



1
2
3
4

Document Number: DSP0263

Date: 2012-08-28

Version: 1.0.0

5 **Cloud Infrastructure Management Interface**
6 **(CIMI) Model and RESTful HTTP-based Protocol**
7 **An Interface for Managing Cloud Infrastructure**

8 **Document Type: Specification**

9 **Document Status: DMTF Standard**

10 **Document Language: en-US**

11 Copyright Notice

12 Copyright © 2012 Distributed Management Task Force, Inc. (DMTF). All rights reserved.

13 DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and systems
14 management and interoperability. Members and non-members may reproduce DMTF specifications and
15 documents, provided that correct attribution is given. As DMTF specifications may be revised from time to
16 time, the particular version and release date should always be noted.

17 Implementation of certain elements of this standard or proposed standard may be subject to third party
18 patent rights, including provisional patent rights (herein "patent rights"). DMTF makes no representations
19 to users of the standard as to the existence of such rights, and is not responsible to recognize, disclose,
20 or identify any or all such third party patent right, owners or claimants, nor for any incomplete or
21 inaccurate identification or disclosure of such rights, owners or claimants. DMTF shall have no liability to
22 any party, in any manner or circumstance, under any legal theory whatsoever, for failure to recognize,
23 disclose, or identify any such third party patent rights, or for such party's reliance on the standard or
24 incorporation thereof in its product, protocols or testing procedures. DMTF shall have no liability to any
25 party implementing such standard, whether such implementation is foreseeable or not, nor to any patent
26 owner or claimant, and shall have no liability or responsibility for costs or losses incurred if a standard is
27 withdrawn or modified after publication, and shall be indemnified and held harmless by any party
28 implementing the standard from any and all claims of infringement by a patent owner for such
29 implementations.

30 For information about patents held by third-parties which have notified the DMTF that, in their opinion,
31 such patent may relate to or impact implementations of DMTF standards, visit
32 <http://www.dmtf.org/about/policies/disclosures.php>.

CONTENTS

34	Foreword	6
35	1 Scope	8
36	1.1 Document structure.....	8
37	1.2 Document versioning scheme	8
38	1.3 Typographical conventions	8
39	2 Normative references	9
40	3 Terms and definitions	10
41	4 HTTP-Based protocol.....	12
42	4.1 Introduction	12
43	4.1.1 XML namespaces	13
44	4.1.2 URI space	13
45	4.1.3 Media types.....	13
46	4.1.4 Request headers.....	13
47	4.1.5 Request query parameters	14
48	4.1.6 Response headers.....	17
49	4.2 Protocol operations	17
50	4.2.1 Common CRUD operations	18
51	4.3 OVF support.....	23
52	5 Model.....	23
53	5.1 Resource wrappers.....	23
54	5.2 Extensibility	24
55	5.3 Identifiers	24
56	5.4 Attribute constraints	25
57	5.5 Data types and their serialization.....	26
58	5.5.1 boolean	26
59	5.5.2 dateTime	26
60	5.5.3 duration	26
61	5.5.4 integer	26
62	5.5.5 string	27
63	5.5.6 ref.....	27
64	5.5.7 map	27
65	5.5.8 structure	28
66	5.5.9 byte[]	28
67	5.5.10 URI.....	28
68	5.5.11 Arrays.....	29
69	5.5.12 Collections	30
70	5.5.13 "Any" type	33
71	5.6 Units.....	33
72	5.7 Relationship semantics.....	34
73	5.8 Operations	34
74	5.9 Alternative model formats	34
75	5.10 Resources	34
76	5.10.1 Common attributes.....	34
77	5.11 Resource Metadata.....	36
78	5.11.1 Attribute types	39
79	5.11.2 Capabilities	41
80	5.11.3 ResourceMetadata Collection.....	44
81	5.12 Cloud Entry Point	45
82	5.12.1 Operations	50
83	5.13 System resources and relationships.....	50
84	5.13.1 System	50
85	5.13.2 System Collection	64

86	5.13.3	System Template	66
87	5.13.4	System Template Collection	70
88	5.14	Machine resources and relationships	71
89	5.14.1	Machine	72
90	5.14.2	Machine Collection.....	87
91	5.14.3	Machine Template	88
92	5.14.4	Machine Template Collection	94
93	5.14.5	Machine Configuration	94
94	5.14.6	Machine Configuration Collection	96
95	5.14.7	Machine Image	97
96	5.14.8	Machine Image Collection	100
97	5.14.9	Credential.....	100
98	5.14.10	Credential Collection.....	102
99	5.14.11	Credential Template.....	102
100	5.14.12	Credential Template Collection.....	103
101	5.15	Volume resources and relationships.....	104
102	5.15.1	Volume	104
103	5.15.2	Volume Collection	108
104	5.15.3	Volume Template.....	109
105	5.15.4	Volume Template Collection.....	111
106	5.15.5	Volume Configuration	112
107	5.15.6	Volume Configuration Collection	114
108	5.15.7	Volume Image.....	114
109	5.15.8	Volume Image Collection	116
110	5.16	Network resources and relationships.....	116
111	5.16.1	Network	117
112	5.16.2	Network Collection	122
113	5.16.3	Network Template.....	123
114	5.16.4	Network Template Collection	125
115	5.16.5	Network Configuration	125
116	5.16.6	Network Configuration Collection	127
117	5.16.7	Network Port	128
118	5.16.8	Network Port Collection	132
119	5.16.9	Network Port Template	132
120	5.16.10	Network Port Template Collection	134
121	5.16.11	Network Port Configuration.....	135
122	5.16.12	Network Port Configuration Collection	136
123	5.16.13	Address.....	137
124	5.16.14	Address Collection	139
125	5.16.15	Address Template.....	139
126	5.16.16	Address Template Collection	141
127	5.16.17	Forwarding Group	142
128	5.16.18	Forwarding Group Collection	144
129	5.16.19	Forwarding Group Template	145
130	5.16.20	Forwarding Group Template Collection	146
131	5.17	Monitoring resources and relationships	146
132	5.17.1	Job	147
133	5.17.2	Job Collection	151
134	5.17.3	Meter	152
135	5.17.4	Meter Collection	157
136	5.17.5	Meter Template.....	157
137	5.17.6	Meter Template Collection	158
138	5.17.7	Meter Configuration	159
139	5.17.8	Meter Configuration Collection	161
140	5.17.9	Event Log.....	162
141	5.17.10	Event Log Collection	165

142 5.17.11 Event Log Template..... 165
143 5.17.12 Event Log Template Collection..... 166
144 5.17.13 Event..... 167
145 6 Security considerations 174
146 ANNEX A (normative) OVF support in CIMI 175
147 ANNEX B (informative) XML Schema..... 177
148 ANNEX C (informative) Change log..... 178

149

150 **Figures**

151 Figure 1 - Cloud Entry Point..... 45
152 Figure 2 - System resources 50
153 Figure 3 - Machine resources 72
154 Figure 4 - Volume resources..... 104
155 Figure 5 - Network resources..... 117
156 Figure 6 - Monitoring resources 147

157

158

Foreword

159 The *Cloud Infrastructure Management Interface (CIMI) Model and RESTful HTTP-based Protocol*
 160 specification (DSP0263) was prepared by the DMTF Cloud Management Working Group. It defines a
 161 logical model for the management of resources within the Infrastructure as a Service domain.

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

164 Acknowledgments

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

166 Editors:

- 167 • Davis, Doug - IBM
- 168 • Pilz, Gilbert - Oracle

169 Contributors:

- 170 • Ali, Ghazanfar - ZTE Corporation
- 171 • Andreou, Marios - Red Hat
- 172 • Bankston, Keith - Microsoft Corporation
- 173 • Bumpus, Winston - VMware Inc.
- 174 • Burkhart, Nathan - Microsoft Corporation
- 175 • Carlson, Mark - Oracle
- 176 • Carter, Steve - Novell
- 177 • Chu, Junsheng - ZTE Corporation
- 178 • Cohen, Josh - Microsoft Corporation
- 179 • Coleman, Derek - Hewlett-Packard Company
- 180 • Crandall, John - Brocade Communications Systems
- 181 • Davis, Doug - IBM
- 182 • Davis, Jim - WBEM Solutions
- 183 • de la Iglesia, Fernando - Telefónica
- 184 • Dempo, Hiroshi - NEC Corporation
- 185 • Durand, Jacques - Fujitsu
- 186 • Edery, Yigal - Microsoft Corporation
- 187 • Ericson, George - EMC
- 188 • Evans, Colleen - Microsoft Corporation
- 189 • Floeren, Norbert - Ericsson AB
- 190 • Freund, Robert - Hitachi, Ltd.
- 191 • Galán, Fermín - Telefónica
- 192 • Gopalan, Krishnan - Microsoft Corporation
- 193 • Iwasa, Kazunori - Fujitsu
- 194 • Johnson, Mark - IBM
- 195 • Khasnabish, Bhumi - ZTE Corporation
- 196 • Kowalski, Vincent - BMC Software
- 197 • Krishnaswamy, Ruby - France Telecom Group
- 198 • Lamers, Lawrence - VMware Inc.
- 199 • Lipton, Paul - CA Technologies
- 200 • Livingston, James - NEC Corporation
- 201 • Lubsey, Vince - Virtustream Inc.
- 202 • Lutterkort, David - Red Hat
- 203 • Maciel, Fred - Hitachi, Ltd.

- 204 • Maier, Andreas - IBM
- 205 • Malhotra, Ashok - Oracle
- 206 • Mischkinsky, Jeff - Oracle
- 207 • Molina, Jesus - Fujitsu
- 208 • Moscovich, Efraim - CA Technologies
- 209 • Murray, Bryan - Hewlett-Packard Company
- 210 • Neely, Steven - Cisco
- 211 • Ogawa, Ryuichi - NEC Corporation
- 212 • Parchem, John - Microsoft Corporation
- 213 • Pardikar, Shishir - Citrix Systems Inc.
- 214 • Peñalvo, Miguel - Telefónica
- 215 • Pilz, Gilbert - Oracle
- 216 • Polo, Alvaro - Telefónica
- 217 • Ronco, Enrico - Telecom Italia
- 218 • Rossini, Federico - Telecom Italia
- 219 • Rutkowski, Matthew - IBM
- 220 • Rutt, Tom - Fujitsu
- 221 • Shah, Hemal - Broadcom
- 222 • Shah, Nihar - Microsoft Corporation
- 223 • Sill, Alan - Texas Tech University
- 224 • Song, Zhexuan - Huawei
- 225 • Song, Zhexuan - Fujitsu
- 226 • Waschke, Marvin - CA Technologies
- 227 • Wells, Eric - Hitachi, Ltd.
- 228 • Wheeler, Jeff - Huawei
- 229 • Wiggers, Maarten - Fujitsu
- 230 • Winkler, Steve - SAP AG
- 231 • Yu, Jack - Oracle
- 232 • Zhang, Aaron - Huawei
- 233 • Zhang, HengLiang - Huawei

234 Cloud Infrastructure Management Interface (CIMI) Model and 235 RESTful HTTP-based Protocol

236 1 Scope

237 This specification describes the model and protocol for management interactions between a cloud
238 Infrastructure as a Service (IaaS) Provider and the Consumers of an IaaS service. The basic resources of
239 IaaS (machines, storage, and networks) are modeled with the goal of providing Consumer management
240 access to an implementation of IaaS and facilitating portability between cloud implementations that
241 support the specification. This document specifies a Representational State Transfer (REST)-style
242 protocol using HTTP. However, the underlying model is not specific to HTTP, and it is possible to map it
243 to other protocols as well.

244 CIMI addresses the management of the lifecycle of infrastructure provided by a Provider. CIMI does not
245 extend beyond infrastructure management to the control of the applications and services that the
246 Consumer chooses to run on the infrastructure provided as a service by the Provider. Although CIMI may
247 be to some extent applicable to other cloud service models, such as Platform as a Service ("PaaS") or
248 Storage as a Service ("SaaS"), these uses are outside the design goals of CIMI.

249 1.1 Document structure

250 This document defines a model and a RESTful HTTP-based protocol.

251 The core REST patterns are defined first and, after each resource is defined, any HTTP-specific
252 information for that resource will be specified.

253 1.2 Document versioning scheme

254 This document will adhere to the versioning scheme defined in clause 6.3 of [DSP4004](#).

255 1.3 Typographical conventions

256 This specification uses the following conventions inside tables describing the resource data model:

- 257 • Resource names, and any other name that is usable as a type (i.e., names of embedded
258 structures as well as atomic types such as "integer", "string"), are in *italic*.
- 259 • Attribute names are in regular font.
- 260 • Names that are just placeholders for actual names that may vary with each model instance, are
261 between < > (e.g., <componentTemplate>).

262 In addition, this specification uses the following syntax to define the serialization of resources:

- 263 • Values in *italics* indicate data types instead of literal values.
- 264 • Characters are appended to items to indicate cardinality:
 - 265 – "?" (0 or 1)
 - 266 – "*" (0 or more)
 - 267 – "+" (1 or more)
- 268 • Vertical bars, "|", denote choice. For example, "a|b" means a choice between "a" and "b".

- 269 • Parentheses, "(" and ")", are used to indicate the scope of the operators "?", "*", "+" and "|".
- 270 • Ellipses (i.e., "...") indicate points of extensibility. Note that the lack of an ellipses does not mean
- 271 no extensibility point exists, rather it is just not explicitly called out - usually for the sake of
- 272 brevity.

273 2 Normative references

274 The following referenced documents are indispensable for the application of this document. For dated or
 275 versioned references, only the edition cited (including any corrigenda or DMTF update versions) applies.

- 276 DMTF DSP0223, *Generic Operations 1.0*,
 277 http://www.dmtf.org/standards/published_documents/DSP0223_1.0.pdf
- 278 DMTF DSP0243, Distributed Management Task Force, Inc., *Open Virtualization Format Specification 1.1*,
 279 http://www.dmtf.org/sites/default/files/standards/documents/DSP0243_1.1.pdf
- 280 DMTF DSP1001, *Management Profile Specification Usage Guide 1.1*,
 281 http://www.dmtf.org/standards/published_documents/DSP1001_1.1.pdf
- 282 DMTF DSP4004, Distributed Management Task Force, Inc., *DMTF Release Process 2.4*,
 283 http://www.dmtf.org/sites/default/files/standards/documents/DSP4004_2.4.pdf
- 284 IANA HTTP Header Registry, <http://www.iana.org/assignments/message-headers/perm-headers.html>
- 285 IEC 80000-13:2008, International Organization for Standardization, Geneva, Switzerland, *Quantities and*
 286 *units – Part 13: Information science and technology*, April 2008,
 287 http://www.iso.org/iso/catalogue_detail?csnumber=31898
- 288 IETF RFC2616, R. Fielding et al, *Hypertext Transfer Protocol -- HTTP/1.1*,
 289 <http://www.ietf.org/rfc/rfc2616.txt>
- 290 IETF RFC2617, J. Franks et al, *HTTP Authentication: Basic and Digest Access Authentication*, June
 291 1999, <http://www.ietf.org/rfc/rfc2617.txt>
- 292 IETF RFC2246, T. Dierks and C. Allen, *The TLS Protocol Version 1.0*, January 1999,
 293 <http://www.ietf.org/rfc/rfc2246.txt>
- 294 IETF RFC3986, T. Berners-Lee et al, *Uniform Resource Identifiers (URI): Generic Syntax*, August 1998,
 295 <http://www.ietf.org/rfc/rfc3986.txt>
- 296 IETF RFC4346, T. Dierks and E. Rescorla, *The Transport Layer Security (TLS) Protocol Version 1.1*, April
 297 2006, <http://www.ietf.org/rfc/rfc4346.txt>
- 298 IETF RFC4627, D. Crockford, *The application/json Media Type for JavaScript Object Notation (JSON)*,
 299 July 2006, <http://www.ietf.org/rfc/rfc4627.txt>
- 300 IETF RFC5246, T. Dierks and E. Rescorla, *The Transport Layer Security (TLS) Protocol Version 1.2*,
 301 <http://www.ietf.org/rfc/rfc5246.txt>
- 302 ISO 8601:2004, International Organization for Standardization, Geneva, Switzerland, *Data elements and*
 303 *interchange formats -- Information interchange - - Representation of dates and times*, March 2008,
 304 http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=40874
- 305 ISO/IEC Directives, Part 2, *Rules for the structure and drafting of International Standards*,
 306 <http://isotc.iso.org/livelink/livelink.exe?func=ll&objId=4230456&objAction=browse&sort=subtype>

- 307 ITU-T X.509, Telecommunication Standardization Sector of ITU, *Information technology - Open Systems*
 308 *Interconnection - The Directory: Public- key and attribute certificate frameworks*, November 2008,
 309 <http://www.itu.int/rec/T-REC-X.509-200811-1>
- 310 NIST Special Publication 800-145, Peter Mell and Timothy Grance, *The NIST Definition of Cloud*
 311 *Computing*, Sept. 2011, <http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf>
- 312 NIST Special Publication 500-292, Fang Liu, Jin Tong, Jian Mao, Robert Bohn, John Messina, Lee
 313 Badger and Dawn Leaf, *NIST Cloud Computing Reference Architecture*, Sept. 2011,
 314 [http://collaborate.nist.gov/twiki-cloud-](http://collaborate.nist.gov/twiki-cloud-computing/pub/CloudComputing/ReferenceArchitectureTaxonomy/NIST_SP_500-292_-_090611.pdf)
 315 [computing/pub/CloudComputing/ReferenceArchitectureTaxonomy/NIST_SP_500-292_-_090611.pdf](http://collaborate.nist.gov/twiki-cloud-computing/pub/CloudComputing/ReferenceArchitectureTaxonomy/NIST_SP_500-292_-_090611.pdf)
- 316 NIST Special Publication 800-57, Elaine Barker et al, *Recommendation for Key Management – Part 1:*
 317 *General (Revised)*, March 2007,
 318 http://csrc.nist.gov/publications/nistpubs/800-57/sp800-57-Part1-revised2_Mar08-2007.pdf
- 319 NIST Special Publication 800-131A, Elaine Barker and Allen Roginsky, *Transitions: Recommendation for*
 320 *Transitioning the Use of Cryptographic Algorithms and Key Lengths*, January 2011,
 321 <http://csrc.nist.gov/publications/nistpubs/800-131A/sp800-131A.pdf>
- 322 Representational State Transfer, Roy Fielding, Doctoral dissertation, University of California, *Architectural*
 323 *Styles and the Design of Network-based Software Architectures (Chapter 5)*, 2000,
 324 http://www.ics.uci.edu/~fielding/pubs/dissertation/rest_arch_style.htm
- 325 XMLSchema - Part 1, World Wide Web Consortium (W3C) Recommendation, H. Thompson, et al.,
 326 Editors, *XML Schema Part 1: Structures Second Edition*, 28 October 2004,
 327 <http://www.w3.org/TR/xmlschema-1/>
- 328 XMLSchema - Part 2, World Wide Web Consortium (W3C) Recommendation, P. Biron, A. Malhotra,
 329 Editors, *XML Schema Part 2: Datatypes (Second Edition)*, 28 October 2004,
 330 <http://www.w3.org/TR/xmlschema-2/>

311 **3 Terms and definitions**

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

334 The terms "shall" ("required"), "shall not," "should" ("recommended"), "should not" ("not recommended"),
 335 "may," "need not" ("not required"), "can" and "cannot" in this document are to be interpreted as described
 336 in [ISO/IEC Directives, Part 2](#), Annex H. The terms in parenthesis are alternatives for the preceding term,
 337 for use in exceptional cases when the preceding term cannot be used for linguistic reasons. Note that
 338 [ISO/IEC Directives, Part 2](#), Annex H specifies additional alternatives. Occurrences of such additional
 339 alternatives shall be interpreted in their normal English meaning.

340 The terms "clause," "subclause," "paragraph," and "annex" in this document are to be interpreted as
 341 described in [ISO/IEC Directives, Part 2](#), Clause 5.

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

345 The terms defined in [DSP4004](#), [DSP0223](#), and [DSP1001](#) apply to this document. The following additional
 346 terms are used in this document.

347 **3.1**

348 **authentication**

349 The process of verifying a claim, made by a subject, that it should be allowed to act on behalf of a given
 350 principal (person, service, etc.). Typical authentication mechanisms involve the use of
 351 username/password combination or public/private key pairs.

352 **3.2**

353 **authorization**

354 (also known as Access Control) The process of verifying that an authenticated principal (person, service,
 355 etc.) has permission to perform certain operations (e.g., read, update) on specific resources.

356 **3.3**

357 **cloud**

358 Synonymous with “cloud computing” as defined in section 2 of the NIST Definition of Cloud Computing
 359 [[SP800-145](#)].

360 **3.4**

361 **Cloud Service Consumer**

362 A category of actors that includes the Consumer Business Manager (who approves business and
 363 financial expenditures for consumed services; accounts for used service instances; establishes business
 364 relationships; sets up accounts, budget, and terms; etc.); the Consumer Service Administrator (who
 365 requests service instances and changes to service instances; purchases services within the business
 366 relationship; creates Service Users (including policies); allocates resources, such as computer and
 367 storage; generates reports, such as usage; etc.); and Service Users (who use service instances provided
 368 by a Cloud Service Provider). The term "Consumer" is used when the indicated action or activity could
 369 involve one or more of the above actors. In cases where the distinction between the actors in this
 370 category is relevant, the more detailed term will be used.

371 For purposes of comparison and alignment, it should be noted that a Cloud Service Consumer is
 372 equivalent to the “Cloud Consumer” actor defined in the NIST Reference Architecture [[SP500-292](#)].

373 **3.5**

374 **Cloud Service Provider**

375 A category of actors that includes the Service Operations Manager (who manages the technical
 376 infrastructure required for providing cloud services; monitors and measures performance and utilization
 377 against SLAs; provides reports from monitoring and measurement; etc.); Service Business Manager (who
 378 offers all types of services developed by cloud service developers; accounts for services potentially
 379 offered by service Providers themselves and services offered on behalf of cloud service developers;
 380 establishes a portfolio of business relationships; and sets up accounts and terms for Consumers, etc.);
 381 and Service Transition Manager (who enables a customer to use the cloud service, including
 382 "onboarding", integration, and process adoption; defines and creates service offerings based on
 383 Templates and Configurations that can be used by Consumers and are populated into the catalog; etc.).
 384 The term "Provider" is used when the indicated action or activity could involve one or more of the above
 385 actors. In cases where the distinction between the actors in the category is relevant, the more detailed
 386 term will be used.

387 For purposes of comparison and alignment, it should be noted that a Cloud Service Provider is equivalent
 388 to the “Cloud Provider” actor defined in the NIST Reference Architecture [[SP500-292](#)].

389 **3.6**

390 **configuration**

391 A Configuration is a set of metadata, the values of which serve as the parameters of a discrete
 392 conformation of a specific type of virtual resource. For example, a Machine Configuration may define a
 393 Machine with the equivalent of a 2.66 GHz processor, 4 GB of memory, and 320 GB of local disk storage.

394 **3.7**395 **Infrastructure as a Service (IaaS)**

396 A cloud computing service model defined in section 2 of the NIST Definition of Cloud Computing [[SP800-145](#)].
397

398 **3.8**399 **message confidentiality**

400 A quality of a message that prevents anyone but the intended receiver(s) from viewing its contents.

401 **3.9**402 **message integrity**

403 A quality of a message that allows a receiver of that message to determine whether the contents of the
404 message have been altered since its creation.

405 **3.10**406 **Template**

407 A Template is the resource that represents the set of metadata and instructions used to instantiate
408 resources (e.g., a Machine Template is used to create Machines). Templates may aggregate other
409 metadata resources such as other Templates, Configurations and Images. For example, a Machine
410 Template refers to a Machine Configuration and a Machine Image.

411 How a specific protocol mapping, or implementation, chooses to supply Templates as inputs to the
412 instantiation process may vary. However, some common patterns should be considered:

- 413 1. By reference - allow Consumers to reference a Template (that exists as a resource in the
414 Provider) as part of the instantiation operation.
- 415 2. By value - allow Consumers to dynamically provide the Template information as part of the
416 instantiation operation.
- 417 3. Reference with overrides - allow Consumers to reference a Template (that exists as a resource in
418 the Provider) and provide additional values that override the attributes of that Template as part of
419 the instantiation operation.

420 **4 HTTP-Based protocol**421 **4.1 Introduction**

422 All operations are based on the *HyperText Transfer Protocol (HTTP)*, version 1.1 [[RFC2616](#)]. Each
423 request is sent using an HTTP verb such as PUT, GET, DELETE, HEAD, or POST and includes a
424 message body in either JSON or XML format. Each response uses a standard HTTP status code, whose
425 semantics are interpreted in the context of the particular request that was made. Each resource in the
426 model has a MIME type that further contextualizes the payload of requests and responses.

427 Resources in the model are identified by URIs, and each resource's representation shall contain an "id"
428 attribute, of type URI, that acts as a "self pointer." This URI shall be unique within the context of the
429 Provider's implementation. Dereferencing (via an HTTP GET) the URI of an resource will yield a
430 representation of the resource containing attributes and links to associated resources. To begin
431 operations, a client shall know the URI to the main entry point of a Provider - also known as the "Cloud
432 Entry Point" resource. All other resources within the environment shall then be discoverable via the
433 iterative following of links to associated resource within each resource retrieved.

434 **4.1.1 XML namespaces**

435 The following table lists the XML namespaces that are used in this specification. The choice of any
 436 namespace prefix is arbitrary and not semantically significant.

Prefix	XML Namespaces	Specification
cimi	http://schemas.dmtf.org/cimi/1	This specification
xs	http://www.w3.org/2001/XMLSchema	XML Schema Part2

437 **4.1.2 URI space**

438 While URIs returned by Providers are to be treated as opaque by Consumers, and Consumers shall not
 439 make assumptions about the layout of the URIs or the structures of the URIs for the resources, Consumer
 440 may augment URIs with any well-defined query parameters that are supported by the Provider as defined
 441 in clause 4.1.5. Providers shall not use the CIMI-defined query parameter reserved namespace (i.e.,
 442 names starting with "CIMI").

443 **4.1.3 Media types**

444 In this specification, resource and response representations are encoded either in JSON, as specified in
 445 [RFC4627](#) or in XML. When serialized in JSON, the media-type for CIMI resources shall be
 446 "application/json." When serialized in XML the media-type shall be "application/xml."

447 In the JSON serialization of CIMI representations sent by Providers there shall be an additional attribute
 448 on the root object called "resourceURI" that will contain the unique URI that is associated with the type of
 449 CIMI resource being serialized. This attribute is optional for Consumers to include. When included, this
 450 attribute's value shall match the "typeURI" attribute of the corresponding ResourceMetadata resource
 451 (see clause 5.11), if ResourceMetadata is supported. This value shall also be equivalent to the wrapping
 452 element of the XML serialization; in other words, the namespace of the wrapper element concatenated a
 453 "/" and then its localName.

454 The server implementation shall provide representations of all resources available in both JSON and XML
 455 as specified herein. The client implementation may thus use either JSON or XML in requests with any
 456 server implementation, and may request a specific serialization using server-driven content negotiation
 457 (using the Accept request header).

458 **4.1.4 Request headers**

459 This specification uses general-header, request-header, and entity-header headers as defined in
 460 [RFC2616](#) in request messages to provide metadata about the message. Applications using messages
 461 defined in this specification shall use headers consistent with the requirements of [RFC2616](#).

462 In addition to headers defined in [RFC2616](#), request messages may include a header defined by this
 463 specification to indicate the set of allowable versions of the CIMI API that the server shall use to process
 464 the message.

465 `CIMI-Specification-Version = "CIMI-Specification-Version" ":" api-version(s)`

466 For example:

467 `CIMI-Specification-Version=1.0`

468 The header allows for a list of *api-version* values to be specified (separated by commas) and to be
 469 presented in descending order according to the client's preference. When more than one value is present
 470 the server shall choose the preferred one from those versions of the specification to process the
 471 message. Clients including more than one value are indicating that any of the specified values are
 472 acceptable.

473 Per [DSP4004](#), the "api-version" string is made up of three parts: m.n.u (major.minor.update). When
 474 present in this header, it shall include at least the major and minor (m.n) version numbers. It may also
 475 include the "update" portion of the version if necessary. Absence of the "update" portion of the "api-
 476 version" string implies that any "update" version of that major.minor version of the specification is
 477 acceptable to the client.

478 If the server is unable to support any of the specified versions, it shall generate a fault and not process
 479 the message. Absence of this header indicates that the server may choose any version of this
 480 specification to process the message.

481 4.1.5 Request query parameters

482 Providers may choose to include query parameters as part of the URIs returned to Consumers.
 483 Consumers shall include those query parameters when sending messages to those URIs. If Providers
 484 choose to define query parameters care should be taken to avoid conflicts with CIMI defined query
 485 parameters.

486 To modify the behavior of the Provider when processing request messages, Consumers may augment
 487 request URIs as described in the following clauses.

488 Unsupported, or unknown, query parameters shall be silently ignored by Providers. Consumer may
 489 examine the CloudEntryPoint's capabilities to determine whether support of these query parameters is
 490 enabled.

491 4.1.5.1 Filtering collections

492 When retrieving the representation of a collection, Consumers may include the \$filter query parameter to
 493 reduce the number of entries of the collection that are returned based on the data within the entries of the
 494 collection. The \$filter parameter shall be of the form:

495 `?$filter=expression`

496 Where "expression" represents a mathematical expression denoting how the top-level attributes of the
 497 resources within the collection shall be filtered. The expression is defined by the following EBNF
 498 grammar:

```

499 Filter      ::= AndExpr ( 'or' Filter )* ;
500 AndExpr     ::= Comp ( 'and' AndExpr )*
501 Comp        ::= Attribute Op Value
502              | Value Op Attribute
503              | '(' Filter ')'
504 Op           ::= '<' | '<=' | '=' | '>=' | '>' | '!='
505 Attribute   ::= ? resource attribute name ?
506              | PropExpr
507 Value       ::= IntValue | DateValue | StringValue | BoolValue
508 IntValue    ::= /[0-9]+/
509 DateValue   ::= ? as defined by XML Schema ?
510 StringValue ::= "... " | '...'
511 BoolValue   ::= 'true' | 'false'
512 PropExpr    ::= 'property[' StringValue ']' Op StringValue
  
```

513 Where "PropExpr" is used to find resources that contain a property with a certain key/value combination.
 514 Where the "key" is the "StringValue" within the square brackets ([]) and the "value" is the "StringValue"
 515 after the "Op". The resource shall be considered to satisfy the search criteria if any of the properties in the
 516 resources match the specified "PropExpr".

517 Each of these shall be percent encoded in the URL as appropriate.

518 The choice of which operator (including 'and' and 'or') is limited based on the type of the value and
 519 attribute. The following describes the allowable operators:

520	'or', 'and'	: Boolean value/attribute
521	'<', '<=', '=', '>=', '>', '!=',	: Integer and date value/attribute
522	'=', '!='	: String value/attribute

523 Consumer may include multiple filters within a single URI. Provider shall treat multiple filters as a series of
 524 "and" expressions where an entry of the collection shall only be included in the response message if it
 525 satisfies all of the filter expressions specified.

526 **Examples:**

527 In the following examples the following sample base URIs are used:

- 528 • /machines is the URI to the Machines Collection
- 529 • /machines/123 is the URI to a Machine
- 530 • /machines/123/disks is the URI to the DiskCollection of a Machine
- 531 • /machines/123/volumes is the URI to the MachineVolumeCollection of a Machine

532 To filter the "Machines Collection" so that just Machines with a "name" attribute of "mine" are returned,
 533 the following filter would be used:

```
534 GET /machines?filter=name='mine'
```

535 To filter a "DiskCollection" of a Machine so that just Disks with a format of "ntfs" are returned, the
 536 following filter would be used:

```
537 GET /machines/123/disks?filter=format='ntfs'
```

538 When \$filter is used, the collection's "count" attribute shall contain the number of resources matching the
 539 filter expression.

540 **4.1.5.2 Subsetting Collections**

541 When retrieving the representation of a collection, Consumers may include query parameters to subset
 542 the number of entities of the collection that are returned. While the previous clause discussed how to
 543 perform a filter over the data within the collection, this clause uses ordinal position within the collection to
 544 achieve the desired reduction.

545 This specification defined two query parameters that, when used, shall indicate the first and last ordinal
 546 positions of the entities within the collection that are returned. The query parameters shall be of the form:

```
547 ?$first=number  
548 ?$last=number
```

549 Where "\$first" indicates the (1-based) ordinal position of the first entity of the collection to return. And
 550 "\$last" indicates the (1-based) ordinal position of the last entity of the collection to return. Consumer are
 551 not required to use both at the same time. When \$first is specified but \$last is not, then the implied value
 552 for \$last shall be the ordinal position of the last entity in the collection. Conversely, when \$last is specified
 553 but \$first is not, the implied value for \$first shall be 1.

554 When either \$first or \$last are specified, and a filter expression (as defined in clause 4.1.5.1) is also
 555 specified, then the filter expression shall be performed first and then the ordinal constraints of \$first and
 556 \$last shall be applied.

557 **4.1.5.3 Subsetting resources**

558 The \$select query parameter may be used to specify a subset of a resource to be acted upon. This has
 559 the semantic equivalence of referencing a different resource whose attributes are a subset of the original
 560 resource. The format of a \$select query parameter is:

561 `?$select=attributeName,...`

562 The value of the \$select query parameter shall be a comma separated list of top-level attribute names of
 563 the resource. Any attribute name erroneously appearing in the list that is not part of the resource shall be
 564 ignored by the Provider. An attribute name of "*" is equivalent to specifying all of the attributes of the
 565 resource. Any attribute name explicitly appearing more than once in a URI shall have its second (and
 566 subsequent) appearances ignored.

567 The \$select query parameter may appear more than once in a URI that is semantically equivalent to all of
 568 the attribute names appearing as values of a single \$select query parameter. For example:

569 `?$select=name&$select=state`

570 is equivalent to:

571 `?$select=name,state`

572 The order of attribute names in the \$select query parameter is not relevant for serialization purposes. The
 573 attributes will be serialized per the serialization rules/order as specified by the resource definition.

574 For example, to subset the list of Machine attributes being acted upon to just the "name" and
 575 "description", the following query parameter would be used:

576 `?$select=name,description`

577 See clause 4.2.1.3.1 for more information on the impact of using this query parameter when updating a
 578 resource.

579 When \$select is used in the URI for a collection resource, the subsettings applies to the attributes of the
 580 entities of the collection rather than to the collection resource itself. For example, when retrieving the
 581 DiskCollection, the following query parameter:

582 `?$select=id,format`

583 would return a collection of the Disks associated with a Machine but each entity of the collection would
 584 just have the "id" and "format" attributes and nothing else, not even the "operations" or "id" attributes.

585 4.1.5.4 Expanding references

586 The \$expand query parameter may be used during the retrieval of a resource to specify which of the top-
 587 level "reference" attributes of a resource will be "expanded". To "expand" a reference means that the
 588 attributes of the resource being referenced shall be included in the serialization of that attribute. This
 589 feature allows for a more optimized retrieval of resources.

590 The serialization shall be performed as follows:

591 JSON serialization:

592 `"name": { "href": string }`

593 shall be expanded to be:

594 `"name": {`
 595 `"href": string,`
 596 `... attributes of referenced resource...`
 597 `}`

598 XML serialization:

599 `<name href="xs:anyURI"/>`

600 shall be expanded to be:

601 `<name href="xs:anyURI">`


```
602     ... attributes of the referenced resource...
603     </name>
```

604 Note that in the XML case the nested elements shall not contain the wrapper element of the referenced
605 resource (e.g., <Machine> in the case of a reference to a Machine resource).

606 The format of a \$expand query parameter shall be:

```
607     ?$expand=attributeName,...
```

608 The value of the \$expand query parameter is a comma separated list of attribute names. Any attribute
609 name erroneously appearing in the list that is not part of the resource, or is not a reference, shall be
610 ignored by the Provider. An attribute name of "*" is equivalent to specifying all of the attributes. Any
611 attribute name explicitly appearing more than once in a URI shall have its second (and subsequent)
612 appearances ignored.

613 The \$expand query parameter may appear more than once in a URI, which is semantically equivalent to
614 all of the attribute names appearing as values of a single \$expand query parameter.

615 When resource being retrieved is a collection, the attribute names listed in the \$expand shall apply to the
616 attributes of the entities within the collection. For example, specifying:

```
617     ?$expand=volumes
```

618 when retrieving the Machine Collection shall have the same net effect as applying the "expand" semantics
619 to the specified attribute ("volumes" in this example) of each Machine within the collection. To be clear,
620 \$expand acts on the attributes of the resources in the collection, not on the wrapping collection resource
621 itself.

622 4.1.6 Response headers

623 As defined in [RFC2616](#), this specification uses general-header, response-header, and entity-header
624 headers in response messages to provide metadata about the message. Applications that use messages
625 defined in this specification shall use headers consistent with the IANA HTTP Header Registry.

626 In addition to headers defined in [RFC2616](#), response messages shall include a header defined by this
627 specification to indicate the version of the CIMI API that the server used to process the message.

```
628     CIMI-Specification-Version = "CIMI-Specification-Version" ":" api-version
```

629 See clause 4.1.4 for more details on this header.

630 Additionally, if the server supports the Job resource, response messages shall include a header defined
631 by this specification to indicate the URI for the job created to process the associated request message.

```
632     CIMI-Job-URI = "CIMI-Job-URI" ":" string
```

633 In cases where an error occurs during the processing of a request, the Provider shall include a
634 representation of a Job resource describing the status of the failed operation. This representation of a Job
635 shall be included even in cases where the Provider does not normally support Job resources to ensure
636 that Consumers are provided with sufficient information, in a consistent manner, as to the reason for the
637 failure regardless of whether the Provider supports Jobs. When Jobs are not supported in general, any of
638 the references in the Job representation (e.g., "id" or the "href" for nestedJobs) shall be empty paths (i.e.,
639 "") and the "nestedJobs" array shall be expanded (see 4.1.5.4) to inline the representation of the pseudo
640 subordinate Jobs.

641 4.2 Protocol operations

642 This clause defines the set of common HTTP operations that a Provider might expose. At its core there
643 are four basic CRUD (Create, Read, Update, and Delete) operations. The manner in which these are
644 used is consistent across all resources within the model; therefore, their use is defined once and is to be

645 applied consistently. Some resources support specialized operations that do not fit well into a CRUD style
 646 of operation and those will all follow a similar high-level pattern but each operation is allowed to have
 647 slight variations to accommodate its specific needs. The specifics of these special operations are detailed
 648 within the clause that defines the resource.

649 When appropriate some of the resource representations will include an "operations" attribute. Providers
 650 shall only include the "operations" attribute when the specified operations are accessible to the current
 651 client for that particular resource. This situation means that based on many factors (e.g., authorization
 652 rights of the clients, current state of the resource, etc.), a different set of "operations" shall be returned on
 653 each serialization of the resource. Each operation shall include a "rel" and an "href" field. The "rel" field
 654 will uniquely identify the operation name (e.g., "add", "edit"), while the "href" field is the URI to which the
 655 operation's request message shall be sent. Note that the "href" field's URI may be different from the URI
 656 of the resource itself. The "operations" attribute shall be serialized as follows:

657 **JSON serialization:**

```
658 { "operations": [
659   { "rel": "string", "href": "string" }, +
660 ]
661 }
```

662 **XML serialization:**

```
663 <Resource xmlns="http://schemas.dmtf.org/cimi/1">
664   <operation rel="xs:anyURI" href="xs:anyURI"/> *
665 </Resource>
```

666 For example, the "edit" operation would appear as:

667 **JSON serialization:**

```
668 { "operations": [
669   { "rel": "edit", "href": "<editURI>" }
670 ]
671 }
```

672 **XML serialization:**

```
673 <Resource xmlns="http://schemas.dmtf.org/cimi/1">
674   <operation rel="edit" href="<editURI>I"/>
675 </Resource>
```

676 Additional "rel" values may be defined by Providers; however, they shall be fully qualified URIs and not
 677 relative URIs.

678 4.2.1 Common CRUD operations

679 Each of the resources supported by this protocol will adhere to the interaction patterns defined in the
 680 following clauses. Clause 4.3 defines resource specific information such as the serialization of each
 681 resource's properties and which specific actions are supported.

682 4.2.1.1 Creating a new resource

683 To create a new instance of a resource type, an HTTP POST request is sent to a designated "addURI" for
 684 that resource type. In many cases, the Collection resource that maintains, or groups, all instances of that
 685 resource type will include an "add" operation. The "add" operation references the "addURI" that is to be
 686 used.

687 The request shall be of the following form:

```
688 POST <addURI> HTTP/1.1
689 Host: <hostname>
```

```

690 Accept: application/(json+xml)
691 Content-Type: application/(json+xml)
692 Content-Length: <length>
693 CIMI-Specification-Version: 1.0 ?
694
695 <serialization of request to create a new resource>
    
```

696 During the process of creating the resource, depending on the resource type, the Provider may set the
 697 state of the new resource to a value of "CREATING".

698 Many of the create requests are defined such that a Template of the new resource is passed in. These
 699 create requests allow for the Template to be passed in "by-reference" or "by-value." For example,
 700 creating a new Machine looks like this:

```

701 <MachineCreate xmlns="http://schemas.dmtf.org/cimi/1">
702   <name> xs:string </name> ?
703   <description> xs:string </description> ?
704   <property key="xs:string"> xs:string </property> *
705   <machineTemplate href="xs:anyURI"? >
706     ... template attributes ... ?
707   </machineTemplate>
708 </MachineCreate>
    
```

709 Creating a new Machine can be done by including a reference to a MachineTemplate in the HTTP body
 710 of the request message, or the individual attributes of the MachineTemplate itself could be included in the
 711 message (as denoted by the "... *template attributes* ..." text in the above example). The same applies for
 712 nested attributes. When the information is passed by-value the Provider may choose to create instances
 713 of those nested resources but they shall be temporal in nature. The Provider shall not expose those
 714 instances to the Consumer and they shall not be included in any query results back to the Consumer.

715 When the request to create a new resource allows for a reference to a Template to be included,
 716 Consumer may include some of the Template's attributes "by-value". In this case the Provider shall use
 717 the "by-value" attributes as override values of any attributes specified within the referenced Template.
 718 Consumer may erase any Template attributes by specifying either

```

719   "attribute": null
    
```

720 for the attribute in the JSON serialization, or

```

721   <attribute/>
    
```

722 in the XML serialization for that attribute. This overriding mechanism shall only be used on immediate top-
 723 level attributes of the Template, and shall not be used to override any sub-attributes.

724 Note that the "name" and "description" attributes of the Template should not be included when passing
 725 the Template attributes by-value. Because those values are defining the name and description of the
 726 Template, not of the new resource being created, and because the Template is never persisted within the
 727 Provider, including these attributes would serve no purpose.

728 Some of the create requests allow for configuration type of resources to be passed by-reference or by-
 729 value as well - e.g., Credential on a Machine create operation. The processing rules defined above
 730 applies in those cases as well.

731 If the operation succeeds, the response shall be of the following form:

```

732 HTTP/1.1 201 Created
733 Location: <location>
734 Content-Type: application/(json+xml)
735 Content-Length: <length> ?
736 CIMI-Specification-Version: 1.0
737
738 <serialization of new resource> ?
    
```

739 If *<serialization of new resource>* is present, the Content-Type and Content-Length headers shall both be
740 present.

741 4.2.1.2 Retrieving a representation of a resource

742 To retrieve a representation of resource, an HTTP GET request is sent to the resource's URI.

743 The request shall be of the following form:

```
744 GET <ResourceURI> HTTP/1.1
745 Host: <hostname>
746 Accept: application/(json|xml) ?
747 CIMI-Specification-Version: 1.0 ?
```

748 If the operation succeeds, the response shall be of the following form:

```
749 HTTP/1.1 200 OK
750 Content-Type: application/(json|xml)
751 Content-Length: <length>
752 CIMI-Specification-Version: 1.0
753
754 <serialization of resource>
```

755 4.2.1.3 Updating a resource

756 To update a resource's state, an HTTP PUT request containing the complete, updated representation is
757 sent to a designated "editURI" for that resource type. In many cases, this "editURI" will be the same as
758 the URI of resource itself. Retrieving the resource representation shall include an "edit" operation, which
759 contains the "editURI" that is to be used, if the requester is allowed to modify the resource.

760 While processing a PUT request, if the server detects that an attempt is being made to update a read-
761 only, or immutable, attribute, it shall silently ignore that attribute update request and shall not generate an
762 error. This rule applies to resource partial updates as well.

763 Because of potential conflicts that might occur due to multiple concurrent updates, Consumers should use
764 the partial update mechanism, defined in 4.2.1.3.1, to reduce the chances of mistakenly updating
765 attributes with out-of-date data.

766 The request shall be of the following form:

```
767 PUT <editURI> HTTP/1.1
768 Host: ...
769 Accept: application/(json|xml)
770 Content-Type: application/(json|xml)
771 Content-Length: <length>
772 CIMI-Specification-Version: 1.0
773
774 <serialization of request to update a resource>
```

775 If the operation succeeds, the response shall be of the following form:

```
776 HTTP/1.1 200 OK
777 Content-Type: application/(json|xml)
778 Content-Length: <length> ?
779 CIMI-Specification-Version: 1.0
780
781 <serialization of updated resource> ?
```

782 If *<serialization of updated resource>* is present, the Content-Type and Content-Length headers shall
783 both be present.

784 **4.2.1.3.1 Partial updates to a resource**

785 To update only certain top-level attributes of a resource, a Consumer may include only the altered
 786 attributes in the representation of the resource within the HTTP request body. When this request is made,
 787 the URI to the resource shall include the attributes to be modified as a comma separated list of query
 788 parameters; in other words, the URI shall be of the form:

```
789 http://example.com/resource?$select=attribute1,attribute2,...
```

790 Only the attributes listed in the URI's query parameters shall be modified; attributes not listed in the URI
 791 shall not be directly modified by the request. Note that this circumstance does not preclude the
 792 modification of one attribute causing side-effects that result in the modification of an attribute not listed in
 793 the query parameters.

794 Any attribute listed in the URI but not included within the HTTP request body shall be reset to a resource
 795 specific value (e.g., removed).

