of the <MESSAGE> element that appears in the request message and
415 contain one of the following:

- 416 – A <MULTIRSP> subelement, if the operation request message contains a <MULTIREQ>
417 subelement.
- 418 – A <SIMPLERSP> subelement, if the operation request message contains a
419 <SIMPLEREQ> subelement.

420 A *simple operation request* is an operation request message that contains a <SIMPLEREQ> subelement.
421 A *simple operation response* is an Operation Response Message that contains a <SIMPLERSP>
422 subelement.

423 A *multiple operation request* is an operation request message that contains a <MULTIREQ> subelement.
424 A *multiple operation response* is an operation response message that contains a <MULTIRSP>
425 subelement.

426 An export response message sent in response to an export request message shall specify the same
427 value for the ID attribute of the <MESSAGE> element that appears in the export request message and
428 shall contain one of the following:

- 429 – A <MULTIEXPRSP> subelement if the export request message contained a
430 <MULTIEXPREQ> subelement, or
- 431 – A <SIMPLEEXPRSP> subelement if the export request message contained a
432 <SIMPLEEXPREQ> subelement.

433 A *simple export request* is an export request message that contains a <SIMPLEEXPREQ> subelement. A
434 *simple export response* is an export response message that contains a <SIMPLEEXPRSP> subelement.

435 A *multiple export request* is an export request message that contains a <MULTIEXPREQ> subelement. A
436 *multiple export response* is an export response message that contains a <MULTIEXPRSP> subelement.

437 5.3 CIM Operation Syntax and Semantics

438 This clause describes method invocations, intrinsic methods, and namespace manipulation.

439 5.3.1 Method Invocations

440 All CIM operation requests defined for this CIM-to-HTTP mapping are defined as invocations of one or
441 more methods. A method can be either:

- 442 • An *intrinsic* method, which is defined for the purposes of modeling a CIM operation.
- 443 • An *extrinsic* method, which is defined on a CIM class in a schema.

444 In addition, intrinsic methods are made against a CIM namespace. Extrinsic methods are invoked on a
445 CIM class (if static) or instance otherwise. Intrinsic methods are defined in 5.3.2.

446 An extrinsic method call is represented in XML by the <METHODCALL> element, and the response to
447 that call is represented by the <METHODRESPONSE> element.

448 An intrinsic method call is represented in XML by the <IMETHODCALL> element, and the response to
449 that call is represented by the <IMETHODRESPONSE> element. An input parameter has an IN qualifier
450 (with a value of `true`) in the method definition, and an output parameter has an OUT qualifier (with a
451 value of `true`). A parameter can be both an input and an output parameter.

452 The <METHODCALL> or <IMETHODCALL> element names the method to be invoked and supplies any
453 input parameters to the method call. Note the following rules about parameters:

- 454 • Each input parameter shall be named using the name assigned in the method definition.
- 455 • Input parameters may be supplied in any order.
- 456 • Each input parameter of the method, and no others, shall be present in the call, unless it is
457 optional.

458 The <METHODRESPONSE> or <IMETHODRESPONSE> element defines either an <ERROR> or an
459 optional return value and output parameters if it is decorated with the OUT qualifier in the method
460 definition. In the latter case, the following rules about parameters apply:

- 461 • Each output parameter shall be named using the name assigned in the method definition.
- 462 • Output parameters may be supplied in any order.
- 463 • Each output parameter of the method, and no others, shall be present in the response, unless it
464 is optional.
- 465 • The method invocation process can be thought of as the binding of the input parameter values
466 specified as subelements of the <METHODCALL> or <IMETHODCALL> element to the input
467 parameters of the method. This binding is followed by an attempt to execute the method using
468 the bound input parameters with one of the following results:
 - 469 – If the attempt to call the method is successful, the return value and output parameters are
470 bound to the subelements of the <METHODRESPONSE> or <IMETHODRESPONSE>
471 element.
 - 472 – If the attempt to call the method is unsuccessful, an error code and optional human-
473 readable description of that code is bound to the <METHODRESPONSE> or
474 <IMETHODRESPONSE> element.

475 5.3.1.1 Simple Operations

476 A simple operation invokes a single method. A simple operation request is represented by a
477 <SIMPLEREQ> element, and a simple operation response is represented by a <SIMPLERSP> element.

478 If the method is [intrinsic](#), then the <SIMPLEREQ> element shall contain an <IMETHODCALL> element,
479 which in turn contains a <LOCALNAMESPACEPATH> subelement identifying the local CIM namespace
480 against which the method is to execute. If the method is [extrinsic](#), then the <SIMPLEREQ> element shall
481 contain a <METHODCALL> element that in turn contains one of the following subelements:

- 482 • A <LOCALCLASSPATH> subelement identifying the CIM class on which the method is to be
483 invoked if the method is static.
- 484 • A <LOCALINSTANCEPATH> subelement identifying the CIM instance on which the method is
485 otherwise to be invoked.

486 5.3.1.2 Multiple Operations

487 A multiple operation requires the invocation of more than one method. A multiple operation request is
488 represented by a <MULTIREQ> element, and a multiple operation response is represented by a
489 <MULTIRSP> element.

490 A <MULTIREQ> (or its respective <MULTIRSP>) element is a sequence of two or more <SIMPLEREQ>
491 (or their respective <SIMPLERSP>) elements.

492 A <MULTIRSP> element shall contain a <SIMPLERSP> element for every <SIMPLEREQ> element in the
493 corresponding multiple operation response. These <SIMPLERSP> elements shall be in the same order
494 as their <SIMPLEREQ> counterparts so that the first <SIMPLERSP> in the response corresponds to the
495 first <SIMPLEREQ> in the request, and so forth.

496 Multiple operations conveniently allow multiple method invocations to be batched into a single HTTP
497 message. Batching reduces the number of roundtrips between a [CIM client](#) and a CIM server and allows
498 the CIM server to make internal optimizations if it chooses. Note that multiple operations do not confer
499 any transactional capabilities in processing the request. For example, the CIM server does not have to
500 guarantee that the constituent method calls either all fail or succeed, only that the entity make a "best
501 effort" to process the operation. However, servers shall finish processing each operation in a batched
502 operation before executing the next one. Clients shall recognize that the order of operations within a
503 batched operation is significant.

504 Not all CIM servers support multiple operations; the way they declare support for this feature is defined in
505 7.5.

506 5.3.1.3 Status Codes

507 This clause defines the status codes and detailed error information that a conforming CIM server
508 application can return. The value of an <ERROR> subelement within a <METHODRESPONSE> or
509 <IMETHODRESPONSE> element includes the following parts:

- 510 • a mandatory status code
- 511 • an optional human-readable description of the status code
- 512 • zero or more CIM_Error instances

513 Table 1 defines the status codes that a conforming CIM server application can return as the value of the
514 CODE attribute of an <ERROR> subelement. In addition to a status code, a conforming CIM server may
515 return zero or more <INSTANCE> subelements as part of an <ERROR> element. Each <INSTANCE>
516 subelement shall be an instance of CIM_Error. For each instance of CIM_Error, the value of
517 CIMStatusCode shall comply with the definition of expected error codes for the CIM operation request. A
518 CIM client may ignore any <INSTANCE> subelements.

519 The symbolic names defined in Table 1 do not appear on the wire. They are used here solely for
520 convenient reference to an error in other parts of this specification.

521 Not all methods are expected to return all the status codes listed in Table 1. For [intrinsic methods](#), the
 522 relevant clause on each method in this specification defines the error codes expected to be returned. For
 523 extrinsic methods, 5.3.5 specifies which of the codes in Table 1 can be used.

524

Table 1 – Status Codes Returned by an <Error> Subelement

| Symbolic Name | Code | Definition |
|--------------------------------------|------|--|
| CIM_ERR_FAILED | 1 | A general error occurred that is not covered by a more specific error code. |
| CIM_ERR_ACCESS_DENIED | 2 | Access to a CIM resource is not available to the client. |
| CIM_ERR_INVALID_NAMESPACE | 3 | The target namespace does not exist. |
| CIM_ERR_INVALID_PARAMETER | 4 | One or more parameter values passed to the method are not valid. |
| CIM_ERR_INVALID_CLASS | 5 | The specified class does not exist. |
| CIM_ERR_NOT_FOUND | 6 | The requested object cannot be found. The operation can be unsupported on behalf of the CIM server in general or on behalf of an implementation of a management profile. |
| CIM_ERR_NOT_SUPPORTED | 7 | The requested operation is not supported on behalf of the CIM server, or on behalf of a provided class. If the operation is supported for a provided class but is not supported for particular instances of that class, then CIM_ERR_FAILED shall be used. |
| CIM_ERR_CLASS_HAS_CHILDREN | 8 | The operation cannot be invoked on this class because it has subclasses. |
| CIM_ERR_CLASS_HAS_INSTANCES | 9 | The operation cannot be invoked on this class because one or more instances of this class exist. |
| CIM_ERR_INVALID_SUPERCLASS | 10 | The operation cannot be invoked because the specified superclass does not exist. |
| CIM_ERR_ALREADY_EXISTS | 11 | The operation cannot be invoked because an object already exists. |
| CIM_ERR_NO_SUCH_PROPERTY | 12 | The specified property does not exist. |
| CIM_ERR_TYPE_MISMATCH | 13 | The value supplied is not compatible with the type. |
| CIM_ERR_QUERY_LANGUAGE_NOT_SUPPORTED | 14 | The query language is not recognized or supported. |
| CIM_ERR_INVALID_QUERY | 15 | The query is not valid for the specified query language. |
| CIM_ERR_METHOD_NOT_AVAILABLE | 16 | The extrinsic method cannot be invoked. |
| CIM_ERR_METHOD_NOT_FOUND | 17 | The specified extrinsic method does not exist. |
| CIM_ERR_NAMESPACE_NOT_EMPTY | 20 | The specified namespace is not empty. |

| Symbolic Name | Code | Definition |
|---|------|---|
| CIM_ERR_INVALID_ENUMERATION_CONTEXT | 21 | The enumeration identified by the specified context cannot be found, is in a closed state, does not exist, or is otherwise invalid. |
| CIM_ERR_INVALID_OPERATION_TIMEOUT | 22 | The specified operation timeout is not supported by the CIM Server. |
| CIM_ERR_PULL_HAS_BEEN_ABANDONED | 23 | The Pull operation has been abandoned due to execution of a concurrent CloseEnumeration operation on the same enumeration. |
| CIM_ERR_PULL_CANNOT_BE_ABANDONED | 24 | The attempt to abandon a concurrent Pull operation on the same enumeration failed. The concurrent Pull operation proceeds normally. |
| CIM_ERR_FILTERED_ENUMERATION_NOT_SUPPORTED | 25 | Using a filter in the enumeration is not supported by the CIM server. |
| CIM_ERR_CONTINUATION_ON_ERROR_NOT_SUPPORTED | 26 | The CIM server does not support continuation on error. |
| CIM_ERR_SERVER_LIMITS_EXCEEDED | 27 | The CIM server has failed the operation based upon exceeding server limits. |
| CIM_ERR_SERVER_IS_SHUTTING_DOWN | 28 | The CIM server is shutting down and cannot process the operation. |

525 5.3.2 Intrinsic Methods

526 This clause describes the [Intrinsic](#) methods defined outside the schema for CIM operations. These
527 methods can only be called on a CIM namespace, rather than on a CIM class or instance.

528 The notation used in the following subclauses to define the signatures of the intrinsic methods is a
529 pseudo-MOF notation that extends the standard MOF BNF ([DSP0004](#)) for describing CIM methods with
530 several pseudo-parameter types enclosed within angle brackets (< and >).

531 This notation decorates the parameters with pseudo-qualifiers (IN, OUT, OPTIONAL, and NULL) to define
532 their invocation semantics. These qualifiers are for description purposes only within the scope of this
533 specification; in particular, a [CIM client](#) shall not specify them in intrinsic method invocations.

534 This notation uses the IN qualifier to denote that the parameter is an input parameter.

535 This notation uses the OUT qualifier to denote that the parameter is an output parameter.

536 A CIM client may omit an optional parameter by not specifying an <IPARAMVALUE> element for that
537 parameter if the required value is the specified default. It shall not omit a parameter that is not marked as
538 optional. A CIM server may omit support for an optional parameter. Any attempt to call a method with an
539 optional parameter that is not supported shall return either CIM_ERR_NOT_SUPPORTED or
540 CIM_ERR_INVALID_PARAMETER.

541 This notation uses the NULL qualifier for parameters whose values can be specified as NULL in a method
542 call. A NULL (unassigned) value for a parameter is specified by an <IPARAMVALUE> or
543 <PARAMVALUE> element with no subelement. For parameters without the NULL qualifier, the CIM client
544 shall specify a value by including a suitable subelement for the <IPARAMVALUE> or <PARAMVALUE>
545 element.

546 All parameters shall be uniquely named and shall correspond to a valid parameter name for that method
 547 as described by this specification. The order of the parameters is not significant.

548 The non-NULL values of intrinsic method parameters or return values modeled as standard CIM types
 549 (such as string and Boolean or arrays thereof) are represented as follows:

- 550 • Simple values use the <VALUE> subelement within an <IPARAMETER> element for method
 551 parameters or within an <IRETURNVALUE> element for method return values.
- 552 • Array values use the <VALUE.ARRAY> subelement within an <IPARAMETER> element for
 553 method parameters or within an <IRETURNVALUE> element for method return values.

554 Table 2 shows how each pseudo-type used by the intrinsic methods shall be mapped to an XML element
 555 described in [DSP0201](#) in the context of both a parameter value (subelement of <IPARAMVALUE>) and a
 556 return value (subelement of <IRETURNVALUE>).

Table 2 – Mapping of Intrinsic Method Pseudo-Types to XML Elements

| Type | XML Element |
|----------------------|---|
| <object> | (VALUE.OBJECT VALUE.OBJECTWITHLOCALPATH VALUE.OBJECTWITHPATH) |
| <class> | CLASS |
| <instance> | INSTANCE |
| <className> | CLASSNAME |
| <namedInstance> | VALUE.NAMEDINSTANCE |
| <instanceName> | INSTANCENAME |
| <instancePath> | INSTANCEPATH |
| <objectWithPath> | VALUE.OBJECTWITHPATH |
| <instanceWithPath> | VALUE.INSTANCEWITHPATH |
| <objectName> | (CLASSNAME INSTANCENAME) |
| <objectPath> | OBJECTPATH |
| <propertyValue> | (VALUE VALUE.ARRAY VALUE.REFERENCE) |
| <qualifierDecl> | QUALIFIER.DECLARATION |
| <enumerationContext> | ENUMERATIONCONTEXT |

558 **5.3.2.1 GetClass**

559 The GetClass operation returns a single CIM class from the target namespace:

```

560 GetClass
561 <class>GetClass (
562     [IN] <className> ClassName,
563     [IN,OPTIONAL] boolean LocalOnly = true,
564     [IN,OPTIONAL] boolean IncludeQualifiers = true,
565     [IN,OPTIONAL] boolean IncludeClassOrigin = false,
566     [IN,OPTIONAL,NULL] string PropertyList [] = NULL
567 )
    
```

568 The `ClassName` input parameter defines the name of the class to be retrieved.

569 If the `LocalOnly` input parameter is `true`, any CIM elements (properties, methods, and qualifiers),
 570 except those added or overridden in the class as specified in the `classname` input parameter, shall not be
 571 included in the returned class. If it is `false`, no additional filtering is defined.

572 If the `IncludeQualifiers` input parameter is `true`, all qualifiers for that class (including qualifiers on
 573 the class and on any returned properties, methods, or method parameters) shall be included as
 574 `<QUALIFIER>` elements in the response. If it is `false`, no `<QUALIFIER>` elements are present in the
 575 returned class.

576 If the `IncludeClassOrigin` input parameter is `true`, the `CLASSORIGIN` attribute shall be present on
 577 all appropriate elements in the returned class. If it is `false`, no `CLASSORIGIN` attributes are present in
 578 the returned class.

579 If the `PropertyList` input parameter is not `NULL`, the members of the array define one or more property
 580 names. The returned class shall not include elements for properties missing from this list. Note that if
 581 `LocalOnly` is specified as `true`, it acts as an additional filter on the set of properties returned. For
 582 example, if property A is included in the `PropertyList` but `LocalOnly` is set to `true` and A is not local
 583 to the requested class, it is not included in the response. If the `PropertyList` input parameter is an
 584 empty array, no properties are included in the response. If the `PropertyList` input parameter is `NULL`,
 585 no additional filtering is defined.

586 If the `PropertyList` contains duplicate elements, the server shall ignore them but otherwise process
 587 the request normally. If the `PropertyList` contains elements that are invalid property names for the
 588 target class, the server shall ignore them but otherwise process the request normally.

589 If `GetClass` is successful, the return value is a single CIM class that shall include all CIM elements
 590 (properties, methods, and qualifiers) defined in or inherited by that class, reduced by any elements
 591 excluded as a result of using the `LocalOnly` or `PropertyList` filters.

592 If `GetClass` is unsuccessful, this method shall return one of the following status codes, where the error
 593 returned is the first applicable error in the list, starting with the first element and working down. Any
 594 additional method-specific interpretation of the error is enclosed in parentheses:

- 595 • `CIM_ERR_ACCESS_DENIED`
- 596 • `CIM_ERR_INVALID_NAMESPACE`
- 597 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized or otherwise
 598 incorrect parameters)
- 599 • `CIM_ERR_NOT_FOUND` (The request CIM class does not exist in the specified namespace.)
- 600 • `CIM_ERR_FAILED` (Some other unspecified error occurred.)

601 5.3.2.2 `GetInstance`

602 The `GetInstance` operation returns a single CIM instance from the target namespace:

```
603 GetInstance
604 <instance>GetInstance (
605     [IN] <instanceName> InstanceName,
606     [IN,OPTIONAL] boolean LocalOnly = true, (DEPRECATED)
607     [IN,OPTIONAL] boolean IncludeQualifiers = false, (DEPRECATED)
608     [IN,OPTIONAL] boolean IncludeClassOrigin = false,
609     [IN,OPTIONAL,NULL] string PropertyList [] = NULL
610 )
```

611 The `InstanceName` input parameter defines the name of the instance to be retrieved.

612 **DEPRECATION NOTE:** With the 1.2 release of this specification, the `LocalOnly` parameter is
 613 DEPRECATED. `LocalOnly` filtering, as defined in 1.1, will not be supported in the next major revision of
 614 this specification. In the 1.1 version of this specification, the definition of the `LocalOnly` parameter was
 615 incorrectly modified. This change introduced a number of interoperability and backward compatibility

616 problems for CIM clients using the `LocalOnly` parameter to filter the set of properties returned. The DMTF
617 strongly recommends that CIM clients set `LocalOnly` to `false` and do not use this parameter to filter the
618 set of properties returned. To minimize the impact of this recommendation on CIM clients, a CIM server
619 may choose to treat the value of the `LocalOnly` parameter as `false` for all requests. A CIM server shall
620 consistently support a single interpretation of the `LocalOnly` parameter. Refer to ANNEX B for additional
621 details.

622 **DEPRECATION NOTE:** The use of the `IncludeQualifiers` parameter is DEPRECATED and it may
623 be removed in a future version of this specification. The `IncludeQualifiers` parameter definition is
624 ambiguous and when it is set to `true`, CIM clients cannot be assured that any qualifiers will be returned.
625 A CIM client should always set `IncludeQualifiers` to `false`. To minimize the impact of this
626 recommendation on CIM clients, a CIM server may choose to treat the value of the
627 `IncludeQualifiers` parameter as `false` for all requests. The preferred behavior is to use the class
628 operations to receive qualifier information and not depend on any qualifiers existing in this response. If
629 the `IncludeQualifiers` input parameter is `true`, all qualifiers for that instance (including qualifiers on
630 the instance and on any returned properties) shall be included as `<QUALIFIER>` elements in the
631 response. If it is `false`, no `<QUALIFIER>` elements are present.

632 If the `IncludeClassOrigin` input parameter is `true`, the `CLASSORIGIN` attribute shall be present on
633 all appropriate elements in the returned instance. If it is `false`, no `CLASSORIGIN` attributes are present.

634 If the `PropertyList` input parameter is not `NULL`, the members of the array define one or more property
635 names. The returned instance shall not include elements for properties missing from this list. Note that if
636 `LocalOnly` is `true`, this acts as an additional filter on the set of properties returned. For example, if
637 property A is included in the `PropertyList` but `LocalOnly` is set to `true` and A is not local to the
638 requested instance, it is not included in the response. If the `PropertyList` input parameter is an empty
639 array, no properties are included in the response. If the `PropertyList` input parameter is `NULL`, no
640 additional filtering is defined.

641 If the `PropertyList` contains duplicate elements, the server shall ignore the duplicates but otherwise
642 process the request normally. If the `PropertyList` contains elements that are invalid Property names
643 for the target instance, the server shall ignore them but otherwise process the request normally.

644 Properties with the `NULL` value may be omitted from the response, even if the CIM client has not
645 requested the exclusion of the property through the `LocalOnly` or `PropertyList` filters. The CIM client
646 shall interpret such omitted properties as `NULL`. Note that the CIM client cannot make any assumptions
647 about properties omitted as a result of using `LocalOnly` or `PropertyList` filters.

648 If `GetInstance` is successful, the return value is a single CIM instance with all properties defined in and
649 inherited by its class reduced by any properties excluded as a result of using the `LocalOnly` or
650 `PropertyList` filters and further reduced by any `NULL` valued properties omitted from the response.

651 If `GetInstance` is unsuccessful, the method shall return one of the following status codes where the error
652 returned is the first applicable error in the list, starting with the first element and working down. Any
653 additional method-specific interpretation of the error is enclosed in parentheses:

- 654 • `CIM_ERR_ACCESS_DENIED`
- 655 • `CIM_ERR_INVALID_NAMESPACE`
- 656 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized, or otherwise
657 incorrect parameters)
- 658 • `CIM_ERR_INVALID_CLASS` (The CIM class does not exist in the specified namespace.)
- 659 • `CIM_ERR_NOT_FOUND` (The CIM class does exist, but the requested CIM instance does not
660 exist in the specified namespace.)

- 661 • CIM_ERR_FAILED (some other unspecified error occurred)

662 5.3.2.3 DeleteClass

663 The DeleteClass operation deletes a single CIM class from the target namespace:

```
664     DeleteClass
665     void DeleteClass (
666         [IN] <className> ClassName
667     )
```

668 The ClassName input parameter defines the name of the class to be deleted.

669 If DeleteClass is successful, the CIM server removes the specified class, including any subclasses and
670 any instances. The operation shall fail if any one of these objects cannot be deleted.

671 If DeleteClass is unsuccessful, this method shall return one of the following status codes, where the error
672 returned is the first applicable error in the list, starting with the first element and working down. Any
673 additional method-specific interpretation of the error is enclosed in parentheses:

- 674 • CIM_ERR_ACCESS_DENIED
- 675 • CIM_ERR_NOT_SUPPORTED
- 676 • CIM_ERR_INVALID_NAMESPACE
- 677 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
678 incorrect parameters)
- 679 • CIM_ERR_NOT_FOUND (The CIM class to be deleted does not exist.)
- 680 • CIM_ERR_CLASS_HAS_CHILDREN (The CIM class has one or more subclasses that cannot
681 be deleted.)
- 682 • CIM_ERR_CLASS_HAS_INSTANCES (The CIM class has one or more instances that cannot
683 be deleted.)
- 684 • CIM_ERR_FAILED (Some other unspecified error occurred.)

685 5.3.2.4 DeleteInstance

686 The DeleteInstance operation deletes a single CIM instance from the target namespace.

```
687     DeleteInstance
688     void DeleteInstance (
689         [IN] <instanceName> InstanceName
690     )
```

691 The InstanceName input parameter defines the name (model path) of the instance to be deleted.

692 Deleting the instance may or may not cause the automatic deletion of additional instances. For example,
693 the deletion of an instance may cause the automatic deletion of all associations that reference that
694 instance. Or the deletion of an instance may cause the automatic deletion of instances (and their
695 associations) that have a Min(1) relationship to that instance.

696 If DeleteInstance is successful, the CIM server removes the specified instance.

697 If DeleteInstance is unsuccessful, this method shall return one of the following status codes, where the
698 error returned is the first applicable error in the list, starting with the first element and working down. Any
699 additional method-specific interpretation of the error is enclosed in parentheses.

- 700 • CIM_ERR_ACCESS_DENIED

- 701 • CIM_ERR_NOT_SUPPORTED (by the CIM server for this operation)
- 702 • CIM_ERR_INVALID_NAMESPACE
- 703 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
- 704 incorrect parameters)
- 705 • CIM_ERR_INVALID_CLASS (The CIM class does not exist in the specified namespace.)
- 706 • CIM_ERR_NOT_SUPPORTED (This operation is not supported for the class of the specified
- 707 instance, if provided.)
- 708 • CIM_ERR_NOT_FOUND (The CIM class does exist, but the requested CIM instance does not
- 709 exist in the specified namespace.)
- 710 • CIM_ERR_FAILED (This operation is not supported for the specified instance, or some other
- 711 unspecified error occurred.)

712 5.3.2.5 CreateClass

713 The CreateClass operation creates a single CIM class in the target namespace. The class shall not
714 already exist:

```
715     CreateClass
716     void CreateClass (
717         [IN] <class> NewClass
718     )
```

719 The `NewClass` input parameter defines the new class. The proposed definition shall be a correct class
720 definition according to [DSP0004](#).

721 In processing the creation of the new class, the CIM server shall conform to the following rules:

- 722 • The server shall ignore any `CLASSORIGIN` and `PROPAGATED` attributes in the `NewClass`.
- 723 • If the new class has no superclass, the `NewClass` parameter defines a new base class. The
724 server shall ensure that all properties and methods of the new class have a `CLASSORIGIN`
725 attribute whose value is the name of the new class.
- 726 • If the new class has a superclass, the `NewClass` parameter defines a new subclass of that
727 superclass. The superclass shall exist. The server shall ensure that the following conditions are
728 met:
 - 729 – Any properties, methods, or qualifiers in the subclass not defined in the superclass are
730 created as new elements of the subclass. In particular, the server shall set the
731 `CLASSORIGIN` attribute on the new properties and methods to the name of the subclass
732 and ensure that all others preserve their `CLASSORIGIN` attribute value from that defined in
733 the superclass.
 - 734 – If a property is defined in the superclass and in the subclass, the value assigned to that
735 property in the subclass (including `NULL`) becomes the default value of the property for the
736 subclass.
 - 737 – If a property or method of the superclass is not specified in the subclass, then it is inherited
738 without modification by the subclass.
 - 739 – Any qualifiers defined in the superclass with a `TOSUBCLASS` attribute value of `true` shall
740 appear in the resulting subclass. Qualifiers in the superclass with a `TOSUBCLASS` attribute
741 value of `false` shall not be propagated to the subclass.
 - 742 – Any qualifier propagated from the superclass cannot be modified in the subclass if the
743 `OVERRIDABLE` attribute of that qualifier is set to `false` in the superclass. It is a client error

744 to specify such a qualifier in the `NewClass` with a definition different than that in the
 745 superclass (where definition encompasses the name, type, and flavor attribute settings of
 746 the `<QUALIFIER>` element and the value of the qualifier).

747 If `CreateClass` is successful, the CIM server creates the specified class.

748 If `CreateClass` is unsuccessful, this method shall return one of the following status codes, where the error
 749 returned is the first applicable error in the list, starting with the first element and working down. Any
 750 additional method-specific interpretation of the error is enclosed in parentheses.

- 751 • `CIM_ERR_ACCESS_DENIED`
- 752 • `CIM_ERR_NOT_SUPPORTED`
- 753 • `CIM_ERR_INVALID_NAMESPACE`
- 754 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized, or otherwise
 755 incorrect parameters)
- 756 • `CIM_ERR_ALREADY_EXISTS` (The CIM class already exists.)
- 757 • `CIM_ERR_INVALID_SUPERCLASS` (The putative CIM class declares a non-existent
 758 superclass.)
- 759 • `CIM_ERR_FAILED` (Some other unspecified error occurred.)

760 5.3.2.6 CreateInstance

761 The `CreateInstance` operation creates a single CIM Instance in the target namespace. The instance shall
 762 not already exist:

```
763     CreateInstance
764     <instanceName>CreateInstance (
765         [IN] <instance> NewInstance
766     )
```

767 **DEPRECATION NOTE:** The use of qualifiers on instances is DEPRECATED and may be removed in a
 768 future version of this specification. A CIM client cannot rely on any qualifiers included in the `NewInstance`
 769 to have any impact on the operation. It is recommended that the CIM server ignore any qualifiers included
 770 in the instance. The `NewInstance` input parameter defines the new instance. The proposed definition
 771 shall be a correct instance definition for the underlying CIM class according to [DSP0004](#).

772 In creating the new instance, the CIM server shall conform to the following rules and ensure that they are
 773 applied:

- 774 • The server shall ignore any `CLASSORIGIN` and `PROPAGATED` attributes in the `NewInstance`.
- 775 • **DEPRECATED.** Any qualifiers in the instance not defined in the class are created as new
 776 elements of the instance.
- 777 • All properties of the instance preserve their `CLASSORIGIN` attribute value from that defined in
 778 the class.
- 779 • If a property is specified in the `NewInstance` parameter, the value assigned to that property in
 780 the instance (including `NULL`) becomes the value of the property for the instance. Note that it is
 781 a client error to specify a property that does not belong to the class.
- 782 • If a property of the class is not specified in the instance, then the instance inherits that property
 783 without modification.
- 784 • **DEPRECATION NOTE:** Use of the `TOINSTANCE` attribute is DEPRECATED. Servers may
 785 choose to ignore `TOINSTANCE`. Servers that do not ignore `TOINSTANCE` shall interpret it so

786 that any qualifiers defined in the class with a TOINSTANCE attribute value of `true` appear in
 787 the instance. Qualifiers in the class with a value of `false` shall not be propagated to the
 788 instance.

789 • **DEPRECATED.** Any Qualifier propagated from the class cannot be modified in the instance if
 790 the OVERRIDABLE attribute of that qualifier is set to `false` in the class. It is a client error to
 791 specify such a qualifier in the `NewInstance` with a definition different than that in the class
 792 (where definition encompasses the name, type, and flavor attribute settings of the
 793 <QUALIFIER> element and the value of the qualifier).

794 If `CreateInstance` is successful, the return value defines the object path of the new CIM instance relative
 795 to the target namespace created by the CIM server (that is, the model path as defined by [DSP0004](#)). It is
 796 returned if one or more of the new keys of the instance are dynamically allocated during creation rather
 797 than specified in the request.

798 If `CreateInstance` is unsuccessful, this method shall return one of the following status codes, where the
 799 error returned is the first applicable error in the list, starting with the first element and working down. Any
 800 additional method-specific interpretation of the error is enclosed in parentheses.

- 801 • CIM_ERR_ACCESS_DENIED
- 802 • CIM_ERR_NOT_SUPPORTED (by the CIM server for this operation)
- 803 • CIM_ERR_INVALID_NAMESPACE
- 804 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
 805 incorrect parameters)
- 806 • CIM_ERR_INVALID_CLASS (The CIM class for the new instance does not exist.)
- 807 • CIM_ERR_NOT_SUPPORTED (This operation is not supported for the class of the specified
 808 instance, if provided.)
- 809 • CIM_ERR_ALREADY_EXISTS (The CIM instance already exists.)
- 810 • CIM_ERR_FAILED (This operation is not supported for the specified instance or some other
 811 unspecified error occurred.)

812 5.3.2.7 ModifyClass

813 The `ModifyClass` operation modifies an existing CIM class in the target namespace. The class shall
 814 already exist:

```
815     ModifyClass
816     void ModifyClass (
817         [IN] <class> ModifiedClass
818     )
```

819 The `ModifiedClass` input parameter defines the set of changes to be made to the current class
 820 definition, which shall be correct amendments to the CIM class as defined by [DSP0004](#).

821 In modifying the class, the CIM server shall conform to the following rules:

- 822 • The CIM server shall ignore any `CLASSORIGIN` and `PROPAGATED` attributes in the
 823 `ModifiedClass`.
- 824 • If the modified class has no superclass, the `ModifiedClass` parameter defines modifications
 825 to a base class. The server shall ensure that the following conditions are met:
 - 826 – All properties and methods of the modified class have a `CLASSORIGIN` attribute whose
 827 value is the name of this class.

- 828 – Any properties, methods, or qualifiers in the existing class definition that do not appear in
829 the `ModifiedClass` parameter are removed from the resulting modified class.
- 830 • If the modified class has a superclass, the `ModifiedClass` parameter defines modifications to
831 a subclass of that superclass. The superclass shall exist, and the client shall not change the
832 name of the superclass in the modified subclass. The server shall ensure that the following
833 conditions are met:
- 834 – Any properties, methods, or qualifiers in the subclass not defined in the superclass are
835 created as elements of the subclass. In particular, the server shall set the `CLASSORIGIN`
836 attribute on the new properties and methods to the name of the subclass and shall ensure
837 that all other others preserve their `CLASSORIGIN` attribute value from that defined in the
838 superclass.
- 839 – Any property, method, or qualifier previously defined in the subclass but not defined in the
840 superclass, and which is not present in the `ModifiedClass` parameter, is removed from
841 the subclass.
- 842 – If a property is specified in the `ModifiedClass` parameter, the value assigned to that
843 property (including `NULL`) becomes the default value of the property for the subclass.
- 844 – If a property or method of the superclass is not specified in the subclass, then the subclass
845 inherits it without modification. Any previous changes to such an element in the subclass
846 are lost.
- 847 – If a qualifier in the superclass is not specified in the subclass and the qualifier is defined in
848 the superclass with a `TOSUBCLASS` attribute value of `true`, then the qualifier shall still be
849 present in the resulting modified subclass. A propagated qualifier cannot be removed from
850 a subclass.
- 851 – Any qualifier propagated from the superclass cannot be modified in the subclass if the
852 `OVERRIDEABLE` attribute of that qualifier is set to `false` in the superclass. It is a client error
853 to specify such a qualifier in the `ModifiedClass` with a definition different than that in the
854 superclass (where definition encompasses the name, type, and flavor attribute settings of
855 the `<QUALIFIER>` element and the value of the qualifier).
- 856 – Any qualifiers defined in the superclass with a `TOSUBCLASS` attribute value of `false` shall
857 not be propagated to the subclass.
- 858 If `ModifyClass` is successful, the CIM server updates the specified class. The request to modify the class
859 shall fail if the server cannot consistently update any existing subclasses or instances of that class.
- 860 If `ModifyClass` is unsuccessful, this method shall return one of the following status codes, where the error
861 returned is the first applicable error in the list, starting with the first element and working down. Any
862 additional method-specific interpretation of the error is enclosed in parentheses.
- 863 • `CIM_ERR_ACCESS_DENIED`
- 864 • `CIM_ERR_NOT_SUPPORTED`
- 865 • `CIM_ERR_INVALID_NAMESPACE`
- 866 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized, or otherwise
867 incorrect parameters)
- 868 • `CIM_ERR_NOT_FOUND` (The CIM class does not exist.)
- 869 • `CIM_ERR_INVALID_SUPERCLASS` (The putative CIM class declares a non-existent or
870 incorrect superclass.)
- 871 • `CIM_ERR_CLASS_HAS_CHILDREN` (The modification could not be performed because the
872 subclasses of the class could not be updated consistently.)

