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6 **Cloud Infrastructure Management Interface**

7 **(CIMI) Model and RESTful HTTP-based Protocol**

8 **An Interface for Managing Cloud Infrastructure**

Information for Work-in-Progress version:

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Forward

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. This model
 163 was developed to address the use cases outlined in the "Scoping Framework for Cloud Management
 164 Models and Protocol Requirements" document.

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172 Contributors:

- 173 • Ali, Ghazanfar - ZTE Corporation
- 174 • Andreou, Marios - Red Hat
- 175 • Bankston, Keith - Microsoft Corporation
- 176 • Bumpus, Winston - VMware Inc.
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237 Cloud Infrastructure Management Interface (CIMI) Model and 238 RESTful HTTP-based Protocol

239 1 Scope

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

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

252 1.1 Document structure

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

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

256 1.2 Document versioning scheme

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

258 1.3 Typographical conventions

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

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

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

- 266 • Values in *italics* indicate data types instead of literal values.
- 267 • Characters are appended to items to indicate cardinality:
 - 268 – "?" (0 or 1)
 - 269 – "*" (0 or more)
 - 270 – "+" (1 or more)
- 271 • Vertical bars, "|", denote choice. For example, "a|b" means a choice between "a" and "b".

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

276 **2 Normative references**

277 The following referenced documents are indispensable for the application of this document. For dated or

278 versioned references, only the edition cited (including any corrigenda or DMTF update versions) applies.

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340 **3 Terms and definitions**

- 341 In this document, some terms have a specific meaning beyond the normal English meaning. Those terms
 342 are defined in this clause.
- 343 The terms "shall" ("required"), "shall not," "should" ("recommended"), "should not" ("not recommended"),
 344 "may," "need not" ("not required"), "can" and "cannot" in this document are to be interpreted as described
 345 in [ISO/IEC Directives, Part 2](#), Annex H. The terms in parenthesis are alternatives for the preceding term,
 346 for use in exceptional cases when the preceding term cannot be used for linguistic reasons. Note that
 347 [ISO/IEC Directives, Part 2](#), Annex H specifies additional alternatives. Occurrences of such additional
 348 alternatives shall be interpreted in their normal English meaning.
- 349 The terms "clause," "subclause," "paragraph," and "annex" in this document are to be interpreted as
 350 described in [ISO/IEC Directives, Part 2](#), Clause 5.
- 351 The terms "normative" and "informative" in this document are to be interpreted as described in [ISO/IEC](#)
 352 [Directives, Part 2](#), Clause 3. In this document, clauses, subclauses, or annexes labeled "(informative)" do
 353 not contain normative content. Notes and examples are always informative elements.

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

356 **3.1**
357 **authentication**

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

361 **3.2**
362 **authorization**

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

365 **3.3**
366 **cloud**

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

369 **3.4**
370 **Cloud Service Consumer**

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

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

382 **3.5**
383 **Cloud Service Provider**

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

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

398 **3.6**

399 **configuration**

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

403 **3.7**404 **Infrastructure as a Service (IaaS)**

405 A cloud computing service model defined in section 2 of the NIST Definition of Cloud Computing [[SP800-145](#)].
406

407 **3.8**408 **message confidentiality**

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

410 **3.9**411 **message integrity**

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

414 **3.10**415 **Template**

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

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

- 422 1. By reference - allow Consumers to reference a Template (that exists as a resource in the
423 Provider) as part of the instantiation operation.
- 424 2. By value - allow Consumers to dynamically provide the Template information as part of the
425 instantiation operation.
- 426 3. Reference with overrides - allow Consumers to reference a Template (that exists as a resource in
427 the Provider) and provide additional values that override the attributes of that Template as part of
428 the instantiation operation.

429 **4 HTTP-Based protocol**430 **4.1 Introduction**

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

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

442 iterative following of links to associated resource within each resource retrieved.