796 From an HTTP perspective, the updated subsetted resource is a distinct one. The semantics of a normal
 797 HTTP PUT are adhered to; it is a complete replacement update of the specified resource. From the
 798 Consumer's perspective, the partial update is interpreted and executed by the Cloud Service Provider,
 799 and some part of the resource is changed.

800 The following sample request updates just the name and description attributes of a Machine:

```
801 PUT /machines/myMachine?$select=name,description HTTP/1.1
802 Host: <hostname>
803 Accept: application/xml
804 Content-Type: application/xml
805 Content-Length: <length>
806 CIMI-Specification-Version: 1.0
807
808 <Machine>
809   <name>My New Machine</name>
810 </Machine>
```

811 The "name" attribute is set to "My New Machine" and the "description" attribute is erased.

812 **4.2.1.4 Deleting a resource**

813 To delete a resource, an HTTP DELETE request is sent to a designated "deleteURI" for that resource
 814 type. In many cases, this "deleteURI" will be the same as the URI of resource itself. Retrieving the
 815 resource representation shall include a "delete" operation, which contains the "deleteURI" that is to be
 816 used, if the requester is allowed to delete the resource.

817 The request shall be of the following form:

```
818 DELETE <deleteURI> HTTP/1.1
819 Host: <hostname>
820 CIMI-Specification-Version: 1.0 ?
```

821 During the process of deleting the resource, depending on the resource type, the Provider may set the
 822 state of the resource to a value of "DELETING".

823 If the operation succeeds, the response shall be of the following form:

```
824 HTTP/1.1 200 OK
825 CIMI-Specification-Version: 1.0
```

826 4.2.1.5 Other operations

827 While some modifications to the resources in the model can be done via a simple update (PUT) operation
828 to the resource's "editURI", sometimes a more complex set of actions need to be taken. In these cases,
829 the operations will be modeled as HTTP POSTs to the operation specific URI of the resource.

830 For each of the resources that define additional operations, a description of the HTTP request and
831 response bodies will be provided. However, the general HTTP interaction will be as described below.

832 The request shall be of the following form:

```
833 POST <operationLinkURI> HTTP/1.1
834 Host: <hostname>
835 Accept: application/(json|xml)
836 Content-Type: application/(json|xml)
837 Content-Length: <length>
838 CIMI-Specification-Version: 1.0
839
840 <serialization of request to perform some action>
```

841 The form of the response will vary depending on the operation and will be defined by the operation itself.

842 Note that the definition of the "Create" operation (see clause 4.2.1.1) follows this same pattern. It is just
843 called out for ease of reference.

844 4.2.1.6 Synchronous operations

845 If a Provider supports the Job resource, each incoming PUT, DELETE, POST request shall result in a Job
846 resource being created and an absolute URI reference to that Job resource shall be returned back to the
847 client via the CIMI-Job-URI HTTP Header in the HTTP response message:

```
848 CIMI-Job-URI: <uri-to-Job>
```

849 In this case, the requested operation shall be complete and the Job URI shall point to a completed Job. If
850 the Job is not complete, the server shall return a 202 and follow the instructions for Asynchronous
851 operations.

852 4.2.1.7 Asynchronous operations

853 In some cases, an operation requested by the client may take an undetermined amount of time to
854 complete. For example, creating a new Machine or starting an existing Machine, may take a relatively
855 long time to complete. In these cases, it is not practical to complete these operations within a reasonable
856 HTTP request timeout interval, so the Provider shall return an HTTP "202 Accepted" response code.

857 As with synchronous operations, if a Provider supports the Job resource, it shall create a Job resource for
858 the incoming request and return a reference to that Job resource back to the client via the CIMI-Job-URI
859 HTTP Header in the HTTP response message. Additionally, in the case of a "202 Accepted" response
860 code, the Provider may also return any of the following in the HTTP response body:

- 861 • a representation of the Job resource, if one was created. If the request did not include the Job
862 MIME type in the HTTP Accept header, the encoding style (json vs xml) of the response should
863 match the encoding style of the request message.
- 864 • a partial representation of the response message as if the operation were a synchronous
865 operation. For example, when creating a new Machine the response message may include a
866 partial representation of the new Machine in the response message. The list of attributes of the
867 resource that are returned will be implementation specific and based upon how much information
868 is available at the time the response message is generate, but it shall be consistent with the
869 definition of the full resource representation. In the case of a create operation, the Provider may
870 also include an HTTP Location header referencing the "to be created" resource if it is known.

- 871 • an empty response body.

872 Note that the decision as to whether any particular operation will be synchronous or asynchronous is at
873 the server's discretion.

874 **4.3 OVF support**

875 The *Open Virtualization Format (OVF) Specification* describes an open, secure, portable, efficient, and
876 extensible format for the packaging and distribution of software to be run in virtual machines. OVF
877 support in CIMI allows an OVF package to be used to create CIMI management resources by importing
878 the package. Additionally, CIMI management resources can be exported into an OVF package. The
879 actual support for the OVF package will typically be provided by a hypervisor being managed by the CIMI
880 provider. The import of an OVF package exposes CIMI specific constructs and parameters as a result of
881 the import without altering the original OVF package. Thus the CIMI resources that are created as a result
882 of the import form a "View" of what the hypervisor did; however, other (non-CIMI mapped) information
883 from the OVF package may have been used by the hypervisor in its import. This other information is
884 implementation dependent and is not further touched upon by this standard.

885 An OVF package can support single virtual machines (VMs) corresponding to a single CIMI Machine or
886 Machine Template (see clause 5.14.1) or may also support a complex hierarchy of VMs and their related
887 resources corresponding to a CIMI System or System Template (see clause 5.13.1) and related CIMI
888 management resources.

889 OVF Support is covered in more detail in ANNEX A.

890 **5 Model**

891 This model assumes that a business relationship has already been established between the Consumer
892 and the Provider. This relationship may include financial terms, creating separately administered clouds
893 that the consuming organization is paying for, and the establishment of authentication credentials to
894 access the administrative entry point for each cloud. The scope of this model is one separately
895 administered cloud.

896 The CIMI model is described here by using a tabular representation. It is inspired from Entity-Relationship
897 modeling, where each entity is modeling a significant cloud resource for which independent access and
898 manipulation is expected. Relationships between resources use a referential mechanism based on
899 unique identifiers that is expected to be already supported by the implementation environment and
900 protocol (e.g., URIs for HTTP).

901 The model is self-describing and allows for querying its own metadata, e.g., to discover which extensions
902 have been implemented. The model is also extensible in different ways (see clause 5.1).

903 Along with this model, a serialization of its entities is defined (both in XML and JSON).

904 An alternative UML diagram representation is provided for each major group of resources

905 **5.1 Resource wrappers**

906 The serialization of resource instances in the model will follow these conventions. Consider the
907 serialization of a resource named "MyResource":

908 **JSON serialization:**

909 The resource is serialized as an object wrapping all its attributes, but without a wrapper name. The
910 resource includes an "resourceURI" with a URI for the type of resource being serialized. For example:

```
911     { "resourceURI": "http://example.com/MyResource",  
912       "attribute": "value"
```

913 }

914 **XML serialization:**

915 The resource is serialized as an element with name equal to the Resource name; for example:

```
916 <MyResource xmlns="http://example.com">
917   <attribute> value </attribute>
918 </MyResource>
```

919 **5.2 Extensibility**

920 There are two types of extensibility mechanisms defined by the CIMI model; one is intended for use by
921 Consumers whilst the other is to be used by Providers.

922 The first allows for a CIMI Consumer to add additional data to a resource. Each resource in the CIMI
923 model has an attribute called "properties." Consumers, when creating or updating a resource, may store
924 any name/value pair in the "properties" attribute. CIMI Providers shall store and return these values to the
925 Consumer. There is no obligation for the Provider to understand or take any action based on these
926 values; they are there for the Consumer's convenience. Providers shall not add elements to this
927 "properties" attribute.

928 The second type of extensibility mechanism allows for Provider defined extensions and this specification
929 includes the ResourceMetadata resource for this purpose. ResourceMetadata may be used to:

- 930 • Express constraints on the existing CIMI defined resource attributes (e.g., express a maximum for
931 the 'cpu' attribute of the MachineConfiguration resource)
- 932 • Introduce new attributes for CIMI defined resources together with any constraints governing these
933 (e.g., a new 'location' attribute for the Volume resource that takes values from a defined set of
934 strings)
- 935 • Introduce new operations for any of the CIMI defined resources (e.g., define a new 'compress'
936 operation for the Volume resource)
- 937 • Express any Provider specific capabilities or features (e.g., the length of time that a Job resource
938 will be retained after Job completion and before this is deleted).

939 It is recommended that Providers use the ResourceMetadata resource to advertise these attributes,
940 operations, and capabilities along with any constraints that might need to be understood by Consumers.
941 The ResourceMetadata resource is defined in clause 5.11.

942 **5.3 Identifiers**

943 All identifiers (e.g., resource names, attributes, operations, parameter names) defined by this
944 specification, or defined via an extension, shall adhere to the following:

- 945 • Identifier names shall be treated as case sensitive.
- 946 • Identifier names shall only use the following set of characters:
 - 947 ○ Uppercase ASCII (U+0041 through U+005A)
 - 948 ○ Lowercase ASCII (U+0061 through U+007A)
 - 949 ○ Digits (U+0030 through U+0039)
 - 950 ○ Underscore (U+005F)
- 951 • Identifier names shall not start with a Digit (U+0030 through U+0039).

952 **5.4 Attribute constraints**

953 Each attribute of the resources in the CIMI model is augmented by a set of "Constraints" that further
954 qualify the attribute being defined. For each attribute there is a Provider and a Consumer set of
955 constraints because each might differ. The following describes the possible "Constraints."

956 **support optional:**

957 This constraint indicates that support for this attribute is optional. If supported, Providers should advertise
958 its support via ResourceMetadata. When a Provider receives a message containing an unknown or
959 unsupported attribute, it shall reject the request. When a Consumer receives a message containing an
960 unknown or unsupported attribute, it shall silently ignore the attribute. However, Consumers are required
961 to include those attributes in messages sent back to the Provider. Note in these cases the Consumer is
962 not required to understand or process the unsupported attribute, merely echo it back to the Provider.

963 Non-empty Consumer supported writeable (i.e., read-write and write-only) attributes shall always be
964 included as part of the resource representation sent from Consumers to Providers, including create
965 requests.

966 Non-empty Provider supported attributes shall always be included as part of the resource representation
967 sent from Providers to Consumers.

968 **support mandatory:**

969 This constraint indicates that support for this attribute is required by compliant implementations. When
970 present on a nested attribute, this attribute is required to be supported only if the parent attribute is
971 supported.

972 Non-empty mandatory writeable (i.e., read-write and write-only) attributes shall always be included as part
973 of the resource representation sent from Consumers to Providers - including create requests.

974 Non-empty Provider mandatory attributes shall always be included as part of the resource representation
975 sent from Providers to Consumers.

976 **immutable:**

977 This Provider constraint indicates that the attribute, once set, shall never change for the lifetime of the
978 resource.

979 **mutable:**

980 This Provider constraint indicates that the attribute may be modified. Providers shall always have the
981 ability to modify these attributes. Whether Consumers have the ability to modify these attributes will be
982 indicated by the read-only, read-write, and write-only constraints.

983 **read-only:**

984 This Consumer constraint indicates that the attribute may be retrieved but not updated by Consumers.
985 Read-only attributes are not required to appear in the serialization of resources in create or update
986 request messages. If present, they shall be silently ignored by the Provider. Read-only attributes shall
987 appear in the serialization of resources sent from Providers.

988 **read-write:**

989 This Consumer constraint indicates that the attribute may be retrieved and/or updated by Consumers.
990 Read-write attributes shall appear in the serialization of resources sent to and from Providers. Providers
991 may further constrain whether Consumers can update these attributes and should indicate this via
992 ResourceMetadata.

993 write-only:

994 This Consumer constraint indicates that the attribute may be updated by Consumers but are not
995 retrievable by Consumers, typically for security reasons. Write-only attributes shall appear in the
996 serialization of resources sent to Providers but shall never appear in the serialization of resources sent
997 from Providers.

998 5.5 Data types and their serialization

999 Unless specifically asked to not include certain attributes in the resource representation, the absence of
1000 an attribute in the representation means that the attribute has no value (i.e., is undefined); meaning there
1001 is no notion of an attribute having an implied value. Note that a client cannot distinguish (from just looking
1002 at the returned representation) whether a particular attribute is not supported from one that does not exist.
1003 Likewise, an absent attribute from a resource representation as the input to an update operation means
1004 that the Consumer is requesting that the Provider remove that attribute.

1005 The following describes the data types and values that are used within the model definition tables.

1006 5.5.1 boolean

1007 A value as defined by xs:boolean per [XML Schema – Part 2](#), with the exception that the only allowable
1008 values are either "true" or "false." The value is case sensitive.

1009 When serialized in JSON these values shall be of JSON type: *boolean*

1010 When serialized in XML these values shall be of XML Schema type: *xs:boolean*

1011 5.5.2 dateTime

1012 A value as defined by xs:dateTime per [XML Schema – Part 2](#). Any constraints on the specific ranges
1013 allowed for any particular attribute will be specified by that attribute's definition or at runtime by the
1014 Provider via the metadata discovery mechanisms defined by this specification.

1015 When serialized in JSON these values shall be of JSON type: *string*

1016 When serialized in XML these values shall be of XML Schema type: *xs:dateTime*

1017 5.5.3 duration

1018 A value as defined by xs:duration per [XML Schema – Part 2](#). Any constraints on the specific ranges
1019 allowed for any particular attribute will be specified by that attribute's definition or at runtime by the
1020 Provider via the metadata discovery mechanisms defined by this specification.

1021 When serialized in JSON these values shall be of JSON type: *string*

1022 When serialized in XML these values shall be of XML Schema type: *xs:duration*

1023 5.5.4 integer

1024 A value as defined by xs:integer per [XML Schema – Part 2](#). Any constraints on the specific ranges
1025 allowed for any particular attribute will be specified by that attribute's definition or at runtime by the
1026 Provider via the metadata discovery mechanisms defined by this specification.

1027 When serialized in JSON these values shall be of JSON type: *number*

1028 When serialized in XML these values shall be of XML Schema type: *xs:integer*

1029 **5.5.5 string**

1030 A value as defined by xs:string per [XML Schema – Part 2](#). Any constraints on this type for any particular
 1031 attribute will be specified by that attribute's definition or at runtime by the Provider via the metadata
 1032 discovery mechanisms defined by this specification.

1033 When serialized in JSON these values shall be of JSON type: *string*

1034 When serialized in XML these values shall be of XML Schema type: *xs:string*

1035 **5.5.6 ref**

1036 A reference to another resource.

1037 References allow for Consumers to navigate to resources. By starting at the Cloud Entry Point and
 1038 following the references that appear in the retrieved resources, Consumers will be able to recursively
 1039 discover and navigate to all other resources.

1040 As a general rule, when an attribute is of type "ref", its value will be held by an attribute named "href"
 1041 (both in JSON and XML).

1042 **JSON serialization:**

1043 In the JSON serialization the "href" property appears as of type "string." When an attribute is of type "ref",
 1044 the name of this attribute will appear as a key, with the "href" property as it a nested value. For example,
 1045 a resource attribute "myvolume" of type "ref" is serialized as:

1046

```
"myvolume": { "href": string }
```

1047 **XML serialization:**

1048 In the XML serialization the "href" attribute appears as type "xs:anyURI." When an attribute is of type
 1049 "ref," the name of this attribute will appear as name of an XML element with the "href" property as an
 1050 (XML) attribute. For example, a resource attribute "myvolume" of type "ref" is serialized as:

1051

```
<myvolume href="xs:anyURI"/>
```

1052

1053 References in both JSON and XML have an extensibility point that allows for additional information (such
 1054 as the target resource to be included "by value") if supported. For convenience the JSON and XML
 1055 representations, as shown above, exclude the implicit extensibility points that would allow for the
 1056 attributes of the target resource to be included if desired. So, more accurately the above representations
 1057 might be written as follows:

1058 For JSON:

1059

```
"myvolume": { "href": string, ... }
```

1060 and in XML:

1061

```
<myvolume href="xs:anyURI"> xs:any* </myvolume>
```

1062 However, for brevity the extensibility points are excluded in the serialization of the resources.

1063 **5.5.7 map**

1064 A list of key/value pairs. The same "key" shall not be used more than once within an attribute. The "key" is
 1065 case sensitive.

1066 **5.5.8 structure**

1067 Attributes of this type are complex attributes made up of a set of nested attributes. For each attribute of
1068 this type there will be an additional table defining those nested attributes.

1069 A nested structure can be considered a complex type definition. Structures may be named or unnamed.
1070 Here is an example of named structure:

1071

Name	<i>summary</i>	
Attribute	Type	Description
low	<i>number</i>	Number of "low" occurrences
medium	<i>number</i>	Number of "medium" occurrences
high	<i>number</i>	Number of "high" occurrences
critical	<i>number</i>	Number of "critical" occurrences

1072 **JSON serialization:**

1073 In JSON, the name of the structure (i.e., of the type it represents) never appears. In other words, whether
1074 the structure is named or not does not matter. An attribute named "systemIncidents" of type "summary"
1075 (as above) is serialized as follows:

```
1076 "systemIncidents": {
1077   "low": number,
1078   "medium": number,
1079   "high": number,
1080   "critical": number
1081 }
```

1082 **XML serialization:**

1083 In XML, the name of the structure (i.e., of the type it represents) never appears. In other words, whether
1084 the structure is named or not does not matter. The same previous "systemIncidents" example will be
1085 serialized so that the structure sub-attributes become XML attributes of a <systemIncidents> XML
1086 element wrapper:

```
1087 <systemIncidents low="xs:integer" medium="xs:integer" high="xs:integer"
1088   critical="xs:integer"/>
```

1089 NOTE: A large number of sub-attributes of atomic type in a structure may be represented alternatively as XML child
1090 elements for better readability. Both options are available; however, the same structure shall be serialized the same
1091 way across resources.

1092 **5.5.9 byte[]**

1093 An arbitrary set of bytes meant to represent a block of binary data. Any constraints on this type for any
1094 particular attribute will be specified by that attribute's definition or at runtime by the Provider via the
1095 metadata discovery mechanisms defined by this specification.

1096 When serialized in JSON these values shall be of JSON type: *string*

1097 When serialized in XML these values shall be of XML Schema type: *xs:hexBinary*

1098 **5.5.10 URI**

1099 The format and syntax of the attributes of type "URI" is defined by [RFC3986](#).

1100 Unless otherwise noted, this specification does not mandate whether Providers use relative or absolute
 1101 URI in the HTTP response bodies.

1102 When URIs are specified as relative URIs, they shall be relative to the parent of the CloudEntryPoint
 1103 unless otherwise noted; in other words, the "baseURI" is the parent of the CloudEntryPoint with a trailing
 1104 slash.

1105 The algorithm used for converting a relative URI to an absolute URI shall be as described in section 5.2 of
 1106 [RFC3986](#). The table below illustrated how relative URIs are resolved against base URIs:

Base URI	Relative URI	Absolute URI
http://example.com/	p1/file	http://example.com/p1/file
http://example.com/c1/	p1/file	http://example.com/c1/p1/file
http://example.com/c1/c2/	p1/file	http://example.com/c1/c2/p1/file

1107 If relative URIs are used, the "baseURI" shall end with a trailing slash and relative URIs shall not begin
 1108 with a leading slash. This format will be consistent with most URI resolve utilities and will produce the
 1109 same results as a simple string concatenation algorithm.

1110 When serialized in JSON these values shall be of JSON type: *string*

1111 When serialized in XML these values shall be of XML Schema type: *xs:anyURI*

1112 **5.5.11 Arrays**

1113 An array represents an ordered list of items of the same type. An array shall always appear as an
 1114 attribute of a resource, and is only accessible as such (it is not a separately addressable resource). When
 1115 a resource is deleted, the items in its arrays shall also be deleted. However, in case these items were just
 1116 references to other resources, these referred resources are not affected (see the semantics of references
 1117 in 5.7)

1118 Attributes that are arrays are defined by using the notation "itemType[]," where itemType is the type name
 1119 for each item of the array. When the type is a structure, not a simple data type, it is recommended as a
 1120 convention in the model that the name of an array be the plural of a name that characterizes each item.
 1121 For example, an array of volume items or of references to these may be named "volumes."

1122 When an attribute is of type of references ("ref[]") – and more generally array of an atomic type - the
 1123 definition in the model will include an "Array item name", that may be used in its serialization.

1124 **JSON serialization:**

1125 Within this specification, arrays in JSON are serialized with a wrapper property. The wrapper name shall
 1126 be same as the attribute name for the array. For example, a "things" attribute of type "thing[]" is serialized
 1127 as:

```
1128 "things" : [  
1129   { ... }, +  
1130 ] ?
```

1131 When the items in the array are structures then the structure name shall not be present in the JSON
 1132 serialization.

1133 In the case of an array of references, i.e., where the "ref" type applies to each element of the array, each
 1134 element will simply be serialized as an "href" property within a JSON array. For example, an array "things"
 1135 of type "ref[]" is serialized as:

```
1136 "things": [  
1137   { "href": string }, +  
1138 ] ?
```

1139

1140 NOTE When serializing arrays, conformant implementations shall not include empty arrays (i.e., arrays that contain
1141 no child properties) in the JSON serialization. Notice that the child of the "things" property is defined with a "+",
1142 meaning at least one child is required. This requirement ensures that the JSON serialization is minimized and only
1143 includes the wrapping "things" element if, and only if, there is at least one "thing" in the array.

1144 XML serialization:

1145 The XML serialization of arrays requires each item of the array to be represented as an element. These
1146 elements shall be consecutive and contiguous in the serialization and the name of each element (tag
1147 name) shall be the name of the element type (the name that appears before "[]" in the array type). For
1148 example, a "things" attribute will be serialized as a list of items named "thing", where "thing" is the name
1149 of a structure:

```
1150 <thing>
1151   ...
1152 </thing> *
```

1153 There is no wrapper element for an array in XML.

1154 In the case of an array of references, i.e., where the "ref" type applies to each element of the array, the
1155 array is serialized as a list of XML elements without wrapper. Each element is named per the "Array item
1156 name" value specified in the attribute's definition. For example, an array "things" of type "ref[]" where the
1157 "Array item name" is "thing", is serialized as:

```
1158 <thing href="xs:anyURI"/> +
```

1159 5.5.12 Collections

1160 Like arrays, collections are groupings of resources of the same type. In contrast with arrays, collections
1161 are themselves resources that have their own URI and can be independently accessed. Collections also
1162 allow for an optimized and convenient interaction pattern by providing a specialized set of operations that
1163 avoid replacing a large number of items when updating the set.

1164 This specification uses collections when the set of items in the list will most likely be modified often and
1165 potentially by multiple Consumers. Conversely, arrays are used when it is expected that the list of items
1166 will not be modified often or can be easily modified by substitution of the entire list, and thus the overhead
1167 of managing these items as separate resources might be burdensome.

1168 Attributes that are collections are represented as type "collection[itemType]." The resource type of the
1169 collection items are specified inside the brackets; for example an attribute that is a collection of Machines
1170 is expressed as "collection[Machine]." These will be serialized as a reference to a collection resource. For
1171 brevity, while these attributes are "references" the word "ref" or "reference" does not appear in the model
1172 definition tables - simply the type "collection[itemType]" appears.

1173 To each one of these resource items, will correspond an entry in the collection. These resources items
1174 are assumed to be of a complex type and are separately addressable and manageable. While different
1175 collections will contain entries of different resource types, all collections follow the pattern described
1176 below:

- 1177 • Collections shall contain an "id" attribute that acts as a "self pointer." Retrieving the data at this
1178 reference shall return the collection. In the XML representation, each collection shall be wrapped
1179 by a <Collection> element.
- 1180 • Collections shall contain a "count" attribute which indicates the number of resources in the
1181 collection at the time the collection was queried.
- 1182 • Collections shall contain a list of resources that make up the collection. As with all arrays, if there
1183 are no resources in the collection, the serialization of the list shall be omitted.

- 1184 • As with all resources in the CIMI model, each resource in the collection shall have an "id" attribute
1185 that acts as a "self pointer." Retrieving the data at this reference shall return just that one
1186 resource and not any parent resource, such as the collection or array attribute.
- 1187 • Adding new resources to the collection shall be done via the "add" operation defined within the
1188 collection. Note that lack of an "add" operation on the collection indicates that new resources are
1189 not permitted at that time.
- 1190 • Deleting resources from the collection shall be done via a "delete" operation on the resource
1191 itself.
- 1192 • Unless otherwise specified, deleting a collection shall also delete all of the resources that make
1193 up the collection, but shall not delete any tertiary resources referenced by the to-be deleted
1194 collection resources.
- 1195 • Collections shall be deleted when their owning resource is deleted.

1196 The resources in a collection are of two kinds:

- 1197 • either the resource is an infrastructure resource (such as those listed in the Cloud Entry Point, or
1198 those embedded in an entity such as the disks inside a Machine),
- 1199 • or the resource is just an intermediary resource that holds a reference to an infrastructure
1200 resource, called the "target resource". By convention, intermediary resources have a name that
1201 concatenates the name of the resource owning the collection, with the name of the target
1202 resource, e.g. "MachineVolume" is the name of the intermediary resource that is used to connect
1203 a Machine to a Volume.

1204 Collections of intermediary resources allow for decoupling the lifecycle of a collection (and of its owning
1205 entity) from the lifecycle of the actual target resources. For example, deleting a collection will delete its
1206 intermediary resources but not its target resources.

1207 The serialization of collections shall adhere to the following pattern:

1208 **JSON serialization:**

```

1209 { "resourceURI": string,
1210   "id": string,
1211   "count": number,
1212   "resourceSpecificGroupingName": [
1213     { "resourceURI": string,
1214       "id": string,
1215       "name": string, ?
1216       "description": string, ?
1217       "created": string, ?
1218       "updated": string, ?
1219       "properties": { "key": string, + }, ?
1220       ... entry specific data ...
1221       "operations": [
1222         { "rel": "edit", "href": string }, ?
1223         { "rel": "delete", "href": string } ?
1224       ] ?
1225       ...
1226     } +
1227   ], ?
1228   "operations": [ { "rel": "add", "href": string } ? ]
1229   ...
1230 }
```

1231 **XML serialization:**

```

1232 <Collection resourceURI="xs:anyURI" xmlns="http://schemas.dmtf.org/cimi/1">
1233   <id> xs:anyURI </id>
1234   <count> xs:integer </count>
1235   <ResourceSpecificElementName>
1236     <id> xs:anyURI </id>
1237     <name> xs:string </name> ?
1238     <description> xs:string </description> ?
1239     <created> xs:dateTime </created> ?
1240     <updated> xs:dateTime </updated> ?
1241     <property key="xs:string"> xs:string </property> *
1242     ... entry specific data ...
1243     <operation rel="edit" href="xs:anyURI"/> ?
1244     <operation rel="delete" href="xs:anyURI"/> ?
1245     <xs:any>*
1246   </ResourceSpecificElementName> *
1247   <operation rel="add" href="xs:anyURI"/> ?
1248   <xs:any>*
1249 </Collection>

```

1250 Where the "resourceURI" attributes shall contain the collection or resource specific URIs for that type of
 1251 collection, and "resourceSpecificGroupingName" and "ResourceSpecificElementName" shall be replaced
 1252 with the name of the collection-specific resource name, e.g. "machines" in JSON or "Machine" in XML.

1253 **5.5.12.1 Adding items to collections**

1254 Adding new resources to collections shall be done by invoking the "add" operation of the collection. The
 1255 contents of the request body will be either a representation of the new resource being added to the
 1256 collection, or a representation of the Template associated with the new resource being created. Each
 1257 resource that requires the use of a Template indicates this in its definition.

1258 For example, to add a new Volume to a Machine's "volumes" collection, the "add" operation's request
 1259 body will be serialized as follows:

1260 **JSON serialization:**

```

1261 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineVolume",
1262   "initialLocation": string,
1263   "volume": { "href": string }
1264 }

```

1265 **XML serialization:**

```

1266 <MachineVolume xmlns="http://schemas.dmtf.org/cimi/1">
1267   <initialLocation> xs:string </initialLocation>
1268   <volume href="xs:string"/>
1269 </MachineVolume>

```

1270 Note that while deleting this type of resource from the collection will delete and remove the resource from
 1271 the collection, it shall not delete the referenced target resource itself - in this case the Volume.

1272 When creating a new resource that requires the use of a Template, the "add" operation shall contain:

- 1273 • The "common attributes" as defined by clause 5.10.1.
- 1274 • The resource specific data needed to create it. This data will either be a reference to the
 1275 resource-specific Template resource or the resource-specific Template resource itself inlined.
- 1276 • In the XML case, a wrapper element (named <ResourceNameCreate>).

1277 For example, to create a new Machine (which requires the use of a Template) and add it to the
 1278 MachineCollection, the "add" operation of the MachineCollection will be serialized as follows:

1279 **JSON serialization:**

```
1280 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineCreate", ?
1281   "name": string, ?
1282   "description": string, ?
1283   "properties": { "key": string, + }, ?
1284   "machineTemplate": { "href": string ?}
1285   ...
1286 }
```

1287 **XML serialization:**

```
1288 <MachineCreate xmlns="http://schemas.dmtf.org/cimi/1">
1289   <name> xs:string </name> ?
1290   <description> xs:string </description> ?
1291   <property key="xs:string"> xs:string </property> *
1292   <machineTemplate href="xs:anyURI"? />
1293   <xs:any>*
1294 </MachineCreate>
```

1295 The MachineCollection will have a new Machine:

1296 **JSON serialization:**

```
1297 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Machine",
1298   "id": string,
1299   "name": string,
1300   ...
1301 }
```

1302 **XML serialization:**

```
1303 <Machine xmlns="http://schemas.dmtf.org/cimi/1">
1304   <id> xs:anyURI </id>
1305   <name> xs:string </name>
1306   ...
1307 </Machine>
```

1308 The processing of the "add" operation shall adhere to the semantics defined in clause 4.2.1.1.

1309 Regardless of whether a Template is used, the "add" operation shall create the new resource and add it
 1310 to the collection and a reference (URI) to the new entry shall be returned in the response message in the
 1311 HTTP Location header.

1312 **5.5.13 "Any" type**

1313 Some attributes are polymorphic and can hold various data types, the list of which is indicated in their
 1314 description. In such cases, the type of the attribute will be indicated as "any" in the model representation.

1315 **5.6 Units**

1316 Some of the resources defined by this specification have attributes that describe an amount of something
 1317 that belongs to, or is associated with, that resource. For example, the `Machine` resource has a `memory`
 1318 attribute that describes "the size of the memory allocated to this machine." The allowable units of these
 1319 attributes are listed in the following table. Their meaning is defined in [IEC 80000-13:2008](#). Their numerical
 1320 equivalents are provided here for convenience:

String	Numerical Value	String	Numerical Value
kilobyte	10 ³	kibibyte	2 ¹⁰
megabyte	10 ⁶	mebibyte	2 ²⁰
gigabyte	10 ⁹	gibibyte	2 ³⁰

String	Numerical Value	String	Numerical Value
terabyte	10 ¹²	tebibyte	2 ⁴⁰
petabyte	10 ¹⁵	pebibyte	2 ⁵⁰
exabyte	10 ¹⁸	exbibyte	2 ⁶⁰
zettabyte	10 ²¹	zebibyte	2 ⁷⁰
yottabyte	10 ²⁴	yobibyte	2 ⁸⁰

1321 5.7 Relationship semantics

1322 A reference between two resource instances has the semantics of a simple "association." In particular,
 1323 unless specified otherwise, (a) the same referred instance can be referred by other resource instances,
 1324 i.e., be "shared," and (b) the referred resource instance is not affected when deleting the referring
 1325 resource instance (i.e., the Delete operation is a "shallow delete" by default).

1326 The embedding of a sub-resource inside another resource, has the semantics of a "composition" (or
 1327 whole-part relationship in UML). In particular, unless specified otherwise, (a) an embedded sub-resource
 1328 cannot be shared by several resource instances, and (b) when deleting an embedding resource instance,
 1329 the embedded sub-resource instances are also deleted.

1330 5.8 Operations

1331 All resource operations defined by this specification are optional for Providers to support. Consumers, via
 1332 examination of an resource's ResourceMetadata, will be able to determine which operations are
 1333 supported. However, even for those operations that are supported Consumers will still need to examine
 1334 each resource's representation to determine which operations are supported at that moment. Whether an
 1335 operation is supported will be based on a number of factors, including state of the resource and access
 1336 control rights of the Consumer. Also see clause 4.2.

1337 5.9 Alternative model formats

1338 Because it is expected that this specification will be implemented by using a variety of technologies, as a
 1339 convenience, the definition of the model elements are provided in alternative formats that are easily
 1340 consumable by technology-specific tooling.

1341 This model is also available in a CIM/MOF format [CIMI-CIM].

1342 In the event of inconsistencies between the various formats, the normative text within this specification
 1343 takes precedence over the XML Schemas and alternative formats, which in turn take precedence over
 1344 examples.

1345 5.10 Resources

1346 The following clauses detail the attributes of the resources defined by the CIMI model.

1347 5.10.1 Common attributes

1348 Except for ResourceMetadata, the resources described by this document share the following common
 1349 attributes.

Attribute	Type	Description
id	<i>ref</i>	The unique self-reference to this resource; assigned upon resource creation. This attribute value shall be unique in the Provider's cloud.

Attribute	Type	Description
		Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
name	<i>string</i>	The human readable name of this resource; assigned by the creator as a part of the resource creation input. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write
description	<i>string</i>	The human readable description of this resource; assigned by the creator as a part of the resource creation input. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write
created	<i>dateTime</i>	The timestamp when this resource was created. The format should be unambiguous, and the value is immutable . Constraints: Provider: support optional; immutable Consumer: support optional; read-only
updated	<i>dateTime</i>	The time at which the last explicit attribute update was made on the resource. Note, while operations such as "stop" do implicitly modify the 'state' attribute it does not change the 'updated_time'. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
properties	<i>map</i>	A list of key/value pairs, some of which may control one or more aspects this resource. Properties may also serve as an extension point, allowing Consumers to record additional information about the resource. The same "key" shall not be used more than once within a "properties" attribute. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write

1350 The following describes the serialization of these attributes in both JSON and XML:

1351 **JSON serialization:**

```

1352     "id": string,
1353     "name": string, ?
1354     "description": string, ?
1355     "created": string, ?
1356     "updated": string, ?
1357     "properties": { "key": string, + }, ?
    
```

1358 **XML serialization:**

```

1359     <id> xs:anyURI </id>
1360     <name> xs:string </name> ?
1361     <description> xs:string </description> ?
1362     <created> xs:dateTime </created> ?
1363     <updated> xs:dateTime </updated> ?
1364     <property key="xs:string"> xs:string </property> *
    
```

1365 **5.11 Resource Metadata**

1366 Implementations of this specification should allow for Consumers to discover the metadata associated
 1367 with each supported resource. Doing so allows for the discovery of Provider defined constraints on the
 1368 CIMI defined attributes as well as discovery of any new extension attributes or operations that the
 1369 Provider may have defined. ResourceMetadata can also be used to express any Provider specific
 1370 capabilities or features. The mechanism by which this metadata is made available will be protocol
 1371 specific.

1372 Note that while this specification does not restrict the editability of the ResourceMetadata attributes, it is
 1373 expected that these types of features will be reserved for administrative type of Consumers, which means
 1374 that these attributes will be read-only for most Consumers.

1375 Each resource's metadata will contain the following pieces of information:

Name	ResourceMetadata													
Type URI	http://schemas.dmtf.org/cimi/1/ResourceMetadata													
Attribute	Type	Description												
id	<i>ref</i>	The unique self-reference to this resource; assigned upon resource creation. This attribute value is immutable , and shall be unique in the Provider's cloud. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only												
typeURI	<i>URI</i>	A unique URI associated with, and denoting, this resource type. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write												
name	<i>string</i>	The name of the resource type. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write												
attributes	<i>attribute[]</i>	A set of Provider defined metadata that can be used by clients to discover any metadata associated with each attribute, as well as the set of extension attributes. Each attribute will contain the following nested data: <table border="1" style="margin-left: 20px;"> <tr> <td>Name</td> <td colspan="2"><i>attribute</i></td> </tr> <tr> <td>Data</td> <td>Type</td> <td>Description</td> </tr> <tr> <td>name</td> <td><i>string</i></td> <td>The name of the attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> <tr> <td>namespace</td> <td><i>URI</i></td> <td>The namespace in which this attribute is defined. It is recommended that a dereference of this URI returns information about the attribute. This shall not be present when describing a CIMI defined attribute, but shall be present when describing a non-CIMI defined attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> </table>	Name	<i>attribute</i>		Data	Type	Description	name	<i>string</i>	The name of the attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	namespace	<i>URI</i>	The namespace in which this attribute is defined. It is recommended that a dereference of this URI returns information about the attribute. This shall not be present when describing a CIMI defined attribute, but shall be present when describing a non-CIMI defined attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
Name	<i>attribute</i>													
Data	Type	Description												
name	<i>string</i>	The name of the attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write												
namespace	<i>URI</i>	The namespace in which this attribute is defined. It is recommended that a dereference of this URI returns information about the attribute. This shall not be present when describing a CIMI defined attribute, but shall be present when describing a non-CIMI defined attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write												

		<table border="1"> <tr> <td>type</td> <td><i>string</i></td> <td> The data type of the attribute. This shall not be present when describing a CIMI defined attribute, but shall be present when describing a non-CIMI defined attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write </td> </tr> <tr> <td>required</td> <td><i>boolean</i></td> <td> Indicates whether this resource requires this attribute to be present. When absent the implied value is "false." Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write </td> </tr> <tr> <td>constraints</td> <td><i>any</i></td> <td> Type specific data that describes the constraints of this attribute. When absent there are no constraints. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write </td> </tr> </table> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>	type	<i>string</i>	The data type of the attribute. This shall not be present when describing a CIMI defined attribute, but shall be present when describing a non-CIMI defined attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	required	<i>boolean</i>	Indicates whether this resource requires this attribute to be present. When absent the implied value is "false." Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	constraints	<i>any</i>	Type specific data that describes the constraints of this attribute. When absent there are no constraints. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write									
type	<i>string</i>	The data type of the attribute. This shall not be present when describing a CIMI defined attribute, but shall be present when describing a non-CIMI defined attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write																		
required	<i>boolean</i>	Indicates whether this resource requires this attribute to be present. When absent the implied value is "false." Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write																		
constraints	<i>any</i>	Type specific data that describes the constraints of this attribute. When absent there are no constraints. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write																		
capabilities	<i>capability[]</i>	<p>A set of Provider defined metadata that can be used by Consumer to discover any capability or feature provided by this Provider.</p> <p>Each capability will contain the following nested data:</p> <table border="1"> <thead> <tr> <th>Name</th> <td colspan="2"><i>capability</i></td> </tr> <tr> <th>Data</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>name</td> <td><i>string</i></td> <td> The name of the capability. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write </td> </tr> <tr> <td>uri</td> <td><i>URI</i></td> <td> A URI that uniquely identifies the capability at a global level. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write </td> </tr> <tr> <td>description</td> <td><i>string</i></td> <td> The human readable description of the semantic of the capability. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write </td> </tr> <tr> <td>value</td> <td><i>any</i></td> <td> The value of the capability. The specific type will vary depending on the definition of the capability. When not present the capability defaults to a "boolean" type with a value of "true" indicating that the specific capability is supported by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write </td> </tr> </tbody> </table> <p>Constraints: Provider: support optional; mutable</p>	Name	<i>capability</i>		Data	Type	Description	name	<i>string</i>	The name of the capability. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write	uri	<i>URI</i>	A URI that uniquely identifies the capability at a global level. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	description	<i>string</i>	The human readable description of the semantic of the capability. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write	value	<i>any</i>	The value of the capability. The specific type will vary depending on the definition of the capability. When not present the capability defaults to a "boolean" type with a value of "true" indicating that the specific capability is supported by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
Name	<i>capability</i>																			
Data	Type	Description																		
name	<i>string</i>	The name of the capability. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write																		
uri	<i>URI</i>	A URI that uniquely identifies the capability at a global level. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write																		
description	<i>string</i>	The human readable description of the semantic of the capability. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write																		
value	<i>any</i>	The value of the capability. The specific type will vary depending on the definition of the capability. When not present the capability defaults to a "boolean" type with a value of "true" indicating that the specific capability is supported by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write																		

		Consumer: support optional; read-write																								
actions	<i>action[]</i>	<p>A set of Provider defined operations that can be used by clients to act on the resource. Note that this attribute is called "actions" so as not to conflict with the ResourceMetadata resource's operations.</p> <p>Each operation will contain the following nested data:</p> <table border="1"> <thead> <tr> <th>Name</th> <th colspan="2"><i>action</i></th> </tr> <tr> <th>Data</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>name</td> <td><i>string</i></td> <td>The name of the operation. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> <tr> <td>uri</td> <td><i>URI</i></td> <td>A URI that uniquely identifies the operation at a global level. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> <tr> <td>description</td> <td><i>string</i></td> <td>The human readable description of the semantic of the operation. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write</td> </tr> <tr> <td>method</td> <td><i>string</i></td> <td>The protocol dependent verb to use to perform the operation. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> <tr> <td>inputMessage</td> <td><i>string</i></td> <td>The body mimeType of the request message; it may depend on the model format chosen by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> <tr> <td>outputMessage</td> <td><i>string</i></td> <td>The body mimeType of the response message; it may depend on the model format chosen by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> </tbody> </table> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>	Name	<i>action</i>		Data	Type	Description	name	<i>string</i>	The name of the operation. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	uri	<i>URI</i>	A URI that uniquely identifies the operation at a global level. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	description	<i>string</i>	The human readable description of the semantic of the operation. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write	method	<i>string</i>	The protocol dependent verb to use to perform the operation. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	inputMessage	<i>string</i>	The body mimeType of the request message; it may depend on the model format chosen by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	outputMessage	<i>string</i>	The body mimeType of the response message; it may depend on the model format chosen by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
Name	<i>action</i>																									
Data	Type	Description																								
name	<i>string</i>	The name of the operation. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write																								
uri	<i>URI</i>	A URI that uniquely identifies the operation at a global level. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write																								
description	<i>string</i>	The human readable description of the semantic of the operation. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write																								
method	<i>string</i>	The protocol dependent verb to use to perform the operation. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write																								
inputMessage	<i>string</i>	The body mimeType of the request message; it may depend on the model format chosen by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write																								
outputMessage	<i>string</i>	The body mimeType of the response message; it may depend on the model format chosen by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write																								

1376 The following describes the serialization of the resource in both JSON and XML:

1377 **JSON media type:** application/json

1378 **JSON serialization:**

```

1379 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ResourceMetadata",
1380   "id": string,
1381   "typeURI": URI,
1382   "name": string,
```

```

1383 "attributes" : [
1384   { "name": string,
1385     "namespace": string, ?
1386     "type": string, ?
1387     "required": boolean, ?
1388     ...constraints...? } *
1389 ], ?
1390 "capabilities": [
1391   { "name": string, ?
1392     "uri": string,
1393     "description": string, ?
1394     "value": any } *
1395 ], ?
1396 "actions" : [
1397   { "name": string,
1398     "uri": string,
1399     "description": string, ?
1400     "method": string,
1401     "inputMessage": string, ?
1402     "outputMessage": string ? }, *
1403 ], ?
1404 "operations": [
1405   { "rel": "edit", "href": string } ?
1406   { "rel": "delete", "href": string }, ?
1407 ] ?
1408 ...
1409 }
    
```

1410 **XML media type:** application/xml

1411 **XML serialization:**

```

1412 <ResourceMetadata xmlns="http://schemas.dmtf.org/cimi/1">
1413   <id> xs:anyURI </id>
1414   <name> xs:string </name>
1415   <typeURI> xs:anyURI </typeURI>
1416   <attribute name="xs:string" namespace="xs:anyURI"? type="xs:string"
1417     required="xs:boolean"? >
1418     ...constraints...?
1419   </attribute> *
1420   <capability name="xs:string"? uri="xs:anyURI" description="xs:string"?>
1421     xs:any*
1422   </capability> *
1423   <action name="xs:string" uri="xs:anyURI" description="xs:string"?
1424     method="xs:string" inputMessage="xs:string"?
1425     outputMessage="xs:string"? /> *
1426   <operation rel="edit" href="xs:anyURI"/> ?
1427   <operation rel="delete" href="xs:anyURI"/> ?
1428   <xs:any>*
1429 </ResourceMetadata>
    
```

1430 Additional metadata about the resource or attributes may be included by the Provider.

1431 5.11.1 Attribute types

1432 The following describes the values, syntax, and serialization of the "constraints" attribute (sub-attribute of
 1433 "attributes"), which has a type of "any."