- 873 • CIM_ERR_CLASS_HAS_INSTANCES (The modification could not be performed because the
874 instances of the class could not be updated consistently.)
- 875 • CIM_ERR_FAILED (Some other unspecified error occurred.)

876 5.3.2.8 ModifyInstance

877 The ModifyInstance operation modifies an existing CIM instance in the target namespace. The instance
878 shall already exist:

```
879     ModifyInstance
880     void ModifyInstance (
881         [IN] <namedInstance> ModifiedInstance,
882         [IN, OPTIONAL] boolean IncludeQualifiers = true, (DEPRECATED)
883         [IN, OPTIONAL, NULL] string propertyList[] = NULL
884     )
```

885 The `ModifiedInstance` input parameter identifies the name of the instance to be modified and
886 provides the new property values.

887 **DEPRECATION NOTE:** Use of the `IncludeQualifiers` parameter is DEPRECATED, and it may be
888 removed in a future version of this specification. The behavior of the `IncludeQualifiers` parameter is
889 not specified. A CIM client cannot rely on `IncludeQualifiers` to have any impact on the operation. It
890 is recommended that the CIM server ignore any qualifiers included in `ModifiedInstance`. If the
891 `IncludeQualifiers` input parameter is `true`, the qualifiers are modified as specified in
892 `ModifiedInstance`. If the parameter is `false`, qualifiers in `ModifiedInstance` are ignored and no qualifiers
893 are explicitly modified.

894 The set of properties to be modified shall be determined as follows:

895 If the `PropertyList` input parameter is not NULL, the members of the array define one or more property
896 names. Only properties specified in the `PropertyList` are modified. Properties of the `ModifiedInstance` that
897 are missing from the `PropertyList` are ignored. If the `PropertyList` is an empty array, no properties are
898 modified. If the `PropertyList` is NULL, the set of properties to be modified consists of those of
899 `ModifiedInstance` with values different from the current values in the instance to be modified.

900 If the `PropertyList` contains duplicate elements, the server shall ignore them but otherwise process the
901 request normally. If the `PropertyList` contains elements that are invalid property names for the instance to
902 be modified, the server shall reject the request. If a property to be modified as previously defined cannot
903 be modified because it is a key property, non-writable, or cannot be modified at this time for any other
904 reason, the server shall reject the request. Non-writable properties are those defined to be non-writable in
905 the schema implemented for the creation class of the instance to be modified. The value of the `WRITE`
906 qualifier as defined in the schema for the creation class (or any of its superclasses) has no effect on the
907 behavior of `ModifyInstance`.

908 In modifying the instance, the CIM server shall conform to the following rules and ensure their application:

- 909 • The server shall ignore any `CLASSORIGIN` and `PROPAGATED` attributes in the
910 `ModifiedInstance`.
- 911 • The class shall exist, and the client shall not change its name in the instance to be modified.
- 912 • **DEPRECATED.** Any qualifiers in the instance not defined in the class are created as new
913 elements of the instance if `IncludeQualifiers` is `true`.
- 914 • All properties of the instance to be modified preserve their `CLASSORIGIN` attribute value from
915 that defined in the class.

- 916 • **DEPRECATED.** Any qualifier previously defined in the instance to be modified but not defined
917 in the class, and which is not present in the ModifiedInstance parameter, is removed from the
918 instance if `IncludeQualifiers` is true.
- 919 • If a property is to be modified as previously defined, its value in the ModifiedInstance (including
920 NULL) becomes its new value in the instance to be modified.
- 921 • If a property is not specified in the ModifiedInstance but is specified in the PropertyList, then the
922 class-defined default value (or NULL if none is defined) becomes its new value in the instance
923 to be modified.
- 924 • **DEPRECATION NOTE:** The use of the TOINSTANCE qualifier attribute is DEPRECATED.
925 Servers may choose to ignore TOINSTANCE. Servers that do not ignore TOINSTANCE shall
926 interpret it so that any qualifiers defined in the class with a TOINSTANCE attribute value of
927 `true` appear in the instance. A propagated qualifier cannot be removed from an instance.
928 qualifiers in the class with a TOINSTANCE attribute value of `false` shall not be propagated to
929 the instance
- 930 • **DEPRECATED.** Any qualifier propagated from the class cannot be modified in the instance if
931 the OVERRIDABLE attribute of that qualifier is set to `false` in the class. It is a client error to
932 specify such a qualifier in ModifiedInstance with a definition different than that in the class
933 (where definition encompasses the name, type, and flavor attribute settings of the
934 <QUALIFIER> element and the value of the qualifier).

935 If ModifyInstance is successful, all properties to be modified are updated in the specified instance.

936 If ModifyInstance is unsuccessful, the specified Instance is not updated, and the method shall return one
937 of the following status codes, where the error returned is the first applicable error in the list, starting with
938 the first element and working down. Any additional interpretation of the error is enclosed in parentheses.

- 939 • CIM_ERR_ACCESS_DENIED
- 940 • CIM_ERR_NOT_SUPPORTED (by the CIM server for this operation)
- 941 • CIM_ERR_INVALID_NAMESPACE
- 942 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
943 incorrect parameters and invalid properties to be modified)
- 944 • CIM_ERR_INVALID_CLASS (The CIM class of the instance to be modified does not exist.)
- 945 • CIM_ERR_NOT_SUPPORTED (This operation is not supported for the class of the specified
946 instance, if provided.)
- 947 • CIM_ERR_NOT_FOUND (The CIM instance to be modified does not exist.)
- 948 • CIM_ERR_FAILED (This operation is not supported for the specified instance or some other
949 unspecified error occurred, including a request for non-writable properties to be modified or a
950 property that cannot be modified at this time.)

951 5.3.2.9 EnumerateClasses

952 The EnumerateClasses operation enumerates subclasses of a CIM class in the target namespace:

```

953     EnumerateClasses
954     <class>*EnumerateClasses (
955         [IN,OPTIONAL,NULL] <className> ClassName=NULL,
956         [IN,OPTIONAL] boolean DeepInheritance = false,
957         [IN,OPTIONAL] boolean LocalOnly = true,
958         [IN,OPTIONAL] boolean IncludeQualifiers = true,
959         [IN,OPTIONAL] boolean IncludeClassOrigin = false
960     )

```

- 961 The `ClassName` input parameter defines the class that is the basis for the enumeration.
- 962 If the `DeepInheritance` input parameter is `true`, all subclasses of the specified class should be
 963 returned. If the `ClassName` input parameter is absent, this implies that all classes in the target
 964 namespace should be returned. If `DeepInheritance` is `false`, only immediate child subclasses are
 965 returned. If the `ClassName` input parameter is `NULL`, this implies that all base classes in the target
 966 namespace should be returned. This definition of `DeepInheritance` applies only to the
 967 `EnumerateClasses` and `EnumerateClassName` operations.
- 968 If the `LocalOnly` input parameter is `true`, any CIM elements (properties, methods, and qualifiers)
 969 except those added or overridden in the class as specified in the `classname` input parameter shall not be
 970 included in the returned class. If it is `false`, this parameter defines no additional filtering.
- 971 If the `IncludeQualifiers` input parameter is `true`, all qualifiers for each class (including qualifiers on
 972 the class and on any returned properties, methods, or method parameters) shall be included as
 973 `<QUALIFIER>` elements in the response. If it is `false`, no `<QUALIFIER>` elements are present.
- 974 If the `IncludeClassOrigin` input parameter is `true`, the `CLASSORIGIN` attribute shall be present on
 975 all appropriate elements in each returned class. If it is `false`, no `CLASSORIGIN` attributes are present.
- 976 If `EnumerateClasses` is successful, the method returns zero or more classes that meet the required
 977 criteria. These classes shall include all CIM elements (properties, methods, and qualifiers) defined in or
 978 inherited by each class, reduced by any elements excluded as a result of using the `LocalOnly` filter.
- 979 If `EnumerateClasses` is unsuccessful, this method shall return one of the following status codes, where
 980 the error returned is the first applicable error in the list, starting with the first element and working down.
 981 Any additional method-specific interpretation of the error is enclosed in parentheses.
- 982 • `CIM_ERR_ACCESS_DENIED`
 - 983 • `CIM_ERR_NOT_SUPPORTED`
 - 984 • `CIM_ERR_INVALID_NAMESPACE`
 - 985 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized, or otherwise
 986 incorrect parameters)
 - 987 • `CIM_ERR_INVALID_CLASS` (The CIM class for this enumeration does not exist.)
 - 988 • `CIM_ERR_FAILED` (Some other unspecified error occurred.)

989 5.3.2.10 EnumerateClassNames

990 The `EnumerateClassNames` operation enumerates the names of subclasses of a CIM class in the target
 991 namespace:

```

992     EnumerateClassNames
993     <className>*EnumerateClassNames (
994         [IN,OPTIONAL,NULL] <className> ClassName = NULL,
995         [IN,OPTIONAL] boolean DeepInheritance = false
996     )
  
```

- 997 The `ClassName` input parameter defines the class that is the basis for the enumeration.
- 998 If the `DeepInheritance` input parameter is `true`, the names of all subclasses of the specified class
 999 should be returned. If the `ClassName` input parameter is absent, this implies that the names of all classes
 1000 in the target namespace should be returned. If `DeepInheritance` is `false`, only the names of
 1001 immediate child subclasses are returned. If the `ClassName` input parameter is `NULL`, this implies that the

1002 names of all base classes in the target namespace should be returned. This definition of
 1003 `DeepInheritance` applies only to the `EnumerateClasses` and `EnumerateClassName` operations.

1004 If `EnumerateClassNames` is successful, the method returns zero or more names of classes that meet the
 1005 requested criteria.

1006 If `EnumerateClassNames` is unsuccessful, this method returns one of the following status codes, where
 1007 the error returned is the first applicable error in the list, starting with the first element and working down.
 1008 Any additional method-specific interpretation of the error is enclosed in parentheses.

- 1009 • `CIM_ERR_ACCESS_DENIED`
- 1010 • `CIM_ERR_NOT_SUPPORTED`
- 1011 • `CIM_ERR_INVALID_NAMESPACE`
- 1012 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized, or otherwise
 1013 incorrect parameters)
- 1014 • `CIM_ERR_INVALID_CLASS` (The CIM class that is the basis for this enumeration does not
 1015 exist.)
- 1016 • `CIM_ERR_FAILED` (Some other unspecified error occurred.)

1017 5.3.2.11 `EnumerateInstances`

1018 The `EnumerateInstances` operation enumerates instances of a CIM class in the target namespace,
 1019 including instances in the class and any subclasses in accordance with the polymorphic nature of CIM
 1020 objects:

```

1021 EnumerateInstances
1022 <namedInstance>*EnumerateInstances (
1023     [IN] <className> ClassName,
1024     [IN,OPTIONAL] boolean LocalOnly = true, (DEPRECATED)
1025     [IN,OPTIONAL] boolean DeepInheritance = true,
1026     [IN,OPTIONAL] boolean IncludeQualifiers = false, (DEPRECATED)
1027     [IN,OPTIONAL] boolean IncludeClassOrigin = false,
1028     [IN,OPTIONAL,NULL] string PropertyList [] = NULL
1029 )
  
```

1030 The `ClassName` input parameter defines the class that is the basis for the enumeration.

1031 **DEPRECATION NOTE:** With the 1.2 release of this specification, the `LocalOnly` parameter is
 1032 DEPRECATED. `LocalOnly` filtering, as defined in 1.1, will not be supported in the next major revision of
 1033 this specification. In the 1.1 version of this specification, the definition of the `LocalOnly` parameter was
 1034 incorrectly modified. This change introduced a number of interoperability and backward compatibility
 1035 problems for CIM clients using the `LocalOnly` parameter to filter the set of properties returned. The
 1036 DMTF strongly recommends that CIM clients set `LocalOnly` to `false` and do not use this parameter to
 1037 filter the set of properties returned. To minimize the impact of this recommendation on CIM clients, a CIM
 1038 server may choose to treat the value of the `LocalOnly` parameter as `false` for all requests. A CIM
 1039 server shall consistently support a single interpretation of the `LocalOnly` parameter. Refer to ANNEX B
 1040 for details.

1041 If the `DeepInheritance` input parameter is `false`, each returned instance shall not include any
 1042 properties added by subclasses of the specified class. If it is `true`, no additional filtering is defined.

1043 **DEPRECATION NOTE:** The use of the `IncludeQualifiers` parameter is DEPRECATED and it may
 1044 be removed in a future version of this specification. The definition of `IncludeQualifiers` is ambiguous
 1045 and when this parameter is set to `true`, CIM clients cannot be assured that any qualifiers will be

1046 returned. A CIM client should always set this parameter to `false`. To minimize the impact of this
1047 recommendation on CIM clients, a CIM server may choose to treat the value of `IncludeQualifiers`
1048 as `false` for all requests. The preferred behavior is to use the class operations to receive qualifier
1049 information and not depend on any qualifiers in this response. If the `IncludeQualifiers` input
1050 parameter is `true`, all qualifiers for the instance, (including qualifiers on the instance and on any returned
1051 properties, shall be included as `<QUALIFIER>` elements in the response. If it is `false`, no
1052 `<QUALIFIER>` elements are present in the returned instance.

1053 If the `IncludeClassOrigin` input parameter is `true`, the `CLASSORIGIN` attribute shall be present on
1054 all appropriate elements in each returned Instance. If it is `false`, no `CLASSORIGIN` attributes are
1055 present.

1056 If the `PropertyList` input parameter is not `NULL`, the members of the array define one or more
1057 property names of the designated class. This definition may include inherited property names or property
1058 names explicitly defined in the designated class. However, it may not include property names added in
1059 subclasses of the designated class. Each returned instance shall not include elements for any properties
1060 missing from this list. Note that `PropertyList` acts as an additional filter on the properties defined by
1061 the `LocalOnly` and `DeepInheritance` input parameters; if the `PropertyList` includes a property that is
1062 not in the set defined by the `LocalOnly` and `DeepInheritance` combination, the element for the
1063 property shall not be returned. If `PropertyList` is an empty array, no elements for properties are
1064 included in the returned instances. If `PropertyList` is `NULL`, no additional filtering is defined.

1065 If the `PropertyList` contains duplicate elements, the server shall ignore the duplicates but otherwise
1066 process the request normally. If the `PropertyList` contains elements which are invalid Property names
1067 for any target instance, the server shall ignore such entries but otherwise process the request normally.

1068 Properties with the `NULL` value may be omitted from the response, even if the CIM client has not
1069 requested the exclusion of the property through the `LocalOnly`, `DeepInheritance`, or `PropertyList`
1070 filters. The CIM client shall interpret such omitted properties as `NULL`. Note that the CIM client cannot
1071 make any assumptions about properties omitted as a result of using any `LocalOnly`,
1072 `DeepInheritance`, or `PropertyList` filters.

1073 If `EnumerateInstances` is successful, the method returns zero or more named instances that meet the
1074 required criteria. These instances shall have all properties defined in and inherited by their respective
1075 classes, reduced by any properties excluded as a result of using the `LocalOnly`, `DeepInheritance`, or
1076 `PropertyList` filters and further reduced by any `NULL`-valued properties omitted from the response.

1077 If `EnumerateInstances` is unsuccessful, this method shall return one of the following status codes, where
1078 the error returned is the first applicable error in the list, starting with the first element and working down.
1079 Any additional method-specific interpretation of the error is enclosed in parentheses.

- 1080 • `CIM_ERR_ACCESS_DENIED`
- 1081 • `CIM_ERR_NOT_SUPPORTED` (by the CIM server for this operation)
- 1082 • `CIM_ERR_INVALID_NAMESPACE`
- 1083 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized, or otherwise
1084 incorrect parameters)
- 1085 • `CIM_ERR_INVALID_CLASS` (The CIM class that is the basis for this enumeration does not
1086 exist.)
- 1087 • `CIM_ERR_NOT_SUPPORTED` (This operation is not supported for the specified class and all
1088 of its subclasses, if provided.)
- 1089 • `CIM_ERR_FAILED` (Some other unspecified error occurred.)

1090 **5.3.2.12 EnumerateInstanceNames**

1091 The EnumerateInstanceNames operation enumerates the names (model paths) of the instances of a CIM
 1092 class in the target namespace, including instances in the class and any subclasses in accordance with
 1093 the polymorphic nature of CIM objects:

```
1094     EnumerateInstanceNames
1095     <instanceName>*EnumerateInstanceNames (
1096         [IN] <className> ClassName
1097     )
```

1098 The `ClassName` input parameter defines the class that is the basis for the enumeration.

1099 If EnumerateInstanceNames is successful, the method returns zero or more InstanceNames (referred to
 1100 in [DSP0004](#) as a model path) that meet the requested criteria. The `InstanceName` shall specify the
 1101 class from which the instance is instantiated, not any of its base classes. Note that this class may be
 1102 different from the class specified as input.

1103 If EnumerateInstanceNames is unsuccessful, this method shall return one of the following status codes,
 1104 where the error returned is the first applicable error in the list, starting with the first element and working
 1105 down. Any additional method-specific interpretation of the error is enclosed in parentheses.

- 1106 • CIM_ERR_ACCESS_DENIED
- 1107 • CIM_ERR_NOT_SUPPORTED (by the CIM server for this operation)
- 1108 • CIM_ERR_INVALID_NAMESPACE
- 1109 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
 1110 incorrect parameters)
- 1111 • CIM_ERR_INVALID_CLASS (The CIM class that is the basis for this enumeration does not
 1112 exist.)
- 1113 • CIM_ERR_NOT_SUPPORTED (This operation is not supported for the specified class and all
 1114 of its subclasses, if provided.)
- 1115 • CIM_ERR_FAILED (Some other unspecified error occurred.)

1116 **5.3.2.13 ExecQuery**

1117 The ExecQuery operation executes a query against the target namespace:

```
1118     ExecQuery
1119     <object>*ExecQuery (
1120         [IN] string QueryLanguage,
1121         [IN] string Query
1122     )
```

1123 The `QueryLanguage` input parameter defines the query language in which the query parameter is
 1124 expressed.

1125 The `Query` input parameter defines the query to be executed. The results of the query shall be
 1126 constrained to contain only CIM classes that exist in the target namespace or CIM instances whose
 1127 classes exist in the target namespace. Note that any instances in the result set may or may not exist in
 1128 any namespace. Note that for query languages supporting select-lists and from-clauses, this implies that
 1129 all select-list entries resolve to disjoint properties exposed by one CIM class named in the from-clause.
 1130 This rule does not prevent such queries from using joins.

1131 Neither the query language nor the format of the query is defined by this specification. It is anticipated
 1132 that query languages will be submitted to the DMTF as separate proposals.

1133 [CIM servers](#) can declare which query languages they support (if any) using a mechanism defined in 7.5.

1134 If ExecQuery is successful, the method returns zero or more CIM classes or instances that correspond to
1135 the results of the query.

1136 If ExecQuery is unsuccessful, the method shall return one of the following status codes, where the error
1137 returned is the first applicable error in the list, starting with the first element and working down. Any
1138 additional method-specific interpretation of the error is enclosed in parentheses.

- 1139 • CIM_ERR_ACCESS_DENIED
- 1140 • CIM_ERR_NOT_SUPPORTED
- 1141 • CIM_ERR_INVALID_NAMESPACE
- 1142 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
1143 incorrect parameters)
- 1144 • CIM_ERR_QUERY_LANGUAGE_NOT_SUPPORTED (The requested query language is not
1145 recognized.)
- 1146 • CIM_ERR_INVALID_QUERY (The query is not a valid query in the specified query language.)
- 1147 • CIM_ERR_FAILED (Some other unspecified error occurred.)

1148 5.3.2.14 Associators

1149 The Associators operation enumerates CIM objects (classes or instances) associated with a particular
1150 source CIM object:

```
1151     Associators
1152     <objectWithPath>*Associators (
1153         [IN] <objectName> ObjectName,
1154         [IN,OPTIONAL,NULL] <className> AssocClass = NULL,
1155         [IN,OPTIONAL,NULL] <className> ResultClass = NULL,
1156         [IN,OPTIONAL,NULL] string Role = NULL,
1157         [IN,OPTIONAL,NULL] string ResultRole = NULL,
1158         [IN,OPTIONAL] boolean IncludeQualifiers = false, (DEPRECATED)
1159         [IN,OPTIONAL] boolean IncludeClassOrigin = false,
1160         [IN,OPTIONAL,NULL] string PropertyList [] = NULL
1161     )
```

1162 The `ObjectName` input parameter defines the source CIM object whose associated objects are to be
1163 returned. This may be either a class name or instance name (model path).

1164 The `AssocClass` input parameter, if not `NULL`, shall be a valid CIM association class name. It acts as a
1165 filter on the returned set of objects by mandating that each returned object shall be associated to the
1166 source object through an instance of this class or one of its subclasses.

1167 The `ResultClass` input parameter, if not `NULL`, shall be a valid CIM class name. It acts as a filter on the
1168 returned set of objects by mandating that each returned object shall be either an instance of this class (or
1169 one of its subclasses) or be this class (or one of its subclasses).

1170 The `Role` input parameter, if not `NULL`, shall be a valid property name. It acts as a filter on the returned
1171 set of objects by mandating that each returned object shall be associated with the source object through
1172 an association in which the source object plays the specified role. That is, the name of the property in the
1173 association class that refers to the source object shall match the value of this parameter.

1174 The `ResultRole` input parameter, if not `NULL`, shall be a valid property name. It acts as a filter on the
1175 returned set of objects by mandating that each returned object shall be associated to the source object

1176 through an association in which the returned object plays the specified role. That is, the name of the
1177 property in the association class that refers to the returned object shall match the value of this parameter.

1178 **DEPRECATION NOTE:** The use of the `IncludeQualifiers` parameter is DEPRECATED and it may
1179 be removed in a future version of this specification. The preferred behavior is to use the class operations
1180 to receive qualifier information and not depend on any qualifiers in this response. If
1181 `IncludeQualifiers` is `true`, all qualifiers for each object (including qualifiers on the object and on any
1182 returned properties) shall be included as `<QUALIFIER>` elements in the response. If it is `false`, no
1183 `<QUALIFIER>` elements are present.

1184 If the `IncludeClassOrigin` input parameter is `true`, the `CLASSORIGIN` attribute shall be present on
1185 all appropriate elements in each returned object. If it is `false`, no `CLASSORIGIN` attributes are present.

1186 If the `PropertyList` input parameter is not `NULL`, the members of the array define one or more
1187 property names. Each returned object shall not include elements for any properties missing from this list.
1188 If `PropertyList` is an empty array, no properties are included in each returned object. If it is `NULL`, no
1189 additional filtering is defined.

1190 If `PropertyList` contains duplicate elements, the server shall ignore them but otherwise process the
1191 request normally. If `PropertyList` contains elements that are invalid property names for any target
1192 object, the server shall ignore such entries but otherwise process the request normally.

1193 Clients should not explicitly specify properties in the `PropertyList` parameter unless they specify a
1194 non-`NULL` value for the `ResultClass` parameter.

1195 If instances are returned, properties with the `NULL` value may be omitted from the response, even if the
1196 CIM client has not requested the exclusion of the through the `PropertyList` filter. The CIM client shall
1197 interpret such omitted properties as `NULL`. Note that the CIM client cannot make any assumptions about
1198 properties omitted as a result of using the `PropertyList` filter. If classes are returned, the CIM server
1199 cannot make this choice, and only the CIM client can cause properties to be excluded by using the
1200 `PropertyList` filter.

1201 If `Associators` is successful, the method returns zero or more CIM classes or instances meeting the
1202 requested criteria. Because it is possible for CIM objects from different hosts or namespaces to be
1203 associated, each returned object includes location information. If the `ObjectName` refers to a class, then
1204 classes are returned. These classes shall have all CIM elements (properties, methods, and qualifiers)
1205 defined in and inherited by that class, reduced by any properties excluded as a result of using the
1206 `PropertyList` filter. If the `ObjectName` refers to an instance, then instances are returned. These
1207 instances shall have all properties defined in and inherited by its class, reduced by any properties
1208 excluded as a result of using the `PropertyList` filter and further reduced by any `NULL` valued
1209 properties omitted from the response.

1210 If `Associators` is unsuccessful, this method shall return one of the following status codes, where the error
1211 returned is the first applicable error in the list, starting with the first element and working down. Any
1212 additional method-specific interpretation of the error is enclosed in parentheses.

- 1213 • `CIM_ERR_ACCESS_DENIED`
- 1214 • `CIM_ERR_NOT_SUPPORTED` (by the CIM server for this operation)
- 1215 • `CIM_ERR_INVALID_NAMESPACE`
- 1216 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized, or otherwise
1217 incorrect parameters)
- 1218 • `CIM_ERR_NOT_SUPPORTED` (This operation is not supported for the class of the specified
1219 instance, if provided.)

- 1220 • CIM_ERR_FAILED (This operation is not supported for the specified instance, or some other
1221 unspecified error occurred.)

1222 5.3.2.15 AssociatorNames

1223 The AssociatorNames operation enumerates the names of CIM Objects (classes or instances) that are
1224 associated with a particular source CIM object:

```
1225     AssociatorNames
1226     <objectPath>*AssociatorNames (
1227         [IN] <objectName> ObjectName,
1228         [IN,OPTIONAL,NULL] <className> AssocClass = NULL,
1229         [IN,OPTIONAL,NULL] <className> ResultClass = NULL,
1230         [IN,OPTIONAL,NULL] string Role = NULL,
1231         [IN,OPTIONAL,NULL] string ResultRole = NULL
1232     )
```

1233 The `ObjectName` input parameter defines the source CIM object whose associated names are to be
1234 returned. This is either a class or instance name (model path).

1235 The `AssocClass` input parameter, if not `NULL`, shall be a valid CIM association class name. It acts as a
1236 filter on the returned set of names by mandating that each returned name identify an object that shall be
1237 associated to the source object through an instance of this class or one of its subclasses.

1238 The `ResultClass` input parameter, if not `NULL`, shall be a valid CIM class name. It acts as a filter on the
1239 returned set of names by mandating that each returned name identify an object that shall be either an
1240 instance of this class (or one of its subclasses) or be this class (or one of its subclasses).

1241 The `Role` input parameter, if not `NULL`, shall be a valid property name. It acts as a filter on the returned
1242 set of names by mandating that each returned name identify an object that shall be associated to the
1243 source object through an association in which the source object plays the specified role. That is, the
1244 name of the property in the association class that refers to the source object shall match the value of this
1245 parameter.

1246 The `ResultRole` input parameter, if not `NULL`, shall be a valid property name. It acts as a filter on the
1247 returned set of names by mandating that each returned name identify an object that shall be associated
1248 to the source object through an association in which the named returned object plays the specified role.
1249 That is, the name of the property in the association class that refers to the returned object shall match the
1250 value of this parameter.

1251 If `AssociatorNames` is successful, the method returns zero or more CIM class paths or instance paths
1252 meeting the requested criteria. Because CIM objects from different hosts or namespaces can be
1253 associated, each returned object includes location information. If the `ObjectName` refers to a class path,
1254 then class paths are returned. Otherwise, the `ObjectName` refers to an instance path, and instance paths
1255 are returned.

1256 If `AssociatorNames` is unsuccessful, one of the following status codes shall be returned by this method,
1257 where the first applicable error in the list (starting with the first element of the list, and working down) is
1258 the error returned. Any additional method-specific interpretation of the error is given in parentheses.

- 1259 • CIM_ERR_ACCESS_DENIED
- 1260 • CIM_ERR_NOT_SUPPORTED (by the CIM server for this operation)
- 1261 • CIM_ERR_INVALID_NAMESPACE
- 1262 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized or otherwise
1263 incorrect parameters)

- 1264 • CIM_ERR_NOT_SUPPORTED (This operation is not supported for the class of the specified
1265 instance, if provided.)
- 1266 • CIM_ERR_FAILED (This operation is not supported for the specified instance, or some other
1267 unspecified error occurred.)

1268 5.3.2.16 References

1269 The References operation enumerates the association objects that refer to a particular target CIM object
1270 (class or instance).

```
1271     References
1272     <objectWithPath>*References (
1273         [IN] <objectName> ObjectName,
1274         [IN,OPTIONAL,NULL] <className> ResultClass = NULL,
1275         [IN,OPTIONAL,NULL] string Role = NULL,
1276         [IN,OPTIONAL] boolean IncludeQualifiers = false, (DEPRECATED)
1277         [IN,OPTIONAL] boolean IncludeClassOrigin = false,
1278         [IN,OPTIONAL,NULL] string PropertyList [] = NULL
1279     )
```

1280 The `ObjectName` input parameter defines the target CIM object whose referring objects are to be
1281 returned. This is either a class or instance name (model path).

1282 The `ResultClass` input parameter, if not `NULL`, shall be a valid CIM class name. It acts as a filter on the
1283 returned set of objects by mandating that each returned object shall be an instance of this class (or one of
1284 its subclasses) or this class (or one of its subclasses).

1285 The `Role` input parameter, if not `NULL`, shall be a valid property name. It acts as a filter on the returned
1286 set of objects by mandating that each returned object shall refer to the target object through a property
1287 with a name that matches the value of this parameter.

1288 **DEPRECATION NOTE:** The use of the `IncludeQualifiers` parameter is DEPRECATED and it may
1289 be removed in a future version of this specification. The preferred behavior is to use the class operations
1290 to receive qualifier information and not depend on any qualifiers in this response. If
1291 `IncludeQualifiers` is `true`, all qualifiers for each object (including qualifiers on the object and on any
1292 returned properties) shall be included as `<QUALIFIER>` elements in the response. If this parameter is
1293 `false`, no `<QUALIFIER>` elements are present in each returned Object.

1294 If the `IncludeClassOrigin` input parameter is `true`, the `CLASSORIGIN` attribute shall be present on
1295 all appropriate elements in each returned object. If it is `false`, no `CLASSORIGIN` attributes are present.

1296 If the `PropertyList` input parameter is not `NULL`, the members of the array define one or more
1297 property names. Each returned object shall not include elements for any properties missing from this list.
1298 If `PropertyList` is an empty array, no properties are included in each returned object. If
1299 `PropertyList` is `NULL`, no additional filtering is defined.

1300 If `PropertyList` contains duplicate elements, the server shall ignore them but otherwise process the
1301 request normally. If `PropertyList` contains elements that are invalid property names for any target
1302 object, the server shall ignore them but otherwise process the request normally.

1303 Clients should not explicitly specify properties in the `PropertyList` parameter unless they specify a
1304 non-`NULL` value for the `ResultClass` parameter.

1305 If instances are returned, properties with the `NULL` value may be omitted from the response, even if the
1306 CIM client has not requested the exclusion of the property through the `PropertyList` filter. The CIM
1307 client must interpret such omitted properties as `NULL`. Note that the CIM client cannot make any

1308 assumptions about properties omitted as a result of using the `PropertyList` filter. If classes are
 1309 returned, the CIM server cannot make this choice, and only the CIM client can cause properties to be
 1310 excluded by using the `PropertyList` filter.

1311 If `References` is successful, the method returns zero or more CIM classes or instances meeting the
 1312 requested criteria. Because CIM objects from different hosts or namespaces can be associated, each
 1313 returned object includes location information. If the `ObjectName` refers to a class, then classes are
 1314 returned. These classes shall have all CIM elements (properties, methods, and qualifiers) defined in and
 1315 inherited by that class, reduced by any properties excluded as a result of using the `PropertyList` filter.
 1316 If the `ObjectName` refers to an instance, then instances are returned. These instances shall have all
 1317 properties defined in and inherited by their respective classes, reduced by any properties excluded as a
 1318 result of using the `PropertyList` filter and further reduced by any NULL valued properties omitted from
 1319 the response.

1320 If `References` is unsuccessful, this method shall return one of the following status codes, where the error
 1321 returned is the first applicable error in the list, starting with the first element and working down. Any
 1322 additional method-specific interpretation of the error is enclosed in parentheses.

- 1323 • `CIM_ERR_ACCESS_DENIED`
- 1324 • `CIM_ERR_NOT_SUPPORTED` (by the CIM server for this operation)
- 1325 • `CIM_ERR_INVALID_NAMESPACE`
- 1326 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized, or otherwise
 1327 incorrect parameters)
- 1328 • `CIM_ERR_NOT_SUPPORTED` (This operation is not supported for the class of the specified
 1329 instance, if provided.)
- 1330 • `CIM_ERR_FAILED` (This operation is not supported for the specified instance, or some other
 1331 unspecified error occurred.)

1332 **5.3.2.17 ReferenceNames**

1333 The `ReferenceNames` operation enumerates the association objects that refer to a particular target CIM
 1334 object (class or instance):

```

1335 ReferenceNames
1336 <objectPath>*ReferenceNames (
1337     [IN] <objectName> ObjectName,
1338     [IN,OPTIONAL,NULL] <className> ResultClass = NULL,
1339     [IN,OPTIONAL,NULL] string Role = NULL
1340 )
    
```

1341 The `ObjectName` input parameter defines the target CIM object with the referring object names to be
 1342 returned. It may be either a class or an instance name (model path).

1343 The `ResultClass` input parameter, if not `NULL`, shall be a valid CIM class name. It acts as a filter on the
 1344 returned set of object names by mandating that each returned Object Name identify an instance of this
 1345 class (or one of its subclasses) or this class (or one of its subclasses).

1346 The `Role` input parameter, if not `NULL`, shall be a valid property name. It acts as a filter on the returned
 1347 set of object names by mandating that each returned object name shall identify an object that refers to the
 1348 target instance through a property with a name that matches the value of this parameter.

1349 If `ReferenceNames` is successful, the method returns zero or more CIM class paths or instance paths
 1350 meeting the requested criteria. Because CIM objects from different hosts or namespaces can be
 1351 associated, each returned object includes location information. If the `ObjectName` refers to a class path,

1352 then class paths are returned. Otherwise, the `ObjectName` refers to an instance path, and instance paths
1353 are returned.

1354 If `ReferenceNames` is unsuccessful, this method shall return one of the following status codes, where the
1355 error returned is the first applicable error in the list, starting with the first element and working down. Any
1356 additional method-specific interpretation of the error is enclosed in parentheses.

- 1357 • `CIM_ERR_ACCESS_DENIED`
- 1358 • `CIM_ERR_NOT_SUPPORTED` (by the CIM server for this operation)
- 1359 • `CIM_ERR_INVALID_NAMESPACE`
- 1360 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized, or otherwise
1361 incorrect parameters)
- 1362 • `CIM_ERR_NOT_SUPPORTED` (This operation is not supported for the class of the specified
1363 instance, if provided.)
- 1364 • `CIM_ERR_FAILED` (This operation is not supported for the specified instance, or some other
1365 unspecified error occurred.)