443 **4.1.1 XML namespaces**

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

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

446 **4.1.2 URI space**

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

452 **4.1.3 Media types**

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

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

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

467 **4.1.4 Request headers**

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

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

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

475 For example:

476 `CIMI-Specification-Version=1.0`

477 The header allows for a list of *api-version* values to be specified (separated by commas) and to be
 478 presented in descending order according to the client's preference. When more than one value is present
 479 the server shall choose the preferred one from those versions of the specification to process the

480 message. Clients including more than one value are indicating that any of the specified values are
481 acceptable.

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

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

490 4.1.5 Request query parameters

491 Providers may choose to include query parameters as part of the URIs returned to Consumers.
492 Consumers shall include those query parameters when sending messages to those URIs. If Providers
493 choose to define query parameters care should be taken to avoid conflicts with CIMI defined query
494 parameters.

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

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

500 4.1.5.1 Filtering collections

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

504 `?$filter=expression`

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

```
508 Filter      ::= AndExpr ( 'or' Filter )* ;
509 AndExpr    ::= Comp ( 'and' AndExpr )*
510 Comp       ::= Attribute Op Value
511             | Value Op Attribute
512             | '(' Filter ')'
513 Op         ::= '<' | '<=' | '=' | '>=' | '>' | '!='
514 Attribute  ::= ? resource attribute name ?
515             | PropExpr
516 Value      ::= IntValue | DateValue | StringValue | BoolValue
517 IntValue   ::= /[0-9]+/
518 DateValue  ::= ? as defined by XML Schema ?
519 StringValue ::= "... " | '...'
520 BoolValue  ::= 'true' | 'false'
521 PropExpr   ::= 'property[' StringValue ']' Op StringValue
```

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

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

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

529	'or', 'and'	: Boolean value/attribute
530	'<', '<=', '=', '>=', '>', '!='	: Integer and date value/attribute
531	'=', '!='	: String value/attribute

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

535 **Examples:**

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

- 537 • /machines is the URI to the Machines Collection
- 538 • /machines/123 is the URI to a Machine
- 539 • /machines/123/disks is the URI to the DiskCollection of a Machine
- 540 • /machines/123/volumes is the URI to the MachineVolumeCollection of a Machine

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

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

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

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

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

549 **4.1.5.2 Subsetting Collections**

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

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

```
556 ?$first=number  

    557 ?$last=number
```

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

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

566 4.1.5.3 Subsetting resources

567 The `$select` query parameter may be used to specify a subset of a resource to be acted upon. This has
568 the semantic equivalence of referencing a different resource whose attributes are a subset of the original
569 resource. The format of a `$select` query parameter is:

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

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

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

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

579 is equivalent to:

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

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

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

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

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

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

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

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

594 4.1.5.4 Expanding references

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

599 The serialization shall be performed as follows:

600 JSON serialization:

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

602 shall be expanded to be:

```
603 "name": {
604   "href": string,
605   ... attributes of referenced resource...
606 }
```


607 **XML serialization:**

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

609 shall be expanded to be:

610 `<name href="xs:anyURI">`
 611 `... attributes of the referenced resource...`
 612 `</name>`

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

615 The format of a `$expand` query parameter shall be:

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

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

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

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

626 `?$expand=volumes`

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

631 **4.1.6 Response headers**

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

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

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

638 See clause 4.1.4 for more details on this header.

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

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

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

650 4.2 Protocol operations

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

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

666 JSON serialization:

```
667 { "operations": [
668   { "rel": "string", "href": "string" }, +
669 ]
670 }
```

671 XML serialization:

```
672 <Resource xmlns="http://schemas.dmtf.org/cimi/1">
673   <operation rel="xs:anyURI" href="xs:anyURI"/> *
674 </Resource>
```

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

676 JSON serialization:

```
677 { "operations": [
678   { "rel": "edit", "href": "<editURI>" }
679 ]
680 }
```

681 XML serialization:

```
682 <Resource xmlns="http://schemas.dmtf.org/cimi/1">
683   <operation rel="edit" href="<editURI>I"/>
684 </Resource>
```

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

687 4.2.1 Common CRUD operations

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

691 4.2.1.1 Creating a new resource

692 To create a new instance of a resource type, an HTTP POST request is sent to a designated "addURI" for
 693 that resource type. In many cases, the Collection resource that maintains, or groups, all instances of that

694 resource type will include an "add" operation. The "add" operation references the "addURI" that is to be
 695 used.