1434 **type="string"**

1435 The JSON shall be of the form:

```

1436 "values": [ string, + ] ?
    
```

1437 The XML shall be of the form:

```
1438 <value> xs:string </value> *
```

1439 **type="integer"**

1440 The JSON shall be of the form:

```
1441 "values": [ number, + ], ?
1442 "ranges": [ { "low": number, "high": number }, + ] ?
```

1443 The XML shall be of the form:

```
1444 <value> xs:integer </value> *
1445 <range low="xs:integer" high="xs:integer"/> *
```

1446 The total value space of an 'integer' attribute is the accumulation of all values and ranges.

1447 **type="boolean"**

1448 The JSON shall be of the form:

```
1449 "value": boolean ?
```

1450 The XML shall be of the form:

```
1451 <value> xs:boolean </value> ?
```

1452 Only one 'value' is permitted. It indicates whether the attribute is required to be either 'true' or 'false'.

1453 5.11.1.1 Examples

1454 The following shows a sample metadata document for a VolumeConfiguration resource in XML that lists
1455 the allowable values for the "format" attribute and has been extended with a "Location" string attribute:

```
1456 <ResourceMetadata xmlns="http://schemas.dmtf.org/cimi/1">
1457   <id> http://example.org/types/VC </id>
1458   <typeURI> http://schemas.dmtf.org/cimi/1/VolumeConfiguration </typeURI>
1459   <name> VolumeConfiguration </name>
1460   <attribute name="format" type="string" required="false">
1461     <value> ext4 </value>
1462     <value> ntfs </value>
1463   </attribute>
1464   <attribute name="Location" namespace="http://example.org/" type="string"/>
1465 </ResourceMetadata>
```

1466 The following shows the same VolumeConfiguration but the "Location" attribute is restricted to a set of
1467 values and is required:

```
1468 <ResourceMetadata xmlns="http://schemas.dmtf.org/cimi/1">
1469   <id> http://example.org/types/VC </id>
1470   <typeURI> http://schemas.dmtf.org/cimi/1/VolumeConfiguration </typeURI>
1471   <name> VolumeConfiguration </name>
1472   <attribute name="format" type="string" required="false">
1473     <value> ext4 </value>
1474     <value> ntfs </value>
1475   </attribute>
1476   <attribute name="Location" namespace="http://example.org/" type="string"
1477     required="true">
1478     <value> NYC </value>
1479     <value> LAX </value>
1480   </attribute>
1481 </ResourceMetadata>
```

1482 The following shows the same VolumeConfiguration serialized in JSON:


```

1483 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
1484   "id": "http://example.org/types/VC",
1485   "typeURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
1486   "name": "VolumeConfiguration",
1487   "attributes": [
1488     { "name": "format",
1489       "type": "string",
1490       "required": false,
1491       "values": [ "ext4", "ntfs" ]
1492     },
1493     { "name": "Location",
1494       "namespace": "http://example.org",
1495       "type": "string",
1496       "required": true,
1497       "values": [ "NYC", "LAX" ]
1498     }
1499   ]
1500 }

```

1501 The following shows a Volume serialized in JSON which provides an action of data compression. In this
 1502 specific example the method returned (POST) is for the CIMI HTTP protocol; should another protocol be
 1503 implemented (e.g. SOAP) the "method" will be different:

```

1504 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
1505   "id": "http://example.org/types/V",
1506   "typeURI": "http://schemas.dmtf.org/cimi/1/Volume",
1507   "name": "Volume",
1508   "actions": [
1509     {
1510       "name": "compress",
1511       "uri": "http://example.org/cimi/action/compress"
1512       "description": "Compress the data stored in the volume",
1513       "method": "POST"
1514     }
1515   ]
1516 }

```

1517 5.11.2 Capabilities

1518 The following table describes the capability URIs defined by this specification. Providers may define new
 1519 URIs and it is recommended that these URIs be dereferencable such that Consumers can discover the
 1520 details of the new capability. The "Resource Name" column contains the name of the resource that may
 1521 contain the specified capability within its ResourceMetadata. The "Capability Name" column contains the
 1522 name of the specified capability and shall be unique within the scope of the corresponding resource. Each
 1523 capability's URI shall be constructed by appending the "Resource Name", a slash(/), and the "Capability
 1524 Name" to "http://schemas.dmtf.org/cimi/1/capability/". For example, the Machine's "InitialState" capability
 1525 would have a URI of:

```

1526 http://schemas.dmtf.org/cimi/1/capability/Machine/InitialState

```

1527 Note that capabilities that apply to the Provider in general, and are not specific to any one resource, are
 1528 associated with the Cloud Entry Point resource (in case a capability would apply only to the
 1529 CloudEntryPoint resource itself, its definition would say so).

Resource Name	Capability Name	Description
CloudEntryPoint	ExpandParameter	Indicated whether the \$expand query parameter is supported by the Provider.
CloudEntryPoint	FilterParameter	Indicates whether the \$filter query parameter is supported by the Provider.
CloudEntryPoint	firstParameter	Indicates whether the \$first and \$last query parameters are supported by the Provider. Note that either both

Resource Name	Capability Name	Description
		shall be supported or neither shall be supported.
CloudEntryPoint	SelectParameter	Indicated whether the \$select query parameter is supported by the Provider.
System	SystemComponentTemplateByValue	Indicates that the Provider supports specifying Component Templates by-value in SystemTemplates.
Machine	DefaultInitialState	Indicates what the default initial state of a new Machine will be unless explicitly set by the "initialState" attribute of the MachineTemplate.
Machine	InitialStates	Indicates the list of allowable initial states that Consumer may choose from when creating a new Machine.
Machine	MachineConfigByValue	Indicates that the Provider supports specifying Machine Configurations by-value in Machine create operations. If true the MachineTemplateByValue capability shall also be specified with a value of true.
Machine	MachineCredentialByValue	Indicates that the Provider supports specifying Credential by-value in Machine create operations. If true the MachineTemplateByValue capability shall also be specified with a value of true.
Machine	MachineImageByValue	Indicates that the Provider supports specifying Machine Images by-value in Machine create operations. If true the MachineTemplateByValue capability shall also be specified with a value of true.
Machine	MachineVolumeTemplatesByValue	Indicates that the Provider supports specifying VolumeTemplates by-value in Machine create operations. If true the MachineTemplateByValue capability shall also be specified with a value of true.
Machine	MachineStopForce	Indicates that the Provider supports specifying the "force" option on the stop and restart operations.
Machine	MachineStopForceDefault	Indicates the default way in which the Provider will stop/restart a Machine. When set to "true", the Provider will forcefully stop the Machine, as opposed to a value of "false," which indicates that the Provider will attempt to gracefully stop the Machine.
Machine	RestoreFromImage	Indicates that the Provider supports restoring Machines from Machine Images that are not SNAPSHOT Machine Images.
Machine	UserData	Indicates which userData injection method will be used. See 5.14.1 for more information.
Credential	CredentialTemplateByValue	Indicates that the Provider supports specifying Credential Templates by-value in Credential create operations.
Volume	SharedVolumeSupport	Indicates that the Provider supports the sharing of volume resources across Machines. The value specified is of type "boolean."
Volume	VolumeConfigByValue	Indicates that the Provider supports specifying Volume Configurations by-value in the Volume create operation. If true, the VolumeTemplateByValue capability shall also be specified with a value of true.
Volume	VolumeImageByValue	Indicates that the Provider supports specifying Volume

Resource Name	Capability Name	Description
		Images by-value in the Volume create operation. If true the VolumeTemplateByValue capability shall also be specified with a value of true.
Volume	VolumeSnapshot	Indicates that the Provider supports creating a new VolumeImage by referencing an existing Volume.
Volume	VolumeTemplateByValue	Indicates that the Provider supports specifying Volume Templates by-value in Volume create operations.
Network	NetworkConfigByValue	Indicates that the Provider supports specifying Network Configurations by-value in the Network create operation.
Network	NetworkTemplateByValue	Indicates that the Provider supports specifying Network Templates by-value in the Network create operation.
NetworkPort	NetworkPortConfigByValue	Indicates that the Provider supports specifying NetworkPort Configurations by-value in the NetworkPort create operation.
NetworkPort	NetworkPortTemplateByValue	Indicates that the Provider supports specifying NetworkPort Templates by-value in the NetworkPort create operation.
ForwardingGroup	MixedNetwork	Indicates whether ForwardingGroups can support both private and public connection at the same time.
Job	JobRetention	If the Provider supports Job resources as specified in this document, this capability indicates in minutes how long a job will live in the system before its deleted. In this case, the value attribute provides the number of minutes (e.g., 30 min). The value specified is of type "integer."
Meter	MeterConfigByValue	Indicates that the Provider supports specifying MeterConfigurations by-value in the Meter create operation.
Meter	MeterTemplateByValue	Indicates that the Provider supports specifying Meter Templates by-value in the Meter create operation.
EventLog	Linked	Indicates that the Provider shall delete EventLogs that are associated with resources when the resource is deleted.

1530 The following example shows the ResourceMetadata for a Machine that advertises some of its
 1531 capabilities:

1532 **JSON serialization:**

```

1533 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ResourceMetadata",
1534   "id": "http://example.com/types/Machine",
1535   "typeURI": "http://schemas.dmtf.org/cimi/1/Machine",
1536   "name": "Machine",
1537   "capabilities": [
1538     { "uri":
1539       "http://schemas.dmtf.org/cimi/1/capability/Machine/MachineConfigByValue",
1540       "value": true },
1541     { "uri":
1542       "http://schemas.dmtf.org/cimi/1/capability/Machine/MachineImageByValue",
1543       "value": true },
1544     { "uri":
1545       "http://schemas.dmtf.org/cimi/1/capability/Machine/DefaultInitialState",
1546       "value": "STARTED" }
    ]
    
```

```

1547     }
1548   }

```

1549 XML serialization:

```

1550 <ResourceMetadata xmlns="http://schemas.dmtf.org/cimi/1">
1551   <id> http://example.org/types/Machine </id>
1552   <typeURI> http://schemas.dmtf.org/cimi/1/Machine </typeURI>
1553   <name> Machine </name>
1554   <capability
1555     uri="http://schemas.dmtf.org/cimi/1/capability/Machine/MachineConfigByValue">
1556     true
1557   </capability>
1558   <capability
1559     uri="http://schemas.dmtf.org/cimi/1/capability/Machine/MachineImageByValue">
1560     true
1561   </capability>
1562   <capability
1563     uri="http://schemas.dmtf.org/cimi/1/capability/Machine/DefaultInitialState">
1564     STARTED
1565   </capability>
1566 </ResourceMetadata>

```

1567 5.11.3 ResourceMetadata Collection

1568 A ResourceMetadata Collection resource represents the collection of ResourceMetadata resources within
 1569 a Provider and follows the Collection pattern defined in clause 5.5.12. Note that modifications of the
 1570 resources within this collection will typically be reserved for administrator type of CIMI Consumers. This
 1571 resource shall be serialized as follows:

1572 JSON serialization:

```

1573 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ResourceMetadataCollection",
1574   "id": string,
1575   "count": number,
1576   "resourceMetadatas": [
1577     { "resourceURI": "http://schemas.dmtf.org/cimi/1/ResourceMetadata",
1578       "id": string,
1579       ... remaining ResourceMetadata attributes ...
1580     }, +
1581   ], ?
1582   "operations": [ { "rel": "add", "href": string } ? ]
1583   ...
1584 }

```

1585 XML serialization:

```

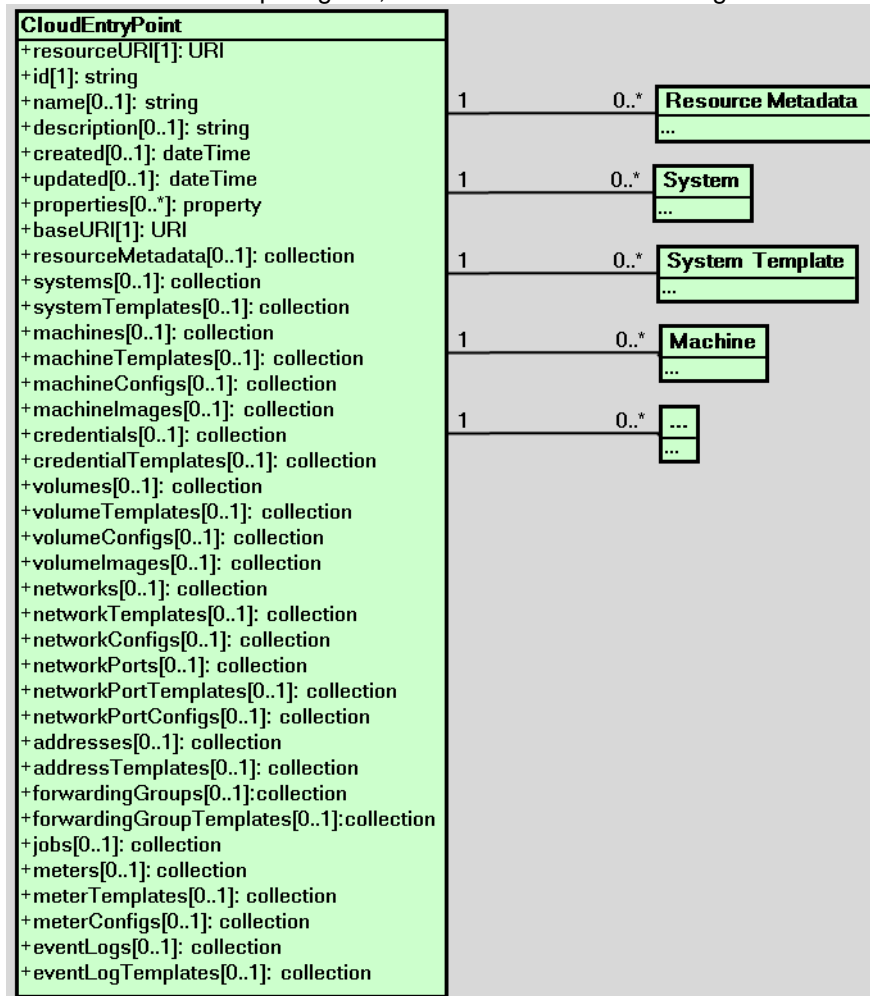
1586 <Collection
1587   resourceURI="http://schemas.dmtf.org/cimi/1/ResourceMetadataCollection"
1588   xmlns="http://schemas.dmtf.org/cimi/1">
1589   <id> xs:anyURI </id>
1590   <count> xs:integer </count>
1591   <ResourceMetadata>
1592     <id> xs:anyURI </id>
1593     ... remaining ResourceMetadata attributes ...
1594   </ResourceMetadata> *
1595   <operation rel="add" href="xs:anyURI"/> ?
1596   <xs:any>*
1597 </Collection>

```

1598 **5.12 Cloud Entry Point**

1599 The Cloud Entry Point represents the entry point into the cloud defined by the CIMI Model. The Cloud
 1600 Entry Point implements a catalog of resources, such as Systems, System Templates, Machines, Machine
 1601 Templates, etc., that can be queried and browsed by the Consumer.

1602 Figure 1 illustrates the Cloud Entry Point and its relationship to other resources. Although this drawing is
 1603 in the style of a Resource Relationship diagram, the use of UML is neither rigorous nor normative.



1604

1605

Figure 1 - Cloud Entry Point

1606 When a Consumer issues a read on the Cloud Entry Point resource, then the Provider shall return a
 1607 Cloud Entry Point resource that only catalogs resources that this Consumer is allowed to perform
 1608 operations on.

Name	CloudEntryPoint	
Type URI	http://www.dmf.org/cimi/CloudEntryPoint	
Attribute	Type	Description
baseURI	URI	An absolute URI that references the "base URI" of the Provider. This URI shall be used to convert relative URIs to resources within this Provider to absolute URIs. See the "URIs" clause of 5.5.
Constraints:		

		Provider: support mandatory; immutable Consumer: support mandatory; read-only
resourceMetadata	<i>collection [Resource Metadata]</i>	A reference to ResourceMetadata Collection of this Cloud Entry Point. The collection contains the resources supported by the Provider. If an resource does not have any metadata, it will not appear in this list, e.g., it has no constraints beyond what the CIMI specification defines nor does it have any extension attributes. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
systems	<i>collection [System]</i>	A reference to the System Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
systemTemplates	<i>collection [SystemTemplate]</i>	A reference to the System Template Collection of this CloudEntry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
machines	<i>collection [Machine]</i>	A reference to the Machine Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
machineTemplates	<i>collection [MachineTemplate]</i>	A reference to the Machine Template Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
machineConfigs	<i>collection [Machine Configuration]</i>	A reference to the Machine Configuration Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
machineImages	<i>collection [MachineImage]</i>	A reference to the Machine Image Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
credentials	<i>collection [Credential]</i>	A reference to the Credential Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
credentialTemplates	<i>collection [CredentialTemplate]</i>	A reference to the Credential Template Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
volumes	<i>collection [Volume]</i>	A reference to the Volume Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only

volumeTemplates	<i>collection [VolumeTemplate]</i>	A reference to the Volume Template Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
volumeConfigs	<i>collection [VolumeConfiguration]</i>	A reference to the Volume Configuration Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
volumeImages	<i>collection [VolumeImage]</i>	A reference to the Volume Image Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
networks	<i>collection [Network]</i>	A reference to the Network Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
networkTemplates	<i>collection [NetworkTemplate]</i>	A reference to the Network Template Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
networkConfigs	<i>collection [NetworkConfiguration]</i>	A reference to the Network Configuration Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
networkPorts	<i>collection [NetworkPort]</i>	A reference to the Network Port Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
networkPortTemplates	<i>collection [NetworkPortTemplate]</i>	A reference to the Network Port Template Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
networkPortConfigs	<i>collection [NetworkPortConfiguration]</i>	A reference to the Network Port Configuration Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
addresses	<i>collection [Address]</i>	A reference to the Address Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
addressTemplates	<i>collection [AddressTemplate]</i>	A reference to the Address Template Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only

forwardingGroups	<i>collection</i> <i>[ForwardingGroup]</i>	A reference to the Forwarding Group Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
forwardingGroupTemplates	<i>collection</i> <i>[ForwardingGroupTemplate]</i>	A reference to the Forwarding Group Template Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
jobs	<i>collection</i> <i>[Job]</i>	A reference to the Jobs Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
meters	<i>collection</i> <i>[Meter]</i>	A reference to the Meter Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
meterTemplates	<i>collection</i> <i>[MeterTemplate]</i>	A reference to the Meter Template Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
meterConfigs	<i>collection</i> <i>[MeterConfiguration]</i>	A reference to the Meter Configuration Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
eventLogs	<i>collection</i> <i>[EventLog]</i>	A reference to the Event Log Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
eventLogTemplates	<i>collection</i> <i>[EventLogTemplate]</i>	A reference to the Event Log Collection of this Cloud Entry Point. Constraints: Provider: support optional; mutable Consumer: support optional; read-only

1609 Each of the collections mentioned above will be defined within the related resource definition clauses. For
1610 example, the MachineCollection resource will be defined in clause 5.14.2 as part of the Machine related
1611 resources.

1612 The following describes the serialization of the resource in both JSON and XML:

1613 **JSON media type:** application/json

1614 **JSON serialization:**

```
1615 { "resourceURI": "http://schemas.dmtf.org/cimi/1/CloudEntryPoint",
1616   "id": string,
1617   "name": string, ?
1618   "description": string, ?
1619   "created": string, ?
1620   "updated": string, ?
1621   "properties": { "key": string, + }, ?
1622   "baseURI": string,
```



```

1623     "resourceMetadata": { "href": string }, ?
1624     "systems": { "href": string }, ?
1625     "systemTemplates": { "href": string }, ?
1626     "machines": { "href": string }, ?
1627     "machineTemplates": { "href": string }, ?
1628     "machineConfigs": { "href": string }, ?
1629     "machineImages": { "href": string }, ?
1630     "credentials": { "href" string }, ?
1631     "credentialTemplates": { "href" string }, ?
1632     "volumes": { "href": string }, ?
1633     "volumeTemplates": { "href": string }, ?
1634     "volumeConfigs": { "href": string }, ?
1635     "volumeImages": { "href": string }, ?
1636     "networks": { "href": string }, ?
1637     "networkTemplates": { "href": string }, ?
1638     "networkConfigs": { "href": string }, ?
1639     "networkPorts": { "href": string }, ?
1640     "networkPortTemplates": { "href": string }, ?
1641     "networkPortConfigs": { "href": string }, ?
1642     "addresses": { "href": string }, ?
1643     "addressTemplates": { "href": string }, ?
1644     "forwardingGroups" { "href": string }, ?
1645     "forwardingGroupTemplates" { "href": string }, ?
1646     "jobs": { "href": string }, ?
1647     "meters": { "href": string }, ?
1648     "meterTemplates": { "href": string }, ?
1649     "meterConfigs": { "href": string }, ?
1650     "eventLogs": { "href": string }, ?
1651     "eventLogTemplates": { "href": string }, ?
1652     "operations": [
1653         { "rel": "edit", "href": string }, ?
1654     ] ?
1655     ...
1656 }
    
```

1657 **XML media type:** application/xml

1658 **XML serialization:**

```

1659 <CloudEntryPoint xmlns="http://schemas.dmtf.org/cimi/1">
1660   <id> xs:anyURI </id>
1661   <name> xs:string </name> ?
1662   <description> xs:string </description> ?
1663   <created> xs:dateTime </created> ?
1664   <updated> xs:dateTime </updated> ?
1665   <property key="xs:string"> xs:string </property> *
1666   <baseURI> xs:anyURI </baseURI>
1667   <resourceMetadata href="xs:anyURI"/> ?
1668   <systems href="xs:anyURI"/> ?
1669   <systemTemplates href="xs:anyURI"/> ?
1670   <machines href="xs:anyURI"/> ?
1671   <machineTemplates href="xs:anyURI"/> ?
1672   <machineConfigs href="xs:anyURI"/> ?
1673   <machineImages href="xs:anyURI"/> ?
1674   <credentials href="xs:anyURI"/> ?
1675   <credentialTemplates href="xs:anyURI"/> ?
1676   <volumes href="xs:anyURI"/> ?
1677   <volumeTemplates href="xs:anyURI"/> ?
1678   <volumeConfigs href="xs:anyURI"/> ?
1679   <volumeImages href="xs:anyURI"/> ?
1680   <networks href="xs:anyURI"/> ?
1681   <networkTemplates href="xs:anyURI"/> ?
1682   <networkConfigs href="xs:anyURI"/> ?
1683   <networkPorts href="xs:anyURI"/> ?
    
```

```

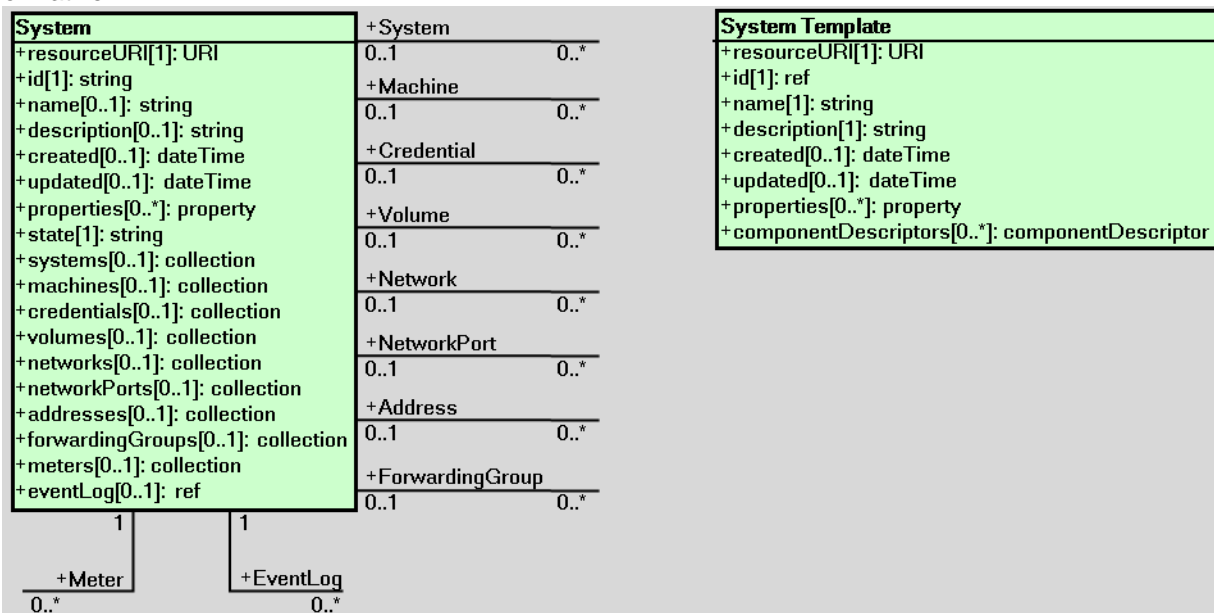
1684 <networkPortTemplates href="xs:anyURI"/> ?
1685 <networkPortConfigs href="xs:anyURI"/> ?
1686 <addresses href="xs:anyURI"/> ?
1687 <addressTemplates href="xs:anyURI"/> ?
1688 <forwardingGroups href="xs:anyURI"/> ?
1689 <forwardingGroupTemplates href="xs:anyURI"/> ?
1690 <jobs href="xs:anyURI"/> ?
1691 <meters href="xs:anyURI"/> ?
1692 <meterTemplates href="xs:anyURI"/> ?
1693 <meterConfigs href="xs:anyURI"/> ?
1694 <eventLogs href="xs:anyURI"/> ?
1695 <eventLogTemplates href="xs:anyURI"/> ?
1696 <operation rel="edit" href="xs:anyURI"/> ?
1697 <xs:any>*
1698 </CloudEntryPoint>
    
```

1699 **5.12.1 Operations**

1700 This resource supports the Read and Update operations.

1701 **5.13 System resources and relationships**

1702 Figure 2 illustrates the resources involved in constructing a System and their relationships. Although this
 1703 drawing is in the style of a Resource Relationship diagram, the use of UML is neither rigorous nor
 1704 normative.



1705 **Figure 2 - System resources**

1706 **5.13.1 System**

1707 A System is a realized resource that consists of one or more Networks, Volumes, Machines, (and others)
 1708 that could be connected and associated with each other. A System can be created from the interpretation
 1709 of a SystemTemplate. A System can be operated and managed as a single resource and usually forms a
 1710 stack of service. For example, a shopping cart system consists of machines for web servers and
 1711 databases, network addresses for public access, and volumes for database files. A System may directly
 1712 provide a user-facing component, or may provide an infrastructure component.

1713 A System has several "top-level" attributes that are collections of references to resources that are owned
 1714 by the System. A resource that is owned by a System has its lifecycle directly tied to the lifecycle of the
 1715 System. In particular, when a System is deleted, all of its owned resources shall also be deleted.
 1716 Generally, operations on a System will translate into operations on its owned resources.

1717 However, a resource owned by a System may in turn refer to some other resources that are not owned by
 1718 this System, e.g., a Machine in a System can refer to a Volume that is not owned by this System. More
 1719 precisely, the following rules apply:

- 1720 • By default, all resources that are created as the result of a System creation are also owned by
 1721 the System. (This rule can be overridden by subsequent modifications to the top-level System
 1722 collection attributes.)
- 1723 • Ownership of a resource to a System is expressed by including the reference to the resource in
 1724 the appropriate top-level System collection attribute, or by ownership to a sub-System of this
 1725 System (i.e., ownership is transitive across hierarchies of Systems).
- 1726 • When a resource other than a System is added to an existing System (i.e., becomes owned by
 1727 the System by insertion of its reference to the appropriate top-level System collection attribute)
 1728 other resources already referred by this added resource are by default not owned by the
 1729 System. (This rule can be overridden by subsequent modifications to the top-level System
 1730 collection attributes.)

1731 A resource shall not be owned by more than one System at any point in time (unless there is an
 1732 ownership relationship between these Systems). Note that a resource does not need to be owned by a
 1733 System (i.e. part of any of its collection attributes) to be referenced/used by a resource in the System. By
 1734 not including it in any of the collections, the resource will simply not be part of any actions performed on
 1735 the System.

Name	System	
Type URI	http://schemas.dmtf.org/cimi/1/System	
Attribute	Type	Description
state	<i>string</i>	<p>The operational state of the System.</p> <p>Allowable values include:</p> <p>CREATING: The System is in the process of being created. Allowable action when in this state is: delete.</p> <p>STARTING/STARTED/STOPPING/STOPPED/PAUSING/PAUSED/SUSPENDING/SUSPENDED: All of the Machines referenced by this System are one of these states. See clause 5.14.1 for the list of available actions based on the state of a Machine.</p> <p>MIXED: This state indicates that either no Machines are referenced by this System or the Machines referenced by this System are in varying states. Allowable action when in this state is: delete.</p> <p>DELETING: The System is in the process of being deleted. Allowable action when in this state is: delete.</p> <p>ERROR: The Provider has detected an error in the System. Allowable action when in this state is: delete.</p> <p>Providers may define additional values.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
systems	<i>collection [SystemSystem]</i>	A reference to the list of references to nested Systems owned by this System. Adding an item (of type System) to this list is logically equivalent to associating the referenced System to this System with a "containment relationship."

		<p>Removing an item from this list is logically equivalent to de-associating the referenced System from this System.</p> <p>Note: the SystemSystem resource type is representing an association between the System and another System. It is defined in the following clause.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
machines	<i>collection</i> <i>[SystemMachine]</i>	<p>A reference to the list of references to Machines owned by this System. Adding an item (of type Machine) to this list is logically equivalent to associating the Machine to this System with a "containment relationship." Removing an item from this list is logically equivalent to de-associating the Machine from this System.</p> <p>Note: the SystemMachine resource type is representing an association between the System and a Machine. It is defined in the following clause.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
credentials	<i>collection</i> <i>[SystemCredential]</i>	<p>A reference to the list of references to Credentials owned by this System. Adding an item (of type Credential) to this list is logically equivalent to associating the Credential to this System with a "containment relationship." Removing an item from this list is logically equivalent to de-associating the Credential from this System.</p> <p>Note: the SystemCredential resource type is representing an association between the System and a Credential. It is defined in the following clause.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
volumes	<i>collection</i> <i>[SystemVolume]</i>	<p>A reference to the list of references Volumes owned by this System. Adding an item (of type Volume) to this list is logically equivalent to associating the Volume to this System with a "containment relationship." Removing an item from this list is logically equivalent to de-associating the Volume from this System.</p> <p>Note: the SystemVolume resource type is representing an association between the System and a Volume. It is defined in the following clause.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
networks	<i>collection</i> <i>[SystemNetwork]</i>	<p>A reference to the list of references Networks owned by this System. Adding an item (of type Network) to this list is logically equivalent to associating the Network to this System with a "containment relationship." Removing an item from this list is logically equivalent to de-associating the Network from this System.</p> <p>Note: the SystemNetwork resource type is representing an association between the System and a Network. It is defined in the following clause.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
networkPorts	<i>collection</i> <i>[SystemNetworkPort]</i>	<p>A reference to the list of references NetworkPorts owned by this System. Adding an item (of type NetworkPort) to this list is logically equivalent to associating the NetworkPort to this System with a "containment relationship." Removing an item from this list is logically equivalent to de-associating the NetworkPort from this System.</p>

		<p>Note: the SystemNetworkPort resource type is representing an association between the System and a NetworkPort. It is defined in the following clause.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
addresses	<i>collection</i> <i>[SystemAddress]</i>	<p>A reference to the list of references Addresses owned by this System. Adding an item (of type Address) to this list is logically equivalent to associating the Address to this System with a "containment relationship." Removing an item from this list is logically equivalent to de-associating the Address from this System.</p> <p>Note: the SystemAddress resource type is representing an association between the System and a Address. It is defined in the following clause.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
forwardingGroups	<i>collection</i> <i>[SystemForwardingGroup]</i>	<p>A reference to the list of references Forwarding Groups owned by this System. Adding an item (of type ForwardingGroup) to this list is logically equivalent to associating the Forwarding Group to this System with a "containment relationship." Removing an item from this list is logically equivalent to de-associating the Forwarding Group from this System.</p> <p>Note: the SystemForwardingGroup resource type is representing an association between the System and a ForwardingGroup. It is defined in the following clause.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
meters	<i>collection</i> <i>[Meter]</i>	<p>A reference to the list of Meters monitored for this System.</p> <p>Note that these Meters are for the System and not for any individual component in the System.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
eventLog	<i>ref</i>	<p>A reference to the EventLog of this System.</p> <p>Note that this EventLog is for the System and not for any individual component in the System.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>

1736 **JSON media type:** application/json

1737 **JSON serialization:**

```

1738 { "resourceURI": "http://schemas.dmtf.org/cimi/1/System",
1739   "id": string,
1740   "name": string, ?
1741   "description": string, ?
1742   "created": string, ?
1743   "updated": string, ?
1744   "properties": { "key": string, + }, ?
1745   "state": string,
1746   "systems": { "href": string }, ?
1747   "machines": { "href": string }, ?
1748   "credentials": { "href": string }, ?
    
```

```

1749 "volumes": { "href": string }, ?
1750 "networks": { "href": string }, ?
1751 "networkPorts": { "href": string }, ?
1752 "addresses": { "href": string }, ?
1753 "forwardingGroups": { "href": string }, ?
1754 "meters": { "href": string }, ?
1755 "eventLog": { "href": string }, ?
1756 "operations": [
1757   { "rel": "edit", "href": string }, ?
1758   { "rel": "delete", "href": string }, ?
1759   { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
1760   { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string }, ?
1761   { "rel": "http://schemas.dmtf.org/cimi/1/action/restart", "href": string },
1762   ?
1763   { "rel": "http://schemas.dmtf.org/cimi/1/action/pause", "href": string }, ?
1764   { "rel": "http://schemas.dmtf.org/cimi/1/action/suspend", "href": string },
1765   ?
1766   { "rel": "http://schemas.dmtf.org/cimi/1/action/export", "href": string } ?
1767 ] ?
1768 ...
1769 }

```

1770 **XML media type:** application/xml

1771 **XML serialization:**

```

1772 <System xmlns="http://schemas.dmtf.org/cimi/1">
1773   <id> xs:anyURI </id>
1774   <name> xs:string </name> ?
1775   <description> xs:string </description> ?
1776   <created> xs:dateTime </created> ?
1777   <updated> xs:dateTime </updated> ?
1778   <property key="xs:string"> xs:string </property> *
1779   <state> xs:string </state>
1780   <systems href="xs:anyURI"/> ?
1781   <machines href="xs:anyURI"/> ?
1782   <credentials href="xs:anyURI"/> ?
1783   <volumes href="xs:anyURI"/> ?
1784   <networks href="xs:anyURI"/> ?
1785   <networkPorts href="xs:anyURI"/> ?
1786   <addresses href="xs:anyURI"/> ?
1787   <forwardingGroups href="xs:anyURI"/> ?
1788   <meters href="xs:anyURI"/> ?
1789   <eventLog href="xs:anyURI"/> ?
1790   <operation rel="edit" href="xs:anyURI"/> ?
1791   <operation rel="delete" href="xs:anyURI"/> ?
1792   <operation rel="http://schemas.dmtf.org/cimi/1/action/start"
1793     href="xs:anyURI"/> ?
1794   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
1795     href="xs:anyURI"/> ?
1796   <operation rel="http://schemas.dmtf.org/cimi/1/action/restart"
1797     href="xs:anyURI"/> ?
1798   <operation rel="http://schemas.dmtf.org/cimi/1/action/pause"
1799     href="xs:anyURI"/> ?
1800   <operation rel="http://schemas.dmtf.org/cimi/1/action/suspend"
1801     href="xs:anyURI"/> ?
1802   <operation rel="http://schemas.dmtf.org/cimi/1/action/export"
1803     href="xs:anyURI"/> ?
1804   <xs:any>*
1805 </System>

```

1806 **5.13.1.1 Collections**

1807 The following describes the collection resources owned by Systems.

 1808 **5.13.1.1.1 SystemSystem Collection**

1809 The resource type for each item of this collection is "SystemSystem", defined as follows:

Name	SystemSystem	
Type URI	http://schemas.dmtf.org/cimi/1/SystemSystem	
Attribute	Type	Description
system	ref	Reference to a System resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

 1810 **JSON serialization:**

```

1811 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemSystemCollection",
1812   "id": string,
1813   "count": number,
1814   "systemSystems": [
1815     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemSystem",
1816       "id": string,
1817       "name": string, ?
1818       "description": string, ?
1819       "created": string, ?
1820       "updated": string, ?
1821       "properties": { "key": string, + }, ?
1822       "system": { "href": string },
1823       "operations": [
1824         { "rel": "edit", "href": string }, ?
1825         { "rel": "delete", "href": string } ?
1826       ] ?
1827       ...
1828     }, +
1829   ], ?
1830   "operations": [ { "rel": "add", "href": string } ? ]
1831   ...
1832 }
    
```

 1833 **XML serialization:**

```

1834 <Collection
1835   resourceURI="http://schemas.dmtf.org/cimi/1/SystemSystemCollection"
1836   xmlns="http://schemas.dmtf.org/cimi/1">
1837   <id> xs:anyURI </id>
1838   <count> xs:integer </count>
1839   <SystemSystem>
1840     <id> xs:anyURI </id>
1841     <name> xs:string </name> ?
1842     <description> xs:string </description> ?
1843     <created> xs:dateTime </created> ?
1844     <updated> xs:dateTime </updated> ?
1845     <property key="xs:string"> xs:string </property> *
1846     <system href="xs:anyURI"/>
1847     <operation rel="edit" href="xs:anyURI"/> ?
1848     <operation rel="delete" href="xs:anyURI"/> ?
1849     <xs:any>*
1850   </SystemSystem> *
1851   <operation rel="add" href="xs:anyURI"/> ?
    
```

1852 <xs:any>*

1853 </Collection>

1854 5.13.1.1.2 SystemMachine Collection

1855 The resource type for each item of this collection is “SystemMachine”, defined as follows:

Name	SystemMachine	
Type URI	http://schemas.dmtf.org/cimi/1/SystemMachine	
Attribute	Type	Description
machine	ref	Reference to a Machine resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

1856 JSON serialization:

```

1857 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemMachineCollection",
1858   "id": string,
1859   "count": number,
1860   "systemMachines": [
1861     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemMachine",
1862       "id": string,
1863       "name": string, ?
1864       "description": string, ?
1865       "created": string, ?
1866       "updated": string, ?
1867       "properties": { "key": string, + }, ?
1868       "machine": { "href": string },
1869       "operations": [
1870         { "rel": "edit", "href": string }, ?
1871         { "rel": "delete", "href": string } ?
1872       ] ?
1873       ...
1874     }, +
1875   ], ?
1876   "operations": [ { "rel": "add", "href": string } ? ]
1877   ...
1878 }
```

1879 XML serialization:

```

1880 <Collection
1881   resourceURI="http://schemas.dmtf.org/cimi/1/SystemMachineCollection"
1882   xmlns="http://schemas.dmtf.org/cimi/1">
1883   <id> xs:anyURI </id>
1884   <count> xs:integer </count>
1885   <SystemMachine>
1886     <id> xs:anyURI </id>
1887     <name> xs:string </name> ?
1888     <description> xs:string </description> ?
1889     <created> xs:dateTime </created> ?
1890     <updated> xs:dateTime </updated> ?
1891     <property key="xs:string"> xs:string </property> *
1892     <machine href="xs:anyURI"/>
1893     <operation rel="edit" href="xs:anyURI"/> ?
1894     <operation rel="delete" href="xs:anyURI"/> ?
1895     <xs:any> *
1896   </SystemMachine> *
1897   <operation rel="add" href="xs:anyURI"/> ?
1898   <xs:any> *
```


1899 </Collection>

 1900 **5.13.1.1.3 SystemCredential Collection**

1901 The resource type for each item of this collection is "SystemCredential", defined as follows:

Name	SystemCredential	
Type URI	http://schemas.dmtf.org/cimi/1/SystemCredential	
Attribute	Type	Description
credential	ref	Reference to a Credential resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

 1902 **JSON serialization:**

```

1903 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemCredentialCollection",
1904   "id": string,
1905   "count": number,
1906   "systemCredentials": [
1907     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemCredential",
1908       "id": string,
1909       "name": string, ?
1910       "description": string, ?
1911       "created": string, ?
1912       "updated": string, ?
1913       "properties": { "key": string, + }, ?
1914       "credential": { "href": string },
1915       "operations": [
1916         { "rel": "edit", "href": string }, ?
1917         { "rel": "delete", "href": string } ?
1918       ] ?
1919       ...
1920     }, +
1921   ], ?
1922   "operations": [ { "rel": "add", "href": string } ? ]
1923   ...
1924 }
```

 1925 **XML serialization:**

```

1926 <Collection
1927   resourceURI="http://schemas.dmtf.org/cimi/1/SystemCredentialCollection"
1928   xmlns="http://schemas.dmtf.org/cimi/1">
1929   <id> xs:anyURI </id>
1930   <count> xs:integer </count>
1931   <SystemCredential>
1932     <id> xs:anyURI </id>
1933     <name> xs:string </name> ?
1934     <description> xs:string </description> ?
1935     <created> xs:dateTime </created> ?
1936     <updated> xs:dateTime </updated> ?
1937     <property key="xs:string"> xs:string </property> *
1938     <credential href="xs:anyURI"/>
1939     <operation rel="edit" href="xs:anyURI"/> ?
1940     <operation rel="delete" href="xs:anyURI"/> ?
1941     <xs:any>*
1942   </SystemCredential> *
1943   <operation rel="add" href="xs:anyURI"/> ?
1944   <xs:any>*
1945 </Collection>
```

1946 **5.13.1.1.4 SystemVolume Collection**

1947 The resource type for each item of this collection is "SystemVolume", defined as follows:

Name	SystemVolume	
Type URI	http://schemas.dmtf.org/cimi/1/SystemVolume	
Attribute	Type	Description
volume	ref	Reference to a Volume resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

1948 **JSON serialization:**

```

1949 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemVolumeCollection",
1950   "id": string,
1951   "count": number,
1952   "systemVolumes": [
1953     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemVolume",
1954       "id": string,
1955       "name": string, ?
1956       "description": string, ?
1957       "created": string, ?
1958       "updated": string, ?
1959       "properties": { "key": string, + }, ?
1960       "volume": { "href": string },
1961       "operations": [
1962         { "rel": "edit", "href": string }, ?
1963         { "rel": "delete", "href": string } ?
1964       ] ?
1965       ...
1966     }, +
1967   ], ?
1968   "operations": [ { "rel": "add", "href": string } ? ]
1969   ...
1970 }

```

1971 **XML serialization:**

```

1972 <Collection
1973   resourceURI="http://schemas.dmtf.org/cimi/1/SystemVolumeCollection"
1974   xmlns="http://schemas.dmtf.org/cimi/1">
1975   <id> xs:anyURI </id>
1976   <count> xs:integer </count>
1977   <SystemVolume>
1978     <id> xs:anyURI </id>
1979     <name> xs:string </name> ?
1980     <description> xs:string </description> ?
1981     <created> xs:dateTime </created> ?
1982     <updated> xs:dateTime </updated> ?
1983     <property key="xs:string"> xs:string </property> *
1984     <volume href="xs:anyURI"/>
1985     <operation rel="edit" href="xs:anyURI"/> ?
1986     <operation rel="delete" href="xs:anyURI"/> ?
1987     <xs:any>*
1988   </SystemVolume> *
1989   <operation rel="add" href="xs:anyURI"/> ?
1990   <xs:any>*
1991 </Collection>

```

1992 **5.13.1.1.5 SystemNetwork Collection**

1993 The resource type for each item of this collection is “SystemNetwork”, defined as follows:

Name	SystemNetwork	
Type URI	http://schemas.dmtf.org/cimi/1/SystemNetwork	
Attribute	Type	Description
network	ref	Reference to a Network resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

1994 **JSON serialization:**

```

1995 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemNetworkCollection",
1996   "id": string,
1997   "count": number,
1998   "systemNetworks": [
1999     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemNetwork",
2000       "id": string,
2001       "name": string, ?
2002       "description": string, ?
2003       "created": string, ?
2004       "updated": string, ?
2005       "properties": { "key": string, + }, ?
2006       "network": { "href": string },
2007       "operations": [
2008         { "rel": "edit", "href": string }, ?
2009         { "rel": "delete", "href": string } ?
2010       ] ?
2011       ...
2012     }, +
2013   ], ?
2014   "operations": [ { "rel": "add", "href": string } ? ]
2015   ...
2016 }
    
```

2017 **XML serialization:**

```

2018 <Collection
2019   resourceURI="http://schemas.dmtf.org/cimi/1/SystemNetworkCollection"
2020   xmlns="http://schemas.dmtf.org/cimi/1">
2021   <id> xs:anyURI </id>
2022   <count> xs:integer </count>
2023   <SystemNetwork>
2024     <id> xs:anyURI </id>
2025     <name> xs:string </name> ?
2026     <description> xs:string </description> ?
2027     <created> xs:dateTime </created> ?
2028     <updated> xs:dateTime </updated> ?
2029     <property key="xs:string"> xs:string </property> *
2030     <network href="xs:anyURI"/>
2031     <operation rel="edit" href="xs:anyURI"/> ?
2032     <operation rel="delete" href="xs:anyURI"/> ?
2033     <xs:any>*
2034   </SystemNetwork> *
2035   <operation rel="add" href="xs:anyURI"/> ?
2036   <xs:any>*
2037 </Collection>
    
```

2038 **5.13.1.1.6 SystemNetworkPort Collection**

2039 The resource type for each item of this collection is "SystemNetwork", defined as follows:

Name	SystemNetworkPort	
Type URI	http://schemas.dmtf.org/cimi/1/SystemNetworkPort	
Attribute	Type	Description
networkPort	ref	Reference to a NetworkPort resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

2040 **JSON serialization:**

```

2041 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemNetworkPortCollection",
2042   "id": string,
2043   "count": number,
2044   "systemNetworkPorts": [
2045     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemNetworkPort",
2046       "id": string,
2047       "name": string, ?
2048       "description": string, ?
2049       "created": string, ?
2050       "updated": string, ?
2051       "properties": { "key": string, + }, ?
2052       "networkPort": { "href": string },
2053       "operations": [
2054         { "rel": "edit", "href": string }, ?
2055         { "rel": "delete", "href": string } ?
2056       ] ?
2057       ...
2058     }, +
2059   ], ?
2060   "operations": [ { "rel": "add", "href": string } ? ]
2061   ...
2062 }

```

2063 **XML serialization:**

```

2064 <Collection
2065   resourceURI="http://schemas.dmtf.org/cimi/1/SystemNetworkPortCollection"
2066   xmlns="http://schemas.dmtf.org/cimi/1">
2067   <id> xs:anyURI </id>
2068   <count> xs:integer </count>
2069   <SystemNetworkPort>
2070     <id> xs:anyURI </id>
2071     <name> xs:string </name> ?
2072     <description> xs:string </description> ?
2073     <created> xs:dateTime </created> ?
2074     <updated> xs:dateTime </updated> ?
2075     <property key="xs:string"> xs:string </property> *
2076     <networkPort href="xs:anyURI"/>
2077     <operation rel="edit" href="xs:anyURI"/> ?
2078     <operation rel="delete" href="xs:anyURI"/> ?
2079     <xs:any>*
2080   </SystemNetworkPort> *
2081   <operation rel="add" href="xs:anyURI"/> ?
2082   <xs:any>*
2083 </Collection>

```

2084 **5.13.1.1.7 SystemAddress Collection**

2085 The resource type for each item of this collection is "SystemAddress", defined as follows:

Name	SystemAddress	
Type URI	http://schemas.dmtf.org/cimi/1/SystemAddress	
Attribute	Type	Description
address	ref	Reference to a Address resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

 2086 **JSON serialization:**

```

2087 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemAddressCollection",
2088   "id": string,
2089   "count": number,
2090   "systemAddresses": [
2091     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemAddress",
2092       "id": string,
2093       "name": string, ?
2094       "description": string, ?
2095       "created": string, ?
2096       "updated": string, ?
2097       "properties": { "key": string, + }, ?
2098       "address": { "href": string },
2099       "operations": [
2100         { "rel": "edit", "href": string }, ?
2101         { "rel": "delete", "href": string } ?
2102       ] ?
2103       ...
2104     }, +
2105   ], ?
2106   "operations": [ { "rel": "add", "href": string } ? ]
2107   ...
2108 }
```

 2109 **XML serialization:**

```

2110 <Collection
2111   resourceURI="http://schemas.dmtf.org/cimi/1/SystemAddressCollection"
2112   xmlns="http://schemas.dmtf.org/cimi/1">
2113   <id> xs:anyURI </id>
2114   <count> xs:integer </count>
2115   <SystemAddress>
2116     <id> xs:anyURI </id>
2117     <name> xs:string </name> ?
2118     <description> xs:string </description> ?
2119     <created> xs:dateTime </created> ?
2120     <updated> xs:dateTime </updated> ?
2121     <property key="xs:string"> xs:string </property> *
2122     <address href="xs:anyURI"/>
2123     <operation rel="edit" href="xs:anyURI"/> ?
2124     <operation rel="delete" href="xs:anyURI"/> ?
2125     <xs:any>*
2126   </SystemAddress> *
2127   <operation rel="add" href="xs:anyURI"/> ?
2128   <xs:any>*
2129 </Collection>
```

2130 **5.13.1.1.8 SystemForwardingGroup Collection**

2131 The resource type for each item of this collection is "SystemForwardingGroup", defined as follows:

Name	SystemForwardingGroup	
Type URI	http://schemas.dmtf.org/cimi/1/SystemForwardingGroup	
Attribute	Type	Description
forwardingGroup	ref	Reference to a ForwardingGroup resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

2132 **JSON serialization:**

```

2133 { "resourceURI":
2134   "http://schemas.dmtf.org/cimi/1/SystemForwardingGroupCollection",
2135   "id": string,
2136   "count", number,
2137   "systemForwardingGroups": [
2138     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemForwardingGroup",
2139       "id": string,
2140       "name": string, ?
2141       "description": string, ?
2142       "created": string, ?
2143       "updated": string, ?
2144       "properties": { "key": string, + }, ?
2145       "forwardingGroup": { "href": string },
2146       "operations": [
2147         { "rel": "edit", "href": string }, ?
2148         { "rel": "delete", "href": string } ?
2149       ] ?
2150       ...
2151     }, +
2152   ], ?
2153   "operations": [ { "rel": "add", "href": string } ? ]
2154   ...
2155 }
    
```

2156 **XML serialization:**

```

2157 <Collection
2158   resourceURI="http://schemas.dmtf.org/cimi/1/SystemForwardingGroupCollection"
2159   xmlns="http://schemas.dmtf.org/cimi/1">
2160   <id> xs:anyURI </id>
2161   <count> xs:integer </count>
2162   <SystemForwardingGroup>
2163     <id> xs:anyURI </id>
2164     <name> xs:string </name> ?
2165     <description> xs:string </description> ?
2166     <created> xs:dateTime </created> ?
2167     <updated> xs:dateTime </updated> ?
2168     <property key="xs:string"> xs:string </property> *
2169     <forwardingGroup href="xs:anyURI"/>
2170     <operation rel="edit" href="xs:anyURI"/> ?
2171     <operation rel="delete" href="xs:anyURI"/> ?
2172     <xs:any>*
2173   </SystemForwardingGroup> *
2174   <operation rel="add" href="xs:anyURI"/> ?
2175   <xs:any>*
2176 </Collection>
    
```

2177 **5.13.1.1.9 SystemMeter Collection**

2178 The resource type for each item of this collection is “Meter” as defined in clause 5.17.3.

2179 **JSON serialization:**

```
2180 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemMeterCollection",
2181   "id": string,
2182   "count": number,
2183   "meters": [
2184     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
2185       "id": string,
2186       ... remaining Meter attributes ...
2187     }, +
2188   ], ?
2189   "operations": [ { "rel": "add", "href": string } ? ]
2190   ...
2191 }
```

2192 **XML serialization:**

```
2193 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/SystemMeterCollection"
2194   xmlns="http://schemas.dmtf.org/cimi/1">
2195   <id> xs:anyURI </id>
2196   <count> xs:integer </count>
2197   <Meter>
2198     <id> xs:anyURI </id>
2199     ... remaining Meter attributes ...
2200   </Meter> *
2201   <operation rel="add" href="xs:anyURI"/> ?
2202   <xs:any>*
2203 </Collection>
```

2204 **5.13.1.2 Operations**

2205 This resource supports the Read, Update, and Delete operations. Create is supported via the System
2206 Collection resource.

