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

8 **Document Type: Specification**  
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10 **Document Language: en-US**

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## Foreward

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

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 164 management and interoperability.

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# 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 ellipsis 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](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*,  
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- 305 ISO/IEC Directives, Part 2, *Rules for the structure and drafting of International Standards*,  
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 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 Protocol evolution and client expectations**

435 Future versions of this specification will structure changes in such a way that clients that conform to an  
 436 earlier version of this specification will continue to work, and will not be adversely affected by the  
 437 evolution of the protocol. Clients are expected to follow a few simple rules to ensure this.

- 438 1. Clients shall not assume that the serializations shown for responses in this specification are  
 439 complete. In particular, clients shall accept responses that contain data mixed in with the  
 440 serializations shown here, and shall ignore such data. However, per section 4.2.1.3, clients shall  
 441 include unknown data in PUT requests to update resources.
- 442 2. Clients shall not assume anything about the operations supported by a server. They are expected  
 443 to discover which operations are supported (and permissible) by navigating to resources from the  
 444 cloud entry point. The serializations of resources encountered will indicate which operations are  
 445 supported by the server.

446 **4.1.2 XML namespaces**

447 The following table lists the XML namespaces that are used in this specification. The choice of any  
 448 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 | <a href="#">XML Schema Part2</a> |

449 **4.1.3 URI space**

450 While URIs returned by Providers are to be treated as opaque by Consumers, and Consumers shall not  
 451 make assumptions about the layout of the URIs or the structures of the URIs for the resources, Consumer  
 452 may augment URIs with any well-defined query parameters that are supported by the Provider as defined  
 453 in clause 4.1.6. Providers shall not use the CIMI-defined query parameter reserved namespace (i.e.,  
 454 names starting with "CIMI").

455 **4.1.4 Media types**

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

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

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

470 **4.1.5 Request headers**

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

#### 474 4.1.6 Request query parameters

475 Providers may choose to include query parameters as part of the URIs returned to Consumers.  
 476 Consumers shall include those query parameters when sending messages to those URIs. If Providers  
 477 choose to define query parameters care should be taken to avoid conflicts with CIMI defined query  
 478 parameters.

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

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

##### 484 4.1.6.1 Filtering collections

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

```
488 ?$filter=expression
```

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

```
492 Filter      ::= AndExpr ( 'or' Filter )* ;
493 AndExpr    ::= Comp ( 'and' AndExpr )*
494 Comp       ::= Attribute Op Value
495             | Value Op Attribute
496             | PropExpr
497             | '(' Filter ')'
498 Op         ::= '<' | '<=' | '=' | '>=' | '>' | '!='
499 Attribute  ::= ? resource attribute name ?
500 Value      ::= IntValue | DateValue | StringValue | BoolValue
501 IntValue   ::= /[0-9]+/
502 DateValue  ::= ? as defined by XML Schema ?
503 StringValue ::= "... " | '...'
504 BoolValue  ::= 'true' | 'false'
505 PropExpr   ::= 'property[' StringValue ']' Op StringValue
```

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

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

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

```
513 'or', 'and'      : Boolean value/attribute
514 '<', '<=', '=', '>=', '>', '!=' : Integer and date value/attribute
515 '=', '!='       : String value/attribute
```

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

#### 519 Examples:

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

- 521 • /machines is the URI to the Machines Collection
- 522 • /machines/123 is the URI to a Machine
- 523 • /machines/123/disks is the URI to the DiskCollection of a Machine
- 524 • /machines/123/volumes is the URI to the MachineVolumeCollection of a Machine

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

```
527 GET /machines?$filter=name='mine'
```

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

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

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

#### 533 4.1.6.2 Subsetting Collections

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

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

```
540 ?$first=number  

    541 ?$last=number
```

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

547 If any part of the range as expressed by \$first and \$last is outside of the bounds of the collection then just  
 548 the resources (if any) in the collection that are contained within that range shall be returned. A fault shall  
 549 not be generated if any part, or all, of the expressed range is outside the bounds of the collection. Note  
 550 that if \$first is larger than \$last then the range shall represent an empty range and therefore no resources  
 551 returned.

552 When either \$first or \$last are specified, and a filter expression (as defined in clause 4.1.6.1) is also  
 553 specified, then the filter expression shall be performed first and then the ordinal constraints of \$first and  
 554 \$last shall be applied.

#### 555 4.1.6.3 Subsetting resources

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

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

560 The value of the \$select query parameter shall be a comma separated list of top-level attribute names of  
 561 the resource. Any attribute name erroneously appearing in the list that is not part of the resource shall be  
 562 ignored by the Provider. An attribute name of "\*" is equivalent to specifying all of the attributes of the

563 resource. Any attribute name explicitly appearing more than once in a URI shall have its second (and  
564 subsequent) appearances ignored.

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

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

568 is equivalent to:

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

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

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

```
574 ?$select=name,description
```

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

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

```
580 ?$select=id,format
```

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

#### 583 4.1.6.4 Expanding references

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

588 The serialization shall be performed as follows:

#### 589 JSON serialization:

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

591 shall be expanded to be:

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

#### 596 XML serialization:

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

598 shall be expanded to be:

```
599 <name href="xs:anyURI">  
600   ... attributes of the referenced resource...  
601 </name>
```

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



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

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

606 The value of the \$expand query parameter is a comma separated list of attribute names. Any attribute  
607 name erroneously appearing in the list that is not part of the resource, or is not a reference, shall be  
608 ignored by the Provider. An attribute name of "\*", or no attribute name list at all, is equivalent to specifying  
609 all of the attributes. Any attribute name explicitly appearing more than once in a URI shall have its second  
610 (and subsequent) appearances ignored.

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

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

615 `?$expand=volumes`

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

#### 620 4.1.7 Response headers

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

624 If the server supports the Job resource, response messages shall include a header defined by this  
625 specification to indicate the URI for the job created to process the associated request message.

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

627 In cases where an error occurs during the processing of a request, the Provider shall include a  
628 representation of a Job resource describing the status of the failed operation. This representation of a Job  
629 shall be included even in cases where the Provider does not normally support Job resources to ensure  
630 that Consumers are provided with sufficient information, in a consistent manner, as to the reason for the  
631 failure regardless of whether the Provider supports Jobs. When Jobs are not supported in general, any of  
632 the references in the Job representation (e.g., "id" or the "href" for nestedJobs) shall be empty paths (i.e.,  
633 "") and the "nestedJobs" array shall be expanded (see 4.1.6.4) to inline the representation of the pseudo  
634 subordinate Jobs.

#### 635 4.2 Protocol operations

636 This clause defines the set of common HTTP operations that a Provider might expose. At its core there  
637 are four basic CRUD (Create, Read, Update, and Delete) operations. The manner in which these are  
638 used is consistent across all resources within the model; therefore, their use is defined once and is to be  
639 applied consistently. Some resources support specialized operations that do not fit well into a CRUD style  
640 of operation and those will all follow a similar high-level pattern but each operation is allowed to have  
641 slight variations to accommodate its specific needs. The specifics of these special operations are detailed  
642 within the clause that defines the resource.

643 When appropriate some of the resource representations will include an "operations" attribute. Providers  
644 shall only include the "operations" attribute when the specified operations are accessible to the current  
645 client for that particular resource. This situation means that based on many factors (e.g., authorization  
646 rights of the clients, current state of the resource, etc.), a different set of "operations" shall be returned on  
647 each serialization of the resource. Each operation shall include a "rel" and an "href" field. The "rel" field  
648 will uniquely identify the operation name (e.g., "add", "edit"), while the "href" field is the URI to which the

649 operation's request message shall be sent. Note that the "href" field's URI may be different from the URI  
650 of the resource itself. The "operations" attribute shall be serialized as follows:

651 **JSON serialization:**

```
652 { "operations": [
653   { "rel": "string", "href": "string" }, +
654 ]
655 }
```

656 **XML serialization:**

```
657 <Resource xmlns="http://schemas.dmtf.org/cimi/1">
658   <operation rel="xs:anyURI" href="xs:anyURI"/> *
659 </Resource>
```

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

661 **JSON serialization:**

```
662 { "operations": [
663   { "rel": "edit", "href": "<editURI>" }
664 ]
665 }
```

666 **XML serialization:**

```
667 <Resource xmlns="http://schemas.dmtf.org/cimi/1">
668   <operation rel="edit" href="<editURI>I"/>
669 </Resource>
```

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

## 672 4.2.1 Common CRUD operations

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

### 676 4.2.1.1 Creating a new resource

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

681 The request shall be of the following form:

```
682 POST <addURI> HTTP/1.1
683 Host: <hostname>
684 Accept: application/(json|xml)
685 Content-Type: application/(json|xml)
686 Content-Length: <length>
687
688 <serialization of request to create a new resource>
```

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

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

```

694 <MachineCreate xmlns="http://schemas.dmtf.org/cimi/1">
695   <name> xs:string </name> ?
696   <description> xs:string </description> ?
697   <property key="xs:string"> xs:string </property> *
698   <machineTemplate href="xs:anyURI"? >
699     ... template attributes ... ?
700   </machineTemplate>
701 </MachineCreate>
    
```

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

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

```

712     "attribute": null
    
```

713 for the attribute in the JSON serialization, or

```

714     <attribute/>
    
```

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

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

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

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

```

725 HTTP/1.1 201 Created
726 Location: <location>
727 Content-Type: application/(json|xml)
728 Content-Length: <length> ?
729
730 <serialization of new resource> ?
    
```

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

#### 733 4.2.1.2 Retrieving a representation of a resource

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

735 The request shall be of the following form:

```

736 GET <ResourceURI> HTTP/1.1
737 Host: <hostname>
738 Accept: application/(json|xml) ?
    
```

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

```

740 HTTP/1.1 200 OK
741 Content-Type: application/(json|xml)
742 Content-Length: <length>
743
744 <serialization of resource>

```

#### 745 4.2.1.3 Updating a resource

746 To update a resource's state, an HTTP PUT request containing the complete, updated representation is  
 747 sent to a designated "editURI" for that resource type. Clients shall include all non-empty attributes of the  
 748 resource in the PUT request - including ones that it might not support or understand that were returned in  
 749 a GET response. This is to ensure that a client does not inadvertently modify (erase) data in a resource  
 750 by excluding it from the full representation of the resource.

751 In many cases, this "editURI" will be the same as the URI of resource itself. Retrieving the resource  
 752 representation shall include an "edit" operation, which contains the "editURI" that is to be used, if the  
 753 requester is allowed to modify the resource.

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

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

760 The request shall be of the following form:

```

761 PUT <editURI> HTTP/1.1
762 Host: ...
763 Accept: application/(json|xml)
764 Content-Type: application/(json|xml)
765 Content-Length: <length>
766
767 <serialization of request to update a resource>

```

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

```

769 HTTP/1.1 200 OK
770 Content-Type: application/(json|xml)
771 Content-Length: <length> ?
772
773 <serialization of updated resource> ?

```

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

#### 776 4.2.1.3.1 Partial updates to a resource

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

```

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

```

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

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

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

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

```
793 PUT /machines/myMachine?$select=name,description HTTP/1.1
794 Host: <hostname>
795 Accept: application/xml
796 Content-Type: application/xml
797 Content-Length: <length>
798
799 <Machine>
800   <name>My New Machine</name>
801 </Machine>
```

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

#### 803 4.2.1.4 Deleting a resource

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

808 The request shall be of the following form:

```
809 DELETE <deleteURI> HTTP/1.1
810 Host: <hostname>
```

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

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

```
814 HTTP/1.1 200 OK
```

#### 815 4.2.1.5 Other operations

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

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

821 The request shall be of the following form:

```
822 POST <operationLinkURI> HTTP/1.1
823 Host: <hostname>
824 Accept: application/(json|xml)
825 Content-Type: application/(json|xml)
826 Content-Length: <length>
827
828 <serialization of request to perform some action>
```

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

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

#### 832 4.2.1.6 Synchronous operations

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

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

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

#### 840 4.2.1.7 Asynchronous operations

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

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

- 849 • a representation of the Job resource, if one was created. If the request did not include the Job  
850 MIME type in the HTTP Accept header, the encoding style (json vs xml) of the response should  
851 match the encoding style of the request message.
- 852 • a partial representation of the response message as if the operation were a synchronous  
853 operation. For example, when creating a new Machine the response message may include a  
854 partial representation of the new Machine in the response message. The list of attributes of the  
855 resource that are returned will be implementation specific and based upon how much information  
856 is available at the time the response message is generate, but it shall be consistent with the  
857 definition of the full resource representation. In the case of a create operation, the Provider may  
858 also include an HTTP Location header referencing the "to be created" resource if it is known.
- 859 • an empty response body.

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

### 862 4.3 OVF support

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

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

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

## 878 5 Model

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

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

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

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

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

### 893 5.1 Resource wrappers

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

#### 896 JSON serialization:

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

```
899 { "resourceURI": "http://example.com/MyResource",  
900   "attribute": "value"  
901 }
```

#### 902 XML serialization:

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

```
904 <MyResource xmlns="http://example.com">  
905   <attribute> value </attribute>  
906 </MyResource>
```

### 907 5.2 Extensibility

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

910 The first allows for a CIMI Consumer to add additional data to a resource. Each resource in the CIMI  
 911 model has an attribute called "properties." Consumers, when creating or updating a resource, may store  
 912 any name/value pair in the "properties" attribute. CIMI Providers shall store and return these values to the  
 913 Consumer. There is no obligation for the Provider to understand or take any action based on these

914 values; they are there for the Consumer's convenience. Providers shall not add elements to this  
915 "properties" attribute.

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

- 918 • Express constraints on the existing CIMI defined resource attributes (e.g., express a maximum for  
919 the 'cpu' attribute of the MachineConfiguration resource)
- 920 • Introduce new attributes for CIMI defined resources together with any constraints governing these  
921 (e.g., a new 'location' attribute for the Volume resource that takes values from a defined set of  
922 strings)
- 923 • Introduce new operations for any of the CIMI defined resources (e.g., define a new 'compress'  
924 operation for the Volume resource)
- 925 • Express any Provider specific capabilities or features (e.g., the length of time that a Job resource  
926 will be retained after Job completion and before this is deleted).

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

### 930 5.3 Identifiers

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

- 933 • Identifier names shall be treated as case sensitive.
- 934 • Identifier names shall only use the following set of characters:
  - 935 ○ Uppercase ASCII (U+0041 through U+005A)
  - 936 ○ Lowercase ASCII (U+0061 through U+007A)
  - 937 ○ Digits (U+0030 through U+0039)
  - 938 ○ Underscore (U+005F)
- 939 • Identifier names shall not start with a Digit (U+0030 through U+0039).

940 Note that these rules do not apply to the "name" common attribute defined in clause 5.10.1.

### 941 5.4 Attribute constraints

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

#### 945 **support optional:**

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



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

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

957 **support mandatory:**

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

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

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

965 **immutable:**

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

968 **mutable:**

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

972 **read-only:**

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

977 **read-write:**

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

982 **write-only:**

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

987 **5.5 Data types and their serialization**

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

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

### 995 **5.5.1 boolean**

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

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

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

### 1000 **5.5.2 dateTime**

1001 A value as defined by xs:dateTime per [XML Schema – Part 2](#). Any constraints on the specific ranges  
1002 allowed for any particular attribute will be specified by that attribute's definition or at runtime by the  
1003 Provider via the metadata discovery mechanisms defined by this specification.

1004 When serialized in JSON these values shall be of JSON type: *string*

1005 When serialized in XML these values shall be of XML Schema type: *xs:dateTime*

### 1006 **5.5.3 duration**

1007 A value as defined by xs:duration per [XML Schema – Part 2](#). Any constraints on the specific ranges  
1008 allowed for any particular attribute will be specified by that attribute's definition or at runtime by the  
1009 Provider via the metadata discovery mechanisms defined by this specification.

1010 When serialized in JSON these values shall be of JSON type: *string*

1011 When serialized in XML these values shall be of XML Schema type: *xs:duration*

### 1012 **5.5.4 integer**

1013 A value as defined by xs:integer per [XML Schema – Part 2](#). Any constraints on the specific ranges  
1014 allowed for any particular attribute will be specified by that attribute's definition or at runtime by the  
1015 Provider via the metadata discovery mechanisms defined by this specification.

1016 When serialized in JSON these values shall be of JSON type: *number*

1017 When serialized in XML these values shall be of XML Schema type: *xs:integer*

### 1018 **5.5.5 string**

1019 A value as defined by xs:string per [XML Schema – Part 2](#). Any constraints on this type for any particular  
1020 attribute will be specified by that attribute's definition or at runtime by the Provider via the metadata  
1021 discovery mechanisms defined by this specification.

1022 When serialized in JSON these values shall be of JSON type: *string*

1023 When serialized in XML these values shall be of XML Schema type: *xs:string*

### 1024 **5.5.6 ref**

1025 A reference to another resource.

1026 References allow for Consumers to navigate to resources. By starting at the Cloud Entry Point and  
1027 following the references that appear in the retrieved resources, Consumers will be able to recursively  
1028 discover and navigate to all other resources.

1029 As a general rule, when an attribute is of type "ref", its value will be held by an attribute named "href"  
 1030 (both in JSON and XML).

1031 **JSON serialization:**

1032 In the JSON serialization the "href" property appears as of type "string." When an attribute is of type "ref",  
 1033 the name of this attribute will appear as a key, with the "href" property as it a nested value. For example,  
 1034 a resource attribute "myvolume" of type "ref" is serialized as:

```
1035 "myvolume": { "href": string }
```

1036 **XML serialization:**

1037 In the XML serialization the "href" attribute appears as type "xs:anyURI." When an attribute is of type  
 1038 "ref," the name of this attribute will appear as name of an XML element with the "href" property as an  
 1039 (XML) attribute. For example, a resource attribute "myvolume" of type "ref" is serialized as:

```
1040 <myvolume href="xs:anyURI"/>
```

1041  
 1042 References in both JSON and XML have an extensibility point that allows for additional information (such  
 1043 as the target resource to be included "by value") if supported. For convenience the JSON and XML  
 1044 representations, as shown above, exclude the implicit extensibility points that would allow for the  
 1045 attributes of the target resource to be included if desired. So, more accurately the above representations  
 1046 might be written as follows:

1047 For JSON:

```
1048 "myvolume": { "href": string, ... }
```

1049 and in XML:

```
1050 <myvolume href="xs:anyURI"> xs:any* </myvolume>
```

1051 However, for brevity the extensibility points are excluded in the serialization of the resources.

1052 **5.5.7 map**

1053 A list of key/value pairs. The same "key" shall not be used more than once within an attribute. The "key" is  
 1054 case sensitive.

1055 **5.5.8 structure**

1056 Attributes of this type are complex attributes made up of a set of nested attributes. For each attribute of  
 1057 this type there will be an additional table defining those nested attributes.

1058 A nested structure can be considered a complex type definition. Structures may be named or unnamed.  
 1059 Here is an example of named structure:

1060

| 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 |

**1061 JSON serialization:**

1062 In JSON, the name of the structure (i.e., of the type it represents) never appears. In other words, whether  
 1063 the structure is named or not does not matter. An attribute named "systemIncidents" of type "summary"  
 1064 (as above) is serialized as follows:

```
1065     "systemIncidents": {
1066         "low": number,
1067         "medium": number,
1068         "high": number,
1069         "critical": number
1070     }
```

**1071 XML serialization:**

1072 In XML, the name of the structure (i.e., of the type it represents) never appears. In other words, whether  
 1073 the structure is named or not does not matter. The same previous "systemIncidents" example will be  
 1074 serialized so that the structure sub-attributes become XML attributes of a <systemIncidents> XML  
 1075 element wrapper:

```
1076     <systemIncidents low="xs:integer" medium="xs:integer" high="xs:integer"
1077         critical="xs:integer"/>
```

1078 NOTE: A large number of sub-attributes of atomic type in a structure may be represented alternatively as XML child  
 1079 elements for better readability. Both options are available; however, the same structure shall be serialized the same  
 1080 way across resources.

**1081 5.5.9 byte[]**

1082 An arbitrary set of bytes meant to represent a block of binary data. Any constraints on this type for any  
 1083 particular attribute will be specified by that attribute's definition or at runtime by the Provider via the  
 1084 metadata discovery mechanisms defined by this specification.

1085 When serialized in JSON these values shall be of JSON type: *string*

1086 When serialized in XML these values shall be of XML Schema type: *xs:hexBinary*

**1087 5.5.10 URI**

1088 The format and syntax of the attributes of type "URI" is defined by [RFC3986](#).

1089 Unless otherwise noted, this specification does not mandate whether Providers use relative or absolute  
 1090 URI in the HTTP response bodies.

1091 When URIs are specified as relative URIs, they shall be relative to the parent of the CloudEntryPoint  
 1092 unless otherwise noted; in other words, the "baseURI" is the parent of the CloudEntryPoint with a trailing  
 1093 slash.

1094 The algorithm used for converting a relative URI to an absolute URI shall be as described in section 5.2 of  
 1095 [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 |

1096 If relative URIs are used, the "baseURI" shall end with a trailing slash and relative URIs shall not begin  
 1097 with a leading slash. This format will be consistent with most URI resolve utilities and will produce the  
 1098 same results as a simple string concatenation algorithm.

1099 When serialized in JSON these values shall be of JSON type: *string*

1100 When serialized in XML these values shall be of XML Schema type: *xs:anyURI*

### 1101 **5.5.11 Arrays**

1102 An array represents an ordered list of items of the same type. An array shall always appear as an  
 1103 attribute of a resource, and is only accessible as such (it is not a separately addressable resource). When  
 1104 a resource is deleted, the items in its arrays shall also be deleted. However, in case these items were just  
 1105 references to other resources, these referred resources are not affected (see the semantics of references  
 1106 in 5.7)

1107 Attributes that are arrays are defined by using the notation "itemType[]," where itemType is the type name  
 1108 for each item of the array. When the type is a structure, not a simple data type, it is recommended as a  
 1109 convention in the model that the name of an array be the plural of a name that characterizes each item.  
 1110 For example, an array of volume items or of references to these may be named "volumes."

1111 When an attribute is of type of references ("ref[]") – and more generally array of an atomic type - the  
 1112 definition in the model will include an "Array item name", that may be used in its serialization.

#### 1113 **JSON serialization:**

1114 Within this specification, arrays in JSON are serialized with a wrapper property. The wrapper name shall  
 1115 be same as the attribute name for the array. For example, a "things" attribute of type "thing[]" is serialized  
 1116 as:

```
1117 "things" : [  
1118   { ... }, +  
1119 ] ?
```

1120 When the items in the array are structures then the structure name shall not be present in the JSON  
 1121 serialization.

1122 In the case of an array of references, i.e., where the "ref" type applies to each element of the array, each  
 1123 element will simply be serialized as an "href" property within a JSON array. For example, an array "things"  
 1124 of type "ref[]" is serialized as:

```
1125 "things": [  
1126   { "href": string }, +  
1127 ] ?
```

1128

1129 **NOTE** When serializing arrays, conformant implementations shall not include empty arrays (i.e., arrays that contain  
 1130 no child properties) in the JSON serialization. Notice that the child of the "things" property is defined with a "+",  
 1131 meaning at least one child is required. This requirement ensures that the JSON serialization is minimized and only  
 1132 includes the wrapping "things" element if, and only if, there is at least one "thing" in the array.

#### 1133 **XML serialization:**

1134 The XML serialization of arrays requires each item of the array to be represented as an element. These  
 1135 elements shall be consecutive and contiguous in the serialization and the name of each element (tag  
 1136 name) shall be the name of the element type (the name that appears before "[]" in the array type). For  
 1137 example, a "things" attribute will be serialized as a list of items named "thing", where "thing" is the name  
 1138 of a structure:

```
1139 <thing>  
1140   ...  
1141 </thing> *
```

1142 There is no wrapper element for an array in XML.

1143 In the case of an array of references, i.e., where the "ref" type applies to each element of the array, the  
 1144 array is serialized as a list of XML elements without wrapper. Each element is named per the "Array item

1145 name" value specified in the attribute's definition. For example, an array "things" of type "ref[]" where the  
1146 "Array item name" is "thing", is serialized as:

1147 `<thing href="xs:anyURI" /> +`

## 1148 5.5.12 Collections

1149 Like arrays, collections are groupings of resources of the same type. In contrast with arrays, collections  
1150 are themselves resources that have their own URI and can be independently accessed. Collections also  
1151 allow for an optimized and convenient interaction pattern by providing a specialized set of operations that  
1152 avoid replacing a large number of items when updating the set.

1153 This specification uses collections when the set of items in the list will most likely be modified often and  
1154 potentially by multiple Consumers. Conversely, arrays are used when it is expected that the list of items  
1155 will not be modified often or can be easily modified by substitution of the entire list, and thus the overhead  
1156 of managing these items as separate resources might be burdensome.

1157 Attributes that are collections are represented as type "collection[itemType]." The resource type of the  
1158 collection items are specified inside the brackets; for example an attribute that is a collection of Machines  
1159 is expressed as "collection[Machine]." These will be serialized as a reference to a collection resource. For  
1160 brevity, while these attributes are "references" the word "ref" or "reference" does not appear in the model  
1161 definition tables - simply the type "collection[itemType]" appears.

1162 To each one of these resource items, will correspond an entry in the collection. These resources items  
1163 are assumed to be of a complex type and are separately addressable and manageable. While different  
1164 collections will contain entries of different resource types, all collections follow the pattern described  
1165 below:

- 1166 • Collections shall contain an "id" attribute that acts as a "self pointer." Retrieving the data at this  
1167 reference shall return the collection. In the XML representation, each collection shall be wrapped  
1168 by a `<Collection>` element.
- 1169 • Collections shall contain a "count" attribute which indicates the number of resources in the  
1170 collection at the time the collection was queried.
- 1171 • Collections shall contain a list of resources that make up the collection. As with all arrays, if there  
1172 are no resources in the collection, the serialization of the list shall be omitted.
- 1173 • As with all resources in the CIMI model, each resource in the collection shall have an "id" attribute  
1174 that acts as a "self pointer." Retrieving the data at this reference shall return just that one  
1175 resource and not any parent resource, such as the collection or array attribute.
- 1176 • Adding new resources to the collection shall be done via the "add" operation defined within the  
1177 collection. Note that lack of an "add" operation on the collection indicates that new resources are  
1178 not permitted at that time.
- 1179 • Deleting resources from the collection shall be done via a "delete" operation on the resource  
1180 itself.
- 1181 • Unless otherwise specified, deleting a collection shall also delete all of the resources that make  
1182 up the collection, but shall not delete any tertiary resources referenced by the to-be deleted  
1183 collection resources.
- 1184 • Collections shall be deleted when their owning resource is deleted.

1185 The resources in a collection are of two kinds:

- 1186 • either the resource is an infrastructure resource (such as those listed in the Cloud Entry Point, or  
1187 those embedded in an entity such as the disks inside a Machine),

- 1188 • or the resource is just an intermediary resource that holds a reference to an infrastructure  
 1189 resource, called the “target resource”. By convention, intermediary resources have a name that  
 1190 concatenates the name of the resource owning the collection, with the name of the target  
 1191 resource, e.g. “MachineVolume” is the name of the intermediary resource that is used to connect  
 1192 a Machine to a Volume.

1193 Collections of intermediary resources allow for decoupling the lifecycle of a collection (and of its owning  
 1194 entity) from the lifecycle of the actual target resources. For example, deleting a collection will delete its  
 1195 intermediary resources but not its target resources.

1196 The serialization of collections shall adhere to the following pattern:

1197 **JSON serialization:**

```

1198 { "resourceURI": string,
1199   "id": string,
1200   "count": number,
1201   "resourceSpecificGroupingName": [
1202     { "resourceURI": string,
1203       "id": string,
1204       "name": string, ?
1205       "description": string, ?
1206       "created": string, ?
1207       "updated": string, ?
1208       "properties": { "key": string, + }, ?
1209       ... entry specific data ...
1210       "operations": [
1211         { "rel": "edit", "href": string }, ?
1212         { "rel": "delete", "href": string } ?
1213       ] ?
1214       ...
1215     } +
1216   ], ?
1217   "operations": [ { "rel": "add", "href": string } ? ]
1218   ...
1219 }
```

1220 **XML serialization:**

```

1221 <Collection resourceURI="xs:anyURI" xmlns="http://schemas.dmtf.org/cimi/1">
1222   <id> xs:anyURI </id>
1223   <count> xs:integer </count>
1224   <ResourceSpecificElementName>
1225     <id> xs:anyURI </id>
1226     <name> xs:string </name> ?
1227     <description> xs:string </description> ?
1228     <created> xs:dateTime </created> ?
1229     <updated> xs:dateTime </updated> ?
1230     <property key="xs:string"> xs:string </property> *
1231     ... entry specific data ...
1232     <operation rel="edit" href="xs:anyURI"/> ?
1233     <operation rel="delete" href="xs:anyURI"/> ?
1234     <xs:any>*
1235   </ResourceSpecificElementName> *
1236   <operation rel="add" href="xs:anyURI"/> ?
1237   <xs:any>*
1238 </Collection>
```

1239 Where the "resourceURI" attributes shall contain the collection or resource specific URIs for that type of  
 1240 collection, and "resourceSpecificGroupingName" and "ResourceSpecificElementName" shall be replaced  
 1241 with the name of the collection-specific resource name, e.g. "machines" in JSON or "Machine" in XML.

1242 **5.5.12.1 Adding items to collections**

1243 Adding new resources to collections shall be done by invoking the "add" operation of the collection. The  
 1244 contents of the request body will be either a representation of the new resource being added to the  
 1245 collection, or a representation of the Template associated with the new resource being created. Each  
 1246 resource that requires the use of a Template indicates this in its definition.

1247 For example, to add a new Volume to a Machine's "volumes" collection, the "add" operation's request  
 1248 body will be serialized as follows:

1249 **JSON serialization:**

```
1250 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineVolume",
1251   "initialLocation": string,
1252   "volume": { "href": string }
1253 }
```

1254 **XML serialization:**

```
1255 <MachineVolume xmlns="http://schemas.dmtf.org/cimi/1">
1256   <initialLocation> xs:string </initialLocation>
1257   <volume href="xs:string"/>
1258 </MachineVolume>
```

1259 Note that while deleting this type of resource from the collection will delete and remove the resource from  
 1260 the collection, it shall not delete the referenced target resource itself - in this case the Volume.

1261 When creating a new resource that requires the use of a Template, the "add" operation shall contain:

- 1262 • The "common attributes" as defined by clause 5.10.1.
- 1263 • The resource specific data needed to create it. This data will either be a reference to the  
 1264 resource-specific Template resource or the resource-specific Template resource itself inlined.
- 1265 • In the XML case, a wrapper element (named *<ResourceNameCreate>*).

1266 For example, to create a new Machine (which requires the use of a Template) and add it to the  
 1267 MachineCollection, the "add" operation of the MachineCollection will be serialized as follows:

1268 **JSON serialization:**

```
1269 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineCreate", ?
1270   "name": string, ?
1271   "description": string, ?
1272   "properties": { "key": string, + }, ?
1273   "machineTemplate": { "href": string ?}
1274   ...
1275 }
```

1276 **XML serialization:**

```
1277 <MachineCreate xmlns="http://schemas.dmtf.org/cimi/1">
1278   <name> xs:string </name> ?
1279   <description> xs:string </description> ?
1280   <property key="xs:string"> xs:string </property> *
1281   <machineTemplate href="xs:anyURI"? />
1282   <xs:any>*
1283 </MachineCreate>
```

1284 The MachineCollection will have a new Machine:

1285 **JSON serialization:**

```
1286 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Machine",
```



```
1287     "id": string,
1288     "name": string,
1289     ...
1290 }
```

1291 **XML serialization:**

```
1292 <Machine xmlns="http://schemas.dmtf.org/cimi/1">
1293   <id> xs:anyURI </id>
1294   <name> xs:string </name>
1295   ...
1296 </Machine>
```

1297 The processing of the "add" operation shall adhere to the semantics defined in clause 4.2.1.1.

1298 Regardless of whether a Template is used, the "add" operation shall create the new resource and add it  
 1299 to the collection and a reference (URI) to the new entry shall be returned in the response message in the  
 1300 HTTP Location header.

1301 **5.5.13 "Any" type**

1302 Some attributes are polymorphic and can hold various data types, the list of which is indicated in their  
 1303 description. In such cases, the type of the attribute will be indicated as "any" in the model representation.

1304 **5.6 Units**

1305 Some of the resources defined by this specification have attributes that describe an amount of something  
 1306 that belongs to, or is associated with, that resource. For example, the `Machine` resource has a `memory`  
 1307 attribute that describes "the size of the memory allocated to this machine." The allowable units of these  
 1308 attributes are listed in the following table. Their meaning is defined in [IEC 80000-13:2008](#). Their numerical  
 1309 equivalents are provided here for convenience:

| String    | Numerical Value  | String   | Numerical Value |
|-----------|------------------|----------|-----------------|
| kilobyte  | 10 <sup>3</sup>  | kibibyte | 2 <sup>10</sup> |
| megabyte  | 10 <sup>6</sup>  | mebibyte | 2 <sup>20</sup> |
| gigabyte  | 10 <sup>9</sup>  | gibibyte | 2 <sup>30</sup> |
| terabyte  | 10 <sup>12</sup> | tebibyte | 2 <sup>40</sup> |
| petabyte  | 10 <sup>15</sup> | pebibyte | 2 <sup>50</sup> |
| exabyte   | 10 <sup>18</sup> | exbibyte | 2 <sup>60</sup> |
| zettabyte | 10 <sup>21</sup> | zebibyte | 2 <sup>70</sup> |
| yottabyte | 10 <sup>24</sup> | yobibyte | 2 <sup>80</sup> |

1310 **5.7 Relationship semantics**

1311 A reference between two resource instances has the semantics of a simple "association." In particular,  
 1312 unless specified otherwise, (a) the same referred instance can be referred by other resource instances,  
 1313 i.e., be "shared," and (b) the referred resource instance is not affected when deleting the referring  
 1314 resource instance (i.e., the Delete operation is a "shallow delete" by default).

1315 The embedding of a sub-resource inside another resource, has the semantics of a "composition" (or  
 1316 whole-part relationship in UML). In particular, unless specified otherwise, (a) an embedded sub-resource  
 1317 cannot be shared by several resource instances, and (b) when deleting an embedding resource instance,  
 1318 the embedded sub-resource instances are also deleted.

## 1319 5.8 Operations

1320 All resource operations defined by this specification are optional for Providers to support. Consumers, via  
 1321 examination of an resource's ResourceMetadata, will be able to determine which operations are  
 1322 supported. However, even for those operations that are supported Consumers will still need to examine  
 1323 each resource's representation to determine which operations are supported at that moment. Whether an  
 1324 operation is supported will be based on a number of factors, including state of the resource and access  
 1325 control rights of the Consumer. Also see clause 4.2.

## 1326 5.9 Alternative model formats

1327 Because it is expected that this specification will be implemented by using a variety of technologies, as a  
 1328 convenience, the definition of the model elements are provided in alternative formats that are easily  
 1329 consumable by technology-specific tooling.

1330 This model is also available in a CIM/MOF format [CIMI-CIM].

1331 In the event of inconsistencies between the various formats, the normative text within this specification  
 1332 takes precedence over the XML Schemas and alternative formats, which in turn take precedence over  
 1333 examples.

## 1334 5.10 Resources

1335 The following clauses detail the attributes of the resources defined by the CIMI model.

### 1336 5.10.1 Common attributes

1337 Except for ResourceMetadata, the resources described by this document share the following common  
 1338 attributes.

| Attribute   | Type            | Description  |
|-------------|-----------------|--|
| id          | <i>ref</i>      | The unique self-reference to this resource; assigned upon resource creation. This attribute value shall be <b>unique</b> in the Provider's cloud.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support optional; read-write                                  |
| created     | <i>dateTime</i> | The timestamp when this resource was created. The format should be unambiguous, and the value is <b>immutable</b> .<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; immutable<br><b>Consumer:</b> 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   |

| Attribute  | Type     | Description  |      |          |  |      |      |             |     |        |   |       |        |  |
|------------|----------|--|------|----------|--|------|------|-------------|-----|--------|---|-------|--------|--|
|            |          | modify the 'state' attribute it does not change the 'updated_time'.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-only   |      |          |  |      |      |             |     |        |   |       |        |  |
| properties | map      | A map of key/value pairs (each entry called a "property"), 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.<br><br>The same "key" shall not be used more than once within a "properties" attribute.<br><br>Each property will contain the following nested data: <table border="1"> <thead> <tr> <th>Name</th> <th colspan="2">property</th> </tr> <tr> <th>Data</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>key</td> <td>string</td> <td>                             The name of the property.<br/><br/> <b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write                         </td> </tr> <tr> <td>value</td> <td>string</td> <td>                             The value of the property.<br/><br/> <b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write                         </td> </tr> </tbody> </table> <b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support optional; read-write | Name | property |  | Data | Type | Description | key | string | The name of the property.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write | value | string | The value of the property.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write |
| Name       | property |  |      |          |  |      |      |             |     |        |   |       |        |  |
| Data       | Type     | Description  |      |          |  |      |      |             |     |        |   |       |        |  |
| key        | string   | The name of the property.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write  |      |          |  |      |      |             |     |        |   |       |        |  |
| value      | string   | The value of the property.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write   |      |          |  |      |      |             |     |        |   |       |        |  |

1339 The following describes the serialization of these attributes in both JSON and XML:

1340 **JSON serialization:**

```
1341 "id": string,
1342 "name": string, ?
1343 "description": string, ?
1344 "created": string, ?
1345 "updated": string, ?
1346 "properties": { "key": string, + }, ?
```

1347 **XML serialization:**

```
1348 <id> xs:anyURI </id>
1349 <name> xs:string </name> ?
1350 <description> xs:string </description> ?
1351 <created> xs:dateTime </created> ?
1352 <updated> xs:dateTime </updated> ?
1353 <property key="xs:string"> xs:string </property> *
```

1354 **5.11 Resource Metadata**

1355 Implementations of this specification should allow for Consumers to discover the metadata associated  
 1356 with each supported resource. Doing so allows for the discovery of Provider defined constraints on the  
 1357 CIMI defined attributes as well as discovery of any new extension attributes or operations that the  
 1358 Provider may have defined. ResourceMetadata can also be used to express any Provider specific  
 1359 capabilities or features. The mechanism by which this metadata is made available will be protocol  
 1360 specific.