1366 5.3.2.18 `GetProperty`

1367 The `GetProperty` operation retrieves a single property value from a CIM instance in the target
1368 namespace:

```
1369 GetProperty  
1370 <propertyValue>GetProperty (  
1371     [IN] <instanceName> InstanceName,  
1372     [IN] string PropertyName  
1373 )
```

1374 The `InstanceName` input parameter specifies the name of the instance (model path) from which the
1375 property value is requested.

1376 The `PropertyName` input parameter specifies the name of the property with the value to be returned.

1377 If `GetProperty` is successful, the return value specifies the value of the requested property. If the value is
1378 NULL, no element is returned.

1379 If `GetProperty` is unsuccessful, this method shall return one of the following status codes, where the error
1380 returned is the first applicable error in the list, starting with the first element and working down. Any
1381 additional method-specific interpretation of the error is enclosed in parentheses.

- 1382 • `CIM_ERR_ACCESS_DENIED`
- 1383 • `CIM_ERR_INVALID_NAMESPACE`
- 1384 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized, or otherwise
1385 incorrect parameters)
- 1386 • `CIM_ERR_INVALID_CLASS` (The CIM class does not exist in the specified namespace.)
- 1387 • `CIM_ERR_NOT_FOUND` (The CIM class exists, but the requested CIM instance does not exist
1388 in the specified namespace.)
- 1389 • `CIM_ERR_NO_SUCH_PROPERTY` (The CIM instance exists, but the requested property does
1390 not.)
- 1391 • `CIM_ERR_FAILED` (Some other unspecified error occurred.)

1392 **5.3.2.19 SetProperty**

1393 The SetProperty operation sets a single property value in a CIM instance in the target namespace:

```
1394     SetProperty
1395     void SetProperty (
1396         [IN] <instanceName> InstanceName,
1397         [IN] string PropertyName,
1398         [IN,OPTIONAL,NULL] <propertyValue> NewValue = NULL
```

1399 The InstanceName input parameter specifies the name of the instance (model path) with the property
1400 value to be updated.

1401 The PropertyName input parameter specifies the name of the property with the value to be updated.

1402 The NewValue input parameter specifies the new value for the property (which may be NULL).

1403 If SetProperty is unsuccessful, this method shall return one of the following status codes, where the error
1404 returned is the first applicable error in the list, starting with the first element and working down. Any
1405 additional method-specific interpretation of the error is enclosed in parentheses.

- 1406 • CIM_ERR_ACCESS_DENIED
- 1407 • CIM_ERR_NOT_SUPPORTED (by the CIM server for this operation)
- 1408 • CIM_ERR_INVALID_NAMESPACE
- 1409 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
1410 incorrect parameters)
- 1411 • CIM_ERR_INVALID_CLASS (The CIM class does not exist in the specified namespace.)
- 1412 • CIM_ERR_NOT_FOUND (The CIM class exists, but the requested CIM instance does not exist
1413 in the specified namespace.)
- 1414 • CIM_ERR_NOT_SUPPORTED (This operation is not supported for the class of the specified
1415 instance, if provided.)
- 1416 • CIM_ERR_NO_SUCH_PROPERTY (The CIM instance exists, but the requested property does
1417 not.)
- 1418 • CIM_ERR_TYPE_MISMATCH (The supplied value is incompatible with the type of the
1419 property.)
- 1420 • CIM_ERR_FAILED (This operation is not supported for the specified instance, or some other
1421 unspecified error occurred.)

1422 **5.3.2.20 GetQualifier**

1423 The GetQualifier operation retrieves a single qualifier declaration from the target namespace.

```
1424     GetQualifier
1425     <qualifierDecl>GetQualifier (
1426         [IN] string QualifierName
1427     )
```

1428 The QualifierName input parameter identifies the qualifier with the declaration to be retrieved.

1429 If GetQualifier is successful, the method returns the qualifier declaration for the named qualifier.

1430 If GetQualifier is unsuccessful, this method shall return one of the following status codes, where the error
 1431 returned is the first applicable error in the list, starting with the first element and working down. Any
 1432 additional method-specific interpretation of the error is enclosed in parentheses.

- 1433 • CIM_ERR_ACCESS_DENIED
- 1434 • CIM_ERR_NOT_SUPPORTED
- 1435 • CIM_ERR_INVALID_NAMESPACE
- 1436 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
 1437 incorrect parameters)
- 1438 • CIM_ERR_NOT_FOUND (The requested qualifier declaration does not exist.)
- 1439 • CIM_ERR_FAILED (Some other unspecified error occurred.)

1440 5.3.2.21 SetQualifier

1441 The SetQualifier operation creates or updates a single qualifier declaration in the target namespace. If the
 1442 qualifier declaration already exists, it is overwritten:

```
1443     SetQualifier
1444     void SetQualifier (
1445         [IN] <qualifierDecl> QualifierDeclaration
1446     )
```

1447 The `QualifierDeclaration` input parameter defines the qualifier declaration to add to the
 1448 namespace.

1449 If SetQualifier is successful, the qualifier declaration is added to the target namespace. If a qualifier
 1450 declaration with the same qualifier name already exists, the new declaration replaces it.

1451 If SetQualifier is unsuccessful, this method returns one of the following status codes, where the error
 1452 returned is the first applicable error in the list, starting with the first element and working down. Any
 1453 additional method-specific interpretation of the error is enclosed in parentheses.

- 1454 • CIM_ERR_ACCESS_DENIED
- 1455 • CIM_ERR_NOT_SUPPORTED
- 1456 • CIM_ERR_INVALID_NAMESPACE
- 1457 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
 1458 incorrect parameters)
- 1459 • CIM_ERR_FAILED (Some other unspecified error occurred.)

1460 5.3.2.22 DeleteQualifier

1461 The DeleteQualifier operation deletes a single qualifier declaration from the target namespace.

```
1462     DeleteQualifier
1463     void DeleteQualifier (
1464         [IN] string QualifierName
1465     )
```

1466 The `QualifierName` input parameter identifies the qualifier with the declaration to be deleted.

1467 If DeleteQualifier is successful, the specified qualifier declaration is deleted from the namespace.

1468 If DeleteQualifier is unsuccessful, this method shall return one of the following status codes, where the
 1469 error returned is the first applicable error in the list, starting with the first element and working down. Any
 1470 additional method-specific interpretation of the error is enclosed in parentheses.

- 1471 • CIM_ERR_ACCESS_DENIED
- 1472 • CIM_ERR_NOT_SUPPORTED
- 1473 • CIM_ERR_INVALID_NAMESPACE
- 1474 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
 1475 incorrect parameters)
- 1476 • CIM_ERR_NOT_FOUND (The requested qualifier declaration does not exist.)
- 1477 • CIM_ERR_FAILED (Some other unspecified error occurred.)

1478 5.3.2.23 EnumerateQualifiers

1479 The EnumerateQualifiers operation enumerates qualifier declarations from the target namespace.

```
1480     EnumerateQualifiers
1481     <qualifierDecl>*EnumerateQualifiers (
1482     )
```

1483 If EnumerateQualifiers is successful, the method returns zero or more qualifier declarations.

1484 If EnumerateQualifiers is unsuccessful, this method shall return one of the following status codes, where
 1485 the error returned is the first applicable error in the list, starting with the first element and working down.
 1486 Any additional method-specific interpretation of the error is enclosed in parentheses.

- 1487 • CIM_ERR_ACCESS_DENIED
- 1488 • CIM_ERR_NOT_SUPPORTED
- 1489 • CIM_ERR_INVALID_NAMESPACE
- 1490 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
 1491 incorrect parameters)
- 1492 • CIM_ERR_FAILED (Some other unspecified error occurred.)

1493 5.3.2.24 Pulled Enumeration Operations

1494 This clause defines a set of operations that return CIM instances or instance paths in portions controlled
 1495 by the CIM client. These operations are called *pulled enumerations*. Usually, an enumeration session is
 1496 established through an Open operation, and subsequent repeated executions of a Pull operation on the
 1497 enumeration session are used to retrieve them. Optionally, the Open operation can also pull a first set of
 1498 items.

1499 Pulled enumeration operations consist of the following individual operations:

- 1500 • Open operations open an enumeration of the following elements:
 - 1501 – OpenEnumerateInstances (instances of a class)
 - 1502 – OpenEnumerateInstancePaths (instance paths of instances of a class)
 - 1503 – OpenReferenceInstances (association instances referencing a target instance)
 - 1504 – OpenReferenceInstancePaths (the instance paths of association instances referencing a
 1505 target instance)
 - 1506 – OpenAssociatorInstances (instances associated with a source instance)

- 1507 – OpenAssociatorInstancePaths (the instance paths of instances associated to a source
- 1508 instance)
- 1509 – OpenQueryInstances (the rows resulting from a query)
- 1510 • Pull operations are for the following cases:
- 1511 – PullInstances (Instances are enumerated, and instance paths are either not available, for
- 1512 example as in for OpenQueryInstances, or not desired.)
- 1513 – PullInstancesWithPath (Instances with paths are enumerated.)
- 1514 – PullInstancePaths (Instance paths are enumerated.)
- 1515 • Other operations are as follows:
- 1516 – CloseEnumeration (closes an open enumeration)
- 1517 – EnumerationCount (estimates the number of items in an open enumeration)

1518 5.3.2.24.1 Behavioral Rules for Pulled Enumeration Operations

1519 A central concept of pulled enumeration operations is the "enumeration session," which provides a
1520 context in which the operations perform their work and which determines the set of elements to be
1521 returned. To process the operations of an enumeration session, some parameters of the Open operation
1522 need to be maintained as long as the enumeration session is open. In addition, some state data about
1523 where the enumeration session is with regard to elements already returned must be maintained.

1524 From a CIM client perspective, an enumeration session is an enumeration context value. A successful
1525 Open operation establishes the enumeration session and returns an enumeration context value
1526 representing it. This value is used as an input/output parameter in subsequent Pull operations on that
1527 enumeration session. The enumeration context value shall uniquely identify the open enumeration
1528 session within the target CIM namespace of the Open operation that established the enumeration
1529 session. It is valid for a CIM server to use NULL as an enumeration context value representing a closed
1530 enumeration session, but a CIM client shall not rely on that.

1531 Defining the enumeration context value in Pull operations as both an input parameter and an output
1532 parameter allows the CIM server to change the enumeration context value during the execution of a pull
1533 operation. This ability to change allows different implementation approaches on the CIM server side,
1534 which are transparent for the CIM client. Example approaches are as follows:

- 1535 • Maintain any state data describing the enumeration session internally in the CIM server. The
- 1536 enumeration context value does not need to change in subsequent Pull operations. The CIM
- 1537 server uses this value only to identify the internal state data for the open enumeration session. It
- 1538 does not use the value to store any state data. A variation of this approach is to hand back
- 1539 modified enumeration context values for additional CIM server-side sequence checking.
- 1540 • Maintain any state data describing the enumeration session only on the CIM client side. All state
- 1541 data is stored in the enumeration context value, and the CIM server does not maintain any state
- 1542 data about the enumeration session, essentially being completely stateless with regard to the
- 1543 enumeration session.
- 1544 • A combination of the two previous approaches.

1545 A CIM server may support keeping enumeration sessions open across connection terminations and
1546 shutdowns of the server. Elements may be created, deleted, or modified concurrently with an
1547 enumeration session that involves these elements. Such changes may or may not be reflected in the
1548 enumeration set. Therefore, there is no guarantee to the CIM client that the enumeration set represents a
1549 consistent snapshot of its elements at a point in time. However, the CIM server should make a best effort
1550 attempt for the returned enumeration set to represent a consistent snapshot of its elements at a point in
1551 time. The order of elements in the enumeration set is undefined.

1552 This specification does not restrict the number of enumeration sessions that can be established or
 1553 executed concurrently in the same CIM server or client. This remains true even if the enumeration sets of
 1554 such concurrently established enumeration sessions contain the same elements.

1555 Except for CloseEnumeration, all operations on a particular enumeration session shall be executed
 1556 sequentially. An enumeration session can be open or closed. It is considered open if operations using its
 1557 enumeration context value as an input parameter can be executed successfully. It is opened by the
 1558 successful completion of an Open operation and closed by one of the following events:

- 1559 • Successful completion of a CloseEnumeration operation
- 1560 • Successful completion of an open or pull operation with the EndOfSequence output parameter
 1561 set to `true`
- 1562 • Unsuccessful completion of a pull operation when ContinueOnError is not requested
- 1563 • CIM server-side decision to close the enumeration session based upon an operation timeout
- 1564 • CIM server-side decision to close an enumeration session during an operation on that
 1565 enumeration session based upon exceeding server limits

1566 A conformant CIM server may support closure of enumeration sessions based upon exceeding server
 1567 limits. Example situations for such a decision are:

- 1568 • Pull operations with no objects requested that are repeated with a high frequency on the same
 1569 enumeration session
- 1570 • EnumerationCount operations repeated with a high frequency on the same enumeration
 1571 session

1572 A mechanism by which CIM servers can declare support for closure of enumeration sessions based upon
 1573 exceeding server limits is defined in 7.5. If a CIM server supports such closure of enumeration sessions, it
 1574 shall make the decision to close during an operation on that enumeration session. There is no way to
 1575 indicate the reason for the closure if the decision is made elsewhere. If a CIM server closes an
 1576 enumeration session based upon exceeding server limits, it shall return failure on the operation on that
 1577 enumeration session with the status code [CIM_ERR_SERVER_LIMITS_EXCEEDED](#).

1578 5.3.2.24.2 Common Parameters for the Open Operations

1579 This clause defines commonly used parameters for the Open operations. The description of the individual
 1580 Open operations references these parameters as appropriate. Note that not every Open operation uses
 1581 every one of these common parameters:

- 1582 • EnumerationContext
 - 1583 – This output parameter is the enumeration context value representing the enumeration
 1584 session. If the EndOfSequence is `true`, the EnumerationContext value may be `NULL`.
- 1585 • EndOfSequence
 - 1586 – This output parameter indicates to the CIM client whether the enumeration session is
 1587 exhausted. If EndOfSequence is `true` upon successful completion of an Open operation,
 1588 no more elements are available and the CIM server closes the enumeration session,
 1589 releasing any allocated resources related to the enumeration session. If the enumeration
 1590 set is empty, it is valid for a CIM server to set EndOfSequence to `true`, even if
 1591 MaxObjectCount is 0. In this case, the enumeration session is closed upon successful
 1592 completion of the Open operation. If EndOfSequence is `false`, additional elements may
 1593 be available and the CIM server shall not close the enumeration session.

- 1594
- IncludeClassOrigin
 - This input parameter is used only on Open operations that enumerate CIM instances. It controls whether information about the class origin of properties, references or methods is included in any enumerated CIM instances. If IncludeClassOrigin is `true`, the CLASSORIGIN attribute shall be present on all appropriate elements in each CIM instance returned by any subsequent PullInstance operations on this enumeration session. If IncludeClassOrigin is `false`, any CLASSORIGIN attributes shall not be present in any enumerated instances.
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- 1602
- FilterQueryLanguage and FilterQuery
 - These input parameters act as an additional restricting filter on the set of enumerated elements (for example, instances or instance paths).
 - If FilterQueryLanguage is not NULL, it shall specify a query language and FilterQuery shall be a valid query in that query language. Neither the query language nor the format of the query is defined by this specification. It is anticipated that query languages will be submitted to the DMTF as separate proposals. A mechanism by which CIM servers can declare the query languages they support for filtering in Pulled enumerations (if any) is defined in 7.5.
 - The query specified in FilterQuery shall address (for example, in its FROM list) the class specified in ClassName and shall not address any other classes. The result set specified by the query (for example, SELECT list) shall be ignored. The query shall not define any ordering criteria or any grouping of objects.
 - If the CIM server does not support filtered enumerations and FilterQueryLanguage is not NULL, the CIM server shall return a failure with the status code `CIM_ERR_FILTERED_ENUMERATION_NOT_SUPPORTED`.
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- 1615
- OperationTimeout
 - This input parameter determines the minimum time the CIM server shall maintain the open enumeration session after the last Open or Pull operation (unless the enumeration session is closed during the last operation). If the operation timeout is exceeded, the CIM server may close the enumeration session at any time, releasing any resources allocated to the enumeration session.
 - An OperationTimeout of 0 means that there is no operation timeout. That is, the enumeration session is never closed based on time.
 - If OperationTimeout is NULL, the CIM server shall choose an operation timeout.
 - All other values for OperationTimeout specify the operation timeout in seconds.
 - A CIM server may restrict the set of allowable values for OperationTimeout. Specifically, the CIM server may not allow 0 (no timeout). If the specified value is not an allowable value, the CIM server shall return failure with the status code `CIM_ERR_INVALID_OPERATION_TIMEOUT`. A mechanism by which CIM servers can declare the allowable values for OperationTimeout is defined in 7.5.
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- 1633
- ContinueOnError
 - This input parameter, if `true`, requests a continuation on error, which is the ability to resume an enumeration session successfully after a Pull operation returns an error. A mechanism by which conformant CIM servers can declare support for continuation on error is defined in 7.5.
 - If a CIM server does not support continuation on error and ContinueOnError is `true`, it shall return a failure with the status code [CIM_ERR_CONTINUATION_ON_ERROR_NOT_SUPPORTED](#).
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- 1641 – If a CIM server supports continuation on error and `ContinueOnError` is `true`, the
 1642 enumeration session shall remain open when a Pull operation fails, and any subsequent
 1643 successful Pull operations shall return the set of elements that would have been returned if
 1644 the failing Pull operations were successful. This behavior is subject to the consistency rules
 1645 defined for pulled enumerations. If `ContinueOnError` is `false`, the enumeration session
 1646 shall be closed when a Pull operation returns a failure.
- 1647 • `MaxObjectCount`
 - 1648 – This input parameter defines the maximum number of elements that this Open operation
 1649 can return. Any `uint32` number is valid, including 0. The CIM server may deliver any
 1650 number of elements up to `MaxObjectCount` but shall not deliver more
 1651 than `MaxObjectCount` elements. A conformant CIM server implementation may choose to
 1652 never return any elements during an Open operation, regardless of the value of
 1653 `MaxObjectCount`. Note that a CIM client can use a `MaxObjectCount` value of 0 to specify
 1654 that it does not want to retrieve any instances in the Open operation.
 - 1655 • Return Value (array of enumerated elements)
 - 1656 – The return value of a successful Open operation is an array of enumerated elements with a
 1657 number of entries from 0 up to a maximum defined by `MaxObjectCount`. These entries
 1658 meet the criteria defined in the Open operation. Note that returning no entries in the array
 1659 does not imply that the enumeration session is exhausted. Only the `EndOfSequence`
 1660 output parameter indicates whether the enumeration session is exhausted.

1661 5.3.2.24.3 OpenEnumerateInstances

1662 The `OpenEnumerateInstances` operation establishes and opens an enumeration session of the instances
 1663 of a CIM class (including instances of its subclasses) in the target namespace. Optionally, it retrieves a
 1664 first set of instances.

```

1665 OpenEnumerateInstances
1666 <instanceWithPath>* OpenEnumerateInstances (
1667     [OUT] <enumerationContext> EnumerationContext,
1668     [OUT] Boolean EndOfSequence,
1669     [IN] <className> ClassName,
1670     [IN,OPTIONAL] boolean DeepInheritance = true,
1671     [IN,OPTIONAL] boolean IncludeClassOrigin = false,
1672     [IN,OPTIONAL,NULL] string PropertyList [] = NULL,
1673     [IN,OPTIONAL,NULL] string FilterQueryLanguage = NULL,
1674     [IN,OPTIONAL,NULL] string FilterQuery = NULL,
1675     [IN,OPTIONAL,NULL] uint32 OperationTimeout = NULL,
1676     [IN,OPTIONAL] Boolean ContinueOnError = false,
1677     [IN,OPTIONAL] uint32 MaxObjectCount = 0
1678 )
  
```

1679 The `OpenEnumerateInstances` operation shall comply with the behavior defined in 5.3.2.24.1.

1680 The `EnumerationContext` output parameter is defined in 5.3.2.24.2.

1681 The `EndOfSequence` output parameter is defined in 5.3.2.24.2.

1682 The `ClassName` input parameter defines the class that is the basis for the enumeration. The enumeration
 1683 set shall consist of all instances of that specified class, including any instances of any of its subclasses, in
 1684 accordance with the polymorphic nature of CIM objects.

1685 The `DeepInheritance` input parameter acts as a filter on the properties included in any enumerated
 1686 CIM instances. If the `DeepInheritance` input parameter is `true`, all properties of each enumerated

- 1687 instance of the class shall be present (subject to constraints imposed by the other parameters), including
1688 any added by subclassing the specified class. If `DeepInheritance` is `false`, each enumerated
1689 instance includes only properties defined for the class specified by `ClassName`.
- 1690 The `IncludeClassOrigin` input parameter is defined in 5.3.2.24.2.
- 1691 The `PropertyList` input parameter acts as a filter on the properties in any enumerated CIM
1692 instances. If `PropertyList` is not `NULL`, the members of the array define zero or more property names
1693 of the specified class. This array may include inherited property names or property names explicitly
1694 defined in the specified class. However, it shall not include property names defined in subclasses of the
1695 specified class. Each enumerated instance shall not include elements for properties missing from this list.
1696 Note that `PropertyList` acts as an additional filter on the properties defined by the `DeepInheritance`
1697 input parameter. If `PropertyList` includes a property that is not in the set defined by
1698 `DeepInheritance`, the element for the property shall not be included. If `PropertyList` is an empty
1699 array, no elements for properties are included in the enumerated instances. If `PropertyList` is `NULL`,
1700 no additional filtering is defined. If `PropertyList` contains duplicate elements, the CIM server shall
1701 ignore them but otherwise process the request normally. If `PropertyList` contains elements that are
1702 invalid property names for any target instance, the CIM server shall ignore such entries but otherwise
1703 process the request normally.
- 1704 The `FilterQueryLanguage` and `FilterQuery` input parameters are defined in 5.3.2.24.2.
- 1705 The `OperationTimeout` input parameter is defined in 5.3.2.24.2.
- 1706 The `ContinueOnError` input parameter is defined in 5.3.2.24.2.
- 1707 The `MaxObjectCount` input parameter is defined in 5.3.2.24.2.
- 1708 If `OpenEnumerateInstances` is successful, the return value shall be an array of enumerated instances as
1709 defined in 5.3.2.24.2.
- 1710 The `PullInstancesWithPath` operation shall be used to pull instances for an enumeration session opened
1711 using `OpenEnumerateInstances`. If any other operation is used to pull instances, the CIM server shall
1712 return failure with the status code `CIM_ERR_FAILED`.
- 1713 If `OpenEnumerateInstances` is unsuccessful, this operation shall return one of the following status codes,
1714 where the error returned is the first applicable error in the list, starting with the first element and working
1715 down. Any additional operation-specific interpretation of the error is enclosed in parentheses.
- 1716 • `CIM_ERR_ACCESS_DENIED`
 - 1717 • `CIM_ERR_SERVER_IS_SHUTTING_DOWN`
 - 1718 • `CIM_ERR_NOT_SUPPORTED`
 - 1719 • `CIM_ERR_INVALID_NAMESPACE`
 - 1720 • `CIM_ERR_INVALID_OPERATION_TIMEOUT`
 - 1721 • `CIM_ERR_CONTINUATION_ON_ERROR_NOT_SUPPORTED`
 - 1722 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized, or otherwise
1723 incorrect parameters)
 - 1724 • `CIM_ERR_INVALID_CLASS` (The CIM class that is the basis for this enumeration does not
1725 exist.)
 - 1726 • `CIM_ERR_FILTERED_ENUMERATION_NOT_SUPPORTED`
 - 1727 • `CIM_ERR_QUERY_LANGUAGE_NOT_SUPPORTED` (The requested filter query language is
1728 not recognized.)

- 1729 • CIM_ERR_INVALID_QUERY (The filter query is not a valid query in the specified filter query language.)
- 1730
- 1731 • CIM_ERR_FAILED (Some other unspecified error occurred.)

1732 5.3.2.24.4 OpenEnumerateInstancePaths

1733 The OpenEnumerateInstancePaths operation establishes and opens an enumeration session of the
 1734 instance paths of the instances of a CIM class (including instances of its subclasses) in the target
 1735 namespace. Optionally, it retrieves a first set of instance paths:

```

1736     OpenEnumerateInstancePaths
1737     <instancePath>* OpenEnumerateInstancePaths (
1738         [OUT] <enumerationContext> EnumerationContext,
1739         [OUT] Boolean EndOfSequence,
1740         [IN] <className> ClassName,
1741         [IN,OPTIONAL,NULL] string FilterQueryLanguage = NULL,
1742         [IN,OPTIONAL,NULL] string FilterQuery = NULL,
1743         [IN,OPTIONAL,NULL] uint32 OperationTimeout = NULL,
1744         [IN,OPTIONAL] Boolean ContinueOnError = false,
1745         [IN,OPTIONAL] uint32 MaxObjectCount = 0
1746     )
  
```

1747 The OpenEnumerateInstancePaths operation shall comply with the behavior defined in 5.3.2.24.1.

1748 The EnumerationContext output parameter is defined in 5.3.2.24.2.

1749 The EndOfSequence output parameter is defined in 5.3.2.24.2.

1750 The ClassName input parameter defines the class that is the basis for the enumeration. The
 1751 enumeration set shall consist of the instance paths of all instances of the specified class, including any
 1752 instances of any of its subclasses, in accordance with the polymorphic nature of CIM objects.

1753 The FilterQueryLanguage and FilterQuery input parameters are defined in 5.3.2.24.2.

1754 The OperationTimeout input parameter is defined in 5.3.2.24.2.

1755 The ContinueOnError input parameter is defined in 5.3.2.24.2.

1756 The MaxObjectCount input parameter is defined in 5.3.2.24.2.

1757 If OpenEnumerateInstancePaths is successful, the return value shall be an array of enumerated instance
 1758 paths as defined in 5.3.2.24.2.

1759 The PullInstancePaths operation shall be used to pull instances for an enumeration session opened using
 1760 OpenEnumerateInstancePaths. If any other operation is used to pull instances, the CIM server shall
 1761 return failure with the status code CIM_ERR_FAILED.

1762 If OpenEnumerateInstancePaths is unsuccessful, this operation shall return one of the following status
 1763 codes, where the error returned is the first applicable error in the list, starting with the first element and
 1764 working down. Any additional operation-specific interpretation of the error is enclosed in parentheses.

- 1765 • CIM_ERR_ACCESS_DENIED
- 1766 • CIM_ERR_SERVER_IS_SHUTTING_DOWN
- 1767 • CIM_ERR_NOT_SUPPORTED
- 1768 • CIM_ERR_INVALID_NAMESPACE

- 1769 • CIM_ERR_INVALID_OPERATION_TIMEOUT
- 1770 • CIM_ERR_CONTINUATION_ON_ERROR_NOT_SUPPORTED
- 1771 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
1772 incorrect parameters)
- 1773 • CIM_ERR_INVALID_CLASS (The CIM class that is the basis for this enumeration does not
1774 exist.)
- 1775 • CIM_ERR_FILTERED_ENUMERATION_NOT_SUPPORTED
- 1776 • CIM_ERR_QUERY_LANGUAGE_NOT_SUPPORTED (The requested filter query language is
1777 not recognized.)
- 1778 • CIM_ERR_INVALID_QUERY (The filter query is not a valid query in the specified filter query
1779 language.)
- 1780 • CIM_ERR_FAILED (Some other unspecified error occurred.)

1781 5.3.2.24.5 OpenReferenceInstances

1782 The OpenReferenceInstances operation establishes and opens the enumeration session of association
1783 instances that refer to a particular target CIM instance in the target namespace. Optionally, it retrieves a
1784 first set of instances:

```

1785     OpenReferenceInstances
1786     <instanceWithPath>* OpenReferenceInstances (
1787         [OUT] <enumerationContext> EnumerationContext,
1788         [OUT] Boolean EndOfSequence,
1789         [IN] <instanceName> InstanceName,
1790         [IN,OPTIONAL,NULL] <className> ResultClass = NULL,
1791         [IN,OPTIONAL,NULL] string Role = NULL,
1792         [IN,OPTIONAL] boolean IncludeClassOrigin = false,
1793         [IN,OPTIONAL,NULL] string PropertyList [] = NULL,
1794         [IN,OPTIONAL,NULL] string FilterQueryLanguage = NULL,
1795         [IN,OPTIONAL,NULL] string FilterQuery = NULL,
1796         [IN,OPTIONAL,NULL] uint32 OperationTimeout = NULL,
1797         [IN,OPTIONAL] Boolean ContinueOnError = false,
1798         [IN,OPTIONAL] uint32 MaxObjectCount = 0
1799     )

```

1800 The OpenReferenceInstances operation shall comply with the behavior defined in 5.3.2.24.1.

1801 The EnumerationContext output parameter is defined in 5.3.2.24.2.

1802 The EndOfSequence output parameter is defined in 5.3.2.24.2.

1803 The InstanceName input parameter specifies an instance name (model path) that identifies the target
1804 CIM instance with the referring association instances to be enumerated. Unless restricted by any of the
1805 filter parameters of this operation, the enumeration set shall consist of all association instances that
1806 reference the target instance.

1807 The ResultClass input parameter, if not NULL, shall be a CIM class name. It acts as a filter on the
1808 enumerated set of instances by mandating that each enumerated instance shall be an instance of this
1809 class or one of its subclasses. The CIM server shall not return an error if the ResultClass input
1810 parameter value is an invalid class name or if the class does not exist in the target namespace,

1811 The Role input parameter, if not NULL, shall be a property name. It acts as a filter on the enumerated set
1812 of instances by mandating that each enumerated instance shall refer to the target instance through a

1813 property with a name that matches the value of this parameter. The CIM server shall not return an error if
1814 the `Role` input parameter value is an invalid property name or if the property does not exist,

1815 The `IncludeClassOrigin` input parameter is defined in 5.3.2.24.2.

1816 The `PropertyList` input parameter acts as a filter on the properties included in any enumerated CIM
1817 instances. If `PropertyList` is not `NULL`, the members of the array define zero or more property names.
1818 Each enumerated instance shall not include elements for any properties missing from this list.
1819 If `PropertyList` is an empty array, no properties are included in each enumerated instance. If
1820 `PropertyList` is `NULL`, all properties are included in each enumerated instance, subject to the
1821 conditions expressed by the other parameters. If `PropertyList` contains duplicate elements, the CIM
1822 server shall ignore them but otherwise process the request normally. If `PropertyList` contains
1823 elements that are invalid property names for any target instance, the CIM server shall ignore them but
1824 otherwise process the request normally. CIM clients should not specify properties in `PropertyList`
1825 unless they specify a non-`NULL` value for the `ResultClass` parameter.

1826 The `FilterQueryLanguage` and `FilterQuery` input parameters are defined in 5.3.2.24.2.

1827 The `OperationTimeout` input parameter is defined in 5.3.2.24.2.

1828 The `ContinueOnError` input parameter is defined in 5.3.2.24.2.

1829 The `MaxObjectCount` input parameter is defined in 5.3.2.24.2.

1830 If `OpenReferenceInstances` is successful, the return value shall be an array of enumerated instances as
1831 defined in 5.3.2.24.2.

1832 The `PullInstancesWithPath` operation shall be used to pull instances for an enumeration session opened
1833 using `OpenReferenceInstances`. If any other operation is used to pull instances, the CIM server shall
1834 return failure with the status code `CIM_ERR_FAILED`.

1835 If `OpenReferenceInstances` is unsuccessful, this operation shall return one of the following status codes,
1836 where the error returned is the first applicable error in the list, starting with the first element of and working
1837 down. Any additional operation-specific interpretation of the error is enclosed in parentheses.

- 1838 • `CIM_ERR_ACCESS_DENIED`
- 1839 • `CIM_ERR_SERVER_IS_SHUTTING_DOWN`
- 1840 • `CIM_ERR_NOT_SUPPORTED`
- 1841 • `CIM_ERR_INVALID_NAMESPACE`
- 1842 • `CIM_ERR_INVALID_OPERATION_TIMEOUT`
- 1843 • `CIM_ERR_CONTINUATION_ON_ERROR_NOT_SUPPORTED`
- 1844 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized or otherwise
1845 incorrect parameters)
- 1846 • `CIM_ERR_NOT_FOUND` (The target instance was not found.)
- 1847 • `CIM_ERR_FILTERED_ENUMERATION_NOT_SUPPORTED`
- 1848 • `CIM_ERR_QUERY_LANGUAGE_NOT_SUPPORTED` (The requested filter query language is
1849 not recognized.)
- 1850 • `CIM_ERR_INVALID_QUERY` (The filter query is not a valid query in the specified filter query
1851 language.)
- 1852 • `CIM_ERR_FAILED` (Some other unspecified error occurred.)

1853 **5.3.2.24.6 OpenReferenceInstancePaths**

1854 The OpenReferenceInstancePaths operation establishes and opens an enumeration session of the
 1855 instance paths of the association instances that refer to a particular target CIM instance in the target
 1856 namespace. Optionally, it retrieves a first set of instance paths.

```

1857     OpenReferenceInstancePaths
1858     <instancePath>* OpenReferenceInstancePaths (
1859         [OUT] <enumerationContext> EnumerationContext,
1860         [OUT] Boolean EndOfSequence,
1861         [IN] <instanceName> InstanceName,
1862         [IN,OPTIONAL,NULL] <className> ResultClass = NULL,
1863         [IN,OPTIONAL,NULL] string Role = NULL,
1864         [IN,OPTIONAL,NULL] string FilterQueryLanguage = NULL,
1865         [IN,OPTIONAL,NULL] string FilterQuery = NULL,
1866         [IN,OPTIONAL,NULL] uint32 OperationTimeout = NULL,
1867         [IN,OPTIONAL] Boolean ContinueOnError = false,
1868         [IN,OPTIONAL] uint32 MaxObjectCount = 0
1869     )
  
```

1870 The OpenReferenceInstancePaths operation shall comply with the behavior defined in 5.3.2.24.1.

1871 The EnumerationContext output parameter is defined in 5.3.2.24.2.

1872 The EndOfSequence output parameter is defined in 5.3.2.24.2.

1873 The InstanceName input parameter specifies an instance name (model path) that identifies the target
 1874 CIM instance with the referring association instances (respectively, their instance paths) to be
 1875 enumerated. Unless restricted by any filter parameters of this operation, the enumeration set shall consist
 1876 of the instance paths of all association instances that reference the target instance.

1877 The ResultClass input parameter, if not NULL, shall be a CIM class name. It acts as a filter on the
 1878 enumerated set of instance paths by mandating that each enumerated instance path shall identify an
 1879 instance of this class or one of its subclasses. The CIM server shall not return an error if the
 1880 ResultClass input parameter value is an invalid class name or if the class does not exist in the target
 1881 namespace.