2207 The following custom operations are also defined:

2208 **Starting/Stopping/Restarting/Pausing/Suspending the Machines in a System**

2209 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/xxx

2210 Where "xxx" is either "start", "stop", "restart", "pause", or "suspend".

2211 This operation will recursively perform the requested operation on each component of the System
2212 (Machine or sub-System). Note that not all Machines need to be in the same state for this operation to be
2213 available and the impact that this operation will have will vary depending on the component's current
2214 state; see clause 5.14.1.2 for more details about performing operations on Machines. If a Machine is in a
2215 state that makes this operation invalid, that Machine will not be affected by the operation.

2216 To start, stop, restart, pause, or suspend the Machines in a System, a POST is sent to the appropriate
2217 URI of the System where the HTTP request body shall be as described in the "Operations" clause of the
2218 Machine resource; see clause 5.14.1.2.

2219 **Exporting a System**

2220 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/export

2221 This operation is defined to export a System. If an export package exists at that URI, it is updated with the
2222 values of the System and any component management resources. Otherwise, a new export package is

2223 created at that URI with a Media Type as specified by the "format" parameter. Other formats may be used
2224 if supported, but are not specified by this standard.

2225 Input parameters:

- 2226 • "format" - type: string - optional
2227 Indicates the Media Type of the exported data. If not present, the default value shall be
2228 "application/ovf."
2229
- 2230 • "destination" - type: URI - optional
2231 The location to where the exported data is placed. If not present, the HTTP response Location
2232 header shall contain the URL to the exported data. Based on the specific protocol specified within
2233 the URI, the Consumer might need to provide additional information (such as credentials) in the
2234 "properties" field. In the case of HTTP, a PUT shall be used to place the data at the specified
2235 location.

2236 Output parameters: None.

2237 HTTP protocol

2238 To export a System, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/export" URI of the
2239 System where the HTTP request body shall be as described below.

2240 **JSON media type:** application/json

2241 **JSON serialization:**

```
2242 { "action": "http://schemas.dmtf.org/cimi/1/action/export",
2243   "format": string, ?
2244   "destination": string, ?
2245   "properties": { "key": string, + } ?
2246   ...
2247 }
```

2248 **XML media type:** application/xml

2249 **XML serialization**

```
2250 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2251   <action http://schemas.dmtf.org/cimi/1/action/export </action>
2252   <format> xs:string </format> ?
2253   <destination> xs:anyURI </destination> ?
2254   <property key="xs:string"> xs:string </property> *
2255   <xs:any>*
2256 </Action>
```

2257 5.13.2 System Collection

2258 A System Collection resource represents the collection of System resources within a Provider and follows
2259 the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

2260 **JSON serialization:**

```
2261 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemCollection",
2262   "id": string,
2263   "count", number,
2264   "systems": [
2265     { "resourceURI": "http://schemas.dmtf.org/cimi/1/System",
2266       "id": string,
2267       ... remaining System attributes ...
2268     }, +
```



```

2269 ], ?
2270 "operations": [
2271   { "rel": "add", "href": string }, ?
2272   { "rel": "http://schemas.dmtf.org/cimi/1/action/import", "href": string } ?
2273 ]
2274 ...
2275 }
    
```

2276 XML serialization:

```

2277 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/SystemCollection"
2278   xmlns="http://schemas.dmtf.org/cimi/1">
2279   <id> xs:anyURI </id>
2280   <count> xs:integer </count>
2281   <System>
2282     <id> xs:anyURI </id>
2283     ... remaining System attributes ...
2284   </System> *
2285   <operation rel="add" href="xs:anyURI"/> ?
2286   <operation rel="http://schemas.dmtf.org/cimi/1/import" href="xs:anyURI"/> ?
2287   <xs:any*>
2288 </Collection>
    
```

2289 5.13.2.1 Operations

2290 NOTE: The "add" operation requires a SystemTemplate to be used.

2291 Resources created during the process of creating a System shall be "owned" by the System (see 5.13.1).
 2292 For example, a "componentDescriptor" that references a MachineTemplate, and within that
 2293 MachineTemplate is a reference to a VolumeTemplate, will result in a reference to the new Machine
 2294 being added to the System.machines attribute and a reference to the new Volume being added to the
 2295 System.volumes attribute. However, if this MachineTemplate refers to an existing Volume, this Volume
 2296 will not be added to the top-level System attributes.

2297 The following custom operations are also defined:

2298 Importing a System

2299 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/import

2300 This operation will import/deserialize a System. Not only will a System be created, but Machines,
 2301 Volumes, and Networks and possibly recursive Systems and their components may also be created
 2302 corresponding to imported descriptor entries. More detail about this process is in ANNEX A.

2303 Input parameters:

- 2304 • "source" - type: URI - mandatory
- 2305 The location from which the imported data will be retrieved. Based on the specific protocol
- 2306 specified within the URI, the Consumer might need to provide additional information (such as
- 2307 credentials) in the "properties" field.

2308 Output parameters: None.

2309 HTTP protocol

2310 To import a SystemTemplate, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/import" URI of
 2311 the System Collection where the HTTP request body shall be as described below.

2312 **JSON media type:** application/json

2313 JSON serialization:

```

2314 { "action": "http://schemas.dmtf.org/cimi/1/action/import",
    
```

```

2315     "source": string, ?
2316     "properties": { "key": string, + } ?
2317     ...
2318 }
    
```

2319 **XML media type:** application/xml

2320 **XML serialization**

```

2321 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2322   <action> http://schemas.dmtf.org/cimi/1/action/import </action>
2323   <source> xs:anyURI </source> ?
2324   <property key="xs:string"> xs:string </property> *
2325   <xs:any>*
2326 </Action>
    
```

2327 **5.13.3 System Template**

2328 The System Template contains the set of individual descriptors that are necessary to create the
 2329 components of a System. Each component descriptor can be considered to be the persisted view of the
 2330 create operation that instantiates the component. In practice, the Provider will interpret the set of
 2331 component descriptors as a set of creation operations to be executed in an order compatible with the
 2332 dependencies (e.g., attachments or references between components) that are manifest between these
 2333 components.

2334 A System Template may include component references in the descriptors, used to express links between
 2335 components of the resulting System. A component reference uses the "name" of the target (referred)
 2336 component. For example, <volume href="#newVolume"/> would reference a Volume named
 2337 "newVolume."

Name	SystemTemplate													
Type URI	http://schemas.dmtf.org/cimi/1/SystemTemplate													
Attribute	Type	Description												
component Descriptors	<i>component Descriptor</i> []	The list of component descriptors describing the components of a System instance realized from this SystemTemplate. For each component descriptor, the corresponding component is created when a System instance is created. Each component descriptor refers to a template (either by reference or value), and may also provide additional metadata (name, description, properties). The creation order of components is not specified in SystemTemplate, in particular the order of the component descriptors in this array is not meaningful in terms of creation order.												
		<table border="1"> <tr> <td>Name</td> <td colspan="2"><i>componentDescriptor</i></td> </tr> <tr> <td>Data</td> <td>Type</td> <td>Description</td> </tr> <tr> <td>name</td> <td><i>string</i></td> <td>The value of the "name" attribute that will be associated with a System component created from this component descriptor. Note: This name is not to be confused with the name that may be present in the component template – e.g., a MachineTemplate – from which this component will be instantiated. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write</td> </tr> <tr> <td>description</td> <td><i>string</i></td> <td>The value of the "description" attribute that will be associated with a System component created from this component descriptor. Constraints:</td> </tr> </table>	Name	<i>componentDescriptor</i>		Data	Type	Description	name	<i>string</i>	The value of the "name" attribute that will be associated with a System component created from this component descriptor. Note: This name is not to be confused with the name that may be present in the component template – e.g., a MachineTemplate – from which this component will be instantiated. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write	description	<i>string</i>	The value of the "description" attribute that will be associated with a System component created from this component descriptor. Constraints:
		Name	<i>componentDescriptor</i>											
		Data	Type	Description										
name	<i>string</i>	The value of the "name" attribute that will be associated with a System component created from this component descriptor. Note: This name is not to be confused with the name that may be present in the component template – e.g., a MachineTemplate – from which this component will be instantiated. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write												
description	<i>string</i>	The value of the "description" attribute that will be associated with a System component created from this component descriptor. Constraints:												

				Provider: support mandatory; mutable Consumer: support optional; read-write
		properties	<i>map</i>	The key/value pairs that will be associated with a System component created from this component descriptor. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write
		type	<i>URI</i>	The TypeURI of the component to be created from this component descriptor, e.g., for a machine: http://schemas.dmtf.org/cimi/1/Machine Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
		component Template	any	Reference either to a component Template or to the Template data itself inlined (i.e., the Template "value"). Note that the exact name of this attribute will vary depending on the type of resource being created, e.g., MachineTemplate for a Machine. Note: Component references (expressing links between components of a resulting System) are to be found, if any, in Templates that are provided inline, because such references contain names that are only relevant to the SystemTemplate where these template values are embedded. Note that the attributes of theTemplate may be specified rather than a reference to an existing Template resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
		quantity	<i>integer</i>	Number of component instances to be created from this component descriptor. By default, this number is equal to 1. When the value is 2 or more, the actual name assigned to each instance will be the "name" value concatenated with a sequential number (e.g., if name="mymachine", and quantity=3, the names will be: mymachine1, mymachine2, mymachine3.) Constraints: Provider: support optional; mutable Consumer: support optional; read-write
		Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write		
meterTemplates	<i>meterTemplates[]</i>	A list of references to Meter Templates that shall be used to create and connect a set of new Meters to the new System. Note that the attributes of the MeterTemplate may be specified rather than a reference		

		to an existing MeterTemplate resource. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
eventLogTemplate	ref	A reference to an EventLogTemplate that shall be used to create and connect a new EventLog to the new System. Note that the attributes of the EventLogTemplate may be specified rather than a reference to an existing EventLogTemplate resource. Constraints: Provider: support optional; mutable Consumer: support optional; read-write

2338 **JSON media type:** application/json

2339 **JSON serialization:**

```

2340 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemTemplate",
2341   "id": string,
2342   "name": string, ?
2343   "description": string, ?
2344   "created": string, ?
2345   "updated": string, ?
2346   "properties": { "key": string, + }, ?
2347   "componentDescriptors": [
2348     { "name": string, ?
2349       "description": string, ?
2350       "properties": { "name": string, + }, ?
2351       "type": string,
2352       "componentTemplate": {
2353         "href": string, ?
2354         ... ComponentTemplate attributes ... ?
2355       }
2356     }, +
2357   ], ?
2358   "meterTemplates": [
2359     { "href": string, ?
2360       ... MeterTemplate attributes ... ?
2361     }, *
2362   ], ?
2363   "eventLogTemplate": {
2364     "href": string, ?
2365     ... EventLogTemplate attributes ... ?
2366   }, ?
2367   "operations": [
2368     { "rel": "edit", "href": string }, ?
2369     { "rel": "delete", "href": string }, ?
2370     { "rel": "http://schemas.dmtf.org/cimi/1/action/export", "href": string } ?
2371   ] ?
2372   ...
2373 }
```

2374 **XML media type:** application/xml

2375 **XML serialization:**

```

2376 <SystemTemplate xmlns="http://schemas.dmtf.org/cimi/1">
2377   <id> xs:anyURI </id>
2378   <name> xs:string </name> ?
2379   <description> xs:string </description> ?
2380   <created> xs:dateTime </created> ?
2381   <updated> xs:dateTime </updated> ?

```

```

2382 <property key="xs:string"> xs:string </property> *
2383 <componentDescriptor>
2384   <name> xs:string </name> ?
2385   <description> xs:string </description> ?
2386   <property name="xs:string"> xs:string </property> *
2387   <type> xs:anyURI </type>
2388   <componentTemplate href="xs:anyURI"? >
2389     ... ComponentTemplate attributes ... ?
2390   </componentTemplate> *
2391 </componentDescriptor> *
2392 <meterTemplate href="xs:anyURI"? >
2393   ... MeterTemplate attributes ... ?
2394 </meterTemplate> *
2395 <eventLogTemplate href="xs:anyURI"? >
2396   ... EventLogTemplate attributes ... ?
2397 </eventLogTemplate> ?
2398 <operation rel="edit" href="xs:anyURI"/> ?
2399 <operation rel="delete" href="xs:anyURI"/> ?
2400 <operation rel="http://schemas.dmtf.org/cimi/1/action/export"
2401 href="xs:anyURI"/> ?
2402 <xs:any>*
2403 </SystemTemplate>

```

2404 5.13.3.1 Operations

2405 This resource supports the Read, Update, and Delete operations. Create is supported via the System
 2406 Template Collection resource.

2407 The following custom operations are also defined:

2408 Exporting a SystemTemplate

2409 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/export

2410 This operation is defined to export a System Template. If an export package exists at that URI, it is
 2411 updated with the values of the System Template and any component management resources. Otherwise
 2412 a new export package is created at that URI with a Media Type as specified by the "format" parameter.
 2413 Other formats may be used if supported, but are not specified by this standard.

2414 Input parameters:

- 2415 • "format" - type: string - optional
 2416 Indicates the Media Type of the exported data. If not present, the default value shall be
 2417 "application/ovf."
 2418
- 2419 • "destination" - type: URI - optional
 2420 The location to where the exported data is placed. If not present, the HTTP response Location
 2421 header shall contain the URL to the exported data. Based on the specific protocol specified within
 2422 the URI, the Consumer might need to provide additional information (such as credentials) in the
 2423 "properties" field. In the case of HTTP, a PUT shall be used to place the data at the specified
 2424 location.

2425 Output parameters: None.

2426 HTTP protocol

2427 To export a SystemTemplate, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/export" URI of
 2428 the System Template where the HTTP request body shall be as described below.

2429 **JSON media type:** application/json

2430 **JSON serialization:**

```
2431 { "action": "http://schemas.dmtf.org/cimi/1/action/export",
2432   "format": string, ?
2433   "destination": string, ?
2434   "properties": { "key": string, + } ?
2435   ...
2436 }
```

2437 **XML media type:** application/xml

2438 **XML serialization**

```
2439 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2440   <action> http://schemas.dmtf.org/cimi/1/action/export </action>
2441   <format> xs:string </format> ?
2442   <destination> xs:anyURI </destination> ?
2443   <property key="xs:string"> xs:string </property> *
2444   <xs:any>*
2445 </Action>
```

2446 5.13.4 System Template Collection

2447 A System Template Collection resource represents the collection of System Template resources within a
2448 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
2449 follows:

2450 **JSON serialization:**

```
2451 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemTemplateCollection",
2452   "id": string,
2453   "count": number,
2454   "systemTemplates": [
2455     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemTemplate",
2456       "id": string,
2457       ... remaining SystemTemplate attributes ...
2458     }, +
2459   ], ?
2460   "operations": [
2461     { "rel": "add", "href": string }, ?
2462     { "rel": "http://schemas.dmtf.org/cimi/1/action/import", "href": string } ?
2463   ]
2464   ...
2465 }
```

2466 **XML serialization:**

```
2467 <Collection
2468   resourceURI="http://schemas.dmtf.org/cimi/1/SystemTemplateCollection"
2469   xmlns="http://schemas.dmtf.org/cimi/1">
2470   <id> xs:anyURI </id>
2471   <count> xs:integer </count>
2472   <SystemTemplate>
2473     <id> xs:anyURI </id>
2474     ... remaining SystemTemplate attributes ...
2475   </SystemTemplate> *
2476   <operation rel="add" href="xs:anyURI"/> ?
2477   <operation rel="http://schemas.dmtf.org/cimi/1/import" href="xs:anyURI"/> ?
2478   <xs:any>*
2479 </Collection>
```

2480 **5.13.4.1 Operations**

2481 The following custom operations are defined:

2482 **Importing a SystemTemplate**

2483 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/import

2484 This operation will import/deserialize a SystemTemplate. Not only will a System Template be created, but
 2485 Machine Templates, Volume Templates, and Network Templates and possibly recursive System
 2486 Templates and their components may also be created, corresponding to imported descriptor entries.
 2487 More detail about this process is in ANNEX A.

2488 Input parameters:

- 2489 • "source" - type: URI - mandatory
- 2490 The location from which the imported data will be retrieved. Based on the specific protocol
- 2491 specified within the URI, the Consumer might need to provide additional information (such as
- 2492 credentials) in the "properties" field.

2493 Output parameters: None.

2494 **HTTP protocol**

2495 To import a SystemTemplate, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/import" URI of
 2496 the System Template Collection where the HTTP request body shall be as described below.

2497 **JSON media type:** application/json

2498 **JSON serialization:**

```
2499 { "action": "http://schemas.dmtf.org/cimi/1/action/import",
2500   "source": string, ?
2501   "properties": { "key": string, + } ?
2502   ...
2503 }
```

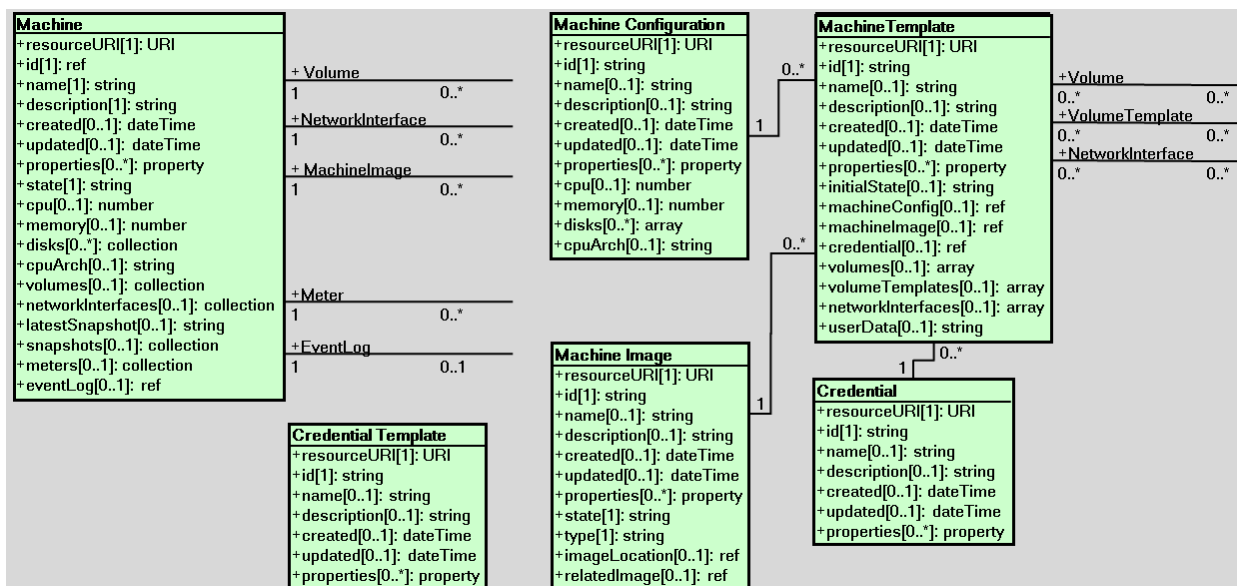
2504 **XML media type:** application/xml

2505 **XML serialization**

```
2506 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2507   <action> http://schemas.dmtf.org/cimi/1/action/import </action>
2508   <source> xs:anyURI </source> ?
2509   <property key="xs:string"> xs:string </property> *
2510   <xs:any>*
2511 </Action>
```

2512 **5.14 Machine resources and relationships**

2513 Figure 3 illustrates the resources involved in constructing a Machine and their relationships. Although this
 2514 drawing is in the style of a Resource Relationship diagram, the use of UML is neither rigorous nor
 2515 normative.



2516 **Figure 3 - Machine resources**

2517 **5.14.1 Machine**

2518 An instantiated compute resource that encapsulates both CPU and Memory.

Name	Machine	
Type URI	http://schemas.dmtf.org/cimi/1/Machine	
Attribute	Type	Description
state	string	<p>The operational state of the Machine.</p> <p>Allowable values include:</p> <p>CREATING: The Machine is in the process of being created. Allowable action when in this state is: delete.</p> <p>STARTING: The Machine is in the process of being started. Allowable actions when in this state are: start, restart, stop, and delete.</p> <p>STARTED: The Machine is available and ready for use. Allowable actions when in this state are: stop, restart, pause, suspend, capture, and delete.</p> <p>STOPPING: The Machine is in the process of being stopped. Allowable actions when in this state are: start, restart, stop, and delete.</p> <p>STOPPED: This value is the virtual equivalent of powering off a physical Machine. There is no saved CPU or memory state. Allowable actions when in this state are: start, restart, capture, and delete.</p> <p>PAUSING: The Machine in the process of being PAUSED. Allowable actions when in this state are: start, restart, and delete.</p> <p>PAUSED: In this state the Machine and its virtual resources remain instantiated and resources remain allocated, similar to the "STARTED" state, but the Machine and its virtual resources are not enabled to perform tasks. Allowable actions when in this state are: start, restart, capture, and delete.</p> <p>SUSPENDING: The Machine is in the process of being suspended. Allowable actions when in this state are: start, restart, and delete.</p> <p>SUSPENDED: In this state the Machine and its virtual resources are stored on non-</p>

		<p>volatile storage. The Machine and its resources are not enabled to perform tasks. Allowable actions when in this state are: start, restart, capture, and delete.</p> <p>DELETING: The Machine is in the process of being deleted. Allowable action when in this state is: delete.</p> <p>ERROR: The Provider has detected an error in the Machine. Allowable actions when in this state are: start, restart, stop, and delete.</p> <p>PAUSED and SUSPENDED states are optional and Providers may choose to support them or not.</p> <p>Providers may define additional values.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
cpu	<i>integer</i>	<p>The amount of CPU that this Machine has.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>
memory	<i>integer</i>	<p>The size of the memory (RAM) in kibibytes allocated to this Machine.</p> <p>When this value is increased, it implies that the Machine is allocated more RAM, and vice versa when the value is decreased.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
disks	<i>collection [Disk]</i>	<p>A reference to the list of disks (local storage) that are part of the Machine. Adding an element to this list creates a disk.</p> <p>Note: the Disk resource type is defined in the following clause.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
cpuArch	<i>string</i>	<p>The CPU architecture that will be supported by Machines created by using this configuration.</p> <p>Allowable values include: 68000, Alpha, ARM, Itanium, MIPS, PA_RISC, POWER, PowerPC, x86, x86_64, z/Architecture, SPARC. Providers may define additional values.</p> <p>Constraints: Provider: support optional; immutable Consumer: support optional; read-only</p>
volumes	<i>collection [MachineVolume]</i>	<p>A reference to the list of references to Volumes that are connected to this Machine.</p> <p>Adding a Volume to this list means that the Machine has some access to the data on the Volume. Removing a Volume from this list means that the Machine no longer has access to the data on the Volume.</p> <p>Note: the MachineVolume resource type is representing an association between the Machine and a Volume. It is defined in the following clause.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
networkInterfaces	<i>collection [MachineNetworkInterface]</i>	<p>A reference to the list of MachineNetworkInterfaces on this Machine.</p> <p>Note: the MachineNetworkInterface resource type is representing an association</p>

	<i>Interface</i>	<p>between the Machine and a NetworkInterface. It is defined in the following clause.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
latestSnapshot	<i>ref</i>	<p>A reference to the SNAPSHOT representing the latest state captured for this Machine (either most recent Snapshot or the last Snapshot reverted to).</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
snapshots	<i>collection</i> <i>[MachineSnapshot]</i>	<p>A reference to the list of references to the SNAPSHOT Machine Images taken of this Machine.</p> <p>Note: the MachineSnapshot resource type is representing an association between the Machine and a Snapshot. It is defined in the following clause.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
meters	<i>collection</i> <i>[Meter]</i>	<p>A reference to the list of Meters monitored for this Machine.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
eventLog	<i>ref</i>	<p>A reference to the EventLog of this Machine.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>

2519 The following describes the serialization of the resource in both JSON and XML:

2520 **JSON media type:** application/json

2521 **JSON serialization:**

```

2522 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Machine",
2523   "id": string,
2524   "name": string, ?
2525   "description": string, ?
2526   "created": string, ?
2527   "updated": string, ?
2528   "properties": { "key": string, + }, ?
2529   "state": string,
2530   "cpu": number,
2531   "memory": number,
2532   "disks" : { "href": string }, ?
2533   "cpuArch": string, ?
2534   "volumes": { "href": string }, ?
2535   "networkInterfaces": { "href": string }, ?
2536   "latestSnapshot": string, ?
2537   "snapshots": { "href": string }, ?
2538   "meters": { "href": string }, ?
2539   "eventLog": { "href": string }, ?
2540   "operations": [
2541     { "rel": "edit", "href": string }, ?
2542     { "rel": "delete", "href": string }, ?
2543     { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
2544     { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string }, ?
2545     { "rel": "http://schemas.dmtf.org/cimi/1/action/restart", "href": string },
2546   ]
    
```

```

2547 { "rel": "http://schemas.dmtf.org/cimi/1/action/pause", "href": string }, ?
2548 { "rel": "http://schemas.dmtf.org/cimi/1/action/suspend", "href": string }
2549 ?
2550 { "rel": "http://schemas.dmtf.org/cimi/1/action/snapshot", "href": string }
2551 ?
2552 { "rel": "http://schemas.dmtf.org/cimi/1/action/restore", "href": string }
2553 ?
2554 ]
2555 ...
2556 }
    
```

2557 **XML media type:** application/xml

2558 **XML serialization:**

```

2559 <Machine xmlns="http://schemas.dmtf.org/cimi/1">
2560   <id> xs:anyURI </id>
2561   <name> xs:string </name> ?
2562   <description> xs:string </description> ?
2563   <created> xs:dateTime </created> ?
2564   <updated> xs:dateTime </updated> ?
2565   <property key="xs:string"> xs:string </property> *
2566   <state> xs:string </state>
2567   <cpu> xs:integer </cpu>
2568   <memory> xs:integer </memory>
2569   <disks href="xs:anyURI"/> ?
2570   <cpuArch> xs:string </cpuArch> ?
2571   <volumes href="xs:anyURI"/> ?
2572   <networkInterfaces href="xs:anyURI"/> ?
2573   <latestSnapshot> xs:anyURI </latestSnapshot> ?
2574   <snapshots href="xs:anyURI"/> ?
2575   <meters href="xs:anyURI"/> ?
2576   <eventLog href="xs:anyURI"/> ?
2577   <operation rel="edit" href="xs:anyURI"/> ?
2578   <operation rel="delete" href="xs:anyURI"/> ?
2579   <operation rel="http://schemas.dmtf.org/cimi/1/action/start"
2580 href="xs:anyURI"/> ?
2581   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
2582 href="xs:anyURI"/> ?
2583   <operation rel="http://schemas.dmtf.org/cimi/1/action/restart"
2584 href="xs:anyURI"/> ?
2585   <operation rel="http://schemas.dmtf.org/cimi/1/action/pause"
2586 href="xs:anyURI"/> ?
2587   <operation rel="http://schemas.dmtf.org/cimi/1/action/suspend"
2588 href="xs:anyURI"/> ?
2589   <operation rel="http://schemas.dmtf.org/cimi/1/action/capture"
2590 href="xs:anyURI"/> ?
2591   <operation rel="http://schemas.dmtf.org/cimi/1/action/snapshot"
2592 href="xs:anyURI"/> ?
2593   <operation rel="http://schemas.dmtf.org/cimi/1/action/restore"
2594 href="xs:anyURI"/> ?
2595   <xs:any>*
2596 </Machine>
    
```

2597 **5.14.1.1 Collections**

2598 The following describes the collection resources owned by Machines.

2599 **5.14.1.1.1 Disk Collection**

2600 The resource type for each item of this collection is "Disk", as defined as follows:

Name	Disk
------	------

Type URI	http://schemas.dmtf.org/cimi/1/Disk	
Attribute	Type	Description
capacity	<i>integer</i>	The initial capacity, in kilobytes, of the disk. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
initialLocation	<i>string</i>	Operating System specific location(path) in its namespace where this disk will first appear. Note, once deployed Consumers might move where this Disk is located. Support of this attribute indicates that the Provider can report this information back to the Consumer. Constraints: Provider: support optional; immutable Consumer: support optional; read-only

2601 **JSON serialization:**

```

2602 { "resourceURI": "http://schemas.dmtf.org/cimi/1/DiskCollection",
2603   "id": string,
2604   "count": number,
2605   "disks": [
2606     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Disk",
2607       "id": string,
2608       "name": string, ?
2609       "description": string, ?
2610       "created": string, ?
2611       "updated": string, ?
2612       "properties": { "key": string, + }, ?
2613       "capacity": number,
2614       "initialLocation": string, ?
2615       "operations": [
2616         { "rel": "edit", "href": string }, ?
2617         { "rel": "delete", "href": string } ?
2618       ] ?
2619       ...
2620     }, +
2621   ], ?
2622   "operations": [ { "rel": "add", "href": string } ? ]
2623   ...
2624 }

```

2625 **XML serialization:**

```

2626 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/DiskCollection"
2627   xmlns="http://schemas.dmtf.org/cimi/1">
2628   <id> xs:anyURI </id>
2629   <count> xs:integer </count>
2630   <Disk>
2631     <id> xs:anyURI </id>
2632     <name> xs:string </name> ?
2633     <description> xs:string </description> ?
2634     <created> xs:dateTime </created> ?
2635     <updated> xs:dateTime </updated> ?
2636     <property key="xs:string"> xs:string </property> *
2637     <capacity> xs:integer </capacity>
2638     <initialLocation> xs:string </initialLocation> ?
2639     <operation rel="edit" href="xs:anyURI"/> ?
2640     <operation rel="delete" href="xs:anyURI"/> ?
2641     <xs:any>*
2642   </Disk> *

```

```

2643     <operation rel="add" href="xs:anyURI"/> ?
2644     <xs:any>*
2645 </Collection>
    
```

2646 5.14.1.1.2 MachineVolume Collection

2647 The resource type for each item of this collection is “MachineVolume”, defined as follows:

Name	MachineVolume	
Type URI	http://schemas.dmtf.org/cimi/1/MachineVolume	
Attribute	Type	Description
initialLocation	<i>string</i>	Operating System specific location(path) in its namespace where this Volume will first appear. Note, once deployed Consumers might move where this Volume is located. Support of this attribute indicates that the Provider can report this information back to the Consumer. Constraints: Provider: support optional; immutable Consumer: support optional; read-only
volume	<i>ref</i>	A reference to the Volume that will be connected. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

2648 JSON serialization:

```

2649 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineVolumeCollection",
2650   "id": string,
2651   "count": number,
2652   "machineVolumes": [
2653     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineVolume",
2654       "id": string,
2655       "name": string, ?
2656       "description": string, ?
2657       "created": string, ?
2658       "updated": string, ?
2659       "properties": { "key": string, + }, ?
2660       "initialLocation": string, ?
2661       "volume": { "href": string },
2662       "operations": [
2663         { "rel": "edit", "href": string }, ?
2664         { "rel": "delete", "href": string } ?
2665       ] ?
2666       ...
2667     }, +
2668   ], ?
2669   "operations": [ { "rel": "add", "href": string } ? ]
2670   ...
2671 }
    
```

2672 XML serialization:

```

2673 <Collection
2674   resourceURI="http://schemas.dmtf.org/cimi/1/MachineVolumeCollection"
2675   xmlns="http://schemas.dmtf.org/cimi/1">
2676   <id> xs:anyURI </id>
2677   <count> xs:integer </count>
2678   <MachineVolume>
2679     <id> xs:anyURI </id>
2680     <name> xs:string </name> ?
2681     <description> xs:string </description> ?
    
```

```

2682 <created> xs:dateTime </created> ?
2683 <updated> xs:dateTime </updated> ?
2684 <property key="xs:string"> xs:string </property> *
2685 <initialLocation> xs:string </initialLocation> ?
2686 <volume href="xs:anyURI"/>
2687 <operation rel="edit" href="xs:anyURI"/> ?
2688 <operation rel="delete" href="xs:anyURI"/> ?
2689 <xs:any>*
2690 </MachineVolume> *
2691 <operation rel="add" href="xs:anyURI"/> ?
2692 <xs:any>*
2693 </Collection>
    
```

2694 **5.14.1.1.3 MachineNetworkInterface Collection**

2695 The resource type for each item of this collection is “MachineNetworkInterface”, defined as follows:

Name	MachineNetworkInterface	
Type URI	http://schemas.dmtf.org/cimi/1/MachineNetworkInterface	
Attribute	Type	Description
addresses	<i>collection</i> [<i>MachineNetworkInterfaceAddress</i>]	A reference to the list of references to the Addresses for this network interface. Note: the MachineNetworkInterfaceAddress resource type is representing an association between the MachineNetworkInterface and an Address. It is defined following this resource's definition. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
network	<i>ref</i>	A reference to a Network for this network interface. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
networkPort	<i>ref</i>	A reference to the NetworkPort for this network interface. If this attribute is provided, the "network" attribute in the referenced NetworkPort shall have the same value as the "network" attribute in this networkInterface. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
state	<i>string</i>	The state of an interface configurable to be "Active" or "Passive." A passive interface is in a standby mode ready to forward traffic if the primary interface fails. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
macAddress	<i>string</i>	Address assigned by the hypervisor when a machine is created or a unique address can be manually assigned. While this attribute can be specified, in most cases it is expected to be supplied by the Provider. Specifying this value is typically only done when the Template is only used for one particular Machine. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
mtu	<i>integer</i>	To set the largest supported maximum transmission unit packet size.

		Constraints: Provider: support optional; mutable Consumer: support optional; read-write
--	--	--

 2696 **JSON serialization:**

```

2697 { "resourceURI":
2698     "http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceCollection",
2699     "id": string,
2700     "count": number,
2701     "machineNetworkInterfaces": [
2702         { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineNetworkInterface",
2703           "id": string,
2704           "name": string, ?
2705           "description": string, ?
2706           "created": string, ?
2707           "updated": string, ?
2708           "properties": { "key": string, + }, ?
2709           "addresses": { "href": string },
2710           "network": { "href": string },
2711           "networkPort": { "href": string }, ?
2712           "state": string, ?
2713           "macAddress": string, ?
2714           "mtu": number, ?
2715           "operations": [
2716             { "rel": "edit", "href": string }, ?
2717             { "rel": "delete", "href": string } ?
2718           ] ?
2719           ...
2720         }, +
2721     ], ?
2722     "operations": [ { "rel": "add", "href": string } ? ]
2723     ...
2724 }
    
```

 2725 **XML serialization:**

```

2726 <Collection
2727 resourceURI="http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceCollection"
2728   xmlns="http://schemas.dmtf.org/cimi/1">
2729   <id> xs:anyURI </id>
2730   <count> xs:integer </count>
2731   <MachineNetworkInterface>
2732     <id> xs:anyURI </id>
2733     <name> xs:string </name> ?
2734     <description> xs:string </description> ?
2735     <created> xs:dateTime </created> ?
2736     <updated> xs:dateTime </updated> ?
2737     <property key="xs:string"> xs:string </property> *
2738     <addresses href="xs:anyURI"/>
2739     <network href="xs:anyURI"/>
2740     <networkPort href="xs:anyURI"/> ?
2741     <state> xs:string </state> ?
2742     <macAddress> xs:string </macAddress> ?
2743     <mtu> xs:integer </mtu> ?
2744     <operation rel="edit" href="xs:anyURI"/> ?
2745     <operation rel="delete" href="xs:anyURI"/> ?
2746     <xs:any>*
2747   </MachineNetworkInterface> *
2748   <operation rel="add" href="xs:anyURI"/> ?
2749   <xs:any>*
2750 </Collection>
    
```

2751 **5.14.1.1.4 MachineNetworkInterfaceAddress Collection**

2752 The resource type for each item of this collection is “MachineNetworkInterfaceAddress”, defined as
2753 follows:

Name	MachineNetworkInterfaceAddress	
Type URI	http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceAddress	
Attribute	Type	Description
address	ref	Reference to an Address resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

2754 **JSON serialization:**

```

2755 { "resourceURI":
2756 "http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceAddressCollection",
2757 "id": string,
2758 "count": number,
2759 "machineNetworkInterfaceAddresses": [
2760   { "resourceURI":
2761     "http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceAddress",
2762     "id": string,
2763     "name": string, ?
2764     "description": string, ?
2765     "created": string, ?
2766     "updated": string, ?
2767     "properties": { "key": string, + }, ?
2768     "address": { "href": string },
2769     "operations": [
2770       { "rel": "edit", "href": string }, ?
2771       { "rel": "delete", "href": string } ?
2772     ] ?
2773     ...
2774   }, +
2775 ], ?
2776 "operations": [ { "rel": "add", "href": string } ? ]
2777 ...
2778 }

```

2779 **XML serialization:**

```

2780 <Collection
2781 resourceURI="http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceAddressColle
2782 ction"
2783   xmlns="http://schemas.dmtf.org/cimi/1">
2784   <id> xs:anyURI </id>
2785   <count> xs:integer </count>
2786   <MachineNetworkInterfaceAddress>
2787     <id> xs:anyURI </id>
2788     <name> xs:string </name> ?
2789     <description> xs:string </description> ?
2790     <created> xs:dateTime </created> ?
2791     <updated> xs:dateTime </updated> ?
2792     <property key="xs:string"> xs:string </property> *
2793     <address href="xs:anyURI"/>
2794     <operation rel="edit" href="xs:anyURI"/> ?
2795     <operation rel="delete" href="xs:anyURI"/> ?
2796     <xs:any>*
2797   </MachineNetworkInterfaceAddress> *
2798   <operation rel="add" href="xs:anyURI"/> ?

```



```
2799     <xs:any>*
2800 </Collection>
```

2801 5.14.1.1.5 MachineSnapshot Collection

2802 The resource type for each item of this collection is "MachineSnapshot", defined as follows:

Name	MachineSnapshot	
Type URI	http://schemas.dmtf.org/cimi/1/MachineSnapshot	
Attribute	Type	Description
snapshot	ref	Reference to a Snapshot resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

2803 JSON serialization:

```
2804 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineSnapshotCollection",
2805   "id": string,
2806   "count": number,
2807   "machineSnapshots": [
2808     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineSnapshot",
2809       "id": string,
2810       "name": string, ?
2811       "description": string, ?
2812       "created": string, ?
2813       "updated": string, ?
2814       "properties": { "key": string, + }, ?
2815       "snapshot": { "href": string },
2816       "operations": [
2817         { "rel": "edit", "href": string }, ?
2818         { "rel": "delete", "href": string } ?
2819       ] ?
2820       ...
2821     }, +
2822   ], ?
2823   "operations": [ { "rel": "add", "href": string } ? ]
2824   ...
2825 }
```

2826 XML serialization:

```
2827 <Collection
2828 resourceURI="http://schemas.dmtf.org/cimi/1/MachineSnapshotCollection"
2829   xmlns="http://schemas.dmtf.org/cimi/1">
2830   <id> xs:anyURI </id>
2831   <count> xs:integer </count>
2832   <MachineSnapshot>
2833     <id> xs:anyURI </id>
2834     <name> xs:string </name> ?
2835     <description> xs:string </description> ?
2836     <created> xs:dateTime </created> ?
2837     <updated> xs:dateTime </updated> ?
2838     <property key="xs:string"> xs:string </property> *
2839     <snapshot href="xs:anyURI"/>
2840     <operation rel="edit" href="xs:anyURI"/> ?
2841     <operation rel="delete" href="xs:anyURI"/> ?
2842     <xs:any>*
2843   </MachineSnapshot> *
2844   <operation rel="add" href="xs:anyURI"/> ?
2845   <xs:any>*
2846 </Collection>
```

2847 **5.14.1.1.6 MachineMeter Collection**

2848 The resource type for each item of this collection is “Meter” as defined in clause 5.17.3.

2849 **JSON serialization:**

```

2850 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineMeterCollection",
2851   "id": string,
2852   "count": number,
2853   "meters": [
2854     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
2855       "id": string,
2856       ... remaining Meter attributes ...
2857     }, +
2858   ], ?
2859   "operations": [ { "rel": "add", "href": string } ? ]
2860   ...
2861 }

```

2862 **XML serialization:**

```

2863 <Collection
2864   resourceURI="http://schemas.dmtf.org/cimi/1/MachineMeterCollection"
2865   xmlns="http://schemas.dmtf.org/cimi/1">
2866   <id> xs:anyURI </id>
2867   <count> xs:integer </count>
2868   <Meter>
2869     <id> xs:anyURI </id>
2870     ... remaining Meter attributes ...
2871   </Meter> *
2872   <operation rel="add" href="xs:anyURI"/> ?
2873   <xs:any>*
2874 </Collection>

```

2875 **5.14.1.2 Operations**2876 This resource supports the Read, Update, and Delete operations. Create is supported via the Machine
2877 Collection resource.

2878 The following custom operations are also defined:

2879 **Starting a Machine**2880 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/start

2881 This operation will start a Machine.

2882 Input parameters: None.

2883 Output parameters: None.

2884 During the processing of this operation, the Machine shall be in the “STARTING” state.

2885 Upon successful completion of this operation, the Machine shall be in the "STARTED" state.

2886 When a Machine is in the "STOPPED" state, starting it is the virtual equivalent of powering on a physical
2887 machine. There is no restored CPU or Memory state, so the guest OS will typically perform boot or
2888 installation tasks.

2889 If the Machine was in the "SUSPENDED" or "PAUSED" state, starting it has the effect of resuming it.

2890 **HTTP protocol**

2891 To start a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/start" URI of the Machine
 2892 where the HTTP request body shall be as described below.