1361 Note that while this specification does not restrict the editability of the ResourceMetadata attributes, it  
 1362 is expected that these types of features will be reserved for administrative type of Consumers, which means  
 1363 that these attributes will be read-only for most Consumers.

1364 Each resource's metadata will contain the following pieces of information:

|                  |   |   |             |                  |  |             |             |                    |      |               |  |           |            |  |      |               |  |          |                |   |
|------------------|---|---|-------------|------------------|--|-------------|-------------|--------------------|------|---------------|--|-----------|------------|--|------|---------------|--|----------|----------------|---|
| <b>Name</b>      | ResourceMetadata                                |   |             |                  |  |             |             |                    |      |               |  |           |            |  |      |               |  |          |                |   |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/ResourceMetadata |   |             |                  |  |             |             |                    |      |               |  |           |            |  |      |               |  |          |                |   |
| <b>Attribute</b> | <b>Type</b>                                     | <b>Description</b>  |             |                  |  |             |             |                    |      |               |  |           |            |  |      |               |  |          |                |   |
| id               | <i>ref</i>                                      | The unique self-reference to this resource; assigned upon resource creation. This attribute value is <b>immutable</b> , and shall be <b>unique</b> in the Provider's cloud.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support mandatory; read-only  |             |                  |  |             |             |                    |      |               |  |           |            |  |      |               |  |          |                |   |
| typeURI          | <i>URI</i>                                      | A unique URI associated with, and denoting, this resource type.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write   |             |                  |  |             |             |                    |      |               |  |           |            |  |      |               |  |          |                |   |
| name             | <i>string</i>                                   | The name of the resource type.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br>Each attribute will contain the following nested data: <table border="1"> <tr> <td><b>Name</b></td> <td colspan="2"><i>attribute</i></td> </tr> <tr> <td><b>Data</b></td> <td><b>Type</b></td> <td><b>Description</b></td> </tr> <tr> <td>name</td> <td><i>string</i></td> <td>The name of the attribute.<br/><br/><b>Constraints:</b><br/><b>Provider:</b> support mandatory; mutable<br/><b>Consumer:</b> 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.<br/><br/><b>Constraints:</b><br/><b>Provider:</b> support mandatory; mutable<br/><b>Consumer:</b> support mandatory; read-write</td> </tr> <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.<br/><br/><b>Constraints:</b><br/><b>Provider:</b> support mandatory; mutable<br/><b>Consumer:</b> 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</td> </tr> </table> | <b>Name</b> | <i>attribute</i> |  | <b>Data</b> | <b>Type</b> | <b>Description</b> | name | <i>string</i> | The name of the attribute.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write | required | <i>boolean</i> | Indicates whether this resource requires this attribute to be present. When absent the implied value is |
| <b>Name</b>      | <i>attribute</i>                                |   |             |                  |  |             |             |                    |      |               |  |           |            |  |      |               |  |          |                |   |
| <b>Data</b>      | <b>Type</b>                                     | <b>Description</b>  |             |                  |  |             |             |                    |      |               |  |           |            |  |      |               |  |          |                |   |
| name             | <i>string</i>                                   | The name of the attribute.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write  |             |                  |  |             |             |                    |      |               |  |           |            |  |      |               |  |          |                |   |
| required         | <i>boolean</i>                                  | Indicates whether this resource requires this attribute to be present. When absent the implied value is   |             |                  |  |             |             |                    |      |               |  |           |            |  |      |               |  |          |                |   |

|              |                     | <table border="1"> <tr> <td></td> <td></td> <td>"false."<br/><b>Constraints:</b><br/><b>Provider:</b> support mandatory; mutable<br/><b>Consumer:</b> 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.<br/><b>Constraints:</b><br/><b>Provider:</b> support mandatory; mutable<br/><b>Consumer:</b> support mandatory; read-write</td> </tr> </table> <p><b>Constraints:</b><br/><b>Provider:</b> support optional; mutable<br/><b>Consumer:</b> support optional; read-write</p>   |      |                   | "false."<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write | constraints | <i>any</i> | Type specific data that describes the constraints of this attribute. When absent there are no constraints.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write |      |               |  |     |            |  |             |               |  |       |            |   |
|--------------|---------------------|--|------|-------------------|--|-------------|------------|--|------|---------------|--|-----|------------|--|-------------|---------------|--|-------|------------|---|
|              |                     | "false."<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write   |      |                   |  |             |            |  |      |               |  |     |            |  |             |               |  |       |            |   |
| constraints  | <i>any</i>          | Type specific data that describes the constraints of this attribute. When absent there are no constraints.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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> <th colspan="2"><i>capability</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 capability.<br/><b>Constraints:</b><br/><b>Provider:</b> support mandatory; mutable<br/><b>Consumer:</b> 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.<br/><b>Constraints:</b><br/><b>Provider:</b> support mandatory; mutable<br/><b>Consumer:</b> 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.<br/><b>Constraints:</b><br/><b>Provider:</b> support mandatory; mutable<br/><b>Consumer:</b> 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.<br/><b>Constraints:</b><br/><b>Provider:</b> support mandatory; mutable<br/><b>Consumer:</b> support mandatory; read-write</td> </tr> </tbody> </table> <p><b>Constraints:</b><br/><b>Provider:</b> support optional; mutable<br/><b>Consumer:</b> support optional; read-write</p> | Name | <i>capability</i> |  | Data        | Type       | Description  | name | <i>string</i> | The name of the capability.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support optional; read-write | uri | <i>URI</i> | A URI that uniquely identifies the capability at a global level.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write | description | <i>string</i> | The human readable description of the semantic of the capability.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write |
| Name         | <i>capability</i>   |  |      |                   |  |             |            |  |      |               |  |     |            |  |             |               |  |       |            |   |
| Data         | Type                | Description  |      |                   |  |             |            |  |      |               |  |     |            |  |             |               |  |       |            |   |
| name         | <i>string</i>       | The name of the capability.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support optional; read-write   |      |                   |  |             |            |  |      |               |  |     |            |  |             |               |  |       |            |   |
| uri          | <i>URI</i>          | A URI that uniquely identifies the capability at a global level.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write   |      |                   |  |             |            |  |      |               |  |     |            |  |             |               |  |       |            |   |
| description  | <i>string</i>       | The human readable description of the semantic of the capability.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; 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> </tbody> </table>  | Name | <i>action</i>     |  | Data        | Type       | Description  |      |               |  |     |            |  |             |               |  |       |            |   |
| Name         | <i>action</i>       |  |      |                   |  |             |            |  |      |               |  |     |            |  |             |               |  |       |            |   |
| Data         | Type                | Description  |      |                   |  |             |            |  |      |               |  |     |            |  |             |               |  |       |            |   |

|  |  |  |               |  |
|--|--|--|---------------|--|
|  |  | name   | <i>string</i> | The name of the operation.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write   |
|  |  | uri  | <i>URI</i>    | A URI that uniquely identifies the operation at a global level.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write                                      |
|  |  | description  | <i>string</i> | The human readable description of the semantic of the operation.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support optional; read-write                                      |
|  |  | method   | <i>string</i> | The protocol dependent verb to use to perform the operation.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write |
|  |  | <b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write |               |  |

1365 The following describes the serialization of the resource in both JSON and XML:

1366 **JSON media type:** application/json

1367 **JSON serialization:**

```

1368 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ResourceMetadata",
1369   "id": string,
1370   "typeURI": URI,
1371   "name": string,
1372   "attributes" : [
1373     { "name": string,
1374       "namespace": string, ?
1375       "type": string, ?
1376       "required": boolean, ?
1377       ...constraints...? } *
1378   ], ?
1379   "capabilities": [
1380     { "name": string, ?
1381       "uri": string,
```

```

1382     "description": string, ?
1383     "value": any } *
1384 ], ?
1385 "actions" : [
1386     { "name": string,
1387       "uri": string,
1388       "description": string, ?
1389       "method": string,
1390       "inputMessage": string, ?
1391       "outputMessage": string ? }, *
1392 ], ?
1393 "operations": [
1394     { "rel": "edit", "href": string }, ?
1395     { "rel": "delete", "href": string } ?
1396 ] ?
1397 ...
1398 }
    
```

1399 **XML media type:** application/xml

1400 **XML serialization:**

```

1401 <ResourceMetadata xmlns="http://schemas.dmtf.org/cimi/1">
1402   <id> xs:anyURI </id>
1403   <name> xs:string </name>
1404   <typeURI> xs:anyURI </typeURI>
1405   <attribute name="xs:string" namespace="xs:anyURI" type="xs:string"
1406     required="xs:boolean"? >
1407     ...constraints...?
1408   </attribute> *
1409   <capability name="xs:string"? uri="xs:anyURI" description="xs:string"?>
1410     xs:any*
1411   </capability> *
1412   <action name="xs:string" uri="xs:anyURI" description="xs:string"?
1413     method="xs:string" inputMessage="xs:string"?
1414     outputMessage="xs:string"? /> *
1415   <operation rel="edit" href="xs:anyURI"/> ?
1416   <operation rel="delete" href="xs:anyURI"/> ?
1417   <xs:any>*
1418 </ResourceMetadata>
    
```

1419 Additional metadata about the resource or attributes may be included by the Provider.

### 1420 5.11.1 Attribute types

1421 The following describes the values, syntax, and serialization of the "constraints" attribute (sub-attribute of  
1422 "attributes"), which has a type of "any."

#### 1423 type="string"

1424 The JSON shall be of the form:

```
1425 "values": [ string, + ] ?
```

1426 The XML shall be of the form:

```
1427 <value> xs:string </value> *
```

#### 1428 type="integer"

1429 The JSON shall be of the form:

```
1430 "values": [ number, + ], ?
1431 "ranges": [ { "low": number, "high": number }, + ] ?
```

1432 The XML shall be of the form:

```
1433 <value> xs:integer </value> *
1434 <range low="xs:integer" high="xs:integer"/> *
```

1435 The total value space of an 'integer' attribute is the accumulation of all values and ranges.

1436 **type="boolean"**

1437 The JSON shall be of the form:

```
1438 "value": boolean ?
```

1439 The XML shall be of the form:

```
1440 <value> xs:boolean </value> ?
```

1441 Only one 'value' is permitted. It indicates whether the attribute is required to be either 'true' or 'false'.

#### 1442 5.11.1.1 Examples

1443 The following shows a sample metadata document for a VolumeConfiguration resource in XML that lists  
1444 the allowable values for the "format" attribute and has been extended with a "Location" string attribute:

```
1445 <ResourceMetadata xmlns="http://schemas.dmtf.org/cimi/1">
1446 <id> http://example.org/types/VC </id>
1447 <typeURI> http://schemas.dmtf.org/cimi/1/VolumeConfiguration </typeURI>
1448 <name> VolumeConfiguration </name>
1449 <attribute name="format" type="string" required="false">
1450 <value> ext4 </value>
1451 <value> ntfs </value>
1452 </attribute>
1453 <attribute name="Location" namespace="http://example.org/" type="string"/>
1454 </ResourceMetadata>
```

1455 The following shows the same VolumeConfiguration but the "Location" attribute is restricted to a set of  
1456 values and is required:

```
1457 <ResourceMetadata xmlns="http://schemas.dmtf.org/cimi/1">
1458 <id> http://example.org/types/VC </id>
1459 <typeURI> http://schemas.dmtf.org/cimi/1/VolumeConfiguration </typeURI>
1460 <name> VolumeConfiguration </name>
1461 <attribute name="format" type="string" required="false">
1462 <value> ext4 </value>
1463 <value> ntfs </value>
1464 </attribute>
1465 <attribute name="Location" namespace="http://example.org/" type="string"
1466 <required="true">
1467 <value> NYC </value>
1468 <value> LAX </value>
1469 </attribute>
1470 </ResourceMetadata>
```

1471 The following shows the same VolumeConfiguration serialized in JSON:

```
1472 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
1473   "id": "http://example.org/types/VC",
1474   "typeURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
1475   "name": "VolumeConfiguration",
1476   "attributes": [
1477     { "name": "format",
1478       "type": "string",
1479       "required": false,
1480       "values": [ "ext4", "ntfs" ]
1481     },
```



```

1482     { "name": "Location",
1483       "namespace": "http://example.org",
1484       "type": "string",
1485       "required": true,
1486       "values": [ "NYC", "LAX" ]
1487     }
1488   ]
1489 }
    
```

1490 The following shows a Volume serialized in JSON which provides an action of data compression. In this  
 1491 specific example the method returned (POST) is for the CIMI HTTP protocol; should another protocol be  
 1492 implemented (e.g. SOAP) the "method" will be different:

```

1493 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
1494   "id": "http://example.org/types/V",
1495   "typeURI": "http://schemas.dmtf.org/cimi/1/Volume",
1496   "name": "Volume",
1497   "actions": [
1498     {
1499       "name": "compress",
1500       "uri": "http://example.org/cimi/action/compress"
1501       "description": "Compress the data stored in the volume",
1502       "method": "POST"
1503     }
1504   ]
1505 }
    
```

### 1506 5.11.2 Capabilities

1507 The following table describes the capability URIs defined by this specification. Providers may define new  
 1508 URIs and it is recommended that these URIs be dereferencable such that Consumers can discover the  
 1509 details of the new capability. The "Resource Name" column contains the name of the resource that may  
 1510 contain the specified capability within its ResourceMetadata. The "Capability Name" column contains the  
 1511 name of the specified capability and shall be unique within the scope of the corresponding resource. Each  
 1512 capability's URI shall be constructed by appending the "Resource Name", a slash(/), and the "Capability  
 1513 Name" to "http://schemas.dmtf.org/cimi/1/capability/". For example, the Machine's "InitialState" capability  
 1514 would have a URI of:

```

1515 http://schemas.dmtf.org/cimi/1/capability/Machine/InitialState
    
```

1516 Note that capabilities that apply to the Provider in general, and are not specific to any one resource, are  
 1517 associated with the Cloud Entry Point resource (in case a capability would apply only to the  
 1518 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 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  |

| Resource Name | Capability Name               | Description  |
|---------------|-------------------------------|--|
|               |                               | 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 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.   |

| Resource Name   | Capability Name            | Description  |
|-----------------|----------------------------|--|
| 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.  |

1519 The following example shows the ResourceMetadata for a Machine that advertises some of its  
 1520 capabilities:

1521 **JSON serialization:**

```

1522 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ResourceMetadata",
1523   "id": "http://example.com/types/Machine",
1524   "typeURI": "http://schemas.dmtf.org/cimi/1/Machine",
1525   "name": "Machine",
1526   "capabilities": [
1527     { "uri":
1528       "http://schemas.dmtf.org/cimi/1/capability/Machine/MachineConfigByValue",
1529       "value": true },
1530     { "uri":
1531       "http://schemas.dmtf.org/cimi/1/capability/Machine/MachineImageByValue",
1532       "value": true },
1533     { "uri":
1534       "http://schemas.dmtf.org/cimi/1/capability/Machine/DefaultInitialState",
1535       "value": "STARTED" }
1536   ]
1537 }
```

1538 **XML serialization:**

```

1539 <ResourceMetadata xmlns="http://schemas.dmtf.org/cimi/1">
1540   <id> http://example.org/types/Machine </id>
1541   <typeURI> http://schemas.dmtf.org/cimi/1/Machine </typeURI>
1542   <name> Machine </name>
```

```

1543     <capability
1544 uri="http://schemas.dmtf.org/cimi/1/capability/Machine/MachineConfigByValue">
1545     true
1546     </capability>
1547     <capability
1548 uri="http://schemas.dmtf.org/cimi/1/capability/Machine/MachineImageByValue">
1549     true
1550     </capability>
1551     <capability
1552 uri="http://schemas.dmtf.org/cimi/1/capability/Machine/DefaultInitialState">
1553     STARTED
1554     </capability>
1555 </ResourceMetadata>

```

### 1556 5.11.3 ResourceMetadata Collection

1557 A ResourceMetadata Collection resource represents the collection of ResourceMetadata resources within  
 1558 a Provider and follows the Collection pattern defined in clause 5.5.12. Note that modifications of the  
 1559 resources within this collection will typically be reserved for administrator type of CIMI Consumers. This  
 1560 resource shall be serialized as follows:

#### 1561 JSON serialization:

```

1562 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ResourceMetadataCollection",
1563   "id": string,
1564   "count": number,
1565   "resourceMetadatas": [
1566     { "resourceURI": "http://schemas.dmtf.org/cimi/1/ResourceMetadata",
1567       "id": string,
1568       ... remaining ResourceMetadata attributes ...
1569     }, +
1570   ], ?
1571   "operations": [ { "rel": "add", "href": string } ? ]
1572   ...
1573 }

```

#### 1574 XML serialization:

```

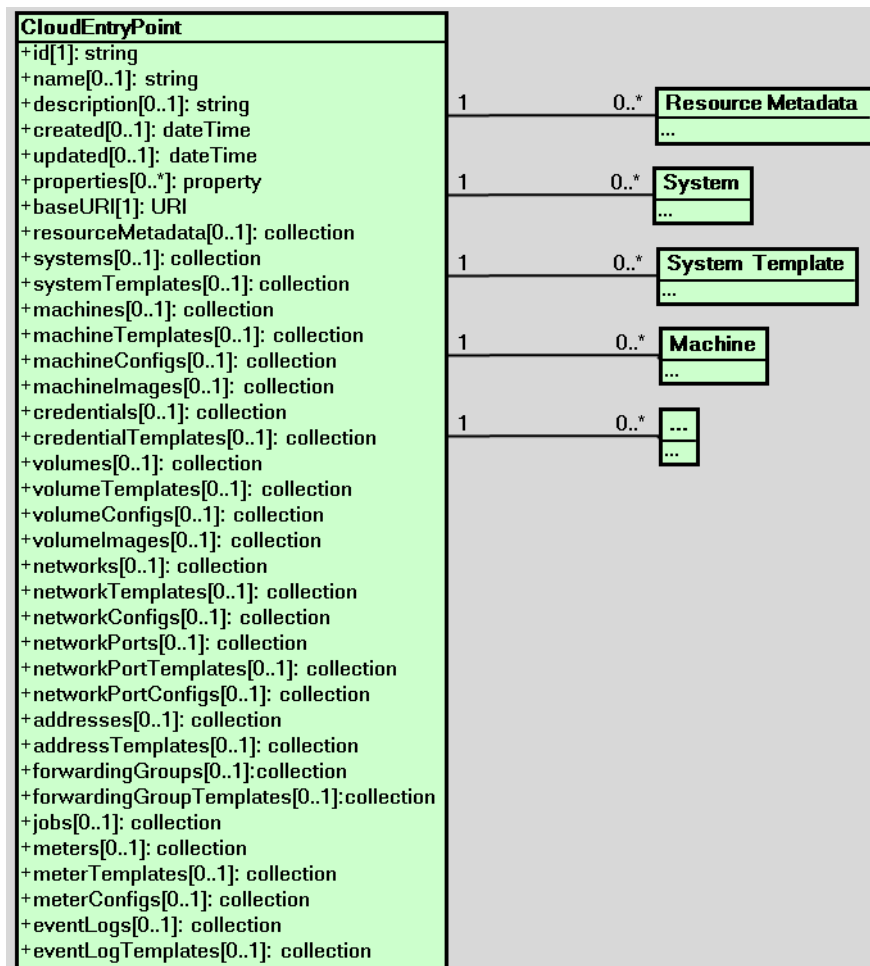
1575 <Collection
1576   resourceURI="http://schemas.dmtf.org/cimi/1/ResourceMetadataCollection"
1577   xmlns="http://schemas.dmtf.org/cimi/1">
1578   <id> xs:anyURI </id>
1579   <count> xs:integer </count>
1580   <ResourceMetadata>
1581     <id> xs:anyURI </id>
1582     ... remaining ResourceMetadata attributes ...
1583   </ResourceMetadata> *
1584   <operation rel="add" href="xs:anyURI"/> ?
1585   <xs:any>*
1586 </Collection>

```

## 1587 5.12 Cloud Entry Point

1588 The Cloud Entry Point represents the entry point into the cloud defined by the CIMI Model. The Cloud  
 1589 Entry Point implements a catalog of resources, such as Systems, System Templates, Machines, Machine  
 1590 Templates, etc., that can be queried and browsed by the Consumer.

1591 Figure 1 illustrates the Cloud Entry Point and its relationship to other resources. Although this drawing is  
 1592 in the style of a Resource Relationship diagram, the use of UML is neither rigorous nor normative.



1593

1594

Figure 1 - Cloud Entry Point

1595 When a Consumer issues a read on the Cloud Entry Point resource, then the Provider shall return a  
 1596 Cloud Entry Point resource that only catalogs resources that this Consumer is allowed to perform  
 1597 operations on.

|                  |   |   |
|------------------|---|---|
| <b>Name</b>      | CloudEntryPoint                         |   |
| <b>Type URI</b>  | http://www.dmf.org/cimi/CloudEntryPoint |   |
| <b>Attribute</b> | <b>Type</b>                             | <b>Description</b>  |
| 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support mandatory; read-only                                  |
| resourceMetadata | collection<br>[Resource Metadata]       | 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.<br><br><b>Constraints:</b> |

|                     |  |   |
|---------------------|--|---|
|                     |  | <b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-only  |
| systems             | <i>collection [System]</i>               | A reference to the System Collection of this Cloud Entry Point.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-only                |
| systemTemplates     | <i>collection [SystemTemplate]</i>       | A reference to the System Template Collection of this CloudEntry Point.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-only        |
| machines            | <i>collection [Machine]</i>              | A reference to the Machine Collection of this Cloud Entry Point.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-only               |
| machineTemplates    | <i>collection [MachineTemplate]</i>      | A reference to the Machine Template Collection of this Cloud Entry Point.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-only      |
| machineConfigs      | <i>collection [MachineConfiguration]</i> | A reference to the Machine Configuration Collection of this Cloud Entry Point.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-only |
| machineImages       | <i>collection [MachineImage]</i>         | A reference to the Machine Image Collection of this Cloud Entry Point.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-only         |
| credentials         | <i>collection [Credential]</i>           | A reference to the Credential Collection of this Cloud Entry Point.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-only            |
| credentialTemplates | <i>collection [CredentialTemplate]</i>   | A reference to the Credential Template Collection of this Cloud Entry Point.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-only   |
| volumes             | <i>collection [Volume]</i>               | A reference to the Volume Collection of this Cloud Entry Point.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-only                |
| volumeTemplates     | <i>collection [VolumeTemplate]</i>       | A reference to the Volume Template Collection of this Cloud Entry Point.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-only       |
| volumeConfigs       | <i>collection [VolumeConfiguration]</i>  | A reference to the Volume Configuration Collection of this Cloud Entry Point.<br><b>Constraints:</b>  |

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

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

1598 Each of the collections mentioned above will be defined within the related resource definition clauses. For  
 1599 example, the MachineCollection resource will be defined in clause 5.14.2 as part of the Machine related  
 1600 resources.

1601 The following describes the serialization of the resource in both JSON and XML:

1602 **JSON media type:** application/json

1603 **JSON serialization:**

```

1604 { "resourceURI": "http://schemas.dmtf.org/cimi/1/CloudEntryPoint",
1605   "id": string,
1606   "name": string, ?
1607   "description": string, ?
1608   "created": string, ?
1609   "updated": string, ?
1610   "properties": { "key": string, + }, ?
1611   "baseURI": string,
1612   "resourceMetadata": { "href": string }, ?
1613   "systems": { "href": string }, ?
1614   "systemTemplates": { "href": string }, ?
1615   "machines": { "href": string }, ?
1616   "machineTemplates": { "href": string }, ?
1617   "machineConfigs": { "href": string }, ?
1618   "machineImages": { "href": string }, ?
1619   "credentials": { "href" string }, ?
1620   "credentialTemplates": { "href" string }, ?
    
```



```

1621     "volumes": { "href": string }, ?
1622     "volumeTemplates": { "href": string }, ?
1623     "volumeConfigs": { "href": string }, ?
1624     "volumeImages": { "href": string }, ?
1625     "networks": { "href": string }, ?
1626     "networkTemplates": { "href": string }, ?
1627     "networkConfigs": { "href": string }, ?
1628     "networkPorts": { "href": string }, ?
1629     "networkPortTemplates": { "href": string }, ?
1630     "networkPortConfigs": { "href": string }, ?
1631     "addresses": { "href": string }, ?
1632     "addressTemplates": { "href": string }, ?
1633     "forwardingGroups" { "href": string }, ?
1634     "forwardingGroupTemplates" { "href": string }, ?
1635     "jobs": { "href": string }, ?
1636     "meters": { "href": string }, ?
1637     "meterTemplates": { "href": string }, ?
1638     "meterConfigs": { "href": string }, ?
1639     "eventLogs": { "href": string }, ?
1640     "eventLogTemplates": { "href": string }, ?
1641     "operations": [
1642         { "rel": "edit", "href": string } ?
1643     ] ?
1644     ...
1645 }
    
```

1646 **XML media type:** application/xml

1647 **XML serialization:**

```

1648 <CloudEntryPoint xmlns="http://schemas.dmtf.org/cimi/1">
1649   <id> xs:anyURI </id>
1650   <name> xs:string </name> ?
1651   <description> xs:string </description> ?
1652   <created> xs:dateTime </created> ?
1653   <updated> xs:dateTime </updated> ?
1654   <property key="xs:string"> xs:string </property> *
1655   <baseURI> xs:anyURI </baseURI>
1656   <resourceMetadata href="xs:anyURI"/> ?
1657   <systems href="xs:anyURI"/> ?
1658   <systemTemplates href="xs:anyURI"/> ?
1659   <machines href="xs:anyURI"/> ?
1660   <machineTemplates href="xs:anyURI"/> ?
1661   <machineConfigs href="xs:anyURI"/> ?
1662   <machineImages href="xs:anyURI"/> ?
1663   <credentials href="xs:anyURI"/> ?
1664   <credentialTemplates href="xs:anyURI"/> ?
1665   <volumes href="xs:anyURI"/> ?
1666   <volumeTemplates href="xs:anyURI"/> ?
1667   <volumeConfigs href="xs:anyURI"/> ?
1668   <volumeImages href="xs:anyURI"/> ?
1669   <networks href="xs:anyURI"/> ?
1670   <networkTemplates href="xs:anyURI"/> ?
1671   <networkConfigs href="xs:anyURI"/> ?
1672   <networkPorts href="xs:anyURI"/> ?
1673   <networkPortTemplates href="xs:anyURI"/> ?
1674   <networkPortConfigs href="xs:anyURI"/> ?
1675   <addresses href="xs:anyURI"/> ?
1676   <addressTemplates href="xs:anyURI"/> ?
1677   <forwardingGroups href="xs:anyURI"/> ?
1678   <forwardingGroupTemplates href="xs:anyURI"/> ?
1679   <jobs href="xs:anyURI"/> ?
1680   <meters href="xs:anyURI"/> ?
1681   <meterTemplates href="xs:anyURI"/> ?
    
```

```

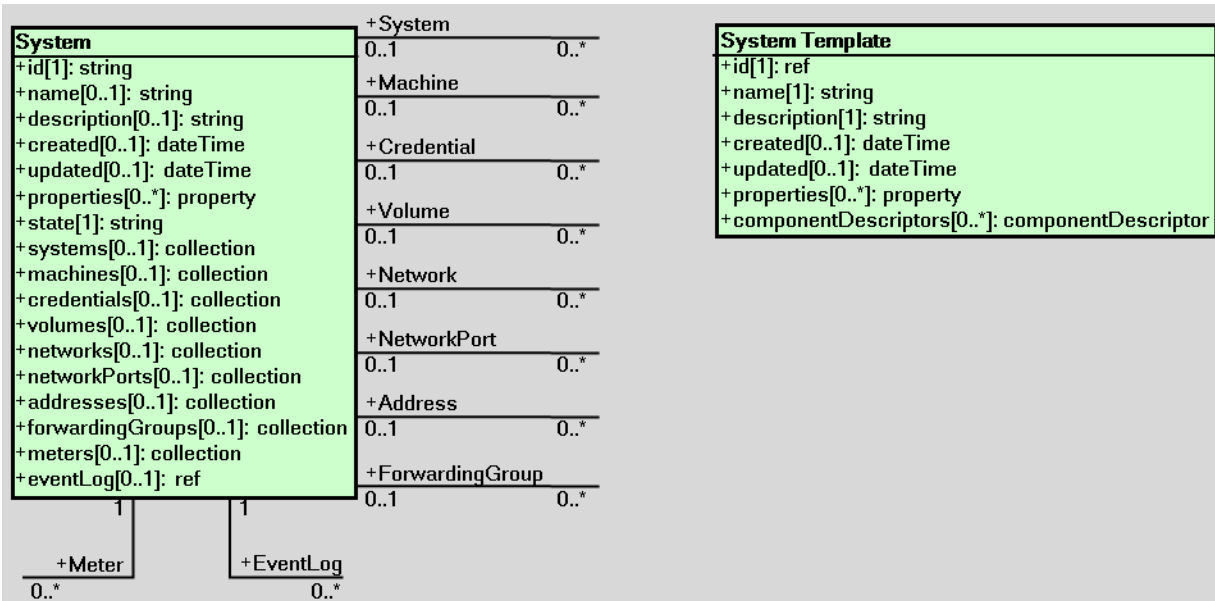
1682 <meterConfigs href="xs:anyURI"/> ?
1683 <eventLogs href="xs:anyURI"/> ?
1684 <eventLogTemplates href="xs:anyURI"/> ?
1685 <operation rel="edit" href="xs:anyURI"/> ?
1686 <xs:any>*
1687 </CloudEntryPoint>
    
```

1688 **5.12.1 Operations**

1689 This resource supports the Read and Update operations.

1690 **5.13 System resources and relationships**

1691 Figure 2 illustrates the resources involved in constructing a System and their relationships. Although this  
 1692 drawing is in the style of a Resource Relationship diagram, the use of UML is neither rigorous nor  
 1693 normative.



1694 **Figure 2 - System resources**

1695 **5.13.1 System**

1696 A System is a realized resource that consists of one or more Networks, Volumes, Machines, (and others)  
 1697 that could be connected and associated with each other. A System can be created from the interpretation  
 1698 of a SystemTemplate. A System can be operated and managed as a single resource and usually forms a  
 1699 stack of service. For example, a shopping cart system consists of machines for web servers and  
 1700 databases, network addresses for public access, and volumes for database files. A System may directly  
 1701 provide a user-facing component, or may provide an infrastructure component.

1702 A System has several "top-level" attributes that are collections of references to resources that are owned  
 1703 by the System. A resource that is owned by a System has its lifecycle directly tied to the lifecycle of the  
 1704 System. In particular, when a System is deleted, all of its owned resources shall also be deleted.  
 1705 Generally, operations on a System will translate into operations on its owned resources.

1706 However, a resource owned by a System may in turn refer to some other resources that are not owned by  
 1707 this System, e.g., a Machine in a System can refer to a Volume that is not owned by this System. More  
 1708 precisely, the following rules apply:

- 1709 • By default, all resources that are created as the result of a System creation are also owned by  
1710 the System. (This rule can be overridden by subsequent modifications to the top-level System  
1711 collection attributes.)
- 1712 • Ownership of a resource to a System is expressed by including the reference to the resource in  
1713 the appropriate top-level System collection attribute, or by ownership to a sub-System of this  
1714 System (i.e., ownership is transitive across hierarchies of Systems).
- 1715 • When a resource other than a System is added to an existing System (i.e., becomes owned by  
1716 the System by insertion of its reference to the appropriate top-level System collection attribute)  
1717 other resources already referred by this added resource are by default not owned by the  
1718 System. (This rule can be overridden by subsequent modifications to the top-level System  
1719 collection attributes.)