696 The request shall be of the following form:

```
697 POST <addURI> HTTP/1.1
698 Host: <hostname>
699 Accept: application/(json|xml)
700 Content-Type: application/(json|xml)
701 Content-Length: <length>
702 CIMI-Specification-Version: 1.0 ?
703
704 <serialization of request to create a new resource>
```

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

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

```
710 <MachineCreate xmlns="http://schemas.dmtf.org/cimi/1">
711   <name> xs:string </name> ?
712   <description> xs:string </description> ?
713   <property key="xs:string"> xs:string </property>*
714   <machineTemplate href="xs:anyURI"? >
715     ... template attributes ... ?
716   </machineTemplate>
717 </MachineCreate>
```

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

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

```
728 "attribute": null
```

729 for the attribute in the JSON serialization, or

```
730 <attribute/>
```

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

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

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

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

```
741 HTTP/1.1 201 Created
```

```

742     Location: <location>
743     Content-Type: application/(json|xml)
744     Content-Length: <length> ?
745     CIMI-Specification-Version: 1.0
746
747     <serialization of new resource> ?

```

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

750 4.2.1.2 Retrieving a representation of a resource

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

752 The request shall be of the following form:

```

753     GET <ResourceURI> HTTP/1.1
754     Host: <hostname>
755     Accept: application/(json|xml) ?
756     CIMI-Specification-Version: 1.0 ?

```

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

```

758     HTTP/1.1 200 OK
759     Content-Type: application/(json|xml)
760     Content-Length: <length>
761     CIMI-Specification-Version: 1.0
762
763     <serialization of resource>

```

764 4.2.1.3 Updating a resource

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

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

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

775 The request shall be of the following form:

```

776     PUT <editURI> HTTP/1.1
777     Host: ...
778     Accept: application/(json|xml)
779     Content-Type: application/(json|xml)
780     Content-Length: <length>
781     CIMI-Specification-Version: 1.0
782
783     <serialization of request to update a resource>

```

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

```

785     HTTP/1.1 200 OK
786     Content-Type: application/(json|xml)
787     Content-Length: <length> ?
788     CIMI-Specification-Version: 1.0
789

```

790 `<serialization of updated resource> ?`

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

793 4.2.1.3.1 Partial updates to a resource

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

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

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

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

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

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

```
810 PUT /machines/myMachine?$select=name,description HTTP/1.1
811 Host: <hostname>
812 Accept: application/xml
813 Content-Type: application/xml
814 Content-Length: <length>
815 CIMI-Specification-Version: 1.0
816
817 <Machine>
818   <name>My New Machine</name>
819 </Machine>
```

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

821 4.2.1.4 Deleting a resource

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

826 The request shall be of the following form:

```
827 DELETE <deleteURI> HTTP/1.1
828 Host: <hostname>
829 CIMI-Specification-Version: 1.0 ?
```

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

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

```
833 HTTP/1.1 200 OK
834 CIMI-Specification-Version: 1.0
```

835 4.2.1.5 Other operations

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

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

841 The request shall be of the following form:

```
842 POST <operationLinkURI> HTTP/1.1
843 Host: <hostname>
844 Accept: application/(json|xml)
845 Content-Type: application/(json|xml)
846 Content-Length: <length>
847 CIMI-Specification-Version: 1.0
848
849 <serialization of request to perform some action>
```

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

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

853 4.2.1.6 Synchronous operations

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

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

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

861 4.2.1.7 Asynchronous operations

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

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

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

- an empty response body.

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

4.3 OVF support

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

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

OVF Support is covered in more detail in ANNEX A.