1882 The Role input parameter, if not NULL, shall be a property name. It acts as a filter on the enumerated set
 1883 of instance paths by mandating that each enumerated instance path shall identify an instance that refers
 1884 to the target instance through a property with a name that matches the value of this parameter. The CIM
 1885 server shall not return an error if the Role input parameter value is an invalid property name or if the
 1886 property does not exist,

1887 The FilterQueryLanguage and FilterQuery input parameters are defined in 5.3.2.24.2.

1888 The OperationTimeout input parameter is defined in 5.3.2.24.2.

1889 The ContinueOnError input parameter is defined in 5.3.2.24.2.

1890 The MaxObjectCount input parameter is defined in 5.3.2.24.2.

1891 If OpenReferenceInstancePaths is successful, the return value shall be an array of enumerated instance
 1892 paths as defined in 5.3.2.24.2.

1893 The PullInstancePaths operation shall be used to pull instances for an enumeration session opened using
 1894 OpenReferenceInstancePaths. If any other operation is used to pull instances, the CIM server shall return
 1895 failure with the status code CIM_ERR_FAILED.

1896 If OpenReferenceInstancePaths is unsuccessful, this operation shall return one of the following status
 1897 codes, where the error returned is the first applicable error in the list, starting with the first element and
 1898 working down. Any additional operation-specific interpretation of the error is enclosed in parentheses.

- 1899 • CIM_ERR_ACCESS_DENIED
- 1900 • CIM_ERR_SERVER_IS_SHUTTING_DOWN
- 1901 • CIM_ERR_NOT_SUPPORTED
- 1902 • CIM_ERR_INVALID_NAMESPACE
- 1903 • CIM_ERR_INVALID_OPERATION_TIMEOUT
- 1904 • CIM_ERR_CONTINUATION_ON_ERROR_NOT_SUPPORTED
- 1905 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
 1906 incorrect parameters)
- 1907 • CIM_ERR_NOT_FOUND (The target instance was not found.)
- 1908 • CIM_ERR_FILTERED_ENUMERATION_NOT_SUPPORTED
- 1909 • CIM_ERR_QUERY_LANGUAGE_NOT_SUPPORTED (The requested filter query language is
 1910 not recognized.)
- 1911 • CIM_ERR_INVALID_QUERY (The filter query is not a valid query in the specified filter query
 1912 language.)
- 1913 • CIM_ERR_FAILED (Some other unspecified error occurred.)

1914 **5.3.2.24.7 OpenAssociatorInstances**

1915 The OpenAssociatorInstances operation establishes and opens an enumeration session of the instances
 1916 associated with a particular source CIM instance in the target namespace. Optionally, it retrieves a first
 1917 set of instances.

```

1918 OpenAssociatorInstances
1919 <instanceWithPath>* OpenAssociatorInstances (
1920     [OUT] <enumerationContext> EnumerationContext,
1921     [OUT] Boolean EndOfSequence,
1922     [IN] <instanceName> InstanceName,
1923     [IN,OPTIONAL,NULL] <className> AssocClass = NULL,
1924     [IN,OPTIONAL,NULL] <className> ResultClass = NULL,
1925     [IN,OPTIONAL,NULL] string Role = NULL,
1926     [IN,OPTIONAL,NULL] string ResultRole = NULL,
1927     [IN,OPTIONAL] boolean IncludeClassOrigin = false,
1928     [IN,OPTIONAL,NULL] string PropertyList [] = NULL,
1929     [IN,OPTIONAL,NULL] string FilterQueryLanguage = NULL,
1930     [IN,OPTIONAL,NULL] string FilterQuery = NULL,
1931     [IN,OPTIONAL,NULL] uint32 OperationTimeout = NULL,
1932     [IN,OPTIONAL] Boolean ContinueOnError = false,
1933     [IN,OPTIONAL] uint32 MaxObjectCount = 0
1934 )
    
```

1935 The OpenAssociatorInstances operation shall comply with the behavior defined in 5.3.2.24.1.

1936 The EnumerationContext output parameter is defined in 5.3.2.24.2.

1937 The EndOfSequence output parameter is defined in 5.3.2.24.2.

- 1938 The `InstanceName` input parameter specifies an instance name (model path) that identifies the source
1939 CIM instance with the associated instances to be enumerated. Unless restricted by any filter parameters
1940 of this operation, the enumeration set shall consist of all instances associated with the source instance.
- 1941 The `AssocClass` input parameter, if not `NULL`, shall be a CIM association class name. It acts as a filter
1942 on the enumerated set of instances by mandating that each enumerated instance shall be associated with
1943 the source instance through an instance of this class or one of its subclasses. The CIM server shall not
1944 return an error if the `AssocClass` input parameter value is an invalid class name or if the class does not
1945 exist in the target namespace.
- 1946 The `ResultClass` input parameter, if not `NULL`, must be a CIM class name. It acts as a filter on the
1947 enumerated set of instances by mandating that each enumerated instance shall be an instance of this
1948 class or one of its subclasses. The CIM server shall not return an error if the `ResultClass` input
1949 parameter value is an invalid class name or if the class does not exist in the target namespace.
- 1950 The `Role` input parameter, if not `NULL`, shall be a property name. It acts as a filter on the enumerated set
1951 of instances by mandating that each enumerated instance shall be associated with the source instance
1952 through an association in which the source instance plays the specified role. That is, the name of the
1953 property in the association class that refers to the source instance shall match the value of this
1954 parameter. The CIM server shall not return an error if the `Role` input parameter value is an invalid
1955 property name or if the property does not exist.
- 1956 The `ResultRole` input parameter, if not `NULL`, shall be a property name. It acts as a filter on the
1957 enumerated set of instances by mandating that each enumerated instance shall be associated with the
1958 source instance through an association in which the enumerated instance plays the specified role. That
1959 is, the name of the property in the association class that refers to the enumerated instance shall match
1960 the value of this parameter. The CIM server shall not return an error if the `ResultRole` input parameter
1961 value is an invalid property name or if the property does not exist.
- 1962 The `IncludeClassOrigin` input parameter is defined in 5.3.2.24.2.
- 1963 The `PropertyList` input parameter acts as a filter on the properties included in any enumerated CIM
1964 instances. If `PropertyList` is not `NULL`, the members of the array define zero or more property names.
1965 Each enumerated instance shall not include elements for any properties missing from this list.
1966 If `PropertyList` is an empty array, no properties are included in each enumerated instance. If
1967 `PropertyList` is `NULL`, all properties are included in each enumerated instance, subject to the
1968 conditions expressed by the other parameters. If `PropertyList` contains duplicate elements, the CIM
1969 server shall ignore them but otherwise process the request normally. If `PropertyList` contains
1970 elements that are invalid property names for any target instance, the CIM server shall ignore them but
1971 otherwise process the request normally. CIM clients should not specify properties in `PropertyList`
1972 unless they specify a non-`NULL` value for the `ResultClass` parameter.
- 1973 The `FilterQueryLanguage` and `FilterQuery` input parameters are defined in 5.3.2.24.2.
- 1974 The `OperationTimeout` input parameter is defined in 5.3.2.24.2.
- 1975 The `ContinueOnError` input parameter is defined in 5.3.2.24.2.
- 1976 The `MaxObjectCount` input parameter is defined in 5.3.2.24.2.
- 1977 If `OpenAssociatorInstances` is successful, the return value shall be an array of enumerated instances as
1978 defined in 5.3.2.24.2.
- 1979 The `PullInstancesWithPath` operation shall be used to pull instances for an enumeration session opened
1980 using `OpenAssociatorInstances`. If any other operation is used to pull instances, the CIM server shall
1981 return failure with the status code `CIM_ERR_FAILED`.

1982 If `OpenAssociatorInstances` is unsuccessful, this operation shall return one of the following status codes,
 1983 where the error returned is the first applicable error in the list, starting with the first element and working
 1984 down. Any additional operation-specific interpretation of the error is given in parentheses.

- 1985 • `CIM_ERR_ACCESS_DENIED`
- 1986 • `CIM_ERR_SERVER_IS_SHUTTING_DOWN`
- 1987 • `CIM_ERR_NOT_SUPPORTED`
- 1988 • `CIM_ERR_INVALID_NAMESPACE`
- 1989 • `CIM_ERR_INVALID_OPERATION_TIMEOUT`
- 1990 • `CIM_ERR_CONTINUATION_ON_ERROR_NOT_SUPPORTED`
- 1991 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized, or otherwise
 1992 incorrect parameters)
- 1993 • `CIM_ERR_NOT_FOUND` (The source instance was not found.)
- 1994 • `CIM_ERR_FILTERED_ENUMERATION_NOT_SUPPORTED`
- 1995 • `CIM_ERR_QUERY_LANGUAGE_NOT_SUPPORTED` (The requested filter query language is
 1996 not recognized.)
- 1997 • `CIM_ERR_INVALID_QUERY` (The filter query is not a valid query in the specified filter query
 1998 language.)
- 1999 • `CIM_ERR_FAILED` (Some other unspecified error occurred.)

2000 **5.3.2.24.8 OpenAssociatorInstancePaths**

2001 The `OpenAssociatorInstancePaths` operation establishes and opens an enumeration session of the
 2002 instance paths of the instances associated with a particular source CIM instance in the target namespace.
 2003 Optionally, it retrieves a first set of instance paths.

```

2004 OpenAssociatorInstancePaths
2005 <instancePath>* OpenAssociatorInstancePaths (
2006     [OUT] <enumerationContext>EnumerationContext,
2007     [OUT] Boolean EndOfSequence,
2008     [IN] <instanceName> InstanceName,
2009     [IN,OPTIONAL,NULL] <className>AssocClass= NULL,
2010     [IN,OPTIONAL,NULL] <className>ResultClass = NULL,
2011     [IN,OPTIONAL,NULL] string Role = NULL,
2012     [IN,OPTIONAL,NULL] string ResultRole = NULL,
2013     [IN,OPTIONAL,NULL] string FilterQueryLanguage = NULL,
2014     [IN,OPTIONAL,NULL] string FilterQuery = NULL,
2015     [IN,OPTIONAL,NULL] uint32 OperationTimeout = NULL,
2016     [IN,OPTIONAL] Boolean ContinueOnError = false,
2017     [IN,OPTIONAL] uint32 MaxObjectCount = 0
2018 )
    
```

2019 This operation shall comply with the behavior defined in 5.3.2.24.1.

2020 The `EnumerationContext` output parameter is defined in 5.3.2.24.2.

2021 The `EndOfSequence` output parameter is defined in 5.3.2.24.2.

2022 The `InstanceName` input parameter specifies an instance name (model path) that identifies the source
 2023 CIM instance with the associated instances (respectively, their instance paths) to be enumerated. Unless

- 2024 restricted by any filter parameters of this operation, the enumeration set shall consist of the instance
2025 paths of all instances associated with the source instance.
- 2026 The `AssocClass` input parameter, if not `NULL`, shall be a CIM association class name. It acts as a filter
2027 on the enumerated set of instance paths by mandating that each instance path identify an instance that
2028 shall be associated with the source instance through an instance of this class or one of its subclasses.
2029 The CIM server shall not return an error if the `AssocClass` input parameter value is an invalid class
2030 name or if the class does not exist in the target namespace.
- 2031 The `ResultClass` input parameter, if not `NULL`, shall be a CIM class name. It acts as a filter on the
2032 enumerated set of instance paths by mandating that each instance path identify an instance that shall be
2033 an instance of this class or one of its subclasses. The CIM server shall not return an error if the
2034 `ResultClass` input parameter value is an invalid class name or if the class does not exist in the target
2035 namespace.
- 2036 The `Role` input parameter, if not `NULL`, shall be a property name. It acts as a filter on the enumerated set
2037 of instance paths by mandating that each instance path identify an instance that shall be associated with
2038 the source instance through an association in which the source instance plays the specified role. That is,
2039 the name of the property in the association class that refers to the source instance shall match the value
2040 of this parameter. The CIM server shall not return an error if the `Role` input parameter value is an invalid
2041 property name or if the property does not exist.
- 2042 The `ResultRole` input parameter, if not `NULL`, shall be a property name. It acts as a filter on the
2043 enumerated set of instance paths by mandating that each instance path identify an instance that shall be
2044 associated with the source instance through an association in which the instance identified by
2045 the enumerated instance path plays the specified role. That is, the name of the property in the association
2046 class that refers to the instance identified by the enumerated instance path shall match the value of this
2047 parameter. The CIM server shall not return an error if the `ResultRole` input parameter value is an
2048 invalid property name or if the property does not exist.
- 2049 The `FilterQueryLanguage` and `FilterQuery` input parameters are defined in 5.3.2.24.2.
- 2050 The `OperationTimeout` input parameter is defined in 5.3.2.24.2.
- 2051 The `ContinueOnError` input parameter is defined in 5.3.2.24.2.
- 2052 The `MaxObjectCount` input parameter is defined in 5.3.2.24.2.
- 2053 If `OpenAssociatorInstancePaths` is successful, the return value shall be an array of enumerated instance
2054 paths as defined in 5.3.2.24.2.
- 2055 The `PullInstancePaths` operation shall be used to pull instances for an enumeration session opened using
2056 `OpenAssociatorInstancePaths`. If any other operation is used to pull instances, the CIM server shall return
2057 failure with the status code `CIM_ERR_FAILED`.
- 2058 If `OpenAssociatorInstancePaths` is unsuccessful, this operation shall return one of the following status
2059 codes, where the error returned is the first applicable error in the list, starting with the first element and
2060 working down. Any additional operation-specific interpretation of the error is enclosed in parentheses.
- 2061 • `CIM_ERR_ACCESS_DENIED`
 - 2062 • `CIM_ERR_SERVER_IS_SHUTTING_DOWN`
 - 2063 • `CIM_ERR_NOT_SUPPORTED`
 - 2064 • `CIM_ERR_INVALID_NAMESPACE`
 - 2065 • `CIM_ERR_INVALID_OPERATION_TIMEOUT`
 - 2066 • `CIM_ERR_CONTINUATION_ON_ERROR_NOT_SUPPORTED`

- 2067 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
2068 incorrect parameters)
- 2069 • CIM_ERR_NOT_FOUND (The source instance was not found.)
- 2070 • CIM_ERR_FILTERED_ENUMERATION_NOT_SUPPORTED
- 2071 • CIM_ERR_QUERY_LANGUAGE_NOT_SUPPORTED (The requested filter query language is
2072 not recognized.)
- 2073 • CIM_ERR_INVALID_QUERY (The filter query is not a valid query in the specified filter
2074 language.)
- 2075 • CIM_ERR_FAILED (Some other unspecified error occurred.)

2076 5.3.2.24.9 Common Parameters for the Pull Operations

2077 This clause defines commonly used parameters for the Pull operations. The description of the individual
2078 Pull operations references these parameters as appropriate. Note that not every Pull operation uses
2079 every one of these common parameters.

- 2080 • EnumerationContext
 - 2081 – This parameter is the enumeration context value representing the enumeration session to
2082 be used.
 - 2083 – When the Pull operation is invoked, the enumeration session represented by the
2084 EnumerationContext input parameter shall be open. The first enumeration session shall
2085 use one of the Open operations with a type of enumerated element that matches the Pull
2086 operation. For the first Pull operation on an enumeration session, the value of the
2087 EnumerationContext input parameter shall be the enumeration context value returned
2088 by a successful Open operation. For subsequent Pull operations on that enumeration
2089 session, the value of the EnumerationContext input parameter shall be the value of the
2090 EnumerationContext output parameter returned by the previous Pull operation on the
2091 same enumeration session.
 - 2092 – After the Pull operation is completed, the enumeration session represented by the
2093 EnumerationContext output parameter shall be open or closed.
- 2094 • EndOfSequence
 - 2095 – This output parameter indicates to the CIM client whether the enumeration session is
2096 exhausted. If EndOfSequence is true upon successful completion of a Pull operation, no
2097 more elements are available and the CIM server shall close the enumeration session,
2098 releasing any allocated resources related to the session. If EndOfSequence is false,
2099 additional elements may be available, and the CIM server shall not close the session.
- 2100 • MaxObjectCount
 - 2101 – This input parameter defines the maximum number of elements that may be returned
2102 by this Pull operation. Any uint32 number is valid, including 0. The CIM server may deliver
2103 any number of elements up to MaxObjectCount but shall not deliver more than
2104 MaxObjectCount elements. The CIM client may use a MaxObjectCount value of 0 to
2105 restart the OperationTimeout for the enumeration session when it does not need to not
2106 retrieve any elements.
- 2107 • Return Value (array of enumerated elements)
 - 2108 – The return value of a Pull operation upon successful completion is an array of enumerated
2109 elements with a number of entries from 0 up to a maximum defined by MaxObjectCount.
2110 These entries meet the criteria defined in the Open operation that established this
2111 enumeration session. Note that returning no entries in the array does not imply that the

2112 enumeration session is exhausted. Only the `EndOfSequence` output parameter indicates
2113 whether the enumeration session is exhausted.

2114 5.3.2.24.10 PullInstancesWithPath

2115 The PullInstancesWithPath operation retrieves instances including their instance paths from an open
2116 enumeration session represented by an enumeration context value:

```
2117 PullInstancesWithPath
2118 <instanceWithPath>* PullInstancesWithPath (
2119     [IN,OUT] <enumerationContext> EnumerationContext,
2120     [OUT] Boolean EndOfSequence,
2121     [IN] uint32 MaxObjectCount
2122 )/td>
```

2123 The PullInstancesWithPath operation shall comply with the behavior defined in 5.3.2.24.1.

2124 The `EnumerationContext` input/output parameter is defined in 5.3.2.24.9. The enumeration session
2125 shall be established using one of the `OpenEnumerateInstances`, `OpenReferenceInstances`, or
2126 `OpenAssociatorInstances` operations.

2127 The `EndOfSequence` output parameter is defined in 5.3.2.24.9.

2128 The `MaxObjectCount` input parameter is defined in 5.3.2.24.9.

2129 If PullInstancesWithPath is successful, the return value shall be an array of enumerated instances
2130 including their instance paths as defined in 5.3.2.24.9.

2131 If PullInstancesWithPath is unsuccessful, this operation shall return one of the following status codes,
2132 where the error returned is the first applicable error in the list, starting with the first element and working
2133 down. Any additional operation-specific interpretation of the error is enclosed in parentheses.

- 2134 • CIM_ERR_ACCESS_DENIED
- 2135 • CIM_ERR_SERVER_IS_SHUTTING_DOWN
- 2136 • CIM_ERR_NOT_SUPPORTED
- 2137 • CIM_ERR_INVALID_NAMESPACE
- 2138 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
2139 incorrect parameters)
- 2140 • CIM_ERR_INVALID_ENUMERATION_CONTEXT
- 2141 • CIM_ERR_PULL_HAS_BEEN_ABANDONED
- 2142 • CIM_ERR_SERVER_LIMITS_EXCEEDED
- 2143 • CIM_ERR_FAILED (Some other unspecified error occurred.)

2144 5.3.2.24.11 PullInstancePaths

2145 The PullInstancePaths operation retrieves instance paths from an open enumeration session represented
2146 by an enumeration context value:

```
2147 PullInstancePaths
2148 <instancePath>* PullInstancePaths (
2149     [IN,OUT] <enumerationContext> EnumerationContext,
2150     [OUT] Boolean EndOfSequence,
2151     [IN] uint32 MaxObjectCount
2152 )
```


- 2153 The PullInstancePaths operation shall comply with the behavior defined in 5.3.2.24.1.
- 2154 The EnumerationContext input/output parameter is defined in 5.3.2.24.9. The enumeration session
2155 shall have been established using one of the OpenEnumerateInstancePaths,
2156 OpenReferenceInstancePaths, or OpenAssociatorInstancePaths operations.
- 2157 The EndOfSequence output parameter is defined in 5.3.2.24.9.
- 2158 The MaxObjectCount input parameter is defined in 5.3.2.24.9.
- 2159 If PullInstancePaths is successful, the return value shall be an array of enumerated instance paths as
2160 defined in 5.3.2.24.9.
- 2161 If PullInstancePaths is unsuccessful, this operation shall return one of the following status codes, where
2162 the error returned is the first applicable error in the list, starting with the first element and working down.
2163 Any additional operation-specific interpretation of the error is enclosed in parentheses.
- 2164 • CIM_ERR_ACCESS_DENIED
 - 2165 • CIM_ERR_SERVER_IS_SHUTTING_DOWN
 - 2166 • CIM_ERR_NOT_SUPPORTED
 - 2167 • CIM_ERR_INVALID_NAMESPACE
 - 2168 • CIM_ERR_INVALID_PARAMETER (including missing, duplicate, unrecognized, or otherwise
2169 incorrect parameters)
 - 2170 • CIM_ERR_INVALID_ENUMERATION_CONTEXT
 - 2171 • CIM_ERR_SERVER_LIMITS_EXCEEDED
 - 2172 • CIM_ERR_PULL_HAS_BEEN_ABANDONED
 - 2173 • CIM_ERR_FAILED (Some other unspecified error occurred.)
- 2174 **5.3.2.24.12 CloseEnumeration**
- 2175 The CloseEnumeration operation closes an open enumeration session, performing an early termination of
2176 an enumeration sequence:
- ```

2177 CloseEnumeration
2178 void CloseEnumeration (
2179 [IN] <enumerationContext> EnumerationContext
2180)

```
- 2181 The EnumerationContext parameter is the value representing the enumeration session to be closed.  
2182 The enumeration session shall be open and shall be established using one of the Open operations. This  
2183 implies that this operation is not to close an enumeration sequence already indicated by  
2184 EndOfSequence because the sequence has already been closed. The value of the  
2185 EnumerationContext parameter shall be the value of the EnumerationContext output parameter  
2186 returned by the previous Pull operation on the enumeration session to be closed.
- 2187 If CloseEnumeration is successful, the CIM server shall close the enumeration session represented by  
2188 EnumerationContext, releasing any allocated resources. Any subsequent use of the  
2189 EnumerationContext value is unsuccessful.
- 2190 CloseEnumeration may be executed concurrently with a Pull operation or an EnumerationCount operation  
2191 on the same enumeration session. If a CIM server receives a CloseEnumeration operation request while  
2192 it is processing a Pull operation on the same enumeration session, the server shall attempt to abandon  
2193 that Pull operation. If the Pull operation can be abandoned, it shall return a failure with the status code  
2194 [CIM\\_ERR\\_PULL\\_HAS\\_BEEN\\_ABANDONED](#) and the CloseEnumeration operation shall return success.

2195 If the Pull operation cannot be abandoned, it shall proceed as if the CloseEnumeration operation has not  
 2196 been issued, and the CloseEnumeration operation shall return a failure with the status code  
 2197 [CIM\\_ERR\\_PULL\\_CANNOT\\_BE\\_ABANDONED](#).

2198 If CloseEnumeration is unsuccessful, this operation shall return one of the following status codes, where  
 2199 the error returned is the first applicable error in the list, starting with the first element and working down.  
 2200 Any additional operation-specific interpretation of the error is enclosed in parentheses.

- 2201 • CIM\_ERR\_ACCESS\_DENIED
- 2202 • CIM\_ERR\_SERVER\_IS\_SHUTTING\_DOWN
- 2203 • CIM\_ERR\_NOT\_SUPPORTED
- 2204 • CIM\_ERR\_INVALID\_NAMESPACE
- 2205 • CIM\_ERR\_INVALID\_PARAMETER (including missing, duplicate, unrecognized, or otherwise  
 2206 incorrect parameters)
- 2207 • CIM\_ERR\_INVALID\_ENUMERATION\_CONTEXT
- 2208 • CIM\_ERR\_PULL\_CANNOT\_BE\_ABANDONED
- 2209 • CIM\_ERR\_FAILED (Some other unspecified error occurred.)

#### 2210 5.3.2.24.13 EnumerationCount

2211 The EnumerationCount operation provides an estimated count of the total number of objects in an open  
 2212 enumeration session represented by an EnumerationContext:

```
2213 EnumerationCount
2214 uint64 EnumerationCount (
2215 [IN] <enumerationContext>EnumerationContext
2216)
```

2217 The EnumerationContext parameter identifies the enumeration session for the EnumerationCount  
 2218 operation. It shall be established using any of the Open operations and shall be open at the time of the  
 2219 CloseEnumeration request. A conformant CIM server may support this operation. A CIM server that does  
 2220 not support this operation should respond with the [CIM\\_ERR\\_NOT\\_SUPPORTED](#) status.

2221 If EnumerationCount is successful, the operation returns an approximate count of the number of objects  
 2222 in the enumeration session. This is the number of items remaining to be sent with subsequent Pull  
 2223 operations. Thus, executing this operation immediately after the open may provide an approximate  
 2224 estimate of the total number of objects to be returned in the enumeration set. The returned count is only  
 2225 an estimate of the number of objects to be pulled in the enumeration sequence. This mechanism is  
 2226 intended to assist CIM clients in determining the overall size of an enumeration set and the number of  
 2227 objects remaining in the enumeration session. It should not be used instead of the EndOfSequence  
 2228 parameter to determine the end of an enumeration sequence.

2229 If the CIM server cannot or will not return an estimate of the number of objects to be returned for the  
 2230 enumerationContext, it may return success and the NULL value.

2231 If EnumerationCount is unsuccessful, this operation shall return one of the following status codes, where  
 2232 the error returned is the first applicable error in the list, starting with the first element and working down.  
 2233 Any additional operation-specific interpretation of the error is enclosed in parentheses.

- 2234 • CIM\_ERR\_ACCESS\_DENIED
- 2235 • CIM\_ERR\_SERVER\_IS\_SHUTTING\_DOWN
- 2236 • CIM\_ERR\_NOT\_SUPPORTED
- 2237 • CIM\_ERR\_INVALID\_NAMESPACE

- 2238 • CIM\_ERR\_INVALID\_PARAMETER (including missing, duplicate, unrecognized, or otherwise
- 2239 incorrect parameters)
- 2240 • CIM\_ERR\_INVALID\_ENUMERATION\_CONTEXT
- 2241 • CIM\_ERR\_SERVER\_LIMITS\_EXCEEDED
- 2242 • CIM\_ERR\_FAILED (Some other unspecified error occurred.)

#### 2243 5.3.2.24.14 OpenQueryInstances

2244 The OpenQueryInstances operation establishes and opens an enumeration session of the instances of a  
 2245 CIM class (including instances of its subclasses) in the target namespace. Optionally, it retrieves a first  
 2246 set of instances:

```

2247 OpenQueryInstances
2248 <instance>* OpenQueryInstances (
2249 [IN] string FilterQuery,
2250 [IN] string FilterQueryLanguage,
2251 [IN,OPTIONAL] Boolean ReturnQueryResultClass = false,
2252 [IN,OPTIONAL,NULL] uint32 OperationTimeout = NULL,
2253 [IN,OPTIONAL] Boolean ContinueOnError = false,
2254 [IN,OPTIONAL] uint32 MaxObjectCount = 0,
2255 [OUT, OPTIONAL, NULL] <class> QueryResultClass,
2256 [OUT] <enumerationContext> EnumerationContext,
2257 [OUT] Boolean EndOfSequence
2258)

```

2259 The OpenQueryInstances shall comply with the behavior defined in 5.3.2.24.1.

2260 The FilterQuery and FilterQueryLanguage input parameters specify the set of enumerated  
 2261 instances.

2262 FilterQueryLanguage shall specify a query language and the value of FilterQuery shall be a valid  
 2263 query in that query language. This specification defines neither the query language nor the format of the  
 2264 query. It is anticipated that query languages will be submitted to the DMTF as separate proposals. A  
 2265 mechanism by which CIM servers can declare the query languages they support for filtering in Pulled  
 2266 enumerations (if any) is defined in 7.5.

2267 The ReturnQueryResultClass input parameter controls whether a class definition is returned in  
 2268 QueryResultClass. If it is set to false, QueryResultClass shall be set to NULL on output. If it is  
 2269 set to true, the value of the QueryResultClass on output shall be a class definition that defines the  
 2270 properties (columns) of each row of the query result.

2271 The OperationTimeout input parameter is defined in 5.3.2.24.2.

2272 The ContinueOnError input parameter is defined in 5.3.2.24.2.

2273 The MaxObjectCount input parameter is defined in 5.3.2.24.2.

2274 The QueryResultClass output parameter shall be set to NULL if the ReturnQueryResultClass  
 2275 input parameter is set to false. Otherwise, it shall return a class definition where each property of the  
 2276 class corresponds to one entry of the query select list. The class definition corresponds to one row of the  
 2277 query result. The class name of this returned class shall be "CIM\_QueryResult." This class definition is  
 2278 valid only in the context of this enumeration.

2279 The EnumerationContext output parameter is defined in 5.3.2.24.2.

2280 The EndOfSequence output parameter is defined in 5.3.2.24.2.

- 2281 If `OpenQueryInstances` is successful, the return value shall be an array of enumerated instances as  
 2282 defined in 5.3.2.24.2. Such instances are available only in the context of the enumeration and do not  
 2283 return an instance path. The `PullInstancesWithPath` operation may not be used to continue an  
 2284 enumeration started by the `OpenQueryInstances` operation.
- 2285 The `PullInstances` operation shall be used to pull instances for an enumeration session opened using `If`  
 2286 `OpenQueryInstances`. If any other operation is used to pull instances, the CIM server shall return failure  
 2287 with the status code `CIM_ERR_FAILED`.
- 2288 If `OpenQueryInstances` is unsuccessful, this operation shall return one of the following status codes,  
 2289 where the error returned is the first applicable error in the list, starting with the first element and working  
 2290 down. Any additional operation-specific interpretation of the error is enclosed in parentheses.
- 2291 • `CIM_ERR_ACCESS_DENIED`
  - 2292 • `CIM_ERR_SERVER_IS_SHUTTING_DOWN`
  - 2293 • `CIM_ERR_NOT_SUPPORTED`
  - 2294 • `CIM_ERR_INVALID_NAMESPACE`
  - 2295 • `CIM_ERR_INVALID_OPERATION_TIMEOUT`
  - 2296 • `CIM_ERR_CONTINUATION_ON_ERROR_NOT_SUPPORTED`
  - 2297 • `CIM_ERR_INVALID_PARAMETER` (including missing, duplicate, unrecognized, or otherwise  
 2298 incorrect parameters)
  - 2299 • `CIM_ERR_QUERY_LANGUAGE_NOT_SUPPORTED` (The requested filter query language is  
 2300 not recognized.)
  - 2301 • `CIM_ERR_INVALID_QUERY` (The filter query is not a valid query in the specified filter query  
 2302 language.)
  - 2303 • `CIM_ERR_QUERY_FEATURE_NOT_SUPPORTED` (The query requires support for features  
 2304 that are not supported.)
  - 2305 • `CIM_ERR_FAILED` (Some other unspecified error occurred.)

### 2306 5.3.2.24.15 PullInstances

2307 The `PullInstances` operation retrieves instances from an `OpenQueryInstances` session represented by an  
 2308 enumeration context value:

```

2309 PullInstances
2310 <instance>* PullInstances (
2311 [IN,OUT] <enumerationContext> EnumerationContext,
2312 [OUT] Boolean EndOfSequence,
2313 [IN] uint32 MaxObjectCount
2314)

```

2315 The `PullInstances` operation shall comply with the behavior defined in 5.3.2.24.1.

2316 The `EnumerationContext` input/output parameter is defined in 5.3.2.24.9. The enumeration session  
 2317 shall be established using the `OpenQueryInstances` operation.

2318 The `EndOfSequence` output parameter is defined in 5.3.2.24.9.

2319 The `MaxObjectCount` input parameter is defined in 5.3.2.24.9.

2320 If `PullInstances` is successful, the return value shall be an array of enumerated instances as defined in  
 2321 5.3.2.24.9.

2322 If PullInstances is unsuccessful, this operation shall return one of the following status codes, where the  
 2323 error returned is the first applicable error in the list, starting with the first element and working down. Any  
 2324 additional operation-specific interpretation of the error is enclosed in parentheses.

- 2325 • CIM\_ERR\_ACCESS\_DENIED
- 2326 • CIM\_ERR\_SERVER\_IS\_SHUTTING\_DOWN
- 2327 • CIM\_ERR\_NOT\_SUPPORTED
- 2328 • CIM\_ERR\_INVALID\_NAMESPACE
- 2329 • CIM\_ERR\_INVALID\_PARAMETER (including missing, duplicate, unrecognized, or otherwise  
 2330 incorrect parameters)
- 2331 • CIM\_ERR\_INVALID\_ENUMERATION\_CONTEXT
- 2332 • CIM\_ERR\_SERVER\_LIMITS\_EXCEEDED
- 2333 • CIM\_ERR\_PULL\_HAS\_BEEN\_ABANDONED
- 2334 • CIM\_ERR\_FAILED (Some other unspecified error occurred.)

### 2335 **5.3.3 Namespace Manipulation Using the CIM\_Namespace Class**

2336 No intrinsic methods are defined specifically to manipulate namespaces. Namespaces shall be  
 2337 manipulated using intrinsic methods on the CIM\_Namespace class.

#### 2338 **5.3.3.1 Namespace Creation**

2339 A namespace is created by calling the intrinsic method CreateInstance for the CIM\_Namespace class. A  
 2340 value is specified for the new instance parameter that defines a valid instance of the CIM\_Namespace  
 2341 class and that has a name property that is the desired name of the new namespace.

2342 The proposed definition shall be a correct namespace definition according to [DSP0004](#). Despite the  
 2343 naming conventions used in the CIM specifications (use of / in namespaces such as root/CIMV2 and  
 2344 root/CIMV2/test), there is no hierarchy implied among different namespaces. Each namespace is  
 2345 independent of all others. The namespaces are to be considered flat, and there is no defined behavior for  
 2346 navigating namespaces.

2347 In creating the new namespace, the CIM server shall conform to the following rules:

- 2348 • The namespace defined by name property shall not already exist in the CIM server.
- 2349 • The <LOCALNAMESPACEPATH> defined for the operation defines the namespace in which  
 2350 the CIM\_Namespace instance associated with this new namespace is created.

2351 It is recommended that instances of CIM\_Namespace be created in root unless there is a specific reason  
 2352 to define them in another namespace. The inclusion of a CIM\_Namespace instance within a namespace  
 2353 other than root is allowed.

2354 In addition to creating instances of CIM\_Namespace, compliant implementations shall also create an  
 2355 instance of the association class CIM\_NamespaceInManager defining the linking of the namespace  
 2356 created to the current CIM\_ObjectManager.

2357 If CreateInstance is successful, the CIM server creates the specified namespace. In addition, the CIM  
 2358 server shall return information about the namespace as an instance of the class CIM\_Namespace and of  
 2359 returning instances of the association class CIM\_NamespaceInManager for each CIM\_Namespace  
 2360 instance created.

### 2361 5.3.3.2 Namespace Deletion

2362 If the CIM server supports the CIM\_Namespace class, all valid namespaces shall be represented by an  
2363 instance of the CIM\_Namespace class. A namespace is deleted using the intrinsic method  
2364 DeleteInstance to delete the instance of the class CIM\_Namespace that represents the namespace. The  
2365 namespace to be deleted shall exist.