1720 A resource shall not be owned by more than one System at any point in time (unless there is an  
1721 ownership relationship between these Systems). Note that a resource does not need to be owned by a  
1722 System (i.e. part of any of its collection attributes) to be referenced/used by a resource in the System. By  
1723 not including it in any of the collections, the resource will simply not be part of any actions performed on  
1724 the System.

|                  |                                       |   |
|------------------|---------------------------------------|---|
| <b>Name</b>      | System                                |   |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/System |   |
| <b>Attribute</b> | <b>Type</b>                           | <b>Description</b>  |
| state            | <i>string</i>                         | <p>The operational state of the System.</p> <p>Allowable values include:</p> <p><b>CREATING:</b> The System is in the process of being created. Allowable action when in this state is: <b>delete</b>.</p> <p><b>STARTING/STARTED/STOPPING/STOPPED/PAUSING/PAUSED/SUSPENDING/SUSPENDED:</b> 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><b>MIXED:</b> 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: <b>delete</b>.</p> <p><b>DELETING:</b> The System is in the process of being deleted. Allowable action when in this state is: <b>delete</b>.</p> <p><b>ERROR:</b> The Provider has detected an error in the System. Allowable action when in this state is: <b>delete</b>.</p> <p>Providers may define additional values.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-only</p> |
| systems          | <i>collection [SystemSystem]</i>      | <p>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." 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-only</p>  |

|              |  |  |
|--------------|--|--|
| machines     | <i>collection</i><br>[SystemMachine]     | <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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-only</p>                      |
| credentials  | <i>collection</i><br>[SystemCredential]  | <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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-only</p>    |
| volumes      | <i>collection</i><br>[SystemVolume]      | <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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-only</p>                               |
| networks     | <i>collection</i><br>[SystemNetwork]     | <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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-only</p>                         |
| networkPorts | <i>collection</i><br>[SystemNetworkPort] | <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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-only</p> |
| addresses    | <i>collection</i><br>[SystemAddress]     | <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</p>  |

|                  |  |   |
|------------------|--|---|
|                  | <i>ess]</i>  | <p>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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-only</p>  |
| forwardingGroups | <i>collection<br/>[SystemFor<br/>wardingGroup]</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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-only</p> |
| meters           | <i>collection<br/>[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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-only</p>  |

1725 **JSON media type:** application/json

1726 **JSON serialization:**

```

1727 { "resourceURI": "http://schemas.dmtf.org/cimi/1/System",
1728   "id": string,
1729   "name": string, ?
1730   "description": string, ?
1731   "created": string, ?
1732   "updated": string, ?
1733   "properties": { "key": string, + }, ?
1734   "state": string,
1735   "systems": { "href": string }, ?
1736   "machines": { "href": string }, ?
1737   "credentials": { "href": string }, ?
1738   "volumes": { "href": string }, ?
1739   "networks": { "href": string }, ?
1740   "networkPorts": { "href": string }, ?
1741   "addresses": { "href": string }, ?
1742   "forwardingGroups": { "href": string }, ?
1743   "meters": { "href": string }, ?
1744   "eventLog": { "href": string }, ?
1745   "operations": [
1746     { "rel": "edit", "href": string }, ?
    
```

```

1747     { "rel": "delete", "href": string }, ?
1748     { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
1749     { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string }, ?
1750     { "rel": "http://schemas.dmtf.org/cimi/1/action/restart", "href": string },
1751     ?
1752     { "rel": "http://schemas.dmtf.org/cimi/1/action/pause", "href": string }, ?
1753     { "rel": "http://schemas.dmtf.org/cimi/1/action/suspend", "href": string },
1754     ?
1755     { "rel": "http://schemas.dmtf.org/cimi/1/action/export", "href": string } ?
1756   ] ?
1757   ...
1758 }

```

1759 **XML media type:** application/xml

1760 **XML serialization:**

```

1761 <System xmlns="http://schemas.dmtf.org/cimi/1">
1762   <id> xs:anyURI </id>
1763   <name> xs:string </name> ?
1764   <description> xs:string </description> ?
1765   <created> xs:dateTime </created> ?
1766   <updated> xs:dateTime </updated> ?
1767   <property key="xs:string"> xs:string </property> *
1768   <state> xs:string </state>
1769   <systems href="xs:anyURI"/> ?
1770   <machines href="xs:anyURI"/> ?
1771   <credentials href="xs:anyURI"/> ?
1772   <volumes href="xs:anyURI"/> ?
1773   <networks href="xs:anyURI"/> ?
1774   <networkPorts href="xs:anyURI"/> ?
1775   <addresses href="xs:anyURI"/> ?
1776   <forwardingGroups href="xs:anyURI"/> ?
1777   <meters href="xs:anyURI"/> ?
1778   <eventLog href="xs:anyURI"/> ?
1779   <operation rel="edit" href="xs:anyURI"/> ?
1780   <operation rel="delete" href="xs:anyURI"/> ?
1781   <operation rel="http://schemas.dmtf.org/cimi/1/action/start"
1782     href="xs:anyURI"/> ?
1783   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
1784     href="xs:anyURI"/> ?
1785   <operation rel="http://schemas.dmtf.org/cimi/1/action/restart"
1786     href="xs:anyURI"/> ?
1787   <operation rel="http://schemas.dmtf.org/cimi/1/action/pause"
1788     href="xs:anyURI"/> ?
1789   <operation rel="http://schemas.dmtf.org/cimi/1/action/suspend"
1790     href="xs:anyURI"/> ?
1791   <operation rel="http://schemas.dmtf.org/cimi/1/action/export"
1792     href="xs:anyURI"/> ?
1793   <xs:any>*
1794 </System>

```

### 1795 5.13.1.1 Collections

1796 The following describes the collection resources owned by Systems.

#### 1797 5.13.1.1.1 SystemSystem Collection

1798 The resource type for each item of this collection is "SystemSystem", defined as follows:

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

 1799 **JSON serialization:**

```

1800 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemSystemCollection",
1801   "id": string,
1802   "count": number,
1803   "systemSystems": [
1804     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemSystem",
1805       "id": string,
1806       "name": string, ?
1807       "description": string, ?
1808       "created": string, ?
1809       "updated": string, ?
1810       "properties": { "key": string, + }, ?
1811       "system": { "href": string },
1812       "operations": [
1813         { "rel": "edit", "href": string }, ?
1814         { "rel": "delete", "href": string } ?
1815       ] ?
1816       ...
1817     }, +
1818   ], ?
1819   "operations": [ { "rel": "add", "href": string } ? ]
1820   ...
1821 }
```

 1822 **XML serialization:**

```

1823 <Collection
1824   resourceURI="http://schemas.dmtf.org/cimi/1/SystemSystemCollection"
1825   xmlns="http://schemas.dmtf.org/cimi/1">
1826   <id> xs:anyURI </id>
1827   <count> xs:integer </count>
1828   <SystemSystem>
1829     <id> xs:anyURI </id>
1830     <name> xs:string </name> ?
1831     <description> xs:string </description> ?
1832     <created> xs:dateTime </created> ?
1833     <updated> xs:dateTime </updated> ?
1834     <property key="xs:string"> xs:string </property> *
1835     <system href="xs:anyURI"/>
1836     <operation rel="edit" href="xs:anyURI"/> ?
1837     <operation rel="delete" href="xs:anyURI"/> ?
1838     <xs:any>*
1839   </SystemSystem> *
1840   <operation rel="add" href="xs:anyURI"/> ?
1841   <xs:any>*
1842 </Collection>
```

 1843 **5.13.1.1.2 SystemMachine Collection**

1844 The resource type for each item of this collection is "SystemMachine", defined as follows:

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

1845 **JSON serialization:**

```

1846 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemMachineCollection",
1847   "id": string,
1848   "count": number,
1849   "systemMachines": [
1850     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemMachine",
1851       "id": string,
1852       "name": string, ?
1853       "description": string, ?
1854       "created": string, ?
1855       "updated": string, ?
1856       "properties": { "key": string, + }, ?
1857       "machine": { "href": string },
1858       "operations": [
1859         { "rel": "edit", "href": string }, ?
1860         { "rel": "delete", "href": string } ?
1861       ] ?
1862       ...
1863     }, +
1864   ], ?
1865   "operations": [ { "rel": "add", "href": string } ? ]
1866   ...
1867 }
```

1868 **XML serialization:**

```

1869 <Collection
1870   resourceURI="http://schemas.dmtf.org/cimi/1/SystemMachineCollection"
1871   xmlns="http://schemas.dmtf.org/cimi/1">
1872   <id> xs:anyURI </id>
1873   <count> xs:integer </count>
1874   <SystemMachine>
1875     <id> xs:anyURI </id>
1876     <name> xs:string </name> ?
1877     <description> xs:string </description> ?
1878     <created> xs:dateTime </created> ?
1879     <updated> xs:dateTime </updated> ?
1880     <property key="xs:string"> xs:string </property> *
1881     <machine href="xs:anyURI"/>
1882     <operation rel="edit" href="xs:anyURI"/> ?
1883     <operation rel="delete" href="xs:anyURI"/> ?
1884     <xs:any>*
1885   </SystemMachine> *
1886   <operation rel="add" href="xs:anyURI"/> ?
1887   <xs:any>*
1888 </Collection>
```

1889 **5.13.1.1.3 SystemCredential Collection**

1890 The resource type for each item of this collection is "SystemCredential", defined as follows:



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

 1891 **JSON serialization:**

```

1892 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemCredentialCollection",
1893   "id": string,
1894   "count": number,
1895   "systemCredentials": [
1896     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemCredential",
1897       "id": string,
1898       "name": string, ?
1899       "description": string, ?
1900       "created": string, ?
1901       "updated": string, ?
1902       "properties": { "key": string, + }, ?
1903       "credential": { "href": string },
1904       "operations": [
1905         { "rel": "edit", "href": string }, ?
1906         { "rel": "delete", "href": string } ?
1907       ] ?
1908       ...
1909     }, +
1910   ], ?
1911   "operations": [ { "rel": "add", "href": string } ? ]
1912   ...
1913 }
```

 1914 **XML serialization:**

```

1915 <Collection
1916   resourceURI="http://schemas.dmtf.org/cimi/1/SystemCredentialCollection"
1917   xmlns="http://schemas.dmtf.org/cimi/1">
1918   <id> xs:anyURI </id>
1919   <count> xs:integer </count>
1920   <SystemCredential>
1921     <id> xs:anyURI </id>
1922     <name> xs:string </name> ?
1923     <description> xs:string </description> ?
1924     <created> xs:dateTime </created> ?
1925     <updated> xs:dateTime </updated> ?
1926     <property key="xs:string"> xs:string </property> *
1927     <credential href="xs:anyURI"/>
1928     <operation rel="edit" href="xs:anyURI"/> ?
1929     <operation rel="delete" href="xs:anyURI"/> ?
1930     <xs:any>*
1931   </SystemCredential> *
1932   <operation rel="add" href="xs:anyURI"/> ?
1933   <xs:any>*
1934 </Collection>
```

 1935 **5.13.1.1.4 SystemVolume Collection**

1936 The resource type for each item of this collection is "SystemVolume", defined as follows:

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

1937 **JSON serialization:**

```

1938 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemVolumeCollection",
1939   "id": string,
1940   "count": number,
1941   "systemVolumes": [
1942     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemVolume",
1943       "id": string,
1944       "name": string, ?
1945       "description": string, ?
1946       "created": string, ?
1947       "updated": string, ?
1948       "properties": { "key": string, + }, ?
1949       "volume": { "href": string },
1950       "operations": [
1951         { "rel": "edit", "href": string }, ?
1952         { "rel": "delete", "href": string } ?
1953       ] ?
1954       ...
1955     }, +
1956   ], ?
1957   "operations": [ { "rel": "add", "href": string } ? ]
1958   ...
1959 }
```

1960 **XML serialization:**

```

1961 <Collection
1962   resourceURI="http://schemas.dmtf.org/cimi/1/SystemVolumeCollection"
1963   xmlns="http://schemas.dmtf.org/cimi/1">
1964   <id> xs:anyURI </id>
1965   <count> xs:integer </count>
1966   <SystemVolume>
1967     <id> xs:anyURI </id>
1968     <name> xs:string </name> ?
1969     <description> xs:string </description> ?
1970     <created> xs:dateTime </created> ?
1971     <updated> xs:dateTime </updated> ?
1972     <property key="xs:string"> xs:string </property> *
1973     <volume href="xs:anyURI"/>
1974     <operation rel="edit" href="xs:anyURI"/> ?
1975     <operation rel="delete" href="xs:anyURI"/> ?
1976     <xs:any>*
1977   </SystemVolume> *
1978   <operation rel="add" href="xs:anyURI"/> ?
1979   <xs:any>*
1980 </Collection>
```

1981 **5.13.1.1.5 SystemNetwork Collection**

1982 The resource type for each item of this collection is "SystemNetwork", defined as follows:

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

 1983 **JSON serialization:**

```

1984 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemNetworkCollection",
1985   "id": string,
1986   "count": number,
1987   "systemNetworks": [
1988     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemNetwork",
1989       "id": string,
1990       "name": string, ?
1991       "description": string, ?
1992       "created": string, ?
1993       "updated": string, ?
1994       "properties": { "key": string, + }, ?
1995       "network": { "href": string },
1996       "operations": [
1997         { "rel": "edit", "href": string }, ?
1998         { "rel": "delete", "href": string } ?
1999       ] ?
2000       ...
2001     }, +
2002   ], ?
2003   "operations": [ { "rel": "add", "href": string } ? ]
2004   ...
2005 }
```

 2006 **XML serialization:**

```

2007 <Collection
2008   resourceURI="http://schemas.dmtf.org/cimi/1/SystemNetworkCollection"
2009   xmlns="http://schemas.dmtf.org/cimi/1">
2010   <id> xs:anyURI </id>
2011   <count> xs:integer </count>
2012   <SystemNetwork>
2013     <id> xs:anyURI </id>
2014     <name> xs:string </name> ?
2015     <description> xs:string </description> ?
2016     <created> xs:dateTime </created> ?
2017     <updated> xs:dateTime </updated> ?
2018     <property key="xs:string"> xs:string </property> *
2019     <network href="xs:anyURI"/>
2020     <operation rel="edit" href="xs:anyURI"/> ?
2021     <operation rel="delete" href="xs:anyURI"/> ?
2022     <xs:any>*
2023   </SystemNetwork> *
2024   <operation rel="add" href="xs:anyURI"/> ?
2025   <xs:any>*
2026 </Collection>
```

 2027 **5.13.1.1.6 SystemNetworkPort Collection**

2028 The resource type for each item of this collection is "SystemNetwork", defined as follows:

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

2029 **JSON serialization:**

```

2030 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemNetworkPortCollection",
2031   "id": string,
2032   "count": number,
2033   "systemNetworkPorts": [
2034     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemNetworkPort",
2035       "id": string,
2036       "name": string, ?
2037       "description": string, ?
2038       "created": string, ?
2039       "updated": string, ?
2040       "properties": { "key": string, + }, ?
2041       "networkPort": { "href": string },
2042       "operations": [
2043         { "rel": "edit", "href": string }, ?
2044         { "rel": "delete", "href": string } ?
2045       ] ?
2046       ...
2047     }, +
2048   ], ?
2049   "operations": [ { "rel": "add", "href": string } ? ]
2050   ...
2051 }
```

2052 **XML serialization:**

```

2053 <Collection
2054   resourceURI="http://schemas.dmtf.org/cimi/1/SystemNetworkPortCollection"
2055   xmlns="http://schemas.dmtf.org/cimi/1">
2056   <id> xs:anyURI </id>
2057   <count> xs:integer </count>
2058   <SystemNetworkPort>
2059     <id> xs:anyURI </id>
2060     <name> xs:string </name> ?
2061     <description> xs:string </description> ?
2062     <created> xs:dateTime </created> ?
2063     <updated> xs:dateTime </updated> ?
2064     <property key="xs:string"> xs:string </property> *
2065     <networkPort href="xs:anyURI"/>
2066     <operation rel="edit" href="xs:anyURI"/> ?
2067     <operation rel="delete" href="xs:anyURI"/> ?
2068     <xs:any>*
2069   </SystemNetworkPort> *
2070   <operation rel="add" href="xs:anyURI"/> ?
2071   <xs:any>*
2072 </Collection>
```

2073 **5.13.1.1.7 SystemAddress Collection**

2074 The resource type for each item of this collection is "SystemAddress", defined as follows:

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

 2075 **JSON serialization:**

```

2076 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemAddressCollection",
2077   "id": string,
2078   "count": number,
2079   "systemAddresses": [
2080     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemAddress",
2081       "id": string,
2082       "name": string, ?
2083       "description": string, ?
2084       "created": string, ?
2085       "updated": string, ?
2086       "properties": { "key": string, + }, ?
2087       "address": { "href": string },
2088       "operations": [
2089         { "rel": "edit", "href": string }, ?
2090         { "rel": "delete", "href": string } ?
2091       ] ?
2092       ...
2093     }, +
2094   ], ?
2095   "operations": [ { "rel": "add", "href": string } ? ]
2096   ...
2097 }
```

 2098 **XML serialization:**

```

2099 <Collection
2100   resourceURI="http://schemas.dmtf.org/cimi/1/SystemAddressCollection"
2101   xmlns="http://schemas.dmtf.org/cimi/1">
2102   <id> xs:anyURI </id>
2103   <count> xs:integer </count>
2104   <SystemAddress>
2105     <id> xs:anyURI </id>
2106     <name> xs:string </name> ?
2107     <description> xs:string </description> ?
2108     <created> xs:dateTime </created> ?
2109     <updated> xs:dateTime </updated> ?
2110     <property key="xs:string"> xs:string </property> *
2111     <address href="xs:anyURI"/>
2112     <operation rel="edit" href="xs:anyURI"/> ?
2113     <operation rel="delete" href="xs:anyURI"/> ?
2114     <xs:any>*
2115   </SystemAddress> *
2116   <operation rel="add" href="xs:anyURI"/> ?
2117   <xs:any>*
2118 </Collection>
```

 2119 **5.13.1.1.8 SystemForwardingGroup Collection**

2120 The resource type for each item of this collection is "SystemForwardingGroup", defined as follows:

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

2121 **JSON serialization:**

```

2122 { "resourceURI":
2123     "http://schemas.dmtf.org/cimi/1/SystemForwardingGroupCollection",
2124     "id": string,
2125     "count": number,
2126     "systemForwardingGroups": [
2127         { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemForwardingGroup",
2128           "id": string,
2129           "name": string, ?
2130           "description": string, ?
2131           "created": string, ?
2132           "updated": string, ?
2133           "properties": { "key": string, + }, ?
2134           "forwardingGroup": { "href": string },
2135           "operations": [
2136             { "rel": "edit", "href": string }, ?
2137             { "rel": "delete", "href": string } ?
2138           ] ?
2139           ...
2140         }, +
2141     ], ?
2142     "operations": [ { "rel": "add", "href": string } ? ]
2143     ...
2144 }

```

2145 **XML serialization:**

```

2146 <Collection
2147   resourceURI="http://schemas.dmtf.org/cimi/1/SystemForwardingGroupCollection"
2148   xmlns="http://schemas.dmtf.org/cimi/1">
2149   <id> xs:anyURI </id>
2150   <count> xs:integer </count>
2151   <SystemForwardingGroup>
2152     <id> xs:anyURI </id>
2153     <name> xs:string </name> ?
2154     <description> xs:string </description> ?
2155     <created> xs:dateTime </created> ?
2156     <updated> xs:dateTime </updated> ?
2157     <property key="xs:string"> xs:string </property> *
2158     <forwardingGroup href="xs:anyURI"/>
2159     <operation rel="edit" href="xs:anyURI"/> ?
2160     <operation rel="delete" href="xs:anyURI"/> ?
2161     <xs:any>*
2162   </SystemForwardingGroup> *
2163   <operation rel="add" href="xs:anyURI"/> ?
2164   <xs:any>*
2165 </Collection>

```

2166 **5.13.1.1.9 SystemMeter Collection**

2167 The resource type for each item of this collection is "Meter" as defined in clause 5.17.3.

2168 **JSON serialization:**

```

2169 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemMeterCollection",
2170   "id": string,
2171   "count": number,
2172   "meters": [
2173     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
2174       "id": string,
2175       ... remaining Meter attributes ...
2176     }, +
2177   ], ?
2178   "operations": [ { "rel": "add", "href": string } ? ]
2179   ...
2180 }

```

2181 **XML serialization:**

```

2182 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/SystemMeterCollection"
2183   xmlns="http://schemas.dmtf.org/cimi/1">
2184   <id> xs:anyURI </id>
2185   <count> xs:integer </count>
2186   <Meter>
2187     <id> xs:anyURI </id>
2188     ... remaining Meter attributes ...
2189   </Meter> *
2190   <operation rel="add" href="xs:anyURI"/> ?
2191   <xs:any>*
2192 </Collection>

```

2193 **5.13.1.2 Operations**

2194 This resource supports the Read, Update, and Delete operations. Create is supported via the System  
 2195 Collection resource.

2196 The following custom operations are also defined:

2197 **Starting/Stopping/Restarting/Pausing/Suspending the Machines in a System**

2198 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/xxx

2199 Where "xxx" is either "start", "stop", "restart", "pause", or "suspend".

2200 This operation will recursively perform the requested operation on each component of the System  
 2201 (Machine or sub-System). Note that not all Machines need to be in the same state for this operation to be  
 2202 available and the impact that this operation will have will vary depending on the component's current  
 2203 state; see clause 5.14.1.2 for more details about performing operations on Machines. If a Machine is in a  
 2204 state that makes this operation invalid, that Machine will not be affected by the operation.

2205 To start, stop, restart, pause, or suspend the Machines in a System, a POST is sent to the appropriate  
 2206 URI of the System where the HTTP request body shall be as described in the "Operations" clause of the  
 2207 Machine resource; see clause 5.14.1.2.

2208 **Exporting a System**

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

2210 This operation is defined to export a System. If an export package exists at that URI, it is updated with the  
 2211 values of the System and any component management resources. Otherwise, a new export package is  
 2212 created at that URI with a Media Type as specified by the "format" parameter. Other formats may be used  
 2213 if supported, but are not specified by this standard.

2214 Input parameters:

- 2215       • "format" - type: string - optional  
 2216       Indicates the Media Type of the exported data. If not present, the default value shall be  
 2217       "application/ovf."  
 2218
- 2219       • "destination" - type: URI - optional  
 2220       The location to where the exported data is placed. If not present, the HTTP response Location  
 2221       header shall contain the URL to the exported data. Based on the specific protocol specified within  
 2222       the URI, the Consumer might need to provide additional information (such as credentials) in the  
 2223       "properties" field. In the case of HTTP, a PUT shall be used to place the data at the specified  
 2224       location.

2225       Output parameters: None.

## 2226       HTTP protocol

2227       To export a System, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/export" URI of the  
 2228       System where the HTTP request body shall be as described below.

2229       **JSON media type:** application/json

2230       **JSON serialization:**

```
2231       { "action": "http://schemas.dmtf.org/cimi/1/action/export",
2232         "format": string, ?
2233         "destination": string, ?
2234         "properties": { "key": string, + } ?
2235         ...
2236       }
```

2237       **XML media type:** application/xml

2238       **XML serialization**

```
2239       <Action xmlns="http://schemas.dmtf.org/cimi/1">
2240         <action> http://schemas.dmtf.org/cimi/1/action/export </action>
2241         <format> xs:string </format> ?
2242         <destination> xs:anyURI </destination> ?
2243         <property key="xs:string"> xs:string </property> *
2244         <xs:any*>
2245       </Action>
```

## 2246       5.13.2 System Collection

2247       A System Collection resource represents the collection of System resources within a Provider and follows  
 2248       the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

2249       **JSON serialization:**

```
2250       { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemCollection",
2251         "id": string,
2252         "count", number,
2253         "systems": [
2254           { "resourceURI": "http://schemas.dmtf.org/cimi/1/System",
2255             "id": string,
2256             ... remaining System attributes ...
2257           }, +
2258         ], ?
2259         "operations": [
2260           { "rel": "add", "href": string }, ?
2261           { "rel": "http://schemas.dmtf.org/cimi/1/action/import", "href": string } ?
2262         ]
2263       ...

```



2264 }

2265 **XML serialization:**

```

2266 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/SystemCollection"
2267     xmlns="http://schemas.dmtf.org/cimi/1">
2268     <id> xs:anyURI </id>
2269     <count> xs:integer </count>
2270     <System>
2271         <id> xs:anyURI </id>
2272         ... remaining System attributes ...
2273     </System> *
2274     <operation rel="add" href="xs:anyURI"/> ?
2275     <operation rel="http://schemas.dmtf.org/cimi/1/import" href="xs:anyURI"/> ?
2276     <xs:any*>
2277 </Collection>
    
```

2278 **5.13.2.1 Operations**

2279 NOTE: The "add" operation requires a SystemTemplate to be used (see 4.2.1.1).

2280 Resources created during the process of creating a System shall be "owned" by the System (see 5.13.1).  
 2281 For example, a "componentDescriptor" that references a MachineTemplate, and within that  
 2282 MachineTemplate is a reference to a VolumeTemplate, will result in a reference to the new Machine  
 2283 being added to the System.machines attribute and a reference to the new Volume being added to the  
 2284 System.volumes attribute. However, if this MachineTemplate refers to an existing Volume, this Volume  
 2285 will not be added to the top-level System attributes.

2286 The following custom operations are also defined:

2287 **Importing a System**

2288 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/import

2289 This operation will import/deserialize a System. Not only will a System be created, but Machines,  
 2290 Volumes, and Networks and possibly recursive Systems and their components may also be created  
 2291 corresponding to imported descriptor entries. More detail about this process is in ANNEX A.

2292 Input parameters:

- 2293 • "source" - type: URI - mandatory
- 2294 The location from which the imported data will be retrieved. Based on the specific protocol
- 2295 specified within the URI, the Consumer might need to provide additional information (such as
- 2296 credentials) in the "properties" field.

2297 Output parameters: None.

2298 **HTTP protocol**

2299 To import a System, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/import" URI of the  
 2300 System Collection where the HTTP request body shall be as described below.

2301 **JSON media type:** application/json

2302 **JSON serialization:**

```

2303 { "action": "http://schemas.dmtf.org/cimi/1/action/import",
2304   "source": string, ?
2305   "properties": { "key": string, + } ?
2306   ...
2307 }
    
```

2308 **XML media type:** application/xml

2309 **XML serialization**

```

2310 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2311   <action> http://schemas.dmtf.org/cimi/1/action/import </action>
2312   <source> xs:anyURI </source> ?
2313   <property key="xs:string"> xs:string </property> *
2314   <xs:any>*
2315 </Action>
    
```

2316 **5.13.3 System Template**

2317 The System Template contains the set of individual descriptors that are necessary to create the  
 2318 components of a System. Each component descriptor can be considered to be the persisted view of the  
 2319 create operation that instantiates the component. In practice, the Provider will interpret the set of  
 2320 component descriptors as a set of creation operations to be executed in an order compatible with the  
 2321 dependencies (e.g., attachments or references between components) that are manifest between these  
 2322 components.

2323 A System Template may include component references in the descriptors, used to express links between  
 2324 components of the resulting System. A component reference uses the "name" of the target (referred)  
 2325 component. For example, <volume href="#newVolume"/> would reference a Volume named  
 2326 "newVolume."

2327 A SystemTemplate shall not contain two component descriptors of the same type that would result in the  
 2328 same non-null value for the "name" attribute of resulting components. Attempting to create or to update a  
 2329 SystemTemplate that fails this rule shall result in an error.

|                       |   |  |                            |                            |  |             |             |                    |      |               |  |             |               |  |
|-----------------------|---|--|----------------------------|----------------------------|--|-------------|-------------|--------------------|------|---------------|--|-------------|---------------|--|
| <b>Name</b>           | SystemTemplate                                |  |                            |                            |  |             |             |                    |      |               |  |             |               |  |
| <b>Type URI</b>       | http://schemas.dmtf.org/cimi/1/SystemTemplate |  |                            |                            |  |             |             |                    |      |               |  |             |               |  |
| <b>Attribute</b>      | <b>Type</b>                                   | <b>Description</b>   |                            |                            |  |             |             |                    |      |               |  |             |               |  |
| 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><b>Name</b></td> <td colspan="2"><i>componentDescriptor</i></td> </tr> <tr> <td><b>Data</b></td> <td><b>Type</b></td> <td><b>Description</b></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.<br/><br/><b>Constraints:</b><br/><b>Provider:</b> support mandatory; mutable<br/><b>Consumer:</b> 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.<br/><br/><b>Constraints:</b><br/><b>Provider:</b> support mandatory; mutable</td> </tr> </table> | <b>Name</b>                | <i>componentDescriptor</i> |  | <b>Data</b> | <b>Type</b> | <b>Description</b> | 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable |
|                       |   | <b>Name</b>  | <i>componentDescriptor</i> |                            |  |             |             |                    |      |               |  |             |               |  |
|                       |   | <b>Data</b>  | <b>Type</b>                | <b>Description</b>         |  |             |             |                    |      |               |  |             |               |  |
| 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable   |                            |                            |  |             |             |                    |      |               |  |             |               |  |

|                |                         |  |                |  |
|----------------|-------------------------|--|----------------|--|
|                |                         |  |                | <b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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:<br><br>http://schemas.dmtf.org/cimi/1/Machine<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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").<br><br>Note that the exact name of this attribute will vary depending on the type of resource being created, e.g., MachineTemplate for a Machine.<br><br>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.<br><br>Note that the attributes of theTemplate may be specified rather than a reference to an existing Template resource.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.)<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write   |
|                |                         | <b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br>Note that the attributes of the MeterTemplate may be specified rather than a reference to an existing MeterTemplate resource. |                |  |

|                  |     |   |
|------------------|-----|---|
|                  |     | <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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 System.</p> <p>Note that the attributes of the EventLogTemplate may be specified rather than a reference to an existing EventLogTemplate resource.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-write</p> |

2330 **JSON media type:** application/json

2331 **JSON serialization:**

```

2332 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemTemplate",
2333   "id": string,
2334   "name": string, ?
2335   "description": string, ?
2336   "created": string, ?
2337   "updated": string, ?
2338   "properties": { "key": string, + }, ?
2339   "componentDescriptors": [
2340     { "name": string, ?
2341       "description": string, ?
2342       "properties": { "key": string, + }, ?
2343       "type": string,
2344       "componentTemplate": {
2345         "href": string, ?
2346         ... ComponentTemplate attributes ... ?
2347       }
2348     }, +
2349   ], ?
2350   "meterTemplates": [
2351     { "href": string, ?
2352       ... MeterTemplate attributes ... ?
2353     }, *
2354   ], ?
2355   "eventLogTemplate": {
2356     "href": string, ?
2357     ... EventLogTemplate attributes ... ?
2358   }, ?
2359   "operations": [
2360     { "rel": "edit", "href": string }, ?
2361     { "rel": "delete", "href": string }, ?
2362     { "rel": "http://schemas.dmtf.org/cimi/1/action/export", "href": string } ?
2363   ] ?
2364   ...
2365 }
```

2366 **XML media type:** application/xml

2367 **XML serialization:**

```

2368 <SystemTemplate xmlns="http://schemas.dmtf.org/cimi/1">
2369   <id> xs:anyURI </id>
2370   <name> xs:string </name> ?
2371   <description> xs:string </description> ?
2372   <created> xs:dateTime </created> ?
2373   <updated> xs:dateTime </updated> ?
2374   <property key="xs:string"> xs:string </property> *
```

```

2375 <componentDescriptor>
2376   <name> xs:string </name> ?
2377   <description> xs:string </description> ?
2378   <property key="xs:string"> xs:string </property> *
2379   <type> xs:anyURI </type>
2380   <componentTemplate href="xs:anyURI"? >
2381     ... ComponentTemplate attributes ... ?
2382   </componentTemplate> *
2383 </componentDescriptor> *
2384 <meterTemplate href="xs:anyURI"? >
2385   ... MeterTemplate attributes ... ?
2386 </meterTemplate> *
2387 <eventLogTemplate href="xs:anyURI"? >
2388   ... EventLogTemplate attributes ... ?
2389 </eventLogTemplate> ?
2390 <operation rel="edit" href="xs:anyURI"/> ?
2391 <operation rel="delete" href="xs:anyURI"/> ?
2392 <operation rel="http://schemas.dmtf.org/cimi/1/action/export"
2393 href="xs:anyURI"/> ?
2394   <xs:any>*
2395 </SystemTemplate>

```

### 2396 5.13.3.1 Operations

2397 This resource supports the Read, Update, and Delete operations. Create is supported via the System  
 2398 Template Collection resource.

2399 The following custom operations are also defined:

#### 2400 Exporting a SystemTemplate

2401 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/export

2402 This operation is defined to export a System Template. If an export package exists at that URI, it is  
 2403 updated with the values of the System Template and any component management resources. Otherwise  
 2404 a new export package is created at that URI with a Media Type as specified by the "format" parameter.  
 2405 Other formats may be used if supported, but are not specified by this standard.

2406 Input parameters:

- 2407 • "format" - type: string - optional  
 2408 Indicates the Media Type of the exported data. If not present, the default value shall be  
 2409 "application/ovf."  
 2410
- 2411 • "destination" - type: URI - optional  
 2412 The location to where the exported data is placed. If not present, the HTTP response Location  
 2413 header shall contain the URL to the exported data. Based on the specific protocol specified within  
 2414 the URI, the Consumer might need to provide additional information (such as credentials) in the  
 2415 "properties" field. In the case of HTTP, a PUT shall be used to place the data at the specified  
 2416 location.

2417 Output parameters: None.

#### 2418 HTTP protocol

2419 To export a SystemTemplate, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/export" URI of  
 2420 the System Template where the HTTP request body shall be as described below.

2421 **JSON media type:** application/json

2422 **JSON serialization:**

```
2423 { "action": "http://schemas.dmtf.org/cimi/1/action/export",
2424   "format": string, ?
2425   "destination": string, ?
2426   "properties": { "key": string, + } ?
2427   ...
2428 }
```

2429 **XML media type:** application/xml

2430 **XML serialization**

```
2431 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2432   <action> http://schemas.dmtf.org/cimi/1/action/export </action>
2433   <format> xs:string </format> ?
2434   <destination> xs:anyURI </destination> ?
2435   <property key="xs:string"> xs:string </property> *
2436   <xs:any>*
2437 </Action>
```

### 2438 5.13.4 System Template Collection

2439 A System Template Collection resource represents the collection of System Template resources within a  
2440 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as  
2441 follows:

2442 **JSON serialization:**

```
2443 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemTemplateCollection",
2444   "id": string,
2445   "count": number,
2446   "systemTemplates": [
2447     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemTemplate",
2448       "id": string,
2449       ... remaining SystemTemplate attributes ...
2450     }, +
2451   ], ?
2452   "operations": [
2453     { "rel": "add", "href": string }, ?
2454     { "rel": "http://schemas.dmtf.org/cimi/1/action/import", "href": string } ?
2455   ]
2456   ...
2457 }
```

2458 **XML serialization:**

```
2459 <Collection
2460   resourceURI="http://schemas.dmtf.org/cimi/1/SystemTemplateCollection"
2461   xmlns="http://schemas.dmtf.org/cimi/1">
2462   <id> xs:anyURI </id>
2463   <count> xs:integer </count>
2464   <SystemTemplate>
2465     <id> xs:anyURI </id>
2466     ... remaining SystemTemplate attributes ...
2467   </SystemTemplate> *
2468   <operation rel="add" href="xs:anyURI"/> ?
2469   <operation rel="http://schemas.dmtf.org/cimi/1/import" href="xs:anyURI"/> ?
2470   <xs:any>*
2471 </Collection>
```

2472 **5.13.4.1 Operations**

2473 The following custom operations are defined:

2474 **Importing a SystemTemplate**

2475 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/import

2476 This operation will import/deserialize a SystemTemplate. Not only will a System Template be created, but  
 2477 Machine Templates, Volume Templates, and Network Templates and possibly recursive System  
 2478 Templates and their components may also be created, corresponding to imported descriptor entries.  
 2479 More detail about this process is in ANNEX A.

2480 Input parameters:

- 2481 • "source" - type: URI - mandatory
- 2482 The location from which the imported data will be retrieved. Based on the specific protocol
- 2483 specified within the URI, the Consumer might need to provide additional information (such as
- 2484 credentials) in the "properties" field.

2485 Output parameters: None.

2486 **HTTP protocol**

2487 To import a SystemTemplate, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/import" URI of  
 2488 the System Template Collection where the HTTP request body shall be as described below.

2489 **JSON media type:** application/json

2490 **JSON serialization:**

```
2491 { "action": "http://schemas.dmtf.org/cimi/1/action/import",
2492   "source": string, ?
2493   "properties": { "key": string, + } ?
2494   ...
2495 }
```

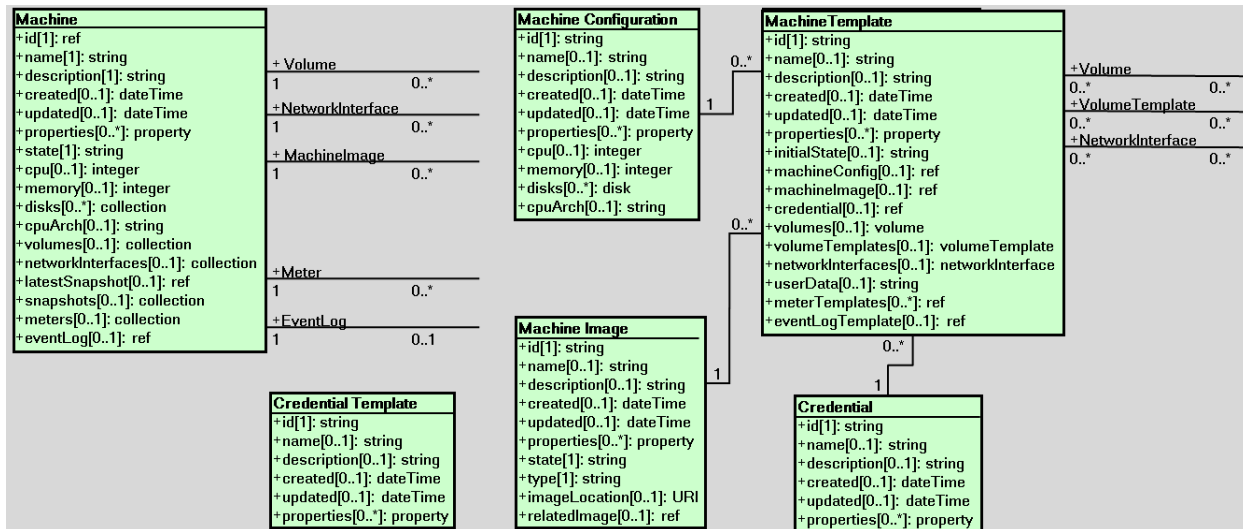
2496 **XML media type:** application/xml

2497 **XML serialization**

```
2498 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2499   <action> http://schemas.dmtf.org/cimi/1/action/import </action>
2500   <source> xs:anyURI </source> ?
2501   <property key="xs:string"> xs:string </property> *
2502   <xs:any>*
2503 </Action>
```

2504 **5.14 Machine resources and relationships**

2505 Figure 3 illustrates the resources involved in constructing a Machine and their relationships. Although this  
 2506 drawing is in the style of a Resource Relationship diagram, the use of UML is neither rigorous nor  
 2507 normative.



2508 **Figure 3 - Machine resources**

2509 **5.14.1 Machine**

2510 An instantiated compute resource that encapsulates both CPU and Memory.

| Name      | Machine                               |   |
|-----------|---------------------------------------|---|
| Type URI  | http://schemas.dmf.org/cimi/1/Machine |   |
| Attribute | Type                                  | Description   |
| state     | string                                | <p>The operational state of the Machine.</p> <p>Allowable values include:</p> <p><b>CREATING:</b> The Machine is in the process of being created. Allowable action when in this state is: <b>delete</b>.</p> <p><b>STARTING:</b> The Machine is in the process of being started. Allowable actions when in this state are: <b>start, restart, stop, and delete</b>.</p> <p><b>STARTED:</b> The Machine is available and ready for use. Allowable actions when in this state are: <b>stop, restart, pause, suspend, capture, and delete</b>.</p> <p><b>STOPPING:</b> The Machine is in the process of being stopped. Allowable actions when in this state are: <b>start, restart, stop, and delete</b>.</p> <p><b>STOPPED:</b> 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: <b>start, restart, capture, and delete</b>.</p> <p><b>PAUSING:</b> The Machine in the process of being PAUSED. Allowable actions when in this state are: <b>start, restart, and delete</b>.</p> <p><b>PAUSED:</b> 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: <b>start, restart, capture, and delete</b>.</p> <p><b>SUSPENDING:</b> The Machine is in the process of being suspended. Allowable actions when in this state are: <b>start, restart, and delete</b>.</p> <p><b>SUSPENDED:</b> In this state the Machine and its virtual resources are stored on non-volatile storage. The Machine and its resources are not enabled to perform tasks. Allowable actions when in this state are: <b>start, restart, capture, and delete</b>.</p> |



|                   |   |   |
|-------------------|---|---|
|                   |   | <p><b>DELETING:</b> The Machine is in the process of being deleted. Allowable action when in this state is: <b>delete</b>.</p> <p><b>ERROR:</b> The Provider has detected an error in the Machine. Allowable actions when in this state are: <b>start, restart, stop, and delete</b>.</p> <p><b>PAUSED</b> and <b>SUSPENDED</b> states are optional and Providers may choose to support them or not.</p> <p>Providers may define additional values.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-only</p>      |
| cpu               | <i>integer</i>                                  | <p>The amount of CPU that this Machine has.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write</p>   |
| disks             | <i>collection<br/>[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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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: <b>68000, Alpha, ARM, Itanium, MIPS, PA_RISC, POWER, PowerPC, x86, x86_64, z/Architecture, SPARC</b>. Providers may define additional values.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; immutable<br/> <b>Consumer:</b> support optional; read-only</p>   |
| volumes           | <i>collection<br/>[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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-only</p> |
| networkInterfaces | <i>collection<br/>[MachineNetworkInterface]</i> | <p>A reference to the list of MachineNetworkInterfaces on this Machine.</p> <p>Note: the MachineNetworkInterface resource type is representing an association between the Machine and a NetworkInterface. It is defined in the following clause.</p> <p><b>Constraints:</b></p>   |

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

2511 The following describes the serialization of the resource in both JSON and XML:

2512 **JSON media type:** application/json

2513 **JSON serialization:**

```

2514 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Machine",
2515   "id": string,
2516   "name": string, ?
2517   "description": string, ?
2518   "created": string, ?
2519   "updated": string, ?
2520   "properties": { "key": string, + }, ?
2521   "state": string,
2522   "cpu": number,
2523   "memory": number,
2524   "disks" : { "href": string }, ?
2525   "cpuArch": string, ?
2526   "volumes": { "href": string }, ?
2527   "networkInterfaces": { "href": string }, ?
2528   "latestSnapshot": string, ?
2529   "snapshots": { "href": string }, ?
2530   "meters": { "href": string }, ?
2531   "eventLog": { "href": string }, ?
2532   "operations": [
2533     { "rel": "edit", "href": string }, ?
2534     { "rel": "delete", "href": string }, ?
2535     { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
2536     { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string }, ?
2537     { "rel": "http://schemas.dmtf.org/cimi/1/action/restart", "href": string },
2538   ?
2539     { "rel": "http://schemas.dmtf.org/cimi/1/action/pause", "href": string }, ?
2540     { "rel": "http://schemas.dmtf.org/cimi/1/action/suspend", "href": string }
2541   ?