5 Model

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

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

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

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

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

5.1 Resource wrappers

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

JSON serialization:

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

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

922 }

923 **XML serialization:**

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

```
925 <MyResource xmlns="http://example.com">
926   <attribute> value </attribute>
927 </MyResource>
```

928 **5.2 Extensibility**

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

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

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

- 939 • Express constraints on the existing CIMI defined resource attributes (e.g., express a maximum for
940 the 'cpu' attribute of the MachineConfiguration resource)
- 941 • Introduce new attributes for CIMI defined resources together with any constraints governing these
942 (e.g., a new 'location' attribute for the Volume resource that takes values from a defined set of
943 strings)
- 944 • Introduce new operations for any of the CIMI defined resources (e.g., define a new 'compress'
945 operation for the Volume resource)
- 946 • Express any Provider specific capabilities or features (e.g., the length of time that a Job resource
947 will be retained after Job completion and before this is deleted).

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

951 **5.3 Identifiers**

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

- 954 • Identifier names shall be treated as case sensitive.
- 955 • Identifier names shall only use the following set of characters:
 - 956 ○ Uppercase ASCII (U+0041 through U+005A)
 - 957 ○ Lowercase ASCII (U+0061 through U+007A)
 - 958 ○ Digits (U+0030 through U+0039)
 - 959 ○ Underscore (U+005F)
- 960 • Identifier names shall not start with a Digit (U+0030 through U+0039).

961 **5.4 Attribute constraints**

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

965 **support optional:**

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

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

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

977 **support mandatory:**

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

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

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

985 **immutable:**

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

988 **mutable:**

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

992 **read-only:**

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

997 **read-write:**

998 This Consumer constraint indicates that the attribute may be retrieved and/or updated by Consumers.
 999 Read-write attributes shall appear in the serialization of resources sent to and from Providers. Providers
 1000 may further constrain whether Consumers can update these attributes and should indicate this via
 1001 ResourceMetadata.

1002 write-only:

1003 This Consumer constraint indicates that the attribute may be updated by Consumers but are not
1004 retrievable by Consumers, typically for security reasons. Write-only attributes shall appear in the
1005 serialization of resources sent to Providers but shall never appear in the serialization of resources sent
1006 from Providers.

1007 5.5 Data types and their serialization

1008 Unless specifically asked to not include certain attributes in the resource representation, the absence of
1009 an attribute in the representation means that the attribute has no value (i.e., is undefined); meaning there
1010 is no notion of an attribute having an implied value. Note that a client cannot distinguish (from just looking
1011 at the returned representation) whether a particular attribute is not supported from one that does not exist.
1012 Likewise, an absent attribute from a resource representation as the input to an update operation means
1013 that the Consumer is requesting that the Provider remove that attribute.

1014 The following describes the data types and values that are used within the model definition tables.

1015 5.5.1 boolean

1016 A value as defined by xs:boolean per [XML Schema – Part 2](#), with the exception that the only allowable
1017 values are either "true" or "false." The value is case sensitive.

1018 When serialized in JSON these values shall be of JSON type: *boolean*

1019 When serialized in XML these values shall be of XML Schema type: *xs:boolean*

1020 5.5.2 dateTime

1021 A value as defined by xs:dateTime per [XML Schema – Part 2](#). Any constraints on the specific ranges
1022 allowed for any particular attribute will be specified by that attribute's definition or at runtime by the
1023 Provider via the metadata discovery mechanisms defined by this specification.

1024 When serialized in JSON these values shall be of JSON type: *string*

1025 When serialized in XML these values shall be of XML Schema type: *xs:dateTime*

1026 5.5.3 duration

1027 A value as defined by xs:duration per [XML Schema – Part 2](#). Any constraints on the specific ranges
1028 allowed for any particular attribute will be specified by that attribute's definition or at runtime by the
1029 Provider via the metadata discovery mechanisms defined by this specification.