2366 If DeleteInstance is successful, the CIM server shall remove the specified CIM\_Namespace instance.

2367 If DeleteInstance is unsuccessful, one of the status codes defined for the DeleteInstance operation shall  
2368 be returned. A CIM server may return [CIM\\_ERR\\_FAILED](#) if a non-empty namespace cannot successfully  
2369 be deleted.

### 2370 5.3.3.3 Manipulation and Query of Namespace Information

2371 The query of namespaces is provided through the following means:

- 2372 • Query of the CIM\_Namespace class on an individual namespace
- 2373 • Use of the CIM\_NamespaceInManager association to link the target CIM\_ObjectManager and  
2374 the instances of CIM\_Namespace representing all namespaces defined in the target  
2375 CIM\_ObjectManager

### 2376 5.3.3.4 Use of the \_\_Namespace Pseudo Class (DEPRECATED)

2377 In previous versions of this specification, namespaces were manipulated through the pseudo class  
2378 \_\_Namespace as follows:

2379 No intrinsic methods are specifically defined for manipulating CIM namespaces. However, modeling a  
2380 CIM namespace using class \_\_Namespace, together with the requirement that the root namespace be  
2381 supported by all CIM servers, implies that all namespace operations can be supported.

2382 For example, all child namespaces of a particular namespace are enumerated by calling the intrinsic  
2383 method EnumerateInstanceNames against the parent namespace, specifying a value for the ClassName  
2384 parameter of \_\_Namespace. A child namespace is created by calling the intrinsic method CreateInstance  
2385 against the parent namespace, specifying a value for the NewInstance parameter that defines a valid  
2386 instance of the class \_\_Namespace and that has a name property that is the desired name of the new  
2387 namespace.

2388 **DEPRECATION NOTE:** The use of the \_\_Namespace class is DEPRECATED. In its place, use the  
2389 CIM\_Namespace class.

### 2390 5.3.4 Functional Profiles

2391 To establish conformance, this clause partitions the [intrinsic methods](#) into functional groups.

2392 Support for a particular group does *not* guarantee that all invocations of a method in that group will  
2393 succeed. Rather, the exclusion of a group is a declaration that any attempt to call a method in that group  
2394 always returns [CIM\\_ERR\\_NOT\\_SUPPORTED](#).

2395 Mechanisms by which a [CIM server](#) may declare the functional groups that it supports are defined in 7.5.

2396 To limit the number of different profiles that a CIM server may support, each functional group has a  
2397 dependency on another group (with the exception of the Basic Read functional group). If functional group  
2398 G<sub>1</sub> has a dependency on functional group G<sub>2</sub>, then a CIM server that supports G<sub>1</sub> shall also support G<sub>2</sub>.

2399 The dependency relation is transitive, so if G<sub>1</sub> depends on G<sub>2</sub>, and G<sub>2</sub> depends on G<sub>3</sub>, then G<sub>1</sub> depends  
2400 on G<sub>3</sub>. It is also anti-symmetric, so if G<sub>1</sub> depends on G<sub>2</sub>, then G<sub>2</sub> cannot depend on G<sub>1</sub>.

2401 Using these rules, Table 3 defines a rooted-directed tree of dependencies with the Basic Read  
 2402 dependency representing the root node.

2403 For example, a CIM server that supports the Schema Manipulation functional group shall also support the  
 2404 Instance Manipulation, Basic Write, and Basic Read.

2405 A CIM server shall support the Basic Read functional group.

2406 **Table 3 – Root-Directed Tree of Functional Profile Dependencies**

| Functional Group       | Dependency            | Methods                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basic Read             | <i>none</i>           | <a href="#">GetClass</a><br><a href="#">EnumerateClasses</a><br><a href="#">EnumerateClassNames</a><br><a href="#">GetInstance</a><br><a href="#">EnumerateInstances</a><br><a href="#">EnumerateInstanceNames</a><br><a href="#">GetProperty</a>                                                                                                                                        |
| Pulled Read            | <i>Basic Read</i>     | <a href="#">OpenEnumerateInstances</a><br><a href="#">OpenEnumerateInstancePaths</a><br><a href="#">OpenReferenceInstances</a><br><a href="#">OpenReferenceInstancePaths</a><br><a href="#">OpenAssociatorInstances</a><br><a href="#">OpenAssociatorInstancePaths</a><br><a href="#">PullInstancesWithPath</a><br><a href="#">PullInstancePaths</a><br><a href="#">CloseEnumeration</a> |
| PulledReadCount        | Pulled Read           | <a href="#">EnumerationCount</a>                                                                                                                                                                                                                                                                                                                                                         |
| Pulled Query Execution | Pulled Read           | <a href="#">OpenQueryInstances</a><br><a href="#">PullInstances</a>                                                                                                                                                                                                                                                                                                                      |
| Basic Write            | Basic Read            | <a href="#">SetProperty</a>                                                                                                                                                                                                                                                                                                                                                              |
| Schema Manipulation    | Instance Manipulation | <a href="#">CreateClass</a><br><a href="#">ModifyClass</a><br><a href="#">DeleteClass</a>                                                                                                                                                                                                                                                                                                |
| Instance Manipulation  | Basic Write           | <a href="#">CreateInstance</a><br><a href="#">ModifyInstance</a><br><a href="#">DeleteInstance</a>                                                                                                                                                                                                                                                                                       |
| Association Traversal  | Basic Read            | <a href="#">Associators</a><br><a href="#">AssociatorNames</a><br><a href="#">References</a><br><a href="#">ReferenceNames</a>                                                                                                                                                                                                                                                           |
| Query Execution        | Basic Read            | <a href="#">ExecQuery</a>                                                                                                                                                                                                                                                                                                                                                                |
| Qualifier Declaration  | Schema Manipulation   | <a href="#">GetQualifier</a><br><a href="#">SetQualifier</a><br><a href="#">DeleteQualifier</a><br><a href="#">EnumerateQualifiers</a>                                                                                                                                                                                                                                                   |

### 2407 5.3.5 Extrinsic Method Invocation

2408 Any [CIM server](#) is assumed to support extrinsic methods, which are defined by the schema supported by  
2409 the CIM server. If a CIM server does not support extrinsic method invocations, it shall return the error  
2410 code [CIM\\_ERR\\_NOT\\_SUPPORTED](#) to any request to execute an extrinsic method (subject to the  
2411 considerations described in the rest of this clause). This allows a [CIM client](#) to determine that all attempts  
2412 to execute extrinsic methods will fail.

2413 If the CIM server cannot invoke extrinsic methods, it shall return one of the following status codes, where  
2414 the error returned is the first applicable error in the list, starting with the first element and working down.  
2415 Any additional specific interpretation of the error is enclosed in parentheses.

- 2416 • CIM\_ERR\_ACCESS\_DENIED
- 2417 • CIM\_ERR\_NOT\_SUPPORTED (The CIM server does not support extrinsic method  
2418 invocations.)
- 2419 • CIM\_ERR\_INVALID\_NAMESPACE
- 2420 • CIM\_ERR\_INVALID\_PARAMETER (including missing, duplicate, unrecognized, or otherwise  
2421 incorrect parameters)
- 2422 • CIM\_ERR\_NOT\_FOUND (The target CIM class or instance does not exist in the specified  
2423 namespace.)
- 2424 • CIM\_ERR\_METHOD\_NOT\_FOUND
- 2425 • CIM\_ERR\_METHOD\_NOT\_AVAILABLE (The CIM server is unable to honor the invocation  
2426 request.)
- 2427 • CIM\_ERR\_FAILED (Some other unspecified error occurred.)

## 2428 5.4 CIM Export Syntax and Semantics

2429 This clause focuses on export methods and their invocation, as well as on functional profiles.

### 2430 5.4.1 Export Method Invocations

2431 All CIM export message requests defined for the CIM-to-HTTP mapping are invocations of one or more  
2432 export methods. Export methods do not operate against CIM namespaces.

2433 An export method call is represented in XML by the <EXPMETHODCALL> element, and the response to  
2434 that call is represented by the <EXPMETHODRESPONSE> element.

2435 An input parameter has an IN qualifier with value `true` in the method definition. An output parameter has  
2436 an OUT qualifier with value `true` in the method definition. A parameter may be both an input parameter  
2437 and an output parameter.

2438 The <EXPMETHODCALL> element names the method to be invoked and supplies any input parameters  
2439 to the export method call:

- 2440 • Each input parameter shall be named using the name assigned in the method definition.
- 2441 • Input parameters may be supplied in any order.
- 2442 • Each input parameter of the method, and no others, shall be present in the call unless it is  
2443 optional.

2444 The <EXPMETHODRESPONSE> element defines either an <ERROR> or a (possibly optional) return  
2445 value and output parameters, which are decorated with the OUT qualifier in the method definition. In the  
2446 latter case, the following rules apply:



- 2447 • Each output parameter shall be named using the name assigned in the method definition.
- 2448 • Output parameters may be supplied in any order.
- 2449 • Each output parameter of the method, and no others, shall be present in the response, unless it
- 2450 is optional.

2451 The method invocation process may be thought of as a two-part process:

- 2452 • Binding the input parameter values specified as subelements of the <EXPMETHODCALL>
- 2453 element to the input parameters of the method.
- 2454 • Attempting to execute the method using the bound input parameters, with one of the following
- 2455 results:
  - 2456 – If the attempt to call the method is successful, the return value and output parameters are
  - 2457 bound to the subelements of the <EXPMETHODRESPONSE> element.
  - 2458 – If the attempt to call the method is unsuccessful, an error code and (optional) human-
  - 2459 readable description of that code is bound to the <EXPMETHODRESPONSE> element.

#### 2460 5.4.1.1 Simple Export

2461 A simple export requires the invocation of a single export method. A simple export request is represented

2462 by a <SIMPLEEXPREQ> element, and a simple export response is represented by a <SIMPLEEXPRSP>

2463 element.

2464 A <SIMPLEEXPREQ> shall contain a <EXPMETHODCALL> element.

#### 2465 5.4.1.2 Multiple Export

2466 A multiple export requires the invocation of more than one export method. A multiple export request is

2467 represented by a <MULTIEXPREQ> element, and a multiple export response is represented by a

2468 <MULTIEXPRSP> element.

2469 A <MULTIEXPREQ> (or its respective <MULTIEXPRSP>) element is a sequence of two or more

2470 <SIMPLEEXPREQ> (or its respective <SIMPLEEXPRSP>) elements.

2471 A <MULTIEXPRSP> element shall contain a <SIMPLEEXPRSP> element for every <SIMPLEEXPREQ>

2472 element in the corresponding multiple export response. These <SIMPLEEXPRSP> elements shall be in

2473 the same order as their <SIMPLEEXPREQ> counterparts. The first <SIMPLEEXPRSP> in the response

2474 corresponds to the first <SIMPLEEXPREQ> in the request, and so forth.

2475 Multiple exports conveniently batch the delivery of multiple export method invocations into a single HTTP

2476 message, reducing the number of roundtrips between a CIM client and a CIM listener and allowing the

2477 CIM listener to make certain internal optimizations. Note that multiple exports do not confer any

2478 transactional capabilities in processing the request. For example, the CIM listener does not have to

2479 guarantee that the constituent export method calls either all failed or all succeeded. The CIM listener

2480 must only make a "best effort" to process the operation. However, CIM listeners shall finish processing

2481 each method invocation in a batched message before executing the next method invocation in the batch.

2482 Clients shall recognize that the order of method calls within a batched message is significant.

2483 Not all CIM listeners support multiple exports. If a CIM listener does not support multiple exports, it shall

2484 return the status code CIM\_ERR\_NOT\_SUPPORTED.

#### 2485 5.4.1.3 Status Codes

2486 This clause defines the status codes and detailed error information that a conforming CIM listener may

2487 return.

2488 The value of an <ERROR> subelement within a <EXPMETHODRESPONSE> element includes the  
 2489 following parts:

- 2490 • mandatory status code
- 2491 • optional human-readable description of the status code
- 2492 • zero or more CIM\_Error instances

2493 The symbolic names defined in Table 4 do not appear on the wire. They are used here solely for  
 2494 convenient reference to an error in other parts of this specification. Not all methods are expected to return  
 2495 all these status codes.

2496 In addition to returning a status code, a conforming CIM listener may return zero or more <INSTANCE>  
 2497 subelements as part of an <ERROR> element. Each <INSTANCE> subelement shall be an instance of  
 2498 CIM\_Error, and the value of CIMStatusCode shall comply with the definition of expected error codes for  
 2499 the CIM export request. A CIM client may ignore any <INSTANCE> subelements.

2500 **Table 4 – Symbolic Names for Referencing Error Codes**

| Symbolic Name         | Code | Definition                                                                  |
|-----------------------|------|-----------------------------------------------------------------------------|
| CIM_ERR_FAILED        | 1    | A general error occurred that is not covered by a more specific error code. |
| CIM_ERR_ACCESS_DENIED | 2    | Access was not available to the client.                                     |
| CIM_ERR_NOT_SUPPORTED | 7    | The requested operation is not supported.                                   |
| CIM_ERR_TYPE_MISMATCH | 13   | The value supplied is incompatible with the type.                           |

2501 **5.4.2 Export Methods**

2502 This clause describes the methods that can be defined within a CIM export message. These methods  
 2503 operate only on an external data representation of a CIM entity, namespace, or element. Specifically,  
 2504 export methods do not operate on CIM namespaces or elements. The export method defined in this  
 2505 specification is Export an Indication.

2506 The notation used in the following subclauses to define the signatures of the export methods is a pseudo-  
 2507 MOF notation that extends the standard MOF BNF ([DSP0004](#)) for describing CIM export methods with a  
 2508 number of pseudo parameter types. The pseudo parameter types are enclosed in angle brackets (< >).

2509 This notation allows parameters to be decorated with pseudo-qualifiers (IN, OPTIONAL, and NULL) to  
 2510 define their invocation semantics. Note that these qualifiers are for description purposes only within the  
 2511 scope of this specification. In particular, a CIM client shall not specify them in export method invocations.

2512 This notation uses the IN qualifier for input parameters.

2513 A CIM client may omit an optional parameter if the required value is the specified default by not specifying  
 2514 an <EXPPARAMVALUE> element for the parameter. It shall not omit a parameter that is not optional.

2515 The NULL qualifier indicates parameters with values that may be specified as NULL in an export method  
 2516 call. A NULL (unassigned) value for a parameter is specified by an <EXPPARAMVALUE> element with  
 2517 no subelement. The CIM client shall specify a value for parameters without the NULL qualifier by  
 2518 including a suitable subelement for the <EXPPARAMVALUE> element.

2519 All parameters shall be uniquely named and shall correspond to a valid parameter name for that method  
 2520 as described by this specification. The order of the parameters is not significant.

2521 The non-NULL values of export method parameters or return values that are modeled as standard CIM  
 2522 types (such as string and Boolean, or arrays thereof) are represented as follows:

2523       • Simple values shall be represented by the <VALUE> subelement in an <EXPPARAMVALUE>  
2524        element (for export method parameters) or in an <IRETURNVALUE> element (for export  
2525        method return values).

2526       • Array values shall be represented by the <VALUE.ARRAY> subelement in an  
2527        <EXPPARAMVALUE> element (for export method parameters) or in an <IRETURNVALUE>  
2528        element (for export method return values).

2529       Table 5 shows how each pseudo-type used by the export methods shall be mapped to an XML element  
2530        described in [DSP0201](#) in the context of both a parameter value (subelement of <EXPPARAMVALUE>)  
2531        and a return value (subelement of <IRETURNVALUE>).

2532

**Table 5 – Mapping of Export Method Pseudo-Types to XML Elements**

| Type             | XML Element                                                   |
|------------------|---------------------------------------------------------------|
| <object>         | (VALUE.OBJECT VALUE.OBJECTWITHLOCALPATH VALUE.OBJECTWITHPATH) |
| <class>          | CLASS                                                         |
| <instance>       | INSTANCE                                                      |
| <className>      | CLASSNAME                                                     |
| <namedInstance>  | VALUE.NAMEDINSTANCE                                           |
| <instanceName>   | INSTANCENAME                                                  |
| <objectWithPath> | VALUE.OBJECTWITHPATH                                          |
| <objectName>     | (CLASSNAME INSTANCENAME)                                      |
| <propertyValue>  | (VALUE VALUE.ARRAY VALUE.REFERENCE)                           |
| <qualifierDecl>  | QUALIFIER.DECLARATION                                         |

2533 **5.4.2.1 ExportIndication**

2534 The ExportIndication operation exports a single CIM indication to the destination CIM listener:

```

2535 ExportIndication
2536 void ExportIndication (
2537 [IN] <instance> NewIndication
2538)

```

2539 The NewIndication input parameter defines the indication to be exported. The proposed definition  
 2540 should be a correct instance definition for the underlying CIM indication class according to the [CIM](#)  
 2541 [specification](#).

2542 If ExportIndication is unsuccessful, this method shall return one of the following status codes, where the  
 2543 error returned is the first applicable error in the list, starting with the first element and working down. Any  
 2544 additional method-specific interpretation of the error is enclosed in parentheses.

- 2545 • CIM\_ERR\_ACCESS\_DENIED
- 2546 • CIM\_ERR\_NOT\_SUPPORTED
- 2547 • CIM\_ERR\_INVALID\_PARAMETER (including missing, duplicate, unrecognized, or otherwise  
 2548 incorrect parameters)
- 2549 • CIM\_ERR\_INVALID\_CLASS (The CIM class of which this is to be a new instance does not  
 2550 exist.)
- 2551 • CIM\_ERR\_FAILED (Some other unspecified error occurred.)

2552 **5.4.3 Functional Profiles**

2553 This clause partitions the export methods into functional groups to establish conformance. See Table 6.

2554 Support for a particular group does not guarantee that all invocations of an export method in that group  
 2555 will succeed. Rather, the exclusion of a group is a declaration that any attempt to call an export method in  
 2556 that group always returns CIM\_ERR\_NOT\_SUPPORTED.

2557 The dependency relation is transitive, so if group G<sub>1</sub> depends on G<sub>2</sub>, and G<sub>2</sub> depends on G<sub>3</sub>, then G<sub>1</sub>  
 2558 depends on G<sub>3</sub>. It is also anti-symmetric, so if G<sub>1</sub> depends on G<sub>2</sub>, then G<sub>2</sub> cannot depend on G<sub>1</sub>.

2559

**Table 6 – Functional Groups of Export Methods**

| Functional Group | Dependency | Method           |
|------------------|------------|------------------|
| Indication       | None       | ExportIndication |

2560 **6 Encapsulation of CIM Messages**

2561 This clause describes how to use CIM messages in HTTP. CIM message requests may be used with or  
 2562 without the [HTTP Extension Framework](#).

2563 Although CIM messages can be used in combination with a variety of HTTP request methods, this  
 2564 specification defines CIM messages only within HTTP POST requests. (M-POST may be used in place of  
 2565 POST. For details on how to use CIM messages with the HTTP Extension Framework, see 6.2.)

2566 All CIM message responses are carried in the corresponding HTTP response. In the remaining  
 2567 discussion, the following terms are used as convenient shorthand for the definitions provided here:

- 2568 • *CIM operation request.* An HTTP POST request message with an XML entity body that defines  
 2569 an [Operation Request Message](#).
- 2570 • *CIM operation response.* An HTTP response message, issued in response to a CIM operation  
 2571 request, with an entity body that defines an [Operation Response Message](#).
- 2572 • *CIM export request.* An HTTP POST request message with an XML entity body that defines a  
 2573 CIM export message request.
- 2574 • *CIM export response.* An HTTP response message, issued in response to a CIM export  
 2575 message request, with an entity body that defines a CIM export message response.
- 2576 • *CIM message request.* An HTTP POST request message with an XML entity body that defines  
 2577 either a CIM operation or export message request.
- 2578 • *CIM message response.* An HTTP response message, issued in response to a CIM operation  
 2579 message (or CIM export message) request, with an entity body that defines a CIM operation  
 2580 message (or CIM export message) response.

2581 Note that an HTTP response to a CIM request is not always a CIM response. For example, a "505 HTTP  
 2582 Version Not Supported" response is not a CIM response.

2583 **6.1 CIM Clients, CIM Servers, and CIM Listeners**

2584 A CIM product is any product that can supply and/or consume management information using the CIM  
 2585 schema. In particular, CIM clients, CIM servers, and CIM listeners are examples of CIM products:

- 2586 • A *CIM client* issues [CIM operation requests](#) (CIM message requests) and receives and  
 2587 processes [CIM operation responses](#) (CIM message responses).
- 2588 • A *CIM server* receives and processes CIM operation message requests and issues CIM  
 2589 operation message responses.
- 2590 • A *CIM listener* is a server that receives and processes CIM export message requests and  
 2591 issues CIM export message responses.

2592 A CIM server may be act as any combination of CIM client, CIM server, and CIM listener. For example, a  
 2593 CIM server that supports indication subscription and generation acts as a CIM client when delivering an  
 2594 indication, through ExportIndication, to a CIM listener.

2595 Throughout this document, the terms CIM client, CIM server, CIM listener, and CIM product are used as  
 2596 convenient shorthand to refer to the subset of CIM products that conform to this specification.

2597 **6.2 Use of M-POST**

2598 A [CIM client](#) attempting to invoke a CIM message using the HTTP Extension Framework method "M-  
2599 POST" shall follow these steps:

- 2600 • If the M-POST invocation fails with an HTTP status of "501 Not Implemented" or "510 Not  
2601 Extended," the client should retry the request using the HTTP method "POST" with the  
2602 appropriate modifications (described in 6.2.2).
- 2603 • If the M-POST invocation fails with an HTTP status of "405 Method Not Allowed," the client  
2604 should fail the request.
- 2605 • For all other status codes, the client shall act in accordance with standard HTTP ([RFC 1945](#),  
2606 [RFC 2068](#)).

2607 This extended invocation mechanism gives Internet proxies and firewalls greater filtering control and  
2608 administrative flexibility over CIM message invocations.

2609 If a client receives a 501 or 510 status in response to an M-POST request, in subsequent invocations to  
2610 the same HTTP server, the client may omit the attempt at M-POST invocations for a suitable period. This  
2611 omission avoids the need for an extra round trip on each and every method invocation. The details of the  
2612 caching strategy employed by the client are outside the scope of this specification.

2613 **6.2.1 Use of the Ext Header**

2614 If a [CIM server](#) or [CIM listener](#) receives a valid M-POST request and has fulfilled all mandatory extension  
2615 header declarations in the request, it shall include in the response the "Ext" header defined by [RFC 2774](#).  
2616 This included header shall be protected by the appropriate [Cache-Control](#) directive.

2617 **6.2.2 Naming of Extension Headers**

2618 In M-POST request messages (and their responses), CIM extension headers shall be declared using the  
2619 name space prefix allotted by the "Man" extension header (in accordance with [RFC 2774](#)) that refers to  
2620 the name space "http://www.dmtf.org/cim/mapping/http/v1.0". The full format of the "Man" header  
2621 declaration for this specification is:

```
2622 Man = "Man" ":" "http://www.dmtf.org/cim/mapping/http/v1.0"
2623 ";" "ns" "=" header-prefix
2624 header-prefix = 2*DIGIT
```

2625 This header-prefix should be generated at random on a per-HTTP message basis, and should not  
2626 necessarily be a specific number.

2627 In accordance with [RFC 2774](#), all POST request messages (and their responses) shall not include such a  
2628 mandatory extension declaration. In POST request messages (and their responses), name space  
2629 prefixes shall not be used.

2630 EXAMPLE 1:

```
2631 Using M-POST:
2632 M-POST /cimom HTTP/1.1
2633 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=23
2634 23-CIMOperation: MethodCall
2635 ...
```

2636 EXAMPLE 2:

```
2637 Using POST:
2638 POST /cimom HTTP/1.1
2639 CIMOperation: MethodCall
```

2640 ...

### 2641 **6.3 Extension Headers Defined for CIM Message Requests and Responses**

2642 A CIM message contains exactly one CIM operation request, CIM operation response, CIM export  
2643 request, or CIM export response. This clause describes the extension headers to specify CIM message  
2644 semantics in the HTTP header of a POST message.

2645 Any [CIM Operation Request](#) or [CIM Operation Response](#) shall, and only CIM operation requests and  
2646 responses may, include the following CIM extension header:

- 2647 • [CIMOperation](#)

2648 Any [CIM Operation Request](#) shall, and only CIM operation requests may, include one and only one of the  
2649 following CIM extension header sets:

- 2650 • [CIMMethod](#) and [CIMObject](#), or
- 2651 • [CIMBatch](#)

2652 Any CIM export request or CIM export response shall, and only CIM export requests and responses may,  
2653 include the following CIM extension header:

- 2654 • [CIMExport](#)

2655 Any CIM export request shall, and only CIM export requests may, include one and only one of the  
2656 following CIM extension headers:

- 2657 • [CIMExportMethod](#)
- 2658 • [CIMExportBatch](#)

2659 An HTTP response with an error status code to a CIM message request may include the following CIM  
2660 extension header:

- 2661 • [CIMError](#)

2662 All CIM messages may include the following CIM extension header:

- 2663 • [CIMProtocolVersion](#)

#### 2664 **6.3.1 Encoding of CIM Element Names within HTTP Headers and Trailers**

2665 CIM element (class, property, qualifier, method, or method parameter) names are natively Unicode, and  
2666 may use UCS-2 characters unsuitable for inclusion within an HTTP message header or trailer. To encode  
2667 CIM element names represented in Unicode to values within HTTP headers or trailers, the following two-  
2668 step mapping process shall be used:

- 2669 • Encode the full Unicode CIM element name using [UTF-8](#).
- 2670 • Using the ""%" HEX HEX" convention, apply the standard URI [[RFC 2396](#), section 2] escaping  
2671 mechanism to the resulting string to escape any characters that are unsafe within an HTTP  
2672 header or trailer.

2673 In this specification, the token CIMIdentifier represents a CIM element name to which this transformation  
2674 has been applied.

2675 One characteristic of this mapping is that CIM elements named with an ASCII representation appear in  
2676 ASCII in the resulting URL.

2677 EXAMPLE:

2678 CIM\_LogicalElement is unchanged under this transformation.

2679 The class named using the UCS-2 sequence representing the Hangeul characters for the Korean word "hangugo"  
2680 (D55C, AD6D, C5B4) becomes

2681 %ED%95%9C%EA%B5%AD%EC%96%B4=10

2682 after UTF-8 transformation and escaping all characters with their % HEX HEX equivalent.

### 2683 6.3.2 Encoding of CIM Object Paths within HTTP Headers and Trailers

2684 This clause describes the mapping that shall be applied to represent CIM object paths, as described  
2685 within an [Operation Request Message](#) using the <LOCALNAMESPACEPATH>, <LOCALCLASSPATH>,  
2686 or <LOCALINSTANCEPATH> elements, in a format that is safe for representation within an HTTP header  
2687 or trailer.

2688 If the element to be transformed is a <LOCALNAMESPACEPATH>, the algorithm is as follows:

- 2689 • For the first NAMESPACE subelement, output the textual content of that element.
- 2690 • For each subsequent NAMESPACE subelement, output the forward slash character (/) followed  
2691 by the textual content of that NAMESPACE element.

2692 If the element to be transformed is a <LOCALCLASSPATH>, the algorithm is as follows:

- 2693 • Transform the <LOCALNAMESPACEPATH> subelement using the rules previously described,  
2694 and output a colon character (:).
- 2695 • Output the value of the NAME attribute of the <CLASSNAME> subelement.

2696 If the element to be transformed is a <LOCALINSTANCEPATH>, the algorithm is as follows:

- 2697 • Transform the <LOCALNAMESPACEPATH> subelement using the rules previously described,  
2698 and output a colon character (:).
- 2699 • Output the value of the CLASSNAME attribute of the <INSTANCENAME> subelement.
- 2700 • If there is at least one <KEYBINDING> subelement under the <INSTANCENAME> subelement,  
2701 then for each such subelement:
  - 2702 – Output a period character (.) if this is the first <KEYBINDING> subelement; otherwise,  
2703 output a comma character (,).
  - 2704 – Output the value of the NAME attribute, followed by an equal character (=).
  - 2705 – If there is a <KEYVALUE> subelement, output the textual element content of that element,  
2706 subject to the following transformation:
    - 2707 ▪ If the VALUETYPE attribute is numeric or Boolean, the output is identical to the content  
2708 of the element.
    - 2709 ▪ If the VALUETYPE attribute is a string, the output is obtained by enclosing the content  
2710 of the element in double quote (") characters and escaping any double quote  
2711 characters or backslash character within the value with a preceding backslash (\)  
2712 character.
  - 2713 – If there is a <VALUE.REFERENCE> subelement
    - 2714 ▪ Output a double quote character (").



- 2715                   ▪ Apply the process recursively to the <CLASSPATH> or <INSTANCEPATH>  
2716                   subelement of the <VALUE.REFERENCE> element, escaping any double quote or  
2717                   backslash character thereby generated with a preceding backslash (\) character.
- 2718                   ▪ Output a closing double quote character (").
- 2719                   • If there is no <KEYBINDING> subelement but there is a <KEYVALUE> or  
2720                   <VALUE.REFERENCE> subelement under the <INSTANCENAME> subelement, then:
- 2721                   – Output an equal character (=).
- 2722                   – Output the transformed value of the <KEYVALUE> or <VALUE.REFERENCE> using the  
2723                   previously-described rules.
- 2724                   • If there are no <KEYBINDING> subelements or no <KEYVALUE> or <VALUE.REFERENCE>  
2725                   subelement, then indicate a singleton instance by outputting the string "@=" under the  
2726                   <INSTANCENAME> subelement.

2727                   Finally, after applying these rules to the <LOCALNAMESPACEPATH>, <LOCALCLASSPATH>, or  
2728                   <LOCALINSTANCEPATH> element, transform the entire output string into URI-safe format in the  
2729                   following two-step procedure:

- 2730                   • Encode the string using UTF-8 [\[RFC 2279\]](#) if it is not already in this format.
- 2731                   • Using the "%#%" HEX HEX" convention, apply the standard URI [\[RFC 2396\]](#), section 2] escaping  
2732                   mechanism to the resulting string to escape any characters that are unsafe within an HTTP  
2733                   header or trailer.

2734                   In this specification, the token CIMObjectPath represents a <LOCALNAMESPACEPATH>,  
2735                   <LOCALCLASSPATH>, or <LOCALINSTANCEPATH> element to which the preceding transformation  
2736                   has been applied.

### 2737                   6.3.3 CIMOperation

2738                   The CIMOperation header shall be present in all [CIM Operation Request](#) and [CIM Operation Response](#)  
2739                   messages. It identifies the HTTP message as carrying a CIM operation request or response.

2740                   CIMOperation = "CIMOperation" ":" ("MethodCall" | "MethodResponse")

2741                   A [CIM client](#) shall include this header, with the value "MethodCall," in all CIM operation requests that it  
2742                   issues. A [CIM server](#) shall include this header in all CIM operation responses that it issues, with the value  
2743                   "MethodResponse".

2744                   If a CIM server receives a CIM operation request with this header, but with a missing value or a value that  
2745                   is not "MethodCall," then it shall fail the request with status "400 Bad Request". The CIM server shall  
2746                   include a [CIMError](#) header in the response with a value of `unsupported-operation`.

2747                   If a CIM server receives a CIM operation request without this header, it shall not process it as a CIM  
2748                   operation request. The status code returned by the CIM server in response to such a request is outside  
2749                   the scope of this specification.

2750                   If a CIM client receives a response to a CIM operation request without this header (or if this header has a  
2751                   value that is not "MethodResponse"), it should discard the response and take appropriate measures to  
2752                   publicize that it has received an incorrect response. The details as to how this is done are outside the  
2753                   scope of this specification.

2754                   The CIMOperation header affords a simple mechanism by which firewall or proxy administrators can  
2755                   make global administrative decisions on all CIM operations.

2756 **6.3.4 CIMExport**

2757 The CIMExport header shall be present in all CIM export request and response messages. It identifies the  
2758 HTTP message as carrying a CIM export method request or response.

2759 CIMExport = "CIMExport" ":" ("MethodRequest" | "MethodResponse")

2760 A CIM client shall include this header with the value "MethodRequest" in all CIM export requests that it  
2761 issues. A CIM listener shall include this header in all CIM export responses that it issues, with the value  
2762 "MethodResponse".

2763 If a CIM listener receives a CIM export request with this header, but with a missing value or a value that is  
2764 not "MethodRequest", then it shall fail the request with status "400 Bad Request". The CIM listener shall  
2765 include a CIMError header in the response with a value of unsupported-operation.

2766 If a CIM listener receives a CIM export request without this header, it shall not process it. The status code  
2767 returned by the CIM listener in response to such a request is outside of the scope of this specification.

2768 If a CIM client receives a response to a CIM export request without this header (or if this header has a  
2769 value that is not "MethodResponse"), it should discard the response and take appropriate measures to  
2770 publicize that it has received an incorrect response. The details as to how this is done are outside the  
2771 scope of this specification.

2772 The CIMExport header affords a simple mechanism by which firewall or proxy administrators can make  
2773 global administrative decisions on all CIM exports.

2774 **6.3.5 CIMProtocolVersion**

2775 The CIMProtocolVersion header may be present in any CIM message. The header identifies the version  
2776 of the CIM operations over the HTTP specification in use by the sending entity.

2777 CIMProtocolVersion = "CIMProtocolVersion" ":" 1\*DIGIT "." 1\*DIGIT

2778 If the header is omitted, then a value of 1.0 must be assumed.

2779 The major and minor revision numbers must be treated as independent integers.

2780 The CIMProtocolVersion  $x_1.y_1$  is less than CIMProtocolVersion  $x_2.y_2$  if and only if one of the following  
2781 statements is true:

- 2782 •  $x_1$  is less than  $x_2$
- 2783 •  $x_1$  equals  $x_2$ , and  $y_1$  is less than  $y_2$

2784 The CIMProtocolVersion  $x_1.y_1$  is greater than CIMProtocolVersion  $x_2.y_2$  if and only if one of the following  
2785 statements is true:

- 2786 •  $x_1$  is greater than  $x_2$ ,
- 2787 •  $x_1$  equals  $x_2$ , and  $y_1$  is greater than  $y_2$

2788 A CIMProtocolVersion  $x_1.y_1$  is within tolerance of CIMProtocolVersion  $x_2.y_2$  if:

- 2789 •  $x_1$  equals  $x_2$ , and
- 2790 •  $y_1$  is less than or equal to  $y_2$

2791 If the CIMProtocolVersion of the CIM message received is within tolerance of the CIMProtocolVersion  
2792 supported for a [CIM server](#) or [CIM listener](#) implementation, the receiving implementation shall accept that  
2793 CIM message. Equivalent CIMProtocolVersion values between [CIM server](#) or [CIM listener](#) and the [CIM](#)

2794 [client](#) shall be accepted. The [CIM server](#) or [CIM listener](#) implementation may reject a CIM message in all  
2795 other cases. For information about how CIM messages are rejected, see 7.3.