```

```

2542     { "rel": "http://schemas.dmtf.org/cimi/1/action/snapshot", "href": string }
2543     ?
2544     { "rel": "http://schemas.dmtf.org/cimi/1/action/restore", "href": string }
2545     ?
2546   ]
2547   ...
2548 }
    
```

2549 **XML media type:** application/xml

2550 **XML serialization:**

```

2551 <Machine xmlns="http://schemas.dmtf.org/cimi/1">
2552   <id> xs:anyURI </id>
2553   <name> xs:string </name> ?
2554   <description> xs:string </description> ?
2555   <created> xs:dateTime </created> ?
2556   <updated> xs:dateTime </updated> ?
2557   <property key="xs:string"> xs:string </property> *
2558   <state> xs:string </state>
2559   <cpu> xs:integer </cpu>
2560   <memory> xs:integer </memory>
2561   <disks href="xs:anyURI"/> ?
2562   <cpuArch> xs:string </cpuArch> ?
2563   <volumes href="xs:anyURI"/> ?
2564   <networkInterfaces href="xs:anyURI"/> ?
2565   <latestSnapshot> xs:anyURI </latestSnapshot> ?
2566   <snapshots href="xs:anyURI"/> ?
2567   <meters href="xs:anyURI"/> ?
2568   <eventLog href="xs:anyURI"/> ?
2569   <operation rel="edit" href="xs:anyURI"/> ?
2570   <operation rel="delete" href="xs:anyURI"/> ?
2571   <operation rel="http://schemas.dmtf.org/cimi/1/action/start"
2572 href="xs:anyURI"/> ?
2573   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
2574 href="xs:anyURI"/> ?
2575   <operation rel="http://schemas.dmtf.org/cimi/1/action/restart"
2576 href="xs:anyURI"/> ?
2577   <operation rel="http://schemas.dmtf.org/cimi/1/action/pause"
2578 href="xs:anyURI"/> ?
2579   <operation rel="http://schemas.dmtf.org/cimi/1/action/suspend"
2580 href="xs:anyURI"/> ?
2581   <operation rel="http://schemas.dmtf.org/cimi/1/action/capture"
2582 href="xs:anyURI"/> ?
2583   <operation rel="http://schemas.dmtf.org/cimi/1/action/snapshot"
2584 href="xs:anyURI"/> ?
2585   <operation rel="http://schemas.dmtf.org/cimi/1/action/restore"
2586 href="xs:anyURI"/> ?
2587   <xs:any>*
2588 </Machine>
    
```

2589 **5.14.1.1 Collections**

2590 The following describes the collection resources owned by Machines.

2591 **5.14.1.1.1 Disk Collection**

2592 The resource type for each item of this collection is "Disk", as defined as follows:

|                  |                                     |                    |
|------------------|-------------------------------------|--------------------|
| <b>Name</b>      | Disk                                |                    |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/Disk |                    |
| <b>Attribute</b> | <b>Type</b>                         | <b>Description</b> |

|                 |                |   |
|-----------------|----------------|---|
| capacity        | <i>integer</i> | The initial capacity, in kilobytes, of the disk.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br>Support of this attribute indicates that the Provider can report this information back to the Consumer.<br><b>Constraints:</b><br><b>Provider:</b> support optional; immutable<br><b>Consumer:</b> support optional; read-only |

 2593 **JSON serialization:**

```

2594 { "resourceURI": "http://schemas.dmtf.org/cimi/1/DiskCollection",
2595   "id": string,
2596   "count": number,
2597   "disks": [
2598     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Disk",
2599       "id": string,
2600       "name": string, ?
2601       "description": string, ?
2602       "created": string, ?
2603       "updated": string, ?
2604       "properties": { "key": string, + }, ?
2605       "capacity": number,
2606       "initialLocation": string, ?
2607       "operations": [
2608         { "rel": "edit", "href": string }, ?
2609         { "rel": "delete", "href": string } ?
2610       ] ?
2611       ...
2612     }, +
2613   ], ?
2614   "operations": [ { "rel": "add", "href": string } ? ]
2615   ...
2616 }
```

 2617 **XML serialization:**

```

2618 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/DiskCollection"
2619   xmlns="http://schemas.dmtf.org/cimi/1">
2620   <id> xs:anyURI </id>
2621   <count> xs:integer </count>
2622   <Disk>
2623     <id> xs:anyURI </id>
2624     <name> xs:string </name> ?
2625     <description> xs:string </description> ?
2626     <created> xs:dateTime </created> ?
2627     <updated> xs:dateTime </updated> ?
2628     <property key="xs:string"> xs:string </property> *
2629     <capacity> xs:integer </capacity>
2630     <initialLocation> xs:string </initialLocation> ?
2631     <operation rel="edit" href="xs:anyURI"/> ?
2632     <operation rel="delete" href="xs:anyURI"/> ?
2633     <xs:any>*
2634   </Disk> *
2635   <operation rel="add" href="xs:anyURI"/> ?
2636   <xs:any>*
2637 </Collection>
```

2638 **5.14.1.1.2 MachineVolume Collection**

2639 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.<br><br>Support of this attribute indicates that the Provider can report this information back to the Consumer.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; immutable<br><b>Consumer:</b> support optional; read-only |
| volume          | <i>ref</i>                                   | A reference to the Volume that will be connected.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write   |

 2640 **JSON serialization:**

```

2641 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineVolumeCollection",
2642   "id": string,
2643   "count": number,
2644   "machineVolumes": [
2645     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineVolume",
2646       "id": string,
2647       "name": string, ?
2648       "description": string, ?
2649       "created": string, ?
2650       "updated": string, ?
2651       "properties": { "key": string, + }, ?
2652       "initialLocation": string, ?
2653       "volume": { "href": string },
2654       "operations": [
2655         { "rel": "edit", "href": string }, ?
2656         { "rel": "delete", "href": string } ?
2657       ] ?
2658       ...
2659     }, +
2660   ], ?
2661   "operations": [ { "rel": "add", "href": string } ? ]
2662   ...
2663 }
```

 2664 **XML serialization:**

```

2665 <Collection
2666   resourceURI="http://schemas.dmtf.org/cimi/1/MachineVolumeCollection"
2667   xmlns="http://schemas.dmtf.org/cimi/1">
2668   <id> xs:anyURI </id>
2669   <count> xs:integer </count>
2670   <MachineVolume>
2671     <id> xs:anyURI </id>
2672     <name> xs:string </name> ?
2673     <description> xs:string </description> ?
2674     <created> xs:dateTime </created> ?
2675     <updated> xs:dateTime </updated> ?
2676     <property key="xs:string"> xs:string </property> *
2677     <initialLocation> xs:string </initialLocation> ?

```

```

2678     <volume href="xs:anyURI"/>
2679     <operation rel="edit" href="xs:anyURI"/> ?
2680     <operation rel="delete" href="xs:anyURI"/> ?
2681     <xs:any>*
2682 </MachineVolume> *
2683     <operation rel="add" href="xs:anyURI"/> ?
2684     <xs:any>*
2685 </Collection>
    
```

2686 **5.14.1.1.3 MachineNetworkInterface Collection**

2687 The resource type for each item of this collection is "MachineNetworkInterface", defined as follows:

|                  |  |  |
|------------------|--|--|
| <b>Name</b>      | MachineNetworkInterface                                |  |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/MachineNetworkInterface |  |
| <b>Attribute</b> | <b>Type</b>  | <b>Description</b>   |
| addresses        | <i>collection</i><br>[MachineNetworkInterfaceAddress]  | A reference to the list of references to the Addresses for this network interface.<br><br>Note: the MachineNetworkInterfaceAddress resource type is representing an association between the MachineNetworkInterface and an Address. It is defined following this resource's definition.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only   |
| network          | <i>ref</i>   | A reference to a Network for this network interface.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write   |
| networkPort      | <i>ref</i>   | A reference to the NetworkPort for this network interface.<br><br>If this attribute is provided, the "network" attribute in the referenced NetworkPort shall have the same value as the "network" attribute in this networkInterface.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write  |
| state            | <i>string</i>  | The state of an interface configurable to be "Active", "Passive" or "Disabled".<br><br>An active interface is the primary interface, able to forward traffic.<br><br>A passive interface is in a standby mode ready to forward traffic if the primary interface fails.<br><br>A disabled interface is one that is not able to forward traffic.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br>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.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write                    |
| mtu              | <i>integer</i>   | To set the largest supported maximum transmission unit packet size.<br><br><b>Constraints:</b>   |

|  |  |   |
|--|--|---|
|  |  | <b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write |
|--|--|---|

 2688 **JSON serialization:**

```

2689 { "resourceURI":
2690     "http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceCollection",
2691     "id": string,
2692     "count": number,
2693     "machineNetworkInterfaces": [
2694         { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineNetworkInterface",
2695           "id": string,
2696           "name": string, ?
2697           "description": string, ?
2698           "created": string, ?
2699           "updated": string, ?
2700           "properties": { "key": string, + }, ?
2701           "addresses": { "href": string },
2702           "network": { "href": string },
2703           "networkPort": { "href": string }, ?
2704           "state": string, ?
2705           "macAddress": string, ?
2706           "mtu": number, ?
2707           "operations": [
2708             { "rel": "edit", "href": string }, ?
2709             { "rel": "delete", "href": string } ?
2710           ] ?
2711           ...
2712         }, +
2713     ], ?
2714     "operations": [ { "rel": "add", "href": string } ? ]
2715     ...
2716 }
    
```

 2717 **XML serialization:**

```

2718 <Collection
2719 resourceURI="http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceCollection"
2720 xmlns="http://schemas.dmtf.org/cimi/1">
2721   <id> xs:anyURI </id>
2722   <count> xs:integer </count>
2723   <MachineNetworkInterface>
2724     <id> xs:anyURI </id>
2725     <name> xs:string </name> ?
2726     <description> xs:string </description> ?
2727     <created> xs:dateTime </created> ?
2728     <updated> xs:dateTime </updated> ?
2729     <property key="xs:string"> xs:string </property> *
2730     <addresses href="xs:anyURI"/>
2731     <network href="xs:anyURI"/>
2732     <networkPort href="xs:anyURI"/> ?
2733     <state> xs:string </state> ?
2734     <macAddress> xs:string </macAddress> ?
2735     <mtu> xs:integer </mtu> ?
2736     <operation rel="edit" href="xs:anyURI"/> ?
2737     <operation rel="delete" href="xs:anyURI"/> ?
2738     <xs:any>*
2739   </MachineNetworkInterface> *
2740   <operation rel="add" href="xs:anyURI"/> ?
2741   <xs:any>*
2742 </Collection>
    
```

2743 **5.14.1.1.4 MachineNetworkInterfaceAddress Collection**

2744 The resource type for each item of this collection is “MachineNetworkInterfaceAddress”, defined as  
2745 follows:

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

2746 **JSON serialization:**

```
2747 { "resourceURI":
2748 "http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceAddressCollection",
2749 "id": string,
2750 "count": number,
2751 "machineNetworkInterfaceAddresses": [
2752 { "resourceURI":
2753 "http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceAddress",
2754 "id": string,
2755 "name": string, ?
2756 "description": string, ?
2757 "created": string, ?
2758 "updated": string, ?
2759 "properties": { "key": string, + }, ?
2760 "address": { "href": string },
2761 "operations": [
2762 { "rel": "edit", "href": string }, ?
2763 { "rel": "delete", "href": string } ?
2764 ] ?
2765 ...
2766 }, +
2767 ], ?
2768 "operations": [ { "rel": "add", "href": string } ? ]
2769 ...
2770 }
```

2771 **XML serialization:**

```
2772 <Collection
2773 resourceURI="http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceAddressColle
2774 ction"
2775 xmlns="http://schemas.dmtf.org/cimi/1">
2776 <id> xs:anyURI </id>
2777 <count> xs:integer </count>
2778 <MachineNetworkInterfaceAddress>
2779 <id> xs:anyURI </id>
2780 <name> xs:string </name> ?
2781 <description> xs:string </description> ?
2782 <created> xs:dateTime </created> ?
2783 <updated> xs:dateTime </updated> ?
2784 <property key="xs:string"> xs:string </property> *
2785 <address href="xs:anyURI"/>
2786 <operation rel="edit" href="xs:anyURI"/> ?
2787 <operation rel="delete" href="xs:anyURI"/> ?
2788 <xs:any>*
2789 </MachineNetworkInterfaceAddress> *
2790 <operation rel="add" href="xs:anyURI"/> ?
```



2791 `<xs:any>*`  
 2792 `</Collection>`

#### 2793 5.14.1.1.5 MachineSnapshot Collection

2794 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only |

#### 2795 JSON serialization:

```

2796 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineSnapshotCollection",
2797   "id": string,
2798   "count": number,
2799   "machineSnapshots": [
2800     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineSnapshot",
2801       "id": string,
2802       "name": string, ?
2803       "description": string, ?
2804       "created": string, ?
2805       "updated": string, ?
2806       "properties": { "key": string, + }, ?
2807       "snapshot": { "href": string },
2808       "operations": [
2809         { "rel": "edit", "href": string }, ?
2810         { "rel": "delete", "href": string } ?
2811       ] ?
2812       ...
2813     }, +
2814   ], ?
2815   "operations": [ { "rel": "add", "href": string } ? ]
2816   ...
2817 }
```

#### 2818 XML serialization:

```

2819 <Collection
2820 resourceURI="http://schemas.dmtf.org/cimi/1/MachineSnapshotCollection"
2821   xmlns="http://schemas.dmtf.org/cimi/1">
2822   <id> xs:anyURI </id>
2823   <count> xs:integer </count>
2824   <MachineSnapshot>
2825     <id> xs:anyURI </id>
2826     <name> xs:string </name> ?
2827     <description> xs:string </description> ?
2828     <created> xs:dateTime </created> ?
2829     <updated> xs:dateTime </updated> ?
2830     <property key="xs:string"> xs:string </property> *
2831     <snapshot href="xs:anyURI"/>
2832     <operation rel="edit" href="xs:anyURI"/> ?
2833     <operation rel="delete" href="xs:anyURI"/> ?
2834     <xs:any>*
2835   </MachineSnapshot> *
2836   <operation rel="add" href="xs:anyURI"/> ?
2837   <xs:any>*
2838 </Collection>
```

2839 **5.14.1.1.6 MachineMeter Collection**

2840 The resource type for each item of this collection is “Meter” as defined in clause 5.17.3.

2841 **JSON serialization:**

```

2842 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineMeterCollection",
2843   "id": string,
2844   "count": number,
2845   "meters": [
2846     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
2847       "id": string,
2848       ... remaining Meter attributes ...
2849     }, +
2850   ], ?
2851   "operations": [ { "rel": "add", "href": string } ? ]
2852   ...
2853 }

```

2854 **XML serialization:**

```

2855 <Collection
2856   resourceURI="http://schemas.dmtf.org/cimi/1/MachineMeterCollection"
2857   xmlns="http://schemas.dmtf.org/cimi/1">
2858   <id> xs:anyURI </id>
2859   <count> xs:integer </count>
2860   <Meter>
2861     <id> xs:anyURI </id>
2862     ... remaining Meter attributes ...
2863   </Meter> *
2864   <operation rel="add" href="xs:anyURI"/> ?
2865   <xs:any>*
2866 </Collection>

```

2867 **5.14.1.2 Operations**2868 This resource supports the Read, Update, and Delete operations. Create is supported via the Machine  
2869 Collection resource.

2870 The following custom operations are also defined:

2871 **Starting a Machine**2872 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/start

2873 This operation will start a Machine.

2874 Input parameters: None.

2875 Output parameters: None.

2876 During the processing of this operation, the Machine shall be in the “STARTING” state.

2877 Upon successful completion of this operation, the Machine shall be in the "STARTED" state.

2878 When a Machine is in the "STOPPED" state, starting it is the virtual equivalent of powering on a physical  
2879 machine. There is no restored CPU or Memory state, so the guest OS will typically perform boot or  
2880 installation tasks.

2881 If the Machine was in the "SUSPENDED" or "PAUSED" state, starting it has the effect of resuming it.

2882 **HTTP protocol**

2883 To start a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/start" URI of the Machine  
 2884 where the HTTP request body shall be as described below.

2885 **JSON media type:** application/json

2886 **JSON serialization:**

```
2887 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
2888   "action": "http://schemas.dmtf.org/cimi/1/action/start",
2889   "properties": { "key": string, + } ?
2890   ...
2891 }
```

2892 **XML media type:** application/xml

2893 **XML serialization**

```
2894 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2895   <action> http://schemas.dmtf.org/cimi/1/action/start </action>
2896   <property key="xs:string"> xs:string </property> *
2897   <xs:any>*
2898 </Action>
```

2899 Upon successful processing of the request, the HTTP response body will be empty.

2900 **Stopping a Machine**

2901 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

2902 This operation will stop, or shutdown, a Machine.

2903 Input parameters:

- 2904 • "force" - type: boolean - optional
- 2905 A flag to indicate whether the Provider shall simulate a power off condition (force=true) or shall
- 2906 simulate a shutdown operation that allows applications to save their state and the file system to
- 2907 be made consistent (force=false). Inclusion of this parameter by Consumers is optional and when
- 2908 not specified, the Provider may choose either mechanism. Providers are encouraged to advertise
- 2909 this choice via the MachineStopForceDefault capability.

2910 Output parameters: None.

2911 During the processing of this operation, the Machine shall be in the "STOPPING" state.

2912 Upon successful completion of this operation, the Machine will be in the "STOPPED" state. Stopping a  
 2913 Machine with force=true is the virtual equivalent of powering off a physical machine. There is no saved  
 2914 CPU or Memory state. Stopping a Machine with force=false results in a machine with consistent file  
 2915 systems.

2916 A Consumer may reissue a stop operation when the state is STOPPING, perhaps with force=true, but  
 2917 Providers shall not issue a force=true stop operation on their own.

2918 **HTTP protocol**

2919 To stop a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the Machine  
 2920 where the HTTP request body shall be as described below.

2921 **JSON media type:** application/json

2922 **JSON serialization:**

```
2923 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
2924   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
```

```

2925     "force": boolean, ?
2926     "properties": { "key": string, + } ?
2927     ...
2928 }

```

2929 **XML media type:** application/xml

2930 **XML serialization**

```

2931 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2932   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
2933   <force> xs:boolean </force> ?
2934   <property key="xs:string"> xs:string </property> *
2935   <xs:any>*
2936 </Action>

```

2937 Upon successful processing of the request, the HTTP response body will be empty.

2938 **Restarting a Machine**

2939 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/restart

2940 This operation will restart a Machine. If the Machine is in the "STARTED" state, this operation will have the semantic effect of executing the "stop" and then "start" operations. If the Machine is in the "STOPPED" state, this operation will have the semantic effect of executing the "start" operation.

2943 Input parameters:

- 2944 • "force" - type: boolean - optional
- 2945 A flag to indicate whether the Provider shall simulate a power off condition (force=true) or shall
- 2946 simulate a shutdown operation that allows applications to save their state and the file system to
- 2947 be made consistent (force=false). Inclusion of this parameter by Consumers is optional and when
- 2948 not specified, the Provider may choose either mechanism. Providers are encouraged to advertise
- 2949 this choice via the MachineStopForceDefault capability.

2950 Output parameters: None.

2951 During the processing of this operation, the Machine shall be in the "STOPPING" and/or "STARTING"

2952 states, as appropriate depending on its initial state.

2953 Upon successful completion of this operation, the Machine will be in the "STARTED" state. Restarting a

2954 Machine is the virtual equivalent of powering off, and then powering on a physical machine. There is no

2955 restored CPU or Memory state, so the guest OS will typically perform boot or installation tasks.

2956 **HTTP protocol**

2957 To restart a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/restart" URI of the

2958 Machine where the HTTP request body shall be as described below.

2959 **JSON media type:** application/json

2960 **JSON serialization:**

```

2961 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
2962   "action": "http://schemas.dmtf.org/cimi/1/action/restart",
2963   "force": boolean, ?
2964   "properties": { "key": string, + } ?
2965   ...
2966 }

```

2967 **XML media type:** application/xml

2968 **XML serialization**

```
2969 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2970 <action> http://schemas.dmtf.org/cimi/1/action/restart </action>
2971 <force> xs:boolean </force> ?
2972 <property key="xs:string"> xs:string </property> *
2973 <xs:any>*
2974 </Action>
```

2975 Upon successful processing of the request, the HTTP response body will be empty.

2976 **Pausing a Machine**

2977 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/pause

2978 This operation will pause a Machine.

2979 Input parameters: None.

2980 Output parameters: None.

2981 During the processing of this operation, the Machine shall be in the "PAUSING" state.

2982 Upon successful completion of this operation, the Machine will be in the "PAUSED" state. Pausing a  
 2983 Machine will keep the Machine and its resources instantiated, but the Machine will not be available to  
 2984 perform any tasks. The current state of the CPU and Memory will be retained in volatile memory.

2985 **HTTP protocol**

2986 To pause a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action.pause" URI of the  
 2987 Machine where the HTTP request body shall be as described below.

2988 **JSON media type:** application/json

2989 **JSON serialization:**

```
2990 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
2991   "action": "http://schemas.dmtf.org/cimi/1/action/pause",
2992   "properties": { "key": string, + } ?
2993   ...
2994 }
```

2995 **XML media type:** application/xml

2996 **XML serialization**

```
2997 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2998 <action> http://schemas.dmtf.org/cimi/1/action/pause </action>
2999 <property key="xs:string"> xs:string </property> *
3000 <xs:any>*
3001 </Action>
```

3002 Upon successful processing of the request, the HTTP response body will be empty.

3003 **Suspending a Machine**

3004 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/suspend

3005 This operation will suspend a Machine.

3006 Input parameters: None.

3007 Output parameters: None.

3008 During the processing of this operation, the Machine shall be in the "SUSPENDING" state.

3009 Upon successful completion of this operation, the Machine will be in the "SUSPENDED" state.  
 3010 Suspending a Machine will keep the Machine and its resources instantiated, but the Machine will not be  
 3011 available to perform any tasks. The current state of the CPU and Memory will be retained in non-volatile  
 3012 memory.

### 3013 HTTP protocol

3014 To suspend a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/suspend" URI of the  
 3015 Machine where the HTTP request body shall be as described below.

3016 **JSON media type:** application/json

### 3017 JSON serialization:

```
3018 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
3019   "action": "http://schemas.dmtf.org/cimi/1/action/suspend",
3020   "properties": { "key": string, + } ?
3021   ...
3022 }
```

3023 **XML media type:** application/xml

### 3024 XML serialization

```
3025 <Action xmlns="http://schemas.dmtf.org/cimi/1">
3026   <action> http://schemas.dmtf.org/cimi/1/action/suspend </action>
3027   <property key="xs:string"> xs:string </property> *
3028   <xs:any>*
3029 </Action>
```

3030 Upon successful processing of the request, the HTTP response body will be empty.

### 3031 Capturing a Machine

3032 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/capture

3033 This operation will create a new Machine Image from an existing Machine. This operation is defined  
 3034 within the Machine Image resource; see 5.14.7.1 for more details. Note that while this operation is  
 3035 performed against a Machine Image, its presence in the Machine serialization is used to advertise  
 3036 support for the operation.

### 3037 Snapshotting a Machine

3038 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/snapshot

3039 This operation will create a new SNAPSHOT Machine Image from an existing Machine. This operation is  
 3040 defined within the Machine Image resource; see 5.14.7.1 for more details. Note that while this operation  
 3041 is performed against a Machine Image, its presence in the Machine serialization is used to advertise  
 3042 support for the operation.

### 3043 Restoring a Machine

3044 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/restore

3045 This operation will restore a Machine from a previously created Machine Image.

3046 Input parameters:

- 3047 • "image" - type: URI - mandatory
- 3048 A reference to the Machine Image.

3049 Output parameters: None.

3050 During the processing of this operation, the Machine shall be in the "RESTORING" state.

3051 Upon successful completion of this operation, the Machine will be in the same state as the specified in the  
3052 Machine Image, if specified.

3053 Note that Providers can indicate support for restoring from non-SNAPSHOT Machine Images via the  
3054 Machine "RestoreFromImage" capability. When this capability is not supported, but the restore operation  
3055 is supported, then that indicates it only supports restoring from SNAPSHOT Machine Images.

### 3056 HTTP protocol

3057 To restore a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/restore" URI of the  
3058 Machine where the HTTP request body shall be as described below.

3059 **JSON media type:** application/json

### 3060 JSON serialization:

```
3061 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
3062   "action": "http://schemas.dmtf.org/cimi/1/action/restore",
3063   "image": string,
3064   "properties": { "key": string, + } ?
3065   ...
3066 }
```

3067 **XML media type:** application/xml

### 3068 XML serialization

```
3069 <Action xmlns="http://schemas.dmtf.org/cimi/1">
3070   <action> http://schemas.dmtf.org/cimi/1/action/restore </action>
3071   <image href="xs:anyURI"/>
3072   <property key="xs:string"> xs:string </property> *
3073   <xs:any>*
3074 </Action>
```

3075 Where the "image" URI is a reference to the Machine Image to be used.

3076 Upon successful processing of the request, the HTTP response body will be empty.

## 3077 5.14.2 Machine Collection

3078 A Machine Collection resource represents the collection of Machine resources within a Provider and  
3079 follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

3080

3081 **JSON serialization:**

```

3082 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineCollection",
3083     "id": string,
3084     "count": number,
3085     "machines": [
3086         { "resourceURI": "http://schemas.dmtf.org/cimi/1/Machine",
3087           "id": string,
3088             ... remaining Machine attributes ...
3089         }, +
3090     ], ?
3091     "operations": [ { "rel": "add", "href": string } ? ]
3092     ...
3093 }
    
```

3094 **XML serialization:**

```

3095 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/MachineCollection"
3096     xmlns="http://schemas.dmtf.org/cimi/1">
3097     <id> xs:anyURI </id>
3098     <count> xs:integer </count>
3099     <Machine>
3100         <id> xs:anyURI </id>
3101         ... remaining Machine attributes ...
3102     </Machine> *
3103     <operation rel="add" href="xs:anyURI"/> ?
3104     <xs:any>*
3105 </Collection>
    
```

3106 **5.14.2.1 Operations**

3107 NOTE: The "add" operation requires a MachineTemplate to be used (see 4.2.1.1).

3108 Within the NetworkInterface portion of the MachineTemplate, there may be a reference to an Address  
 3109 resource. If one is not provided, the Provider shall create one on the Consumer's behalf. In these cases,  
 3110 and unless some action is taken to change this behavior, the Address will be bound to the new Machine  
 3111 that is created and shall be deleted by the Provider when the Machine is deleted. Additionally, if these  
 3112 Provider-created Address resources are disassociated from the Machine, the Provider shall delete them.  
 3113 If the Consumer does provide an Address resource, the Address shall not be deleted when the Machine  
 3114 is deleted and it is then up to the Consumer to delete the Address through some other mechanism.

3115 Upon successful processing of the "add" operation, unless otherwise specified via the MachineTemplate  
 3116 "initialState" attribute, or unless determined by the MachineImage, the state of the new Machine shall be  
 3117 the value of the DefaultInitialState capability. If no DefaultInitialState capability is defined and the  
 3118 MachineImage doesn't imply any particular state, the default value is "STOPPED."

3119 **5.14.3 Machine Template**

3120 A Machine Template represents the set of metadata and instructions used in the creation of a Machine.

|                  |  |  |
|------------------|--|--|
| <b>Name</b>      | MachineTemplate                                |  |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/MachineTemplate |  |
| <b>Attribute</b> | <b>Type</b>                                    | <b>Description</b>   |
| initialState     | string   | The initial state of the new Machine, unless determined by the MachineImage used when instantiating the Machine.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write</p> </td> </tr> </tbody> </table> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-write</p> | volume | <i>ref</i> | <p>Reference to the Volume that will be connected.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-write</p>   |      |               |  |           |      |             |                 |               |   |        |            |  |
| volume          | <i>ref</i>              | <p>Reference to the Volume that will be connected.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> 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.<br/><br/>                     Support of this attribute indicates that the Provider allows for Consumers to choose where the Volume will appear.<br/><br/> <b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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.<br/><br/>                     Note that the attributes of the VolumeTemplate may be specified rather than a reference to an existing VolumeTemplate resource.<br/><br/> <b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write                 </td> </tr> </tbody> </table> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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.<br><br>Support of this attribute indicates that the Provider allows for Consumers to choose where the Volume will appear.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write | volumeTemplate | <i>ref</i> | Reference to the Volume Template that will be used to create a new Volume.<br><br>Note that the attributes of the VolumeTemplate may be specified rather than a reference to an existing VolumeTemplate resource.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br>Support of this attribute indicates that the Provider allows for Consumers to choose where the Volume will appear.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write  |      |                         |  |           |      |             |                 |               |  |                |            |   |
| volumeTemplate    | <i>ref</i>                | Reference to the Volume Template that will be used to create a new Volume.<br><br>Note that the attributes of the VolumeTemplate may be specified rather than a reference to an existing VolumeTemplate resource.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br/><br/>                     Array item name: address<br/><br/> <b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> 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.<br/><br/>                     It is expected that NetworkPorts and Networks will be defined separately and prior to the Machines that connect to them.<br/><br/> <b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> 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.<br><br>Array item name: address<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only   | network        | <i>ref</i> | A reference to the Network for this network interface.<br><br>It is expected that NetworkPorts and Networks will be defined separately and prior to the Machines that connect to them.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br>Array item name: address<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only  |      |                         |  |           |      |             |                 |               |  |                |            |   |
| network           | <i>ref</i>                | A reference to the Network for this network interface.<br><br>It is expected that NetworkPorts and Networks will be defined separately and prior to the Machines that connect to them.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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", "Passive." or "Disabled"</p> <p>An active interface is the primary interface, able to forward traffic.</p> <p>A passive interface is in a standby mode ready to forward traffic if the primary interface fails.</p> <p>A disabled interface is one that is not able to forward traffic.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-write</p> </td> </tr> </table> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-write</p> | state | <i>string</i> | <p>The state of an interface configurable to be "Active", "Passive." or "Disabled"</p> <p>An active interface is the primary interface, able to forward traffic.</p> <p>A passive interface is in a standby mode ready to forward traffic if the primary interface fails.</p> <p>A disabled interface is one that is not able to forward traffic.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-write</p> | mtu | <i>integer</i> | <p>To set the largest supported packet size.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-write</p>  |             |            |   |       |               |   |     |                |  |
| state            | <i>string</i>           | <p>The state of an interface configurable to be "Active", "Passive." or "Disabled"</p> <p>An active interface is the primary interface, able to forward traffic.</p> <p>A passive interface is in a standby mode ready to forward traffic if the primary interface fails.</p> <p>A disabled interface is one that is not able to forward traffic.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-write</p>  |             |            |   |       |               |   |     |                |  |
| mtu              | <i>integer</i>          | <p>To set the largest supported packet size.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> 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>   |             |            |   |       |               |   |     |                |  |

|  |  |  |
|--|--|--|
|  |  | <b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write |
|--|--|--|

3121 The following describes the serialization of the resource in both JSON and XML:

3122 **JSON media type:** application/json

3123 **JSON serialization:**

```

3124 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineTemplate",
3125   "id": string,
3126   "name": string, ?
3127   "description": string, ?
3128   "created": string, ?
3129   "updated": string, ?
3130   "properties": { "key": string, + }, ?
3131   "initialState": string, ?
3132   "machineConfig": {
3133     "href": string | ... MachineConfiguration attributes ...
3134   }, ?
3135   "machineImage": {
3136     "href": string | ... MachineImage attributes ...
3137   }, ?
3138   "credential": {
3139     "href": string | ... CredentialTemplate attributes ...
3140   }, ?
3141   "volumes": [
3142     { "initialLocation": string?, "href": string }, +
3143   ], ?
3144   "volumeTemplates": [
3145     { "initialLocation": string?,
3146       "href": string, ?
3147       ... VolumeTemplate attributes ... ?
3148     }, +
3149   ], ?
3150   "networkInterfaces": [
3151     { "addresses": [
3152       {"href": string}, +
3153     ],
3154     "network": {"href": string},
3155     "networkPort": {"href": string}, ?
3156     "state": string,
3157     "mtu": number ?
3158   }, +
3159   ], ?
3160   "userData": string, ?
3161   "meterTemplates": [
3162     { "href": string, ?
3163       ... MeterTemplate attributes ... ?
3164     }, *
3165   ], ?
3166   "eventLogTemplate": {
3167     "href": string, ?
3168     ... EventLogTemplate attributes ... ?
3169   }, ?
3170   "operations": [
3171     { "rel": "edit", "href": string }, ?
3172     { "rel": "delete", "href": string } ?
3173   ] ?
3174   ...
3175 }
```

3176 **XML media type:** application/xml

3177 **XML serialization:**

```

3178 <MachineTemplate xmlns="http://schemas.dmtf.org/cimi/1">
3179   <id> xs:anyURI </id>
3180   <name> xs:string </name> ?
3181   <description> xs:string </description> ?
3182   <created> xs:dateTime </created> ?
3183   <updated> xs:dateTime </updated> ?
3184   <property key="xs:string"> xs:string </property> *
3185   <initialState> xs:string </initialState> ?
3186   <machineConfig href="xs:anyURI"?>
3187     ... MachineConfiguration attributes ... ?
3188   </machineConfig> ?
3189   <machineImage href="xs:anyURI"?>
3190     ... MachineImage attributes ... ?
3191   </machineImage> ?
3192   <credential href="xs:anyURI"?>
3193     ... CredentialTemplate attributes ... ?
3194   </credential> ?
3195   <volume initialLocation="xs:string"? href="xs:anyURI" /> *
3196   <volumeTemplate initialLocation="xs:string"? href="xs:anyURI"? >
3197     ... VolumeTemplate attributes ... ?
3198   </volumeTemplate> *
3199   <networkInterface>
3200     <address href="xs:anyURI"/> *
3201     <network href="xs:anyURI"/>
3202     <networkPort href="xs:anyURI"/> ?
3203     <state> xs:string </state>
3204     <mtu> xs:integer </mtu> ?
3205   </networkInterface> *
3206   <meterTemplate href="xs:anyURI"? >
3207     ... MeterTemplate attributes ... ?
3208   </meterTemplate> *
3209   <eventLogTemplate href="xs:anyURI"? >
3210     ... EventLogTemplate attributes ... ?
3211   </eventLogTemplate> ?
3212   <userData> xs:string </userData> ?
3213   <operation rel="edit" href="xs:anyURI"/> ?
3214   <operation rel="delete" href="xs:anyURI"/> ?
3215   <xs:any*>
3216 </MachineTemplate>
    
```

3217 **Injection of user-defined data**

3218 To simplify the customization of individual Machines, it is possible to pass arbitrary data into the new  
 3219 Machine by using the `userData` parameter. The value of this parameter shall be the Base64-encoded  
 3220 payload. The Provider shall arrange for this data to be available from inside the Machine by using one of  
 3221 the following three methods:

- 3222 1. *Metadata server:* The data can be retrieved from within the instance by using an HTTP GET  
 3223 request to `http://169.254.169.254/cimi/latest/user-data`.
- 3224 2. *Disk:* The Machine will have access to a Disk with an ISO 9660 file system on it. The data can be  
 3225 found in a file at `<location>/cimi/user-data`.
- 3226 3. *Image modification:* The Provider modifies the root file system of the machine image just before  
 3227 launching the machine. In UNIX-like operating systems, the data can be found in the file  
 3228 `/var/lib/cimi/user-data`.

3229 It is strongly recommended that Providers implement a metadata server, or, failing that, injection via Disk,  
 3230 as image modification is brittle and may not work for every operating system in use. The Provider shall  
 3231 indicate which of these three methods is supported with the Machine 'UserData' capability in the  
 3232 ResourceMetadata for Machines. The value for this feature shall be one of metadata, disk, or imgmod,  
 3233 corresponding to the three methods listed above.

3234 The Provider shall preserve this data across restarts of the machine. The data will be the Base64-  
 3235 decoded version of the data that was passed into the MachineCreate request.

#### 3236 5.14.3.1 Operations

3237 This resource supports the Read, Update, and Delete operations. Create is supported via the Machine  
 3238 Template Collection resource.