1030 When serialized in JSON these values shall be of JSON type: *string*

1031 When serialized in XML these values shall be of XML Schema type: *xs:duration*

1032 5.5.4 integer

1033 A value as defined by xs:integer per [XML Schema – Part 2](#). Any constraints on the specific ranges
1034 allowed for any particular attribute will be specified by that attribute's definition or at runtime by the
1035 Provider via the metadata discovery mechanisms defined by this specification.

1036 When serialized in JSON these values shall be of JSON type: *number*

1037 When serialized in XML these values shall be of XML Schema type: *xs:integer*

1038 5.5.5 string

1039 A value as defined by xs:string per [XML Schema – Part 2](#). Any constraints on this type for any particular
1040 attribute will be specified by that attribute's definition or at runtime by the Provider via the metadata
1041 discovery mechanisms defined by this specification.

1042 When serialized in JSON these values shall be of JSON type: *string*

1043 When serialized in XML these values shall be of XML Schema type: *xs:string*

1044 5.5.6 ref

1045 A reference to another resource.

1046 References allow for Consumers to navigate to resources. By starting at the Cloud Entry Point and
1047 following the references that appear in the retrieved resources, Consumers will be able to recursively
1048 discover and navigate to all other resources.

1049 As a general rule, when an attribute is of type "ref", its value will be held by an attribute named "href"
1050 (both in JSON and XML).

1051 JSON serialization:

1052 In the JSON serialization the "href" property appears as of type "string." When an attribute is of type "ref",
1053 the name of this attribute will appear as a key, with the "href" property as it a nested value. For example,
1054 a resource attribute "myvolume" of type "ref" is serialized as:

```
1055     "myvolume": { "href": string }
```

1056 XML serialization:

1057 In the XML serialization the "href" attribute appears as type "xs:anyURI." When an attribute is of type
1058 "ref," the name of this attribute will appear as name of an XML element with the "href" property as an
1059 (XML) attribute. For example, a resource attribute "myvolume" of type "ref" is serialized as:

```
1060     <myvolume href="xs:anyURI"/>
```

1061
1062 References in both JSON and XML have an extensibility point that allows for additional information (such
1063 as the target resource to be included "by value") if supported. For convenience the JSON and XML
1064 representations, as shown above, exclude the implicit extensibility points that would allow for the
1065 attributes of the target resource to be included if desired. So, more accurately the above representations
1066 might be written as follows:

1067 For JSON:

```
1068     "myvolume": { "href": string, ... }
```

1069 and in XML:

```
1070     <myvolume href="xs:anyURI"> xs:any* </myvolume>
```

1071 However, for brevity the extensibility points are excluded in the serialization of the resources.

1072 5.5.7 map

1073 A list of key/value pairs. The same "key" shall not be used more than once within an attribute. The "key" is
1074 case sensitive.

1075 **5.5.8 structure**

1076 Attributes of this type are complex attributes made up of a set of nested attributes. For each attribute of
1077 this type there will be an additional table defining those nested attributes.

1078 A nested structure can be considered a complex type definition. Structures may be named or unnamed.
1079 Here is an example of named structure:

1080

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

1081 **JSON serialization:**

1082 In JSON, the name of the structure (i.e., of the type it represents) never appears. In other words, whether
1083 the structure is named or not does not matter. An attribute named "systemIncidents" of type "summary"
1084 (as above) is serialized as follows:

```
1085 "systemIncidents": {
1086   "low": number,
1087   "medium": number,
1088   "high": number,
1089   "critical": number
1090 }
```

1091 **XML serialization:**

1092 In XML, the name of the structure (i.e., of the type it represents) never appears. In other words, whether
1093 the structure is named or not does not matter. The same previous "systemIncidents" example will be
1094 serialized so that the structure sub-attributes become XML attributes of a <systemIncidents> XML
1095 element wrapper:

```
1096 <systemIncidents low="xs:integer" medium="xs:integer" high="xs:integer"
1097   critical="xs:integer"/>
```

1098 NOTE: A large number of sub-attributes of atomic type in a structure may be represented alternatively as XML child
1099 elements for better readability. Both options are available; however, the same structure shall be serialized the same
1100 way across resources.