2893 **JSON media type:** application/json

2894 **JSON serialization:**

```
2895 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
2896   "action": "http://schemas.dmtf.org/cimi/1/action/start",
2897   "properties": { "key": string, + } ?
2898   ...
2899 }
```

2900 **XML media type:** application/xml

2901 **XML serialization**

```
2902 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2903   <action> http://schemas.dmtf.org/cimi/1/action/start </action>
2904   <property key="xs:string"> xs:string </property> *
2905   <xs:any>*
2906 </Action>
```

2907 Upon successful processing of the request, the HTTP response body will be empty.

2908 **Stopping a Machine**

2909 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

2910 This operation will stop, or shutdown, a Machine.

2911 Input parameters:

- 2912 • "force" - type: boolean - optional
- 2913 A flag to indicate whether the Provider shall simulate a power off condition (force=true) or shall
- 2914 simulate a shutdown operation that allows applications to save their state and the file system to
- 2915 be made consistent (force=false). Inclusion of this parameter by Consumers is optional and when
- 2916 not specified, the Provider may choose either mechanism. Providers are encouraged to advertise
- 2917 this choice via the MachineStopForceDefault capability.

2918 Output parameters: None.

2919 During the processing of this operation, the Machine shall be in the "STOPPING" state.

2920 Upon successful completion of this operation, the Machine will be in the "STOPPED" state. Stopping a
 2921 Machine with force=true is the virtual equivalent of powering off a physical machine. There is no saved
 2922 CPU or Memory state. Stopping a Machine with force=false results in a machine with consistent file
 2923 systems.

2924 A Consumer may reissue a stop operation when the state is STOPPING, perhaps with force=true, but
 2925 Providers shall not issue a force=true stop operation on their own.

2926 **HTTP protocol**

2927 To stop a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the Machine
 2928 where the HTTP request body shall be as described below.

2929 **JSON media type:** application/json

2930 **JSON serialization:**

```
2931 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
2932   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
```

```

2933     "force": boolean, ?
2934     "properties": { "key": string, + } ?
2935     ...
2936 }

```

2937 **XML media type:** application/xml

2938 XML serialization

```

2939 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2940   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
2941   <force> xs:boolean </force> ?
2942   <property key="xs:string"> xs:string </property> *
2943   <xs:any>*
2944 </Action>

```

2945 Upon successful processing of the request, the HTTP response body will be empty.

2946 Restarting a Machine

2947 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/restart

2948 This operation will restart a Machine. If the Machine is in the "STARTED" state, this operation will have
 2949 the semantic effect of executing the "stop" and then "start" operations. If the Machine is in the
 2950 "STOPPED" state, this operation will have the semantic effect of executing the "start" operation.

2951 Input parameters:

- 2952 • "force" - type: boolean - optional
- 2953 A flag to indicate whether the Provider shall simulate a power off condition (force=true) or shall
- 2954 simulate a shutdown operation that allows applications to save their state and the file system to
- 2955 be made consistent (force=false). Inclusion of this parameter by Consumers is optional and when
- 2956 not specified, the Provider may choose either mechanism. Providers are encouraged to advertise
- 2957 this choice via the MachineStopForceDefault capability.

2958 Output parameters: None.

2959 During the processing of this operation, the Machine shall be in the "STOPPING" and/or "STARTING"
 2960 states, as appropriate depending on its initial state.

2961 Upon successful completion of this operation, the Machine will be in the "STARTED" state. Restarting a
 2962 Machine is the virtual equivalent of powering off, and then powering on a physical machine. There is no
 2963 restored CPU or Memory state, so the guest OS will typically perform boot or installation tasks.

2964 HTTP protocol

2965 To restart a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/restart" URI of the
 2966 Machine where the HTTP request body shall be as described below.

2967 **JSON media type:** application/json

2968 JSON serialization:

```

2969 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
2970   "action": "http://schemas.dmtf.org/cimi/1/action/restart",
2971   "force": boolean, ?
2972   "properties": { "key": string, + } ?
2973   ...
2974 }

```

2975 **XML media type:** application/xml

2976 **XML serialization**

```
2977 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2978   <action> http://schemas.dmtf.org/cimi/1/action/restart </action>
2979   <force> xs:boolean </force> ?
2980   <property key="xs:string"> xs:string </property> *
2981   <xs:any>*
2982 </Action>
```

2983 Upon successful processing of the request, the HTTP response body will be empty.

2984 **Pausing a Machine**

2985 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/pause

2986 This operation will pause a Machine.

2987 Input parameters: None.

2988 Output parameters: None.

2989 During the processing of this operation, the Machine shall be in the "PAUSING" state.

2990 Upon successful completion of this operation, the Machine will be in the "PAUSED" state. Pausing a
 2991 Machine will keep the Machine and its resources instantiated, but the Machine will not be available to
 2992 perform any tasks. The current state of the CPU and Memory will be retained in volatile memory.

2993 **HTTP protocol**

2994 To pause a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action.pause" URI of the
 2995 Machine where the HTTP request body shall be as described below.

2996 **JSON media type:** application/json

2997 **JSON serialization:**

```
2998 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
2999   "action": "http://schemas.dmtf.org/cimi/1/action/pause",
3000   "properties": { "name": string, + } ?
3001   ...
3002 }
```

3003 **XML media type:** application/xml

3004 **XML serialization**

```
3005 <Action xmlns="http://schemas.dmtf.org/cimi/1">
3006   <action> http://schemas.dmtf.org/cimi/1/action/pause </action>
3007   <property name="xs:string"> xs:string </property> *
3008   <xs:any>*
3009 </Action>
```

3010 Upon successful processing of the request, the HTTP response body will be empty.

3011 **Suspending a Machine**

3012 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/suspend

3013 This operation will suspend a Machine.

3014 Input parameters: None.

3015 Output parameters: None.

3016 During the processing of this operation, the Machine shall be in the "SUSPENDING" state.

3017 Upon successful completion of this operation, the Machine will be in the "SUSPENDED" state.

3018 Suspending a Machine will keep the Machine and its resources instantiated, but the Machine will not be
3019 available to perform any tasks. The current state of the CPU and Memory will be retained in non-volatile
3020 memory.

3021 HTTP protocol

3022 To suspend a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/suspend" URI of the
3023 Machine where the HTTP request body shall be as described below.

3024 **JSON media type:** application/json

3025 JSON serialization:

```
3026 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
3027   "action": "http://schemas.dmtf.org/cimi/1/action/suspend",
3028   "properties": { "name": string, + } ?
3029   ...
3030 }
```

3031 **XML media type:** application/xml

3032 XML serialization

```
3033 <Action xmlns="http://schemas.dmtf.org/cimi/1">
3034   <action> http://schemas.dmtf.org/cimi/1/action/suspend </action>
3035   <property name="xs:string"> xs:string </property> *
3036   <xs:any>*
3037 </Action>
```

3038 Upon successful processing of the request, the HTTP response body will be empty.

3039 Capturing a Machine

3040 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/capture

3041 This operation will create a new Machine Image from an existing Machine. This operation is defined
3042 within the Machine Image resource; see 5.14.7.1 for more details. Note that while this operation is
3043 performed against a Machine Image, its presence in the Machine serialization is used to advertise
3044 support for the operation.

3045 Snapshotting a Machine

3046 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/snapshot

3047 This operation will create a new SNAPSHOT Machine Image from an existing Machine. This operation is
3048 defined within the Machine Image resource; see 5.14.7.1 for more details. Note that while this operation
3049 is performed against a Machine Image, its presence in the Machine serialization is used to advertise
3050 support for the operation.

3051 Restoring a Machine

3052 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/restore

3053 This operation will restore a Machine from a previously created Machine Image.

3054 Input parameters:

- 3055 • "image" - type: URI - mandatory
- 3056 A reference to the Machine Image.

3057 Output parameters: None.

3058 During the processing of this operation, the Machine shall be in the "RESTORING" state.

3059 Upon successful completion of this operation, the Machine will be in the same state as the specified in the
3060 Machine Image, if specified.

3061 Note that Providers can indicate support for restoring from non-SNAPSHOT Machine Images via the
3062 Machine "RestoreFromImage" capability. When this capability is not supported, but the restore operation
3063 is supported, then that indicates it only supports restoring from SNAPSHOT Machine Images.

3064 HTTP protocol

3065 To restore a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/restore" URI of the
3066 Machine where the HTTP request body shall be as described below.

3067 **JSON media type:** application/json

3068 JSON serialization:

```
3069 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
3070   "action": "http://schemas.dmtf.org/cimi/1/action/restore",
3071   "image": string,
3072   "properties": { "name": string, + } ?
3073   ...
3074 }
```

3075 **XML media type:** application/xml

3076 XML serialization

```
3077 <Action xmlns="http://schemas.dmtf.org/cimi/1">
3078   <action> http://schemas.dmtf.org/cimi/1/action/restore </action>
3079   <image href="xs:anyURI"/>
3080   <property name="xs:string"> xs:string </property> *
3081   <xs:any>*
3082 </Action>
```

3083 Where the "image" URI is a reference to the Machine Image to be used.

3084 Upon successful processing of the request, the HTTP response body will be empty.

3085 5.14.2 Machine Collection

3086 A Machine Collection resource represents the collection of Machine resources within a Provider and
3087 follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:
3088

3089 **JSON serialization:**

```

3090 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineCollection",
3091     "id": string,
3092     "count": number,
3093     "machines": [
3094         { "resourceURI": "http://schemas.dmtf.org/cimi/1/Machine",
3095           "id": string,
3096           ... remaining Machine attributes ...
3097         }, +
3098     ], ?
3099     "operations": [ { "rel": "add", "href": string } ? ]
3100     ...
3101 }
    
```

3102 **XML serialization:**

```

3103 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/MachineCollection"
3104     xmlns="http://schemas.dmtf.org/cimi/1">
3105     <id> xs:anyURI </id>
3106     <count> xs:integer </count>
3107     <Machine>
3108         <id> xs:anyURI </id>
3109         ... remaining Machine attributes ...
3110     </Machine> *
3111     <operation rel="add" href="xs:anyURI"/> ?
3112     <xs:any>*
3113 </Collection>
    
```

3114 **5.14.2.1 Operations**

3115 NOTE: The "add" operation requires a MachineTemplate be used.

3116 Within the NetworkInterface portion of the MachineTemplate, there may be a reference to an Address
 3117 resource. If one is not provided, the Provider shall create one on the Consumer's behalf. In these cases,
 3118 and unless some action is taken to change this behavior, the Address will be bound to the new Machine
 3119 that is created and shall be deleted by the Provider when the Machine is deleted. Additionally, if these
 3120 Provider-created Address resources are disassociated from the Machine, the Provider shall delete them.
 3121 If the Consumer does provide an Address resource, the Address shall not be deleted when the Machine
 3122 is deleted and it is then up to the Consumer to delete the Address through some other mechanism.

3123 Upon successful processing of the "add" operation, unless otherwise specified via the MachineTemplate
 3124 "initialState" attribute, or unless determined by the MachineImage, the state of the new Machine shall be
 3125 the value of the DefaultInitialState capability. If no DefaultInitialState capability is defined and the
 3126 MachineImage doesn't imply any particular state, the default value is "STOPPED."

3127 **5.14.3 Machine Template**

3128 A Machine Template represents the set of metadata and instructions used in the creation of a Machine.

Name	MachineTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/MachineTemplate	
Attribute	Type	Description
initialState	string	The initial state of the new Machine, unless determined by the MachineImage used when instantiating the Machine. Constraints: Provider: support optional; mutable Consumer: support optional; read-write

machineConfig	<i>ref</i>	<p>A reference to the Machine Configuration that will be used to create a Machine from this Machine Template.</p> <p>Note that the attributes of the MachineConfiguration may be specified rather than a reference to an existing MachineConfiguration resource.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>												
machinelImage	<i>ref</i>	<p>A reference to the Machine Image that will be used to create a Machine from this Machine Template.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>												
credential	<i>ref</i>	<p>A reference to the Credential that will be used to create the initial login credentials for the new Machine.</p> <p>Note that the attributes of the Credential may be specified rather than a reference to an existing Credential resource.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>												
volumes	<i>volume[]</i>	<p>A list of references to existing Volumes that will be connected to the Machine during its creation.</p> <p>Each volume has the following attributes, which describe aspects of the way in which the Machine will be connected to the Volume:</p> <table border="1"> <thead> <tr> <th>Name</th> <th colspan="2"><i>volume</i></th> </tr> <tr> <th>Attribute</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>initialLocation</td> <td><i>string</i></td> <td> <p>An Operating System specific location(path) in its namespace where the Volume will appear.</p> <p>Support of this attribute indicates that the Provider allows for Consumers to choose where the Volume will appear.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p> </td> </tr> <tr> <td>volume</td> <td><i>ref</i></td> <td> <p>Reference to the Volume that will be connected.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p> </td> </tr> </tbody> </table> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>	Name	<i>volume</i>		Attribute	Type	Description	initialLocation	<i>string</i>	<p>An Operating System specific location(path) in its namespace where the Volume will appear.</p> <p>Support of this attribute indicates that the Provider allows for Consumers to choose where the Volume will appear.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>	volume	<i>ref</i>	<p>Reference to the Volume that will be connected.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
Name	<i>volume</i>													
Attribute	Type	Description												
initialLocation	<i>string</i>	<p>An Operating System specific location(path) in its namespace where the Volume will appear.</p> <p>Support of this attribute indicates that the Provider allows for Consumers to choose where the Volume will appear.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>												
volume	<i>ref</i>	<p>Reference to the Volume that will be connected.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>												
volumeTemplates	<i>volumeTemplate[]</i>	<p>A list of references to Volume Templates that will be used to create a set of new Volumes that will to be connected to the Machine during its creation.</p> <p>If the Machine is created as part of a System creation, the Volumes created from these templates will be considered as part of that System without the need for these Volume Templates to also be listed in the volumeTemplates attribute of the relevant System Template. If the same</p>												

		<p>Volume Template reference is listed in both the volumeTemplates attribute of a System Template and in the volumeTemplates attribute of a Machine Template contained by that System Template, this means that multiple, distinct Volume instances will be created as part of the overall System creation.</p> <p>Each volumeTemplate has the following attributes, which describe aspects of the way in which the Machine will be connected to the Volume instance that will be created from the template:</p> <table border="1"> <thead> <tr> <th>Name</th> <td colspan="2"><i>volumeTemplate</i></td> </tr> <tr> <th>Attribute</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>initialLocation</td> <td><i>string</i></td> <td> An Operating System specific location(path) in its namespace where the Volume will appear. Support of this attribute indicates that the Provider allows for Consumers to choose where the Volume will appear. Constraints: Provider: support optional; mutable Consumer: support optional; read-write </td> </tr> <tr> <td>volumeTemplate</td> <td><i>ref</i></td> <td> Reference to the Volume Template that will be used to create a new Volume. Note that the attributes of the VolumeTemplate may be specified rather than a reference to an existing VolumeTemplate resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write </td> </tr> </tbody> </table> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>	Name	<i>volumeTemplate</i>		Attribute	Type	Description	initialLocation	<i>string</i>	An Operating System specific location(path) in its namespace where the Volume will appear. Support of this attribute indicates that the Provider allows for Consumers to choose where the Volume will appear. Constraints: Provider: support optional; mutable Consumer: support optional; read-write	volumeTemplate	<i>ref</i>	Reference to the Volume Template that will be used to create a new Volume. Note that the attributes of the VolumeTemplate may be specified rather than a reference to an existing VolumeTemplate resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
Name	<i>volumeTemplate</i>													
Attribute	Type	Description												
initialLocation	<i>string</i>	An Operating System specific location(path) in its namespace where the Volume will appear. Support of this attribute indicates that the Provider allows for Consumers to choose where the Volume will appear. Constraints: Provider: support optional; mutable Consumer: support optional; read-write												
volumeTemplate	<i>ref</i>	Reference to the Volume Template that will be used to create a new Volume. Note that the attributes of the VolumeTemplate may be specified rather than a reference to an existing VolumeTemplate resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write												
networkInterfaces	<i>networkInterface[]</i>	<p>A list of resources that define the network interfaces that will be created on Machines instantiated from this template.</p> <table border="1"> <thead> <tr> <th>Name</th> <td colspan="2"><i>networkInterface</i></td> </tr> <tr> <th>Attribute</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>addresses</td> <td><i>ref[]</i></td> <td> A list of references to the Addresses for this network interface. Array item name: address Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only </td> </tr> <tr> <td>network</td> <td><i>ref</i></td> <td> A reference to the Network for this network interface. It is expected that NetworkPorts and Networks will be defined separately and prior to the Machines that connect to them. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write </td> </tr> </tbody> </table>	Name	<i>networkInterface</i>		Attribute	Type	Description	addresses	<i>ref[]</i>	A list of references to the Addresses for this network interface. Array item name: address Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only	network	<i>ref</i>	A reference to the Network for this network interface. It is expected that NetworkPorts and Networks will be defined separately and prior to the Machines that connect to them. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
Name	<i>networkInterface</i>													
Attribute	Type	Description												
addresses	<i>ref[]</i>	A list of references to the Addresses for this network interface. Array item name: address Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only												
network	<i>ref</i>	A reference to the Network for this network interface. It is expected that NetworkPorts and Networks will be defined separately and prior to the Machines that connect to them. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write												

		<table border="1"> <tr> <td>networkPort</td> <td><i>ref</i></td> <td> <p>A reference to the NetworkPort for this network interface.</p> <p>Note this is a reference to a NetworkPort and not a NetworkPortTemplate. It is expected that NetworkPorts and Networks will be defined separately and prior to the Machines that connect to them.</p> <p>If this attribute is provided, the "network" attribute in the referenced NetworkPort shall have the same value as the "network" attribute in this networkInterface.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p> </td> </tr> <tr> <td>state</td> <td><i>string</i></td> <td> <p>The state of an interface configurable to be "Active" or "Passive."</p> <p>A passive interface is in a standby mode ready to forward traffic if the primary interface fails.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p> </td> </tr> <tr> <td>mtu</td> <td><i>integer</i></td> <td> <p>To set the largest supported packet size.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p> </td> </tr> </table> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>	networkPort	<i>ref</i>	<p>A reference to the NetworkPort for this network interface.</p> <p>Note this is a reference to a NetworkPort and not a NetworkPortTemplate. It is expected that NetworkPorts and Networks will be defined separately and prior to the Machines that connect to them.</p> <p>If this attribute is provided, the "network" attribute in the referenced NetworkPort shall have the same value as the "network" attribute in this networkInterface.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>	state	<i>string</i>	<p>The state of an interface configurable to be "Active" or "Passive."</p> <p>A passive interface is in a standby mode ready to forward traffic if the primary interface fails.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>	mtu	<i>integer</i>	<p>To set the largest supported packet size.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>
networkPort	<i>ref</i>	<p>A reference to the NetworkPort for this network interface.</p> <p>Note this is a reference to a NetworkPort and not a NetworkPortTemplate. It is expected that NetworkPorts and Networks will be defined separately and prior to the Machines that connect to them.</p> <p>If this attribute is provided, the "network" attribute in the referenced NetworkPort shall have the same value as the "network" attribute in this networkInterface.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>									
state	<i>string</i>	<p>The state of an interface configurable to be "Active" or "Passive."</p> <p>A passive interface is in a standby mode ready to forward traffic if the primary interface fails.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>									
mtu	<i>integer</i>	<p>To set the largest supported packet size.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>									
userData	<i>string</i>	<p>A Base64 encoded string whose decoded version is to be injected into Machines created by using this template. See the discussion of injection of user-defined data below.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>									
meterTemplates	<i>meterTemplates[]</i>	<p>A list of references to Meter Templates that shall be used to create and connect a set of new Meters to the new Machine.</p> <p>Note that the attributes of the MeterTemplate may be specified rather than a reference to an existing MeterTemplate resource.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>									
eventLogTemplate	<i>ref</i>	<p>A reference to an EventLogTemplate that shall be used to create and connect a new EventLog to the new Machine.</p> <p>Note that the attributes of the EventLogTemplate may be specified rather than a reference to an existing EventLogTemplate resource.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>									

3129 The following describes the serialization of the resource in both JSON and XML:

3130 **JSON media type:** application/json

3131 **JSON serialization:**

```

3132 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineTemplate",
3133   "id": string,
3134   "name": string, ?
3135   "description": string, ?
3136   "created": string, ?
3137   "updated": string, ?
3138   "properties": { "key": string, + }, ?
3139   "initialState": string, ?
3140   "machineConfig": {
3141     "href": string | ... MachineConfiguration attributes ...
3142   }, ?
3143   "machineImage": {
3144     "href": string | ... MachineImage attributes ...
3145   }, ?
3146   "credential": {
3147     "href": string | ... CredentialTemplate attributes ...
3148   }, ?
3149   "volumes": [
3150     { "initialLocation": string?, "href": string }, +
3151   ], ?
3152   "volumeTemplates": [
3153     { "initialLocation": string?,
3154       "href": string, ?
3155       ... VolumeTemplate attributes ... ?
3156     }, +
3157   ], ?
3158   "networkInterfaces": [
3159     { "addresses": [
3160       {"href": string}, +
3161     ],
3162     "network": {"href": string},
3163     "networkPort": {"href": string}, ?
3164     "state": string,
3165     "mtu": number ?
3166   }, +
3167   ], ?
3168   "userData": string, ?
3169   "meterTemplates": [
3170     { "href": string, ?
3171       ... MeterTemplate attributes ... ?
3172     }, *
3173   ], ?
3174   "eventLogTemplate": {
3175     "href": string, ?
3176     ... EventLogTemplate attributes ... ?
3177   }, ?
3178   "operations": [
3179     { "rel": "edit", "href": string }, ?
3180     { "rel": "delete", "href": string } ?
3181   ] ?
3182   ...
3183 }
```

3184 **XML media type:** application/xml

3185 **XML serialization:**

```

3186 <MachineTemplate xmlns="http://schemas.dmtf.org/cimi/1">
3187   <id> xs:anyURI </id>
3188   <name> xs:string </name> ?
```

```

3189 <description> xs:string </description> ?
3190 <created> xs:dateTime </created> ?
3191 <updated> xs:dateTime </updated> ?
3192 <property key="xs:string"> xs:string </property> *
3193 <initialState> xs:string </initialState> ?
3194 <machineConfig href="xs:anyURI"?>
3195     ... MachineConfiguration attributes ... ?
3196 </machineConfig> ?
3197 <machineImage href="xs:anyURI"?>
3198     ... MachineImage attributes ... ?
3199 </machineImage> ?
3200 <credential href="xs:anyURI"?>
3201     ... CredentialTemplate attributes ... ?
3202 </credential> ?
3203 <volume initialLocation="xs:string"? href="xs:anyURI" /> *
3204 <volumeTemplate initialLocation="xs:string"? href="xs:anyURI"? >
3205     ... VolumeTemplate attributes ... ?
3206 </volumeTemplate> *
3207 <networkInterface>
3208     <address href="xs:anyURI"/> *
3209     <network href="xs:anyURI"/>
3210     <networkPort href="xs:anyURI"/> ?
3211     <state> xs:string </state>
3212     <mtu> xs:integer </mtu> ?
3213 </networkInterface> *
3214 <meterTemplate href="xs:anyURI"? >
3215     ... MeterTemplate attributes ... ?
3216 </meterTemplate> *
3217 <eventLogTemplate href="xs:anyURI"? >
3218     ... EventLogTemplate attributes ... ?
3219 </eventLogTemplate> ?
3220 <userData> xs:string </userData> ?
3221 <operation rel="edit" href="xs:anyURI"/> ?
3222 <operation rel="delete" href="xs:anyURI"/> ?
3223 <xs:any>*
3224 </MachineTemplate>
    
```

3225 Injection of user-defined data

3226 To simplify the customization of individual Machines, it is possible to pass arbitrary data into the new
 3227 Machine by using the `userData` parameter. The value of this parameter shall be the Base64-encoded
 3228 payload. The Provider shall arrange for this data to be available from inside the Machine by using one of
 3229 the following three methods:

- 3230 1. *Metadata server*: The data can be retrieved from within the instance by using an HTTP GET
 3231 request to `http://169.254.169.254/cimi/latest/user-data`.
- 3232 2. *Disk*: The Machine will have access to a Disk with an ISO 9660 file system on it. The data can be
 3233 found in a file at `<location>/cimi/user-data`.
- 3234 3. *Image modification*: The Provider modifies the root file system of the machine image just before
 3235 launching the machine. In UNIX-like operating systems, the data can be found in the file
 3236 `/var/lib/cimi/user-data`.

3237 It is strongly recommended that Providers implement a metadata server, or, failing that, injection via Disk,
 3238 as image modification is brittle and may not work for every operating system in use. The Provider shall
 3239 indicate which of these three methods is supported with the Machine 'UserData' capability in the
 3240 ResourceMetadata for Machines. The value for this feature shall be one of `metadata`, `disk`, or `imgmod`,
 3241 corresponding to the three methods listed above.

3242 The Provider shall preserve this data across restarts of the machine. The data will be the Base64-
 3243 decoded version of the data that was passed into the MachineCreate request.

3244 **5.14.3.1 Operations**

3245 This resource supports the Read, Update, and Delete operations. Create is supported via the Machine
3246 Template Collection resource.

3247 **5.14.4 Machine Template Collection**

3248 A Machine Template Collection resource represents the collection of Machine Template resources within
3249 a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
3250 follows:

3251 **JSON serialization:**

```
3252 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineTemplateCollection",
3253   "id": string,
3254   "count": number,
3255   "machineTemplates": [
3256     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineTemplate",
3257       "id": string,
3258       ... remaining MachineTemplate attributes ...
3259     }, +
3260   ], ?
3261   "operations": [ { "rel": "add", "href": string } ? ]
3262   ...
3263 }
```

3264 **XML serialization:**

```
3265 <Collection
3266   resourceURI="http://schemas.dmtf.org/cimi/1/MachineTemplateCollection"
3267   xmlns="http://schemas.dmtf.org/cimi/1">
3268   <id> xs:anyURI </id>
3269   <count> xs:integer </count>
3270   <MachineTemplate>
3271     <id> xs:anyURI </id>
3272     ... remaining MachineTemplate attributes ...
3273   </MachineTemplate> *
3274   <operation rel="add" href="xs:anyURI"/> ?
3275   <xs:any>*
3276 </Collection>
```

3277 **5.14.4.1 Operations**

3278 This resource supports the Read and Update operations. Creation of new Machine Template resources
3279 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

3280 **5.14.5 Machine Configuration**

3281 The Machine Configuration resource represents the set of configuration values that define the (virtual)
3282 hardware resources of a to-be-realized Machine Instance. Machine Configurations are created by
3283 Providers and may, at the Providers discretion, be created by Consumers.

Name	MachineConfiguration	
Type URI	http://schemas.dmtf.org/cimi/1/MachineConfiguration	
Attribute	Type	Description
cpu	integer	Indicates the amount of CPU that a Machine realized from this configuration will have. Constraints: Provider: support optional; mutable Consumer: support optional; read-write

memory	<i>integer</i>	<p>Indicates the amount of RAM, in kibibytes, that a Machine realized from this configuration will have.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>															
disks	disk[]	<p>Contains the list of metadata of the disks that will be created upon the instantiation of a Machine from this configuration. The disks are local storage to the Machine.</p> <p>Each disks attribute has the following sub-attributes:</p> <table border="1"> <thead> <tr> <th>Name</th> <th colspan="2">disk</th> </tr> <tr> <th>Attribute</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>capacity</td> <td><i>integer</i></td> <td>Indicates the initial capacity, in kilobytes, of the disk described by this attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> <tr> <td>format</td> <td><i>string</i></td> <td>The format/type of this disk (e.g., ext4, NTFS). Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> <tr> <td>initialLocation</td> <td><i>string</i></td> <td>An Operating System specific location(path) in its namespace where this disk will first appear. Note, once deployed Consumers might move where this Disk is located. Constraints: Provider: support optional; mutable Consumer: support optional; read-write</td> </tr> </tbody> </table> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>	Name	disk		Attribute	Type	Description	capacity	<i>integer</i>	Indicates the initial capacity, in kilobytes, of the disk described by this attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	format	<i>string</i>	The format/type of this disk (e.g., ext4, NTFS). Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	initialLocation	<i>string</i>	An Operating System specific location(path) in its namespace where this disk will first appear. Note, once deployed Consumers might move where this Disk is located. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
Name	disk																
Attribute	Type	Description															
capacity	<i>integer</i>	Indicates the initial capacity, in kilobytes, of the disk described by this attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write															
format	<i>string</i>	The format/type of this disk (e.g., ext4, NTFS). Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write															
initialLocation	<i>string</i>	An Operating System specific location(path) in its namespace where this disk will first appear. Note, once deployed Consumers might move where this Disk is located. Constraints: Provider: support optional; mutable Consumer: support optional; read-write															
cpuArch	string	<p>This property indicates the CPU architecture that will be supported by Machines created by using this configuration.</p> <p>Allowable values include: 68000, Alpha, ARM, Itanium, MIPS, PA_RISC, POWER, PowerPC, x86, x86_64, z/Architecture, SPARC. Providers may define additional values.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>															

3284 NOTE: The disk attributes "format" will not appear on Machine resources because after the Machine is created, the
 3285 user of the Machine will be able to modify this attribute of a disk, possibly without the Provider's knowledge. Therefore
 3286 these attributes might not be an aspect of the Machine that the Provider can reliably manage.

3287 **JSON media type:** application/json

3288 **JSON serialization:**

```

3289 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineConfiguration",
3290   "id": string,
3291   "name": string, ?
3292   "description": string, ?
3293   "created": string, ?
3294   "updated": string, ?
3295   "properties": { "key": string, + }, ?
3296   "cpu": number,
3297   "memory": number,
3298   "disks" : [
    
```

```

3299     { "capacity": number,
3300       "format": string,
3301       "initialLocation": string?
3302     }, +
3303   ], ?
3304   "cpuArch": string, ?
3305   "operations": [
3306     { "rel": "edit", "href": string }, ?
3307     { "rel": "delete", "href": string } ?
3308   ] ?
3309   ...
3310 }

```

3311 **XML media type:** application/xml

3312 **XML serialization:**

```

3313 <MachineConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
3314   <id> xs:anyURI </id>
3315   <name> xs:string </name> ?
3316   <description> xs:string </description> ?
3317   <created> xs:dateTime </created> ?
3318   <updated> xs:dateTime </updated> ?
3319   <property key="xs:string"> xs:string </property> *
3320   <cpu> xs:integer </cpu>
3321   <memory> xs:integer </memory>
3322   <disk>
3323     <capacity> xs:integer </capacity>
3324     <format> xs:string </format>
3325     <initialLocation> xs:string </initialLocation> ?
3326   </disk> *
3327   <cpuArch> xs:string </cpuArch> ?
3328   <operation rel="edit" href="xs:anyURI"/> ?
3329   <operation rel="delete" href="xs:anyURI"/> ?
3330   <xs:any*>
3331 </MachineConfiguration>

```

3332 5.14.5.1 Operations

3333 This resource supports the Read, Update, and Delete operations. Create is supported via the Machine
3334 Configuration Collection resource.

3335 5.14.6 Machine Configuration Collection

3336 A Machine Configuration Collection resource represents the collection of Machine Configuration
3337 resources within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource
3338 shall be serialized as follows:

3339 **JSON serialization:**

```

3340 { "resourceURI":
3341   "http://schemas.dmtf.org/cimi/1/MachineConfigurationCollection",
3342   "id": string,
3343   "count": number,
3344   "machineConfigurations": [
3345     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineConfiguration",
3346       "id": string,
3347       ... remaining MachineConfiguration attributes ...
3348     }, +
3349   ], ?
3350   "operations": [ { "rel": "add", "href": string } ? ]
3351   ...
3352 }

```


3353 **XML serialization:**

```

3354 <Collection
3355     resourceURI="http://schemas.dmtf.org/cimi/1/MachineConfigurationCollection"
3356     xmlns="http://schemas.dmtf.org/cimi/1">
3357     <id> xs:anyURI </id>
3358     <count> xs:integer </count>
3359     <MachineConfiguration>
3360         <id> xs:anyURI </id>
3361         ... remaining MachineConfiguration attributes ...
3362     </MachineConfiguration> *
3363     <operation rel="add" href="xs:anyURI"/> ?
3364     <xs:any>*
3365 </Collection>
    
```

3366 **5.14.6.1 Operations**

3367 This resource supports the Read and Update operations. Creation of new Machine Configuration
 3368 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

3369 **5.14.7 Machine Image**

3370 This resource represents the information necessary for hardware virtualized resources to create a
 3371 Machine Instance; it contains configuration data such as startup instructions, including possible
 3372 combinations of the following items, depending on the 'type' of Machine Image created:

- 3373 • the software image (i.e., a copy of an installed Machine), which is to be instantiated on the disk
 3374 and other virtual resources. The image can be a snapshot that consists of disk images plus
 3375 memory and other resource state information.
- 3376 • installation software, which, when executed on the hardware (virtual) resources, builds the
 3377 machine instance
- 3378 • both a disk image and a set of software and parameters in order to install new components not
 3379 included in the original disk image

3380

Name	MachinelImage	
Type URI	http://schemas.dmtf.org/cimi/1/MachinelImage	
Attribute	Type	Description
state	<i>string</i>	The operational state of the MachinelImage. Allowable values include: CREATING: The MachinelImage is in the process of being created. Allowable action when in this state is: delete . AVAILABLE: The MachinelImage is available and ready for use. Allowable action when in this state is: delete . DELETING: The MachinelImage is in the process of being deleted. Allowable action when in this state is: delete . ERROR: The Provider has detected an error in the MachinelImage. Allowable action when in this state is: delete . Providers may define additional values. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

type	<i>string</i>	<p>The type of Machine Image that is represented by this resource. This specification defines the following values:</p> <p>IMAGE: This type represents the persisted data of a stopped Machine. Unlike "snapshots", it does not contain any runtime information. When this value is used the "relatedImage" attribute shall not be present.</p> <p>SNAPSHOT: This type represents the persisted data of a Machine. If the Machine was not in a stopped state when this Image was created, it will also contain runtime information. When this value is used, the "relatedImage" attribute shall reference the most recently created (or reverted to) snapshot Image for that Machine, which allows for easy discovery of the "previous" snapshot. The "relatedImage" attribute shall not be set by Consumers.</p> <p>PARTIAL_SNAPSHOT: This type follows the same semantics as the "SNAPSHOT" Machine Image except that it will contain just the changes (deltas) made to the Machine based on the referenced "relatedImage" Machine Image rather than a complete representation of the Machine.</p> <p>When a Machine Image is deleted, the following semantics shall apply:</p> <p>Any "SNAPSHOT" Machine Images that have a "relatedImage" value that references the deleted Machine Image shall have that value changed to the "relatedImage" attribute of the delete Machine Image.</p> <p>Any "PARTIAL_SNAPSHOT" Machine Images that have a "relatedImage" value that references the deleted Machine Image shall also be deleted. This detail applies recursively to any subsequent "PARTIAL_SNAPSHOT" Machine Images as well.</p> <p>Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only</p>
imageLocation	<i>URI</i>	<p>A reference to the location of the binary data that makes up this image.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
relatedImage	<i>ref</i>	<p>A reference to another Machine Image resource that is related to this one. The specific meaning of this value will vary depending on the type of Machine Image.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>

3381 The following describes the serialization of the resource in both JSON and XML:

3382 **JSON media type:** application/json

3383

3384 **JSON serialization:**

```

3385 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineImage",
3386     "id": string,
3387     "name": string, ?
3388     "description": string, ?
3389     "created": string, ?
3390     "updated": string, ?
3391     "properties": { "key": string, + }, ?
3392     "state": string,
3393     "type": string,
3394     "imageLocation": string,
3395     "relatedImage": { "href": string }, ?
3396     "operations": [
3397         { "rel": "edit", "href": string }, ?
3398         { "rel": "delete", "href": string } ?
3399     ] ?
3400     ...
3401 }
    
```

3402 **XML media type:** application/xml

3403 **XML serialization:**

```

3404 <MachineImage xmlns="http://schemas.dmtf.org/cimi/1">
3405   <id> xs:anyURI </id>
3406   <name> xs:string </name> ?
3407   <description> xs:string </description> ?
3408   <created> xs:dateTime </created> ?
3409   <updated> xs:dateTime </updated> ?
3410   <property key="xs:string"> xs:string </property> *
3411   <state> xs:string </state>
3412   <type> xs:string </type>
3413   <imageLocation> xs:anyURI </imageLocation>
3414   <relatedImage href="xs:anyURI"/> ?
3415   <operation rel="edit" href="xs:anyURI"/> ?
3416   <operation rel="delete" href="xs:anyURI"/> ?
3417   <xs:any*>
3418 </MachineImage>
    
```

3419 **5.14.7.1 Operations**

3420 This resource supports the Read, Update, and Delete operations. Create is supported via the Machine
 3421 Image Collection resource.

3422 When creating a new Machine Image the representation of the new Machine Image may include a
 3423 reference in the "imageLocation" attribute. Providers shall inspect this reference (most likely via an HTTP
 3424 HEAD) to determine if any special processing is required. This specification defines the following
 3425 additional steps that Providers shall take depending on the type of resource being referenced:

3426 **http://schemas.dmtf.org/cimi/1/Machine**

3427 If the "imageLocation" is a reference to a Machine, the Provider shall create a new Machine Image based
 3428 on the Machine being referenced. Upon completion of the create operation, the Machine Image's
 3429 "imageLocation" attribute shall not reference the Machine (as the Machine might change over time), but
 3430 instead it shall reference the (or contain the data of a) static representation of the Machine.

3431 **5.14.8 Machine Image Collection**

3432 A Machine Image Collection resource represents the collection of Machine Image resources within a
 3433 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
 3434 follows:

3435 **JSON serialization:**

```
3436 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineImageCollection",
3437   "id": string,
3438   "count": number,
3439   "machineImages": [
3440     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineImage",
3441       "id": string,
3442       ... remaining MachineImage attributes ...
3443     }, +
3444   ], ?
3445   "operations": [ { "rel": "add", "href": string } ? ]
3446   ...
3447 }
```

3448 **XML serialization:**

```
3449 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/MachineImageCollection"
3450   xmlns="http://schemas.dmtf.org/cimi/1">
3451   <id> xs:anyURI </id>
3452   <count> xs:integer </count>
3453   <MachineImage>
3454     <id> xs:anyURI </id>
3455     ... remaining MachineImage attributes ...
3456   </MachineImage> *
3457   <operation rel="add" href="xs:anyURI"/> ?
3458   <xs:any>*
3459 </Collection>
```

3460 **5.14.8.1 Operations**

3461 This resource supports the Read and Update operations. Creation of new Machine Image resources are
 3462 supported via a POST to the "add" operation's URI as described in clause 4.2.1.1, where the request
 3463 body and the way it is processed is described in clause 5.14.7.1.

3464 **5.14.9 Credential**

3465 A Credential resource contains the information required to create the initial administrative superuser of a
 3466 newly created Machine or to represent the credentials needed to perform some operation. Due to the
 3467 variation between operating systems and Providers, this specification does not mandate one particular
 3468 set of attributes that all implementations need to support. However, Providers are expected to extend this
 3469 resource with additional attributes to meet their requirements.

3470 For example, a Provider might extend this resource with username and password attributes, which would
 3471 then be the login information for new Machines. These extension attributes would appear as siblings to
 3472 the common attributes like "name" and "description."

Name	Credential	
Type URI	http://schemas.dmtf.org/cimi/1/Credential	
Attribute	Type	Description
<i>TBD</i>		The exact set of attributes will be determined by the Provider.

3473 Some common extension attributes that Providers might use include:

3474 **UserName/Password:**

Attribute	Type	Description
userName	<i>string</i>	The initial superuser's user name. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
password	<i>string</i>	Initial superuser's password. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; write-only

3475

3476 **Public key:**

Attribute	Type	Description
key	<i>byte[]</i>	The digit of the public key for the initial superuser. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

3477 **JSON media type:** application/json

3478 **JSON serialization:**

```

3479 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Credential",
3480   "id": string,
3481   "name": string, ?
3482   "description": string, ?
3483   "created": string, ?
3484   "updated": string, ?
3485   "properties": { "key": string, + }, ?
3486   "operations": [
3487     { "rel": "edit", "href": string } ?
3488     { "rel": "delete", "href": string } ?
3489   ] ?
3490   ...
3491 }
```

3492 **XML media type:** application/xml

3493 **XML serialization:**

```

3494 <Credential xmlns="http://schemas.dmtf.org/cimi/1">
3495   <id> xs:anyURI </id>
3496   <name> xs:string </name> ?
3497   <description> xs:string </description> ?
3498   <created> xs:dateTime </created> ?
3499   <updated> xs:dateTime </updated> ?
3500   <property key="xs:string"> xs:string </property> *
3501   <operation rel="edit" href="xs:anyURI"/> ?
3502   <operation rel="delete" href="xs:anyURI"/> ?
3503   <xs:any*>
3504 </Credential>
```

3505 **5.14.9.1 Operations**

3506 This resource supports the Read, Update, and Delete operations. Create is supported via the Credential
3507 Collection resource.

3508 **5.14.10 Credential Collection**

3509 A Credential Collection resource represents the collection of Credential resources within a Provider and
 3510 follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

3511 **JSON serialization:**

```

3512 { "resourceURI": "http://schemas.dmtf.org/cimi/1/CredentialCollection",
3513   "id": string,
3514   "count": number,
3515   "credential": [
3516     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Credential",
3517       "id": string,
3518       ... remaining Credential attributes ...
3519     }, +
3520   ], ?
3521   "operations": [ { "rel": "add", "href": string } ? ]
3522   ...
3523 }
```

3524 **XML serialization:**

```

3525 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/CredentialCollection"
3526   xmlns="http://schemas.dmtf.org/cimi/1">
3527   <id> xs:anyURI </id>
3528   <count> xs:integer </count>
3529   <Credential>
3530     <id> xs:anyURI </id>
3531     ... remaining Credential attributes ...
3532   </Credentials> *
3533   <operation rel="add" href="xs:anyURI"/> ?
3534   <xs:any>*
3535 </Collection>
```

3536 **5.14.10.1 Operations**

3537 NOTE: The "add" operation requires a CredentialTemplate be used.

3538 **5.14.11 Credential Template**

3539 This resource captures the configuration values for realizing a Credential resource. A Credential
 3540 Template may be used to create multiple Credentials.

Name	CredentialTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/CredentialTemplate	
Attribute	Type	Description
TBD		The exact set of attributes will be determined by the provider.

3541 The following describes the serialization of the resource in both JSON and XML:

3542 **JSON media type:** application/json

3543 **JSON serialization:**

```

3544 { "resourceURI": "http://schemas.dmtf.org/cimi/1/CredentialTemplate",
3545   "id": string,
3546   "name": string, ?
3547   "description": string, ?
3548   "created": string, ?
3549   "updated": string, ?
3550   "properties": { "key": string, + }, ?
3551   "operations": [
```

```

3552     { "rel": "edit", "href": string }, ?
3553     { "rel": "delete", "href": string } ?
3554   ] ?
3555   ...
3556 }

```

3557 **XML media type:** application/xml

3558 **XML serialization:**

```

3559 <CredentialTemplate xmlns="http://schemas.dmtf.org/cimi/1">
3560   <id> xs:anyURI </id>
3561   <name> xs:string </name> ?
3562   <description> xs:string </description> ?
3563   <created> xs:dateTime </created> ?
3564   <updated> xs:dateTime </updated> ?
3565   <property key="xs:string"> xs:string </property> *
3566   <operation rel="edit" href="xs:anyURI"/> ?
3567   <operation rel="delete" href="xs:anyURI"/> ?
3568   <xs:any>*
3569 </CredentialTemplate>

```

3570 5.14.11.1 Operations

3571 This resource supports the Read, Update, and Delete operations. Create is supported via the Credential
 3572 Template Collection resource.

3573 5.14.12 Credential Template Collection

3574 A Credential Template Collection resource represents the collection of CredentialTemplate resources
 3575 within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be
 3576 serialized as follows:

3577 **JSON serialization:**

```

3578 { "resourceURI":
3579   "http://schemas.dmtf.org/cimi/1/CredentialTemplateCollection",
3580   "id": string,
3581   "count": number,
3582   "credentialTemplates": [
3583     { "resourceURI": "http://schemas.dmtf.org/cimi/1/CredentialTemplate",
3584       "id": string,
3585       ... remaining CredentialTemplate attributes ...
3586     }, +
3587   ], ?
3588   "operations": [ { "rel": "add", "href": string } ? ]
3589   ...
3590 }
3591

```

3592 **XML serialization:**

```

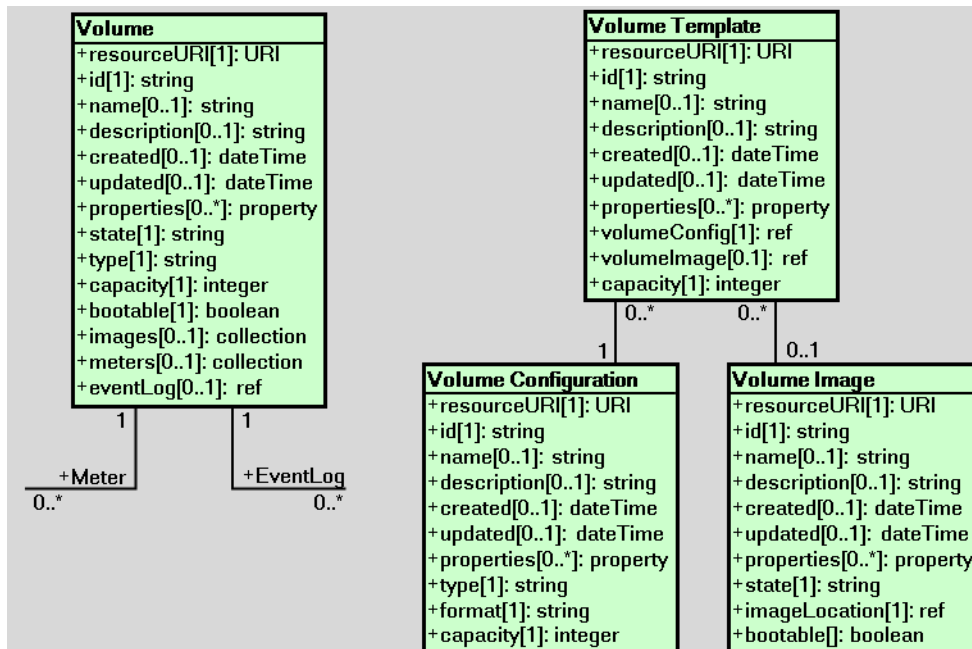
3593 <Collection
3594   resourceURI="http://schemas.dmtf.org/cimi/1/CredentialTemplateCollection"
3595   xmlns="http://schemas.dmtf.org/cimi/1">
3596   <id> xs:anyURI </id>
3597   <count> xs:integer </count>
3598   <CredentialTemplate>
3599     <id> xs:anyURI </id>
3600     ... remaining CredentialTemplate attributes ...
3601   </CredentialTemplate> *
3602   <operation rel="add" href="xs:anyURI"/> ?
3603   <xs:any*>
3604 </Collection>
    
```

3605 **5.14.12.1 Operations**

3606 This resource supports the Read and Update operations. Creation of new Credential Template resources
 3607 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

3608 **5.15 Volume resources and relationships**

3609 Figure 4 illustrates the resources involved in constructing a Volume and their relationships. Although this
 3610 drawing is in the style of a Resource Relationship diagram, the use of UML is neither rigorous nor
 3611 normative.