#### 3239 5.14.4 Machine Template Collection

3240 A Machine Template Collection resource represents the collection of Machine Template resources within  
 3241 a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as  
 3242 follows:

##### 3243 JSON serialization:

```
3244 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineTemplateCollection",
3245   "id": string,
3246   "count": number,
3247   "machineTemplates": [
3248     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineTemplate",
3249       "id": string,
3250       ... remaining MachineTemplate attributes ...
3251     }, +
3252   ], ?
3253   "operations": [ { "rel": "add", "href": string } ? ]
3254   ...
3255 }
```

##### 3256 XML serialization:

```
3257 <Collection
3258   resourceURI="http://schemas.dmtf.org/cimi/1/MachineTemplateCollection"
3259   xmlns="http://schemas.dmtf.org/cimi/1">
3260   <id> xs:anyURI </id>
3261   <count> xs:integer </count>
3262   <MachineTemplate>
3263     <id> xs:anyURI </id>
3264     ... remaining MachineTemplate attributes ...
3265   </MachineTemplate> *
3266   <operation rel="add" href="xs:anyURI"/> ?
3267   <xs:any>*
3268 </Collection>
```

#### 3269 5.14.4.1 Operations

3270 This resource supports the Read and Update operations. Creation of new Machine Template resources  
 3271 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

#### 3272 5.14.5 Machine Configuration

3273 The Machine Configuration resource represents the set of configuration values that define the (virtual)  
 3274 hardware resources of a to-be-realized Machine Instance. Machine Configurations are created by  
 3275 Providers and may, at the Providers discretion, be created by Consumers.

| <b>Name</b>      | MachineConfiguration                                |   |      |             |  |           |      |             |          |                |   |        |               |  |                 |               |  |
|------------------|---|---|------|-------------|--|-----------|------|-------------|----------|----------------|---|--------|---------------|--|-----------------|---------------|--|
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/MachineConfiguration |   |      |             |  |           |      |             |          |                |   |        |               |  |                 |               |  |
| <b>Attribute</b> | <b>Type</b>   | <b>Description</b>  |      |             |  |           |      |             |          |                |   |        |               |  |                 |               |  |
| cpu              | <i>integer</i>                                      | Indicates the amount of CPU that a Machine realized from this configuration will have.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write  |      |             |  |           |      |             |          |                |   |        |               |  |                 |               |  |
| memory           | <i>integer</i>                                      | Indicates the amount of RAM, in kibibytes, that a Machine realized from this configuration will have.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write   |      |             |  |           |      |             |          |                |   |        |               |  |                 |               |  |
| 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> <td colspan="2"><i>disk</i></td> </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. <b>Constraints:</b><br/><b>Provider:</b> support mandatory; mutable<br/><b>Consumer:</b> 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).<br/><b>Constraints:</b><br/><b>Provider:</b> support mandatory; mutable<br/><b>Consumer:</b> 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.<br/><b>Constraints:</b><br/><b>Provider:</b> support optional; mutable<br/><b>Consumer:</b> support optional; read-write</td> </tr> </tbody> </table> <p><b>Constraints:</b><br/><b>Provider:</b> support optional; mutable<br/><b>Consumer:</b> support optional; read-write</p> | Name | <i>disk</i> |  | Attribute | Type | Description | capacity | <i>integer</i> | Indicates the initial capacity, in kilobytes, of the disk described by this attribute. <b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write | format | <i>string</i> | The format/type of this disk (e.g., ext4, NTFS).<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write |
| Name             | <i>disk</i>   |   |      |             |  |           |      |             |          |                |   |        |               |  |                 |               |  |
| Attribute        | Type  | Description   |      |             |  |           |      |             |          |                |   |        |               |  |                 |               |  |
| capacity         | <i>integer</i>                                      | Indicates the initial capacity, in kilobytes, of the disk described by this attribute. <b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write   |      |             |  |           |      |             |          |                |   |        |               |  |                 |               |  |
| format           | <i>string</i>                                       | The format/type of this disk (e.g., ext4, NTFS).<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> 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: <b>68000, Alpha, ARM, Itanium, MIPS, PA_RISC, POWER, PowerPC, x86, x86_64, z/Architecture, SPARC</b>. Providers may define additional values.</p> <p><b>Constraints:</b><br/><b>Provider:</b> support optional; mutable<br/><b>Consumer:</b> support optional; read-write</p>  |      |             |  |           |      |             |          |                |   |        |               |  |                 |               |  |

3276 NOTE: The disk attributes "format" will not appear on Machine resources because after the Machine is created, the  
 3277 user of the Machine will be able to modify this attribute of a disk, possibly without the Provider's knowledge. Therefore  
 3278 these attributes might not be an aspect of the Machine that the Provider can reliably manage.

3279 **JSON media type:** application/json

3280 **JSON serialization:**

```

3281 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineConfiguration",
3282   "id": string,
3283   "name": string, ?
3284   "description": string, ?
3285   "created": string, ?
3286   "updated": string, ?
3287   "properties": { "key": string, + }, ?
3288   "cpu": number,
3289   "memory": number,
3290   "disks" : [
3291     { "capacity": number,
3292       "format": string,
3293       "initialLocation": string?
3294     }, +
3295   ], ?
3296   "cpuArch": string, ?
3297   "operations": [
3298     { "rel": "edit", "href": string }, ?
3299     { "rel": "delete", "href": string } ?
3300   ] ?
3301   ...
3302 }
```

3303 **XML media type:** application/xml

3304 **XML serialization:**

```

3305 <MachineConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
3306   <id> xs:anyURI </id>
3307   <name> xs:string </name> ?
3308   <description> xs:string </description> ?
3309   <created> xs:dateTime </created> ?
3310   <updated> xs:dateTime </updated> ?
3311   <property key="xs:string"> xs:string </property> *
3312   <cpu> xs:integer </cpu>
3313   <memory> xs:integer </memory>
3314   <disk>
3315     <capacity> xs:integer </capacity>
3316     <format> xs:string </format>
3317     <initialLocation> xs:string </initialLocation> ?
3318   </disk> *
3319   <cpuArch> xs:string </cpuArch> ?
3320   <operation rel="edit" href="xs:anyURI"/> ?
3321   <operation rel="delete" href="xs:anyURI"/> ?
3322   <xs:any*>
3323 </MachineConfiguration>
```

### 3324 5.14.5.1 Operations

3325 This resource supports the Read, Update, and Delete operations. Create is supported via the Machine  
3326 Configuration Collection resource.

### 3327 5.14.6 Machine Configuration Collection

3328 A Machine Configuration Collection resource represents the collection of Machine Configuration  
3329 resources within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource  
3330 shall be serialized as follows:



3331 **JSON serialization:**

```

3332 { "resourceURI":
3333     "http://schemas.dmtf.org/cimi/1/MachineConfigurationCollection",
3334     "id": string,
3335     "count": number,
3336     "machineConfigurations": [
3337         { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineConfiguration",
3338           "id": string,
3339           ... remaining MachineConfiguration attributes ...
3340         }, +
3341     ], ?
3342     "operations": [ { "rel": "add", "href": string } ? ]
3343     ...
3344 }
    
```

3345 **XML serialization:**

```

3346 <Collection
3347     resourceURI="http://schemas.dmtf.org/cimi/1/MachineConfigurationCollection"
3348     xmlns="http://schemas.dmtf.org/cimi/1">
3349     <id> xs:anyURI </id>
3350     <count> xs:integer </count>
3351     <MachineConfiguration>
3352         <id> xs:anyURI </id>
3353         ... remaining MachineConfiguration attributes ...
3354     </MachineConfiguration> *
3355     <operation rel="add" href="xs:anyURI"/> ?
3356     <xs:any*>
3357 </Collection>
    
```

3358 **5.14.6.1 Operations**

3359 This resource supports the Read and Update operations. Creation of new Machine Configuration  
 3360 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

3361 **5.14.7 Machine Image**

3362 This resource represents the information necessary for hardware virtualized resources to create a  
 3363 Machine Instance; it contains configuration data such as startup instructions, including possible  
 3364 combinations of the following items, depending on the 'type' of Machine Image created:

- 3365 • the software image (i.e., a copy of an installed Machine), which is to be instantiated on the disk  
 3366 and other virtual resources. The image can be a snapshot that consists of disk images plus  
 3367 memory and other resource state information.
- 3368 • installation software, which, when executed on the hardware (virtual) resources, builds the  
 3369 machine instance
- 3370 • both a disk image and a set of software and parameters in order to install new components not  
 3371 included in the original disk image

3372

|                  |  |   |
|------------------|--|---|
| <b>Name</b>      | MachinelImage                                |   |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/MachinelImage |   |
| <b>Attribute</b> | <b>Type</b>                                  | <b>Description</b>  |
| state            | string                                       | The operational state of the MachinelImage.<br>Allowable values include:<br><b>CREATING:</b> The MachinelImage is in the process of being created. Allowable action |

|               |               |  |
|---------------|---------------|--|
|               |               | <p>when in this state is: <b>delete</b>.</p> <p><b>AVAILABLE:</b> The MachineImage is available and ready for use. Allowable action when in this state is: <b>delete</b>.</p> <p><b>DELETING:</b> The MachineImage is in the process of being deleted. Allowable action when in this state is: <b>delete</b>.</p> <p><b>ERROR:</b> The Provider has detected an error in the MachineImage. Allowable action when in this state is: <b>delete</b>.</p> <p>Providers may define additional values.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-only</p>  |
| type          | <i>string</i> | <p>The type of Machine Image that is represented by this resource. This specification defines the following values:</p> <p><b>IMAGE:</b> 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><b>SNAPSHOT:</b> 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><b>PARTIAL_SNAPSHOT:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; immutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-only</p>  |

3373 The following describes the serialization of the resource in both JSON and XML:

3374 **JSON media type:** application/json

3375

**3376 JSON serialization:**

```

3377 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineImage",
3378     "id": string,
3379     "name": string, ?
3380     "description": string, ?
3381     "created": string, ?
3382     "updated": string, ?
3383     "properties": { "key": string, + }, ?
3384     "state": string,
3385     "type": string,
3386     "imageLocation": string,
3387     "relatedImage": { "href": string }, ?
3388     "operations": [
3389         { "rel": "edit", "href": string }, ?
3390         { "rel": "delete", "href": string } ?
3391     ] ?
3392     ...
3393 }
```

**3394 XML media type: application/xml**
**3395 XML serialization:**

```

3396 <MachineImage xmlns="http://schemas.dmtf.org/cimi/1">
3397   <id> xs:anyURI </id>
3398   <name> xs:string </name> ?
3399   <description> xs:string </description> ?
3400   <created> xs:dateTime </created> ?
3401   <updated> xs:dateTime </updated> ?
3402   <property key="xs:string"> xs:string </property> *
3403   <state> xs:string </state>
3404   <type> xs:string </type>
3405   <imageLocation> xs:anyURI </imageLocation>
3406   <relatedImage href="xs:anyURI"/> ?
3407   <operation rel="edit" href="xs:anyURI"/> ?
3408   <operation rel="delete" href="xs:anyURI"/> ?
3409   <xs:any*>
3410 </MachineImage>
```

**3411 5.14.7.1 Operations**

3412 This resource supports the Read, Update, and Delete operations. Create is supported via the Machine  
 3413 Image Collection resource.

3414 When creating a new Machine Image the representation of the new Machine Image may include a  
 3415 reference in the "imageLocation" attribute. Providers shall inspect this reference (most likely via an HTTP  
 3416 HEAD) to determine if any special processing is required. This specification defines the following  
 3417 additional steps that Providers shall take depending on the type of resource being referenced:

**3418 http://schemas.dmtf.org/cimi/1/Machine**

3419 If the "imageLocation" is a reference to a Machine, the Provider shall create a new Machine Image based  
 3420 on the Machine being referenced. Upon completion of the create operation, the Machine Image's  
 3421 "imageLocation" attribute shall not reference the Machine (as the Machine might change over time), but  
 3422 instead it shall reference the (or contain the data of a) static representation of the Machine.

3423 **5.14.8 Machine Image Collection**

3424 A Machine Image Collection resource represents the collection of Machine Image resources within a  
 3425 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as  
 3426 follows:

3427 **JSON serialization:**

```

3428 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineImageCollection",
3429   "id": string,
3430   "count": number,
3431   "machineImages": [
3432     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineImage",
3433       "id": string,
3434       ... remaining MachineImage attributes ...
3435     }, +
3436   ], ?
3437   "operations": [ { "rel": "add", "href": string } ? ]
3438   ...
3439 }
```

3440 **XML serialization:**

```

3441 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/MachineImageCollection"
3442   xmlns="http://schemas.dmtf.org/cimi/1">
3443   <id> xs:anyURI </id>
3444   <count> xs:integer </count>
3445   <MachineImage>
3446     <id> xs:anyURI </id>
3447     ... remaining MachineImage attributes ...
3448   </MachineImage> *
3449   <operation rel="add" href="xs:anyURI"/> ?
3450   <xs:any>*
3451 </Collection>
```

3452 **5.14.8.1 Operations**

3453 This resource supports the Read and Update operations. Creation of new Machine Image resources are  
 3454 supported via a POST to the "add" operation's URI as described in clause 4.2.1.1, where the request  
 3455 body and the way it is processed is described in clause 5.14.7.1.

3456 **5.14.9 Credential**

3457 A Credential resource contains the information required to create the initial administrative superuser of a  
 3458 newly created Machine or to represent the credentials needed to perform some operation. Due to the  
 3459 variation between operating systems and Providers, this specification does not mandate one particular  
 3460 set of attributes that all implementations need to support. However, Providers are expected to extend this  
 3461 resource with additional attributes to meet their requirements.

3462 For example, a Provider might extend this resource with username and password attributes, which would  
 3463 then be the login information for new Machines. These extension attributes would appear as siblings to  
 3464 the common attributes like "name" and "description."

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

3465 Some common extension attributes that Providers might use include:

3466 **UserName/Password:**

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

3467

3468 **Public key:**

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

3469 **JSON media type:** application/json

3470 **JSON serialization:**

```

3471 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Credential",
3472   "id": string,
3473   "name": string, ?
3474   "description": string, ?
3475   "created": string, ?
3476   "updated": string, ?
3477   "properties": { "key": string, + }, ?
3478   "operations": [
3479     { "rel": "edit", "href": string }, ?
3480     { "rel": "delete", "href": string } ?
3481   ] ?
3482   ...
3483 }
```

3484 **XML media type:** application/xml

3485 **XML serialization:**

```

3486 <Credential xmlns="http://schemas.dmtf.org/cimi/1">
3487   <id> xs:anyURI </id>
3488   <name> xs:string </name> ?
3489   <description> xs:string </description> ?
3490   <created> xs:dateTime </created> ?
3491   <updated> xs:dateTime </updated> ?
3492   <property key="xs:string"> xs:string </property> *
3493   <operation rel="edit" href="xs:anyURI"/> ?
3494   <operation rel="delete" href="xs:anyURI"/> ?
3495   <xs:any*>
3496 </Credential>
```

3497 **5.14.9.1 Operations**

3498 This resource supports the Read, Update, and Delete operations. Create is supported via the Credential  
3499 Collection resource.

3500 **5.14.10 Credential Collection**

3501 A Credential Collection resource represents the collection of Credential resources within a Provider and  
 3502 follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

3503 **JSON serialization:**

```

3504 { "resourceURI": "http://schemas.dmtf.org/cimi/1/CredentialCollection",
3505   "id": string,
3506   "count": number,
3507   "credential": [
3508     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Credential",
3509       "id": string,
3510       ... remaining Credential attributes ...
3511     }, +
3512   ], ?
3513   "operations": [ { "rel": "add", "href": string } ? ]
3514   ...
3515 }
```

3516 **XML serialization:**

```

3517 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/CredentialCollection"
3518   xmlns="http://schemas.dmtf.org/cimi/1">
3519   <id> xs:anyURI </id>
3520   <count> xs:integer </count>
3521   <Credential>
3522     <id> xs:anyURI </id>
3523     ... remaining Credential attributes ...
3524   </Credentials> *
3525   <operation rel="add" href="xs:anyURI"/> ?
3526   <xs:any>*
3527 </Collection>
```

3528 **5.14.10.1 Operations**

3529 NOTE: The "add" operation requires a CredentialTemplate to be used (see 4.2.1.1).

3530 **5.14.11 Credential Template**

3531 This resource captures the configuration values for realizing a Credential resource. A Credential  
 3532 Template may be used to create multiple Credentials.

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

3533 The following describes the serialization of the resource in both JSON and XML:

3534 **JSON media type:** application/json

3535 **JSON serialization:**

```

3536 { "resourceURI": "http://schemas.dmtf.org/cimi/1/CredentialTemplate",
3537   "id": string,
3538   "name": string, ?
3539   "description": string, ?
3540   "created": string, ?
3541   "updated": string, ?
3542   "properties": { "key": string, + }, ?
3543   "operations": [
```

```

3544     { "rel": "edit", "href": string }, ?
3545     { "rel": "delete", "href": string } ?
3546   ] ?
3547   ...
3548 }

```

3549 **XML media type:** application/xml

3550 **XML serialization:**

```

3551 <CredentialTemplate xmlns="http://schemas.dmtf.org/cimi/1">
3552   <id> xs:anyURI </id>
3553   <name> xs:string </name> ?
3554   <description> xs:string </description> ?
3555   <created> xs:dateTime </created> ?
3556   <updated> xs:dateTime </updated> ?
3557   <property key="xs:string"> xs:string </property> *
3558   <operation rel="edit" href="xs:anyURI" /> ?
3559   <operation rel="delete" href="xs:anyURI" /> ?
3560   <xs:any*
3561 </CredentialTemplate>

```

### 3562 5.14.11.1 Operations

3563 This resource supports the Read, Update, and Delete operations. Create is supported via the Credential  
3564 Template Collection resource.

## 3565 5.14.12 Credential Template Collection

3566 A Credential Template Collection resource represents the collection of CredentialTemplate resources  
3567 within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be  
3568 serialized as follows:

3569 **JSON serialization:**

```

3570 { "resourceURI":
3571   "http://schemas.dmtf.org/cimi/1/CredentialTemplateCollection",
3572   "id": string,
3573   "count": number,
3574   "credentialTemplates": [
3575     { "resourceURI": "http://schemas.dmtf.org/cimi/1/CredentialTemplate",
3576       "id": string,
3577       ... remaining CredentialTemplate attributes ...
3578     }, +
3579   ], ?
3580   "operations": [ { "rel": "add", "href": string } ? ]
3581   ...
3582 }
3583

```

3584 **XML serialization:**

```

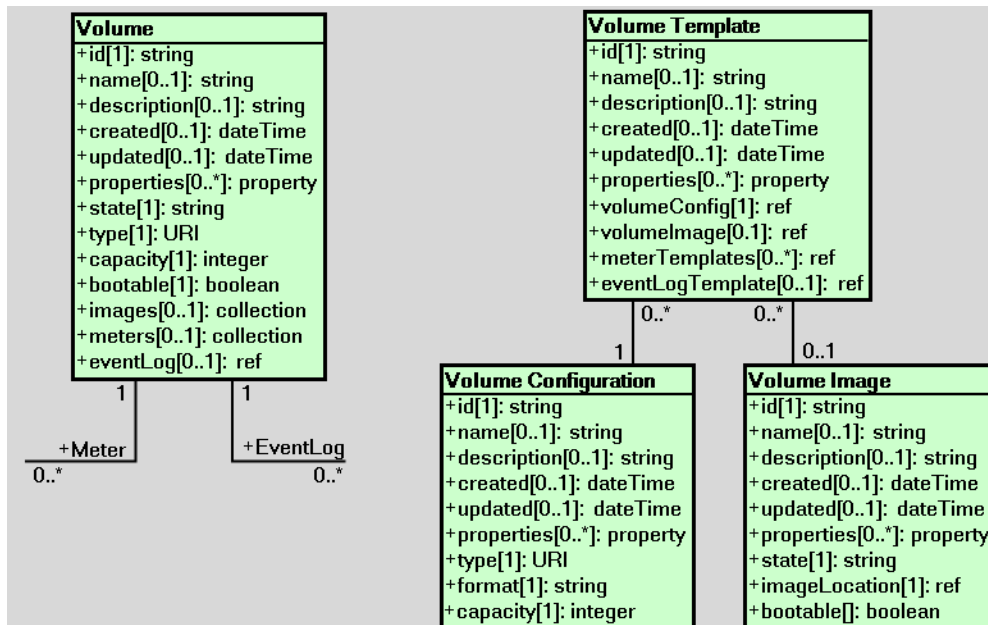
3585 <Collection
3586   resourceURI="http://schemas.dmtf.org/cimi/1/CredentialTemplateCollection"
3587   xmlns="http://schemas.dmtf.org/cimi/1">
3588   <id> xs:anyURI </id>
3589   <count> xs:integer </count>
3590   <CredentialTemplate>
3591     <id> xs:anyURI </id>
3592     ... remaining CredentialTemplate attributes ...
3593   </CredentialTemplate> *
3594   <operation rel="add" href="xs:anyURI"/> ?
3595   <xs:any*>
3596 </Collection>
    
```

3597 **5.14.12.1 Operations**

3598 This resource supports the Read and Update operations. Creation of new Credential Template resources  
 3599 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

3600 **5.15 Volume resources and relationships**

3601 Figure 4 illustrates the resources involved in constructing a Volume and their relationships. Although this  
 3602 drawing is in the style of a Resource Relationship diagram, the use of UML is neither rigorous nor  
 3603 normative.



3604 **Figure 4 - Volume resources**

3605 **5.15.1 Volume**

3606 A Volume represents storage at either the block or the file-system level. Volumes can be connected to  
 3607 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><b>CREATING:</b> The Volume is in the process of being created. Allowable action when in this state is: <b>delete</b>.</p> <p><b>AVAILABLE:</b> The Volume is available and ready for use. Allowable action when in this state is: <b>delete</b>.</p> <p><b>CAPTURING:</b> The Volume is in the process of being captured (snapshotted) into a new VolumeImage. Allowable action when in this state is: <b>delete</b>.</p> <p><b>DELETING:</b> The Volume is in the process of being deleted. Allowable action when in this state is: <b>delete</b>.</p> <p><b>ERROR:</b> The Provider has detected an error in the Volume. Allowable action when in this state is: <b>delete</b>.</p> <p>Providers may define additional values.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> 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><b>http://schemas.dmtf.org/cimi/1/mapped:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; immutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write</p>   |
| bootable  | <i>boolean</i>                        | <p>This property indicates whether this Volume is bootable.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-only</p>  |

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

3608 The following describes the serialization of the resource in both JSON and XML:

3609 **JSON media type:** application/json

3610 **JSON serialization:**

```

3611 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Volume",
3612   "id": string,
3613   "name": string, ?
3614   "description": string, ?
3615   "created": string, ?
3616   "updated": string, ?
3617   "properties": { "key": string, + }, ?
3618   "state": string,
3619   "type": string,
3620   "capacity": number,
3621   "bootable": boolean,
3622   "images": { "href": string }, ?
3623   "meters": { "href": string }, ?
3624   "eventLog": { "href": string }, ?
3625   "operations": [
3626     { "rel": "edit", "href": string }, ?
3627     { "rel": "delete", "href": string } ?
3628   ] ?
3629   ...
3630 }
```

3631 **XML media type:** application/xml

3632 **XML serialization:**

```

3633 <Volume xmlns="http://schemas.dmtf.org/cimi/1">
3634   <id> xs:anyURI </id>
3635   <name> xs:string </name> ?
3636   <description> xs:string </description> ?
3637   <created> xs:dateTime </created> ?
3638   <updated> xs:dateTime </updated> ?
3639   <property key="xs:string"> xs:string </property> *
3640   <state> xs:string </state>
3641   <type> xs:anyURI </type>
3642   <capacity> xs:integer </capacity>
3643   <bootable> xs:boolean </bootable>
3644   <images href="xs:anyURI"/> ?
3645   <meters href="xs:anyURI"/> ?
3646   <eventLog href="xs:anyURI"/> ?
3647   <operation rel="edit" href="xs:anyURI"/> ?
3648   <operation rel="delete" href="xs:anyURI"/> ?
3649   <xs:any>*
3650 </Volume>
```

3651 **5.15.1.1 Collections**

3652 The following describes the collection resources owned by Volumes.

 3653 **5.15.1.1.1 VolumeVolumelImage Collection**

3654 The resource type for each item of this collection is "VolumeVolumelImage", defined as follows:

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

 3655 **JSON serialization:**

```

3656 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeVolumeImageCollection",
3657   "id": string,
3658   "count": number,
3659   "volumeVolumeImages": [
3660     { "resourceURI":
3661       "http://schemas.dmtf.org/cimi/1/VolumeVolumeImage",
3662       "id": string,
3663       "name": string, ?
3664       "description": string, ?
3665       "created": string, ?
3666       "updated": string, ?
3667       "properties": { "key": string, + }, ?
3668       "volumeImage": { "href": string },
3669       "operations": [
3670         { "rel": "edit", "href": string }, ?
3671         { "rel": "delete", "href": string } ?
3672       ] ?
3673       ...
3674     }, +
3675   ], ?
3676   "operations": [ { "rel": "add", "href": string } ? ]
3677   ...
3678 }
```

 3679 **XML serialization:**

```

3680 <Collection
3681 resourceURI="http://schemas.dmtf.org/cimi/1/VolumeVolumeImageCollection"
3682 xmlns="http://schemas.dmtf.org/cimi/1">
3683 <id> xs:anyURI </id>
3684 <count> xs:integer </count>
3685 <VolumeVolumeImage>
3686 <id> xs:anyURI </id>
3687 <name> xs:string </name> ?
3688 <description> xs:string </description> ?
3689 <created> xs:dateTime </created> ?
3690 <updated> xs:dateTime </updated> ?
3691 <property key="xs:string"> xs:string </property> *
3692 <volumeImage href="xs:anyURI"/>
3693 <operation rel="edit" href="xs:anyURI"/> ?
3694 <operation rel="delete" href="xs:anyURI"/> ?
3695 <xs:any>*
3696 </VolumeVolumeImage> *
```

```

3697     <operation rel="add" href="xs:anyURI"/> ?
3698     <xs:any>*
3699 </Collection>

```

### 3700 5.15.1.1.2 VolumeMeter Collection

3701 The resource type for each item of this collection is “Meter” as defined in clause 5.17.3.

#### 3702 JSON serialization:

```

3703 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeMeterCollection",
3704   "id": string,
3705   "count": number,
3706   "meters": [
3707     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
3708       "id": string,
3709       ... remaining Meter attributes ...
3710     }, +
3711   ], ?
3712   "operations": [ { "rel": "add", "href": string } ? ]
3713   ...
3714 }

```

#### 3715 XML serialization:

```

3716 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/VolumeMeterCollection"
3717   xmlns="http://schemas.dmtf.org/cimi/1">
3718   <id> xs:anyURI </id>
3719   <count> xs:integer </count>
3720   <Meter>
3721     <id> xs:anyURI </id>
3722     ... remaining Meter attributes ...
3723   </Meter> *
3724   <operation rel="add" href="xs:anyURI"/> ?
3725   <xs:any>*
3726 </Collection>

```

### 3727 5.15.1.2 Operations

3728 This resource supports the Read, Update, and Delete operations. Create is supported via the Volume  
3729 Collection resource.

### 3730 5.15.2 Volume Collection

3731 A Volume Collection resource represents the collection of Volumes within a Provider and follows the  
3732 Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

#### 3733 JSON serialization:

```

3734 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeCollection",
3735   "id": string,
3736   "count": number,
3737   "volumes": [
3738     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Volume",
3739       "id": string,
3740       ... remaining Volume attributes ...
3741     }, +
3742   ], ?
3743   "operations": [ { "rel": "add", "href": string } ? ]
3744   ...
3745 }

```

3746 **XML serialization:**

```

3747 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/VolumeCollection"
3748     xmlns="http://schemas.dmtf.org/cimi/1">
3749   <id> xs:anyURI </id>
3750   <count> xs:integer </count>
3751   <Volume>
3752     <id> xs:anyURI </id>
3753     ... remaining Volume attributes ...
3754   </Volume> *
3755   <operation rel="add" href="xs:anyURI"/> ?
3756   <xs:any>*
3757 </Collection>
    
```

3758 **5.15.2.1 Operations**

3759 NOTE: The "add" operation requires a VolumeTemplate to be used (see 4.2.1.1).

3760 **5.15.3 Volume Template**

3761 This resource captures the configuration values for realizing a Volume. A Volume Template may be used  
 3762 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.<br><br>Note that the attributes of the VolumeConfiguration may be specified rather than a reference to an existing VolumeConfiguration resource.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> 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.<br><br>Note that the attributes of the MeterTemplate may be specified rather than a reference to an existing MeterTemplate resource.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> 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.<br><br>Note that the attributes of the EventLogTemplate may be specified rather than a reference to an existing EventLogTemplate resource.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write     |

3763 The following describes the serialization of the resource in both JSON and XML:

3764 **JSON media type:** application/json

3765 **JSON serialization:**

```

3766 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeTemplate",
3767   "id": string,
3768   "name": string, ?
3769   "description": string, ?
3770   "created": string, ?
3771   "updated": string, ?
3772   "properties": { "key": string, + }, ?
3773   "volumeConfig": {
3774     "href": string | ... VolumeConfiguration attributes ...
3775   },
3776   "volumeImage": { "href": string }, ?
3777   "meterTemplates": [
3778     { "href": string, ?
3779       ... MeterTemplate attributes ... ?
3780     }, *
3781   ], ?
3782   "eventLogTemplate": {
3783     "href": string, ?
3784     ... EventLogTemplate attributes ... ?
3785   }, ?
3786   "operations": [
3787     { "rel": "edit", "href": string }, ?
3788     { "rel": "delete", "href": string } ?
3789   ] ?
3790   ...
3791 }

```

3792 **XML media type:** application/xml

3793 **XML serialization:**

```

3794 <VolumeTemplate xmlns="http://schemas.dmtf.org/cimi/1">
3795   <id> xs:anyURI </id>
3796   <name> xs:string </name> ?
3797   <description> xs:string </description> ?
3798   <created> xs:dateTime </created> ?
3799   <updated> xs:dateTime </updated> ?
3800   <property key="xs:string"> xs:string </property> *
3801   <volumeConfig href="xs:anyURI"?>
3802     ... VolumeConfiguration attributes ... ?
3803   </volumeConfig>
3804   <volumeImage href="xs:anyURI"/> ?
3805   <meterTemplate href="xs:anyURI"? >
3806     ... MeterTemplate attributes ... ?
3807   </meterTemplate> *
3808   <eventLogTemplate href="xs:anyURI"? >
3809     ... EventLogTemplate attributes ... ?
3810   </eventLogTemplate> ?
3811   <operation rel="edit" href="xs:anyURI"/> ?
3812   <operation rel="delete" href="xs:anyURI"/> ?
3813   <xs:any*>
3814 </VolumeTemplate>

```

### 3815 5.15.3.1 Operations

3816 This resource supports the Read, Update, and Delete operations. Create is supported via the Volume  
3817 Template Collection resource.

3818 **5.15.4 Volume Template Collection**

3819 A Volume Template Collection resource represents the collection of VolumeTemplate resources within a  
3820 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as  
3821 follows:  
3822

3823 **JSON serialization:**

```

3824 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeTemplateCollection",
3825     "id": string,
3826     "count": number,
3827     "volumeTemplates": [
3828       { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeTemplate",
3829         "id": string,
3830         ... remaining volumeTemplate attributes ...
3831       }, +
3832     ], ?
3833     "operations": [ { "rel": "add", "href": string } ? ]
3834     ...
3835 }
    
```

3836 **XML serialization:**

```

3837 <Collection
3838   resourceURI="http://schemas.dmtf.org/cimi/1/VolumeTemplateCollection"
3839   xmlns="http://schemas.dmtf.org/cimi/1">
3840   <id> xs:anyURI </id>
3841   <count> xs:integer </count>
3842   <VolumeTemplate>
3843     <id> xs:anyURI </id>
3844     ... remaining VolumeTemplates attributes ...
3845   </VolumeTemplate> *
3846   <operation rel="add" href="xs:anyURI"/> ?
3847   <xs:any>*
3848 </Collection>
    
```

3849 **5.15.4.1 Operations**

3850 This resource supports the Read and Update operations. Creation of new Volume Template resources  
 3851 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

3852 **5.15.5 Volume Configuration**

3853 The Volume Configuration resource represents the set of configuration values needed to create a Volume  
 3854 with certain characteristics. Volume Configurations are created by Providers and may, at the Providers  
 3855 discretion, be created by Consumers.

|                  |  |   |
|------------------|--|---|
| <b>Name</b>      | VolumeConfiguration                                |   |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/VolumeConfiguration |   |
| <b>Attribute</b> | <b>Type</b>  | <b>Description</b>  |
| type             | URI  | <p>A URI that indicates the type of Volume to be created. This specification defines the following URI:</p> <p><b>http://schemas.dmtf.org/cimi/1/mapped:</b>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><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> 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."<br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write  |
| capacity | <i>integer</i> | The default size in kilobytes, when limited, of the Volume created from this Volume Configuration.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write |

3856 The following describes the serialization of the resource in both JSON and XML:

3857 **JSON media type:** application/json

3858 **JSON serialization:**

```

3859 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
3860   "id": string,
3861   "name": string, ?
3862   "description": string, ?
3863   "created": string, ?
3864   "updated": string, ?
3865   "properties": { "key": string, + }, ?
3866   "type": string,
3867   "format": string,
3868   "capacity": number,
3869   "operations": [
3870     { "rel": "edit", "href": string }, ?
3871     { "rel": "delete", "href": string } ?
3872   ] ?
3873   ...
3874 }
```

3875 **XML media type:** application/xml

3876 **XML serialization:**

```

3877 <VolumeConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
3878   <id> xs:anyURI </id>
3879   <name> xs:string </name> ?
3880   <description> xs:string </description> ?
3881   <created> xs:dateTime </created> ?
3882   <updated> xs:dateTime </updated> ?
3883   <property key="xs:string"> xs:string </property> *
3884   <type> xs:anyURI </type>
3885   <format> xs:string </format>
3886   <capacity> xs:integer </capacity>
3887   <operation rel="edit" href="xs:anyURI"/> ?
3888   <operation rel="delete" href="xs:anyURI"/> ?
3889   <xs:any*>
3890 </VolumeConfiguration>
```

### 3891 5.15.5.1 Operations

3892 This resource supports the Read, Update, and Delete operations. Create is supported via the Volume  
 3893 Configuration Collection resource.

3894 **5.15.6 Volume Configuration Collection**

3895 A Volume Configuration Collection resource represents the collection of Volume Configuration resources  
 3896 within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be  
 3897 serialized as follows:

3898 **JSON serialization:**

```

3899 { "resourceURI":
3900   "http://schemas.dmtf.org/cimi/1/VolumeConfigurationCollection",
3901   "id": string,
3902   "count": number,
3903   "volumeConfigurations": [
3904     { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
3905       "id": string,
3906       ... remaining VolumeConfiguration attributes ...
3907     }, +
3908   ], ?
3909   "operations": [ { "rel": "add", "href": string } ? ]
3910   ...
3911 }
```

3912 **XML serialization:**

```

3913 <Collection
3914   resourceURI="http://schemas.dmtf.org/cimi/1/VolumeConfigurationCollection"
3915   xmlns="http://schemas.dmtf.org/cimi/1">
3916   <id> xs:anyURI </id>
3917   <count> xs:integer </count>
3918   <VolumeConfiguration>
3919     <id> xs:anyURI </id>
3920     ... remaining VolumeConfiguration attributes ...
3921   </VolumeConfiguration> *
3922   <operation rel="add" href="xs:anyURI"/> ?
3923   <xs:any>*
3924 </Collection>
```

3925 **5.15.6.1 Operations**

3926 This resource supports the Read and Update operations. Creation of new Volume Image resources are  
 3927 supported via a POST to the "add" operations' URI as described in clause 4.2.1.1.

3928 **5.15.7 Volume Image**

3929 This resource represents an image that could be placed on a pre-loaded volume.

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

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

3930 The following describes the serialization of the resource in both JSON and XML:

3931 **JSON media type:** application/json

3932 **JSON serialization:**

```

3933 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeImage",
3934   "id": string,
3935   "name": string, ?
3936   "description": string, ?
3937   "created": string, ?
3938   "updated": string, ?
3939   "properties": { "key": string, + }, ?
3940   "state": string,
3941   "imageLocation": { "href": string },
3942   "bootable": boolean,
3943   "operations": [
3944     { "rel": "edit", "href": string }, ?
3945     { "rel": "delete", "href": string } ?
3946   ] ?
3947   ...
3948 }
```

3949 **XML media type:** application/xml

3950 **XML serialization:**

```

3951 <VolumeImage xmlns="http://schemas.dmtf.org/cimi/1">
3952   <id> xs:anyURI </id>
3953   <name> xs:string </name> ?
3954   <description> xs:string </description> ?
3955   <created> xs:dateTime </created> ?
3956   <updated> xs:dateTime </updated> ?
3957   <property key="xs:string"> xs:string </property> *
3958   <state> xs:string </state>
3959   <imageLocation href="xs:anyURI"/>
3960   <bootable> xs:boolean </bootable>
3961   <operation rel="edit" href="xs:anyURI"/> ?
3962   <operation rel="delete" href="xs:anyURI"/> ?
3963   <xs:any>*
3964 </VolumeImage>
```

3965 **5.15.7.1 Operations**

3966 This resource supports the Read, Update, and Delete operations. Create is supported via the Volume  
3967 Image Collection resource.