1101 **5.5.9 byte[]**

1102 An arbitrary set of bytes meant to represent a block of binary data. Any constraints on this type for any
1103 particular attribute will be specified by that attribute's definition or at runtime by the Provider via the
1104 metadata discovery mechanisms defined by this specification.

1105 When serialized in JSON these values shall be of JSON type: *string*

1106 When serialized in XML these values shall be of XML Schema type: *xs:hexBinary*

1107 **5.5.10 URI**

1108 The format and syntax of the attributes of type "URI" is defined by [RFC3986](#).

1109 Unless otherwise noted, this specification does not mandate whether Providers use relative or absolute
 1110 URI in the HTTP response bodies.

1111 When URIs are specified as relative URIs, they shall be relative to the parent of the CloudEntryPoint
 1112 unless otherwise noted; in other words, the "baseURI" is the parent of the CloudEntryPoint with a trailing
 1113 slash.

1114 The algorithm used for converting a relative URI to an absolute URI shall be as described in section 5.2 of
 1115 [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

1116 If relative URIs are used, the "baseURI" shall end with a trailing slash and relative URIs shall not begin
 1117 with a leading slash. This format will be consistent with most URI resolve utilities and will produce the
 1118 same results as a simple string concatenation algorithm.

1119 When serialized in JSON these values shall be of JSON type: *string*

1120 When serialized in XML these values shall be of XML Schema type: *xs:anyURI*

1121 **5.5.11 Arrays**

1122 An array represents an ordered list of items of the same type. An array shall always appear as an
 1123 attribute of a resource, and is only accessible as such (it is not a separately addressable resource). When
 1124 a resource is deleted, the items in its arrays shall also be deleted. However, in case these items were just
 1125 references to other resources, these referred resources are not affected (see the semantics of references
 1126 in 5.7)

1127 Attributes that are arrays are defined by using the notation "itemType[]," where itemType is the type name
 1128 for each item of the array. When the type is a structure, not a simple data type, it is recommended as a
 1129 convention in the model that the name of an array be the plural of a name that characterizes each item.
 1130 For example, an array of volume items or of references to these may be named "volumes."

1131 When an attribute is of type of references ("ref[]") – and more generally array of an atomic type - the
 1132 definition in the model will include an "Array item name", that may be used in its serialization.

1133 **JSON serialization:**

1134 Within this specification, arrays in JSON are serialized with a wrapper property. The wrapper name shall
 1135 be same as the attribute name for the array. For example, a "things" attribute of type "thing[]" is serialized
 1136 as:

```
1137 "things" : [  
1138   { ... }, +  
1139 ] ?
```

1140 When the items in the array are structures then the structure name shall not be present in the JSON
 1141 serialization.

1142 In the case of an array of references, i.e., where the "ref" type applies to each element of the array, each
 1143 element will simply be serialized as an "href" property within a JSON array. For example, an array "things"
 1144 of type "ref[]" is serialized as:

```
1145 "things": [  
1146   { "href": string }, +  
1147 ] ?
```

1148

1149 NOTE: When serializing arrays, conformant implementations shall not include empty arrays (i.e., arrays that contain
1150 no child properties) in the JSON serialization. Notice that the child of the "things" property is defined with a "+",
1151 meaning at least one child is required. This requirement ensures that the JSON serialization is minimized and only
1152 includes the wrapping "things" element if, and only if, there is at least one "thing" in the array.