3612 **Figure 4 - Volume resources**

3613 **5.15.1 Volume**

3614 A Volume represents storage at either the block or the file-system level. Volumes can be connected to
 3615 Machines. Once connected, Volumes can be accessed by processes on that Machine.

Name	Volume	
Type URI	http://schemas.dmtf.org/cimi/1/Volume	
Attribute	Type	Description
state	<i>string</i>	<p>Indicates the operational state of the Volume.</p> <p>Allowable values include:</p> <p>CREATING: The Volume is in the process of being created. Allowable action when in this state is: delete.</p> <p>AVAILABLE: The Volume is available and ready for use. Allowable action when in this state is: delete.</p> <p>CAPTURING: The Volume is in the process of being captured (snapshotted) into a new VolumeImage. Allowable action when in this state is: delete.</p> <p>DELETING: The Volume is in the process of being deleted. Allowable action when in this state is: delete.</p> <p>ERROR: The Provider has detected an error in the Volume. Allowable action when in this state is: delete.</p> <p>Providers may define additional values.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
type	<i>URI</i>	<p>A URI that indicates the type of Volume to be created. This specification defines the following URI:</p> <p>http://schemas.dmtf.org/cimi/1/mapped: Indicates a Volume that shall be used for shared storage that might be available to multiple Machines, but which does not require an explicit mount operation from within the guest operating system.</p> <p>Additional values may be defined. If certain types of Volumes require additional data then it is expected that this resource will be extended. For example, a "sharedFileSystem" type might require additional networking information and credentials to be specified.</p> <p>Constraints: Provider: support mandatory ; immutable Consumer: support mandatory ; read-only</p>
capacity	<i>integer</i>	<p>The maximum size, when limited, of the Volume in kilobytes.</p> <p>When this value is increased, the Volume can contain more data. Decreasing this value may require evaluations.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
bootable	<i>boolean</i>	<p>This property indicates whether this Volume is bootable.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
images	<i>collection [VolumeVolumeImage]</i>	<p>A reference to the list of references to Volume Images that represent snapshots taken from the Volume.</p> <p>Note: the VolumeVolumeImage resource type is representing an association between the Volume and a VolumeImage. It is defined in the following clause.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>

meters	<i>collection</i> <i>[Meter]</i>	A reference to the list of Meters monitored for this Volume. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
eventLog	<i>ref</i>	A reference to the EventLog of this Volume. Constraints: Provider: support optional; mutable Consumer: support optional; read-only

3616 The following describes the serialization of the resource in both JSON and XML:

3617 **JSON media type:** application/json

3618 **JSON serialization:**

```

3619 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Volume",
3620   "id": string,
3621   "name": string, ?
3622   "description": string, ?
3623   "created": string, ?
3624   "updated": string, ?
3625   "properties": { "key": string, + }, ?
3626   "state": string,
3627   "type": string,
3628   "capacity": number,
3629   "bootable": boolean,
3630   "images": { "href": string }, ?
3631   "meters": { "href": string }, ?
3632   "eventLog": { "href": string }, ?
3633   "operations": [
3634     { "rel": "edit", "href": string }, ?
3635     { "rel": "delete", "href": string } ?
3636   ] ?
3637   ...
3638 }
```

3639 **XML media type:** application/xml

3640 **XML serialization:**

```

3641 <Volume xmlns="http://schemas.dmtf.org/cimi/1">
3642   <id> xs:anyURI </id>
3643   <name> xs:string </name> ?
3644   <description> xs:string </description> ?
3645   <created> xs:dateTime </created> ?
3646   <updated> xs:dateTime </updated> ?
3647   <property key="xs:string"> xs:string </property> *
3648   <state> xs:string </state>
3649   <type> xs:anyURI </type>
3650   <capacity> xs:integer </capacity>
3651   <bootable> xs:boolean </bootable>
3652   <images href="xs:anyURI"/> ?
3653   <meters href="xs:anyURI"/> ?
3654   <eventLog href="xs:anyURI"/> ?
3655   <operation rel="edit" href="xs:anyURI"/> ?
3656   <operation rel="delete" href="xs:anyURI"/> ?
3657   <xs:any>*
3658 </Volume>
```

3659 **5.15.1.1 Collections**

3660 The following describes the collection resources owned by Volumes.

 3661 **5.15.1.1.1 VolumeVolumelImage Collection**

3662 The resource type for each item of this collection is "VolumeVolumelImage", defined as follows:

Name	VolumeVolumelImage	
Type URI	http://schemas.dmtf.org/cimi/1/VolumeVolumelImage	
Attribute	Type	Description
volumelImage	ref	Reference to a Volume Image resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

 3663 **JSON serialization:**

```

3664 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeVolumeImageCollection",
3665   "id": string,
3666   "count": number,
3667   "volumeVolumeImages": [
3668     { "resourceURI":
3669       "http://schemas.dmtf.org/cimi/1/VolumeVolumeImage",
3670       "id": string,
3671       "name": string, ?
3672       "description": string, ?
3673       "created": string, ?
3674       "updated": string, ?
3675       "properties": { "key": string, + }, ?
3676       "volumeImage": { "href": string },
3677       "operations": [
3678         { "rel": "edit", "href": string }, ?
3679         { "rel": "delete", "href": string } ?
3680       ] ?
3681       ...
3682     }, +
3683   ], ?
3684   "operations": [ { "rel": "add", "href": string } ? ]
3685   ...
3686 }
```

 3687 **XML serialization:**

```

3688 <Collection
3689 resourceURI="http://schemas.dmtf.org/cimi/1/VolumeVolumeImageCollection"
3690   xmlns="http://schemas.dmtf.org/cimi/1">
3691   <id> xs:anyURI </id>
3692   <count> xs:integer </count>
3693   <VolumeVolumeImage>
3694     <id> xs:anyURI </id>
3695     <name> xs:string </name> ?
3696     <description> xs:string </description> ?
3697     <created> xs:dateTime </created> ?
3698     <updated> xs:dateTime </updated> ?
3699     <property key="xs:string"> xs:string </property> *
3700     <volumeImage href="xs:anyURI"/>
3701     <operation rel="edit" href="xs:anyURI"/> ?
3702     <operation rel="delete" href="xs:anyURI"/> ?
3703     <xs:any>*
3704   </VolumeVolumeImage> *
```

```

3705     <operation rel="add" href="xs:anyURI"/> ?
3706     <xs:any>*
3707 </Collection>

```

3708 5.15.1.1.2 VolumeMeter Collection

3709 The resource type for each item of this collection is “Meter” as defined in clause 5.17.3.

3710 JSON serialization:

```

3711 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeMeterCollection",
3712   "id": string,
3713   "count": number,
3714   "meters": [
3715     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
3716       "id": string,
3717       ... remaining Meter attributes ...
3718     }, +
3719   ], ?
3720   "operations": [ { "rel": "add", "href": string } ? ]
3721   ...
3722 }

```

3723 XML serialization:

```

3724 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/VolumeMeterCollection"
3725   xmlns="http://schemas.dmtf.org/cimi/1">
3726   <id> xs:anyURI </id>
3727   <count> xs:integer </count>
3728   <Meter>
3729     <id> xs:anyURI </id>
3730     ... remaining Meter attributes ...
3731   </Meter> *
3732   <operation rel="add" href="xs:anyURI"/> ?
3733   <xs:any>*
3734 </Collection>

```

3735 5.15.1.2 Operations

3736 This resource supports the Read, Update, and Delete operations. Create is supported via the Volume
3737 Collection resource.

3738 5.15.2 Volume Collection

3739 A Volume Collection resource represents the collection of Volumes within a Provider and follows the
3740 Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

3741 JSON serialization:

```

3742 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeCollection",
3743   "id": string,
3744   "count": number,
3745   "volumes": [
3746     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Volume",
3747       "id": string,
3748       ... remaining Volume attributes ...
3749     }, +
3750   ], ?
3751   "operations": [ { "rel": "add", "href": string } ? ]
3752   ...
3753 }

```

3754 **XML serialization:**

```

3755 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/VolumeCollection"
3756     xmlns="http://schemas.dmtf.org/cimi/1">
3757   <id> xs:anyURI </id>
3758   <count> xs:integer </count>
3759   <Volume>
3760     <id> xs:anyURI </id>
3761     ... remaining Volume attributes ...
3762   </Volume> *
3763   <operation rel="add" href="xs:anyURI"/> ?
3764   <xs:any>*
3765 </Collection>
    
```

3766 **5.15.2.1 Operations**

3767 NOTE: The "add" operation requires a VolumeTemplate be used.

3768 **5.15.3 Volume Template**

3769 This resource captures the configuration values for realizing a Volume. A Volume Template may be used
 3770 to create multiple Volumes.

Name	VolumeTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/VolumeTemplate	
Attribute	Type	Description
volumeConfig	<i>ref</i>	A reference to the Volume Configuration that will be used to create a Volume from this Volume Template. Note that the attributes of the VolumeConfiguration may be specified rather than a reference to an existing VolumeConfiguration resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
volumeImage	<i>ref</i>	A reference to the Volume Image that will be used to create a Volume from this Volume Template. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
meterTemplates	<i>meterTemplates[]</i>	A list of references to Meter Templates that shall be used to create and connect a set of new Meters to the new Volume. Note that the attributes of the MeterTemplate may be specified rather than a reference to an existing MeterTemplate resource. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
eventLogTemplate	<i>ref</i>	A reference to an EventLogTemplate that shall be used to create and connect a new EventLog to the new Volume. Note that the attributes of the EventLogTemplate may be specified rather than a reference to an existing EventLogTemplate resource. Constraints: Provider: support optional; mutable Consumer: support optional; read-write

3771 The following describes the serialization of the resource in both JSON and XML:

3772 **JSON media type:** application/json

3773 **JSON serialization:**

```

3774 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeTemplate",
3775   "id": string,
3776   "name": string, ?
3777   "description": string, ?
3778   "created": string, ?
3779   "updated": string, ?
3780   "properties": { "key": string, + }, ?
3781   "volumeConfig": {
3782     "href": string | ... VolumeConfiguration attributes ...
3783   },
3784   "volumeImage": { "href": string }, ?
3785   "meterTemplates": [
3786     { "href": string, ?
3787       ... MeterTemplate attributes ... ?
3788     }, *
3789   ], ?
3790   "eventLogTemplate": {
3791     "href": string, ?
3792     ... EventLogTemplate attributes ... ?
3793   }, ?
3794   "operations": [
3795     { "rel": "edit", "href": string }, ?
3796     { "rel": "delete", "href": string } ?
3797   ] ?
3798   ...
3799 }

```

3800 **XML media type:** application/xml

3801 **XML serialization:**

```

3802 <VolumeTemplate xmlns="http://schemas.dmtf.org/cimi/1">
3803   <id> xs:anyURI </id>
3804   <name> xs:string </name> ?
3805   <description> xs:string </description> ?
3806   <created> xs:dateTime </created> ?
3807   <updated> xs:dateTime </updated> ?
3808   <property key="xs:string"> xs:string </property> *
3809   <volumeConfig href="xs:anyURI"?>
3810     ... VolumeConfiguration attributes ... ?
3811   </volumeConfig>
3812   <volumeImage href="xs:anyURI"/> ?
3813   <meterTemplate href="xs:anyURI"? >
3814     ... MeterTemplate attributes ... ?
3815   </meterTemplate> *
3816   <eventLogTemplate href="xs:anyURI"? >
3817     ... EventLogTemplate attributes ... ?
3818   </eventLogTemplate> ?
3819   <operation rel="edit" href="xs:anyURI"/> ?
3820   <operation rel="delete" href="xs:anyURI"/> ?
3821   <xs:any*>
3822 </VolumeTemplate>

```

3823 5.15.3.1 Operations

3824 This resource supports the Read, Update, and Delete operations. Create is supported via the Volume
 3825 Template Collection resource.

3826 **5.15.4 Volume Template Collection**

3827 A Volume Template Collection resource represents the collection of VolumeTemplate resources within a
3828 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
3829 follows:
3830

3831 **JSON serialization:**

```

3832 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeTemplateCollection",
3833     "id": string,
3834     "count": number,
3835     "volumeTemplates": [
3836       { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeTemplate",
3837         "id": string,
3838         ... remaining volumeTemplate attributes ...
3839       }, +
3840     ], ?
3841     "operations": [ { "rel": "add", "href": string } ? ]
3842     ...
3843 }
    
```

3844 **XML serialization:**

```

3845 <Collection
3846   resourceURI="http://schemas.dmtf.org/cimi/1/VolumeTemplateCollection"
3847   xmlns="http://schemas.dmtf.org/cimi/1">
3848   <id> xs:anyURI </id>
3849   <count> xs:integer </count>
3850   <VolumeTemplate>
3851     <id> xs:anyURI </id>
3852     ... remaining VolumeTemplates attributes ...
3853   </VolumeTemplate> *
3854   <operation rel="add" href="xs:anyURI"/> ?
3855   <xs:any>*
3856 </Collection>
    
```

3857 **5.15.4.1 Operations**

3858 This resource supports the Read and Update operations. Creation of new Volume Template resources
 3859 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

3860 **5.15.5 Volume Configuration**

3861 The Volume Configuration resource represents the set of configuration values needed to create a Volume
 3862 with certain characteristics. Volume Configurations are created by Providers and may, at the Providers
 3863 discretion, be created by Consumers.

Name	VolumeConfiguration	
Type URI	http://schemas.dmtf.org/cimi/1/VolumeConfiguration	
Attribute	Type	Description
type	URI	<p>A URI that indicates the type of Volume to be created. This specification defines the following URI:</p> <p>http://schemas.dmtf.org/cimi/1/mapped:Indicates a Volume that shall be used for shared storage that might be available to multiple Machines, but which does not require an explicit mount operation from within the guest operating system.</p> <p>Additional values may be defined. If certain types of Volumes require additional data then it is expected that this resource will be extended.</p> <p>Constraints: Provider: support mandatory ; mutable Consumer: support mandatory ; read-write</p>
format	string	The format of the file system that will be placed on Volumes created from this configuration. This attribute is only meaningful for Volume Configurations that describe block devices. This attribute is optional; the absence of this attribute indicates that Volumes created from this configuration will not be formatted with a file system. Example values:

		"ext4," "ntfs." Constraints: Provider: support optional; mutable Consumer: support optional; read-write
capacity	<i>integer</i>	The default size in kilobytes, when limited, of the Volume created from this Volume Configuration. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

3864 The following describes the serialization of the resource in both JSON and XML:

3865 **JSON media type:** application/json

3866 **JSON serialization:**

```

3867 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
3868   "id": string,
3869   "name": string, ?
3870   "description": string, ?
3871   "created": string, ?
3872   "updated": string, ?
3873   "properties": { "key": string, + }, ?
3874   "type": string,
3875   "format": string,
3876   "capacity": number,
3877   "operations": [
3878     { "rel": "edit", "href": string }, ?
3879     { "rel": "delete", "href": string } ?
3880   ] ?
3881   ...
3882 }
```

3883 **XML media type:** application/xml

3884 **XML serialization:**

```

3885 <VolumeConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
3886   <id> xs:anyURI </id>
3887   <name> xs:string </name> ?
3888   <description> xs:string </description> ?
3889   <created> xs:dateTime </created> ?
3890   <updated> xs:dateTime </updated> ?
3891   <property key="xs:string"> xs:string </property> *
3892   <type> xs:anyURI </type>
3893   <format> xs:string </format>
3894   <capacity> xs:integer </capacity>
3895   <operation rel="edit" href="xs:anyURI"/> ?
3896   <operation rel="delete" href="xs:anyURI"/> ?
3897   <xs:any*>
3898 </VolumeConfiguration>
```

3899 5.15.5.1 Operations

3900 This resource supports the Read, Update, and Delete operations. Create is supported via the Volume
 3901 Configuration Collection resource.

3902 **5.15.6 Volume Configuration Collection**

3903 A Volume Configuration Collection resource represents the collection of Volume Configuration resources
 3904 within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be
 3905 serialized as follows:

3906 **JSON serialization:**

```

3907 { "resourceURI":
3908     "http://schemas.dmtf.org/cimi/1/VolumeConfigurationCollection",
3909     "id": string,
3910     "count": number,
3911     "volumeConfigurations": [
3912         { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
3913           "id": string,
3914           ... remaining VolumeConfiguration attributes ...
3915         }, +
3916     ], ?
3917     "operations": [ { "rel": "add", "href": string } ? ]
3918     ...
3919 }
```

3920 **XML serialization:**

```

3921 <Collection
3922     resourceURI="http://schemas.dmtf.org/cimi/1/VolumeConfigurationCollection"
3923     xmlns="http://schemas.dmtf.org/cimi/1">
3924     <id> xs:anyURI </id>
3925     <count> xs:integer </count>
3926     <VolumeConfiguration>
3927         <id> xs:anyURI </id>
3928         ... remaining VolumeConfiguration attributes ...
3929     </VolumeConfiguration> *
3930     <operation rel="add" href="xs:anyURI"/> ?
3931     <xs:any>*
3932 </Collection>
```

3933 **5.15.6.1 Operations**

3934 This resource supports the Read and Update operations. Creation of new Volume Image resources are
 3935 supported via a POST to the "add" operations' URI as described in clause 4.2.1.1.

3936 **5.15.7 Volume Image**

3937 This resource represents an image that could be placed on a pre-loaded volume.

Name	VolumelImage	
Type URI	http://schemas.dmtf.org/cimi/1/VolumelImage	
Attribute	Type	Description
state	string	Indicates the operational state of the VolumelImage. Allowable values include: CREATING: The VolumelImage is in the process of being created. Allowable action when in this state is: delete . AVAILABLE: The VolumelImage is available and ready for use. Allowable action when in this state is: delete . DELETING: The VolumelImage is in the process of being deleted. Allowable action when in this state is: delete . ERROR: The Provider has detected an error in the VolumelImage. Allowable action

		when in this state is: delete . Providers may define additional values. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
imageLocation	<i>ref</i>	A reference to the location of the binary data that makes up this image. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
bootable	<i>boolean</i>	This property indicates whether Volumes created from this Volume Image will be bootable. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

3938 The following describes the serialization of the resource in both JSON and XML:

3939 **JSON media type:** application/json

3940 **JSON serialization:**

```

3941 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeImage",
3942   "id": string,
3943   "name": string, ?
3944   "description": string, ?
3945   "created": string, ?
3946   "updated": string, ?
3947   "properties": { "key": string, + }, ?
3948   "state": string,
3949   "imageLocation": { "href": string },
3950   "bootable": boolean,
3951   "operations": [
3952     { "rel": "edit", "href": string }, ?
3953     { "rel": "delete", "href": string } ?
3954   ] ?
3955   ...
3956 }
```

3957 **XML media type:** application/xml

3958 **XML serialization:**

```

3959 <VolumeImage xmlns="http://schemas.dmtf.org/cimi/1">
3960   <id> xs:anyURI </id>
3961   <name> xs:string </name> ?
3962   <description> xs:string </description> ?
3963   <created> xs:dateTime </created> ?
3964   <updated> xs:dateTime </updated> ?
3965   <property key="xs:string"> xs:string </property> *
3966   <state> xs:string </state>
3967   <imageLocation href="xs:anyURI"/>
3968   <bootable> xs:boolean </bootable>
3969   <operation rel="edit" href="xs:anyURI"/> ?
3970   <operation rel="delete" href="xs:anyURI"/> ?
3971   <xs:any>*
3972 </VolumeImage>
```

3973 **5.15.7.1 Operations**

3974 This resource supports the Read, Update, and Delete operations. Create is supported via the Volume
3975 Image Collection resource.

3976 **5.15.8 Volume Image Collection**

3977 A Volume Image Collection resource represents the collection of Volume Image resources within a
3978 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
3979 follows:

3980 **JSON serialization:**

```
3981 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeImageCollection",
3982   "id": string,
3983   "count": number,
3984   "volumeImages": [
3985     { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeImage",
3986       "id": string,
3987       ... remaining VolumeImage attributes ...
3988     }, +
3989   ], ?
3990   "operations": [ { "rel": "add", "href": string } ? ]
3991   ...
3992 }
```

3993 **XML serialization:**

```
3994 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/VolumeImageCollection"
3995   xmlns="http://schemas.dmtf.org/cimi/1">
3996   <id> xs:anyURI </id>
3997   <count> xs:integer </count>
3998   <VolumeImage>
3999     <id> xs:anyURI </id>
4000     ... remaining VolumeImage attributes ...
4001   </VolumeImage> *
4002   <operation rel="add" href="xs:anyURI"/> ?
4003   <xs:any>*
4004 </Collection>
```

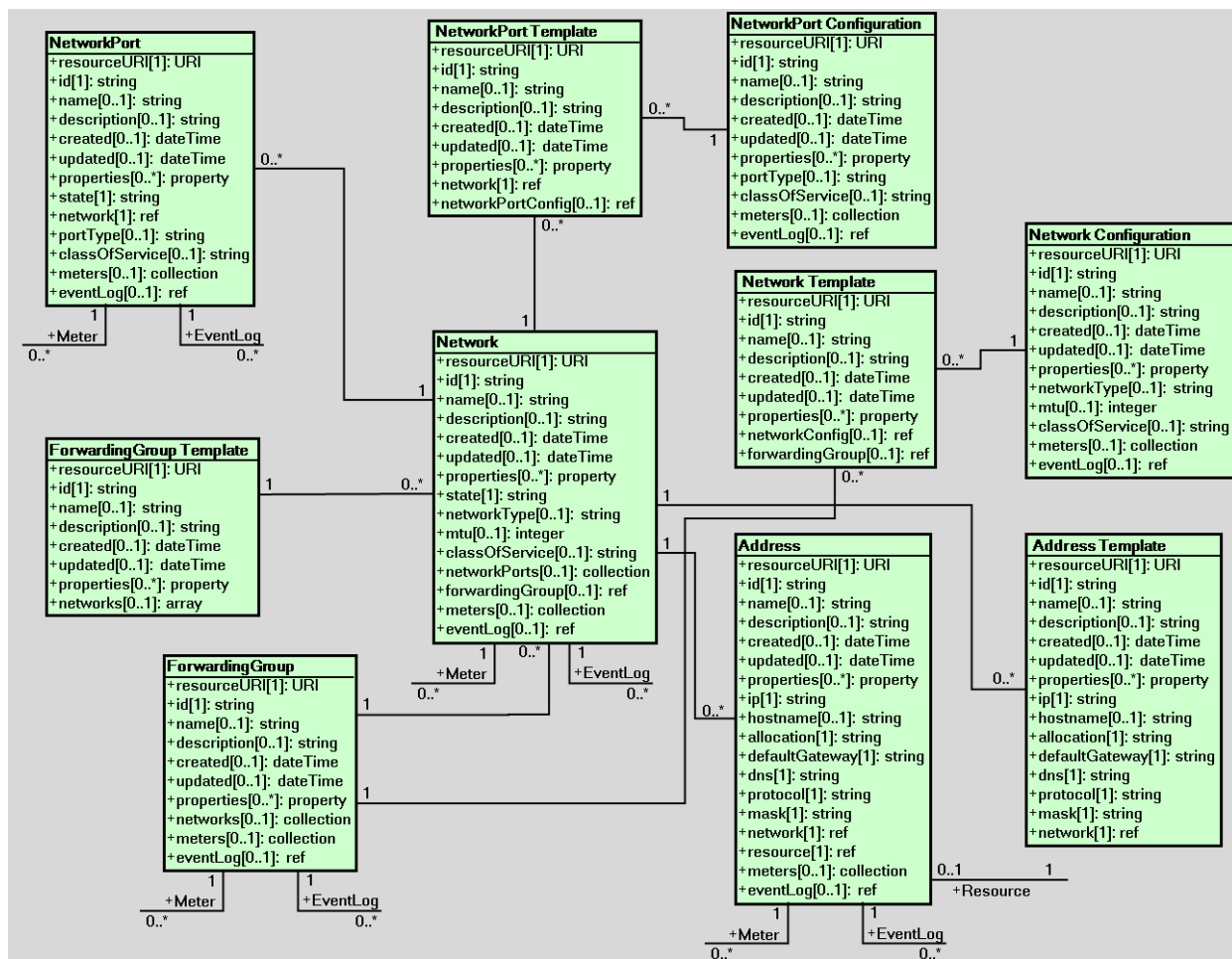
4005 **5.15.8.1 Operations**

4006 This resource supports the Read and Update operations. Creation of new Volume Image resources are
4007 supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

4008 During the creation of a new Volume Image resource, if the "imageLocation" attribute refers to an existing
4009 Volume, this shall be interpreted as a request to create a snapshot of the Volume. Once completed, the
4010 "imageLocation" attribute of the new Volume Image resource shall not refer to the original Volume,
4011 instead it shall refer to a static copy of the Volume. Additionally, the "image" attribute of the referenced
4012 Volume resource shall be updated to include a reference to this new Volume Image resource. During this
4013 process, the Provider may put the Volume into a "CAPTURING" state if necessary.

4014 **5.16 Network resources and relationships**

4015 Figure 5 illustrates the resources involved in constructing Networks and their Network Ports and their
4016 relationships. Although this drawing is in the style of a Resource Relationship diagram, the use of UML is
4017 neither rigorous nor normative.



4018 **Figure 5 - Network resources**

4019 **5.16.1 Network**

4020 A network is a collection of interconnected logical services with the purpose of forwarding data traffic
 4021 between end points.

4022 Networks in a ForwardingGroup should all have the same "networkType" attributes, which prevents a
 4023 Network with a "private" access attribute from being publicly forwarded because it is a member of a
 4024 ForwardingGroup that also contains Networks with a "public" access attribute.

Name	Network	
Type URI	http://schemas.dmtf.org/cimi/1/Network	
Attribute	Type	Description
state	string	The operational state of the System. Allowable values include: CREATING : The Network is in the process of being created. Allowable action when in this state is: delete . STARTING : The Network is in the process of being started. Allowable actions when in this state are: stop and delete .

		<p>STARTED: The Network is available and ready for use. Allowable actions when in this state are: stop, and delete.</p> <p>STOPPING: The Network is in the process of being stopped. Allowable actions when in this state are: stop and delete.</p> <p>STOPPED: The Network is stopped and not available for use. Allowable actions when in this state are: start and delete.</p> <p>DELETING: The Network is in the process of being deleted. Allowable action when in this state is: delete.</p> <p>ERROR: The Provider has detected an error in the Network. Allowable action when in this state is: delete.</p> <p>Providers may define additional values.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
networkType	<i>string</i>	<p>An indicator of whether the Machine resource has access to a Public or Private network.</p> <p>Allowable values include:</p> <p>PUBLIC: represents an open and Internet routable network.</p> <p>PRIVATE: identifies a local non-routed network.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write</p>
mtu	<i>integer</i>	<p>Maximum Transmission Unit. Indicates The largest Packet size supported on this network.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>
classOfService	<i>string</i>	<p>Indicates the Provider's supported category, associated with a collection of attributes characterizing a level of a quality experience</p> <p>Example values:</p> <p>GOLD: High bandwidth, low latency, low jitter</p> <p>SILVER: An improved service experience over bronze for voice or video traffic</p> <p>BRONZE: Best effort</p> <p>The list of possible values, and their implied quality of service, is out of scope of this specifications.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>
networkPorts	<i>collection [Network Port]</i>	<p>A reference to the list of NetworkPorts that are associated with this Network.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>
forwardingGroup	<i>ref</i>	<p>A reference to a ForwardingGroup of which this Network is a part.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-only</p>

meters	<i>collection</i> <i>[Meter]</i>	A reference to the list of Meters monitored for this Network. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
eventLog	<i>ref</i>	A reference to the EventLog of this Network. Constraints: Provider: support optional; mutable Consumer: support optional; read-only

4025 The following describes the serialization of the resource in both JSON and XML:

4026 **JSON media type:** application/json

4027 **JSON serialization:**

```

4028 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Network",
4029   "id": string,
4030   "name": string, ?
4031   "description": string, ?
4032   "created": string, ?
4033   "updated": string, ?
4034   "properties": { "key": string, + }, ?
4035   "state": string,
4036   "networkType": string, ?
4037   "mtu": number, ?
4038   "classOfService": string, ?
4039   "networkPorts": { "href": string }, ?
4040   "forwardingGroup": { "href": string }, ?
4041   "meters": { "href": string }, ?
4042   "eventLog": { "href": string }, ?
4043   "operations": [
4044     { "rel": "edit", "href": string }, ?
4045     { "rel": "delete", "href": string }, ?
4046     { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
4047     { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string } ?
4048   ] ?
4049   ...
4050 }
```

4051 **XML media type:** application/xml

4052 **XML serialization:**

```

4053 <Network xmlns="http://schemas.dmtf.org/cimi/1">
4054   <id> xs:anyURI </id>
4055   <name> xs:string </name> ?
4056   <description> xs:string </description> ?
4057   <created> xs:dateTime </created> ?
4058   <updated> xs:dateTime </updated> ?
4059   <property key="xs:string"> xs:string </property> *
4060   <state> xs:string </state>
4061   <networkType> xs:string </networkType> ?
4062   <mtu> xs:integer </mtu> ?
4063   <classOfService> xs:string </classOfService> ?
4064   <networkPorts href="xs:anyURI"/> ?
4065   <forwardingGroup href="xs:anyURI"/> ?
4066   <meters href="xs:anyURI"/> ?
4067   <eventLog href="xs:anyURI"/> ?
4068   <operation rel="edit" href="xs:anyURI"/> ?
4069   <operation rel="delete" href="xs:anyURI"/> ?
4070   <operation rel="http://schemas.dmtf.org/cimi/1/action/start">
```

```

4071 href="xs:anyURI"/> ?
4072 <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
4073 href="xs:anyURI"/> ?
4074 <xs:any>*
4075 </Network>

```

4076 5.16.1.1 Collections

4077 The following describes the collection resources owned by Networks.

4078 5.16.1.1.1 NetworkPort Collection

4079 When NetworkPorts are created via a Network's NetworkPortCollection's "add" operation, they shall
 4080 added to the global (Cloud Entry Point) NetworkPortCollection as well.

4081 As specified in clause 5.5.12, when a Network is deleted all of its collections, and resources in those
 4082 collections, shall also be deleted. This means that all of the NetworkPorts related to that Network shall
 4083 also be deleted.

4084 The resource type for each item of this collection is "NetworkPort" as defined in clause 5.16.7.

4085 JSON serialization:

```

4086 { "resourceURI":
4087   "http://schemas.dmtf.org/cimi/1/NetworkPortCollection",
4088   "id": string,
4089   "count": number,
4090   "networkports": [
4091     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPort",
4092       "id": string,
4093       ... remaining NetworkPort attributes ...
4094     }, +
4095   ] ?
4096   ...
4097 }

```

4098 XML serialization:

```

4099 <Collection
4100   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkNetworkPortCollection"
4101   xmlns="http://schemas.dmtf.org/cimi/1">
4102   <id> xs:anyURI </id>
4103   <count> xs:integer </count>
4104   <NetworkPort>
4105     <id> xs:anyURI </id>
4106     ... remaining NetworkPort attributes ...
4107   </NetworkPort> *
4108   <xs:any>*
4109 </Collection>

```

4110 5.16.1.1.2 NetworkMeter Collection

4111 The resource type for each item of this collection is "Meter" as defined in clause 5.17.3.

4112 JSON serialization:

```

4113 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkMeterCollection",
4114   "id": string,
4115   "count": number,
4116   "meters": [
4117     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
4118       "id": string,
4119       ... remaining Meter attributes ...

```



```

4120     }, +
4121   ], ?
4122   "operations": [ { "rel": "add", "href": string } ? ]
4123   ...
4124 }

```

4125 **XML serialization:**

```

4126 <Collection
4127   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkMeterCollection"
4128   xmlns="http://schemas.dmtf.org/cimi/1">
4129   <id> xs:anyURI </id>
4130   <count> xs:integer </count>
4131   <Meter>
4132     <id> xs:anyURI </id>
4133     ... remaining Meter attributes ...
4134   </Meter> *
4135   <operation rel="add" href="xs:anyURI"/> ?
4136   <xs:any>*
4137 </Collection>

```

4138 **5.16.1.2 Operations**

4139 This resource supports the Read, Update, and Delete operations. Create is supported via the Network
 4140 Collection resource.

4141 The following custom operations are also defined:

4142 **Starting a Network**

4143 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/start

4144 This operation will start a Network.

4145 Input parameters: None.

4146 Output parameters: None.

4147 During the processing of this operation, the Network shall be in the "STARTING" state.

4148 Upon successful completion of this operation, the Network shall be in the "STARTED" state.

4149 **HTTP protocol**

4150 To start a Network, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/start" URI of the Network
 4151 where the HTTP request body shall be as described below.

4152 **JSON media type:** application/json

4153 **JSON serialization:**

```

4154 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
4155   "action": "http://schemas.dmtf.org/cimi/1/action/start",
4156   "properties": { "key": string, + } ?
4157   ...
4158 }

```

4159 **XML media type:** application/xml

4160 **XML serialization**

```

4161 <Action xmlns="http://schemas.dmtf.org/cimi/1">
4162   <action> http://schemas.dmtf.org/cimi/1/action/start </action>
4163   <property key="xs:string"> xs:string </property> *

```

```
4164     <xs:any>*
4165 </Action>
```

4166 Upon successful processing of the request, the HTTP response body will be empty.

4167 **Stopping a Network**

4168 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

4169 This operation will stop a Network. When stopped, a Network shall not allow data to flow through it.

4170 Input parameters: None.

4171 Output parameters: None.

4172 During the processing of this operation, the Network shall be in the "STOPPING" state.

4173 Upon successful completion of this operation, the Network shall be in the "STOPPED" state.

4174 **HTTP Protocol**

4175 To stop a Network, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the Network
4176 where the HTTP request body shall be as described below.

4177 **JSON media type:** application/json

4178 **JSON serialization:**

```
4179     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
4180       "action": "http://schemas.dmtf.org/cimi/1/action/stop",
4181       "properties": { "key": string, + } ?
4182       ...
4183     }
```

4184 **XML media type:** application/xml

4185 **XML serialization**

```
4186     <Action xmlns="http://schemas.dmtf.org/cimi/1">
4187       <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
4188       <property key="xs:string"> xs:string </property> *
4189       <xs:any>*
4190     </Action>
```

4191 Upon successful processing of the request, the HTTP response body will be empty.

4192 **5.16.2 Network Collection**

4193 A Network Collection resource represents the collection of Networks within a Provider and follows the
4194 Collection pattern that is defined in clause 5.5.12. This resource shall be serialized as follows:

4195 **JSON serialization:**

```
4196     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkCollection",
4197       "id": string,
4198       "count": number,
4199       "networks": [
4200         { "resourceURI": "http://schemas.dmtf.org/cimi/1/Network",
4201           "id": string,
4202           ... remaining Network attributes ...
4203         }, +
4204       ], ?
4205       "operations": [ { "rel": "add", "href": string } ? ]
4206       ...
```

4207 }

4208 **XML serialization:**

```

4209 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/NetworkCollection"
4210     xmlns="http://schemas.dmtf.org/cimi/1">
4211     <id> xs:anyURI </id>
4212     <count> xs:integer </count>
4213     <Network>
4214         <id> xs:anyURI </id>
4215         ... remaining Network attributes ...
4216     </Network> *
4217     <operation rel="add" href="xs:anyURI"/> ?
4218     <xs:any>*
4219 </Collection>
    
```

4220 **5.16.2.1 Operations**

4221 NOTE: The "add" operation requires a NetworkTemplate be used.

4222 **5.16.3 Network Template**

4223 The Network Template is a set of configuration values for realizing a Network. An instance of Network
 4224 Template may be used to create multiple Networks.

Name	NetworkTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/NetworkTemplate	
Attribute	Type	Description
networkConfig	ref	<p>A reference to the Network Configuration that will be used to create a Network from this Network Template.</p> <p>Note that the attributes of the NetworkConfiguration may be specified rather than a reference to an existing NetworkConfiguration resource.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>
forwardingGroup	ref	<p>A reference to a ForwardingGroup of which this Network will be a part.</p> <p>Note that Networks forward to themselves; therefore, this attribute will only appear in cases where the Network that will be created from this template forwards to one or more additional Networks.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>
meterTemplates	meterTemplates[]	<p>A list of references to Meter Templates that shall be used to create and connect a set of new Meters to the new Network.</p> <p>Note that the attributes of the MeterTemplate may be specified rather than a reference to an existing MeterTemplate resource.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>
eventLogTemplate	ref	<p>A reference to an EventLogTemplate that shall be used to create and connect a new EventLog to the new Network.</p> <p>Note that the attributes of the EventLogTemplate may be specified rather than a reference to an existing EventLogTemplate resource.</p> <p>Constraints:</p>

		Provider: support optional; mutable Consumer: support optional; read-write
--	--	---

4225 The following describes the serialization of the resource in both JSON and XML:

4226 **JSON media type:** application/json

4227 **JSON serialization:**

```

4228 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkTemplate",
4229   "id": string,
4230   "name": string, ?
4231   "description": string, ?
4232   "created": string, ?
4233   "updated": string, ?
4234   "properties": { "key": string, + }, ?
4235   "networkConfig": {
4236     "href": string |... NetworkingConfiguration attributes ...
4237   }, ?
4238   "forwardingGroup": { "href": string }, ?
4239   "meterTemplates": [
4240     { "href": string, ?
4241       ... MeterTemplate attributes ... ?
4242     }, *
4243   ], ?
4244   "eventLogTemplate": {
4245     "href": string, ?
4246     ... EventLogTemplate attributes ... ?
4247   }, ?
4248   "operations": [
4249     { "rel": "edit", "href": string }, ?
4250     { "rel": "delete", "href": string } ?
4251   ] ?
4252   ...
4253 }
```

4254 **XML media type:** application/xml

4255 **XML serialization:**

```

4256 <NetworkTemplate xmlns="http://schemas.dmtf.org/cimi/1">
4257   <id> xs:anyURI </id>
4258   <name> xs:string </name> ?
4259   <description> xs:string </description> ?
4260   <created> xs:dateTime </created> ?
4261   <updated> xs:dateTime </updated> ?
4262   <property key="xs:string"> xs:string </property> *
4263   <networkConfig href="xs:anyURI"?>
4264     ... NetworkingConfiguration attributes ... ?
4265   </networkConfig> ?
4266   <forwardingGroup href="xs:anyURI"/> ?
4267   <meterTemplate href="xs:anyURI"? >
4268     ... MeterTemplate attributes ... ?
4269   </meterTemplate> *
4270   <eventLogTemplate href="xs:anyURI"? >
4271     ... EventLogTemplate attributes ... ?
4272   </eventLogTemplate> ?
4273   <operation rel="edit" href="xs:anyURI"/> ?
4274   <operation rel="delete" href="xs:anyURI"/> ?
4275   <xs:any>*
4276 </NetworkTemplate>
```

4277 **5.16.3.1 Operations**

4278 This resource supports the Read, Update and Delete operations. Create is supported via the Network
4279 Template Collection resource.

4280 **5.16.4 Network Template Collection**

4281 A Network Template Collection resource represents the collection of NetworkTemplates within a Provider
4282 and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

4283 **JSON serialization:**

```
4284 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkTemplateCollection",
4285   "id": string,
4286   "count": number,
4287   "networkTemplates": [
4288     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkTemplate",
4289       "id": string,
4290       ... remaining NetworkTemplate attributes ...
4291     }, +
4292   ], ?
4293   "operations": [ { "rel": "add", "href": string } ? ]
4294   ...
4295 }
```

4296 **XML serialization:**

```
4297 <Collection
4298   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkTemplateCollection"
4299   xmlns="http://schemas.dmtf.org/cimi/1">
4300   <id> xs:anyURI </id>
4301   <count> xs:integer </count>
4302   <NetworkTemplate>
4303     <id> xs:anyURI </id>
4304     ... remaining NetworkTemplate attributes ...
4305   </NetworkTemplate> *
4306   <operation rel="add" href="xs:anyURI"/> ?
4307   <xs:any>*
4308 </Collection>
```

4309 **5.16.4.1 Operations**

4310 This resource supports the Read and Update operations. Creation of new Network Template resources
4311 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

4312 **5.16.5 Network Configuration**

4313 The following set of configuration values represent the information needed to create a Network with
4314 certain characteristics.

Name	NetworkConfiguration	
Type URI	http://schemas.dmtf.org/cimi/1/NetworkConfiguration	
Attribute	Type	Description
networkType	string	An indicator of whether or not the Network will be a Public or Private network. Allowable values include: PUBLIC: represents an open and Internet routable network. PRIVATE: identifies a local non-Internet network. Constraints:

		Provider: support optional; mutable Consumer: support optional; read-write
mtu	<i>integer</i>	Maximum Transmission Unit. Size Indicates the largest supported packet size. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
classOfService	<i>string</i>	Indicates the Provider's supported category, associated with a collection of attributes characterizing a level of a quality experience Example values: GOLD: High bandwidth, low latency, low jitter SILVER: An improved service experience over bronze for voice or video traffic BRONZE: Best effort The list of possible values, and their implied quality of service, is out of scope of this specifications. Constraints: Provider: support optional; mutable Consumer: support optional; read-write

4315 The following describes the serialization of the resource in both JSON and XML:

4316 **JSON media type:** application/json

4317 **JSON serialization:**

```

4318 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkConfiguration",
4319   "id": string,
4320   "name": string, ?
4321   "description": string, ?
4322   "created": string, ?
4323   "updated": string, ?
4324   "properties": { "key": string, + }, ?
4325   "networkType": string, ?
4326   "mtu": number, ?
4327   "classOfService": string, ?
4328   "operations": [
4329     { "rel": "edit", "href": string }, ?
4330     { "rel": "delete", "href": string } ?
4331   ] ?
4332   ...
4333 }
```

4334 **XML media type:** application/xml

4335 **XML serialization:**

```

4336 <NetworkConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
4337   <id> xs:anyURI </id>
4338   <name> xs:string </name> ?
4339   <description> xs:string </description> ?
4340   <created> xs:dateTime </created> ?
4341   <updated> xs:dateTime </updated> ?
4342   <property key="xs:string"> xs:string </property> *
4343   <networkType> xs:string </networkType> ?
4344   <mtu> xs:integer <mtu> ?
4345   <classOfService> xs:string </classOfService> ?
4346   <operation rel="edit" href="xs:anyURI"/> ?
4347   <operation rel="delete" href="xs:anyURI"/> ?
4348   <xs:any*>
```

4349 `</NetworkConfiguration>`

4350 5.16.5.1 Operations

4351 This resource supports the Read, Update, and Delete operations. Create is supported via the Network
4352 Configuration Collection resource.