2796 Beyond tolerance considerations, the implementation should reject the received CIM message *only* if the  
2797 design as defined by the CIMProtocolVersion of the receiving implementation has changed in the  
2798 declaration of the API, method parameters, or behavior since the design defined by the  
2799 CIMProtocolVersion of the received CIM message.

### 2800 6.3.6 CIMMethod

2801 The CIMMethod header shall be present in any [CIM Operation Request](#) message that contains a [Simple](#)  
2802 [Operation Request](#).

2803 It shall not be present in any [CIM Operation Response](#) message nor in any [CIM Operation Request](#)  
2804 message unless it is a simple operation request. It shall not be present in any CIM export request or  
2805 response message.

2806 The header identifies the name of the CIM method to be invoked, encoded in an [HTTP-safe](#)  
2807 [representation](#). Firewalls and proxies may use this header to carry out routing and forwarding decisions  
2808 based on the CIM method to be invoked.

2809 The name of the CIM method within a simple operation request is the value of the NAME attribute of the  
2810 <METHODCALL> or <IMETHODCALL> element.

2811 CIMMethod = "CIMMethod" ":" MethodName

2812 MethodName = [CIMIdentifier](#)

2813 If a [CIM server](#) receives a CIM operation request for which any one of the following statements is true,  
2814 then it shall fail the request and return a status of "400 Bad Request". Also, it shall include a [CIMError](#)  
2815 header in the response with a value of `header-mismatch`, subject to the considerations specified in 7.3:

- 2816 • The CIMMethod header is present, but it has an invalid value.
- 2817 • The CIMMethod header is not present, but the operation request message is a [Simple](#)  
2818 [Operation Request](#).
- 2819 • The CIMMethod header is present, but the operation request message is not a simple operation  
2820 request.
- 2821 • The CIMMethod header is present and the operation request message is a simple operation  
2822 request, but the CIMIdentifier value (when unencoded) does not match the unique method  
2823 name within the simple operation request.

2824 Note that this verification provides a *basic* level of assurance that any intermediate firewall or proxy was  
2825 not acting on misleading information when it decided to forward the request based on the content of the  
2826 CIMMethod header. Additional securing of HTTP messages against modification in transit (such as the  
2827 encryption of the payload or appending of a digital signature thereto) would be required to provide a  
2828 higher degree of integrity.

### 2829 6.3.7 CIMObject

2830 The CIMObject header shall be present in any [CIM Operation Request](#) message that contains a [Simple](#)  
2831 [Operation Request](#).

2832 It shall not be present in any [CIM Operation Response](#) message nor in any [CIM Operation Request](#)  
2833 message unless it is a simple operation Request. It shall not be present in any CIM export request or  
2834 response message.

2835 The header identifies the CIM object on which the method is to be invoked using a CIM object path  
 2836 encoded in an [HTTP-safe representation](#). This object shall be a class or instance for an [extrinsic](#) method  
 2837 or a namespace for an [intrinsic](#) method. Firewalls and proxies may use this header to carry out routing  
 2838 and forwarding decisions based on the CIM object that is the target of a method invocation.

2839       CIMObject = "CIMObject" ":" ObjectPath

2840       ObjectPath = [CIMObjectPath](#)

2841 The ObjectPath value is constructed by applying the algorithm defined in 6.3.2 to either of the following  
 2842 subelements within the CIM operation request:

- 2843       • The <LOCALNAMESPACEPATH> subelement of the <IMETHODCALL> element.
- 2844       • The <LOCALCLASSPATH> or <LOCALINSTANCEPATH> subelement of the  
 2845       <METHODCALL> element.

2846 If a [CIM server](#) receives a CIM operation request for which any one of the following statements is true,  
 2847 then it shall fail the request and return a status of "400 Bad Request". Also, it shall include a [CIMError](#)  
 2848 header in the response with a value of `header-mismatch`, subject to the considerations specified in 7.3:

- 2849       • The CIMObject header is present, but it has an invalid value.
- 2850       • The CIMObject header is not present, but the operation request message is a [Simple Operation](#)  
 2851       [Request](#).
- 2852       • The CIMObject header is present, but the operation request message is not a simple operation  
 2853       request.
- 2854       • The CIMObject header is present and the operation request message is a simple operation  
 2855       request, but the ObjectPath value does not match the operation request message (where a  
 2856       *match* is defined in 6.3.2).

2857 Note that this verification provides a *basic* level of assurance that any intermediate firewall or proxy is not  
 2858 acting on misleading information when it forwards the request based on the content of the CIMObject  
 2859 header. Additional securing of HTTP messages against modification in transit, such as encrypting the  
 2860 payload or appending a digital signature to it, would be required to provide a higher degree of integrity.

### 2861 **6.3.8 CIMExportMethod**

2862 The CIMExportMethod header shall be present in any CIM export request message that contains a  
 2863 simple export request.

2864 This header shall not be present in any CIM export response message nor in any CIM export request  
 2865 message unless it is a simple export request. It shall not be present in any CIM operation request or  
 2866 response message.

2867 The CIMExportMethod header identifies the name of the CIM export method to be invoked, encoded in an  
 2868 HTTP-safe representation. Firewalls and proxies may use this header to carry out routing and forwarding  
 2869 decisions based on the CIM export method to be invoked.

2870 The name of the CIM export method within a simple export request is the value of the NAME attribute of  
 2871 the <EXPMETHODCALL> element.

2872       CIMExportMethod = "CIMExportMethod" ":" ExportMethodName

2873       ExportMethodName = CIMIdentifier

2874 If a CIM listener receives a CIM export request for which any one of the following statements is true, then  
 2875 it shall fail the request and return a status of "400 Bad Request". Also, it shall include a CIMError header  
 2876 in the response with a value of `header-mismatch`, subject to the considerations specified in 7.3:

- 2877 • The CIMExportMethod header is present, but it has an invalid value.
- 2878 • The CIMExportMethod header is not present, but the export request message is a simple export  
2879 request.
- 2880 • The CIMExportMethod header is present, but the export request message is not a simple export  
2881 request.
- 2882 • The CIMExportMethod header is present and the export request message is a simple export  
2883 request, but the CIMIdentifier value (when unencoded) does not match the unique method  
2884 name within the simple export request.

2885 Note that this verification provides a basic level of assurance that any intermediate firewall or proxy is not  
2886 acting on misleading information when it forwards the request based on the content of the  
2887 CIMExportMethod header. Additional securing of HTTP messages against modification in transit, such as  
2888 encrypting the payload or appending a digital signature to it, would be required to provide a higher degree  
2889 of integrity.

### 2890 6.3.9 CIMBatch

2891 The CIMBatch header shall be present in any [CIM Operation Request](#) message that contains a [Multiple](#)  
2892 [Operation Request](#).

2893 This header shall not be present in any [CIM Operation Response](#) message nor in any [CIM Operation](#)  
2894 [Request](#) message unless it is a multiple operation request. It shall not be present in any CIM export  
2895 request or response message.

2896 The CIMBatch header identifies the encapsulated operation request message as containing multiple  
2897 method invocations. Firewalls and proxies may use this header to carry out routing and forwarding  
2898 decisions for batched CIM method invocations.

2899 CIMBatch = "CIMBatch" ":"

2900 If a [CIM server](#) receives a CIM operation request for which any one of the following statements is true,  
2901 then it must fail the request and return a status of "400 Bad Request". Also it must include a [CIMError](#)  
2902 header in the response with a value of `header-mismatch`, subject to the considerations specified in 7.3:

- 2903 • The CIMBatch header is present, but it has an invalid value.
- 2904 • The CIMBatch header is not present, but the operation request message is a multiple operation  
2905 request.
- 2906 • The CIMBatch header is present, but the operation request message is not a multiple operation  
2907 request.

2908 Note that this verification provides a *basic* level of assurance that any intermediate firewall or proxy is not  
2909 acting on misleading information when it forwards the request based on the content of the CIMBatch  
2910 header. Additional securing of HTTP messages against modification in transit, such as encrypting the  
2911 payload or appending a digital signature to it, would be required to provide a higher degree of integrity.

2912 If a CIM server receives a CIM operation request for which the CIMBatch header is present but the server  
2913 does not support multiple operations, then it shall fail the request and return a status of "501 Not  
2914 Implemented". Firewalls or Proxies may also employ this mechanism to compel a [CIM client](#) to use simple  
2915 operation requests rather than multiple operation requests.

2916 A CIM client that receives a response of "501 Not Implemented" to a multiple operation request should  
2917 resubmit that request as a series of simple operation requests.

2918 **6.3.10 CIMExportBatch**

2919 The CIMExportBatch header shall be present in any CIM export request message that contains a multiple  
2920 export request.

2921 It shall not be present in any CIM operation request or response message. Also, it shall not be present in  
2922 any CIM export response message nor in any CIM export request message unless it is a multiple export  
2923 request.

2924 The header identifies the encapsulated Export Request Message as containing multiple export method  
2925 invocations. Firewalls and proxies may use this header to carry out routing and forwarding decisions for  
2926 batched CIM Export method invocations.

2927 `CIMExportBatch = "CIMExportBatch" ":"`

2928 If a CIM listener receives a CIM export request for which any one of the following statements is true, then  
2929 it must fail the request and return a status of "400 Bad Request". Also, it must include a CIMError header  
2930 in the response with a value of header-mismatch, subject to the considerations specified in [Errors](#):

- 2931 • The CIMExportBatch header is present, but it has an invalid value.
- 2932 • The CIMExportBatch header is not present, but the export request message is a multiple export  
2933 request.
- 2934 • The CIMExportBatch header is present, but the export request message is not a multiple export  
2935 request.

2936 Note that this verification provides a *basic* level of assurance that any intermediate firewall or proxy is not  
2937 acting on misleading information when it forwards the request based on the content of the  
2938 CIMExportBatch header. Additional securing of HTTP messages against modification in transit, such as  
2939 encrypting the payload or appending a digital signature to it, would be required to provide a higher degree  
2940 of integrity.

2941 If a CIM listener receives a CIM export request for which the CIMExportBatch header is present, but the  
2942 CIM listener does not support multiple exports, then it shall fail the request and return a status of "501 Not  
2943 Implemented". Firewalls or Proxies may also employ this mechanism to compel a CIM client to use simple  
2944 rather than multiple export requests.

2945 A CIM client that receives a response of "501 Not Implemented" to a multiple export request should  
2946 resubmit that request as a series of simple export requests.

2947 **6.3.11 CIMError**

2948 The CIMError header may be present in any HTTP response to a CIM message request that is not a CIM  
2949 message response.

2950 It shall not be present in any CIM message response or in any CIM message request.

2951 The CIMError header provides further CIM-specific diagnostic information if the [CIM server](#) or  
2952 [CIM listener](#) encounters a fundamental error during processing of the CIM operation request and is  
2953 intended to assist clients to further disambiguate errors with the same HTTP status code:

```
2954 CIMError = "CIMError" ":" cim-error
2955 cim-error = "unsupported-protocol-version" |
2956 "multiple-requests-unsupported" |
2957 "unsupported-cim-version" |
2958 "unsupported-dtd-version" |
2959 "request-not-valid" |
2960 "request-not-well-formed" |
```

2961 "request-not-loosely-valid" |  
 2962 "header-mismatch" |  
 2963 "unsupported-operation"

### 2964 6.3.12 CIMRoleAuthenticate

2965 A CIM server may return a CIMRoleAuthenticate header as part of the 401 Unauthorized response along  
 2966 with the WWW-Authenticate header. The CIMRoleAuthenticate header must meet the challenge of  
 2967 indicating the CIM server policy on role credentials.

2968 challenge = "credentialrequired" | "credentialoptional" | "credentialnotrequired"

- 2969 • A challenge of *credentialrequired* indicates that the CIM server requires that a CIM client must  
 2970 present a credential if it seeks to assume a role.
- 2971 • A challenge of *credentialoptional* indicates that the credential is optional. If a credential is not  
 2972 sent, the CIM server allows the role assumption if it is permitted for the given user. However,  
 2973 certain operations that require the role credential may not succeed.
- 2974 • A challenge of *credentialnotrequired* indicates that no credential is required to assume the role.

2975 Absence of the CIMRoleAuthenticate header indicates that the CIM server does not support role  
 2976 assumption. A CIM client should handle each of these cases appropriately.

2977 The challenge does not contain any authorization scheme, realm, or other information. A CIM client  
 2978 should extract this information from the WWW-Authenticate header. This implies that for any given  
 2979 request, the role credentials should use the same scheme as those required for the user credentials.

2980 A CIM server allows role assumption to succeed only if the user is allowed to assume the role. Therefore,  
 2981 even if appropriate credentials are presented, role assumption can fail. If either the user authentication or  
 2982 role assumption fails, the entire authentication operation fails.

2983 To maintain backward compatibility, a CIM server that supports role assumption must allow user  
 2984 authentication even if no role is specified.

### 2985 6.3.13 CIMRoleAuthorization

2986 The CIMRoleAuthorization header is supplied along with the normal authorization header that the CIM  
 2987 client populates to perform user authentication. If the CIM client needs to perform role assumption and  
 2988 the server challenge is *credentialrequired*, the CIMRoleAuthorization header must be supplied with the  
 2989 appropriate credentials. The credentials supplied as part of the CIMRoleAuthorization header must use  
 2990 the same scheme as those specified for the authorization header, as specified in [RFC 2617](#). Therefore,  
 2991 both Basic and Digest authentication are possible for the role credential.

2992 If the CIM client wishes to assume a role but does not wish to supply role credentials for server challenge  
 2993 *credentialoptional* or *credentialnotrequired*, the CIMRoleAuthorization header must set the auth-scheme  
 2994 field as specified in [RFC 2617](#) to be "role". The auth-param must contain the role name.

2995 A CIM server that supports roles must be capable of handling the presence of credentials in the  
 2996 CIMRoleAuthorization header (that is auth-scheme not set to "role") regardless of whether it is expecting  
 2997 credentials or not. It may choose to ignore these credentials.

### 2998 6.3.14 CIMStatusCodeDescription

2999 If a CIM product includes the CIMStatusCode trailer, it may also include the CIMStatusCodeDescription  
 3000 trailer. The value of this trailer is a string describing the nature of the error. A CIM product shall not  
 3001 include this trailer if the CIMStatusCode trailer is not present.

### 3002 6.3.15 WBEMServerResponseTime

3003 The WBEMServerResponseTime header may be present in any CIM response message. If it is present,  
3004 the header shall contain a measure, specified in microseconds, of the elapsed time required by the CIM  
3005 server to process the request and create a response. Specifically, WBEMServerResponseTime describes  
3006 the time elapsed since the CIM server received the CIM request message and the associated CIM  
3007 response message was ready to send to the CIM client.

3008 WBEMServerResponseTime = "WBEMServerResponseTime" ":" , where the response time must be  
3009 representable as a 64-bit unsigned integer value. If the actual elapsed time exceeds the maximum  
3010 representable value, then the maximum value shall be returned. If the actual elapsed time is less than 1  
3011 microsecond, then a 0 shall be returned.

3012 Although a CIM client may ignore the WBEMServerResponseTime header, it shall allow this header to be  
3013 included in a response.

## 3014 7 HTTP Requirements and Usage

3015 This clause describes HTTP support and the use of standard headers.

### 3016 7.1 HTTP Support

3017 It is recommended that [CIM clients](#), [CIM servers](#), and [CIM listeners](#) support [HTTP/1.1](#). CIM clients, CIM  
3018 servers, and CIM listeners may support HTTP/1.0. CIM clients, CIM servers, and CIM listeners shall not  
3019 be limited to any version of HTTP earlier than 1.0.

3020 CIM products that use extension headers as defined in this specification shall conform to the  
3021 requirements defined in [RFC 2774](#) for their use.

### 3022 7.2 Use of Standard Headers

3023 Unless otherwise stated in this specification, CIM products shall comply with the requirements on the use  
3024 of headers described in [RFC 1945](#), [RFC 2068](#). This clause defines only *additional* requirements on CIM  
3025 products with respect to the use of standard HTTP headers ([RFC 1945](#), [RFC 2068](#)) in a CIM message.

3026 Note that CIM products should not use headers defined in [RFC 2068](#) but deprecated from [RFC 2616](#) (for  
3027 example, Public, Content-Base).

#### 3028 7.2.1 Accept

3029 If a [CIM client](#) includes an Accept header in a request, it shall specify a value that allows the server to  
3030 return an entity body of "text/xml" or "application/xml" in the response.

3031 A [CIM server](#) or [CIM listener](#) shall accept any value for this header stating that "text/xml" or  
3032 "application/xml" is an acceptable type for a response entity. A CIM server or CIM listener should return  
3033 "406 Not Acceptable" if the Accept header indicates that neither of these content types is acceptable.

3034 If a CIM server or CIM listener accepts a request to return an entity of a type other than "text/xml" or  
3035 "application/xml", the nature of the response is outside the scope of this specification.

#### 3036 7.2.2 Accept-Charset

3037 If a [CIM client](#) includes an Accept-Charset header in a request, it shall specify a value that allows the CIM  
3038 server or CIM listener to return an entity body using the character set "UTF-8".



3039 A [CIM server](#) or [CIM listener](#) shall accept any value for this header asserting that "UTF-8" is an  
 3040 acceptable character set for a response entity. If the client does not provide an Accept-Charset, then  
 3041 "UTF-8" should be assumed by the [CIM server](#) or [CIM listener](#).

3042     Accept-Charset: UTF-8

3043 A CIM server or CIM listener shall return "406 Not Acceptable" if the character set requested in the  
 3044 Accept-Charset header is not supported.

3045 If a CIM server or CIM listener accepts a request to return an entity using a character set other than  
 3046 "UTF-8", the behavior of the subsequent CIM client and CIM server interaction is outside the scope of this  
 3047 specification. See 7.8 for details.

### 3048 7.2.3 Accept-Encoding

3049 If a [CIM client](#) includes an Accept-Encoding header in a request, it shall specify a q value that allows the  
 3050 CIM server or CIM listener to use the "Identity" encoding. The value shall be greater than 0 or not  
 3051 specified.

3052     Accept-Encoding: Identity

3053     Accept-Encoding: Identity; q=1.0

3054 A [CIM server](#) or [CIM listener](#) shall accept any value for this header asserting that "Identity" is an  
 3055 acceptable encoding for the response entity.

3056 A CIM server or CIM listener shall return "406 Not Acceptable" if the Accept-Encoding header indicates  
 3057 that the requested encoding is not acceptable.

### 3058 7.2.4 Accept-Language

3059 If a CIM client includes an Accept-Language header in a request, it shall request a language-range,  
 3060 special-range, or both. The CIM client shall also allow any language to be returned if the requested  
 3061 languages cannot be supported. This is accomplished by including the special-range, "\*". The CIM client  
 3062 may request multiple languages. Each language has equal priority, unless a q value is provided.

3063     Accept-Language: zh, \*

3064     Accept-Language: zh;q=1.0, en;q=.7, \*

3065 Each CIM element in the response should be localized in only one language. A CIM element shall not be  
 3066 duplicated in the response because it is localized in more than one language.

3067 CIM servers may support multiple languages. A CIM product shall interpret the use of the special-range  
 3068 value, "\*", as a request to return the response content using the default language defined for the target  
 3069 processing the request. Multiple targets, with different default language settings, may participate in the  
 3070 construction of a response. (See [RFC 2616](#) section 3.10 and [ISO 639-1](#).)

3071 See 7.8 for more information.

### 3072 7.2.5 Accept-Ranges

3073 [CIM clients](#) shall not include the Accept-Ranges header in a request. A [CIM server](#) or [CIM listener](#) shall  
 3074 reject a request that includes an Accept-Range header with a status of "406 Not Acceptable".

### 3075 7.2.6 Allow

3076 If a [CIM server](#) or [CIM listener](#) is returning a "405 Method Not Allowed" response to a CIM message  
 3077 request, then the Allow header shall include either M-POST or POST. Whether it includes any other  
 3078 HTTP methods is outside the scope of this specification.

### 3079 7.2.7 Authorization

3080 See 7.4 for details.

### 3081 7.2.8 Cache-Control

3082 Generally, a CIM message request may consist of a mixture of CIM method invocations, some of which  
3083 may be eminently able to cache (for example, the manufacturer label on a disk drive) and some of which  
3084 may be decidedly impossible to cache (for example, format a disk drive).

3085 Furthermore, the encapsulation of such multiple method invocations in an HTTP POST or M-POST  
3086 means that if a CIM message request has any effect on an HTTP cache it is likely to be one of  
3087 invalidating cached responses for the target CIM server or CIM listener. Indeed, [HTTP/1.1](#) stipulates that  
3088 by default POST responses cannot be cached unless the server indicates otherwise using an appropriate  
3089 Cache-Control or Expires header.

3090 For these reasons, CIM message responses should not be considered as able to be cached. A [CIM](#)  
3091 [server](#) or [CIM listener](#) should not include a Cache-Control header in a CIM message response that might  
3092 indicate to a cache that the response can be cached.

3093 If the CIM server or CIM listener is responding to a CIM message request conveyed in an M-POST  
3094 request, then in accordance with [RFC 2774](#) the CIM server or CIM listener shall include a no-cache  
3095 control directive to prevent inadvertent caching of the "Ext" header, as in the following example:

3096 EXAMPLE

```
3097 HTTP/1.1 200 OK
3098 Ext:
3099 Cache-Control: no-cache
3100 ...
```

### 3101 7.2.9 Connection

3102 The following courses of action are recommended for connections:

- 3103 • [CIM clients](#) should avoid the use of the "Connection: close" header unless it is known in  
3104 advance that this is the only request likely to be sent out on that connection.
- 3105 • [CIM servers](#) and [CIM listener](#) support persistent connections wherever possible.

3106 Timeout mechanisms should be employed to remove idle connections on the CIM client, CIM server, and  
3107 CIM listener. The details of timeout mechanisms are outside the scope of this specification. Clients should  
3108 be cautious in retrying requests, especially if they are not idempotent (for example, method invocation).

3109 CIM clients, CIM servers, and CIM listeners should support pipelining (see [RFC 2068](#), section 1.1.2.2) if  
3110 possible, but be aware of the requirements defined in [RFC 2068](#). In particular, attention is drawn to the  
3111 requirement from [RFC 2068](#) that clients not pipeline requests using non-idempotent methods or non-  
3112 idempotent sequences of methods. A client that needs to send a non-idempotent request should wait to  
3113 send that request until it receives the response status for the previous request.

### 3114 7.2.10 Content-Encoding

3115 If a [CIM client](#) includes a Content-Encoding header in a request, it should specify a value of "identity",  
3116 unless there is good reason to believe that the server or listener can accept another encoding.

### 3117 7.2.11 Content-Language

3118 The Content-Language entity-header field of a CIM message describes the natural language(s) of the  
3119 intended audience of the content.

3120 A CIM message may contain a Content-Language header. The value of the Content-Language header in  
3121 a CIM response message shall be consistent with the Accept-Language values specified in the  
3122 corresponding CIM request message. If the CIM server cannot determine one or more of the content  
3123 languages used to construct the response, then the Content-Language entity shall not be returned.

3124 Multiple targets using different Content-Language values may participate in constructing a response. The  
3125 Content-Language field shall reflect all Content-Language values used to construct the response. The  
3126 content of a CIM message may contain elements in languages not listed in the Content-Language field.

3127 `Content-Language: en`

3128 See 7.8 for details.

### 3129 **7.2.12 Content-Range**

3130 [CIM clients](#), [CIM servers](#), and [CIM listeners](#) shall not use this header.

### 3131 **7.2.13 Content-Type**

3132 [CIM clients](#), [CIM servers](#), and [CIM listeners](#) shall specify (and accept) a media type for the Content-Type  
3133 header of either "text/xml" or "application/xml" as defined in [RFC 2376](#). In addition, they may specify and  
3134 shall accept a "charset" parameter as defined in [RFC 2616](#). If a "charset" parameter is specified, it shall  
3135 have the value "utf-8" either with or without surrounding double quotes. The sending side should use  
3136 the form without double quotes. The receiving side shall support both forms. If a "charset" parameter is  
3137 not specified, the receiving side shall assume "utf-8" as a default.

3138 Examples of valid Content-Type headers are:

3139 `Content-type: text/xml`

3140 `Content-type: text/xml; charset=utf-8`

3141 `Content-type: text/xml; charset="utf-8"`

3142 `Content-type: application/xml`

3143 `Content-type: application/xml; charset=utf-8`

3144 `Content-type: application/xml; charset="utf-8"`

### 3145 **7.2.14 Expires**

3146 For the reasons described in 7.2.8, a [CIM server](#) or [CIM listener](#) shall not include an Expires header in a  
3147 CIM message response that might indicate to a cache that the response can be cached.

### 3148 **7.2.15 If-Range**

3149 [CIM clients](#), [CIM servers](#), and [CIM listeners](#) shall not use this header.

### 3150 **7.2.16 Proxy-Authenticate**

3151 See 7.4 for details.

### 3152 **7.2.17 Range**

3153 [CIM clients](#), [CIM servers](#), and [CIM listeners](#) shall not use this header.

### 3154 **7.2.18 WWW-Authenticate**

3155 See 7.4 for details.

### 3156 7.3 Errors and Status Codes

3157 This clause defines how [CIM servers](#) and [CIM listeners](#) shall handle errors that occur in processing a CIM  
3158 message request. This specification does not introduce any new HTTP response status codes.

3159 If there is an error in processing the HTTP Request-Line or standard HTTP headers, the CIM server or  
3160 CIM listener shall take appropriate action as dictated by its conformance to the relevant version of HTTP  
3161 ([RFC 1945](#), [RFC 2068](#)).

3162 Otherwise, if there are any mandatory extension declarations that the server does not support it shall  
3163 respond with a "510 Not Extended" status according to [RFC 2774](#).

3164 Otherwise, the request shall be processed in accordance with the relevant version of HTTP ([RFC 1945](#),  
3165 [RFC 2068](#)) and the additional rules defined in this document.

3166 Assuming that the HTTP request is otherwise correct, the CIM server or CIM listener shall use the  
3167 following status codes when processing the CIM extension headers:

- 3168 • 501 Not Implemented

3169 This status code indicates that one of the following situations occurred:

- 3170 – The [CIMProtocolVersion](#) extension header in the request specifies a version of the CIM  
3171 mapping onto HTTP that is not supported by this CIM server or CIM listener. The CIM  
3172 server or CIM listener shall include a [CIMError](#) header in the response with a value of  
3173 `unsupported-protocol-version`.
- 3174 – The client specified a [Multiple Operation Request](#) (or multiple Export Request), and the  
3175 CIM server (or CIM listener) does not support such requests. The CIM server or CIM  
3176 listener shall include a [CIMError](#) header in the response with a value of `multiple-  
3177 requests-unsupported`.
- 3178 – The CIMVERSION attribute in the message request is not set to a proper value. The  
3179 CIMVERSION attribute shall be in the form of "M.N", where M is the major revision of the  
3180 specification in numeric form and N is the minor revision in numeric form. The version shall  
3181 be at "2.0" or greater (for example, "2.0" or "2.3"). The CIM server or CIM listener shall  
3182 include a CIMError header in the response with a value of `unsupported-cim-version`.
- 3183 – The DTDVERSION attribute in the message request is not set to a proper value. The  
3184 DTDVERSION attribute shall be in the form of "M.N", where M is the major revision of the  
3185 specification in numeric form and N is the minor revision in numeric form. The version shall  
3186 be at "2.0" or greater (for example, "2.0" or "2.1"). The CIM server or CIM listener shall  
3187 include a CIMError header in the response with a value of `unsupported-dtd-version`.

- 3188 • 401 Unauthorized

3189 The CIM server or CIM listener is configured to require that a client authenticate itself before it  
3190 can issue CIM message requests to the server or listener.

- 3191 • 403 Forbidden

3192 The CIM server or CIM listener does not allow the client to issue CIM message requests. The  
3193 CIM server or CIM listener may alternatively respond with a "404 Not Found" if it does not wish  
3194 to reveal this information to the client.

- 3195 • 407 Proxy Authentication Required

3196 The CIM server or CIM listener is configured to require that the proxy authenticate itself before it  
3197 can issue CIM message requests on behalf of a CIM client to the server or listener.

3198 Assuming that the CIM extension headers are correct, a validating CIM server or CIM listener (one that  
3199 enforces the validity of the CIM message request with respect to the CIM XML DTD) shall use the  
3200 following status code when processing the entity body containing the CIM message request:

- 3201 • 400 Bad Request

3202 The entity body defining the CIM message request is not well-formed or not valid with respect to  
3203 the CIM XML DTD. The CIM server or CIM listener shall include a [CIMError](#) header in the  
3204 response with a value of `request-not-well-formed` or `request-not-valid` (as  
3205 appropriate).

3206 A loosely-validating CIM server or CIM listener only enforces the CIM message request to be [loosely](#)  
3207 [valid](#). Therefore, it may reject a CIM message request that is not loosely valid with an HTTP status code  
3208 of 400 (Bad Request) before further processing. In this case, the CIM server or CIM listener shall include  
3209 a [CIMError](#) header in the response with a value of `request-not-loosely-valid`.

3210 A loosely-validating CIM server or CIM listener shall reject a CIM message request that is not well-formed  
3211 with an HTTP status code of 400 (Bad Request). In this case, the CIM server or CIM listener shall include  
3212 a [CIMError](#) header in the response with a value of `request-not-well-formed`.

3213 A loosely-validating CIM server or CIM listener shall not reject an invalid CIM message request that is  
3214 loosely valid in the XML sense.

3215 A loosely-validating CIM server or CIM listener shall ultimately signal an error to the CIM client if the CIM  
3216 message request is not loosely valid. That is, the request is missing required content or the required  
3217 content is incorrect, such as an attribute with an invalid value according to the CIM XML DTD. It is not  
3218 mandated to reject a CIM message request before processing, for to do otherwise would compel the  
3219 server or listener to check the complete request before processing can begin and this would be as  
3220 expensive as requiring the server or listener to fully validate the request. Therefore, a loosely-validating  
3221 server or listener may elect to begin processing the request and issuing a response (with an HTTP  
3222 success status code) before verifying that the entire request is loosely valid.

3223 A CIM client may use the [CIMValidation](#) header mechanism to determine whether a CIM server or CIM  
3224 listener is validating or loosely-validating.

3225 Assuming that the CIM message request is correctly formed as previously described, the CIM server or  
3226 CIM listener shall process the request accordingly and return a CIM message response.

3227 The entity body shall be a correct CIM message response for that request.

3228 If the CIM message response contains an entity that is a simple message response, then the response  
3229 status shall be "200 OK". Otherwise, the response status shall be "207 Multistatus".

## 3230 7.4 Security Considerations

3231 [CIM clients](#), [CIM servers](#), and [CIM listeners](#) may elect not to use authentication, but only in environments  
3232 where lack of security is not an issue.

3233 Basic authentication is described in [RFC 1945](#) and [RFC 2068](#). Digest authentication is defined in  
3234 [RFC 2069](#). Both authentication schemes are covered in a consolidated document ([RFC 2617](#)), which also  
3235 makes a number of improvements to the original specification of digest authentication.

3236 Basic authentication provides a very rudimentary level of authentication, with the major weakness that the  
3237 client password is sent over the wire in unencrypted form.

3238 For this reason, [CIM clients](#), [CIM servers](#), and [CIM listeners](#) shall not use basic authentication other than  
3239 in the context of a highly secure environment (for example, in conjunction with SSL or in a physically  
3240 secure private network). CIM servers and CIM listeners shall not send basic authentication credentials in  
3241 a WWW-Authenticate header other than in the context of a highly secure environment.

3242 Conforming applications should support the digest authentication scheme. Because digest authentication  
3243 verifies that both parties share a common secret without having to send that secret in the clear, it is more  
3244 secure than basic authentication. However, CIM clients, CIM servers, and CIM listeners that require more  
3245 robust protection should use encryption mechanisms such as SSL or SHTTP.

3246 CIM clients, CIM servers, and CIM listeners using basic or digest authentication shall comply with the  
3247 requirements set forth in [RFC 1945](#), [RFC 2068](#), [RFC 2069](#), and [RFC 2617](#). This specification describes  
3248 only *additional* requirements on CIM clients, CIM servers, and CIM listeners when these authentication  
3249 schemes are used.

3250 CIM servers and CIM listeners should require that CIM clients authenticate themselves. This specification  
3251 does not mandate this because it is recognized that in some circumstances the CIM server or CIM  
3252 listener may not require or wish the overhead of employing authentication. CIM servers and CIM listeners  
3253 should carefully consider the performance/security tradeoffs in determining how often to issue challenges  
3254 to CIM clients.

3255 A CIM server or CIM listener that returns a "401 Unauthorized" response to a CIM message request  
3256 should include in the WWW-Authenticate response-header either the "Basic" or "Digest" authentication  
3257 values (but not both). This specification does not mandate use of basic or digest authentication because it  
3258 is recognized that in some circumstances the CIM server or CIM listener may use bespoke authentication  
3259 mechanisms not covered by [RFC 2617](#). Similar considerations apply to the use of the Proxy-Authorization  
3260 header in "407 Proxy Authentication Required".

## 3261 **7.5 Determining CIM Server Capabilities**

3262 If a CIM server can return capabilities information, there are two techniques for returning this information  
3263 as defined in this specification:

- 3264 • The preferred technique is through the use of the classes defined in 7.5.1.
- 3265 • Alternatively, use of the HTTP OPTIONS method as defined in 7.5.2 is allowed because historically it  
3266 is the original technique defined for requesting capabilities information.

3267 Use of the CIM classes defined in 7.5.1 is strongly encouraged and it is expected that this method will be  
3268 enhanced and extended in the future to provide more capabilities information. The future use of the HTTP  
3269 OPTIONS method to determine capabilities of CIM servers is discouraged. It will probably not be  
3270 expanded significantly and may be reviewed for possible deprecation in the next major revision of this  
3271 specification.