3968 **5.15.8 Volume Image Collection**

3969 A Volume Image Collection resource represents the collection of Volume Image resources within a  
3970 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as  
3971 follows:

3972 **JSON serialization:**

```
3973 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeImageCollection",
3974   "id": string,
3975   "count": number,
3976   "volumeImages": [
3977     { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeImage",
3978       "id": string,
3979       ... remaining VolumeImage attributes ...
3980     }, +
3981   ], ?
3982   "operations": [ { "rel": "add", "href": string } ? ]
3983   ...
3984 }
```

3985 **XML serialization:**

```
3986 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/VolumeImageCollection"
3987   xmlns="http://schemas.dmtf.org/cimi/1">
3988   <id> xs:anyURI </id>
3989   <count> xs:integer </count>
3990   <VolumeImage>
3991     <id> xs:anyURI </id>
3992     ... remaining VolumeImage attributes ...
3993   </VolumeImage> *
3994   <operation rel="add" href="xs:anyURI"/> ?
3995   <xs:any>*
3996 </Collection>
```

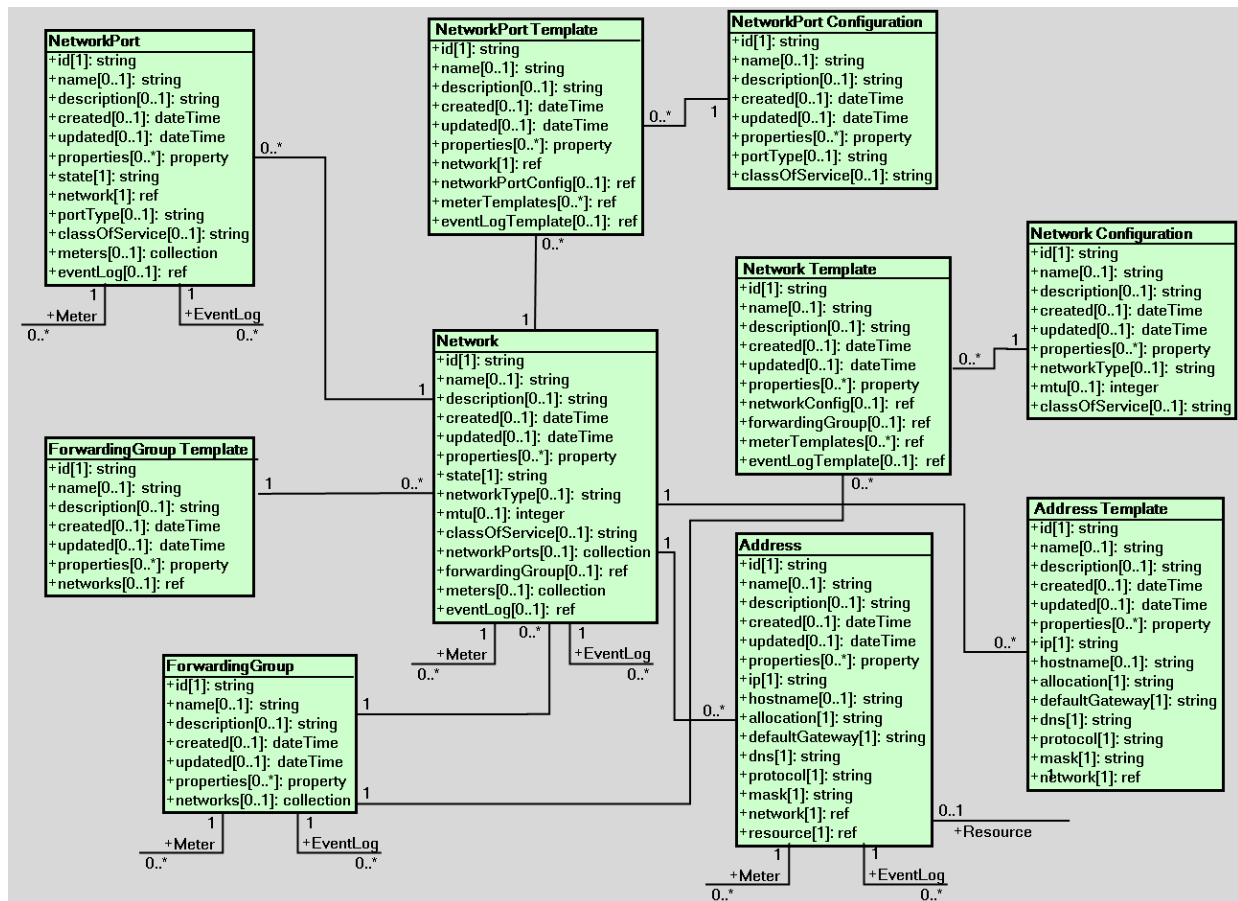
3997 **5.15.8.1 Operations**

3998 This resource supports the Read and Update operations. Creation of new Volume Image resources are  
3999 supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

4000 During the creation of a new Volume Image resource, if the "imageLocation" attribute refers to an existing  
4001 Volume, this shall be interpreted as a request to create a snapshot of the Volume. Once completed, the  
4002 "imageLocation" attribute of the new Volume Image resource shall not refer to the original Volume,  
4003 instead it shall refer to a static copy of the Volume. Additionally, the "images" attribute of the referenced  
4004 Volume resource shall be updated to include a reference to this new Volume Image resource. During this  
4005 process, the Provider may put the Volume into a "CAPTURING" state if necessary.

4006 **5.16 Network resources and relationships**

4007 Figure 5 illustrates the resources involved in constructing Networks and their Network Ports and their  
4008 relationships. Although this drawing is in the style of a Resource Relationship diagram, the use of UML is  
4009 neither rigorous nor normative.



4010 **Figure 5 - Network resources**

4011 **5.16.1 Network**

4012 A network is a collection of interconnected logical services with the purpose of forwarding data traffic  
 4013 between end points.

4014 Networks in a ForwardingGroup should all have the same "networkType" attributes, which prevents a  
 4015 Network with a "private" access attribute from being publicly forwarded because it is a member of a  
 4016 ForwardingGroup that also contains Networks with a "public" access attribute.

|                  |  |  |
|------------------|--|--|
| <b>Name</b>      | Network                                |  |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/Network |  |
| <b>Attribute</b> | <b>Type</b>                            | <b>Description</b>   |
| state            | string                                 | The operational state of the System.<br><br>Allowable values include:<br><br><b>CREATING:</b> The Network is in the process of being created. Allowable action when in this state is: <b>delete</b> .<br><br><b>STARTING:</b> The Network is in the process of being started. Allowable actions when in this state are: <b>stop</b> and <b>delete</b> .<br><br><b>STARTED:</b> The Network is available and ready for use. Allowable actions when in this state are: <b>stop</b> , and <b>delete</b> . |

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

|          |            |   |
|----------|------------|---|
|          |            | <b>Consumer:</b> support optional; read-only  |
| eventLog | <i>ref</i> | A reference to the EventLog of this Network.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-only |

4017 The following describes the serialization of the resource in both JSON and XML:

4018 **JSON media type:** application/json

4019 **JSON serialization:**

```

4020 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Network",
4021   "id": string,
4022   "name": string, ?
4023   "description": string, ?
4024   "created": string, ?
4025   "updated": string, ?
4026   "properties": { "key": string, + }, ?
4027   "state": string,
4028   "networkType": string, ?
4029   "mtu": number, ?
4030   "classOfService": string, ?
4031   "networkPorts": { "href": string }, ?
4032   "forwardingGroup": { "href": string }, ?
4033   "meters": { "href": string }, ?
4034   "eventLog": { "href": string }, ?
4035   "operations": [
4036     { "rel": "edit", "href": string }, ?
4037     { "rel": "delete", "href": string }, ?
4038     { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
4039     { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string } ?
4040   ] ?
4041   ...
4042 }
```

4043 **XML media type:** application/xml

4044 **XML serialization:**

```

4045 <Network xmlns="http://schemas.dmtf.org/cimi/1">
4046   <id> xs:anyURI </id>
4047   <name> xs:string </name> ?
4048   <description> xs:string </description> ?
4049   <created> xs:dateTime </created> ?
4050   <updated> xs:dateTime </updated> ?
4051   <property key="xs:string"> xs:string </property> *
4052   <state> xs:string </state>
4053   <networkType> xs:string </networkType> ?
4054   <mtu> xs:integer </mtu> ?
4055   <classOfService> xs:string </classOfService> ?
4056   <networkPorts href="xs:anyURI"/> ?
4057   <forwardingGroup href="xs:anyURI"/> ?
4058   <meters href="xs:anyURI"/> ?
4059   <eventLog href="xs:anyURI"/> ?
4060   <operation rel="edit" href="xs:anyURI"/> ?
4061   <operation rel="delete" href="xs:anyURI"/> ?
4062   <operation rel="http://schemas.dmtf.org/cimi/1/action/start"
4063 href="xs:anyURI"/> ?
4064   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
4065 href="xs:anyURI"/> ?
4066   <xs:any*>
```

4067 </Network>

### 4068 5.16.1.1 Collections

4069 The following describes the collection resources owned by Networks.

#### 4070 5.16.1.1.1 NetworkPort Collection

4071 When NetworkPorts are created via a Network's NetworkPortCollection's "add" operation, they shall  
4072 added to the global (Cloud Entry Point) NetworkPortCollection as well.

4073 As specified in clause 5.5.12, when a Network is deleted all of its collections, and resources in those  
4074 collections, shall also be deleted. This means that all of the NetworkPorts related to that Network shall  
4075 also be deleted.

4076 The resource type for each item of this collection is "NetworkPort" as defined in clause 5.16.7.

#### 4077 JSON serialization:

```
4078 { "resourceURI":
4079   "http://schemas.dmtf.org/cimi/1/NetworkNetworkPortCollection",
4080   "id": string,
4081   "count": number,
4082   "networkports": [
4083     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPort",
4084       "id": string,
4085       ... remaining NetworkPort attributes ...
4086     }, +
4087   ] ?
4088   ...
4089 }
```

#### 4090 XML serialization:

```
4091 <Collection
4092   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkNetworkPortCollection"
4093   xmlns="http://schemas.dmtf.org/cimi/1">
4094   <id> xs:anyURI </id>
4095   <count> xs:integer </count>
4096   <NetworkPort>
4097     <id> xs:anyURI </id>
4098     ... remaining NetworkPort attributes ...
4099   </NetworkPort> *
4100   <xs:any*>
4101 </Collection>
```

#### 4102 5.16.1.1.2 NetworkMeter Collection

4103 The resource type for each item of this collection is "Meter" as defined in clause 5.17.3.

#### 4104 JSON serialization:

```
4105 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkMeterCollection",
4106   "id": string,
4107   "count": number,
4108   "meters": [
4109     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
4110       "id": string,
4111       ... remaining Meter attributes ...
4112     }, +
4113   ], ?
4114   "operations": [ { "rel": "add", "href": string } ? ]
4115   ...
```



4116 }

4117 **XML serialization:**

```

4118 <Collection
4119     resourceURI="http://schemas.dmtf.org/cimi/1/NetworkMeterCollection"
4120     xmlns="http://schemas.dmtf.org/cimi/1">
4121     <id> xs:anyURI </id>
4122     <count> xs:integer </count>
4123     <Meter>
4124         <id> xs:anyURI </id>
4125         ... remaining Meter attributes ...
4126     </Meter> *
4127     <operation rel="add" href="xs:anyURI"/> ?
4128     <xs:any>*
4129 </Collection>
    
```

4130 **5.16.1.2 Operations**

4131 This resource supports the Read, Update, and Delete operations. Create is supported via the Network  
 4132 Collection resource.

4133 The following custom operations are also defined:

4134 **Starting a Network**

4135 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/start

4136 This operation will start a Network.

4137 Input parameters: None.

4138 Output parameters: None.

4139 During the processing of this operation, the Network shall be in the "STARTING" state.

4140 Upon successful completion of this operation, the Network shall be in the "STARTED" state.

4141 **HTTP protocol**

4142 To start a Network, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/start" URI of the Network  
 4143 where the HTTP request body shall be as described below.

4144 **JSON media type:** application/json

4145 **JSON serialization:**

```

4146 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
4147   "action": "http://schemas.dmtf.org/cimi/1/action/start",
4148   "properties": { "key": string, + } ?
4149   ...
4150 }
    
```

4151 **XML media type:** application/xml

4152 **XML serialization**

```

4153 <Action xmlns="http://schemas.dmtf.org/cimi/1">
4154     <action> http://schemas.dmtf.org/cimi/1/action/start </action>
4155     <property key="xs:string"> xs:string </property> *
4156     <xs:any>*
4157 </Action>
    
```

4158 Upon successful processing of the request, the HTTP response body will be empty.

4159 **Stopping a Network**4160 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

4161 This operation will stop a Network. When stopped, a Network shall not allow data to flow through it.

4162 Input parameters: None.

4163 Output parameters: None.

4164 During the processing of this operation, the Network shall be in the "STOPPING" state.

4165 Upon successful completion of this operation, the Network shall be in the "STOPPED" state.

4166 **HTTP Protocol**4167 To stop a Network, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the Network  
4168 where the HTTP request body shall be as described below.4169 **JSON media type:** application/json4170 **JSON serialization:**

```
4171 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
4172   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
4173   "properties": { "key": string, + } ?
4174   ...
4175 }
```

4176 **XML media type:** application/xml4177 **XML serialization**

```
4178 <Action xmlns="http://schemas.dmtf.org/cimi/1">
4179   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
4180   <property key="xs:string"> xs:string </property> *
4181   <xs:any>*
4182 </Action>
```

4183 Upon successful processing of the request, the HTTP response body will be empty.

4184 **5.16.2 Network Collection**4185 A Network Collection resource represents the collection of Networks within a Provider and follows the  
4186 Collection pattern that is defined in clause 5.5.12. This resource shall be serialized as follows:4187 **JSON serialization:**

```
4188 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkCollection",
4189   "id": string,
4190   "count": number,
4191   "networks": [
4192     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Network",
4193       "id": string,
4194       ... remaining Network attributes ...
4195     }, +
4196   ], ?
4197   "operations": [ { "rel": "add", "href": string } ? ]
4198   ...
4199 }
```

4200 **XML serialization:**4201 

```
<Collection resourceURI="http://schemas.dmtf.org/cimi/1/NetworkCollection"
```

```

4202     xmlns="http://schemas.dmtf.org/cimi/1">
4203     <id> xs:anyURI </id>
4204     <count> xs:integer </count>
4205     <Network>
4206         <id> xs:anyURI </id>
4207         ... remaining Network attributes ...
4208     </Network> *
4209     <operation rel="add" href="xs:anyURI"/> ?
4210     <xs:any>*
4211 </Collection>
    
```

4212 **5.16.2.1 Operations**

4213 NOTE: The "add" operation requires a NetworkTemplate to be used (see 4.2.1.1).

4214 **5.16.3 Network Template**

4215 The Network Template is a set of configuration values for realizing a Network. An instance of Network  
 4216 Template may be used to create multiple Networks.

| Name             | NetworkTemplate                                |  |
|------------------|--|--|
| Type URI         | http://schemas.dmtf.org/cimi/1/NetworkTemplate |  |
| Attribute        | Type   | Description  |
| networkConfig    | <i>ref</i>                                     | A reference to the Network Configuration that will be used to create a Network from this Network Template.<br><br>Note that the attributes of the NetworkConfiguration may be specified rather than a reference to an existing NetworkConfiguration resource.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write                      |
| forwardingGroup  | <i>ref</i>                                     | A reference to a ForwardingGroup of which this Network will be a part.<br><br>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.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> 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 Network.<br><br>Note that the attributes of the MeterTemplate may be specified rather than a reference to an existing MeterTemplate resource.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> 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 Network.<br><br>Note that the attributes of the EventLogTemplate may be specified rather than a reference to an existing EventLogTemplate resource.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write                          |

4217 The following describes the serialization of the resource in both JSON and XML:

4218 **JSON media type:** application/json

4219 **JSON serialization:**

```

4220 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkTemplate",
4221   "id": string,
4222   "name": string, ?
4223   "description": string, ?
4224   "created": string, ?
4225   "updated": string, ?
4226   "properties": { "key": string, + }, ?
4227   "networkConfig": {
4228     "href": string |... NetworkingConfiguration attributes ...
4229   }, ?
4230   "forwardingGroup": { "href": string }, ?
4231   "meterTemplates": [
4232     { "href": string, ?
4233       ... MeterTemplate attributes ... ?
4234     }, *
4235   ], ?
4236   "eventLogTemplate": {
4237     "href": string, ?
4238     ... EventLogTemplate attributes ... ?
4239   }, ?
4240   "operations": [
4241     { "rel": "edit", "href": string }, ?
4242     { "rel": "delete", "href": string } ?
4243   ] ?
4244   ...
4245 }
```

4246 **XML media type:** application/xml

4247 **XML serialization:**

```

4248 <NetworkTemplate xmlns="http://schemas.dmtf.org/cimi/1">
4249   <id> xs:anyURI </id>
4250   <name> xs:string </name> ?
4251   <description> xs:string </description> ?
4252   <created> xs:dateTime </created> ?
4253   <updated> xs:dateTime </updated> ?
4254   <property key="xs:string"> xs:string </property> *
4255   <networkConfig href="xs:anyURI"?>
4256     ... NetworkingConfiguration attributes ... ?
4257   </networkConfig> ?
4258   <forwardingGroup href="xs:anyURI"/> ?
4259   <meterTemplate href="xs:anyURI"? >
4260     ... MeterTemplate attributes ... ?
4261   </meterTemplate> *
4262   <eventLogTemplate href="xs:anyURI"? >
4263     ... EventLogTemplate attributes ... ?
4264   </eventLogTemplate> ?
4265   <operation rel="edit" href="xs:anyURI"/> ?
4266   <operation rel="delete" href="xs:anyURI"/> ?
4267   <xs:any*
4268 </NetworkTemplate>
```

### 4269 5.16.3.1 Operations

4270 This resource supports the Read, Update and Delete operations. Create is supported via the Network  
 4271 Template Collection resource.

4272 **5.16.4 Network Template Collection**

4273 A Network Template Collection resource represents the collection of NetworkTemplates within a Provider  
 4274 and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

4275 **JSON serialization:**

```

4276 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkTemplateCollection",
4277   "id": string,
4278   "count": number,
4279   "networkTemplates": [
4280     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkTemplate",
4281       "id": string,
4282       ... remaining NetworkTemplate attributes ...
4283     }, +
4284   ], ?
4285   "operations": [ { "rel": "add", "href": string } ? ]
4286   ...
4287 }
```

4288 **XML serialization:**

```

4289 <Collection
4290   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkTemplateCollection"
4291   xmlns="http://schemas.dmtf.org/cimi/1">
4292   <id> xs:anyURI </id>
4293   <count> xs:integer </count>
4294   <NetworkTemplate>
4295     <id> xs:anyURI </id>
4296     ... remaining NetworkTemplate attributes ...
4297   </NetworkTemplate> *
4298   <operation rel="add" href="xs:anyURI"/> ?
4299   <xs:any>*
4300 </Collection>
```

4301 **5.16.4.1 Operations**

4302 This resource supports the Read and Update operations. Creation of new Network Template resources  
 4303 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

4304 **5.16.5 Network Configuration**

4305 The following set of configuration values represent the information needed to create a Network with  
 4306 certain characteristics.

|                  |   |   |
|------------------|---|---|
| <b>Name</b>      | NetworkConfiguration                                |   |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/NetworkConfiguration |   |
| <b>Attribute</b> | <b>Type</b>   | <b>Description</b>  |
| networkType      | string  | An indicator of whether or not the Network will be a Public or Private network.<br>Allowable values include:<br><b>PUBLIC:</b> represents an open and Internet routable network.<br><b>PRIVATE:</b> identifies a local non-Internet network.<br><u><b>Constraints:</b></u><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write |
| mtu              | integer   | Maximum Transmission Unit. Size Indicates the largest supported packet size.<br><u><b>Constraints:</b></u>  |

|                |               |  |
|----------------|---------------|--|
|                |               | <b>Provider:</b> support optional; mutable<br><b>Consumer:</b> 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<br><br>Example values:<br><b>GOLD:</b> High bandwidth, low latency, low jitter<br><b>SILVER:</b> An improved service experience over bronze for voice or video traffic<br><b>BRONZE:</b> Best effort<br><br>The list of possible values, and their implied quality of service, is out of scope of this specifications.<br><br><u><b>Constraints:</b></u><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write |

4307 The following describes the serialization of the resource in both JSON and XML:

4308 **JSON media type:** application/json

4309 **JSON serialization:**

```

4310 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkConfiguration",
4311   "id": string,
4312   "name": string, ?
4313   "description": string, ?
4314   "created": string, ?
4315   "updated": string, ?
4316   "properties": { "key": string, + }, ?
4317   "networkType": string, ?
4318   "mtu": number, ?
4319   "classOfService": string, ?
4320   "operations": [
4321     { "rel": "edit", "href": string }, ?
4322     { "rel": "delete", "href": string } ?
4323   ] ?
4324   ...
4325 }
```

4326 **XML media type:** application/xml

4327 **XML serialization:**

```

4328 <NetworkConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
4329   <id> xs:anyURI </id>
4330   <name> xs:string </name> ?
4331   <description> xs:string </description> ?
4332   <created> xs:dateTime </created> ?
4333   <updated> xs:dateTime </updated> ?
4334   <property key="xs:string"> xs:string </property> *
4335   <networkType> xs:string </networkType> ?
4336   <mtu> xs:integer <mtu> ?
4337   <classOfService> xs:string </classOfService> ?
4338   <operation rel="edit" href="xs:anyURI"/> ?
4339   <operation rel="delete" href="xs:anyURI"/> ?
4340   <xs:any>*
4341 </NetworkConfiguration>
```

4342 **5.16.5.1 Operations**

4343 This resource supports the Read, Update, and Delete operations. Create is supported via the Network  
4344 Configuration Collection resource.

4345 **5.16.6 Network Configuration Collection**

4346 A Network Configuration Collection resource represents the collection of Network Configurations within a  
4347 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as  
4348 follows:

4349 **JSON serialization:**

```
4350 { "resourceURI":
4351   "http://schemas.dmtf.org/cimi/1/NetworkConfigurationCollection",
4352   "id": string,
4353   "count": number,
4354   "networkConfigurations": [
4355     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkConfiguration",
4356       "id": string,
4357       ... remaining NetworkConfiguration attributes ...
4358     }, +
4359   ], ?
4360   "operations": [ { "rel": "add", "href": string } ? ]
4361   ...
4362 }
```

4363 **XML serialization:**

```
4364 <Collection
4365   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkConfigurationCollection"
4366   xmlns="http://schemas.dmtf.org/cimi/1">
4367   <id> xs:anyURI </id>
4368   <count> xs:integer </count>
4369   <NetworkConfiguration>
4370     <id> xs:anyURI </id>
4371     ... remaining NetworkConfiguration attributes ...
4372   </NetworkConfiguration> *
4373   <operation rel="add" href="xs:anyURI"/> ?
4374   <xs:any>*
4375 </Collection>
```

4376 **5.16.6.1 Operations**

4377 This resource supports the Read and Update operations. Creation of new Network Configuration  
4378 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.  
4379

4380 **5.16.7 Network Port**

4381 A NetworkPort is a realized connection point between a Network and a resource - such as a Machine.

|                  |  |   |
|------------------|--|---|
| <b>Name</b>      | NetworkPort                                |   |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/NetworkPort |   |
| <b>Attribute</b> | <b>Type</b>                                | <b>Description</b>  |
| state            | <i>string</i>                              | <p>The operational state of the NetworkPort.</p> <p>Allowable values include:</p> <p><b>CREATING:</b> The NetworkPort is in the process of being created. Allowable action when in this state is: <b>delete</b>.</p> <p><b>STARTED:</b> The NetworkPort is available (enabled) and ready for use. Allowable actions when in this state are: <b>stop</b> and <b>delete</b>.</p> <p><b>STOPPED:</b> The NetworkPort is stopped(disabled) and not available for use. Allowable actions when in this state are: <b>start</b> and <b>delete</b>.</p> <p><b>DELETING:</b> The NetworkPort is in the process of being deleted. Allowable action when in this state is: <b>delete</b>.</p> <p><b>ERROR:</b> The Provider has detected an error in the NetworkPort. Allowable action when in this state is: <b>delete</b>.</p> <p>Providers may define additional values.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-only</p> |
| network          | <i>ref</i>                                 | <p>A reference to the network associated with this NetworkPort.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> 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><b>ACCESS:</b> a member of a network.</p> <p><b>TRUNK:</b> transport more than one network.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> 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><b>GOLD:</b> High bandwidth, low latency, low jitter</p> <p><b>SILVER:</b> An improved service experience over bronze for voice or video traffic</p> <p><b>BRONZE:</b> Best effort</p> <p>The list of possible values, and their implied quality of service, is out of scope of this specifications.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable</p>  |



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

4382 The following describes the serialization of the resource in both JSON and XML:

4383 **JSON media type:** application/json

4384 **JSON serialization:**

```

4385 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPort",
4386   "id": string,
4387   "name": string, ?
4388   "description": string, ?
4389   "created": string, ?
4390   "updated": string, ?
4391   "properties": { "key": string, + }, ?
4392   "state": string,
4393   "network": { "href": string },
4394   "portType": string, ?
4395   "classOfService": string, ?
4396   "meters": { "href": string }, ?
4397   "eventLog": { "href": string }, ?
4398   "operations": [
4399     { "rel": "edit", "href": string }, ?
4400     { "rel": "delete", "href": string }, ?
4401     { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
4402     { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string } ?
4403   ] ?
4404   ...
4405 }
```

4406 **XML media type:** application/xml

4407 **XML serialization:**

```

4408 <NetworkPort xmlns="http://schemas.dmtf.org/cimi/1">
4409   <id> xs:anyURI </id>
4410   <name> xs:string </name> ?
4411   <description> xs:string </description> ?
4412   <created> xs:dateTime </created> ?
4413   <updated> xs:dateTime </updated> ?
4414   <property key="xs:string"> xs:string </property> *
4415   <state> xs:string </state>
4416   <network href="xs:anyURI"/>
4417   <portType> xs:string </portType> ?
4418   <classOfService> xs:string </classOfService> ?
4419   <meters href="xs:anyURI"/> ?
4420   <eventLog href="xs:anyURI"/> ?
4421   <operation rel="edit" href="xs:anyURI"/> ?
4422   <operation rel="delete" href="xs:anyURI"/> ?
4423   <operation rel="http://schemas.dmtf.org/cimi/1/action/start"
4424 href="xs:anyURI"/> ?
4425   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
4426 href="xs:anyURI"/> ?
```

```
4427     <xs:any>*
4428 </NetworkPort>
```

### 4429 5.16.7.1 Collections

4430 The following describes the collection resources owned by NetworkPorts.

#### 4431 5.16.7.1.1 NetworkPortMeter Collection

4432 The resource type for each item of this collection is "Meter" as defined in clause 5.17.3.

#### 4433 JSON serialization:

```
4434 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortMeterCollection",
4435   "id": string,
4436   "count": number,
4437   "meters": [
4438     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
4439       "id": string,
4440       ... remaining Meter attributes ...
4441     }, +
4442   ], ?
4443   "operations": [ { "rel": "add", "href": string } ? ]
4444   ...
4445 }
```

#### 4446 XML serialization:

```
4447 <Collection
4448   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkPortMeterCollection"
4449   xmlns="http://schemas.dmtf.org/cimi/1">
4450 <id> xs:anyURI </id>
4451 <count> xs:integer </count>
4452 <Meter>
4453   <id> xs:anyURI </id>
4454   ... remaining Meter attributes ...
4455 </Meter> *
4456 <operation rel="add" href="xs:anyURI"/> ?
4457 <xs:any>*
4458 </Collection>
```

### 4459 5.16.7.2 Operations

4460 This resource supports the Read, Update, and Delete operations. Create is supported via the Network  
4461 Port Collection resource.

4462 Deleting a NetworkPort shall remove that NetworkPort from the global (Cloud Entry Point) NetworkPort  
4463 Collection as well as from its corresponding Network's NetworkPorts collection.

4464 The following custom operations are also defined:

#### 4465 Starting a NetworkPort

4466 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/start

4467 This operation will start a NetworkPort.

4468 Input parameters: None.

4469 Output parameters: None.

4470 Upon successful completion of this operation, the NetworkPort shall be in the "STARTED" state.

4471 **HTTP Protocol**

4472 To start a NetworkPort, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/start" URI of the  
4473 NetworkPort where the HTTP request body shall be as described below.

4474 **JSON media type:** application/json

4475 **JSON serialization:**

```
4476 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
4477   "action": "http://schemas.dmtf.org/cimi/1/action/start",
4478   "properties": { "key": string, + } ?
4479   ...
4480 }
```

4481 **XML media type:** application/xml

4482 **XML serialization**

```
4483 <Action xmlns="http://schemas.dmtf.org/cimi/1">
4484   <action> http://schemas.dmtf.org/cimi/1/action/start </action>
4485   <property key="xs:string"> xs:string </property> *
4486   <xs:any>*
4487 </Action>
```

4488 Upon successful processing of the request, the HTTP response body will be empty.

4489 **Stopping a NetworkPort**

4490 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

4491 This operation will stop a NetworkPort. When stopped, the NetworkPort is not available for use and no  
4492 network traffic shall flow through it.

4493 Input parameters: None.

4494 Output parameters: None.

4495 Upon successful completion of this operation, the NetworkPort shall be in the "STOPPED" state.

4496 **HTTP Protocol**

4497 To stop a NetworkPort, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the  
4498 NetworkPort where the HTTP request body shall be as described below.

4499 **JSON media type:** application/json

4500 **JSON serialization:**

```
4501 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
4502   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
4503   "properties": { "key": string, + } ?
4504   ...
4505 }
```

4506 **XML media type:** application/xml

4507 **XML serialization**

```
4508 <Action xmlns="http://schemas.dmtf.org/cimi/1">
4509   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
4510   <property key="xs:string"> xs:string </property> *
4511   <xs:any>*
4512 </Action>
```

4513 Upon successful processing of the request, the HTTP response body will be empty.

4514 **5.16.8 Network Port Collection**

4515 A NetworkPortCollection resource represents the collection of NetworkPorts within a Provider and follows  
4516 the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

4517 **JSON serialization:**

```
4518 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortCollection",
4519   "id": string,
4520   "count": number,
4521   "networkPorts": [
4522     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPort",
4523       "id": string,
4524       ... remaining NetworkPort attributes ...
4525     }, +
4526   ], ?
4527   "operations": [ { "rel": "add", "href": string } ? ]
4528   ...
4529 }
```

4530 **XML serialization:**

```
4531 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/NetworkPortCollection"
4532   xmlns="http://schemas.dmtf.org/cimi/1">
4533   <id> xs:anyURI </id>
4534   <count> xs:integer </count>
4535   <NetworkPort>
4536     <id> xs:anyURI </id>
4537     ... remaining NetworkPort attributes ...
4538   </NetworkPort> *
4539   <operation rel="add" href="xs:anyURI"/> ?
4540   <xs:any>*
4541 </Collection>
```

4542 **5.16.8.1 Operations**

4543 NOTE: The "add" operation requires a NetworkPortTemplate to be used (see 4.2.1.1).

4544 When NetworkPorts are created via the global (Cloud Entry Point) NetworkPortCollection's "add"  
4545 operation, they are automatically added to the corresponding Network's "NetworkPort" collection resource  
4546 as well.

4547 **5.16.9 Network Port Template**

4548 The Network Port Template is a set of Configuration values for realizing a NetworkPort. A NetworkPort  
4549 Template may be used to create multiple NetworkPorts.

|                     |  |  |
|---------------------|--|--|
| <b>Name</b>         | NetworkPortTemplate                                |  |
| <b>Type URI</b>     | http://schemas.dmtf.org/cimi/1/NetworkPortTemplate |  |
| <b>Attribute</b>    | <b>Type</b>  | <b>Description</b>   |
| network             | ref  | A reference to the network to be associated with this NetworkPort.<br><br>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. |
| <b>Constraints:</b> |  |  |

|                   |                         |  |
|-------------------|-------------------------|--|
|                   |                         | <b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br>Note that the attributes of the NetworkPortConfiguration may be specified rather than a reference to an existing NetworkPortConfiguration resource.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br>Note that the attributes of the MeterTemplate may be specified rather than a reference to an existing MeterTemplate resource.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> 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.<br><br>Note that the attributes of the EventLogTemplate may be specified rather than a reference to an existing EventLogTemplate resource.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write                      |

4550 The following describes the serialization of the resource in both JSON and XML:

4551 **JSON media type:** application/json

4552 **JSON serialization:**

```

4553 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortTemplate",
4554   "id": string,
4555   "name": string, ?
4556   "description": string, ?
4557   "created": string, ?
4558   "updated": string, ?
4559   "properties": { "key": string, + }, ?
4560   "network": { "href": string }, ?
4561   "networkPortConfig": {
4562     "href": string | ... NetworkPortConfiguration attributes ...
4563   },
4564   "meterTemplates": [
4565     { "href": string, ?
4566       ... MeterTemplate attributes ... ?
4567     }, *
4568   ], ?
4569   "eventLogTemplate": {
4570     "href": string, ?
4571     ... EventLogTemplate attributes ... ?
4572   }, ?
4573   "operations": [
4574     { "rel": "edit", "href": string }, ?
4575     { "rel": "delete", "href": string } ?
4576   ] ?
4577   ...
4578 }
    
```

4579 **XML media type:** application/xml

4580 **XML serialization:**

```

4581 <NetworkPortTemplate xmlns="http://schemas.dmtf.org/cimi/1">
4582   <id> xs:anyURI </id>
4583   <name> xs:string </name> ?
4584   <description> xs:string </description> ?
4585   <created> xs:dateTime </created> ?
4586   <updated> xs:dateTime </updated> ?
4587   <property key="xs:string"> xs:string </property> *
4588   <network href="xs:anyURI"/> ?
4589   <networkPortConfig href="xs:anyURI"?>
4590     ... NetworkPortConfiguration attributes ... ?
4591 </networkPortConfig>
4592   <meterTemplate href="xs:anyURI"? >
4593     ... MeterTemplate attributes ... ?
4594 </meterTemplate> *
4595   <eventLogTemplate href="xs:anyURI"? >
4596     ... EventLogTemplate attributes ... ?
4597 </eventLogTemplate> ?
4598   <operation rel="edit" href="xs:anyURI"/> ?
4599   <operation rel="delete" href="xs:anyURI"/> ?
4600   <xs:any>*
4601 </NetworkPortTemplate>

```

4602 **5.16.9.1 Operations**

4603 This resource supports the Read, Update, and Delete operations. Create is supported via the Network  
4604 Port Template Collection resource.

4605 **5.16.10 Network Port Template Collection**

4606 A Network Port Template Collection resource represents the collection of Network port Templates within a  
4607 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as  
4608 follows:

4609 **JSON serialization:**

```

4610 { "resourceURI":
4611   "http://schemas.dmtf.org/cimi/1/NetworkPortTemplateCollection",
4612   "id": string,
4613   "count": number,
4614   "networkPortTemplates": [
4615     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortTemplate",
4616       "id": string,
4617       ... remaining NetworkPortTemplate attributes ...
4618     }, +
4619   ], ?
4620   "operations": [ { "rel": "add", "href": string } ? ]
4621   ...
4622 }

```

4623 **XML serialization:**

```

4624 <Collection
4625   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkPortTemplateCollection"
4626   xmlns="http://schemas.dmtf.org/cimi/1">
4627   <id> xs:anyURI </id>
4628   <count> xs:integer </count>
4629   <NetworkPortTemplate>
4630     <id> xs:anyURI </id>
4631     ... remaining NetworkPortTemplate attributes ...

```

```

4632     </NetworkPortTemplate> *
4633     <operation rel="add" href="xs:anyURI"/> ?
4634     <xs:any>*
4635 </Collection>
    
```

4636 **5.16.10.1 Operations**

4637 This resource supports the Read and Update operations. Creation of new Network Port Template  
 4638 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

4639 **5.16.11 Network Port Configuration**

4640 The set of configuration values representing the information needed to create a NetworkPort with certain  
 4641 characteristics.

|                  |   |  |
|------------------|---|--|
| <b>Name</b>      | NetworkPortConfiguration                                |  |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/NetworkPortConfiguration |  |
| <b>Attribute</b> | <b>Type</b>   | <b>Description</b>   |
| 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><b>ACCESS:</b> a member of a network.</p> <p><b>TRUNK:</b> transport more than one network.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> 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><b>GOLD:</b> High bandwidth, low latency, low jitter</p> <p><b>SILVER:</b> An improved service experience over bronze for voice or video traffic</p> <p><b>BRONZE:</b> Best effort</p> <p>The list of possible values, and their implied quality of service, is out of scope of this specifications.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write</p> |

4642 The following describes the serialization of the resource in both JSON and XML:

4643 **JSON media type:** application/json

4644 **JSON serialization:**

```

4645     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortConfiguration",
4646       "id": string,
4647       "name": string, ?
4648       "description": string, ?
4649       "created": string, ?
4650       "updated": string, ?
4651       "properties": { "key": string, + }, ?
4652       "portType": string, ?
4653       "classOfService": string, ?
4654       "operations": [
    
```

```

4655     { "rel": "edit", "href": string }, ?
4656     { "rel": "delete", "href": string } ?
4657   ] ?
4658   ...
4659 }

```

4660 **XML media type:** application/xml

4661 **XML serialization:**

```

4662 <NetworkPortConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
4663   <id> xs:anyURI </id>
4664   <name> xs:string </name> ?
4665   <description> xs:string </description> ?
4666   <created> xs:dateTime </created> ?
4667   <updated> xs:dateTime </updated> ?
4668   <property key="xs:string"> xs:string </property> *
4669   <portType> xs:string </portType> ?
4670   <classOfService> xs:string </classOfService> ?
4671   <operation rel="edit" href="xs:anyURI"/> ?
4672   <operation rel="delete" href="xs:anyURI"/> ?
4673   <xs:any>*
4674 </NetworkPortConfiguration>

```

### 4675 5.16.11.1 Operations

4676 This resource supports the Read, Update, and Delete operations. Create is supported via the Network  
4677 Port Configuration Collection resource.