4353 5.16.6 Network Configuration Collection

4354 A Network Configuration Collection resource represents the collection of Network Configurations within a
4355 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
4356 follows:

4357 JSON serialization:

```
4358 { "resourceURI":
4359   "http://schemas.dmtf.org/cimi/1/NetworkConfigurationCollection",
4360   "id": string,
4361   "count": number,
4362   "networkConfigurations": [
4363     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkConfiguration",
4364       "id": string,
4365       ... remaining NetworkConfiguration attributes ...
4366     }, +
4367   ], ?
4368   "operations": [ { "rel": "add", "href": string } ? ]
4369   ...
4370 }
```

4371 XML serialization:

```
4372 <Collection
4373   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkConfigurationCollection"
4374   xmlns="http://schemas.dmtf.org/cimi/1">
4375   <id> xs:anyURI </id>
4376   <count> xs:integer </count>
4377   <NetworkConfiguration>
4378     <id> xs:anyURI </id>
4379     ... remaining NetworkConfiguration attributes ...
4380   </NetworkConfiguration> *
4381   <operation rel="add" href="xs:anyURI"/> ?
4382   <xs:any*>
4383 </Collection>
```

4384 5.16.6.1 Operations

4385 This resource supports the Read and Update operations. Creation of new Network Configuration
4386 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.
4387

4388 **5.16.7 Network Port**

4389 A NetworkPort is a realized connection point between a Network and a resource - such as a Machine.

Name	NetworkPort	
Type URI	http://schemas.dmtf.org/cimi/1/NetworkPort	
Attribute	Type	Description
state	<i>string</i>	<p>The operational state of the NetworkPort.</p> <p>Allowable values include:</p> <p>CREATING: The NetworkPort is in the process of being created. Allowable action when in this state is: delete.</p> <p>STARTED: The NetworkPort is available (enabled) and ready for use. Allowable actions when in this state are: stop and delete.</p> <p>STOPPED: The NetworkPort is stopped(disabled) and not available for use. Allowable actions when in this state are: start and delete.</p> <p>DELETING: The NetworkPort is in the process of being deleted. Allowable action when in this state is: delete.</p> <p>ERROR: The Provider has detected an error in the NetworkPort. Allowable action when in this state is: delete.</p> <p>Providers may define additional values.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
network	<i>ref</i>	<p>A reference to the network associated with this NetworkPort.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
portType	<i>string</i>	<p>Indicates that a port will be used as an Access port (a member of the network) or a Trunk port that becomes a transport for multiple networks.</p> <p>Allowable values include:</p> <p>ACCESS: a member of a network.</p> <p>TRUNK: transport more than one network.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
classOfService	<i>string</i>	<p>Indicates the Provider supported category, associated with a collection of attributes characterizing a level of a quality experience</p> <p>Example values:</p> <p>GOLD: High bandwidth, low latency, low jitter</p> <p>SILVER: An improved service experience over bronze for voice or video traffic</p> <p>BRONZE: Best effort</p> <p>The list of possible values, and their implied quality of service, is out of scope of this specifications.</p> <p>Constraints: Provider: support mandatory; mutable</p>

		Consumer: support mandatory; read-write
meters	<i>collection</i> <i>[Meter]</i>	A reference to the list of Meters monitored for this NetworkPort. Constraints: Provider: support optional; mutable Consumer: support optional; read-only
eventLog	<i>ref</i>	A reference to the EventLog of this NetworkPort. Constraints: Provider: support optional; mutable Consumer: support optional; read-only

4390 The following describes the serialization of the resource in both JSON and XML:

4391 **JSON media type:** application/json

4392 **JSON serialization:**

```

4393 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPort",
4394   "id": string,
4395   "name": string, ?
4396   "description": string, ?
4397   "created": string, ?
4398   "updated": string, ?
4399   "properties": { "key": string, + }, ?
4400   "state": string,
4401   "network": { "href": string },
4402   "portType": string, ?
4403   "classOfService": string, ?
4404   "meters": { "href": string }, ?
4405   "eventLog": { "href": string }, ?
4406   "operations": [
4407     { "rel": "edit", "href": string }, ?
4408     { "rel": "delete", "href": string }, ?
4409     { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
4410     { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string } ?
4411   ] ?
4412   ...
4413 }
```

4414 **XML media type:** application/xml

4415 **XML serialization:**

```

4416 <NetworkPort xmlns="http://schemas.dmtf.org/cimi/1">
4417   <id> xs:anyURI </id>
4418   <name> xs:string </name> ?
4419   <description> xs:string </description> ?
4420   <created> xs:dateTime </created> ?
4421   <updated> xs:dateTime </updated> ?
4422   <property key="xs:string"> xs:string </property> *
4423   <state> xs:string </state>
4424   <network href="xs:anyURI"/>
4425   <portType> xs:string </portType> ?
4426   <classOfService> xs:string </classOfService> ?
4427   <meters href="xs:anyURI"/> ?
4428   <eventLog href="xs:anyURI"/> ?
4429   <operation rel="edit" href="xs:anyURI"/> ?
4430   <operation rel="delete" href="xs:anyURI"/> ?
4431   <operation rel="http://schemas.dmtf.org/cimi/1/action/start"
4432 href="xs:anyURI"/> ?
4433   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
4434 href="xs:anyURI"/> ?
```

```
4435     <xs:any>*
4436 </NetworkPort>
```

4437 5.16.7.1 Collections

4438 The following describes the collection resources owned by NetworkPorts.

4439 5.16.7.1.1 NetworkPortMeter Collection

4440 The resource type for each item of this collection is "Meter" as defined in clause 5.17.3.

4441 JSON serialization:

```
4442 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortMeterCollection",
4443   "id": string,
4444   "count": number,
4445   "meters": [
4446     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
4447       "id": string,
4448       ... remaining Meter attributes ...
4449     }, +
4450   ], ?
4451   "operations": [ { "rel": "add", "href": string } ? ]
4452   ...
4453 }
```

4454 XML serialization:

```
4455 <Collection
4456   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkPortMeterCollection"
4457   xmlns="http://schemas.dmtf.org/cimi/1">
4458   <id> xs:anyURI </id>
4459   <count> xs:integer </count>
4460   <Meter>
4461     <id> xs:anyURI </id>
4462     ... remaining Meter attributes ...
4463   </Meter> *
4464   <operation rel="add" href="xs:anyURI"/> ?
4465   <xs:any>*
4466 </Collection>
```

4467 5.16.7.2 Operations

4468 This resource supports the Read, Update, and Delete operations. Create is supported via the Network
4469 Port Collection resource.

4470 Deleting a NetworkPort shall remove that NetworkPort from the global (Cloud Entry Point) NetworkPort
4471 Collection as well as from its corresponding Network's NetworkPorts collection.

4472 The following custom operations are also defined:

4473 Starting a NetworkPort

4474 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/start

4475 This operation will start a NetworkPort.

4476 Input parameters: None.

4477 Output parameters: None.

4478 Upon successful completion of this operation, the NetworkPort shall be in the "STARTED" state.

4479 **HTTP Protocol**

4480 To start a NetworkPort, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/start" URI of the
4481 NetworkPort where the HTTP request body shall be as described below.

4482 **JSON media type:** application/json

4483 **JSON serialization:**

```
4484 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
4485   "action": "http://schemas.dmtf.org/cimi/1/action/start",
4486   "properties": { "key": string, + } ?
4487   ...
4488 }
```

4489 **XML media type:** application/xml

4490 **XML serialization**

```
4491 <Action xmlns="http://schemas.dmtf.org/cimi/1">
4492   <action> http://schemas.dmtf.org/cimi/1/action/start </action>
4493   <property key="xs:string"> xs:string </property> *
4494   <xs:any>*
4495 </Action>
```

4496 Upon successful processing of the request, the HTTP response body will be empty.

4497 **Stopping a NetworkPort**

4498 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

4499 This operation will stop a NetworkPort. When stopped, the NetworkPort is not available for use and no
4500 network traffic shall flow through it.

4501 Input parameters: None.

4502 Output parameters: None.

4503 Upon successful completion of this operation, the NetworkPort shall be in the "STOPPED" state.

4504 **HTTP Protocol**

4505 To stop a NetworkPort, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the
4506 NetworkPort where the HTTP request body shall be as described below.

4507 **JSON media type:** application/json

4508 **JSON serialization:**

```
4509 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
4510   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
4511   "properties": { "key": string, + } ?
4512   ...
4513 }
```

4514 **XML media type:** application/xml

4515 **XML serialization**

```
4516 <Action xmlns="http://schemas.dmtf.org/cimi/1">
4517   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
4518   <property key="xs:string"> xs:string </property> *
4519   <xs:any>*
4520 </Action>
```

4521 Upon successful processing of the request, the HTTP response body will be empty.

4522 **5.16.8 Network Port Collection**

4523 A NetworkPortCollection resource represents the collection of NetworkPorts within a Provider and follows
 4524 the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

4525 **JSON serialization:**

```

4526 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortCollection",
4527   "id": string,
4528   "count": number,
4529   "networkPorts": [
4530     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPort",
4531       "id": string,
4532       ... remaining NetworkPort attributes ...
4533     }, +
4534   ], ?
4535   "operations": [ { "rel": "add", "href": string } ? ]
4536   ...
4537 }
```

4538 **XML serialization:**

```

4539 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/NetworkPortCollection"
4540   xmlns="http://schemas.dmtf.org/cimi/1">
4541   <id> xs:anyURI </id>
4542   <count> xs:integer </count>
4543   <NetworkPort>
4544     <id> xs:anyURI </id>
4545     ... remaining NetworkPort attributes ...
4546   </NetworkPort> *
4547   <operation rel="add" href="xs:anyURI"/> ?
4548   <xs:any>*
4549 </Collection>
```

4550 **5.16.8.1 Operations**

4551 NOTE: The "add" operation requires a NetworkPortTemplate be used.

4552 When NetworkPorts are created via the global (Cloud Entry Point) NetworkPortCollection's "add"
 4553 operation, they are automatically added to the corresponding Network's "NetworkPort" collection resource
 4554 as well.

4555 **5.16.9 Network Port Template**

4556 The Network Port Template is a set of Configuration values for realizing a NetworkPort. A NetworkPort
 4557 Template may be used to create multiple NetworkPorts.

Name	NetworkPortTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/NetworkPortTemplate	
Attribute	Type	Description
network	ref	A reference to the network to be associated with this NetworkPort. When this Template is used to create a new NetworkPort via the global (Cloud Entry Point) NetworkPort Collection, this attribute shall be present. When this Template is used to create a new NetworkPort via a Network's NetworkPorts Collection then this attribute shall either be absent or shall have the same value as the "id" of the Network to which this NetworkPort is being added.
Constraints:		

		Provider: support mandatory; mutable Consumer: support mandatory; read-write
networkPortConfig	<i>ref</i>	A reference to the NetworkPortConfiguration that will be used to create a NetworkPort from this NetworkPort Template. Note that the attributes of the NetworkPortConfiguration may be specified rather than a reference to an existing NetworkPortConfiguration resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
meterTemplates	<i>meterTemplates[]</i>	A list of references to Meter Templates that shall be used to create and connect a set of new Meters to the new NetworkPort. Note that the attributes of the MeterTemplate may be specified rather than a reference to an existing MeterTemplate resource. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
eventLogTemplate	<i>ref</i>	A reference to an EventLogTemplate that shall be used to create and connect a new EventLog to the new NetworkPort. Note that the attributes of the EventLogTemplate may be specified rather than a reference to an existing EventLogTemplate resource. Constraints: Provider: support optional; mutable Consumer: support optional; read-write

4558 The following describes the serialization of the resource in both JSON and XML:

4559 **JSON media type:** application/json

4560 **JSON serialization:**

```

4561 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortTemplate",
4562   "id": string,
4563   "name": string, ?
4564   "description": string, ?
4565   "created": string, ?
4566   "updated": string, ?
4567   "properties": { "key": string, + }, ?
4568   "network": { "href": string }, ?
4569   "networkPortConfig": {
4570     "href": string | ... NetworkPortConfiguration attributes ...
4571   },
4572   "meterTemplates": [
4573     { "href": string, ?
4574       ... MeterTemplate attributes ... ?
4575     }, *
4576   ], ?
4577   "eventLogTemplate": {
4578     "href": string, ?
4579     ... EventLogTemplate attributes ... ?
4580   }, ?
4581   "operations": [
4582     { "rel": "edit", "href": string }, ?
4583     { "rel": "delete", "href": string } ?
4584   ] ?
4585   ...
4586 }
```

4587 **XML media type:** application/xml

4588 **XML serialization:**

```

4589 <NetworkPortTemplate xmlns="http://schemas.dmtf.org/cimi/1">
4590   <id> xs:anyURI </id>
4591   <name> xs:string </name> ?
4592   <description> xs:string </description> ?
4593   <created> xs:dateTime </created> ?
4594   <updated> xs:dateTime </updated> ?
4595   <property key="xs:string"> xs:string </property> *
4596   <network href="xs:anyURI"/> ?
4597   <networkPortConfig href="xs:anyURI"?>
4598     ... NetworkPortConfiguration attributes ... ?
4599 </networkPortConfig>
4600   <meterTemplate href="xs:anyURI"? >
4601     ... MeterTemplate attributes ... ?
4602 </meterTemplate> *
4603   <eventLogTemplate href="xs:anyURI"? >
4604     ... EventLogTemplate attributes ... ?
4605 </eventLogTemplate> ?
4606   <operation rel="edit" href="xs:anyURI"/> ?
4607   <operation rel="delete" href="xs:anyURI"/> ?
4608   <xs:any>*
4609 </NetworkPortTemplate>

```

4610 **5.16.9.1 Operations**

4611 This resource supports the Read, Update, and Delete operations. Create is supported via the Network
4612 Port Template Collection resource.

4613 **5.16.10 Network Port Template Collection**

4614 A Network Port Template Collection resource represents the collection of Network port Templates within a
4615 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
4616 follows:

4617 **JSON serialization:**

```

4618 { "resourceURI":
4619   "http://schemas.dmtf.org/cimi/1/NetworkPortTemplateCollection",
4620   "id": string,
4621   "count": number,
4622   "networkPortTemplates": [
4623     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortTemplate",
4624       "id": string,
4625       ... remaining NetworkPortTemplate attributes ...
4626     }, +
4627   ], ?
4628   "operations": [ { "rel": "add", "href": string } ? ]
4629   ...
4630 }

```

4631 **XML serialization:**

```

4632 <Collection
4633   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkPortTemplateCollection"
4634   xmlns="http://schemas.dmtf.org/cimi/1">
4635   <id> xs:anyURI </id>
4636   <count> xs:integer </count>
4637   <NetworkPortTemplate>
4638     <id> xs:anyURI </id>
4639     ... remaining NetworkPortTemplate attributes ...

```

```

4640     </NetworkPortTemplate> *
4641     <operation rel="add" href="xs:anyURI"/> ?
4642     <xs:any>*
4643 </Collection>
    
```

4644 **5.16.10.1 Operations**

4645 This resource supports the Read and Update operations. Creation of new Network Port Template
 4646 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

4647 **5.16.11 Network Port Configuration**

4648 The set of configuration values representing the information needed to create a NetworkPort with certain
 4649 characteristics.

Name	NetworkPortConfiguration	
Type URI	http://schemas.dmtf.org/cimi/1/NetworkPortConfiguration	
Attribute	Type	Description
portType	string	<p>Indicates that a port will be used as an Access port (a member of the network) or a Trunk port that becomes a transport for multiple networks.</p> <p>Allowable values include:</p> <p>ACCESS: a member of a network.</p> <p>TRUNK: transport more than one network.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
classOfService	string	<p>Indicates the Provider supported category, associated with a collection of attributes characterizing a level of a quality experience</p> <p>Example values:</p> <p>GOLD: High bandwidth, low latency, low jitter</p> <p>SILVER: An improved service experience over bronze for voice or video traffic</p> <p>BRONZE: Best effort</p> <p>The list of possible values, and their implied quality of service, is out of scope of this specifications.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>

4650 The following describes the serialization of the resource in both JSON and XML:

4651 **JSON media type:** application/json

4652 **JSON serialization:**

```

4653 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortConfiguration",
4654   "id": string,
4655   "name": string, ?
4656   "description": string, ?
4657   "created": string, ?
4658   "updated": string, ?
4659   "properties": { "key": string, + }, ?
4660   "portType": string, ?
4661   "classOfService": string, ?
4662   "operations": [
    
```

```

4663     { "rel": "edit", "href": string }, ?
4664     { "rel": "delete", "href": string } ?
4665   ] ?
4666   ...
4667 }

```

4668 **XML media type:** application/xml

4669 **XML serialization:**

```

4670 <NetworkPortConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
4671   <id> xs:anyURI </id>
4672   <name> xs:string </name> ?
4673   <description> xs:string </description> ?
4674   <created> xs:dateTime </created> ?
4675   <updated> xs:dateTime </updated> ?
4676   <property key="xs:string"> xs:string </property> *
4677   <portType> xs:string </portType> ?
4678   <classOfService> xs:string </classOfService> ?
4679   <operation rel="edit" href="xs:anyURI"/> ?
4680   <operation rel="delete" href="xs:anyURI"/> ?
4681   <xs:any>*
4682 </NetworkPortConfiguration>

```

4683 5.16.11.1 Operations

4684 This resource supports the Read, Update, and Delete operations. Create is supported via the Network
4685 Port Configuration Collection resource.

4686 5.16.12 Network Port Configuration Collection

4687 A NetworkPort Configuration Collection resource represents the collection of NetworkPortConfigurations
4688 within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be
4689 serialized as follows:

4690 **JSON serialization:**

```

4691 { "resourceURI":
4692   "http://schemas.dmtf.org/cimi/1/NetworkPortConfigurationCollection",
4693   "id": string,
4694   "count": number,
4695   "networkPortConfigurations": [
4696     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortConfiguration",
4697       "id": string,
4698       ... remaining NetworkPortConfiguration attributes ...
4699     }, +
4700   ], ?
4701   "operations": [ { "rel": "add", "href": string } ? ]
4702   ...
4703 }

```

4704 **XML serialization:**

```

4705 <Collection
4706 resourceURI="http://schemas.dmtf.org/cimi/1/NetworkPortConfigurationCollection"
4707 xmlns="http://schemas.dmtf.org/cimi/1">
4708   <id> xs:anyURI </id>
4709   <count> xs:integer </count>
4710   <NetworkPortConfiguration>
4711     <id> xs:anyURI </id>
4712     ... remaining NetworkPortConfiguration attributes ...
4713   </NetworkPortConfiguration> *
4714   <operation rel="add" href="xs:anyURI"/> ?

```


4715 `<xs:any>*`
 4716 `</Collection>`

4717 **5.16.12.1 Operations**

4718 This resource supports the Read and Update operations. Creation of new NetworkPortConfiguration
 4719 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

4720 **5.16.13 Address**

4721 An Address represents an IP address, and its associated metadata, for a particular Network. When a
 4722 Consumer creates an Address resource it is the semantic equivalent of asking for a static IP address that
 4723 can then be associated with resources at a later point in time. Addresses that are manually created by
 4724 Consumers shall not be automatically deleted when the resource (e.g., a Machine) that is using that
 4725 Address is deleted because these manually created Addresses are expected to have a lifetime that is
 4726 different from the resources that use them. Addresses that are created by Providers on the Consumer's
 4727 behalf shall be deleted at the Provider's discretion. In particular, the Provider shall delete Addresses that
 4728 it created on behalf of the Consumer when the resource that is using that Address is deleted or when the
 4729 Address becomes disassociated from the resource.

4730 Addresses that are created by Providers may be converted to ones that are under the Consumer's control
 4731 (i.e., will not be deleted until explicitly requested by Consumers) by changing the "allocation" attribute
 4732 from "dynamic" to "static," if this feature supported by Providers.

Name	Address	
Type URI	http://schemas.dmtf.org/cimi/1/Address	
Attribute	Type	Description
ip	string	The IP address assigned to a virtual interface. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
hostname	string	The DNS resolvable name associated with this network interface. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
allocation	string	The value is either " dynamic " or " static ". Expresses whether this address is controlled by the Provider or Consumer. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
defaultGateway	string	An IP address of a router that serves other networks. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
dns	string	The IP address of the Domain Name Service from host name to IP resolution. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
protocol	string	The selected network protocol, such as IPv4 or IPv6. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

mask	<i>string</i>	The network mask associated with this Address. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
network	<i>ref</i>	A reference to the Network with which this Address will be associated. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
resource	<i>ref</i>	A reference to the resource that is using this Address. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

4733 The following describes the serialization of the resource in both JSON and XML:

4734 **JSON media type:** application/json

4735 **JSON serialization:**

```

4736 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Address",
4737   "id": string,
4738   "name": string, ?
4739   "description": string, ?
4740   "created": string, ?
4741   "updated": string, ?
4742   "properties": { "key": string, + }, ?
4743   "ip": string,
4744   "hostname": string, ?
4745   "allocation": string,
4746   "defaultGateway": string,
4747   "dns": string,
4748   "protocol": string,
4749   "mask": string,
4750   "network": { "href": string },
4751   "resource": { "href": string }, ?
4752   "operations": [
4753     { "rel": "edit", "href": string }, ?
4754     { "rel": "delete", "href": string } ?
4755   ] ?
4756   ...
4757 }
```

4758 **XML media type:** application/xml

4759 **XML serialization:**

```

4760 <Address xmlns="http://schemas.dmtf.org/cimi/1">
4761   <id> xs:anyURI </id>
4762   <name> xs:string </name> ?
4763   <description> xs:string </description> ?
4764   <created> xs:dateTime </created> ?
4765   <updated> xs:dateTime </updated> ?
4766   <property key="xs:string"> xs:string </property> *
4767   <ip> xs:string </ip>
4768   <hostname> xs:string </hostname> ?
4769   <allocation> xs:string </allocation>
4770   <defaultGateway> xs:string </defaultGateway>
4771   <dns> xs:string </dns>
4772   <protocol> xs:string </protocol>
4773   <mask> xs:string </mask>
```

```

4774 <network href="xs:anyURI"/>
4775 <resource href="xs:anyURI"/> ?
4776 <operation rel="edit" href="xs:anyURI"/> ?
4777 <operation rel="delete" href="xs:anyURI"/> ?
4778 <xs:any>*
4779 </Address>
    
```

4780 **5.16.13.1 Operations**

4781 This resource supports the Read, Update, and Delete operations. Create is supported via the Address
 4782 Collection resource.

4783 **5.16.14 Address Collection**

4784 An Address Collection resource represents the collection of Addresses within a Provider that are
 4785 owned/managed by the Consumer Provider and follows the Collection pattern defined in clause 5.5.12.
 4786 This resource shall be serialized as follows:

4787 **JSON serialization:**

```

4788 { "resourceURI": "http://schemas.dmtf.org/cimi/1/AddressCollection",
4789   "id": string,
4790   "count": number,
4791   "addresses": [
4792     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Address",
4793       "id": string,
4794       ... remaining Address attributes ...
4795     }, +
4796   ], ?
4797   "operations": [ { "rel": "add", "href": string } ? ]
4798   ...
4799 }
    
```

4800 **XML serialization:**

```

4801 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/AddressCollection"
4802   xmlns="http://schemas.dmtf.org/cimi/1">
4803   <id> xs:anyURI </id>
4804   <count> xs:integer </count>
4805   <Address>
4806     <id> xs:anyURI </id>
4807     ... remaining Address attributes ...
4808   </Address> *
4809   <operation rel="add" href="xs:anyURI"/> ?
4810   <xs:any>*
4811 </Collection>
    
```

4812 **5.16.14.1 Operations**

4813 NOTE: The "add" operation requires an AddressTemplate be used.

4814 **5.16.15 Address Template**

4815 This resource captures the configuration values for realizing an Address. An Address Template may be
 4816 used to create multiple Addresses.

Name	AddressTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/AddressTemplate	
Attribute	Type	Description
ip	string	The IP address assigned to a virtual interface.

		<p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
hostname	<i>string</i>	<p>The DNS resolvable name associated with this network interface.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>
allocation	<i>string</i>	<p>A value of either "dynamic" or "static". Expresses whether this address is controlled by the Provider or Consumer.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
defaultGateway	<i>string</i>	<p>An IP address of a router that serves other networks.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
dns	<i>string</i>	<p>The IP address of the Domain Name Service from host name to IP resolution.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
protocol	<i>string</i>	<p>The selected network protocol, such as IPv4 or IPv6.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
mask	<i>string</i>	<p>The network mask associated with this Address.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
network	<i>ref</i>	<p>A reference to the Network with which this Address will be associated.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>

4817 The following describes the serialization of the resource in both JSON and XML:

4818 **JSON media type:** application/json

4819 **JSON serialization:**

```

4820 { "resourceURI": "http://schemas.dmtf.org/cimi/1/AddressTemplate",
4821   "id": string,
4822   "name": string, ?
4823   "description": string, ?
4824   "created": string, ?
4825   "updated": string, ?
4826   "properties": { "key": string, + }, ?
4827   "ip": string,
4828   "hostname": string, ?
4829   "allocation": string,
4830   "defaultGateway": string,
4831   "dns": string,
4832   "protocol": string,
4833   "mask": string,

```

```

4834     "network": { "href": string },
4835     "operations": [
4836       { "rel": "edit", "href": string }, ?
4837       { "rel": "delete", "href": string } ?
4838     ] ?
4839     ...
4840 }
    
```

4841 **XML media type:** application/xml

4842 **XML serialization:**

```

4843 <AddressTemplate xmlns="http://schemas.dmtf.org/cimi/1">
4844   <id> xs:anyURI </id>
4845   <name> xs:string </name> ?
4846   <description> xs:string </description> ?
4847   <created> xs:dateTime </created> ?
4848   <updated> xs:dateTime </updated> ?
4849   <property key="xs:string"> xs:string </property> *
4850   <ip> xs:string </ip>
4851   <hostname> xs:string </hostname> ?
4852   <allocation> xs:string </allocation>
4853   <defaultGateway> xs:string </defaultGateway>
4854   <dns> xs:string </dns>
4855   <protocol> xs:string </protocol>
4856   <mask> xs:string </mask>
4857   <network href="xs:anyURI"/>
4858   <operation rel="edit" href="xs:anyURI"/> ?
4859   <operation rel="delete" href="xs:anyURI"/> ?
4860   <xs:any>*
4861 </AddressTemplate>
    
```

4862 5.16.15.1 Operations

4863 This resource supports the Read, Update, and Delete operations. Create is supported via the Address
4864 Template Collection resource.

4865 5.16.16 Address Template Collection

4866 An Address Template Collection resource represents the collection of Address Template resources within
4867 a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
4868 follows:

4869 **JSON serialization:**

```

4870 { "resourceURI": "http://schemas.dmtf.org/cimi/1/AddressTemplateCollection",
4871   "id": string,
4872   "count": number,
4873   "addressTemplates": [
4874     { "resourceURI": "http://schemas.dmtf.org/cimi/1/AddressTemplate",
4875       "id": string,
4876       ... remaining AddressTemplate attributes ...
4877     }, +
4878   ], ?
4879   "operations": [ { "rel": "add", "href": string } ? ]
4880   ...
4881 }
    
```

4882 **XML serialization:**

```

4883 <Collection
4884   resourceURI="http://schemas.dmtf.org/cimi/1/AddressTemplateCollection"
4885   xmlns="http://schemas.dmtf.org/cimi/1">
    
```

```

4886     <id> xs:anyURI </id>
4887     <count> xs:integer </count>
4888     <AddressTemplate>
4889         <id> xs:anyURI </id>
4890         ... remaining AddressTemplate attributes ...
4891     </AddressTemplate> *
4892     <operation rel="add" href="xs:anyURI"/> ?
4893     <xs:any>*
4894 </Collection>
    
```

4895 **5.16.16.1 Operations**

4896 This resource supports the Read and Update operations. Creation of new Address Template resources
 4897 are supported via a POST to the "addLink" URI as described in clause 4.2.1.1.

4898 **5.16.17 Forwarding Group**

4899 A Forwarding Group represents a collection of Networks that route to each other.

4900 Networks in a ForwardingGroup should all have the same "networkType" attributes, which prevents a
 4901 Network with a "private" networkType attribute from being publicly forwarded because it is a member of a
 4902 ForwardingGroup that also contains Networks with a "public" networkType attribute.

4903 Providers shall not allow two Networks to be forwardable to each other unless they are explicitly
 4904 connected by being part of a common ForwardingGroup.

Name	ForwardingGroup	
Type URI	http://schemas.dmtf.org/cimi/1/ForwardingGroup	
Attribute	Type	Description
networks	collection [Forwardin gGroupNe twork]	A reference to the list of references to the Networks in this Forwarding Group. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

4905 The following describes the serialization of the resource in both JSON and XML:

4906 **JSON media type:** application/json

4907 **JSON serialization:**

```

4908     { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwrdingGroup",
4909       "id": string,
4910       "name": string, ?
4911       "description": string, ?
4912       "created": string, ?
4913       "updated": string, ?
4914       "properties": { "key": string, + }, ?
4915       "networks": [
4916         { "href": string }, +
4917       ], ?
4918       "operations": [
4919         { "rel": "edit", "href": string }, ?
4920         { "rel": "delete", "href": string } ?
4921       ] ?
4922       ...
4923     }
    
```

4924 **XML media type:** application/xml

4925 **XML serialization:**

```

4926 <ForwardingGroup xmlns="http://schemas.dmtf.org/cimi/1">
4927   <id> xs:anyURI </id>
4928   <name> xs:string </name> ?
4929   <description> xs:string </description> ?
4930   <created> xs:dateTime </created> ?
4931   <updated> xs:dateTime </updated> ?
4932   <property key="xs:string"> xs:string </property> *
4933   <network href="xs:anyURI"> *
4934   <operation rel="edit" href="xs:anyURI"/> ?
4935   <operation rel="delete" href="xs:anyURI"/> ?
4936   <xs:any>*
4937 </ForwardingGroup>
    
```

4938 **5.16.17.1 Collections**

4939 The following describes the collection resources owned by ForwardingGroups.

4940 **5.16.17.1.1 ForwardingGroupNetwork Collection**

4941 The resource type for each item of this collection is "ForwardingGroupNetwork", as defined as follows:

Name	ForwardingGroupNetwork	
Type URI	http://schemas.dmtf.org/cimi/1/ForwardingGroupNetwork	
Attribute	Type	Description
network	ref	A reference to a Network in the ForwardingGroup. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

4942 **JSON serialization:**

```

4943 { "resourceURI":
4944   "http://schemas.dmtf.org/cimi/1/ForwardingGroupNetworkCollection",
4945   "id": string,
4946   "count": number,
4947   "forwardingGroupNetworks": [
4948     { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroupNetwork",
4949       "id": string,
4950       "name": string, ?
4951       "description": string, ?
4952       "created": string, ?
4953       "updated": string, ?
4954       "properties": { "key": string, + }, ?
4955       "network": { "href": string },
4956       "operations": [
4957         { "rel": "edit", "href": string }, ?
4958         { "rel": "delete", "href": string } ?
4959       ] ?
4960       ...
4961     }, +
4962   ], ?
4963   "operations": [ { "rel": "add", "href": string } ? ]
4964   ...
4965 }
    
```

4966 **XML serialization:**

4967 <Collection

```

4968 resourceURI="http://schemas.dmtf.org/cimi/1/ForwardingGroupNetworkCollection"
4969     xmlns="http://schemas.dmtf.org/cimi/1">
4970     <id> xs:anyURI </id>
4971     <count> xs:integer </count>
4972     <ForwardingGroupNetwork>
4973         <id> xs:anyURI </id>
4974         <name> xs:string </name> ?
4975         <description> xs:string </description> ?
4976         <created> xs:dateTime </created> ?
4977         <updated> xs:dateTime </updated> ?
4978         <property key="xs:string"> xs:string </property> *
4979         <network href="xs:anyURI"/>
4980         <operation rel="edit" href="xs:anyURI"/> ?
4981         <operation rel="delete" href="xs:anyURI"/> ?
4982         <xs:any>*
4983     </ForwardingGroupNetwork> *
4984     <operation rel="add" href="xs:anyURI"/> ?
4985     <xs:any>*
4986 </Collection>

```

4987 5.16.17.2 Operations

4988 This resource supports the Read, Update, and Delete operations. Create is supported via the
4989 ForwardingGroup Collection resource.

4990 5.16.18 Forwarding Group Collection

4991 A Forwarding Group Collection resource represents the collection of Forwarding Groups within a Provider
4992 and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

4993 JSON serialization:

```

4994 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroupCollection",
4995   "id": string,
4996   "count": number,
4997   "forwardingGroups": [
4998     { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroup",
4999       "id": string,
5000       ... remaining ForwardingGroup attributes ...
5001     }, +
5002   ], ?
5003   "operations": [ { "rel": "add", "href": string } ? ]
5004   ...
5005 }

```

5006 XML serialization:

```

5007 <Collection
5008     resourceURI="http://schemas.dmtf.org/cimi/1/ForwardingGroupCollection"
5009     xmlns="http://schemas.dmtf.org/cimi/1">
5010     <id> xs:anyURI </id>
5011     <count> xs:integer </count>
5012     <ForwardingGroup>
5013         <id> xs:anyURI </id>
5014         ... remaining ForwardingGroup attributes ...
5015     </ForwardingGroup> *
5016     <operation rel="add" href="xs:anyURI"/> ?
5017     <xs:any>*
5018 </Collection>

```

5019 5.16.18.1 Operations

5020 NOTE: The "add" operation requires a ForwardingGroupTemplate be used.

5021 **5.16.19 Forwarding Group Template**

 5022 This resource captures the configuration values for realizing a ForwardingGroup. A Forwarding Group
 5023 Template may be used to create multiple ForwardingGroup.

Name	ForwardingGroupTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplate	
Attribute	Type	Description
networks	<i>ref[]</i>	An array of references to the networks in this Forwarding Group. Array item name: network Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

5024 The following describes the serialization of the resource in both JSON and XML:

 5025 **JSON media type:** application/json

 5026 **JSON serialization:**

```

5027 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplate",
5028   "id": string,
5029   "name": string, ?
5030   "description": string, ?
5031   "created": string, ?
5032   "updated": string, ?
5033   "properties": { "key": string, + }, ?
5034   "networks": [
5035     { "href": string }, +
5036   ], ?
5037   "operations": [
5038     { "rel": "edit", "href": string }, ?
5039     { "rel": "delete", "href": string } ?
5040   ] ?
5041   ...
5042 }
```

 5043 **XML media type:** application/xml

 5044 **XML serialization:**

```

5045 <ForwardingGroupTemplate xmlns="http://schemas.dmtf.org/cimi/1">
5046   <id> xs:anyURI </id>
5047   <name> xs:string </name> ?
5048   <description> xs:string </description> ?
5049   <created> xs:dateTime </created> ?
5050   <updated> xs:dateTime </updated> ?
5051   <property key="xs:string"> xs:string </property> *
5052   <network href="xs:anyURI"> *
5053   <operation rel="edit" href="xs:anyURI"/> ?
5054   <operation rel="delete" href="xs:anyURI"/> ?
5055   <xs:any*
5056 </ForwardingGroupTemplate>
```

 5057 **5.16.19.1 Operations**

 5058 This resource supports the Read, Update, and Delete operations. Create is supported via the Forwarding
 5059 Group Template Collection resource.

5060 5.16.20 Forwarding Group Template Collection

5061 A Forwarding Group Template Collection resource represents the collection of Forwarding Group
5062 Template resources within a Provider and follows the Collection pattern defined in clause 5.5.12. This
5063 resource shall be serialized as follows:

5064 JSON serialization:

```
5065 { "resourceURI":
5066     "http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplateCollection",
5067     "id": string,
5068     "count": number,
5069     "forwardingGroupTemplates": [
5070         { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplate",
5071           "id": string,
5072           ... remaining ForwardingGroupTemplate attributes ...
5073         }, +
5074     ], ?
5075     "operations": [ { "rel": "add", "href": string } ? ]
5076     ...
5077 }
```

5078 XML serialization:

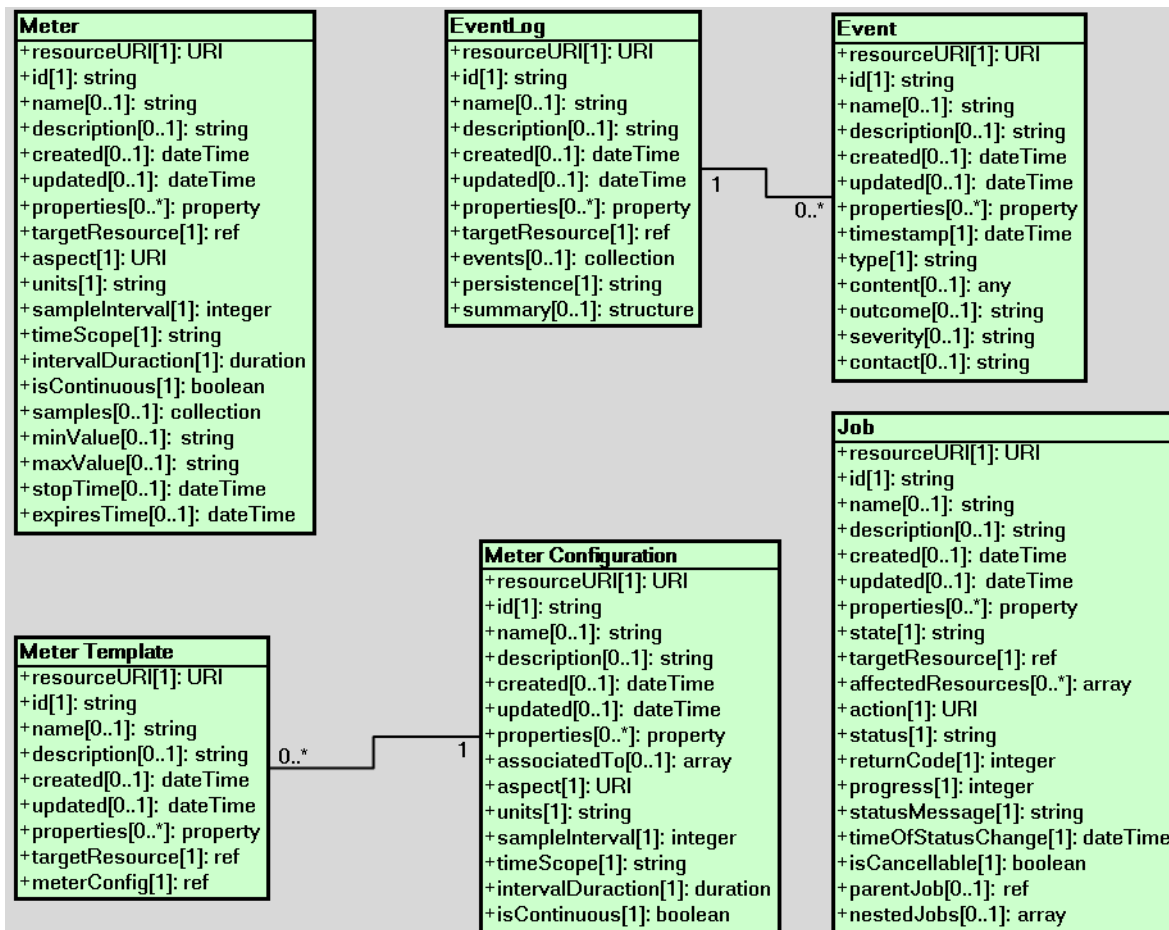
```
5079 <Collection
5080   resourceURI="http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplateCollection"
5081   xmlns="http://schemas.dmtf.org/cimi/1">
5082   <id> xs:anyURI </id>
5083   <count> xs:integer </count>
5084   <ForwardingGroupTemplate>
5085     <id> xs:anyURI </id>
5086     ... remaining ForwardingGroupTemplate attributes ...
5087   </ForwardingGroupTemplate> *
5088   <operation rel="add" href="xs:anyURI"/> ?
5089   <xs:any>*
5090 </Collection>
```

5091 5.16.20.1 Operations

5092 This resource supports the Read and Update operations. Creation of new Forwarding Group Template
5093 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

5094 5.17 Monitoring resources and relationships

5095 Figure 6 illustrates the resources involved in tracking the progress of operations, as well as, metering and
5096 monitoring the status of other resources. Although this drawing is in the style of a Resource Relationship
5097 diagram, the use of UML is neither rigorous nor normative.



5098

Figure 6 - Monitoring resources

 5099 **5.17.1 Job**

 5100 This resource represents a process (i.e., a sequence of one or more operations directed to accomplish a
 5101 specific goal) that is performed by the Provider.

 5102 If a Provider supports exposing Job resources to Consumers, each request from a Consumer that would
 5103 result in a change to the environment shall result in a Job resource being created and an absolute URI
 5104 reference to that Job resource shall be made available to the requesting Consumer. Providers may create
 5105 additional Job resources for Provider initiated operations if the Provider chooses to expose these Jobs to
 5106 Consumers.

 5107 When a Job does not complete successfully (e.g., it is in the FAILED or STOPPED state), this
 5108 specification does not place any requirements on the Provider to ensure that the affected resources are
 5109 left in certain states. Based on the environmental conditions at that time, the Provider might choose to
 5110 "undo" any impact of the operation; simply halt processing; attempt some kind of "cleanup" action; or
 5111 choose to do something else. However, Providers shall list all resources impacted by the Job in the
 5112 "affectedResources" attribute, thus allowing Consumers an opportunity to examine the state of each
 5113 resource themselves. In cases where a resource has been deleted, references to that resource shall not
 5114 appear in the "affectedResources" attribute.

 5115 The Job resource allows for nesting of Jobs. The determination of when a single operation is converted
 5116 into multiple nested Jobs is out of scope of this specification. However, if there are nested Jobs, the top-

5117 most Job resource shall report the overall status of all Jobs and shall only be in a "SUCCESS" state if all
 5118 nested Jobs are also in "SUCCESS" state. When nested Jobs are created, there is no requirement for
 5119 the top-most Job resource to reference all affected resources in its "affectedResources" attribute. The
 5120 Consumer will need to traverse the entire set of nested Jobs to determine the complete list of resources
 5121 impacted by the Jobs.

Name	Job	
Type URI	http://schemas.dmtf.org/cimi/1/Job	
Attribute	Type	Description
state	<i>string</i>	The state of the process associated with this operation. Allowable values include: QUEUED : Indicates that the operation has not yet begun processing. Allowable actions when in this state are: stop . RUNNING : Indicates that the operation is still being executed. Allowable action when in this state is: stop . FAILED : Indicates that the operation failed to complete successfully. SUCCESS : Indicates that the operation successfully completed. STOPPING : Indicates that the operation is in the process of being stopped. Allowable action when in this state is: stop . STOPPED : Indicates that the operation was stopped before completion. STOPPING and STOPPED states are optional and Providers may choose to support them or not. Providers may define additional values. <u>Constraints:</u> Provider : support mandatory; mutable Consumer : support mandatory; read-only
targetResource	<i>ref</i>	A reference to the top-level resource upon which the operation is being performed. Typically, this resource would be the resource on which the operation was invoked. Note that when an "add" Job is executed against a "Collection" resource (e.g. MachineCollection), the targetResource attribute shall reference the Collection resource - as that is the resource on which the operation was performed. Additionally, the newly created resource shall appear in the "affectedResources" attribute. <u>Constraints:</u> Provider : support mandatory; immutable Consumer : support mandatory; read-only
affectedResources	<i>ref[]</i>	A list of references to resources that have been impacted by this Job. Note that this list will always contain the "targetResource" reference. Array item name: affectedResource <u>Constraints:</u> Provider : support mandatory; mutable Consumer : support mandatory; read-only
action	<i>URI</i>	A URI that indicates the type of action being performed. <u>Constraints:</u> Provider : support mandatory; immutable Consumer : support mandatory; read-only

returnCode	<i>integer</i>	<p>The operation return code. The specific value will be specific to the implementation. Values in the range of 0 to 9999 are reserved for use by this specification.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
progress	<i>integer</i>	<p>An integer value in the range 0 ... 100 that indicates the progress of this Job. This value shall be 100 when the Job is no longer executing, regardless of the outcome.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
statusMessage	<i>string</i>	<p>This attribute is a human-readable string that provides information about the operation. It is used to further qualify or provide additional information about the current status of the operation. For example, this attribute may indicate the reason why the operation failed, or whether the operation was cancelled by the Consumer or the Provider.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
timeOfStatusChange	<i>dateTime</i>	<p>A timestamp indicating the last time that the status of the operation changed.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
parentJob	<i>ref</i>	<p>A reference to the Job of which this resource is a subordinate.</p> <p>Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only</p>
nestedJobs	<i>ref[]</i>	<p>An array of references to a set of subordinate Job resources.</p> <p>Array item name: nestedJob</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>

5122 The following describes the serialization of the resource in both JSON and XML:

5123 **JSON media type:** application/json

5124 **JSON serialization:**

```

5125 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Job",
5126   "id": string,
5127   "name": string, ?
5128   "description": string, ?
5129   "created": string, ?
5130   "updated": string, ?
5131   "properties": { "key": string, + }, ?
5132   "state": string,
5133   "targetResource": { "href": string },
5134   "affectedResources": [ { "href": string }, + ],
5135   "action": string,
5136   "returnCode": number,
5137   "progress": number,
5138   "statusMessage": string,
5139   "timeOfStatusChange": date,

```

```

5140     "isCancellable": boolean,
5141     "parentJob": { "href": string }, ?
5142     "nestedJobs": [
5143       { "href": string }, +
5144     ], ?
5145     "operations": [
5146       { "rel": "edit", "href": string }, ?
5147       { "rel": "delete", "href": string }, ?
5148       { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string } ?
5149     ] ?
5150     ...
5151   }

```

5152 **XML media type:** application/xml

5153 **XML serialization:**

```

5154 <Job xmlns="http://schemas.dmtf.org/cimi/1">
5155   <id> xs:anyURI </id>
5156   <name> xs:string </name> ?
5157   <description> xs:string </description> ?
5158   <created> xs:dateTime </created> ?
5159   <updated> xs:dateTime </updated> ?
5160   <property key="xs:string"> xs:string </property> *
5161   <state> xs:string </state>
5162   <targetResource href="xs:anyURI"/>
5163   <affectedResource href="xs:anyURI"/> +
5164   <action> xs:anyURI </action>
5165   <status> xs:string </status>
5166   <returnCode> xs:integer </returnCode>
5167   <progress> xs:integer <progress>
5168   <statusMessage> xs:string </statusMessage>
5169   <timeOfStatusChange> xs:dateTime </timeOfStatusChange>
5170   <isCancellable> xs:boolean </isCancellable>
5171   <parentJob href="xs:anyURI"/> ?
5172   <nestedJob href="xs:anyURI"/> *
5173   <operation rel="edit" href="xs:anyURI"/> ?
5174   <operation rel="delete" href="xs:anyURI"/> ?
5175   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
5176 href="xs:anyURI"/> ?
5177   <xs:any*>
5178 </Job>

```

5179 5.17.1.1 Operations

5180 This resource supports the Read, Update and Delete operations.

5181 Note that deleting a Job that is in the "RUNNING" state shall be the equivalent of first stopping the Job
5182 and then deleting it. A request to delete a running Job that does not support the "stop" action shall fail.

5183 The following custom operations are also defined:

5184 **Stopping a Job**

5185 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

5186 This operation will stop a Job.

5187 Input parameters: None.

5188 Output parameters: None.

5189 During the processing of this operation, the Job shall be in the "STOPPING" state.

5190 Upon successful completion of this operation, the Job shall be in the "STOPPED" state.

5191 **HTTP protocol**

5192 To stop a Job, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the Job where
5193 the HTTP request body shall be as described below.

5194 **JSON media type:** application/json

5195 **JSON serialization:**

```
5196 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
5197   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
5198   "properties": { "key": string, + } ?
5199   ...
5200 }
```

5201 **XML media type:** application/xml

5202 **XML serialization**

```
5203 <Action xmlns="http://schemas.dmtf.org/cimi/1">
5204   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
5205   <property key="xs:string"> xs:string </property> *
5206   <xs:any>*
5207 </Action>
```

5208 Upon successful processing of the request, the HTTP response body will be empty.

5209 **5.17.2 Job Collection**

5210 A Job Collection resource represents the collection of Jobs within a Provider and follows the Collection
5211 pattern defined in clause 5.5.12. This resource shall be serialized as follows:

5212 **JSON serialization:**

```
5213 { "resourceURI": "http://schemas.dmtf.org/cimi/1/JobCollection",
5214   "id": string,
5215   "count": integer,
5216   "jobs": [
5217     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Job",
5218       "id": string,
5219       ... remaining Job attributes ...
5220     }, +
5221   ], ?
5222   "operations": [ { "rel": "add", "href": string } ? ]
5223   ...
5224 }
```

5225 **XML serialization:**

```
5226 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/JobCollection"
5227   xmlns="http://schemas.dmtf.org/cimi/1">
5228   <id> xs:anyURI </id>
5229   <count> xs:integer </count>
5230   <Job>
5231     <id> xs:anyURI </id>
5232     ... remaining Job attributes ...
5233   </Job> *
5234   <operation rel="add" href="xs:anyURI"/> ?
5235   <xs:any>*
5236 </Collection>
```

5237 **5.17.3 Meter**

5238 This resource represents an available Meter of some property associated to a given resource.

5239 When a Meter's "targetResource" is deleted all Meters associated with that resource shall also be
5240 deleted. In other words, deleting a resource-specific MetersCollection (e.g. a Machine's MetersCollection)
5241 shall also result in the deletion of the Meters referenced from that collection.