### 3272 **7.5.1 Determining CIM Server Capabilities through CIM Classes**

3273 A set of CIM classes is defined specifically to return CIM server capabilities information as follows:

- 3274 • **CIM\_ObjectManager**  
3275 This class is a type of CIM\_Service that defines the capabilities of the target CIM server.
- 3276 • **CIM\_ObjectManagerCommunicationMechanism**  
3277 This class describes access to the target CIM server. It defines the capabilities of the CIM  
3278 server that are available through the target Object Manager Communication mechanism. A CIM  
3279 server is allowed to support different capabilities through different communication mechanisms.
- 3280 • **CIM\_CIMXMLCommunicationMechanism**  
3281 This class specializes on ObjectManagerCommunicationMechanism, adding properties specific  
3282 to the CIM-XML encoding and protocol.
- 3283 • **CIM\_CommMechanismForManager**

- 3284 This association between CIM\_ObjectManager and  
3285 CIM\_ObjectManagerCommunicationMechanism defines the communications protocols (and  
3286 corresponding capabilities) available on the target CIM server through the  
3287 ObjectManagerCommunicationMechanism instances.
- 3288 A CIM client may use instances of these CIM classes to determine the CIM capabilities (if any) of the  
3289 target CIM server. A CIM server that supports capabilities determination through these classes shall  
3290 support at least the Enumerate Instance and Get Instance operations for the classes. The use of other  
3291 methods of the basic read profile is optional. A CIM server that does not support the determination of CIM  
3292 capabilities through these classes shall return [CIM\\_ERR\\_NOT\\_FOUND](#) to any instance or class request  
3293 on these classes. These classes shall not be used for reporting any other information than capabilities of  
3294 the target CIM server.
- 3295 To provide interoperability, the CIM object manager classes shall exist in a well-known namespace.  
3296 Because there is no discovery mechanism that can define this well-known namespace to a CIM client, it  
3297 shall be one or more predefined namespaces. Therefore, to ensure interoperability, we recommend that  
3298 pending future extensions of the WBEM specifications include discovery tools that define a namespace  
3299 for these classes in a CIM server; these predefined namespaces should exist in either the root  
3300 namespace or in the /root/CIMV2 namespace.
- 3301 A CIM server that supports capabilities reporting through these classes shall correctly report the current  
3302 actual capabilities of the target CIM server and shall report on all capabilities defined. A CIM server is  
3303 allowed to report "none" if the capability does not exist or "unknown" if the status of the capability is  
3304 unknown at the time of the request for those properties where these choices exist in the properties  
3305 definition. Because the CIM\_ObjectManager object provides information on the target CIM server, only a  
3306 single instance of this class may exist in a CIM server.
- 3307 The capabilities to be reported through the CIM\_ObjectManagerCommunicationMechanism are as  
3308 follows:
- 3309 • CommunicationMechanism property, which defines the communication protocol for the  
3310 CommunicationMechanism object. A compliant CIM server shall include the CIM-XML protocol  
3311 for at least one ObjectManagerCommunicationMechanism instance.
  - 3312 • ProfilesSupported property, which defines the functional profiles supported as defined in clause  
3313 5.3.4. All CIM servers shall support the basic-read functional group. All CIM clients may assume  
3314 that any CIM server supports the basic-read functional group. The list of functional groups  
3315 returned by a CIM server shall contain the basic-read group and shall not contain duplicates.  
3316 CIM clients shall ignore duplicate entries in the functional-group list. If a functional group is  
3317 included in the list, the CIM client shall assume that all other groups on which it depends  
3318 (according to the rules defined in 5.3.4) are also supported. A CIM server should not explicitly  
3319 include a functional group in the list whose presence may be inferred implicitly by a  
3320 dependency. Support for a functional group does not imply that any method from that group will  
3321 always succeed. Rather, the absence of the functional group from this list (whether explicit or  
3322 implied) indicates to the CIM client that methods in that group will never succeed.
  - 3323 • MultipleOperationsSupported property, which defines whether the target CIM server supports  
3324 multiple operation requests as defined in 5.3.2. `True` in this property indicates that the server  
3325 can accept and process multiple operation requests. `False` indicates that the CIM server can  
3326 accept only single operation requests.
  - 3327 • AuthenticationMechanismsSupported property, which defines the authentication mechanisms  
3328 supported by the target CIM server as defined in 7.4.
  - 3329 • PulledEnumerationClosureOnExceedingServerLimits property, which indicates whether the CIM  
3330 server supports closure of Pulled Enumeration sessions based upon exceeding server limits.
  - 3331 • PulledEnumerationContinuationOnErrorSupported property, which indicates whether the CIM  
3332 server supports continuation on error for Pulled enumerations.

3333       • PulledEnumerationMinimumOperationTimeout (PulledEnumerationMaximumOperationTimeout)  
 3334       property, which indicates the minimum (maximum) operation timeout allowed by the CIM server  
 3335       for Pulled enumerations.

3336       Compliant CIM servers may report additional capabilities for the CommunicationMechanism Functional  
 3337       Profiles, QueryLanguageSupported, and AuthenticationMechanismSupported by defining the "other"  
 3338       enumeration in the property and returning additional information in the associated "additional capabilities"  
 3339       property.

## 3340   7.5.2   Determining CIM Server Capabilities through the HTTP Options

3341       A CIM client may use the OPTIONS method to determine the CIM capabilities (if any) of the target server.  
 3342       A [CIM server](#) may support the OPTIONS method (for example, CIM servers supporting only HTTP/1.0  
 3343       would not support OPTIONS).

3344       To support the ability for a server to declare its CIM capabilities independently of HTTP, the DMTF  
 3345       intends to publish a CIM schema (in a separate document) describing such capabilities. In particular, this  
 3346       mechanism would allow servers that do not support the OPTIONS method to declare their capabilities to  
 3347       a client.

3348       If a CIM server supports the OPTIONS method, it should return the following headers in the response:

- 3349       • CIM Extension Header [CIMProtocolVersion](#), which provides a way for a client to discover the  
 3350       version of the CIM HTTP mapping supported by the CIM server.
- 3351       • CIM Extension Header CIMSupportedFunctionalGroups, which provides a way for a client to  
 3352       discover the CIM operations supported by the CIM server.
- 3353       • CIM Extension Header [CIMSupportsMultipleOperations](#), which provides a way for the client to  
 3354       discover whether the CIM server can support [Multiple Operation Requests](#).

3355       In addition, if the CIM server supports one or more query languages, it should return the following header  
 3356       in the response:

- 3357       • CIM Extension Header [CIMSupportedQueryLanguages](#), which allows the client to discover the  
 3358       query languages supported by the CIM server.

3359       In addition, if the CIM server runs in a fixed validation mode, it should return the following header in the  
 3360       response:

- 3361       • CIM Extension Header [CIMValidation](#), which allows the client to determine whether the CIM  
 3362       server is strictly validating or loosely validating.

3363       If the [CIMProtocolVersion](#), [CIMSupportedFunctionalGroups](#), [CIMSupportsMultipleOperations](#),  
 3364       [CIMValidation](#), or [CIMSupportedQueryLanguages](#) extension headers are included in the response, the  
 3365       CIM server shall declare them as optional extension headers using the "Opt" header defined in  
 3366       [RFC 2774](#).

3367       The full format of the "Opt" header declaration for this specification is:

```
3368 Opt = "Opt" ":" "http://www.dmtf.org/cim/mapping/http/v1.0"
3369 ";" "ns" "=" header-prefix
3370 header-prefix = 2*DIGIT
```

3371       This header-prefix should be generated at random on a per-HTTP message basis and should not  
 3372       necessarily be a specific number.

3373       EXAMPLE: The following is a fragment of a legitimate OPTIONS response from a CIM server:

```
3374 HTTP/1.1 200 OK
3375 Opt: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=77
```



```

3376 77-CIMProtocolVersion: 1.0
3377 77-CIMSupportedFunctionalGroups: basic-read
3378 77-CIMBatch
3379 77-CIMSupportedQueryLanguages: wql
3380 ...

```

### 3381 7.5.2.1 CIMSupportedFunctionalGroups

3382 The CIMSupportedFunctionalGroups extension header should be returned by a [CIM server](#) in any  
 3383 OPTIONS response. It shall not be returned in any other scenario.

3384 This header is defined as follows:

```

3385 CIMSupportedFunctionalGroups = "CIMSupportedFunctionalGroups" ":" 1#functional-
3386 group
3387 functional-group = "basic-read" |
3388 "basic-write" |
3389 "schema-manipulation" |
3390 "instance-manipulation" |
3391 "qualifier-declaration" |
3392 "association-traversal" |
3393 "query-execution"

```

3394 The functional group definitions correspond directly to those listed in 5.4.3. All CIM servers shall support  
 3395 the basic-read functional group. All [CIM clients](#) may assume that any CIM server supports the basic-read  
 3396 functional group.

3397 The list of functional groups returned by a CIM server shall contain the basic-read group and shall not  
 3398 contain any duplicates. CIM clients shall ignore any duplicate entries in the functional-group list.

3399 If a functional group is included in the list, the CIM client shall assume that all other groups on which it  
 3400 depends (according to the rules defined in 5.4.3) are also supported. A CIM server should not explicitly  
 3401 include a functional group in the list if the presence of the group may be implied by a dependency.

3402 EXAMPLE: The following HTTP response message indicates that the CIM server supports instance-manipulation,  
 3403 association-traversal, basic-write, and basic-read.

```

3404 HTTP/1.1 200 OK
3405 Opt: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=77
3406 77-CIMProtocolVersion: 1.0
3407 77-CIMSupportedFunctionalGroups: association-traversal, instance-manipulation
3408 ...

```

3409 Support for a functional group does *not* imply that any method from that group will always succeed.  
 3410 Rather, the absence (whether explicit or implied) of the functional group from this header is an indication  
 3411 to the CIM client that methods in that group will *never* succeed.

### 3412 7.5.2.2 CIMSupportsMultipleOperations

3413 The CIMSupportsMultipleOperations extension header shall be returned in an OPTIONS response by any  
 3414 [CIM server](#) that supports [Multiple Operation Requests](#). It shall not be returned in any other circumstances.

3415 This header is defined as follows:

```

3416 CIMSupportsMultipleOperations = "CIMSupportsMultipleOperations"

```

3417 The presence of this header indicates that the server can accept and process multiple operation requests.  
 3418 The absence of this header indicates that the server can only accept and process [Simple Operation](#)  
 3419 [Requests](#).

### 3420 7.5.2.3 CIMSupportedQueryLanguages

3421 The CIMSupportedQueryLanguages extension header should be returned by a [CIM server](#) that supports  
3422 at least one query language in any OPTIONS response. It shall not be returned in any other scenario.

3423 This header is defined as follows (token has the meaning conferred by [RFC 2068](#), section 2.2):

```
3424 CIMSupportedQueryLanguages = "CIMSupportedQueryLanguages" ":" 1#query-language
3425 query-language = token
```

3426 The query-language value shall be treated as case-insensitive. It is anticipated that query languages will  
3427 be submitted for approval to the DMTF, and each submission will define a value for this token to enable it  
3428 to be specified in this header.

### 3429 7.5.2.4 CIMValidation

3430 The CIMValidation extension header may be returned by a [CIM server](#) to provide information about the  
3431 level of validation of [CIM Operation Request](#) messages.

3432 This header is defined as follows:

```
3433 CIMValidation = "CIMValidation" ":" validation-level
3434 validation-level = "validating" |
3435 "loosely-validating"
```

3436 A validation-level of `validating` indicates that the CIM server always applies strict validation of each  
3437 CIM operation request. A validation-level of `loosely-validating` indicates that the CIM server applies  
3438 [loose validation](#) of each CIM operation request.

3439 In the absence of this header, a CIM client should assume that the CIM server operates in strict validation  
3440 mode.

## 3441 7.6 Other HTTP Methods

3442 This specification does not in any way define or constrain the way a CIM client, CIM server, or  
3443 CIM listener uses any HTTP method other than those explicitly cited.

## 3444 7.7 Discovery and Addressing

3445 The target URI of the [CIM Operation Request](#) is defined as the location of the [CIM server](#). This  
3446 specification does not constrain the format of this URI other than it should be a valid URI ([RFC 2396](#)) for  
3447 describing an HTTP-addressable resource.

3448 An HTTP server that supports the CIM mapping defined in this specification, and which supports the  
3449 OPTIONS method, should include the following CIM extension header in an OPTIONS response:

- 3450 • CIMOM

3451 This header is defined as follows:

```
3452 CIMOM = "CIMOM" ":" (absoluteURI | relativeURI)
```

3453 The terms `absoluteURI` and `relativeURI` are taken from [RFC 2068](#); they indicate the location of the CIM  
3454 server for this HTTP server.

3455 If the CIMOM extension header is included in the response, the CIM server shall declare it an optional  
3456 extension header as described in 7.5.

3457 A [CIM client](#) that needs to communicate with a CIM server on an HTTP server should try an OPTIONS  
3458 request to that HTTP server. If the OPTIONS request fails or the response does not include the CIM-

3459 CIMOM extension header, the CIM client may assume that the value of CIM-CIMOM is the relative URI  
3460 **cimom**.

3461 The DMTF recommends the use of the following well-known IP ports in compliant CIM servers. This is a  
3462 recommendation and not a requirement. The DMTF has registered these port addresses with IANA, so  
3463 they are for the exclusive use of the DMTF.

- 3464 • CIM-XML (HTTP) 5988/tcp
- 3465 • CIM-XML (HTTP) 5988/udp
- 3466 • CIM-XML (HTTPS) 5989/tcp
- 3467 • CIM-XML (HTTPS) 5989/udp

3468 Other discovery mechanisms are outside the scope of this version of the specification.

3469 EXAMPLE 1:

3470 This example shows an HTTP server located at <http://www.dmtf.org/> issuing an OPTIONS response to an HTTP  
3471 client to indicate that its CIM server is located at <http://www.dmtf.org/access/cimom>.

```
3472 HTTP/1.1 200 OK
3473 Opt: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=48
3474 48-CIMOM: /access/cimom
3475 ...
```

3476 EXAMPLE 2:

3477 If an HTTP server located at <http://www.dmtf.org/> responds with a "501 Not Implemented" to an OPTIONS  
3478 request from a CIM client, the CIM client may then try to contact the CIM server at <http://www.dmtf.org/cimom>.

## 3479 7.8 Internationalization Considerations

3480 This clause defines the capabilities of the CIM HTTP mapping with respect to IETF policy guidelines on  
3481 character sets and languages ([RFC 2277](#)).

3482 In this specification, human-readable fields are contained within a response or request entity body. In all  
3483 cases, a human-readable content is encoded using XML (which explicitly provides for character set  
3484 tagging and encoding) and requires that XML processors read XML elements encoded, at minimum,  
3485 using the UTF-8 ([RFC 2279](#)) encoding of the ISO 10646 multilingual plane.

3486 Properties that are not of type string or string array shall not be localized.

3487 Because keys are writeable only on instantiation, key values shall not be localized. See [DSP0004](#) for  
3488 details.

3489 XML examples in this specification demonstrate the use of the charset parameter of the Content-Type  
3490 header, as defined in [RFC 2616](#), as well as the XML attribute on the <?xml> processing instruction, which  
3491 together provide charset identification information for MIME and XML processors. This specification  
3492 mandates that conforming applications shall support at least the "UTF-8" charset encoding ([RFC 2277](#)) in  
3493 the Content-Type header and shall support the "UTF-8" value for the XML `encoding` attribute.

3494 XML also provides a language tagging capability for specifying the language of the contents of a  
3495 particular XML element, based on use of [IANA registered language tags \(RFC 1766\)](#) in combination with  
3496 [ISO 639-1](#), in the `xml:lang` attribute of an XML element to identify the language of its content and  
3497 attributes. Section 3.10 of [RFC 2616](#) defines how the two-character ISO 639-1 language code is used as  
3498 the primary-tag. The language-tag shall be registered by IANA.

3499 [DSP0201](#) and [DSP0203](#) declare this attribute on any XML elements. Therefore, conforming applications  
3500 should use this attribute when specifying the language in which a particular element is encoded for string  
3501 and string array attributes and qualifiers. See the usage [rules](#) on this element, which are defined by the

3502 World Wide Web Consortium in [XML 1.0, second edition](#). The attribute may be scoped by the instance or  
3503 a class and should not be scoped by a property because instances or classes should be localized in one  
3504 language.

3505 This specification defines several names of HTTP headers and their values. These names are  
3506 constructed using standard encoding practices so that they always have an HTTP-safe ASCII  
3507 representation. Because these headers are not usually visible to users, they do not need to support  
3508 encoding in multiple character sets.

3509 [DSP0201](#) and [DSP0203](#) introduce several XML element names. Similarly, these names are not visible to  
3510 an end user and do not need to support multiple character set encodings.

3511 The [CIM model \(DSP0004\)](#) defines the subset of the Unicode character set that can be used to name  
3512 CIM elements (classes, instances, methods, properties, qualifiers, and method parameters). In general,  
3513 these characters appear as the value of XML attributes or as element content and are not displayed to  
3514 end users.

3515 Negotiation and notification of language settings is effected in this mapping using the standard [Accept-](#)  
3516 [Language](#) and [Content-Language](#) headers defined in [RFC 2068](#).

## ANNEX A (Informative)

3517  
3518  
3519  
3520  
3521

### Examples of Message Exchanges

3522 This annex illustrates the protocol defined in this document with examples of valid HTTP  
3523 request/response exchanges. The examples are for illustration purposes only and are not considered part  
3524 of the specification.

3525 For clarity, additional white space is included in the examples, but such white space is not an intrinsic part  
3526 of such XML documents.

#### 3527 A.1 Retrieval of a Single Class Definition

3528 The following HTTP request illustrates how a client requests the class CIM\_VideoBIOSElement.

```

3529 M-POST /cimom HTTP/1.1
3530 HOST: http://www.myhost.com/
3531 Content-Type: application/xml; charset=utf-8
3532 Content-Length: xxxx
3533 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3534 73-CIMOperation: MethodCall
3535 73-CIMMethod: GetClass
3536 73-CIMObject: root/cimv2

3537 <?xml version="1.0" encoding="utf-8" ?>
3538 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3539 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3540 <SIMPLEREQ>
3541 <IMETHODCALL NAME="GetClass">
3542 <LOCALNAMESPACEPATH>
3543 <NAMESPACE NAME="root"/>
3544 <NAMESPACE NAME="cimv2"/>
3545 </LOCALNAMESPACEPATH>
3546 <IPARAMVALUE NAME="ClassName"><CLASSNAME
3547 NAME="CIM_VideoBIOSElement" /></IPARAMVALUE>
3548 <IPARAMVALUE NAME="LocalOnly"><VALUE>FALSE</VALUE></IPARAMVALUE>
3549 </IMETHODCALL>
3550 </SIMPLEREQ>
3551 </MESSAGE>
3552 </CIM>

```

3553 Following is an HTTP response to the preceding request indicating success of the requested operation.  
3554 For clarity of exposition, the complete definition of the returned <CLASS> element is not shown.

```

3555 HTTP/1.1 200 OK
3556 Content-Type: application/xml; charset=utf-8
3557 Content-Length: xxxx
3558 Ext:
3559 Cache-Control: no-cache
3560 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3561 73-CIMOperation: MethodResponse

```

```

3562 <?xml version="1.0" encoding="utf-8" ?>
3563 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3564 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3565 <SIMPLERSP>
3566 <IMETHODRESPONSE NAME="GetClass">
3567 <IRETURNVALUE>
3568 <CLASS NAME="CIM_VideoBIOSElement" SUPERCLASS="CIM_SoftwareElement">
3569 ...
3570 </CLASS>
3571 </IRETURNVALUE>
3572 </IMETHODRESPONSE>
3573 </SIMPLERSP>
3574 </MESSAGE>
3575 </CIM>

```

## 3576 A.2 Retrieval of a Single Instance Definition

3577 The following HTTP request illustrates how a client requests the instance MyClass.MyKey="S3".

```

3578 M-POST /cimom HTTP/1.1
3579 HOST: http://www.myhost.com/
3580 Content-Type: application/xml; charset=utf-8
3581 Content-Length: xxxx
3582 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3583 73-CIMOperation: MethodCall
3584 73-CIMMethod: GetInstance
3585 73-CIMObject: root%2FmyNamespace

3586 <?xml version="1.0" encoding="utf-8" ?>
3587 <CIM CIMVERSION="2.0" DTDVERSION="1.1">
3588 <MESSAGE ID="87855" PROTOCOLVERSION="1.0">
3589 <SIMPLEREQ>
3590 <IMETHODCALL NAME="GetInstance">
3591 <LOCALNAMESPACEPATH>
3592 <NAMESPACE NAME="root" />
3593 <NAMESPACE NAME="myNamespace" />
3594 </LOCALNAMESPACEPATH>
3595 <IPARAMVALUE NAME="InstanceName">
3596 <INSTANCENAME CLASSNAME="MyClass">
3597 <KEYBINDING NAME="MyKey"><KEYVALUE>S3</KEYVALUE></KEYBINDING>
3598 </INSTANCENAME>
3599 </IPARAMVALUE>
3600 <IPARAMVALUE NAME="LocalOnly"><VALUE>FALSE</VALUE></IPARAMVALUE>
3601 </IMETHODCALL>
3602 </SIMPLEREQ>
3603 </MESSAGE>
3604 </CIM>

```

3605 Following is an HTTP response to the preceding request indicating an error because the specified  
3606 instance is not found.

```

3607 HTTP/1.1 200 OK
3608 Content-Type: application/xml; charset=utf-8
3609 Content-Length: xxxx
3610 Ext:

```

```

3611 Cache-Control: no-cache
3612 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3613 73-CIMOperation: MethodResponse
3614 <?xml version="1.0" encoding="utf-8" ?>
3615 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3616 <MESSAGE ID="87885" PROTOCOLVERSION="1.0">
3617 <SIMPLERSP>
3618 <IMETHODRESPONSE NAME="GetInstance">
3619 <ERROR CODE="6" DESCRIPTION="Instance of MyClass not found"/>
3620 </IMETHODRESPONSE>
3621 </SIMPLERSP>
3622 </MESSAGE>
3623 </CIM>

```

### 3624 A.3 Deletion of a Single Class Definition

3625 The following HTTP request illustrates how a client deletes the class CIM\_VideoBIOSElement.

```

3626 M-POST /cimom HTTP/1.1
3627 HOST: http://www.myhost.com/
3628 Content-Type: application/xml; charset=utf-8
3629 Content-Length: xxxx
3630 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3631 73-CIMOperation: MethodCall
3632 73-CIMMethod: DeleteClass
3633 73-CIMObject: root/cimv2
3634 <?xml version="1.0" encoding="utf-8" ?>
3635 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3636 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3637 <SIMPLEREQ>
3638 <IMETHODCALL NAME="DeleteClass">
3639 <LOCALNAMESPACEPATH>
3640 <NAMESPACE NAME="root" />
3641 <NAMESPACE NAME="cimv2" />
3642 </LOCALNAMESPACEPATH>
3643 <IPARAMVALUE NAME="ClassName"><CLASSNAME
3644 NAME="CIM_VideoBIOSElement" /></IPARAMVALUE>
3645 </IMETHODCALL>
3646 </SIMPLEREQ>
3647 </MESSAGE>
3648 </CIM>

```

3649 Following is an HTTP response to the preceding request indicating failure of the preceding operation due  
3650 to the inability to delete instances of the class.

```

3651 HTTP/1.1 200 OK
3652 Content-Type: application/xml; charset=utf-8
3653 Content-Length: xxxx
3654 Ext:
3655 Cache-Control: no-cache
3656 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3657 73-CIMOperation: MethodResponse
3658 <?xml version="1.0" encoding="utf-8" ?>
3659 <CIM CIMVERSION="2.0" DTDVERSION="2.0">

```

```

3660 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3661 <SIMPLERSP>
3662 <IMETHODRESPONSE NAME="DeleteClass">
3663 <ERROR CODE="9" DESCRIPTION="Class has non-deletable instances"/>
3664 </IMETHODRESPONSE>
3665 </SIMPLERSP>
3666 </MESSAGE>
3667 </CIM>

```

#### 3668 A.4 Deletion of a Single Instance Definition

3669 The following HTTP request illustrates how a client deletes the instance MyClass.MyKey="S3".

```

3670 M-POST /cimom HTTP/1.1
3671 HOST: http://www.myhost.com/
3672 Content-Type: application/xml; charset=utf-8
3673 Content-Length: xxxx
3674 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3675 73-CIMOperation: MethodCall
3676 73-CIMMethod: DeleteInstance
3677 73-CIMObject: root%2FmyNamespace
3678 <?xml version="1.0" encoding="utf-8" ?>
3679 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3680 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3681 <SIMPLEREQ>
3682 <IMETHODCALL NAME="DeleteInstance">
3683 <LOCALNAMESPACEPATH>
3684 <NAMESPACE NAME="root"/>
3685 <NAMESPACE NAME="myNamespace"/>
3686 </LOCALNAMESPACEPATH>
3687 <IPARAMVALUE NAME="InstanceName">
3688 <INSTANCENAME CLASSNAME="MyClass">
3689 <KEYBINDING NAME="MyKey">
3690 <KEYVALUE>S3</KEYVALUE>
3691 </KEYBINDING>
3692 </INSTANCENAME>
3693 </IPARAMVALUE>
3694 </IMETHODCALL>
3695 </SIMPLEREQ>
3696 </MESSAGE>
3697 </CIM>

```

3698 Following is an HTTP response to the preceding request indicating success of the preceding operation.

```

3699 HTTP/1.1 200 OK
3700 Content-Type: application/xml; charset=utf-8
3701 Content-Length: xxxx
3702 Ext:
3703 Cache-Control: no-cache
3704 Man: http://www.dmtf.org/cim/operation ; ns=73
3705 73-CIMOperation: MethodResponse
3706 <?xml version="1.0" encoding="utf-8" ?>
3707 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3708 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">

```



```

3709 <SIMPLERSP>
3710 <IMETHODRESPONSE NAME="DeleteInstance"/>
3711 </SIMPLERSP>
3712 </MESSAGE>
3713 </CIM>

```

## 3714 A.5 Creation of a Single Class Definition

3715 The following HTTP request illustrates how a client creates the class MySchema\_VideoBIOSElement as  
 3716 a subclass of CIM\_VideoBIOSElement. For clarity of exposition, most of the submitted <CLASS> element  
 3717 is omitted from the example.

```

3718 M-POST /cimom HTTP/1.1
3719 HOST: http://www.myhost.com/
3720 Content-Type: application/xml; charset=utf-8
3721 Content-Length: xxxx
3722 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3723 73-CIMOperation: MethodCall
3724 73-CIMMethod: CreateClass
3725 73-CIMObject: root/cimv2
3726
3727 <?xml version="1.0" encoding="utf-8" ?>
3728 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3729 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3730 <SIMPLEREQ>
3731 <IMETHODCALL NAME="CreateClass">
3732 <LOCALNAMESPACEPATH>
3733 <NAMESPACE NAME="root"/>
3734 <NAMESPACE NAME="cimv2"/>
3735 </LOCALNAMESPACEPATH>
3736 <IPARAMVALUE NAME="NewClass">
3737 <CLASS NAME="MySchema_VideoBIOSElement"
3738 SUPERCLASS="CIM_VideoBIOSElement">
3739 ...
3740 </CLASS>
3741 </IPARAMVALUE>
3742 </IMETHODCALL>
3743 </SIMPLEREQ>
3744 </MESSAGE>
3745 </CIM>

```

3745 Following is an HTTP response to the preceding request indicating success of the preceding operation.

```

3746 HTTP/1.1 200 OK
3747 Content-Type: application/xml; charset=utf-8
3748 Content-Length: xxxx
3749 Ext:
3750 Cache-Control: no-cache
3751 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3752 73-CIMOperation: MethodResponse
3753
3754 <?xml version="1.0" encoding="utf-8" ?>
3755 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3756 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3757 <SIMPLERSP>
3758 <IMETHODRESPONSE NAME="CreateClass"/>

```

```

3758 </SIMPLERSP>
3759 </MESSAGE>
3760 </CIM>

```

## 3761 A.6 Creation of a Single Instance Definition

3762 The following HTTP request illustrates how a client creates an instance of the class  
 3763 MySchema\_VideoBIOSElement. For clarity of exposition, most of the submitted <INSTANCE> element is  
 3764 omitted from the example.

```

3765 M-POST /cimom HTTP/1.1
3766 HOST: http://www.myhost.com/
3767 Content-Type: application/xml; charset=utf-8
3768 Content-Length: xxxx
3769 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3770 73-CIMOperation: MethodCall
3771 73-CIMMethod: CreateInstance
3772 73-CIMObject: root/cimv2

3773 <?xml version="1.0" encoding="utf-8" ?>
3774 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3775 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3776 <SIMPLEREQ>
3777 <IMETHODCALL NAME="CreateInstance">
3778 <LOCALNAMESPACEPATH>
3779 <NAMESPACE NAME="root"/>
3780 <NAMESPACE NAME="cimv2"/>
3781 </LOCALNAMESPACEPATH>
3782 <IPARAMVALUE NAME="NewInstance">
3783 <INSTANCE CLASSNAME="CIM_VideoBIOSElement">
3784 ...
3785 </INSTANCE>
3786 </IPARAMVALUE>
3787 </IMETHODCALL>
3788 </SIMPLEREQ>
3789 </MESSAGE>
3790 </CIM>

```

3791 Following is an HTTP response to the preceding request indicating the success of the preceding  
 3792 operation.

```

3793 HTTP/1.1 200 OK
3794 Content-Type: application/xml; charset=utf-8
3795 Content-Length: xxxx
3796 Ext:
3797 Cache-Control: no-cache
3798 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3799 73-CIMOperation: MethodResponse

3800 <?xml version="1.0" encoding="utf-8" ?>
3801 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3802 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3803 <SIMPLERSP>
3804 <IMETHODRESPONSE NAME="CreateInstance">
3805 <IRETURNVALUE>
3806 <INSTANCENAME CLASSNAME="MySchema_VideoBIOSElement">

```

```

3807 <KEYBINDING NAME="Name" >
3808 <KEYVALUE>S4</KEYVALUE>
3809 </KEYBINDING>
3810 </INSTANCENAME>
3811 </IRETURNVALUE>
3812 </IRETURNVALUE>
3813 </SIMPLERSP>
3814 </MESSAGE>
3815 </CIM>

```

## 3816 A.7 Enumeration of Class Names

3817 The following HTTP request illustrates how a client enumerates the names of all subclasses of the class  
3818 CIM\_SoftwareElement.

```

3819 M-POST /cimom HTTP/1.1
3820 HOST: http://www.myhost.com/
3821 Content-Type: application/xml; charset=utf-8
3822 Content-Length: xxxx
3823 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3824 73-CIMOperation: MethodCall
3825 73-CIMMethod: EnumerateClassNames
3826 73-CIMObject: root/cimv2
3827 <?xml version="1.0" encoding="utf-8" ?>
3828 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3829 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3830 <SIMPLEREQ>
3831 <IMETHODCALL NAME="EnumerateClassNames">
3832 <LOCALNAMESPACEPATH>
3833 <NAMESPACE NAME="root" />
3834 <NAMESPACE NAME="cimv2" />
3835 </LOCALNAMESPACEPATH>
3836 <IPARAMVALUE NAME="ClassName"><CLASSNAME
3837 NAME="CIM_SoftwareElement" /></IPARAMVALUE>
3838 <IPARAMVALUE
3839 NAME="DeepInheritance"><VALUE>FALSE</VALUE></IPARAMVALUE>
3840 </IMETHODCALL>
3841 </SIMPLEREQ>
3842 </MESSAGE>
3843 </CIM>

```

3844 Following is an HTTP response to the preceding request indicating the success of the preceding  
3845 operation and returning the names of the requested subclasses.

```

3846 HTTP/1.1 200 OK
3847 Content-Type: application/xml; charset=utf-8
3848 Content-Length: xxxx
3849 Ext:
3850 Cache-Control: no-cache
3851 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3852 73-CIMOperation: MethodResponse
3853 <?xml version="1.0" encoding="utf-8" ?>
3854 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3855 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">

```

```

3856 <SIMPLERSP>
3857 <IMETHODRESPONSE NAME="EnumerateClassNames">
3858 <IRETURNVALUE>
3859 <CLASSNAME NAME="CIM_BIOSElement"/>
3860 <CLASSNAME NAME="CIM_VideoBOISElement"/>
3861 </IRETURNVALUE>
3862 </IMETHODRESPONSE>
3863 </SIMPLERSP>
3864 </MESSAGE>
3865 </CIM>

```

## 3866 A.8 Enumeration of Instances

3867 The following HTTP request illustrates how a client enumerates all instances of the class  
 3868 CIM\_LogicalDisk. For clarity of exposition, most of the returned instances are omitted from the example.

```

3869 M-POST /cimom HTTP/1.1
3870 HOST: http://www.myhost.com/
3871 Content-Type: application/xml; charset=utf-8
3872 Content-Length: xxxx
3873 Man: http://www.dmtf.org/cim/operation ; ns=73
3874 73-CIMOperation: MethodCall
3875 73-CIMMethod: EnumerateInstances
3876 73-CIMObject: root/cimv2

3877 <?xml version="1.0" encoding="utf-8" ?>
3878 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3879 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3880 <SIMPLEREQ>
3881 <IMETHODCALL NAME="EnumerateInstances">
3882 <LOCALNAMESPACEPATH>
3883 <NAMESPACE NAME="root"/>
3884 <NAMESPACE NAME="cimv2"/>
3885 </LOCALNAMESPACEPATH>
3886 <IPARAMVALUE NAME="ClassName"><CLASSNAME
3887 NAME="CIM_LogicalDisk"/></IPARAMVALUE>
3888 <IPARAMVALUE NAME="LocalOnly"><VALUE>TRUE</VALUE></IPARAMVALUE>
3889 <IPARAMVALUE NAME="DeepInheritance"><VALUE>TRUE</VALUE></IPARAMVALUE>
3890 </IMETHODCALL>
3891 </SIMPLEREQ>
3892 </MESSAGE>
3893 </CIM>

```

3894 Following is an HTTP response to the preceding request indicating success of the preceding operation,  
 3895 returning the requested instances.

```

3896 HTTP/1.1 200 OK
3897 Content-Type: application/xml; charset=utf-8
3898 Content-Length: xxxx
3899 Ext:
3900 Cache-Control: no-cache
3901 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3902 73-CIMOperation: MethodResponse

3903 <?xml version="1.0" encoding="utf-8" ?>
3904 <CIM CIMVERSION="2.0" DTDVERSION="2.0">

```

```

3905 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3906 <SIMPLERSP>
3907 <IMETHODRESPONSE NAME="EnumerateInstances">
3908 <IRETURNVALUE>
3909 <VALUE.NAMEDINSTANCE>
3910 <INSTANCENAME CLASSNAME="Erewhon_LogicalDisk">
3911 ...
3912 </INSTANCENAME>
3913 <INSTANCE CLASSNAME="Erewhon_LogicalDisk">
3914 ...
3915 </INSTANCE>
3916 </VALUE.NAMEDINSTANCE>
3917 ...
3918 <VALUE.NAMEDINSTANCE>
3919 <INSTANCENAME CLASSNAME="Foobar_LogicalDisk">
3920 ...
3921 </INSTANCENAME>
3922 <INSTANCE CLASSNAME="Foobar_LogicalDisk">
3923 ...
3924 </INSTANCE>
3925 </VALUE.NAMEINSTANCE>
3926 </IRETURNVALUE>
3927 </IMETHODRESPONSE>
3928 </SIMPLERSP>
3929 </MESSAGE>
3930 </CIM>