### 4678 5.16.12 Network Port Configuration Collection

4679 A NetworkPort Configuration Collection resource represents the collection of NetworkPortConfigurations  
4680 within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be  
4681 serialized as follows:

4682 **JSON serialization:**

```

4683 { "resourceURI":
4684   "http://schemas.dmtf.org/cimi/1/NetworkPortConfigurationCollection",
4685   "id": string,
4686   "count": number,
4687   "networkPortConfigurations": [
4688     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortConfiguration",
4689       "id": string,
4690       ... remaining NetworkPortConfiguration attributes ...
4691     }, +
4692   ], ?
4693   "operations": [ { "rel": "add", "href": string } ? ]
4694   ...
4695 }

```

4696 **XML serialization:**

```

4697 <Collection
4698 resourceURI="http://schemas.dmtf.org/cimi/1/NetworkPortConfigurationCollection"
4699 xmlns="http://schemas.dmtf.org/cimi/1">
4700   <id> xs:anyURI </id>
4701   <count> xs:integer </count>
4702   <NetworkPortConfiguration>
4703     <id> xs:anyURI </id>
4704     ... remaining NetworkPortConfiguration attributes ...
4705   </NetworkPortConfiguration> *
4706   <operation rel="add" href="xs:anyURI"/> ?

```



4707 `<xs:any>*`  
 4708 `</Collection>`

4709 **5.16.12.1 Operations**

4710 This resource supports the Read and Update operations. Creation of new NetworkPortConfiguration  
 4711 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

4712 **5.16.13 Address**

4713 An Address represents an IP address, and its associated metadata, for a particular Network. When a  
 4714 Consumer creates an Address resource it is the semantic equivalent of asking for a static IP address that  
 4715 can then be associated with resources at a later point in time. Addresses that are manually created by  
 4716 Consumers shall not be automatically deleted when the resource (e.g., a Machine) that is using that  
 4717 Address is deleted because these manually created Addresses are expected to have a lifetime that is  
 4718 different from the resources that use them. Addresses that are created by Providers on the Consumer's  
 4719 behalf shall be deleted at the Provider's discretion. In particular, the Provider shall delete Addresses that  
 4720 it created on behalf of the Consumer when the resource that is using that Address is deleted or when the  
 4721 Address becomes disassociated from the resource.

4722 Addresses that are created by Providers may be converted to ones that are under the Consumer's control  
 4723 (i.e., will not be deleted until explicitly requested by Consumers) by changing the "allocation" attribute  
 4724 from "dynamic" to "static," if this feature supported by Providers.

|                  |  |   |
|------------------|--|---|
| <b>Name</b>      | Address                                |   |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/Address |   |
| <b>Attribute</b> | <b>Type</b>                            | <b>Description</b>  |
| ip               | <i>string</i>                          | The IP address assigned to a virtual interface.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write   |
| hostname         | <i>string</i>                          | The DNS resolvable name associated with this network interface.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; mutable<br><b>Consumer:</b> support optional; read-write   |
| allocation       | <i>string</i>                          | The value is either " <b>dynamic</b> " or " <b>static</b> ". Expresses whether this address is controlled by the Provider or Consumer.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only |
| defaultGateway   | <i>string</i>                          | An IP address of a router that serves other networks.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write   |
| dns              | <i>string[]</i>                        | The IP addresses of the Domain Name Services for host name to IP resolution.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write  |
| protocol         | <i>string</i>                          | The selected network protocol, such as IPv4 or IPv6.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write  |

|          |               |  |
|----------|---------------|--|
| mask     | <i>string</i> | The network mask associated with this Address.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write                         |
| network  | <i>ref</i>    | A reference to the Network with which this Address will be associated.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write |
| resource | <i>ref</i>    | A reference to the resource that is using this Address.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only                 |

4725 The following describes the serialization of the resource in both JSON and XML:

4726 **JSON media type:** application/json

4727 **JSON serialization:**

```

4728 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Address",
4729   "id": string,
4730   "name": string, ?
4731   "description": string, ?
4732   "created": string, ?
4733   "updated": string, ?
4734   "properties": { "key": string, + }, ?
4735   "ip": string,
4736   "hostname": string, ?
4737   "allocation": string,
4738   "defaultGateway": string,
4739   "dns": [ string, + ],
4740   "protocol": string,
4741   "mask": string,
4742   "network": { "href": string },
4743   "resource": { "href": string }, ?
4744   "operations": [
4745     { "rel": "edit", "href": string }, ?
4746     { "rel": "delete", "href": string } ?
4747   ] ?
4748   ...
4749 }
```

4750 **XML media type:** application/xml

4751 **XML serialization:**

```

4752 <Address xmlns="http://schemas.dmtf.org/cimi/1">
4753   <id> xs:anyURI </id>
4754   <name> xs:string </name> ?
4755   <description> xs:string </description> ?
4756   <created> xs:dateTime </created> ?
4757   <updated> xs:dateTime </updated> ?
4758   <property key="xs:string"> xs:string </property> *
4759   <ip> xs:string </ip>
4760   <hostname> xs:string </hostname> ?
4761   <allocation> xs:string </allocation>
4762   <defaultGateway> xs:string </defaultGateway>
4763   <dns> xs:string </dns> +
4764   <protocol> xs:string </protocol>
4765   <mask> xs:string </mask>
```

```

4766 <network href="xs:anyURI"/>
4767 <resource href="xs:anyURI"/> ?
4768 <operation rel="edit" href="xs:anyURI"/> ?
4769 <operation rel="delete" href="xs:anyURI"/> ?
4770 <xs:any>*
4771 </Address>
    
```

4772 **5.16.13.1 Operations**

4773 This resource supports the Read, Update, and Delete operations. Create is supported via the Address  
 4774 Collection resource.

4775 **5.16.14 Address Collection**

4776 An Address Collection resource represents the collection of Addresses within a Provider that are  
 4777 owned/managed by the Consumer Provider and follows the Collection pattern defined in clause 5.5.12.  
 4778 This resource shall be serialized as follows:

4779 **JSON serialization:**

```

4780 { "resourceURI": "http://schemas.dmtf.org/cimi/1/AddressCollection",
4781   "id": string,
4782   "count": number,
4783   "addresses": [
4784     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Address",
4785       "id": string,
4786       ... remaining Address attributes ...
4787     }, +
4788   ], ?
4789   "operations": [ { "rel": "add", "href": string } ? ]
4790   ...
4791 }
    
```

4792 **XML serialization:**

```

4793 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/AddressCollection"
4794   xmlns="http://schemas.dmtf.org/cimi/1">
4795   <id> xs:anyURI </id>
4796   <count> xs:integer </count>
4797   <Address>
4798     <id> xs:anyURI </id>
4799     ... remaining Address attributes ...
4800   </Address> *
4801   <operation rel="add" href="xs:anyURI"/> ?
4802   <xs:any>*
4803 </Collection>
    
```

4804 **5.16.14.1 Operations**

4805 NOTE: The "add" operation requires an AddressTemplate to be used (see 4.2.1.1).

4806 **5.16.15 Address Template**

4807 This resource captures the configuration values for realizing an Address. An Address Template may be  
 4808 used to create multiple Addresses.

|                  |  |   |
|------------------|--|---|
| <b>Name</b>      | AddressTemplate                                |   |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/AddressTemplate |   |
| <b>Attribute</b> | <b>Type</b>                                    | <b>Description</b>                              |
| ip               | string   | The IP address assigned to a virtual interface. |

|                |                 |  |
|----------------|-----------------|--|
|                |                 | <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write</p>  |
| hostname       | <i>string</i>   | <p>The DNS resolvable name associated with this network interface.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; mutable<br/> <b>Consumer:</b> support optional; read-write</p>   |
| allocation     | <i>string</i>   | <p>A value of either "<b>dynamic</b>" or "<b>static</b>". Expresses whether this address is controlled by the Provider or Consumer.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-only</p> |
| defaultGateway | <i>string</i>   | <p>An IP address of a router that serves other networks.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write</p>   |
| dns            | <i>string[]</i> | <p>The IP addresses of the Domain Name Services for host name to IP resolution.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write</p>  |
| protocol       | <i>string</i>   | <p>The selected network protocol, such as IPv4 or IPv6.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write</p>  |
| mask           | <i>string</i>   | <p>The network mask associated with this Address.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write</p>  |
| network        | <i>ref</i>      | <p>A reference to the Network with which this Address will be associated.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write</p>  |

4809 The following describes the serialization of the resource in both JSON and XML:

4810 **JSON media type:** application/json

4811 **JSON serialization:**

```

4812 { "resourceURI": "http://schemas.dmtf.org/cimi/1/AddressTemplate",
4813   "id": string,
4814   "name": string, ?
4815   "description": string, ?
4816   "created": string, ?
4817   "updated": string, ?
4818   "properties": { "key": string, + }, ?
4819   "ip": string,
4820   "hostname": string, ?
4821   "allocation": string,
4822   "defaultGateway": string,
4823   "dns": [ string, + ],
4824   "protocol": string,
4825   "mask": string,

```

```

4826 "network": { "href": string },
4827 "operations": [
4828   { "rel": "edit", "href": string }, ?
4829   { "rel": "delete", "href": string } ?
4830 ] ?
4831 ...
4832 }
    
```

4833 **XML media type:** application/xml

4834 **XML serialization:**

```

4835 <AddressTemplate xmlns="http://schemas.dmtf.org/cimi/1">
4836   <id> xs:anyURI </id>
4837   <name> xs:string </name> ?
4838   <description> xs:string </description> ?
4839   <created> xs:dateTime </created> ?
4840   <updated> xs:dateTime </updated> ?
4841   <property key="xs:string"> xs:string </property> *
4842   <ip> xs:string </ip>
4843   <hostname> xs:string </hostname> ?
4844   <allocation> xs:string </allocation>
4845   <defaultGateway> xs:string </defaultGateway>
4846   <dns> xs:string </dns> +
4847   <protocol> xs:string </protocol>
4848   <mask> xs:string </mask>
4849   <network href="xs:anyURI"/>
4850   <operation rel="edit" href="xs:anyURI"/> ?
4851   <operation rel="delete" href="xs:anyURI"/> ?
4852   <xs:any>*
4853 </AddressTemplate>
    
```

#### 4854 5.16.15.1 Operations

4855 This resource supports the Read, Update, and Delete operations. Create is supported via the Address  
4856 Template Collection resource.

#### 4857 5.16.16 Address Template Collection

4858 An Address Template Collection resource represents the collection of Address Template resources within  
4859 a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as  
4860 follows:

4861 **JSON serialization:**

```

4862 { "resourceURI": "http://schemas.dmtf.org/cimi/1/AddressTemplateCollection",
4863   "id": string,
4864   "count": number,
4865   "addressTemplates": [
4866     { "resourceURI": "http://schemas.dmtf.org/cimi/1/AddressTemplate",
4867       "id": string,
4868       ... remaining AddressTemplate attributes ...
4869     }, +
4870   ], ?
4871   "operations": [ { "rel": "add", "href": string } ? ]
4872   ...
4873 }
    
```

4874 **XML serialization:**

```

4875 <Collection
4876   resourceURI="http://schemas.dmtf.org/cimi/1/AddressTemplateCollection"
4877   xmlns="http://schemas.dmtf.org/cimi/1">
    
```

```

4878     <id> xs:anyURI </id>
4879     <count> xs:integer </count>
4880     <AddressTemplate>
4881       <id> xs:anyURI </id>
4882       ... remaining AddressTemplate attributes ...
4883     </AddressTemplate> *
4884     <operation rel="add" href="xs:anyURI"/> ?
4885     <xs:any>*
4886   </Collection>

```

4887 **5.16.16.1 Operations**

4888 This resource supports the Read and Update operations. Creation of new Address Template resources  
 4889 are supported via a POST to the "addLink" URI as described in clause 4.2.1.1.

4890 **5.16.17 Forwarding Group**

4891 A Forwarding Group represents a collection of Networks that route to each other.

4892 Networks in a ForwardingGroup should all have the same "networkType" attributes, which prevents a  
 4893 Network with a "private" networkType attribute from being publicly forwarded because it is a member of a  
 4894 ForwardingGroup that also contains Networks with a "public" networkType attribute.

4895 Providers shall not allow two Networks to be forwardable to each other unless they are explicitly  
 4896 connected by being part of a common ForwardingGroup.

|                  |  |  |
|------------------|--|--|
| <b>Name</b>      | ForwardingGroup                                |  |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/ForwardingGroup |  |
| <b>Attribute</b> | <b>Type</b>                                    | <b>Description</b>   |
| networks         | collection<br>[Forwardin<br>gGroupNe<br>twork] | A reference to the list of references to the Networks in this Forwarding Group.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only |

4897 The following describes the serialization of the resource in both JSON and XML:

4898 **JSON media type:** application/json

4899 **JSON serialization:**

```

4900     { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwrdingGroup",
4901       "id": string,
4902       "name": string, ?
4903       "description": string, ?
4904       "created": string, ?
4905       "updated": string, ?
4906       "properties": { "key": string, + }, ?
4907       "networks": [
4908         { "href": string }, +
4909       ], ?
4910       "operations": [
4911         { "rel": "edit", "href": string }, ?
4912         { "rel": "delete", "href": string } ?
4913       ] ?
4914       ...
4915     }

```

4916 **XML media type:** application/xml

4917 **XML serialization:**

```

4918 <ForwardingGroup xmlns="http://schemas.dmtf.org/cimi/1">
4919   <id> xs:anyURI </id>
4920   <name> xs:string </name> ?
4921   <description> xs:string </description> ?
4922   <created> xs:dateTime </created> ?
4923   <updated> xs:dateTime </updated> ?
4924   <property key="xs:string"> xs:string </property> *
4925   <network href="xs:anyURI"> *
4926   <operation rel="edit" href="xs:anyURI"/> ?
4927   <operation rel="delete" href="xs:anyURI"/> ?
4928   <xs:any>*
4929 </ForwardingGroup>
    
```

4930 **5.16.17.1 Collections**

4931 The following describes the collection resources owned by ForwardingGroups.

4932 **5.16.17.1.1 ForwardingGroupNetwork Collection**

4933 The resource type for each item of this collection is "ForwardingGroupNetwork", as defined as follows:

|                  |   |  |
|------------------|---|--|
| <b>Name</b>      | ForwardingGroupNetwork                                |  |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/ForwardingGroupNetwork |  |
| <b>Attribute</b> | <b>Type</b>   | <b>Description</b>   |
| network          | ref   | A reference to a Network in the ForwardingGroup.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write |

4934 **JSON serialization:**

```

4935 { "resourceURI":
4936   "http://schemas.dmtf.org/cimi/1/ForwardingGroupNetworkCollection",
4937   "id": string,
4938   "count": number,
4939   "forwardingGroupNetworks": [
4940     { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroupNetwork",
4941       "id": string,
4942       "name": string, ?
4943       "description": string, ?
4944       "created": string, ?
4945       "updated": string, ?
4946       "properties": { "key": string, + }, ?
4947       "network": { "href": string },
4948       "operations": [
4949         { "rel": "edit", "href": string }, ?
4950         { "rel": "delete", "href": string } ?
4951       ] ?
4952       ...
4953     }, +
4954   ], ?
4955   "operations": [ { "rel": "add", "href": string } ? ]
4956   ...
4957 }
    
```

4958 **XML serialization:**

4959 <Collection

```

4960 resourceURI="http://schemas.dmtf.org/cimi/1/ForwardingGroupNetworkCollection"
4961     xmlns="http://schemas.dmtf.org/cimi/1">
4962     <id> xs:anyURI </id>
4963     <count> xs:integer </count>
4964     <ForwardingGroupNetwork>
4965         <id> xs:anyURI </id>
4966         <name> xs:string </name> ?
4967         <description> xs:string </description> ?
4968         <created> xs:dateTime </created> ?
4969         <updated> xs:dateTime </updated> ?
4970         <property key="xs:string"> xs:string </property> *
4971         <network href="xs:anyURI"/>
4972         <operation rel="edit" href="xs:anyURI"/> ?
4973         <operation rel="delete" href="xs:anyURI"/> ?
4974         <xs:any>*
4975     </ForwardingGroupNetwork> *
4976     <operation rel="add" href="xs:anyURI"/> ?
4977     <xs:any>*
4978 </Collection>

```

### 4979 5.16.17.2 Operations

4980 This resource supports the Read, Update, and Delete operations. Create is supported via the  
4981 ForwardingGroup Collection resource.

### 4982 5.16.18 Forwarding Group Collection

4983 A Forwarding Group Collection resource represents the collection of Forwarding Groups within a Provider  
4984 and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

#### 4985 JSON serialization:

```

4986 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroupCollection",
4987   "id": string,
4988   "count": number,
4989   "forwardingGroups": [
4990     { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroup",
4991       "id": string,
4992       ... remaining ForwardingGroup attributes ...
4993     }, +
4994   ], ?
4995   "operations": [ { "rel": "add", "href": string } ? ]
4996   ...
4997 }

```

#### 4998 XML serialization:

```

4999 <Collection
5000     resourceURI="http://schemas.dmtf.org/cimi/1/ForwardingGroupCollection"
5001     xmlns="http://schemas.dmtf.org/cimi/1">
5002     <id> xs:anyURI </id>
5003     <count> xs:integer </count>
5004     <ForwardingGroup>
5005         <id> xs:anyURI </id>
5006         ... remaining ForwardingGroup attributes ...
5007     </ForwardingGroup> *
5008     <operation rel="add" href="xs:anyURI"/> ?
5009     <xs:any>*
5010 </Collection>

```

### 5011 5.16.18.1 Operations

5012 NOTE: The "add" operation requires a ForwardingGroupTemplate to be used (see 4.2.1.1).



5013 **5.16.19 Forwarding Group Template**

 5014 This resource captures the configuration values for realizing a ForwardingGroup. A Forwarding Group  
 5015 Template may be used to create multiple ForwardingGroup.

|                  |  |   |
|------------------|--|---|
| <b>Name</b>      | ForwardingGroupTemplate                                |   |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplate |   |
| <b>Attribute</b> | <b>Type</b>  | <b>Description</b>  |
| networks         | <i>ref[]</i>   | An array of references to the networks in this Forwarding Group.<br>Array item name: network<br><u><b>Constraints:</b></u><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write |

5016 The following describes the serialization of the resource in both JSON and XML:

 5017 **JSON media type:** application/json

 5018 **JSON serialization:**

```

5019 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplate",
5020   "id": string,
5021   "name": string, ?
5022   "description": string, ?
5023   "created": string, ?
5024   "updated": string, ?
5025   "properties": { "key": string, + }, ?
5026   "networks": [
5027     { "href": string }, +
5028   ], ?
5029   "operations": [
5030     { "rel": "edit", "href": string }, ?
5031     { "rel": "delete", "href": string } ?
5032   ] ?
5033   ...
5034 }
```

 5035 **XML media type:** application/xml

 5036 **XML serialization:**

```

5037 <ForwardingGroupTemplate xmlns="http://schemas.dmtf.org/cimi/1">
5038   <id> xs:anyURI </id>
5039   <name> xs:string </name> ?
5040   <description> xs:string </description> ?
5041   <created> xs:dateTime </created> ?
5042   <updated> xs:dateTime </updated> ?
5043   <property key="xs:string"> xs:string </property> *
5044   <network href="xs:anyURI"> *
5045   <operation rel="edit" href="xs:anyURI"/> ?
5046   <operation rel="delete" href="xs:anyURI"/> ?
5047   <xs:any*>
5048 </ForwardingGroupTemplate>
```

 5049 **5.16.19.1 Operations**

 5050 This resource supports the Read, Update, and Delete operations. Create is supported via the Forwarding  
 5051 Group Template Collection resource.

### 5052 **5.16.20 Forwarding Group Template Collection**

5053 A Forwarding Group Template Collection resource represents the collection of Forwarding Group  
5054 Template resources within a Provider and follows the Collection pattern defined in clause 5.5.12. This  
5055 resource shall be serialized as follows:

#### 5056 **JSON serialization:**

```
5057 { "resourceURI":
5058   "http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplateCollection",
5059   "id": string,
5060   "count": number,
5061   "forwardingGroupTemplates": [
5062     { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplate",
5063       "id": string,
5064       ... remaining ForwardingGroupTemplate attributes ...
5065     }, +
5066   ], ?
5067   "operations": [ { "rel": "add", "href": string } ? ]
5068   ...
5069 }
```

#### 5070 **XML serialization:**

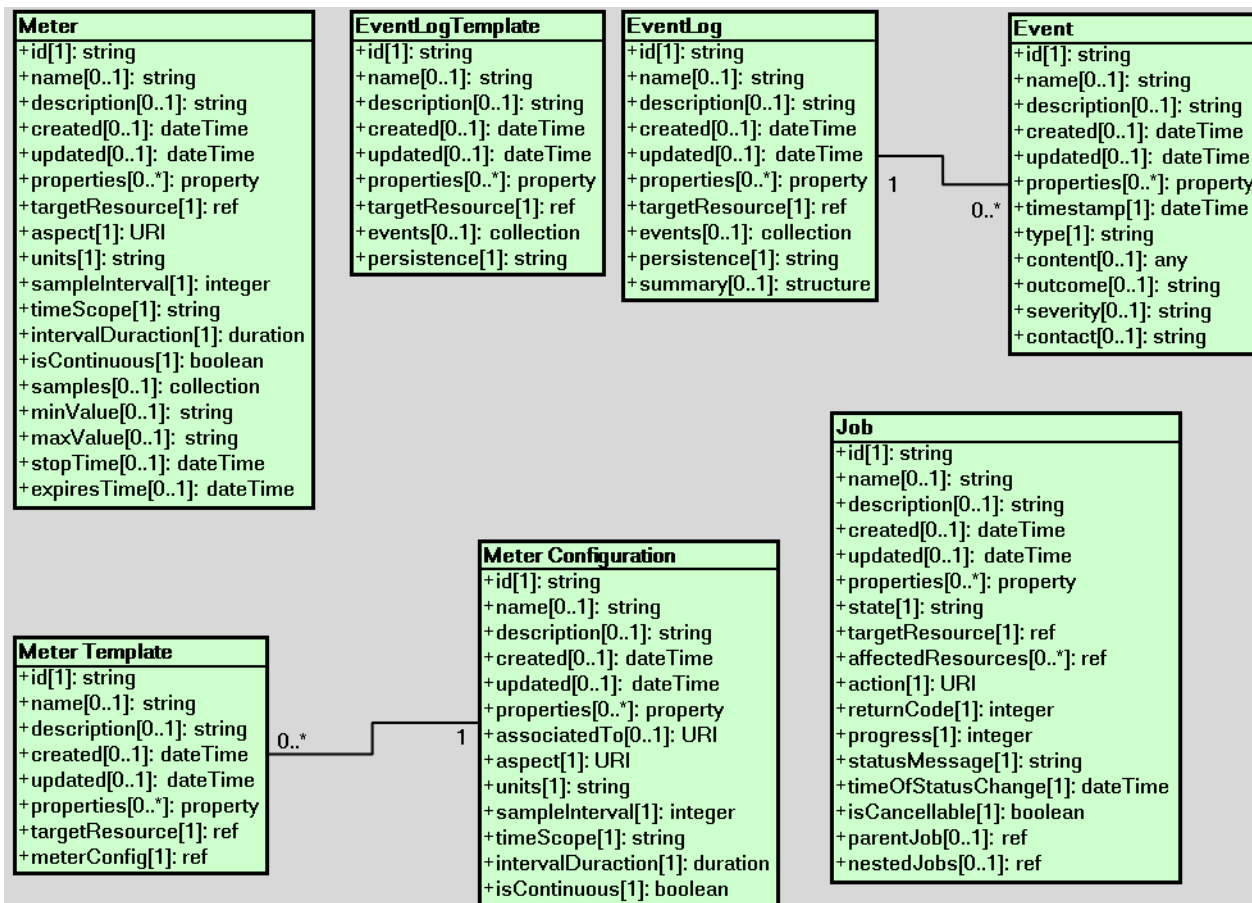
```
5071 <Collection
5072   resourceURI="http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplateCollection"
5073   xmlns="http://schemas.dmtf.org/cimi/1">
5074   <id> xs:anyURI </id>
5075   <count> xs:integer </count>
5076   <ForwardingGroupTemplate>
5077     <id> xs:anyURI </id>
5078     ... remaining ForwardingGroupTemplate attributes ...
5079   </ForwardingGroupTemplate> *
5080   <operation rel="add" href="xs:anyURI"/> ?
5081   <xs:any>*
5082 </Collection>
```

#### 5083 **5.16.20.1 Operations**

5084 This resource supports the Read and Update operations. Creation of new Forwarding Group Template  
5085 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

### 5086 **5.17 Monitoring resources and relationships**

5087 Figure 6 illustrates the resources involved in tracking the progress of operations, as well as, metering and  
5088 monitoring the status of other resources. Although this drawing is in the style of a Resource Relationship  
5089 diagram, the use of UML is neither rigorous nor normative.



5090 **Figure 6 - Monitoring resources**

5091 **5.17.1 Job**

5092 This resource represents a process (i.e., a sequence of one or more operations directed to accomplish a  
5093 specific goal) that is performed by the Provider.

5094 If a Provider supports exposing Job resources to Consumers, each request from a Consumer that would  
5095 result in a change to the environment shall result in a Job resource being created and an absolute URI  
5096 reference to that Job resource shall be made available to the requesting Consumer. Providers may create  
5097 additional Job resources for Provider initiated operations if the Provider chooses to expose these Jobs to  
5098 Consumers.

5099 When a Job does not complete successfully (e.g., it is in the FAILED or STOPPED state), this  
5100 specification does not place any requirements on the Provider to ensure that the affected resources are  
5101 left in certain states. Based on the environmental conditions at that time, the Provider might choose to  
5102 "undo" any impact of the operation; simply halt processing; attempt some kind of "cleanup" action; or  
5103 choose to do something else. However, Providers shall list all resources impacted by the Job in the  
5104 "affectedResources" attribute, thus allowing Consumers an opportunity to examine the state of each  
5105 resource themselves. In cases where a resource has been deleted, references to that resource shall not  
5106 appear in the "affectedResources" attribute.

5107 The Job resource allows for nesting of Jobs. The determination of when a single operation is converted  
5108 into multiple nested Jobs is out of scope of this specification. However, if there are nested Jobs, the top-  
5109 most Job resource shall report the overall status of all Jobs and shall only be in a "SUCCESS" state if all

5110 nested Jobs are also in "SUCCESS" state. When nested Jobs are created, there is no requirement for  
 5111 the top-most Job resource to reference all affected resources in its "affectedResources" attribute. The  
 5112 Consumer will need to traverse the entire set of nested Jobs to determine the complete list of resources  
 5113 impacted by the Jobs.

| Name              | Job                                |  |
|-------------------|------------------------------------|--|
| Type URI          | http://schemas.dmtf.org/cimi/1/Job |  |
| Attribute         | Type                               | Description  |
| state             | <i>string</i>                      | <p>The state of the process associated with this operation.</p> <p>Allowable values include:</p> <p><b>QUEUED:</b> Indicates that the operation has not yet begun processing.<br/>Allowable actions when in this state are: <b>stop</b>.</p> <p><b>RUNNING:</b> Indicates that the operation is still being executed. Allowable action when in this state is: <b>stop</b>.</p> <p><b>FAILED:</b> Indicates that the operation failed to complete successfully.</p> <p><b>SUCCESS:</b> Indicates that the operation successfully completed.</p> <p><b>STOPPING:</b> Indicates that the operation is in the process of being stopped. Allowable action when in this state is: <b>stop</b>.</p> <p><b>STOPPED:</b> Indicates that the operation was stopped before completion.</p> <p><b>STOPPING</b> and <b>STOPPED</b> states are optional and Providers may choose to support them or not.</p> <p>Providers may define additional values.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-only</p> |
| targetResource    | <i>ref</i>                         | <p>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.</p> <p>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.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; immutable<br/> <b>Consumer:</b> support mandatory; read-only</p>  |
| affectedResources | <i>ref[]</i>                       | <p>A list of references to resources that have been impacted by this Job. Note that this list will always contain the "targetResource" reference.</p> <p>Array item name: affectedResource</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-only</p>  |
| action            | <i>URI</i>                         | <p>A URI that indicates the type of action being performed.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; immutable<br/> <b>Consumer:</b> support mandatory; read-only</p>   |
| returnCode        | <i>integer</i>                     | 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.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only  |
| progress           | <i>integer</i>  | 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.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only  |
| statusMessage      | <i>string</i>   | 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.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only |
| timeOfStatusChange | <i>dateTime</i> | A timestamp indicating the last time that the status of the operation changed.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only  |
| parentJob          | <i>ref</i>      | A reference to the Job of which this resource is a subordinate.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support mandatory; read-only   |
| nestedJobs         | <i>ref[]</i>    | An array of references to a set of subordinate Job resources.<br>Array item name: nestedJob<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only   |

5114 The following describes the serialization of the resource in both JSON and XML:

5115 **JSON media type:** application/json

5116 **JSON serialization:**

```

5117 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Job",
5118   "id": string,
5119   "name": string, ?
5120   "description": string, ?
5121   "created": string, ?
5122   "updated": string, ?
5123   "properties": { "key": string, + }, ?
5124   "state": string,
5125   "targetResource": { "href": string },
5126   "affectedResources": [ { "href": string }, + ],
5127   "action": string,
5128   "returnCode": number,
5129   "progress": number,
5130   "statusMessage": string,
5131   "timeOfStatusChange": date,
5132   "isCancellable": boolean,
    
```

```

5133     "parentJob": { "href": string }, ?
5134     "nestedJobs": [
5135         { "href": string }, +
5136     ], ?
5137     "operations": [
5138         { "rel": "edit", "href": string }, ?
5139         { "rel": "delete", "href": string }, ?
5140         { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string } ?
5141     ] ?
5142     ...
5143 }

```

5144 **XML media type:** application/xml

5145 **XML serialization:**

```

5146 <Job xmlns="http://schemas.dmtf.org/cimi/1">
5147   <id> xs:anyURI </id>
5148   <name> xs:string </name> ?
5149   <description> xs:string </description> ?
5150   <created> xs:dateTime </created> ?
5151   <updated> xs:dateTime </updated> ?
5152   <property key="xs:string"> xs:string </property> *
5153   <state> xs:string </state>
5154   <targetResource href="xs:anyURI"/>
5155   <affectedResource href="xs:anyURI"/> +
5156   <action> xs:anyURI </action>
5157   <status> xs:string </status>
5158   <returnCode> xs:integer </returnCode>
5159   <progress> xs:integer <progress>
5160   <statusMessage> xs:string </statusMessage>
5161   <timeOfStatusChange> xs:dateTime </timeOfStatusChange>
5162   <isCancellable> xs:boolean </isCancellable>
5163   <parentJob href="xs:anyURI"/> ?
5164   <nestedJob href="xs:anyURI"/> *
5165   <operation rel="edit" href="xs:anyURI"/> ?
5166   <operation rel="delete" href="xs:anyURI"/> ?
5167   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
5168 href="xs:anyURI"/> ?
5169   <xs:any*>
5170 </Job>

```

### 5171 5.17.1.1 Operations

5172 This resource supports the Read, Update and Delete operations.

5173 Note that deleting a Job that is in the "RUNNING" state shall be the equivalent of first stopping the Job  
5174 and then deleting it. A request to delete a running Job that does not support the "stop" action shall fail.

5175 The following custom operations are also defined:

#### 5176 Stopping a Job

5177 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

5178 This operation will stop a Job.

5179 Input parameters: None.

5180 Output parameters: None.

5181 During the processing of this operation, the Job shall be in the "STOPPING" state.

5182 Upon successful completion of this operation, the Job shall be in the "STOPPED" state.

5183 **HTTP protocol**

5184 To stop a Job, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the Job where  
5185 the HTTP request body shall be as described below.

5186 **JSON media type:** application/json

5187 **JSON serialization:**

```
5188 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
5189   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
5190   "properties": { "key": string, + } ?
5191   ...
5192 }
```

5193 **XML media type:** application/xml

5194 **XML serialization**

```
5195 <Action xmlns="http://schemas.dmtf.org/cimi/1">
5196   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
5197   <property key="xs:string"> xs:string </property> *
5198   <xs:any>*
5199 </Action>
```

5200 Upon successful processing of the request, the HTTP response body will be empty.

5201 **5.17.2 Job Collection**

5202 A Job Collection resource represents the collection of Jobs within a Provider and follows the Collection  
5203 pattern defined in clause 5.5.12. This resource shall be serialized as follows:

5204 **JSON serialization:**

```
5205 { "resourceURI": "http://schemas.dmtf.org/cimi/1/JobCollection",
5206   "id": string,
5207   "count": integer,
5208   "jobs": [
5209     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Job",
5210       "id": string,
5211       ... remaining Job attributes ...
5212     }, +
5213   ], ?
5214   "operations": [ { "rel": "add", "href": string } ? ]
5215   ...
5216 }
```

5217 **XML serialization:**

```
5218 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/JobCollection"
5219   xmlns="http://schemas.dmtf.org/cimi/1">
5220   <id> xs:anyURI </id>
5221   <count> xs:integer </count>
5222   <Job>
5223     <id> xs:anyURI </id>
5224     ... remaining Job attributes ...
5225   </Job> *
5226   <operation rel="add" href="xs:anyURI"/> ?
5227   <xs:any>*
5228 </Collection>
```

5229 **5.17.3 Meter**

5230 This resource represents an available Meter of some property associated to a given resource.

5231 When a Meter's "targetResource" is deleted all Meters associated with that resource shall also be  
5232 deleted. In other words, deleting a resource-specific MetersCollection (e.g. a Machine's MetersCollection)  
5233 shall also result in the deletion of the Meters referenced from that collection.

|                  |                                      |   |
|------------------|--------------------------------------|---|
| <b>Name</b>      | Meter                                |   |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/Meter |   |
| <b>Attribute</b> | <b>Type</b>                          | <b>Description</b>  |
| targetResource   | <i>ref</i>                           | A reference to the resource to which the Meter is related.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support mandatory; read-only   |
| aspect           | <i>URI</i>                           | A unique identifier representing the aspect of the resource being metered.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support mandatory; read-only   |
| units            | <i>string</i>                        | The name of the used units, e.g., kilobits per second, CPU usage percentage, etc.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support mandatory; read-only  |
| sampleInterval   | <i>integer</i>                       | The time between consecutive samples in seconds.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write  |
| timeScope        | <i>string</i>                        | The time scope to which this meter's value applies.<br><br>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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support mandatory; read-only   |
| samples          | <i>collection<br/>[Sample]</i>       | A reference to the list of taken samples<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only   |



|             |                 |  |
|-------------|-----------------|--|
| minValue    | <i>string</i>   | The expected minimal measure value.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support mandatory; read-only   |
| maxValue    | <i>string</i>   | The expected maximum measure value.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support mandatory; read-only   |
| stopTime    | <i>dateTime</i> | The time from which the meter stops tracking samples.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br>Note that a Meter might be deleted before this time if the resource being metered is deleted.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write |

5234 The following describes the serialization of the resource in both JSON and XML:

5235 **JSON media type:** application/json

5236 **JSON serialization:**

```

5237 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
5238   "id": string,
5239   "name": string, ?
5240   "description": string, ?
5241   "created": string, ?
5242   "updated": string, ?
5243   "properties": { "key": string, + }, ?
5244   "targetResource": { "href": string },
5245   "aspect": string,
5246   "units": string,
5247   "sampleInterval": number,
5248   "timeScope": string,
5249   "intervalDuration": string,
5250   "isContinuous": boolean,
5251   "samples": { "href": string }, ?
5252   "minValue": string, ?
5253   "maxValue": string, ?
5254   "stopTime": string, ?
5255   "expiresTime": string, ?
5256   "operations": [
5257     { "rel": "edit", "href": string }, ?
5258     { "rel": "delete", "href": string }, ?
5259     { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
5260     { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string } ?
5261   ] ?
5262   ...
5263 }
```

5264 **XML media type:** application/xml

5265 **XML serialization:**

```

5266 <Meter xmlns="http://schemas.dmtf.org/cimi/1">
5267   <id> xs:anyURI </id>
5268   <name> xs:string </name> ?
5269   <description> xs:string </description> ?
5270   <created> xs:dateTime </created> ?
5271   <updated> xs:dateTime </updated> ?
5272   <property key="xs:string"> xs:string </property> *
5273   <targetResource href="xs:anyURI"/>
5274   <aspect> xs:anyURI </aspect>
5275   <units> xs:string </units>
5276   <sampleInterval> xs:integer </sampleInterval>
5277   <timeScope> xs:string <timeScope>
5278   <intervalDuration xs:duration </intervalDuration>
5279   <isContinuous> xs:boolean </isContinuous>
5280   <samples href="xs:anyURI"/> ?
5281   <minValue> xs:string </minValue> ?
5282   <maxValue> xs:string </maxValue> ?
5283   <stopTime> xs:dateTime </stopTime> ?
5284   <expiresTime> xs:dateTime </expiresTime> ?
5285   <operation rel="edit" href="xs:anyURI"/> ?
5286   <operation rel="delete" href="xs:anyURI"/> ?
5287   <operation rel="http://schemas.dmtf.org/cimi/1/action/start"
5288 href="xs:anyURI"/> ?
5289   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
5290 href="xs:anyURI"/> ?
5291   <xs:any>*
5292 </Meter>
    
```

5293 **5.17.3.1 Collections**

5294 The following describes the collection resources owned by Meters.

5295 **5.17.3.1.1 Sample Collection**

5296 The resource type for each item of this collection is “Sample”, defined as follows:

|                  |                                       |   |
|------------------|---------------------------------------|---|
| <b>Name</b>      | Sample                                |   |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/Sample |   |
| <b>Attribute</b> | <b>Type</b>                           | <b>Description</b>  |
| timestamp        | <i>dateTime</i>                       | It indicates when the measure was taken (timeScope="Point").<br>When the timeScope is "Interval", it indicates the end of the time interval.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support mandatory; read-only |
| value            | <i>string</i>                         | It indicates the sampled value of the measure.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support mandatory; read-only   |

5297 **JSON serialization:**

```

5298 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SampleCollection",
5299   "id": string,
5300   "count": number,
5301   "samples": [
    
```

```

5302     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Sample",
5303       "id": string,
5304       "name": string, ?
5305       "description": string, ?
5306       "created": string, ?
5307       "updated": string, ?
5308       "properties": { "key": string, + }, ?
5309       "timestamp": string,
5310       "value": string
5311       ...
5312     }, +
5313   ], ?
5314   ...
5315 }
    
```

#### 5316 XML serialization:

```

5317 <Collection
5318   resourceURI="http://schemas.dmtf.org/cimi/1/SampleCollection"
5319   xmlns="http://schemas.dmtf.org/cimi/1">
5320 <id> xs:anyURI </id>
5321 <count> xs:integer </count>
5322 <Sample>
5323   <id> xs:anyURI </id>
5324   <name> xs:string </name> ?
5325   <description> xs:string </description> ?
5326   <created> xs:dateTime </created> ?
5327   <updated> xs:dateTime </updated> ?
5328   <property key="xs:string"> xs:string </property> *
5329   <sample timestamp="xs:dateTime" value="xs:string"/>
5330   <xs:any>*
5331 </Sample> *
5332 <xs:any>*
5333 </Collection>
    
```

#### 5334 5.17.3.2 Operations

5335 This resource supports the Read, Update, and Delete operations. Create is supported via the Meter  
5336 Collection resource.