Name	Meter	
Type URI	http://schemas.dmtf.org/cimi/1/Meter	
Attribute	Type	Description
targetResource	<i>ref</i>	A reference to the resource to which the Meter is related. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
aspect	<i>URI</i>	A unique identifier representing the aspect of the resource being metered. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
units	<i>string</i>	The name of the used units, e.g., kilobits per second, CPU usage percentage, etc. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
sampleInterval	<i>integer</i>	The time between consecutive samples in seconds. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
timeScope	<i>string</i>	The time scope to which this meter's value applies. Two possible values: "Point" indicates that the Meter applies to a point in time. "Interval" indicates that the Meter applies to a time interval. For instance, it would be possible to define a Meter whose purpose is to provide the daily average CPU usage. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
intervalDuration	<i>duration</i>	The interval duration when the timeScope is set to "Interval". Possible values: hourly, daily, weekly, monthly or yearly. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
isContinuous	<i>boolean</i>	This value indicates whether or not the Meter value is continuous or scalar. Performance Meters are an example of a linear metric. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
samples	<i>collection [Sample]</i>	A reference to the list of taken samples Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

minValue	<i>string</i>	The expected minimal measure value. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
maxValue	<i>string</i>	The expected maximum measure value. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
stopTime	<i>dateTime</i>	The time from which the meter stops tracking samples. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
expiresTime	<i>dateTime</i>	The time from which the Meter is not monitored anymore. It implies the deletion of the Meter after this time. Note that a Meter might be deleted before this time if the resource being metered is deleted. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

5242 The following describes the serialization of the resource in both JSON and XML:

5243 **JSON media type:** application/json

5244 **JSON serialization:**

```

5245 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
5246   "id": string,
5247   "name": string, ?
5248   "description": string, ?
5249   "created": string, ?
5250   "updated": string, ?
5251   "properties": { "key": string, + }, ?
5252   "targetResource": { "href": string }, ?
5253   "aspect": string,
5254   "units": string,
5255   "sampleInterval": number,
5256   "timeScope": string,
5257   "intervalDuration": string,
5258   "isContinuous": boolean,
5259   "samples": { "href": string }, ?
5260   "minValue": string, ?
5261   "maxValue": string, ?
5262   "stopTime": string, ?
5263   "expiresTime": string, ?
5264   "operations": [
5265     { "rel": "edit", "href": string }, ?
5266     { "rel": "delete", "href": string }, ?
5267     { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
5268     { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string } ?
5269   ] ?
5270   ...
5271 }
```

5272 **XML media type:** application/xml

5273 **XML serialization:**

```

5274 <Meter xmlns="http://schemas.dmtf.org/cimi/1">
5275   <id> xs:anyURI </id>
5276   <name> xs:string </name> ?
5277   <description> xs:string </description> ?
5278   <created> xs:dateTime </created> ?
5279   <updated> xs:dateTime </updated> ?
5280   <property key="xs:string"> xs:string </property> *
5281   <targetResource href="xs:anyURI"/>
5282   <aspect> xs:anyURI </aspect>
5283   <units> xs:string </units>
5284   <sampleInterval> xs:integer </sampleInterval>
5285   <timeScope> xs:string <timeScope>
5286   <intervalDuration xs:duration </intervalDuration>
5287   <isContinuous> xs:boolean </isContinuous>
5288   <samples href="xs:anyURI"/> ?
5289   <minValue> xs:string </minValue> ?
5290   <maxValue> xs:string </maxValue> ?
5291   <stopTime> xs:dateTime </stopTime> ?
5292   <expiresTime> xs:dateTime </expiresTime> ?
5293   <operation rel="edit" href="xs:anyURI"/> ?
5294   <operation rel="delete" href="xs:anyURI"/> ?
5295   <operation rel="http://schemas.dmtf.org/cimi/1/action/start"
5296 href="xs:anyURI"/> ?
5297   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
5298 href="xs:anyURI"/> ?
5299   <xs:any>*
5300 </Meter>
    
```

5301 **5.17.3.1 Collections**

5302 The following describes the collection resources owned by Meters.

5303 **5.17.3.1.1 Sample Collection**

5304 The resource type for each item of this collection is “Sample”, defined as follows:

Name	Sample	
Type URI	http://schemas.dmtf.org/cimi/1/Sample	
Attribute	Type	Description
timeStamp	dateTime	It indicates when the measure was taken (timeScope="Point"). When the timeScope is "Interval", it indicates the end of the time interval. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
value	string	It indicates the sampled value of the measure. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only

5305 **JSON serialization:**

```

5306 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SampleCollection",
5307   "id": string,
5308   "count": number,
5309   "samples": [
    
```

```

5310 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Sample",
5311     "id": string,
5312     "name": string, ?
5313     "description": string, ?
5314     "created": string, ?
5315     "updated": string, ?
5316     "properties": { "key": string, + }, ?
5317     "timestamp": string,
5318     "value": string
5319     ...
5320 }, +
5321 ], ?
5322 ...
5323 }

```

5324 XML serialization:

```

5325 <Collection
5326     resourceURI="http://schemas.dmtf.org/cimi/1/SampleCollection"
5327     xmlns="http://schemas.dmtf.org/cimi/1">
5328 <id> xs:anyURI </id>
5329 <count> xs:integer </count>
5330 <Sample>
5331     <id> xs:anyURI </id>
5332     <name> xs:string </name> ?
5333     <description> xs:string </description> ?
5334     <created> xs:dateTime </created> ?
5335     <updated> xs:dateTime </updated> ?
5336     <property key="xs:string"> xs:string </property> *
5337     <sample timestamp="xs:dateTime" value="xs:string"/>
5338     <xs:any>*
5339 </Sample> *
5340 <xs:any>*
5341 </Collection>

```

5342 5.17.3.2 Operations

5343 This resource supports the Read, Update, and Delete operations. Create is supported via the Meter
5344 Collection resource.

5345 NOTE: The deletion of a Meter shall remove the Meter from the targetResource's "meter" attribute.

5346 The following custom operations are also defined:

5347 Starting a Meter

5348 **/link@rel:** <http://schemas.dmtf.org/cimi/1/action/start>

5349 This operation will start a Meter.

5350 Input parameters: None.

5351 Output parameters: None.

5352 Upon successful completion of this operation, the Meter starts recording samples related to its associated
5353 resource.

5354 HTTP protocol

5355 To start a Meter, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/start" URI of the Meter
5356 where the HTTP request body shall be as described below.

5357 **JSON media type:** application/json

5358 **JSON serialization:**

```
5359 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
5360   "action": "http://schemas.dmtf.org/cimi/1/action/start",
5361   "properties": { "key": string, + } ?
5362   ...
5363 }
```

5364 **XML media type:** application/xml

5365 **XML serialization**

```
5366 <Action xmlns="http://schemas.dmtf.org/cimi/1">
5367   <action> http://schemas.dmtf.org/cimi/1/action/start </action>
5368   <property key="xs:string"> xs:string </property> *
5369   <xs:any>*
5370 </Action>
```

5371 Upon successful processing of the request, the HTTP response body will be empty.

5372 **Stopping a Meter**

5373 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

5374 This operation will stop a Meter.

5375 Input parameters: None.

5376 Output parameters: None.

5377 Upon successful completion of this operation, the Meter will no longer be recording samples related to its
5378 associated resource.

5379 **HTTP protocol**

5380 To stop a Meter, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the Meter
5381 where the HTTP request body shall be as described below.

5382 **JSON media type:** application/json

5383 **JSON serialization:**

```
5384 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
5385   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
5386   "properties": { "key": string, + } ?
5387   ...
5388 }
```

5389 **XML media type:** application/xml

5390 **XML serialization**

```
5391 <Action xmlns="http://schemas.dmtf.org/cimi/1">
5392   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
5393   <property key="xs:string"> xs:string </property> *
5394   <xs:any>*
5395 </Action>
```

5396 Upon successful processing of the request, the HTTP response body will be empty.

5397 **5.17.4 Meter Collection**

5398 A Meter Collection resource represents the collection of Meters within a Provider and follows the
 5399 Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

5400 **JSON serialization:**

```
5401 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterCollection",
5402   "id": string,
5403   "count": number,
5404   "meters": [
5405     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
5406       "id": string,
5407       ... remaining Meter attributes ...
5408     }, +
5409   ], ?
5410   "operations": [ { "rel": "add", "href": string } ? ]
5411   ...
5412 }
```

5413 **XML serialization:**

```
5414 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/MeterCollection"
5415   xmlns="http://schemas.dmtf.org/cimi/1">
5416   <id> xs:anyURI </id>
5417   <count> xs:integer </count>
5418   <Meter>
5419     <id> xs:anyURI </id>
5420     ... remaining Meter attributes ...
5421   </Meter> *
5422   <operation rel="add" href="xs:anyURI"/> ?
5423   <xs:any>*
5424 </Collection>
```

5425 **5.17.4.1 Operations**

5426 NOTE: The "add" operation requires a MeterTemplate be used.

5427 When Meters are created via the global (Cloud Entry Point) MeterCollection's "add" operation, they are
 5428 automatically added to the corresponding targetResource's "Meters" collection resource as well.

5429 **5.17.5 Meter Template**

5430 A Meter Template represents the information needed to create a new Meter.

Name	MeterTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/MeterTemplate	
Attribute	Type	Description
targetResource	ref	A reference to the resource that will be metered. The type of the resource shall be one of the "associatedTo" types listed in the Meter Configuration referenced. When this Template is used to create a new Meter via the global (Cloud Entry Point) Meters Collection, this attribute shall be present. When this Template is used to create a new Meter via a targetResource's Meters Collection then this attribute shall either be absent or shall have the same value as the "id" of the targetResource to which this Meter is being added. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
meterConfig	ref	A reference to the Meter Configuration that will be used to create a Meter from this

	<p>Meter Template.</p> <p>Note that the attributes of the MeterConfiguration may be specified rather than a reference to an existing MeterConfiguration resource.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
--	---

5431 The following describes the serialization of the resource in both JSON and XML:

5432 **JSON media type:** application/json

5433 **JSON serialization:**

```

5434 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterTemplate",
5435   "id": string,
5436   "name": string, ?
5437   "description": string, ?
5438   "created": string, ?
5439   "updated": string, ?
5440   "properties": { "key": string, + }, ?
5441   "targetResource": { string },
5442   "meterConfig": {
5443     "href": string | ... MeterConfiguration attributes ...
5444   },
5445   "operations": [
5446     { "rel": "edit", "href": string }, ?
5447     { "rel": "delete", "href": string } ?
5448   ] ?
5449   ...
5450 }
```

5451 **XML media type:** application/xml

5452 **XML serialization:**

```

5453 <MeterTemplate xmlns="http://schemas.dmtf.org/cimi/1">
5454   <id> xs:anyURI </id>
5455   <name> xs:string </name> ?
5456   <description> xs:string </description> ?
5457   <created> xs:dateTime </created> ?
5458   <updated> xs:dateTime </updated> ?
5459   <property key="xs:string"> xs:string </property> *
5460   <targetResource href="xs:anyURI"/>
5461   <meterConfig href="xs:anyURI"?>
5462     ... MeterConfiguration attributes ... ?
5463   </meterConfig>
5464   <operation rel="edit" href="xs:anyURI"/> ?
5465   <operation rel="delete" href="xs:anyURI"/> ?
5466   <xs:any*>
5467 </MeterTemplate>
```

5468 5.17.6 Meter Template Collection

5469 A Meter Template Collection resource represents the collection of MeterTemplate resources within a
5470 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
5471 follows:

5472 **JSON serialization:**

```

5473 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterTemplateCollection",
5474   "id": string,
5475   "count": number,
```

```

5476 "meterTemplates": [
5477   { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterTemplate",
5478     "id": string,
5479     ... remaining MeterTemplate attributes ...
5480   }, +
5481 ], ?
5482 "operations": [ { "rel": "add", "href": string } ? ]
5483 ...
5484 }
    
```

5485 **XML serialization:**

```

5486 <Collection
5487   resourceURI="http://schemas.dmtf.org/cimi/1/MeterTemplateCollection"
5488   xmlns="http://schemas.dmtf.org/cimi/1">
5489   <id> xs:anyURI </id>
5490   <count> xs:integer </count>
5491   <MeterTemplate>
5492     <id> xs:anyURI </id>
5493     ... remaining MeterTemplate attributes ...
5494   </MeterTemplate> *
5495   <operation rel="add" href="xs:anyURI"/> ?
5496   <xs:any>*
5497 </Collection>
    
```

5498 **5.17.6.1 Operations**

5499 This resource supports the Read and Update operations. Creation of new Meter Template resources are
 5500 supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

5501 **5.17.7 Meter Configuration**

5502 A Meter Configuration represents the definition of a Meter.

Name	MeterConfiguration	
Type URI	http://schemas.dmtf.org/cimi/1/MeterConfiguration	
Attribute	Type	Description
associatedTo	<i>URI[]</i>	An array of URIs that indicate the resources to which a Meter created from this configuration can be applied. The value space of these URIs is identical to that of ResourceMetadata.typeURI, which is a URI that uniquely identifies a resource type. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
aspect	<i>URI</i>	A unique identifier representing the aspect of the resource being metered. See the table below for the set of CIMI defined URIs. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
units	<i>string</i>	The human-readable name of the used units, e.g., kilobits per second, CPU usage percentage, etc. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
sampleInterval	<i>integer</i>	The time between consecutive samples in seconds. Constraints: Provider: support mandatory; mutable

		Consumer: support mandatory; read-write
timeScope	<i>string</i>	<p>The time scope to which the Meter value applies.</p> <p>Two possible values: "Point" indicates that the Meter applies to a point in time. "Interval" indicates that the Meter applies to a time interval. For instance, it would be possible to define a MeterConfiguration whose purpose is to provide the daily average CPU usage.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
intervalDuration	<i>duration</i>	<p>The interval duration when the timeScope is set to "Interval." Possible values: hourly, daily, weekly, monthly, or yearly.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
isContinuous	<i>boolean</i>	<p>This value indicates whether the Meter value is continuous or scalar. Performance Meters are an example of a linear metric.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>

5503 The following describes the serialization of the resource in both JSON and XML:

5504 **JSON media type:** application/json

5505 **JSON serialization:**

```

5506 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterConfiguration",
5507   "id": string,
5508   "name": string, ?
5509   "description": string, ?
5510   "created": string, ?
5511   "updated": string, ?
5512   "properties": { "key": string, + }, ?
5513   "associatedTo": [
5514     { "href": string }, +
5515   ], ?
5516   "aspect": string,
5517   "units": string,
5518   "sampleInterval": number,
5519   "timeScope": string,
5520   "intervalDuration": string,
5521   "isContinuous": boolean,
5522   "operations": [
5523     { "rel": "edit", "href": string }, ?
5524     { "rel": "delete", "href": string } ?
5525   ] ?
5526   ...
5527 }
```

5528 **XML media type:** application/xml

5529 **XML serialization:**

```

5530 <MeterConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
5531   <id> xs:anyURI </id>
5532   <name> xs:string </name> ?
5533   <description> xs:string </description> ?
5534   <created> xs:dateTime </created> ?
5535   <updated> xs:dateTime </updated> ?
```



```

5536 <property key="xs:string"> xs:string </property> *
5537 <associatedTo href="xs:anyURI"/> *
5538 <aspect> xs:anyURI </aspect>
5539 <units> xs:string </units>
5540 <sampleInterval> xs:integer </sampleInterval>
5541 <timeScope> xs:string </timeScope>
5542 <intervalDuration> xs:duration </intervalDuration>
5543 <isContinuous> xs:boolean </isContinuous>
5544 <operation rel="edit" href="xs:anyURI"/> ?
5545 <operation rel="delete" href="xs:anyURI"/> ?
5546 <xs:any>*
5547 </MeterConfiguration>
    
```

5548 The following table describes the "aspect" URIs defined by this specification. Providers may define new
 5549 aspect URIs and it is recommended that these URIs be dereferencable such that Consumers can
 5550 discover the details of the new aspect. For brevity the "URI" column in the table only shows the last part
 5551 of the URI. It should be appended to: "http://schemas.dmtf.org/cimi/1/aspect/".

Aspect	Description
cpu	The percentage CPU usage of the resource. Typically associated with CEP, System, and Machine resources. For resources that group other resources (e.g., CEP or System resources), this aspect provides the aggregated percentage usage of the CPU.
memory	The amount of memory being used by the resource. Typically associated with CEP, System, and Machine resources. For resources that group other resources (e.g., CEP or System resources), this aspect provides the aggregated usage of the memory.
disk	The amount of disk being used by the resource. Typically associated with CEP, System, Machine, and Volume resources. For resources that group other resources (e.g., CEP or System resources), this aspect provides the aggregated disk usage.
bandwidth	The amount of network traffic. Typically associated with CEP, System, and Network resources. For CEP and System resources, this aspect provides the aggregated bandwidth of all the networks under them.
inputBandwidth	The amount of input bandwidth used by the resource. Typically associated with Machine, NetworkPort, and Volume resources. For Machine resources, this aspect provides the aggregated input bandwidth usage of all its network interfaces .
outputBandwidth	The amount of output bandwidth used by the resource. Typically associated with Machine, NetworkPort, and Volume resources. For Machine resources, this aspect provides the aggregated input bandwidth usage of all its network interfaces.

5552 **5.17.7.1 Operations**

5553 This resource supports the Read, Update, and Delete operations. Create is supported via the Meter
 5554 Configuration Collection resource.

5555 **5.17.8 Meter Configuration Collection**

5556 A Meter Configuration Collection resource represents the collection of Meter Configurations within a
 5557 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
 5558 follows:

5559 **JSON serialization:**

```

5560 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterConfigurationCollection",
5561   "id": string,
5562   "count": number,
5563   "meterConfigurations": [
5564     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterConfiguration",
5565       "id": string,
5566       ... remaining MeterConfiguration attributes ...
    
```

```

5567     }, +
5568     ], ?
5569     "operations": [ { "rel": "add", "href": string } ? ]
5570     ...
5571 }
    
```

5572 **XML serialization:**

```

5573 <Collection
5574     resourceURI="http://schemas.dmtf.org/cimi/1/MeterConfigurationCollection"
5575     xmlns="http://schemas.dmtf.org/cimi/1">
5576   <id> xs:anyURI </id>
5577   <count> xs:integer </count>
5578   <MeterConfiguration>
5579     <id> xs:anyURI </id>
5580     ... remaining MeterConfiguration attributes ...
5581   </MeterConfiguration> *
5582   <operation rel="add" href="xs:anyURI"/> ?
5583   <xs:any>*
5584 </Collection>
    
```

5585 **5.17.8.1 Operations**

5586 This resource supports the Read and Update operations. Creation of new Meter Configuration resources
 5587 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

5588 **5.17.9 Event Log**

5589 An resource that represents a registry of Events.

5590 When an EventLog's "targetResource" is deleted the EventLog associated with that resource may also be
 5591 deleted. In other words, deleting a resource (e.g. a Machine) may also result in the deletion of the
 5592 EventLog referenced from that resource. This behavior is denoted by the EventLog.Linked capability.

5593 When an EventLog is deleted all of its Events shall also be deleted.

Name	EventLog	
Type URI	http://schemas.dmtf.org/cimi/1/EventLog	
Attribute	Type	Description
targetResource	ref	A reference to the resource to which the Events are related. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
events	collection [Event]	A reference to the list of occurred Events. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
persistence	string	A value that indicates the persistence of the Events within the EventLog. For instance, daily, weekly, monthly, or yearly. Events that exceed the persistence duration may be deleted. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
summary	<unnamed structure>	A summary of all the events present in the EventLog when the read operation is performed, grouped by severity. Each summary attribute is an (unnamed) structure that has the following sub-

attributes:		
Attribute	Type	Description
low	<i>integer</i>	Number of occurred Events with a low severity. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
medium	<i>integer</i>	Number of occurred Events with a medium severity. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
high	<i>integer</i>	Number of occurred Events with a high severity. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
critical	<i>integer</i>	Number of occurred Events with a critical severity. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only		

5594 The following describes the serialization of the resource in both JSON and XML:

5595 **JSON media type:** application/json

5596 **JSON serialization:**

```

5597 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLog",
5598   "id": string,
5599   "name": string, ?
5600   "description": string, ?
5601   "created": string, ?
5602   "updated": string, ?
5603   "properties": { "key": string, + }, ?
5604   "targetResource": { "href": string },
5605   "events": { "href": string },
5606   "persistence": string,
5607   "summary": {
5608     "low": number,
5609     "medium": number,
5610     "high": number,
5611     "critical": number
5612   }, ?
5613   "operations": [
5614     { "rel": "edit", "href": string }, ?
5615     { "rel": "delete", "href": string } ?
5616   ] ?
5617   ...
5618 }
```

5619 **XML media type:** application/xml

5620 **XML serialization:**

```

5621 <EventLog xmlns="http://schemas.dmtf.org/cimi/1">
5622   <id> xs:anyURI </id>
```

```

5623     <name> xs:string </name> ?
5624     <description> xs:string </description> ?
5625     <created> xs:dateTime </created> ?
5626     <updated> xs:dateTime </updated> ?
5627     <property key="xs:string"> xs:string </property> *
5628     <targetResource href="xs:anyURI"/>
5629     <events href="xs:anyURI"/>
5630     <persistence> xs:string </persistence>
5631     <summary>
5632         <low> xs:integer </low>
5633         <medium> xs:integer </medium>
5634         <high> xs:integer </high>
5635         <critical> xs:integer </critical>
5636     </summary>
5637     <operation rel="edit" href="xs:anyURI"/> ?
5638     <operation rel="delete" href="xs:anyURI"/> ?
5639     <xs:any*>
5640 </EventLog>

```

5641 5.17.9.1 Collections

5642 The following describes the collection resources owned by EventLogs.

5643 5.17.9.1.1 Event Collection

5644 The resource type for each item of this collection is “Event” as defined in clause 5.17.13.

5645 JSON serialization:

```

5646 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventCollection",
5647   "id": string,
5648   "count": number,
5649   "events": [
5650     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Event",
5651       "id": string,
5652       ... remaining Event attributes ...
5653     }, +
5654   ], ?
5655   "operations": [ { "rel": "add", "href": string } ? ]
5656   ...
5657 }

```

5658 XML serialization:

```

5659 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/EventCollection"
5660   xmlns="http://schemas.dmtf.org/cimi/1">
5661   <id> xs:anyURI </id>
5662   <count> xs:integer </count>
5663   <Event>
5664     <id> xs:anyURI </id>
5665     ... remaining Event attributes ...
5666   </Event> *
5667   <operation rel="add" href="xs:anyURI"/> ?
5668   <xs:any*>
5669 </Collection>

```

5670 5.17.9.2 Operations

5671 This resource supports the Read, Update, and Delete operations.

5672 **5.17.10 Event Log Collection**

5673 A Event Log Collection resource represents the collection of Event Logs within a Provider and follows the
5674 Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

5675 **JSON serialization:**

```
5676 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLogCollection",
5677   "id": string,
5678   "count": number,
5679   "eventLogs": [
5680     { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLog",
5681       "id": string,
5682       ... remaining EventLog attributes ...
5683     }, +
5684   ], ?
5685   "operations": [ { "rel": "add", "href": string } ? ]
5686   ...
5687 }
```

5688 **XML serialization:**

```
5689 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/EventLogCollection"
5690   xmlns="http://schemas.dmtf.org/cimi/1">
5691   <id> xs:anyURI </id>
5692   <count> xs:integer </count>
5693   <EventLog>
5694     <id> xs:anyURI </id>
5695     ... remaining EventLog attributes ...
5696   </EventLog> *
5697   <operation rel="add" href="xs:anyURI"/> ?
5698   <xs:any>*
5699 </Collection>
```

5700 **5.17.11 Event Log Template**

5701 An EventLog Template represents the information needed to create a new EventLog.

Name	EventLogTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/EventLogTemplate	
Attribute	Type	Description
targetResource	ref	A reference to the resource to which the EventLog shall be connected. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
persistence	string	A value that indicates the persistence of the Events in the new EventLog. For instance, daily, weekly, monthly, or yearly. Events that exceed the persistence duration may be deleted. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

5702 The following describes the serialization of the resource in both JSON and XML:

5703 **JSON media type:** application/json

5704 **JSON serialization:**

```
5705 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLogTemplate",
5706   "id": string,
```

```

5707     "name": string, ?
5708     "description": string, ?
5709     "created": string, ?
5710     "updated": string, ?
5711     "properties": { "key": string, + }, ?
5712     "targetResource": { string },
5713     "persistence": string,
5714     "operations": [
5715         { "rel": "edit", "href": string }, ?
5716         { "rel": "delete", "href": string } ?
5717     ] ?
5718     ...
5719 }

```

5720 **XML media type:** application/xml

5721 **XML serialization:**

```

5722 <EventLogTemplate xmlns="http://schemas.dmtf.org/cimi/1">
5723   <id> xs:anyURI </id>
5724   <name> xs:string </name> ?
5725   <description> xs:string </description> ?
5726   <created> xs:dateTime </created> ?
5727   <updated> xs:dateTime </updated> ?
5728   <property key="xs:string"> xs:string </property> *
5729   <targetResource href="xs:anyURI"/>
5730   <persistence> xs:string </persistence>
5731   <operation rel="edit" href="xs:anyURI"/> ?
5732   <operation rel="delete" href="xs:anyURI"/> ?
5733   <xs:any>*
5734 </EventLogTemplate>

```

5735 5.17.12 Event Log Template Collection

5736 A EventLog Template Collection resource represents the collection of EventLogTemplate resources
5737 within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be
5738 serialized as follows:

5739 **JSON serialization:**

```

5740 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLogTemplateCollection",
5741   "id": string,
5742   "count": number,
5743   "eventLogTemplates": [
5744     { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLogTemplate",
5745       "id": string,
5746       ... remaining EventLogTemplate attributes ...
5747     }, +
5748   ], ?
5749   "operations": [ { "rel": "add", "href": string } ? ]
5750   ...
5751 }

```

5752 **XML serialization:**

```

5753 <Collection
5754   resourceURI="http://schemas.dmtf.org/cimi/1/EventLogTemplateCollection"
5755   xmlns="http://schemas.dmtf.org/cimi/1">
5756   <id> xs:anyURI </id>
5757   <count> xs:integer </count>
5758   <EventLogTemplate>
5759     <id> xs:anyURI </id>
5760     ... remaining EventLogTemplate attributes ...
5761   </EventLogTemplate> *

```

```
5762 <operation rel="add" href="xs:anyURI"/> ?
5763 <xs:any>*
5764 </Collection>
```

5765 **5.17.12.1 Operations**

5766 This resource supports the Read and Update operations. Creation of new EventLog Template resources
5767 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

5768 **5.17.13 Event**

5769 An resource that represents the occurrence of an event within the managed infrastructure. Some
5770 examples of Events may be:

- 5771 • Machine X has been rebooted by guest OS.
- 5772 • Machine X is not responding to platform services.
- 5773 • A new vCPU has been added to machine X following defined elasticity rules.

5774 The scope of the Event concept is any information that the Provider is able to track within its infrastructure
5775 and that can constitute useful information for the Consumer. Possible examples include, but are not
5776 limited to, errors and inconveniences that occur in the (virtual) resources assigned to Consumers;
5777 Provider-initiated actions, such as maintenance tasks; etc.

Name	Event	
Type URI	http://schemas.dmtf.org/cimi/1/Event	
Attribute	Type	Description
timestamp	<i>dateTime</i>	<p>The time of occurrence of the actual event. A datetime field formatted according to DSP4004, which follows ISO8601; the timestamp should preserve time zone information, i.e., include a local time component and an offset from UTC.</p> <p>For example, Monday, May 25, 2012, at 1:30:15 PM EST is represented as:</p> <pre>2012-05-25T13:30:15-05:00</pre> <p>NOTE: This attribute should not be confused with the time of creation of the Event resource instance, which is captured in the common "created" attribute.</p> <p>Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only</p>
type	<i>URI</i>	<p>A URI that uniquely identifies the type of the event. When the "content" attribute is present, this URI determines the actual data structure used for this content, e.g., to which schema it is associated.</p> <p>Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only</p>
content	<i>any</i>	<p>A polymorphic attribute that represents detailed event data, the type of which will vary with the event "type." Typically, a data structure; for example:</p> <p>In the case of a monitoring event, the content will hold the target resource ID and type, measured attribute(s), and status value(s).</p> <p>In the case of an audit event conforming to the CADF model, the content will hold the detailed event structure that complies with CADF event schema.</p> <p>In the case of a CIM Indication, the content will hold the structure and attributes defined for such events.</p> <p>Constraints:</p>

		<p>Provider: support mandatory; immutable Consumer: support mandatory; read-only</p>
outcome	<i>string</i>	<p>A string value that characterizes the general significance of the event. A core set is defined that may be used regardless of the event type. For each event type, the definition of a core outcome value maybe refined in the context of this type, provided it does not conflict with the general meaning of the outcome given below.</p> <p>Core outcomes are:</p> <p>Pending: The event is about an action or process that is still ongoing.</p> <p>Unknown: The event is about a request or action that is not known by the Provider.</p> <p>Status: The event reports on the state or status of a resource.</p> <p>Success: The event reports on a successful outcome of some action or process.</p> <p>Warning: The event reports on a situation that requires attention or remedial action.</p> <p>Failure: The event reports on a failed outcome of some action or process.</p> <p>This set of core outcome values may be extended to accommodate possible outcomes of a specific event type. In this case, the extended set of values will apply to all events of this type.</p> <p>Constraints: Provider: support optional; immutable Consumer: support optional; read-only</p>
severity	<i>string</i>	<p>A value indicating the Event severity. Possible values are:</p> <p>critical</p> <p>high</p> <p>medium</p> <p>low</p> <p>The meaning of the severity level may vary depending on the event "type." When such an attribute is not relevant to a particular type of event, it should be omitted.</p> <p>Constraints: Provider: support optional; immutable Consumer: support optional; read-only</p>
contact	<i>string</i>	<p>A reference to a contact point or processing point to handle the event. The actual type of this content (e.g., email address, phone# of helpdesk or staff, message queue, URL...) is dependent on, and determined by the event "type." This attribute is mutable as it may be determined after event creation by the Provider.</p> <p>Constraints: Provider: support optional; immutable Consumer: support optional; read-only</p>

5778 NOTE: There exists a legacy of several event models that have been standardized or designed for various domains
5779 relevant to IT. The objective in CIMI is not to elect one particular event model, but to select as top-level event
5780 attributes the most immediately relevant data useful for event processing in a Cloud environment. Additional event
5781 data may still be represented in the variable content attribute that allows for mapping other event models into a CIMI
5782 event.

5783 The following describes the serialization of the resource in both JSON and XML:

5784 **JSON media type:** application/json

5785 **JSON serialization:**

5786

```
{ "resourceURI": "http://schemas.dmtf.org/cimi/1/Event",
```


5787

```
  "id": string,
```



```

5788 "name": string, ?
5789 "description": string, ?
5790 "created": string, ?
5791 "updated": string, ?
5792 "properties": { "key": string, + }, ?
5793 "timestamp": string,
5794 "type": string,
5795 "content": any, ?
5796 "outcome": string, ?
5797 "severity": string, ?
5798 "contact": string, ?
5799 ...
5800 }
    
```

5801 **XML media type:** application/xml

5802 **XML serialization:**

```

5803 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5804   <id> xs:anyURI </id>
5805   <name> xs:string </name> ?
5806   <description> xs:string </description> ?
5807   <created> xs:dateTime </created> ?
5808   <updated> xs:dateTime </updated> ?
5809   <property key="xs:string"> xs:string </property> *
5810   <timestamp> xs:dateTime </timestamp>
5811   <type> xs:string </type>
5812   <content> xs:any* </content> ?
5813   <outcome> xs:string </outcome> ?
5814   <severity> xs:string </severity> ?
5815   <contact> xs:string </contact> ?
5816   <xs:any>*
5817 </Event>
    
```

5818 The following table describes the "type" URIs that are defined or acknowledged by this specification.
 5819 Additional types may be added by a Provider, for example to characterize external events mapped into
 5820 CIMI events. It is recommended that these URIs be dereferencable such that Consumers can discover a
 5821 more detailed description of the type. Event types defined by this specification will share the same base
 5822 URI: http://schemas.dmtf.org/cimi/1/event/. For brevity, when the "Event Type" column in the table only
 5823 shows a relative URI (e.g., state) it shall be appended to the end of this base URI.

Event Type	Description						
state	<p>Events of this type report state information about CIMI run-time resources such as instances of Machines, Systems, Networks, and Volumes. This information includes reports on any change in the "state" of these resources.</p> <p>The content element associated with this event type has the following structure:</p> <table border="1"> <thead> <tr> <th>Data</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>resName</td> <td>string</td> <td>The name of the resource about the state of which is reported.</td> </tr> </tbody> </table> <p>Constraints: Provider: support optional; immutable Consumer: support optional; read-only</p>	Data	Type	Description	resName	string	The name of the resource about the state of which is reported.
Data	Type	Description					
resName	string	The name of the resource about the state of which is reported.					

	resource	<i>ref</i>	The reference to the resource about the state of which is reported. (Note: This reference may become invalid because the event might outlive the resource.) Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only															
	resType	<i>URI</i>	URI denoting this resource type (same as the type URI associated with the Resource type for this resource). Constraints: Provider: support optional; immutable Consumer: support optional; read-only.															
	state	<i>string</i>	The state reported for the resource. Shall be the same as the "state" attribute value (if any) of the run-time resource at the time the event is generated. Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only															
	previous	<i>string</i>	The previous state value, if the event reports a state change. Constraints: Provider: support optional; immutable Consumer: support optional; read-only.															
alarm	<p>Events of this type report errors or alarms occurring during management operations of Cloud resource. This information includes failures to provision resources, failures to fulfill requests to the CIMI interface, and any critical situation that needs be addressed in a timely manner.</p> <p>The content element associated with this event type has the following structure:</p> <table border="1"> <thead> <tr> <th>Data</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td> resName </td> <td> <i>string</i> </td> <td> The name of the resource associated with this alarm, if applicable. Constraints: Provider: support optional; immutable Consumer: support optional; read-only. </td> </tr> <tr> <td> resource </td> <td> <i>ref</i> </td> <td> The reference to the resource associated with this alarm, if applicable. (Note: This reference may become invalid because the event might outlive the resource.) Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only </td> </tr> <tr> <td> restype </td> <td> <i>URI</i> </td> <td> URI denoting, this resource type associated with this alarm, if applicable (same as the type URI associated with the Resource type for this resource). Constraints: Provider: support optional; immutable Consumer: support optional; read-only </td> </tr> <tr> <td> code </td> <td> <i>string</i> </td> <td> An alarm code. </td> </tr> </tbody> </table>			Data	Type	Description	resName	<i>string</i>	The name of the resource associated with this alarm, if applicable. Constraints: Provider: support optional; immutable Consumer: support optional; read-only.	resource	<i>ref</i>	The reference to the resource associated with this alarm, if applicable. (Note: This reference may become invalid because the event might outlive the resource.) Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only	restype	<i>URI</i>	URI denoting, this resource type associated with this alarm, if applicable (same as the type URI associated with the Resource type for this resource). Constraints: Provider: support optional; immutable Consumer: support optional; read-only	code	<i>string</i>	An alarm code.
Data	Type	Description																
resName	<i>string</i>	The name of the resource associated with this alarm, if applicable. Constraints: Provider: support optional; immutable Consumer: support optional; read-only.																
resource	<i>ref</i>	The reference to the resource associated with this alarm, if applicable. (Note: This reference may become invalid because the event might outlive the resource.) Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only																
restype	<i>URI</i>	URI denoting, this resource type associated with this alarm, if applicable (same as the type URI associated with the Resource type for this resource). Constraints: Provider: support optional; immutable Consumer: support optional; read-only																
code	<i>string</i>	An alarm code.																

			Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only
	detail	string	The detailed information associated with the alarm. Constraints: Provider: support optional; immutable Consumer: support optional; read-only
model	Events of this type report changes in the CIMI resource model, which includes creation, modification, and destruction of resource instances; and updates to metadata (resource extensions, capabilities and constraints, etc.). The content element associated with this event type has the following structure:		
	Data	Type	Description
	resName	string	The name of the main model resource affected by the modification. Constraints: Provider: support optional; immutable Consumer: support optional; read-only
	resource	ref	The reference to the main model resource affected by the modification. (Note: This reference may become invalid because the event might outlive the resource.) Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only
	resType	URI	URI denoting, this resource type (same as the type URI associated with the Resource type for this resource). Constraints: Provider: support optional; immutable Consumer: support optional; read-only
	change	string	The kind of modification reported (create/update/delete). Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only
	detail	string	The detailed information associated with the change, typically the data for an update or creation, as used in a request. Constraints: Provider: support optional; immutable Consumer: support optional; read-only
access	Events of this type keep track of all requests to access some resource of a CIMI provider. The content element associated with this event type has the following structure:		
	Data	Type	Description
	operation	string	The method or name of the operation intended for this access (for the HTTP protocol, the HTTP method for the request). Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only
	resource	ref	The reference of the primary resource supporting the operation (for the HTTP protocol, the resource URI or the URI associated with the operation). (Note: This reference may become invalid because the event

			might outlive the resource.) Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only
	detail	string	The detailed information associated with the change, typically the data for an update or creation, as used in a request Constraints: Provider: support optional; immutable Consumer: support optional; read-only
	initiator	string	The details identifying the request initiator, in case that information can be associated with the request. Constraints: Provider: support optional; immutable Consumer: support optional; read-only
http://schemas.dmtf.org/cloud/audit/1.0/	Events of this type represent events that have audit significance, as defined by CADF (...). This type can be subdivided further by extending the URI path (e.g., http://schemas.dmtf.org/cloud/audit/1.0/event/security, for security audit events). The content element associated with this event type has the same structure as the event serialization defined in CADF[...]:		

5824 The following describes the serialization of the "content" property for various types of events:

5825 **"state" event:**

5826 **JSON serialization:**

```

5827 { "id": string,
5828   ...
5829   "type": "http://schemas.dmtf.org/cimi/1/event/state",
5830   "content": {
5831     "resName": string,
5832     "resource" : { "href" : string },
5833     "resType" : string,
5834     "state" : string,
5835     "previous" : string ?
5836   }
5837   ...
5838 }
```

5839 **XML serialization:**

```

5840 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5841   ...
5842   <type> http://schemas.dmtf.org/cimi/1/event/state </type>
5843   <content>
5844     <resName> xs:string </resName>
5845     <resource href="xs:anyURI"/>
5846     <resType> xs:anyURI </resType>
5847     <state> xs:string </state>
5848     <previous> xs:string </previous> ?
5849   </content> ?
5850   ...
5851 </Event>
5852
```

5853 **"alarm" event:**

5854 **JSON serialization:**

```
5855 { "id": string,
5856   ...
5857   "type": "http://schemas.dmtf.org/cimi/1/event/alarm",
5858   "content": {
5859     "resName": string ?
5860     "resource" : { "href" : string }, ?
5861     "resType" : string ?
5862     "code" : string,
5863     "detail" : string ?
5864   }
5865   ...
5866 }
```

5867 **XML serialization:**

```
5868 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5869   ...
5870   <type> http://schemas.dmtf.org/cimi/1/event/alarm </type>
5871   <content>
5872     <resname> xs:string </resname> ?
5873     <resource href="xs:anyURI"/> ?
5874     <restype> xs:anyURI </restype> ?
5875     <code> xs:string </code>
5876     <detail> xs:string </detail> ?
5877   </content> ?
5878   ...
5879 </Event>
```

5880 **"model" event:**

5881 **JSON serialization:**

```
5882 { "id": string,
5883   ...
5884   "type": "http://schemas.dmtf.org/cimi/1/event/model",
5885   "content": {
5886     "resName": string, ?
5887     "resource" : { "href" : string }, ?
5888     "resType" : string, ?
5889     "change" : string,
5890     "detail" : string ?
5891   }
5892   ...
5893 }
```

5894 **XML serialization:**

```
5895 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5896   ...
5897   <type> http://schemas.dmtf.org/cimi/1/event/model </type>
5898   <content>
5899     <resname> xs:string </resname> ?
5900     <resource href="xs:anyURI"/> ?
5901     <restype> xs:anyURI </restype> ?
5902     <change> xs:string </change>
5903     <detail> xs:string </detail> ?
5904   </content> ?
5905   ...
5906 </Event>
```

5907 **"access" event:**

5908 **JSON serialization:**

```
5909 { "id": string,
5910   ...
5911   "type": "http://schemas.dmtf.org/cimi/1/event/access",
5912   "content": {
5913     "operation": string,
5914     "resource" : { "href" : string },
5915     "detail" : string, ?
5916     "initiator" : string ?
5917   }
5918   ...
5919 }
```

5920 **XML Serialization:**

```
5921 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5922   ...
5923   <type> http://schemas.dmtf.org/cimi/1/event/access </type>
5924   <content>
5925     <operation> xs:string </operation>
5926     <resource href="xs:anyURI"/>
5927     <detail> xs:string </detail> ?
5928     <initiator> xs:string </initiator> ?
5929   </content> ?
5930   ...
5931 </Event>
```

5932 **5.17.13.1 Operations**

5933 This resource supports the Read, Update, and Delete operations.

5934 **6 Security considerations**

5935 There are many security mechanisms that can be used in conjunction with this specification. This
 5936 specification does not mandate any particular mechanism(s). Providers shall provide enough information
 5937 about their security mechanisms so that the Consumer can implement the necessary algorithms to
 5938 successfully communicate with the Provider.

**ANNEX A
(normative)**

5939
5940
5941
5942
5943

OVF support in CIMI

5944 This annex details how elements of the OVF descriptor are mapped to CIMI resources and their
5945 attributes. This definition allows the import of an OVF package to create multiple CIMI resources. This is
5946 done by specifying a reference to an OVF package in the import operation of a System Collection or
5947 System Template Collection (the Media Type at that URI shall be “application/ovf”). Please reference
5948 [DSP0243](#) for more information about OVF.

5949 Support for OVF import and export is optional for a Provider and it is an implementation choice as to how
5950 many of the attributes in the OVF package are exposed through CIMI resources. A Provider may support
5951 the import of OVF package for only Systems, only System Templates or both. Support for the actual
5952 import and export of OVF packages will typically be handled by a hypervisor under the management of
5953 the CIMI implementation, and thus the CIMI resources that are created reflect what the hypervisor did
5954 upon import and form a “View” into the results.

5955 The import of an OVF package can be reflected in the creation of templates that can be later used to
5956 create Systems, Machines and other component resources. The import of an OVF package can also be
5957 used to directly create Systems, Machines and other component resources, bypassing the step of
5958 creating templates.

5959 Clause 5.13.4 details how to import an OVF file to create a System Template (and component resources).
5960 The System Template thus created will contain a reference to a Machine Template for every
5961 VirtualSystem that is defined in the OVF Descriptor VirtualSystemCollection. Note that CIMI currently
5962 allows Systems of Systems, so for each VirtualSystemCollection encountered in a nested set of
5963 collections, a separate System Template is created within the parent System Template with Machine
5964 Templates for each of the contained VirtualSystems in that VirtualSystemCollection.

5965 The values of the attributes for the Machine Template are taken from the VirtualHardwareSection of the
5966 VirtualSystem description (required in OVF). If multiple VirtualHardwareSections are used for a given
5967 VirtualSystem (allowed in OVF), the result is implementation dependent, but the implementation might
5968 choose a Machine Template from an existing (perhaps static) set that best matches one of the
5969 VirtualHardwareSections. Items in the VirtualHardwareSection are mapped to CIMI Machine
5970 Configuration properties and the corresponding Machine Configuration resource is created and linked to
5971 from the created Machine Template for that VirtualSystem.

5972 The CIMI Volume Templates are created according to the DiskSection of the OVF Descriptor and can be
5973 shared among multiple VirtualSystems (CIMI Machine Templates) defined in the OVF Package. In
5974 addition, a new CIMI Machine Image resource may be created from the DiskSection if an ovf:fileRef for
5975 the virtual disk content is specified.

5976 The CIMI Network Templates are created according to the NetworkSection of the OVF Descriptor along
5977 with the Connection elements in the various VirtualHardwareSections that refer to these named networks.

5978 Clause 5.13.2.1 details how to import an OVF file to create a System (and component resources). The
5979 System thus created will contain a reference to a Machine for every VirtualSystem that is defined in the
5980 OVF Descriptor VirtualSystemCollection. Note that CIMI currently allows Systems of Systems, so for each
5981 VirtualSystemCollection encountered in a nested set of collections, a separate System is created within
5982 the parent System with Machines for each of the contained VirtualSystems in that
5983 VirtualSystemCollection.

5984 The values of the attributes for the Machine are taken from the VirtualHardwareSection of the
5985 VirtualSystem description (required in OVF). If multiple VirtualHardwareSections are used for a given
5986 VirtualSystem (allowed in OVF), the result is implementation dependent. Items in the
5987 VirtualHardwareSection are mapped to CIMI Machine Configuration properties and the corresponding
5988 Machine Configuration resource is created and linked to from the created Machine for that VirtualSystem.

5989 The CIMI Volumes are created according to the DiskSection of the OVF Descriptor and can be shared
5990 among multiple VirtualSystems (CIMI Machines) defined in the OVF Package. In addition, a new CIMI
5991 Machine Image resource may be created from the DiskSection if an ovf:fileRef for the virtual disk content
5992 is specified.

5993 The CIMI Networks are created according to the NetworkSection of the OVF Descriptor along with the
5994 Connection elements in the various VirtualHardwareSections that refer to these named networks.

5995

5996 **ANNEX B**
5997 **(informative)**

5998
5999
6000 **XML Schema**

6001 The XML Schema for the XML serialization of the CIMI model can be found at:

6002 http://schemas.dmtf.org/cimi/1/DSP8009_1.0.0.xsd

6003 The schema provided does not intend to reflect every single modeling constraint and requirement
6004 specified in the model. This schema is designed to apply more broadly to any model-related serialized
6005 material found in Consumer requests as well as in Provider responses, and is intended to provide a
6006 preliminary, non-exhaustive syntactic check on these.

**ANNEX C
(informative)**

Change log

Version	Date	Description
1.0.0	2012-08-28	

6007
6008
6009
6010
6011

6012