```

### 3931 A.9 Retrieval of a Single Property

3932 The following HTTP request illustrates how a client retrieves the FreeSpace property from the instance  
3933 MyDisk.DeviceID="C:".

```

3934 M-POST /cimom HTTP/1.1
3935 HOST: http://www.myhost.com/
3936 Content-Type: application/xml; charset=utf-8
3937 Content-Length: xxxx
3938 Man: http://www.dmtf.org/cim/operation ; ns=73
3939 73-CIMOperation: MethodCall
3940 73-CIMMethod: GetProperty
3941 73-CIMObject: root%2FmyNamespace
3942 <?xml version="1.0" encoding="utf-8" ?>
3943 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3944 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3945 <SIMPLEREQ>
3946 <IMETHODCALL NAME="GetProperty">
3947 <LOCALNAMESPACEPATH>
3948 <NAMESPACE NAME="root" />
3949 <NAMESPACE NAME="myNamespace" />
3950 </LOCALNAMESPACEPATH>
3951 <IPARAMVALUE NAME="InstanceName">
3952 <INSTANCENAME CLASSNAME="MyDisk">
3953 <KEYBINDING NAME="DeviceID"><KEYVALUE>C:</KEYVALUE></KEYBINDING>
3954 </INSTANCENAME>

```

```

3955 </IPARAMVALUE>
3956 <IPARAMVALUE
3957 NAME="PropertyName"><VALUE>FreeSpace</VALUE></IPARAMVALUE>
3958 </IMETHODCALL>
3959 </SIMPLEREQ>
3960 </MESSAGE>
3961 </CIM>

```

3962 Following is an HTTP response to the preceding request indicating success of the preceding operation,  
 3963 returning the requested value.

```

3964 HTTP/1.1 200 OK
3965 Content-Type: application/xml; charset=utf-8
3966 Content-Length: xxxx
3967 Ext:
3968 Cache-Control: no-cache
3969 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3970 73-CIMOperation: MethodResponse

3971 <?xml version="1.0" encoding="utf-8" ?>
3972 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3973 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3974 <SIMPLERSP>
3975 <IMETHODRESPONSE NAME="GetProperty">
3976 <IRETURNVALUE>
3977 <VALUE>6752332</VALUE>
3978 </IRETURNVALUE>
3979 </IMETHODRESPONSE>
3980 </SIMPLERSP>
3981 </MESSAGE>
3982 </CIM>

```

### 3983 A.10 Execution of an Extrinsic Method

3984 The following HTTP request illustrates how a client executes the SetPowerState method on the instance  
 3985 MyDisk.DeviceID="C:".

```

3986 M-POST /cimom HTTP/1.1
3987 HOST: http://www.myhost.com/
3988 Content-Type: application/xml; charset=utf-8
3989 Content-Length: xxxx
3990 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
3991 73-CIMOperation: MethodCall
3992 73-CIMMethod: SetPowerState
3993 73-CIMObject: root%2FmyNamespace%3AMyDisk.Name%3D%22C%3A%22

3994 <?xml version="1.0" encoding="utf-8" ?>
3995 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
3996 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
3997 <SIMPLEREQ>
3998 <METHODCALL NAME="SetPowerState">
3999 <LOCALINSTANCEPATH>
4000 <LOCALNAMESPACEPATH>
4001 <NAMESPACE NAME="root" />
4002 <NAMESPACE NAME="myNamespace" />
4003 </LOCALNAMESPACEPATH>

```

```

4004 <INSTANCENAME CLASSNAME="MyDisk">
4005 <KEYBINDING NAME="Name"><KEYVALUE>C:</KEYVALUE></KEYBINDING>
4006 </INSTANCENAME>
4007 </LOCALINSTANCEPATH>
4008 <PARAMVALUE NAME="PowerState"><VALUE>1</VALUE></PARAMVALUE>
4009 <PARAMVALUE
4010 NAME="Time"><VALUE>00000001132312.000000:000</VALUE></PARAMVALUE>
4011 </METHODCALL>
4012 </SIMPLEREQ>
4013 </MESSAGE>
4014 </CIM>

```

4015 Following is an HTTP response to the preceding request indicating the success of the preceding  
 4016 operation.

```

4017 HTTP/1.1 200 OK
4018 Content-Type: application/xml; charset=utf-8
4019 Content-Length: xxxx
4020 Ext:
4021 Cache-Control: no-cache
4022 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=73
4023 73-CIMOperation: MethodResponse
4024
4025 <?xml version="1.0" encoding="utf-8" ?>
4026 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
4027 <MESSAGE ID="87872" PROTOCOLVERSION="1.0">
4028 <SIMPLERSP>
4029 <METHODRESPONSE NAME="SetPowerState">
4030 <RETURNVALUE>
4031 <VALUE>0</VALUE>
4032 </RETURNVALUE>
4033 </METHODRESPONSE>
4034 </SIMPLERSP>
4035 </MESSAGE>
4036 </CIM>

```

### 4036 A.11 Indication Delivery Example

4037 The following HTTP request illustrates the format for sending an indication of type CIM\_AlertIndication to  
 4038 a CIM listener.

```

4039 M-POST /cimlistener/browser HTTP/1.1
4040 HOST: http://www.acme.com/
4041 Content-Type: application/xml; charset=utf-8
4042 Content-Length: XXX
4043 Man: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=40
4044 40-CIMExport: MethodRequest
4045 40-CIMExportMethod: ExportIndication
4046
4047 <?xml version="1.0" encoding="utf-8" ?>
4048 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
4049 <MESSAGE ID="1007" PROTOCOLVERSION="1.0">
4050 <SIMPLEEXPREQ>
4051 <EXPMETHODCALL NAME="ExportIndication">
4052 <EXPPARAMVALUE NAME="NewIndication">
4053 <INSTANCE CLASSNAME="CIM_AlertIndication" >

```

```

4053 <PROPERTY NAME="Description" TYPE="string">
4054 <VALUE>Sample CIM_AlertIndication indication</VALUE>
4055 </PROPERTY>
4056 <PROPERTY NAME="AlertType" TYPE="uint16">
4057 <VALUE>1</VALUE>
4058 </PROPERTY>
4059 <PROPERTY NAME="PerceivedSeverity" TYPE="uint16">
4060 <VALUE>3</VALUE>
4061 </PROPERTY>
4062 <PROPERTY NAME="ProbableCause" TYPE="uint16">
4063 <VALUE>2</VALUE>
4064 </PROPERTY>
4065 <PROPERTY NAME="IndicationTime" TYPE="datetime">
4066 <VALUE>20010515104354.000000:000</VALUE>
4067 </PROPERTY>
4068 </INSTANCE>
4069 </EXPPARAMVALUE>
4070 </EXPMETHODCALL>
4071 </SIMPLEEXPREQ>
4072 </MESSAGE>
4073 </CIM>

```

4074 Following is an HTTP response to the preceding request indicating a successful receipt by the CIM  
4075 listener.

```

4076 HTTP/1.1 200 OK
4077 Content-Type: application/xml; charset=utf-8
4078 Content-Length: 267
4079 Ext:
4080 Cache-Control: no-cache
4081 Man: http://www.dmtf.org/cim/mapping/http/v1.0; ns=40
4082 40-CIMExport: MethodResponse

4083 <?xml version="1.0" encoding="utf-8" ?>
4084 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
4085 <MESSAGE ID="1007" PROTOCOLVERSION="1.0">
4086 <SIMPLEEXPRSP>
4087 <EXPMETHODRESPONSE NAME="ExportIndication">
4088 <IRETURNVALUE>
4089 </IRETURNVALUE>
4090 </EXPMETHODRESPONSE>
4091 </SIMPLEEXPRSP>
4092 </MESSAGE>
4093 </CIM>

```

## 4094 A.12 Subscription Example

4095 A CIM client application activates a subscription by creating an instance of the  
4096 CIM\_IndicationSubscription class, which defines an association between a CIM\_IndicationFilter (a filter)  
4097 instance and a CIM\_IndicationHandler (a handler) instance. The CIM\_IndicationFilter instance defines the  
4098 filter criteria and data project list to describe the desired indication stream. The CIM\_IndicationHandler  
4099 instance defines the desired indication encoding, destination location, and protocol for delivering the  
4100 indication stream.



4101 The following HTTP request illustrates how a client creates an instance of the class CIM\_IndicationFilter.  
 4102 Note that the exact syntax of the WMI Query Language is still under review and is subject to change.

```

4103 Host: bryce
4104 Content-Type: application/xml; charset=utf-8
4105 Content-Length: XXXX
4106 Man: http://www.dmtf.org/cim/mapping/http/v1.0;ns=20
4107 20-CIMProtocolVersion: 1.0
4108 20-CIMOperation: MethodCall
4109 20-CIMMethod: CreateInstance
4110 20-CIMObject: root/cimv2

4111 <?xml version="1.0" encoding="utf-8"?>
4112 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
4113 <MESSAGE ID="53000" PROTOCOLVERSION="1.0">
4114 <SIMPLEREQ>
4115 <IMETHODCALL NAME="CreateInstance">
4116 <LOCALNAMESPACEPATH>
4117 <NAMESPACE NAME="root"/>
4118 <NAMESPACE NAME="cimv2"/>
4119 </LOCALNAMESPACEPATH>
4120 <IPARAMVALUE NAME="NewInstance">
4121 <INSTANCE CLASSNAME="CIM_IndicationFilter">
4122 <PROPERTY NAME="SystemCreationClassName" TYPE="string">
4123 <VALUE>CIM_UnitaryComputerSystem</VALUE>
4124 </PROPERTY>
4125 <PROPERTY NAME="SystemName" TYPE="string">
4126 <VALUE>server001.acme.com</VALUE>
4127 </PROPERTY>
4128 <PROPERTY NAME="CreationClassName" TYPE="string">
4129 <VALUE>CIM_IndicationFilter</VALUE>
4130 </PROPERTY>
4131 <PROPERTY NAME="Name" TYPE="string">
4132 <VALUE>ACMESubscription12345</VALUE>
4133 </PROPERTY>
4134 <PROPERTY NAME="SourceNamespace" TYPE="string">
4135 <VALUE>root/cimv2</VALUE>
4136 </PROPERTY>
4137 <PROPERTY NAME="Query" TYPE="string">
4138 <VALUE>
4139 SELECT Description, AlertType, PerceivedSeverity,
4140 ProbableCause, IndicationTime
4141 FROM CIM_AlertIndication
4142 WHERE PerceivedSeverity = 3
4143 </VALUE>
4144 </PROPERTY>
4145 <PROPERTY NAME="QueryLanguage" TYPE="string">
4146 <VALUE>WQL</VALUE>
4147 </PROPERTY>
4148 </INSTANCE>
4149 </IPARAMVALUE>
4150 </IMETHODCALL>
4151 </SIMPLEREQ>
4152 </MESSAGE>

```

4153 </CIM>

4154 Following is an HTTP response to the preceding request indicating success of the preceding operation.

```

4155 HTTP/1.1 200 OK
4156 Content-Type: application/xml; charset=utf-8
4157 Content-Length: XXX
4158 Ext:
4159 Cache-Control: no-cache
4160 Man: http://www.dmtf.org/cim/mapping/http/v1.0; ns=28
4161 28-CIMOperation: MethodResponse
4162
4163 <?xml version="1.0" encoding="utf-8" ?>
4164 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
4165 <MESSAGE ID="53000" PROTOCOLVERSION="1.0">
4166 <SIMPLERSP>
4167 <IMETHODRESPONSE NAME="CreateInstance">
4168 <IRETURNVALUE>
4169 <INSTANCENAME CLASSNAME="CIM_IndicationFilter">
4170 <KEYBINDING NAME="SystemCreationClassName">
4171 <KEYVALUE VALUETYPE="string">
4172 CIM_UnitaryComputerSystem
4173 </KEYVALUE>
4174 </KEYBINDING>
4175 <KEYBINDING NAME="SystemName">
4176 <KEYVALUE VALUETYPE="string">
4177 server001.acme.com
4178 </KEYVALUE>
4179 </KEYBINDING>
4180 <KEYBINDING NAME="CreationClassName">
4181 <KEYVALUE VALUETYPE="string">
4182 CIM_IndicationFilter
4183 </KEYVALUE>
4184 </KEYBINDING>
4185 <KEYBINDING NAME="Name">
4186 <KEYVALUE VALUETYPE="string">
4187 ACMESubscription12345
4188 </KEYVALUE>
4189 </KEYBINDING>
4190 </INSTANCENAME>
4191 </IRETURNVALUE>
4192 </IMETHODRESPONSE>
4193 </SIMPLERSP>
4194 </MESSAGE>
4195 </CIM>

```

4196 The following HTTP request illustrates how a client creates an instance of the class  
 4197 CIM\_IndicationHandlerCIMXML.

```

4198 M-POST /cimom HTTP/1.1
4199 Host: bryce
4200 Content-Type: application/xml; charset=utf-8
4201 Content-Length: XXX
4202 Man: http://www.dmtf.org/cim/mapping/http/v1.0;ns=20
4203 20-CIMProtocolVersion: 1.0

```

```

4204 20-CIMOperation: MethodCall
4205 20-CIMMethod: CreateInstance
4206 20-CIMObject: root/cimv2
4207 <?xml version="1.0" encoding="utf-8"?>
4208 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
4209 <MESSAGE ID="54000" PROTOCOLVERSION="1.0">
4210 <SIMPLEREQ>
4211 <IMETHODCALL NAME="CreateInstance">
4212 <LOCALNAMESPACEPATH>
4213 <NAMESPACE NAME="root"/>
4214 <NAMESPACE NAME="cimv2"/>
4215 </LOCALNAMESPACEPATH>
4216 <IPARAMVALUE NAME="NewInstance">
4217 <INSTANCE CLASSNAME="CIM_IndicationHandlerCIMXML">
4218 <PROPERTY NAME="SystemCreationClassName" TYPE="string">
4219 <VALUE>CIM_UnitaryComputerSystem</VALUE>
4220 </PROPERTY>
4221 <PROPERTY NAME="SystemName" TYPE="string">
4222 <VALUE>server001.acme.com</VALUE>
4223 </PROPERTY>
4224 <PROPERTY NAME="CreationClassName" TYPE="string">
4225 <VALUE>CIM_IndicationHandlerCIMXML</VALUE>
4226 </PROPERTY>
4227 <PROPERTY NAME="Name" TYPE="string">
4228 <VALUE>ACMESubscription12345</VALUE>
4229 </PROPERTY>
4230 <PROPERTY NAME="Owner" TYPE="string">
4231 <VALUE>ACMEAlertMonitoringConsole</VALUE>
4232 </PROPERTY>
4233 <PROPERTY NAME="Destination" TYPE="string">
4234 <VALUE>HTTP://www.acme.com/cimlistener/browser</VALUE>
4235 </PROPERTY>
4236 </INSTANCE>
4237 </IPARAMVALUE>
4238 </IMETHODCALL>
4239 </SIMPLEREQ>
4240 </MESSAGE>
4241 </CIM>

```

4242 Following is an HTTP response to the preceding request indicating the success of the preceding  
4243 operation.

```

4244 HTTP/1.1 200 OK
4245 Content-Type: application/xml; charset=utf-8
4246 Content-Length: XXX
4247 Ext:
4248 Cache-Control: no-cache
4249 Man: http://www.dmtf.org/cim/mapping/http/v1.0; ns=27
4250 27-CIMOperation: MethodResponse
4251 <?xml version="1.0" encoding="utf-8" ?>
4252 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
4253 <MESSAGE ID="54000" PROTOCOLVERSION="1.0">
4254 <SIMPLERSP>

```

```

4255 <IMETHODRESPONSE NAME="CreateInstance">
4256 <IRETURNVALUE>
4257 <INSTANCENAME CLASSNAME="CIM_IndicationHandlerCIMXML">
4258 <KEYBINDING NAME="SystemCreationClassName">
4259 <KEYVALUE VALUETYPE="string">
4260 CIM_UnitaryComputerSystem
4261 </KEYVALUE>
4262 </KEYBINDING>
4263 <KEYBINDING NAME="SystemName">
4264 <KEYVALUE VALUETYPE="string">
4265 server001.acme.com
4266 </KEYVALUE>
4267 </KEYBINDING>
4268 <KEYBINDING NAME="CreationClassName">
4269 <KEYVALUE VALUETYPE="string">
4270 CIM_IndicationHandlerCIMXML
4271 </KEYVALUE>
4272 </KEYBINDING>
4273 <KEYBINDING NAME="Name">
4274 <KEYVALUE VALUETYPE="string">
4275 ACMESubscription12345
4276 </KEYVALUE>
4277 </KEYBINDING>
4278 </INSTANCENAME>
4279 </IRETURNVALUE>
4280 </IMETHODRESPONSE>
4281 </SIMPLERSP>
4282 </MESSAGE>
4283 </CIM>

```

4284 The following HTTP request illustrates how a client creates an instance of the class  
4285 CIM\_IndicationSubscription.

```

4286 M-POST /cimom HTTP/1.1
4287 Host: bryce
4288 Content-Type: application/xml; charset=utf-8
4289 Content-Length: XXXX
4290 Man: http://www.dmtf.org/cim/mapping/http/v1.0;ns=55
4291 55-CIMProtocolVersion: 1.0
4292 55-CIMOperation: MethodCall
4293 55-CIMMethod: CreateInstance
4294 55-CIMObject: root/cimv2

4295 <?xml version="1.0" encoding="utf-8"?>
4296 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
4297 <MESSAGE ID="55000" PROTOCOLVERSION="1.0">
4298 <SIMPLEREQ>
4299 <IMETHODCALL NAME="CreateInstance">
4300 <LOCALNAMESPACEPATH>
4301 <NAMESPACE NAME="root"/>
4302 <NAMESPACE NAME="cimv2"/>
4303 </LOCALNAMESPACEPATH>
4304 <IPARAMVALUE NAME="NewInstance">
4305 <INSTANCE CLASSNAME="CIM_IndicationSubscription">

```

```

4306 <PROPERTY.REFERENCE NAME="Filter"
4307 REFERENCECLASS="CIM_IndicationFilter">
4308 <VALUE.REFERENCE>
4309 <INSTANCENAME CLASSNAME="CIM_IndicationFilter">
4310 <KEYBINDING NAME="SystemCreationClassName">
4311 <KEYVALUE VALUETYPE="string">
4312 CIM_UnitaryComputerSystem
4313 </KEYVALUE>
4314 </KEYBINDING>
4315 <KEYBINDING NAME="SystemName">
4316 <KEYVALUE VALUETYPE="string">
4317 server001.acme.com
4318 </KEYVALUE>
4319 </KEYBINDING>
4320 <KEYBINDING NAME="CreationClassName">
4321 <KEYVALUE VALUETYPE="string">
4322 CIM_IndicationFilter
4323 </KEYVALUE>
4324 </KEYBINDING>
4325 <KEYBINDING NAME="Name">
4326 <KEYVALUE VALUETYPE="string">
4327 ACMESubscription12345
4328 </KEYVALUE>
4329 </KEYBINDING>
4330 </INSTANCENAME>
4331 </VALUE.REFERENCE>
4332 </PROPERTY.REFERENCE>
4333 <PROPERTY.REFERENCE NAME="Handler"
4334 REFERENCECLASS="CIM_IndicationHandler">
4335 <VALUE.REFERENCE>
4336 <INSTANCENAME CLASSNAME="CIM_IndicationHandlerCIMXML">
4337 <KEYBINDING NAME="SystemCreationClassName">
4338 <KEYVALUE VALUETYPE="string">
4339 CIM_UnitaryComputerSystem
4340 </KEYVALUE>
4341 </KEYBINDING>
4342 <KEYBINDING NAME="SystemName">
4343 <KEYVALUE VALUETYPE="string">
4344 server001.acme.com
4345 </KEYVALUE>
4346 </KEYBINDING>
4347 <KEYBINDING NAME="CreationClassName">
4348 <KEYVALUE VALUETYPE="string">
4349 CIM_IndicationHandlerCIMXML
4350 </KEYVALUE>
4351 </KEYBINDING>
4352 <KEYBINDING NAME="Name">
4353 <KEYVALUE VALUETYPE="string">
4354 ACMESubscription12345
4355 </KEYVALUE>
4356 </KEYBINDING>
4357 </INSTANCENAME>
4358 </VALUE.REFERENCE>

```

```

4359 </PROPERTY.REFERENCE>
4360 </INSTANCE>
4361 </IPARAMVALUE>
4362 </IMETHODCALL>
4363 </SIMPLEREQ>
4364 </MESSAGE>
4365 </CIM>

```

4366 Following is an HTTP response to the preceding request indicating the success of the preceding  
4367 operation.

```

4368 HTTP/1.1 200 OK
4369 Content-Type: application/xml; charset=utf-8
4370 Content-Length: XXXX
4371 Ext:
4372 Cache-Control: no-cache
4373 Man: http://www.dmtf.org/cim/mapping/http/v1.0; ns=75
4374 75-CIMOperation: MethodResponse

4375 <?xml version="1.0" encoding="utf-8" ?>
4376 <CIM CIMVERSION="2.0" DTDVERSION="2.0">
4377 <MESSAGE ID="55000" PROTOCOLVERSION="1.0">
4378 <SIMPLERSP>
4379 <IMETHODRESPONSE NAME="CreateInstance">
4380 <IRETURNVALUE>
4381 <INSTANCENAME CLASSNAME="CIM_IndicationSubscription">
4382 <KEYBINDING NAME="Filter">
4383 <VALUE.REFERENCE>
4384 <INSTANCENAME CLASSNAME="CIM_IndicationFilter">
4385 <KEYBINDING NAME="SystemCreationClassName">
4386 <KEYVALUE VALUETYPE="string">
4387 CIM_UnitaryComputerSystem
4388 </KEYVALUE>
4389 </KEYBINDING>
4390 <KEYBINDING NAME="SystemName">
4391 <KEYVALUE VALUETYPE="string">
4392 server001.acme.com
4393 </KEYVALUE>
4394 </KEYBINDING>
4395 <KEYBINDING NAME="CreationClassName">
4396 <KEYVALUE VALUETYPE="string">
4397 CIM_IndicationFilter
4398 </KEYVALUE>
4399 </KEYBINDING>
4400 <KEYBINDING NAME="Name">
4401 <KEYVALUE VALUETYPE="string">
4402 ACMESubscription12345
4403 </KEYVALUE>
4404 </KEYBINDING>
4405 </INSTANCENAME>
4406 </VALUE.REFERENCE>
4407 </KEYBINDING>
4408 <KEYBINDING NAME="Handler">
4409 <VALUE.REFERENCE>

```

```

4410 <INSTANCENAME CLASSNAME="CIM_IndicationHandlerCIMXML">
4411 <KEYBINDING NAME="SystemCreationClassName">
4412 <KEYVALUE VALUETYPE="string">
4413 CIM_UnitaryComputerSystem
4414 </KEYVALUE>
4415 </KEYBINDING>
4416 <KEYBINDING NAME="SystemName">
4417 <KEYVALUE VALUETYPE="string">
4418 server001.acme.com
4419 </KEYVALUE>
4420 </KEYBINDING>
4421 <KEYBINDING NAME="CreationClassName">
4422 <KEYVALUE VALUETYPE="string">
4423 CIM_IndicationHandlerCIMXML
4424 </KEYVALUE>
4425 </KEYBINDING>
4426 <KEYBINDING NAME="Name">
4427 <KEYVALUE VALUETYPE="string">
4428 ACMESubscription12345
4429 </KEYVALUE>
4430 </KEYBINDING>
4431 </INSTANCENAME>
4432 </VALUE.REFERENCE>
4433 </KEYBINDING>
4434 </INSTANCENAME>
4435 </IRETURNVALUE>
4436 </IMETHODRESPONSE>
4437 </SIMPLERSP>
4438 </MESSAGE>
4439 </CIM>

```

### 4440 A.13 Multiple Operations Example

4441 The following HTTP request illustrates how a client performs multiple operations. This example batches a  
 4442 GetClass, an EnumerateInstanceNames, and an EnumerateInstance operation on  
 4443 CIM\_ObjectManagerAdapter.

```

4444 POST /CIMOM1 HTTP/1.1
4445 Authorization: Basic Z3Vlc3Q6Z3Vlc3Q=
4446 Content-Length: XXX
4447 Host: localhost:5988
4448 CIMOperation: MethodCall
4449 CIMProtocolVersion: 1.0
4450 Content-Type: application/xml; charset=utf-8
4451 CIMBatch: CIMBatch
4452 <?xml version="1.0" encoding="UTF-8"?>
4453 <CIM DTDVERSION="2.0" CIMVERSION="2.0">
4454 <MESSAGE ID="2004:2:5:1:1:11:41:1" PROTOCOLVERSION="1.0">
4455 <MULTIREQ>
4456 <SIMPLEREQ>
4457 <IMETHODCALL NAME="GetClass">
4458 <LOCALNAMESPACEPATH>
4459 <NAMESPACE NAME="interop" />
4460 </LOCALNAMESPACEPATH>

```

```

4461 <IPARAMVALUE NAME="ClassName">
4462 <CLASSNAME NAME="CIM_ObjectManagerAdapter" />
4463 </IPARAMVALUE>
4464 <IPARAMVALUE NAME="LocalOnly">
4465 <VALUE>FALSE</VALUE>
4466 </IPARAMVALUE>
4467 <IPARAMVALUE NAME="IncludeClassOrigin">
4468 <VALUE>TRUE</VALUE>
4469 </IPARAMVALUE>
4470 </IMETHODCALL>
4471 </SIMPLEREQ>
4472 <SIMPLEREQ>
4473 <IMETHODCALL NAME="Associators">
4474 <LOCALNAMESPACEPATH>
4475 <NAMESPACE NAME="interop" />
4476 </LOCALNAMESPACEPATH>
4477 <IPARAMVALUE NAME="ObjectName">
4478 <CLASSNAME NAME="CIM_ObjectManagerAdapter" />
4479 </IPARAMVALUE>
4480 <IPARAMVALUE NAME="IncludeQualifiers">
4481 <VALUE>TRUE</VALUE>
4482 </IPARAMVALUE>
4483 <IPARAMVALUE NAME="IncludeClassOrigin">
4484 <VALUE>TRUE</VALUE>
4485 </IPARAMVALUE>
4486 </IMETHODCALL>
4487 </SIMPLEREQ>
4488 <SIMPLEREQ>
4489 <IMETHODCALL NAME="EnumerateInstanceNames">
4490 <LOCALNAMESPACEPATH>
4491 <NAMESPACE NAME="interop" />
4492 </LOCALNAMESPACEPATH>
4493 <IPARAMVALUE NAME="ClassName">
4494 <CLASSNAME NAME="CIM_ObjectManagerAdapter" />
4495 </IPARAMVALUE>
4496 </IMETHODCALL>
4497 </SIMPLEREQ>
4498 <SIMPLEREQ>
4499 <IMETHODCALL NAME="EnumerateInstances">
4500 <LOCALNAMESPACEPATH>
4501 <NAMESPACE NAME="interop" />
4502 </LOCALNAMESPACEPATH>
4503 <IPARAMVALUE NAME="ClassName">
4504 <CLASSNAME NAME="CIM_ObjectManagerAdapter" />
4505 </IPARAMVALUE>
4506 <IPARAMVALUE NAME="LocalOnly">
4507 <VALUE>FALSE</VALUE>
4508 </IPARAMVALUE>
4509 </IMETHODCALL>
4510 </SIMPLEREQ>
4511 </MULTIREQ>
4512 </MESSAGE>
4513 </CIM>

```



4514 Following is the HTTP response to the preceding request indicating the success of the preceding  
 4515 operation.

```

4516 HTTP/1.1 200 OK
4517 CIMOperation: MethodResponse
4518 Content-Length: XXX
4519 <?xml version="1.0" encoding="UTF-8"?>
4520 <CIM DTDVERSION="2.0" CIMVERSION="2.0">
4521 <MESSAGE ID="2004:2:5:1:1:11:41:1" PROTOCOLVERSION="1.0">
4522 <MULTIRSP>
4523 <SIMPLERSP>
4524 <IMETHODRESPONSE NAME="GetClass">
4525 <IRETURNVALUE>
4526 <CLASS SUPERCLASS="CIM_WBEMService"
4527 NAME="CIM_ObjectManagerAdapter">
4528 ...
4529 </CLASS>
4530 </IRETURNVALUE>
4531 </IMETHODRESPONSE>
4532 </SIMPLERSP>
4533 <SIMPLERSP>
4534 <IMETHODRESPONSE NAME="Associators">
4535 <IRETURNVALUE>
4536 <VALUE.OBJECTWITHPATH>
4537 ...
4538 </VALUE.OBJECTWITHPATH>
4539 <VALUE.OBJECTWITHPATH>
4540 ...
4541 </VALUE.OBJECTWITHPATH>
4542 ...
4543 </IRETURNVALUE>
4544 </IMETHODRESPONSE>
4545 </SIMPLERSP>
4546 <SIMPLERSP>
4547 <IMETHODRESPONSE NAME="EnumerateInstanceNames">
4548 <IRETURNVALUE>
4549 <INSTANCENAME CLASSNAME="WBEMSolutions_ObjectManagerAdapter">
4550 ...
4551 </INSTANCENAME>
4552 <INSTANCENAME CLASSNAME="WBEMSolutions_ObjectManagerAdapter">
4553 ...
4554 </INSTANCENAME>
4555 ...
4556 </IRETURNVALUE>
4557 </IMETHODRESPONSE>
4558 </SIMPLERSP>
4559 </SIMPLERSP>
4560 <IMETHODRESPONSE NAME="EnumerateInstances">
4561 <IRETURNVALUE>
4562 <VALUE.NAMEDINSTANCE>
4563 ...
4564 </VALUE.NAMEDINSTANCE>
4565 <VALUE.NAMEDINSTANCE>

```

```
4566 ...
4567 </VALUE.NAMEDINSTANCE>
4568 ...
4569 </IRETURNVALUE>
4570 </IMETHODRESPONSE>
4571 </SIMPLERSP>
4572 </MULTIRSP>
4573 </MESSAGE>
4574 </CIM>
```

## ANNEX B (informative)

4575  
4576  
4577  
4578  
4579

### LocalOnly Parameter Discussion

4580 This annex discusses the issues associated with the 1.1 definition of the LocalOnly parameter for the  
4581 GetInstance and EnumerateInstances operations.

#### 4582 B.1 Explanation of the Deprecated 1.1 Interpretation

4583 In April 2002, two DMTF Change Requests (CRs), CR809 (EnumerateInstances) and CR815  
4584 (GetInstance), were approved and incorporated into the 1.1 version of this specification to clarify the  
4585 interpretation of the LocalOnly flag for the GetInstance and EnumerateInstances operations. With these  
4586 CRs, the definition of the LocalOnly flag for these operations was modified to align with the interpretation  
4587 of this flag for the GetClass and EnumerateClasses operations. This change was incorrect, resulted in  
4588 reduced functionality, and introduced several backward compatibility issues.

4589 To clarify the difference between the 1.0 Interpretation and the 1.1 Interpretation (CR815), consider the  
4590 following example:

```
4591 class A {
4592 [Key]
4593 string name;
4594 uint32 counter = 3;
4595 };

4596 class B : A {
4597 uint32 moreData = 4;
4598 };

4599 instance of A {
4600 name = "Roger";
4601 };

4602 instance of B {
4603 name = "Karl";
4604 counter = 3;
4605 moreData = 5;
4606 };

4607 instance of B {
4608 name = "Denise";
4609 counter = 5;
4610 };
```

4611 Assuming PropertyList = NULL and LocalOnly = TRUE, Table B-1 shows the properties returned by a  
 4612 GetInstance operation.

4613 **Table B-1 – Comparison of Properties Returned by GetInstance in Versions 1.0 and 1.1**

| Instance | DSP0200 1.0 Interpretation | DSP0200 1.1 Interpretation |
|----------|----------------------------|----------------------------|
| "Roger"  | name                       | name, counter              |
| "Karl"   | name, counter, moreData    | moreData                   |
| "Denise" | name, counter              | moreData                   |

4614 The properties returned using the 1.0 interpretation are consistent with the properties specified in the  
 4615 MOF instance definitions, and the properties returned using the 1.1 Interpretation are consistent with the  
 4616 properties defined in the class definitions.

4617 **B.2 Risks of Using the 1.1 Interpretation**

4618 The risks of using the 1.1 interpretation are as follows:

- 4619 1) Within the DMTF, promoting a property from a class to one of its superclasses is defined as a  
 4620 backward-compatible change that can be made in a minor revision of the CIM schema. With the 1.1  
 4621 interpretation, promoting a property to a superclass can cause backward-incompatible changes.

4622 Suppose, for example, version 1.0 of the schema includes the following definitions:

```

4623 class A {
4624 [Key]
4625 string name;
4626 uint32 counter = 3;
4627 };

4628 class B : A {
4629 uint32 moreData = 4;
4630 };

```

4631 Now suppose that the schema is modified in version 1.1 to promote the property moreData from  
 4632 class B to class A.

```

4633 class A {
4634 [Key]
4635 string name;
4636 uint32 counter = 3;
4637 uint32 moreData = 4;
4638 };

4639 class B : A {
4640 };

```

4641 Using these examples, Table B-2 shows the properties returned by a call to GetInstance with  
 4642 PropertyList = NULL and LocalOnly = TRUE. With the 1.1 Interpretation, this schema change would  
 4643 affect the list of properties returned. When dealing with a CIM server that complies with the 1.1  
 4644 interpretation, applications must be designed to treat “promoting properties” as a backward-  
 4645 compatible change.

4646 **Table B-2 – Comparison of Properties Returned by a Call to GetInstance in Versions 1.0 and 1.1**

| Instance | Schema Version 1.0 | Schema Version 1.1      |
|----------|--------------------|-------------------------|
| of A     | name, counter      | name, counter, moreData |
| of B     | moreData           | none                    |

4647 2) The 1.1 Interpretation encourages application developers to use multiple operations to retrieve the  
 4648 properties of an instance. That is, a commonly-stated use model for the 1.1 interpretation is to  
 4649 selectively traverse subclasses getting additional properties of an instance. This practice significantly  
 4650 increases the risk that a client will construct an inconsistent instance. With both Interpretations,  
 4651 applications should be designed to ensure that dependent properties are retrieved together.

4652 **B.3 Techniques for Differentiating between the 1.0 Interpretation and 1.1**  
 4653 **Interpretation**

4654 For concrete classes, CIM servers that comply with the 1.0 Interpretation return the value of all KEY  
 4655 properties not explicitly excluded by the PropertyList parameter. CIM servers that comply with the 1.1  
 4656 interpretation return only the value of KEY properties explicitly defined in the class. Applications can use  
 4657 this difference to detect which interpretation is supported by a CIM server.

**ANNEX C**  
(informative)**Change Log**

| <b>Version</b> | <b>Date</b>   | <b>Description</b>    |
|----------------|---------------|-----------------------|
| Version 1.0    | Jun 2, 1999   | DMTF Final Standard   |
| Version 1.1    | Jan 06, 2003  | DMTF Final Standard   |
| Version 1.2    | Jan 09, 2007  | DMTF Final Standard   |
| Version 1.3.0  | Oct 15, 2008  | DMTF Final Standard   |
| Version 1.3.1  | July 29, 2009 | DMTF Standard Release |

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