5337 NOTE: The deletion of a Meter shall remove the Meter from the targetResource's "meter" attribute.

5338 The following custom operations are also defined:

#### 5339 Starting a Meter

5340 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/start

5341 This operation will start a Meter.

5342 Input parameters: None.

5343 Output parameters: None.

5344 Upon successful completion of this operation, the Meter starts recording samples related to its associated  
5345 resource.

#### 5346 HTTP protocol

5347 To start a Meter, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/start" URI of the Meter  
5348 where the HTTP request body shall be as described below.

5349 **JSON media type:** application/json

5350 **JSON serialization:**

```
5351 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
5352   "action": "http://schemas.dmtf.org/cimi/1/action/start",
5353   "properties": { "key": string, + } ?
5354   ...
5355 }
```

5356 **XML media type:** application/xml

5357 **XML serialization**

```
5358 <Action xmlns="http://schemas.dmtf.org/cimi/1">
5359   <action> http://schemas.dmtf.org/cimi/1/action/start </action>
5360   <property key="xs:string"> xs:string </property> *
5361   <xs:any>*
5362 </Action>
```

5363 Upon successful processing of the request, the HTTP response body will be empty.

5364 **Stopping a Meter**

5365 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

5366 This operation will stop a Meter.

5367 Input parameters: None.

5368 Output parameters: None.

5369 Upon successful completion of this operation, the Meter will no longer be recording samples related to its  
5370 associated resource.

5371 **HTTP protocol**

5372 To stop a Meter, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the Meter  
5373 where the HTTP request body shall be as described below.

5374 **JSON media type:** application/json

5375 **JSON serialization:**

```
5376 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
5377   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
5378   "properties": { "key": string, + } ?
5379   ...
5380 }
```

5381 **XML media type:** application/xml

5382 **XML serialization**

```
5383 <Action xmlns="http://schemas.dmtf.org/cimi/1">
5384   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
5385   <property key="xs:string"> xs:string </property> *
5386   <xs:any>*
5387 </Action>
```

5388 Upon successful processing of the request, the HTTP response body will be empty.

5389 **5.17.4 Meter Collection**

5390 A Meter Collection resource represents the collection of Meters within a Provider and follows the  
 5391 Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

5392 **JSON serialization:**

```
5393 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterCollection",
5394   "id": string,
5395   "count": number,
5396   "meters": [
5397     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
5398       "id": string,
5399       ... remaining Meter attributes ...
5400     }, +
5401   ], ?
5402   "operations": [ { "rel": "add", "href": string } ? ]
5403   ...
5404 }
```

5405 **XML serialization:**

```
5406 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/MeterCollection"
5407   xmlns="http://schemas.dmtf.org/cimi/1">
5408   <id> xs:anyURI </id>
5409   <count> xs:integer </count>
5410   <Meter>
5411     <id> xs:anyURI </id>
5412     ... remaining Meter attributes ...
5413   </Meter> *
5414   <operation rel="add" href="xs:anyURI"/> ?
5415   <xs:any>*
5416 </Collection>
```

5417 **5.17.4.1 Operations**

5418 NOTE: The "add" operation requires a MeterTemplate to be used (see 4.2.1.1).

5419 When Meters are created via the global (Cloud Entry Point) MeterCollection's "add" operation, they are  
 5420 automatically added to the corresponding targetResource's "Meters" collection resource as well.

5421 **5.17.5 Meter Template**

5422 A Meter Template represents the information needed to create a new Meter.

|                  |  |  |
|------------------|--|--|
| <b>Name</b>      | MeterTemplate                                |  |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/MeterTemplate |  |
| <b>Attribute</b> | <b>Type</b>                                  | <b>Description</b>   |
| 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.<br><br>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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write</p> |
|--|---|

5423 The following describes the serialization of the resource in both JSON and XML:

5424 **JSON media type:** application/json

5425 **JSON serialization:**

```

5426 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterTemplate",
5427   "id": string,
5428   "name": string, ?
5429   "description": string, ?
5430   "created": string, ?
5431   "updated": string, ?
5432   "properties": { "key": string, + }, ?
5433   "targetResource": { string },
5434   "meterConfig": {
5435     "href": string | ... MeterConfiguration attributes ...
5436   },
5437   "operations": [
5438     { "rel": "edit", "href": string }, ?
5439     { "rel": "delete", "href": string } ?
5440   ] ?
5441   ...
5442 }

```

5443 **XML media type:** application/xml

5444 **XML serialization:**

```

5445 <MeterTemplate xmlns="http://schemas.dmtf.org/cimi/1">
5446   <id> xs:anyURI </id>
5447   <name> xs:string </name> ?
5448   <description> xs:string </description> ?
5449   <created> xs:dateTime </created> ?
5450   <updated> xs:dateTime </updated> ?
5451   <property key="xs:string"> xs:string </property> *
5452   <targetResource href="xs:anyURI"/>
5453   <meterConfig href="xs:anyURI"?>
5454     ... MeterConfiguration attributes ... ?
5455   </meterConfig>
5456   <operation rel="edit" href="xs:anyURI"/> ?
5457   <operation rel="delete" href="xs:anyURI"/> ?
5458   <xs:any*>
5459 </MeterTemplate>

```

### 5460 5.17.6 Meter Template Collection

5461 A Meter Template Collection resource represents the collection of MeterTemplate resources within a  
5462 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as  
5463 follows:

5464 **JSON serialization:**

```

5465 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterTemplateCollection",
5466   "id": string,
5467   "count": number,

```

```

5468 "meterTemplates": [
5469   { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterTemplate",
5470     "id": string,
5471     ... remaining MeterTemplate attributes ...
5472   }, +
5473 ], ?
5474 "operations": [ { "rel": "add", "href": string } ? ]
5475 ...
5476 }
    
```

5477 **XML serialization:**

```

5478 <Collection
5479   resourceURI="http://schemas.dmtf.org/cimi/1/MeterTemplateCollection"
5480   xmlns="http://schemas.dmtf.org/cimi/1">
5481   <id> xs:anyURI </id>
5482   <count> xs:integer </count>
5483   <MeterTemplate>
5484     <id> xs:anyURI </id>
5485     ... remaining MeterTemplate attributes ...
5486   </MeterTemplate> *
5487   <operation rel="add" href="xs:anyURI"/> ?
5488   <xs:any>*
5489 </Collection>
    
```

5490 **5.17.6.1 Operations**

5491 This resource supports the Read and Update operations. Creation of new Meter Template resources are  
 5492 supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

5493 **5.17.7 Meter Configuration**

5494 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write   |
| sampleInterval | <i>integer</i>                                    | The time between consecutive samples in seconds.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable   |

|                  |                 |   |
|------------------|-----------------|---|
|                  |                 | <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; mutable<br/> <b>Consumer:</b> support mandatory; read-write</p>  |

5495 The following describes the serialization of the resource in both JSON and XML:

5496 **JSON media type:** application/json

5497 **JSON serialization:**

```

5498 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterConfiguration",
5499   "id": string,
5500   "name": string, ?
5501   "description": string, ?
5502   "created": string, ?
5503   "updated": string, ?
5504   "properties": { "key": string, + }, ?
5505   "associatedTo": [
5506     { "href": string }, +
5507   ], ?
5508   "aspect": string,
5509   "units": string,
5510   "sampleInterval": number,
5511   "timeScope": string,
5512   "intervalDuration": string,
5513   "isContinuous": boolean,
5514   "operations": [
5515     { "rel": "edit", "href": string }, ?
5516     { "rel": "delete", "href": string } ?
5517   ] ?
5518   ...
5519 }
```

5520 **XML media type:** application/xml

5521 **XML serialization:**

```

5522 <MeterConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
5523   <id> xs:anyURI </id>
5524   <name> xs:string </name> ?
5525   <description> xs:string </description> ?
5526   <created> xs:dateTime </created> ?
5527   <updated> xs:dateTime </updated> ?
```



```

5528 <property key="xs:string"> xs:string </property> *
5529 <associatedTo href="xs:anyURI"/> *
5530 <aspect> xs:anyURI </aspect>
5531 <units> xs:string </units>
5532 <sampleInterval> xs:integer </sampleInterval>
5533 <timeScope> xs:string </timeScope>
5534 <intervalDuration> xs:duration </intervalDuration>
5535 <isContinuous> xs:boolean </isContinuous>
5536 <operation rel="edit" href="xs:anyURI"/> ?
5537 <operation rel="delete" href="xs:anyURI"/> ?
5538 <xs:any>*
5539 </MeterConfiguration>
    
```

5540 The following table describes the "aspect" URIs defined by this specification. Providers may define new  
 5541 aspect URIs and it is recommended that these URIs be dereferencable such that Consumers can  
 5542 discover the details of the new aspect. For brevity the "URI" column in the table only shows the last part  
 5543 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.         |

5544 **5.17.7.1 Operations**

5545 This resource supports the Read, Update, and Delete operations. Create is supported via the Meter  
 5546 Configuration Collection resource.

5547 **5.17.8 Meter Configuration Collection**

5548 A Meter Configuration Collection resource represents the collection of Meter Configurations within a  
 5549 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as  
 5550 follows:

5551 **JSON serialization:**

```

5552 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterConfigurationCollection",
5553   "id": string,
5554   "count": number,
5555   "meterConfigurations": [
5556     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterConfiguration",
5557       "id": string,
5558       ... remaining MeterConfiguration attributes ...
    
```

```

5559     }, +
5560     ], ?
5561     "operations": [ { "rel": "add", "href": string } ? ]
5562     ...
5563 }
    
```

5564 **XML serialization:**

```

5565 <Collection
5566     resourceURI="http://schemas.dmtf.org/cimi/1/MeterConfigurationCollection"
5567     xmlns="http://schemas.dmtf.org/cimi/1">
5568     <id> xs:anyURI </id>
5569     <count> xs:integer </count>
5570     <MeterConfiguration>
5571         <id> xs:anyURI </id>
5572         ... remaining MeterConfiguration attributes ...
5573     </MeterConfiguration> *
5574     <operation rel="add" href="xs:anyURI"/> ?
5575     <xs:any>*
5576 </Collection>
    
```

5577 **5.17.8.1 Operations**

5578 This resource supports the Read and Update operations. Creation of new Meter Configuration resources  
 5579 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

5580 **5.17.9 Event Log**

5581 An resource that represents a registry of Events.

5582 When an EventLog's "targetResource" is deleted the EventLog associated with that resource may also be  
 5583 deleted. In other words, deleting a resource (e.g. a Machine) may also result in the deletion of the  
 5584 EventLog referenced from that resource. This behavior is denoted by the EventLog.Linked capability.

5585 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 | <i>ref</i>                              | A reference to the resource to which the Events are related.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support mandatory; read-only  |
| events         | <i>collection [Event]</i>               | A reference to the list of occurred Events.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only   |
| persistence    | <i>string</i>                           | 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write |
| summary        | <i>&lt;unnamed structure&gt;</i>        | A summary of all the events present in the EventLog when the read operation is performed, grouped by severity.<br><br>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.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only      |
| medium  | <i>integer</i> | Number of occurred Events with a medium severity.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only   |
| high  | <i>integer</i> | Number of occurred Events with a high severity.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only     |
| critical  | <i>integer</i> | Number of occurred Events with a critical severity.<br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only |
| <b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-only |                |  |

5586 The following describes the serialization of the resource in both JSON and XML:

5587 **JSON media type:** application/json

5588 **JSON serialization:**

```

5589 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLog",
5590   "id": string,
5591   "name": string, ?
5592   "description": string, ?
5593   "created": string, ?
5594   "updated": string, ?
5595   "properties": { "key": string, + }, ?
5596   "targetResource": { "href": string },
5597   "events": { "href": string },
5598   "persistence": string,
5599   "summary": {
5600     "low": number,
5601     "medium": number,
5602     "high": number,
5603     "critical": number
5604   }, ?
5605   "operations": [
5606     { "rel": "edit", "href": string }, ?
5607     { "rel": "delete", "href": string } ?
5608   ] ?
5609   ...
5610 }
```

5611 **XML media type:** application/xml

5612 **XML serialization:**

```

5613 <EventLog xmlns="http://schemas.dmtf.org/cimi/1">
5614   <id> xs:anyURI </id>
```

```

5615 <name> xs:string </name> ?
5616 <description> xs:string </description> ?
5617 <created> xs:dateTime </created> ?
5618 <updated> xs:dateTime </updated> ?
5619 <property key="xs:string"> xs:string </property> *
5620 <targetResource href="xs:anyURI"/>
5621 <events href="xs:anyURI"/>
5622 <persistence> xs:string </persistence>
5623 <summary>
5624 <low> xs:integer </low>
5625 <medium> xs:integer </medium>
5626 <high> xs:integer </high>
5627 <critical> xs:integer </critical>
5628 </summary>
5629 <operation rel="edit" href="xs:anyURI"/> ?
5630 <operation rel="delete" href="xs:anyURI"/> ?
5631 <xs:any*>
5632 </EventLog>

```

### 5633 5.17.9.1 Collections

5634 The following describes the collection resources owned by EventLogs.

#### 5635 5.17.9.1.1 Event Collection

5636 The resource type for each item of this collection is “Event” as defined in clause 5.17.13.

#### 5637 JSON serialization:

```

5638 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventCollection",
5639   "id": string,
5640   "count": number,
5641   "events": [
5642     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Event",
5643       "id": string,
5644       ... remaining Event attributes ...
5645     }, +
5646   ], ?
5647   "operations": [ { "rel": "add", "href": string } ? ]
5648   ...
5649 }

```

#### 5650 XML serialization:

```

5651 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/EventCollection"
5652   xmlns="http://schemas.dmtf.org/cimi/1">
5653   <id> xs:anyURI </id>
5654   <count> xs:integer </count>
5655   <Event>
5656     <id> xs:anyURI </id>
5657     ... remaining Event attributes ...
5658   </Event> *
5659   <operation rel="add" href="xs:anyURI"/> ?
5660   <xs:any*>
5661 </Collection>

```

### 5662 5.17.9.2 Operations

5663 This resource supports the Read, Update, and Delete operations.

5664 **5.17.10 Event Log Collection**

5665 A Event Log Collection resource represents the collection of Event Logs within a Provider and follows the  
5666 Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

5667 **JSON serialization:**

```
5668 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLogCollection",
5669   "id": string,
5670   "count": number,
5671   "eventLogs": [
5672     { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLog",
5673       "id": string,
5674       ... remaining EventLog attributes ...
5675     }, +
5676   ], ?
5677   "operations": [ { "rel": "add", "href": string } ? ]
5678   ...
5679 }
```

5680 **XML serialization:**

```
5681 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/EventLogCollection"
5682   xmlns="http://schemas.dmtf.org/cimi/1">
5683   <id> xs:anyURI </id>
5684   <count> xs:integer </count>
5685   <EventLog>
5686     <id> xs:anyURI </id>
5687     ... remaining EventLog attributes ...
5688   </EventLog> *
5689   <operation rel="add" href="xs:anyURI"/> ?
5690   <xs:any>*
5691 </Collection>
```

5692 **5.17.11 Event Log Template**

5693 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; mutable<br><b>Consumer:</b> support mandatory; read-write |

5694 The following describes the serialization of the resource in both JSON and XML:

5695 **JSON media type:** application/json

5696 **JSON serialization:**

```
5697 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLogTemplate",
5698   "id": string,
```

```

5699     "name": string, ?
5700     "description": string, ?
5701     "created": string, ?
5702     "updated": string, ?
5703     "properties": { "key": string, + }, ?
5704     "targetResource": { string },
5705     "persistence": string,
5706     "operations": [
5707         { "rel": "edit", "href": string }, ?
5708         { "rel": "delete", "href": string } ?
5709     ] ?
5710     ...
5711 }

```

5712 **XML media type:** application/xml

5713 **XML serialization:**

```

5714 <EventLogTemplate xmlns="http://schemas.dmtf.org/cimi/1">
5715   <id> xs:anyURI </id>
5716   <name> xs:string </name> ?
5717   <description> xs:string </description> ?
5718   <created> xs:dateTime </created> ?
5719   <updated> xs:dateTime </updated> ?
5720   <property key="xs:string"> xs:string </property> *
5721   <targetResource href="xs:anyURI"/>
5722   <persistence> xs:string </persistence>
5723   <operation rel="edit" href="xs:anyURI"/> ?
5724   <operation rel="delete" href="xs:anyURI"/> ?
5725   <xs:any>*
5726 </MeterTemplate>

```

## 5727 5.17.12 Event Log Template Collection

5728 A EventLog Template Collection resource represents the collection of EventLogTemplate resources  
5729 within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be  
5730 serialized as follows:

5731 **JSON serialization:**

```

5732 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLogTemplateCollection",
5733   "id": string,
5734   "count": number,
5735   "eventLogTemplates": [
5736     { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLogTemplate",
5737       "id": string,
5738       ... remaining EventLogTemplate attributes ...
5739     }, +
5740   ], ?
5741   "operations": [ { "rel": "add", "href": string } ? ]
5742   ...
5743 }

```

5744 **XML serialization:**

```

5745 <Collection
5746   resourceURI="http://schemas.dmtf.org/cimi/1/EventLogTemplateCollection"
5747   xmlns="http://schemas.dmtf.org/cimi/1">
5748   <id> xs:anyURI </id>
5749   <count> xs:integer </count>
5750   <EventLogTemplate>
5751     <id> xs:anyURI </id>
5752     ... remaining EventLogTemplate attributes ...
5753   </EventLogTemplate> *

```

```
5754 <operation rel="add" href="xs:anyURI"/> ?
5755 <xs:any>*
5756 </Collection>
```

5757 **5.17.12.1 Operations**

5758 This resource supports the Read and Update operations. Creation of new EventLog Template resources  
5759 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

5760 **5.17.13 Event**

5761 An resource that represents the occurrence of an event within the managed infrastructure. Some  
5762 examples of Events may be:

- 5763 • Machine X has been rebooted by guest OS.
- 5764 • Machine X is not responding to platform services.
- 5765 • A new vCPU has been added to machine X following defined elasticity rules.

5766 The scope of the Event concept is any information that the Provider is able to track within its infrastructure  
5767 and that can constitute useful information for the Consumer. Possible examples include, but are not  
5768 limited to, errors and inconveniences that occur in the (virtual) resources assigned to Consumers;  
5769 Provider-initiated actions, such as maintenance tasks; etc.

|                  |                                      |  |
|------------------|--------------------------------------|--|
| <b>Name</b>      | Event                                |  |
| <b>Type URI</b>  | http://schemas.dmtf.org/cimi/1/Event |  |
| <b>Attribute</b> | <b>Type</b>                          | <b>Description</b>   |
| timestamp        | <i>dateTime</i>                      | <p>The time of occurrence of the actual event. A datetime field formatted according to <a href="#">DSP4004</a>, which follows <a href="#">ISO8601</a>; 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><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; immutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; immutable<br/> <b>Consumer:</b> 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><b>Constraints:</b></p>   |

|          |               |   |
|----------|---------------|---|
|          |               | <p><b>Provider:</b> support mandatory; immutable<br/> <b>Consumer:</b> 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 <b>type</b>, 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><b>Pending:</b> The event is about an action or process that is still ongoing.</p> <p><b>Unknown:</b> The event is about a request or action that is not known by the Provider.</p> <p><b>Status:</b> The event reports on the state or status of a resource.</p> <p><b>Success:</b> The event reports on a successful outcome of some action or process.</p> <p><b>Warning:</b> The event reports on a situation that requires attention or remedial action.</p> <p><b>Failure:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; immutable<br/> <b>Consumer:</b> support optional; read-only</p> |
| severity | <i>string</i> | <p>A value indicating the Event severity. Possible values are:</p> <p><b>critical</b></p> <p><b>high</b></p> <p><b>medium</b></p> <p><b>low</b></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><b>Constraints:</b><br/> <b>Provider:</b> support optional; immutable<br/> <b>Consumer:</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; immutable<br/> <b>Consumer:</b> support optional; read-only</p>  |

5770 NOTE: There exists a legacy of several event models that have been standardized or designed for various domains  
5771 relevant to IT. The objective in CIMI is not to elect one particular event model, but to select as top-level event  
5772 attributes the most immediately relevant data useful for event processing in a Cloud environment. Additional event  
5773 data may still be represented in the variable content attribute that allows for mapping other event models into a CIMI  
5774 event.

5775 The following describes the serialization of the resource in both JSON and XML:

5776 **JSON media type:** application/json

5777 **JSON serialization:**

5778 

```
{ "resourceURI": "http://schemas.dmtf.org/cimi/1/Event",
```

  
5779 

```
  "id": string,
```



```

5780 "name": string, ?
5781 "description": string, ?
5782 "created": string, ?
5783 "updated": string, ?
5784 "properties": { "key": string, + }, ?
5785 "timestamp": string,
5786 "type": string,
5787 "content": any, ?
5788 "outcome": string, ?
5789 "severity": string, ?
5790 "contact": string, ?
5791 ...
5792 }
    
```

5793 **XML media type:** application/xml

5794 **XML serialization:**

```

5795 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5796   <id> xs:anyURI </id>
5797   <name> xs:string </name> ?
5798   <description> xs:string </description> ?
5799   <created> xs:dateTime </created> ?
5800   <updated> xs:dateTime </updated> ?
5801   <property key="xs:string"> xs:string </property> *
5802   <timestamp> xs:dateTime </timestamp>
5803   <type> xs:string </type>
5804   <content> xs:any* </content> ?
5805   <outcome> xs:string </outcome> ?
5806   <severity> xs:string </severity> ?
5807   <contact> xs:string </contact> ?
5808   <xs:any>*
5809 </Event>
    
```

5810 The following table describes the "type" URIs that are defined or acknowledged by this specification.  
 5811 Additional types may be added by a Provider, for example to characterize external events mapped into  
 5812 CIMI events. It is recommended that these URIs be dereferencable such that Consumers can discover a  
 5813 more detailed description of the type. Event types defined by this specification will share the same base  
 5814 URI: http://schemas.dmtf.org/cimi/1/event/. For brevity, when the "Event Type" column in the table only  
 5815 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 <b>content</b> 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><b>Constraints:</b><br/> <b>Provider:</b> support optional; immutable<br/> <b>Consumer:</b> 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>   | <p>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. )</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; immutable<br/> <b>Consumer:</b> support optional; read-only</p> |      |      |             |         |               |  |          |            |  |         |            |  |      |               |                |
|----------|---|--|---|------|------|-------------|---------|---------------|--|----------|------------|--|---------|------------|--|------|---------------|----------------|
|          | resType   | <i>URI</i>   | <p>URI denoting this resource type (same as the type URI associated with the Resource type for this resource).</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; immutable<br/> <b>Consumer:</b> support optional; read-only.</p>  |      |      |             |         |               |  |          |            |  |         |            |  |      |               |                |
|          | state   | <i>string</i>  | <p>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.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; immutable<br/> <b>Consumer:</b> support optional; read-only</p>  |      |      |             |         |               |  |          |            |  |         |            |  |      |               |                |
|          | previous  | <i>string</i>  | <p>The previous state value, if the event reports a state change.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; immutable<br/> <b>Consumer:</b> support optional; read-only.</p>   |      |      |             |         |               |  |          |            |  |         |            |  |      |               |                |
| 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 <b>content</b> 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> <p>The name of the resource associated with this alarm, if applicable.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; immutable<br/> <b>Consumer:</b> support optional; read-only.</p> </td> </tr> <tr> <td>resource</td> <td><i>ref</i></td> <td> <p>The reference to the resource associated with this alarm, if applicable. (Note: This reference may become invalid because the event might outlive the resource. )</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; immutable<br/> <b>Consumer:</b> support optional; read-only</p> </td> </tr> <tr> <td>restype</td> <td><i>URI</i></td> <td> <p>URI denoting, this resource type associated with this alarm, if applicable (same as the type URI associated with the Resource type for this resource).</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; immutable<br/> <b>Consumer:</b> support optional; read-only</p> </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> | <p>The name of the resource associated with this alarm, if applicable.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; immutable<br/> <b>Consumer:</b> support optional; read-only.</p> | resource | <i>ref</i> | <p>The reference to the resource associated with this alarm, if applicable. (Note: This reference may become invalid because the event might outlive the resource. )</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; immutable<br/> <b>Consumer:</b> support optional; read-only</p> | restype | <i>URI</i> | <p>URI denoting, this resource type associated with this alarm, if applicable (same as the type URI associated with the Resource type for this resource).</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; immutable<br/> <b>Consumer:</b> support optional; read-only</p> | code | <i>string</i> | An alarm code. |
| Data     | Type  | Description  |   |      |      |             |         |               |  |          |            |  |         |            |  |      |               |                |
| resName  | <i>string</i>   | <p>The name of the resource associated with this alarm, if applicable.</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; immutable<br/> <b>Consumer:</b> support optional; read-only.</p>   |   |      |      |             |         |               |  |          |            |  |         |            |  |      |               |                |
| resource | <i>ref</i>  | <p>The reference to the resource associated with this alarm, if applicable. (Note: This reference may become invalid because the event might outlive the resource. )</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support mandatory; immutable<br/> <b>Consumer:</b> support optional; read-only</p> |   |      |      |             |         |               |  |          |            |  |         |            |  |      |               |                |
| restype  | <i>URI</i>  | <p>URI denoting, this resource type associated with this alarm, if applicable (same as the type URI associated with the Resource type for this resource).</p> <p><b>Constraints:</b><br/> <b>Provider:</b> support optional; immutable<br/> <b>Consumer:</b> support optional; read-only</p>             |   |      |      |             |         |               |  |          |            |  |         |            |  |      |               |                |
| code     | <i>string</i>   | An alarm code.   |   |      |      |             |         |               |  |          |            |  |         |            |  |      |               |                |

|        |  |             |  |
|--------|--|-------------|--|
|        |  |             | <b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support optional; read-only   |
|        | detail   | string      | The detailed information associated with the alarm.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; immutable<br><b>Consumer:</b> 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.).<br><br>The <b>content</b> element associated with this event type has the following structure: |             |  |
|        | <b>Data</b>  | <b>Type</b> | <b>Description</b>   |
|        | resName  | string      | The name of the main model resource affected by the modification.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; immutable<br><b>Consumer:</b> support optional; read-only   |
|        | resource   | ref         | The reference to the main model resource affected by the modification.<br>(Note: This reference may become invalid because the event might outlive the resource. )<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> support optional; read-only |
|        | resType  | URI         | URI denoting, this resource type (same as the type URI associated with the Resource type for this resource).<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; immutable<br><b>Consumer:</b> support optional; read-only  |
|        | change   | string      | The kind of modification reported (create/update/delete).<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> 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.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; immutable<br><b>Consumer:</b> support optional; read-only  |
| access | Events of this type keep track of all requests to access some resource of a CIMI provider.<br><br>The <b>content</b> element associated with this event type has the following structure:  |             |  |
|        | <b>Data</b>  | <b>Type</b> | <b>Description</b>   |
|        | operation  | string      | The method or name of the operation intended for this access (for the HTTP protocol, the HTTP method for the request).<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> 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. )<br><br><b>Constraints:</b><br><b>Provider:</b> support mandatory; immutable<br><b>Consumer:</b> 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<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; immutable<br><b>Consumer:</b> support optional; read-only |
|  | initiator   | string | The details identifying the request initiator, in case that information can be associated with the request.<br><br><b>Constraints:</b><br><b>Provider:</b> support optional; immutable<br><b>Consumer:</b> 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).<br><br>The <b>content</b> element associated with this event type has the same structure as the event serialization defined in CADF[...]: |        |  |

5816 The following describes the serialization of the "content" property for various types of events:

5817 **"state" event:**

5818 **JSON serialization:**

```
5819 { "id": string,
5820   ...
5821   "type": "http://schemas.dmtf.org/cimi/1/event/state",
5822   "content": {
5823     "resName": string,
5824     "resource" : { "href" : string },
5825     "resType" : string,
5826     "state" : string,
5827     "previous" : string ?
5828   }
5829   ...
5830 }
```

5831 **XML serialization:**

```
5832 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5833   ...
5834   <type> http://schemas.dmtf.org/cimi/1/event/state </type>
5835   <content>
5836     <resName> xs:string </resName>
5837     <resource href="xs:anyURI"/>
5838     <resType> xs:anyURI </resType>
5839     <state> xs:string </state>
5840     <previous> xs:string </previous> ?
5841   </content> ?
5842   ...
5843 </Event>
5844
```

5845 **"alarm" event:**

5846 **JSON serialization:**

```
5847 { "id": string,
5848 ...
5849 "type": "http://schemas.dmtf.org/cimi/1/event/alarm",
5850 "content": {
5851   "resName": string ?
5852   "resource" : { "href" : string }, ?
5853   "resType" : string ?
5854   "code" : string,
5855   "detail" : string ?
5856 }
5857 ...
5858 }
```

5859 **XML serialization:**

```
5860 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5861 ...
5862 <type> http://schemas.dmtf.org/cimi/1/event/alarm </type>
5863 <content>
5864   <resname> xs:string </resname> ?
5865   <resource href="xs:anyURI"/> ?
5866   <restype> xs:anyURI </restype> ?
5867   <code> xs:string </code>
5868   <detail> xs:string </detail> ?
5869 </content> ?
5870 ...
5871 </Event>
```

5872 **"model" event:**

5873 **JSON serialization:**

```
5874 { "id": string,
5875 ...
5876 "type": "http://schemas.dmtf.org/cimi/1/event/model",
5877 "content": {
5878   "resName": string, ?
5879   "resource" : { "href" : string }, ?
5880   "resType" : string, ?
5881   "change" : string,
5882   "detail" : string ?
5883 }
5884 ...
5885 }
```

5886 **XML serialization:**

```
5887 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5888 ...
5889 <type> http://schemas.dmtf.org/cimi/1/event/model </type>
5890 <content>
5891   <resname> xs:string </resname> ?
5892   <resource href="xs:anyURI"/> ?
5893   <restype> xs:anyURI </restype> ?
5894   <change> xs:string </change>
5895   <detail> xs:string </detail> ?
5896 </content> ?
5897 ...
5898 </Event>
```

5899 **"access" event:**

5900 **JSON serialization:**

```
5901 { "id": string,
5902   ...
5903   "type": "http://schemas.dmtf.org/cimi/1/event/access",
5904   "content": {
5905     "operation": string,
5906     "resource" : { "href" : string },
5907     "detail" : string, ?
5908     "initiator" : string ?
5909   }
5910   ...
5911 }
```

5912 **XML Serialization:**

```
5913 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5914   ...
5915   <type> http://schemas.dmtf.org/cimi/1/event/access </type>
5916   <content>
5917     <operation> xs:string </operation>
5918     <resource href="xs:anyURI"/>
5919     <detail> xs:string </detail> ?
5920     <initiator> xs:string </initiator> ?
5921   </content> ?
5922   ...
5923 </Event>
```

5924 **5.17.13.1 Operations**

5925 This resource supports the Read, Update, and Delete operations.

## 5926 **6 Security considerations**

5927 There are many security mechanisms that can be used in conjunction with this specification. This  
 5928 specification does not mandate any particular mechanism(s). Providers shall provide enough information  
 5929 about their security mechanisms so that the Consumer can implement the necessary algorithms to  
 5930 successfully communicate with the Provider.

## ANNEX A (normative)

5931  
5932  
5933  
5934  
5935

### OVF support in CIMI

5936 This annex details how elements of the OVF descriptor are mapped to CIMI resources and their  
5937 attributes. This definition allows the import of an OVF package to create multiple CIMI resources. This is  
5938 done by specifying a reference to an OVF package in the import operation of a System Collection or  
5939 System Template Collection (the Media Type at that URI shall be “application/ovf”). Please reference  
5940 [DSP0243](#) for more information about OVF.

5941 Support for OVF import and export is optional for a Provider and it is an implementation choice as to how  
5942 many of the attributes in the OVF package are exposed through CIMI resources. A Provider may support  
5943 the import of OVF package for only Systems, only System Templates or both. Support for the actual  
5944 import and export of OVF packages will typically be handled by a hypervisor under the management of  
5945 the CIMI implementation, and thus the CIMI resources that are created reflect what the hypervisor did  
5946 upon import and form a “View” into the results.

5947 The import of an OVF package can be reflected in the creation of templates that can be later used to  
5948 create Systems, Machines and other component resources. The import of an OVF package can also be  
5949 used to directly create Systems, Machines and other component resources, bypassing the step of  
5950 creating templates.

5951 Clause 5.13.4 details how to import an OVF file to create a System Template (and component resources).  
5952 The System Template thus created will contain a reference to a Machine Template for every  
5953 VirtualSystem that is defined in the OVF Descriptor VirtualSystemCollection. Note that CIMI currently  
5954 allows Systems of Systems, so for each VirtualSystemCollection encountered in a nested set of  
5955 collections, a separate System Template is created within the parent System Template with Machine  
5956 Templates for each of the contained VirtualSystems in that VirtualSystemCollection.

5957 The values of the attributes for the Machine Template are taken from the VirtualHardwareSection of the  
5958 VirtualSystem description (required in OVF). If multiple VirtualHardwareSections are used for a given  
5959 VirtualSystem (allowed in OVF), the result is implementation dependent, but the implementation might  
5960 choose a Machine Template from an existing (perhaps static) set that best matches one of the  
5961 VirtualHardwareSections. Items in the VirtualHardwareSection are mapped to CIMI Machine  
5962 Configuration properties and the corresponding Machine Configuration resource is created and linked to  
5963 from the created Machine Template for that VirtualSystem.

5964 The CIMI Volume Templates are created according to the DiskSection of the OVF Descriptor and can be  
5965 shared among multiple VirtualSystems (CIMI Machine Templates) defined in the OVF Package. In  
5966 addition, a new CIMI Machine Image resource may be created from the DiskSection if an ovf:fileRef for  
5967 the virtual disk content is specified.

5968 The CIMI Network Templates are created according to the NetworkSection of the OVF Descriptor along  
5969 with the Connection elements in the various VirtualHardwareSections that refer to these named networks.

5970 Clause 5.13.2.1 details how to import an OVF file to create a System (and component resources). The  
5971 System thus created will contain a reference to a Machine for every VirtualSystem that is defined in the  
5972 OVF Descriptor VirtualSystemCollection. Note that CIMI currently allows Systems of Systems, so for each  
5973 VirtualSystemCollection encountered in a nested set of collections, a separate System is created within  
5974 the parent System with Machines for each of the contained VirtualSystems in that  
5975 VirtualSystemCollection.

5976 The values of the attributes for the Machine are taken from the VirtualHardwareSection of the  
5977 VirtualSystem description (required in OVF). If multiple VirtualHardwareSections are used for a given  
5978 VirtualSystem (allowed in OVF), the result is implementation dependent. Items in the  
5979 VirtualHardwareSection are mapped to CIMI Machine Configuration properties and the corresponding  
5980 Machine Configuration resource is created and linked to from the created Machine for that VirtualSystem.

5981 The CIMI Volumes are created according to the DiskSection of the OVF Descriptor and can be shared  
5982 among multiple VirtualSystems (CIMI Machines) defined in the OVF Package. In addition, a new CIMI  
5983 Machine Image resource may be created from the DiskSection if an ovf:fileRef for the virtual disk content  
5984 is specified.

5985 The CIMI Networks are created according to the NetworkSection of the OVF Descriptor along with the  
5986 Connection elements in the various VirtualHardwareSections that refer to these named networks.

5987



5988 **ANNEX B**  
5989 **(informative)**

5990  
5991  
5992 **XML Schema**

5993 The XML Schema for the XML serialization of the CIMI model can be found at:

5994 <http://schemas.dmtf.org/cimi/1/DSP8009.xsd>

5995 The schema provided does not intend to reflect every single modeling constraint and requirement  
5996 specified in the model. This schema is designed to apply more broadly to any model-related serialized  
5997 material found in Consumer requests as well as in Provider responses, and is intended to provide a  
5998 preliminary, non-exhaustive syntactic check on these. In particular future updates of this specification may  
5999 intermix new XML elements into the resources using the current CIMI namespace to resources. The  
6000 schema that is provided is just a starting-point for those who would find it useful and it might need to be  
6001 modified based on specific application's needs.

**ANNEX C  
(informative)**

**Change log**

| <b>Version</b> | <b>Date</b> | <b>Description</b> |
|----------------|-------------|--------------------|
| 1.0.0          | 2012-08-28  | Version 1.0        |
| 1.0.1          | 2012-09-12  | Errata             |

6002  
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