1153 XML serialization:

1154 The XML serialization of arrays requires each item of the array to be represented as an element. These
1155 elements shall be consecutive and contiguous in the serialization and the name of each element (tag
1156 name) shall be the name of the element type (the name that appears before "[]" in the array type). For
1157 example, a "things" attribute will be serialized as a list of items named "thing", where "thing" is the name
1158 of a structure:

```
1159 <thing>
1160   ...
1161 </thing> *
```

1162 There is no wrapper element for an array in XML.

1163 In the case of an array of references, i.e., where the "ref" type applies to each element of the array, the
1164 array is serialized as a list of XML elements without wrapper. Each element is named per the "Array item
1165 name" value specified in the attribute's definition. For example, an array "things" of type "ref[]" where the
1166 "Array item name" is "thing", is serialized as:

```
1167 <thing href="xs:anyURI"/> +
```

1168 5.5.12 Collections

1169 Like arrays, collections are groupings of resources of the same type. In contrast with arrays, collections
1170 are themselves resources that have their own URI and can be independently accessed. Collections also
1171 allow for an optimized and convenient interaction pattern by providing a specialized set of operations that
1172 avoid replacing a large number of items when updating the set.

1173 This specification uses collections when the set of items in the list will most likely be modified often and
1174 potentially by multiple Consumers. Conversely, arrays are used when it is expected that the list of items
1175 will not be modified often or can be easily modified by substitution of the entire list, and thus the overhead
1176 of managing these items as separate resources might be burdensome.

1177 Attributes that are collections are represented as type "collection[itemType]." The resource type of the
1178 collection items are specified inside the brackets; for example an attribute that is a collection of Machines
1179 is expressed as "collection[Machine]." These will be serialized as a reference to a collection resource. For
1180 brevity, while these attributes are "references" the word "ref" or "reference" does not appear in the model
1181 definition tables - simply the type "collection[itemType]" appears.

1182 To each one of these resource items, will correspond an entry in the collection. These resources items
1183 are assumed to be of a complex type and are separately addressable and manageable. While different
1184 collections will contain entries of different resource types, all collections follow the pattern described
1185 below:

- 1186 • Collections shall contain an "id" attribute that acts as a "self pointer." Retrieving the data at this
1187 reference shall return the collection. In the XML representation, each collection shall be wrapped
1188 by a `<Collection>` element.
- 1189 • Collections shall contain a "count" attribute which indicates the number of resources in the
1190 collection at the time the collection was queried.
- 1191 • Collections shall contain a list of resources that make up the collection. As with all arrays, if there
1192 are no resources in the collection, the serialization of the list shall be omitted.

- 1193 • As with all resources in the CIMI model, each resource in the collection shall have an "id" attribute
1194 that acts as a "self pointer." Retrieving the data at this reference shall return just that one
1195 resource and not any parent resource, such as the collection or array attribute.
- 1196 • Adding new resources to the collection shall be done via the "add" operation defined within the
1197 collection. Note that lack of an "add" operation on the collection indicates that new resources are
1198 not permitted at that time.
- 1199 • Deleting resources from the collection shall be done via a "delete" operation on the resource
1200 itself.
- 1201 • Unless otherwise specified, deleting a collection shall also delete all of the resources that make
1202 up the collection, but shall not delete any tertiary resources referenced by the to-be deleted
1203 collection resources.
- 1204 • Collections shall be deleted when their owning resource is deleted.

1205 The resources in a collection are of two kinds:

- 1206 • either the resource is an infrastructure resource (such as those listed in the Cloud Entry Point, or
1207 those embedded in an entity such as the disks inside a Machine),
- 1208 • or the resource is just an intermediary resource that holds a reference to an infrastructure
1209 resource, called the "target resource". By convention, intermediary resources have a name that
1210 concatenates the name of the resource owning the collection, with the name of the target
1211 resource, e.g. "MachineVolume" is the name of the intermediary resource that is used to connect
1212 a Machine to a Volume.

1213 Collections of intermediary resources allow for decoupling the lifecycle of a collection (and of its owning
1214 entity) from the lifecycle of the actual target resources. For example, deleting a collection will delete its
1215 intermediary resources but not its target resources.

1216 The serialization of collections shall adhere to the following pattern:

1217 **JSON serialization:**

```

1218 { "resourceURI": string,
1219   "id": string,
1220   "count": number,
1221   "resourceSpecificGroupingName": [
1222     { "resourceURI": string,
1223       "id": string,
1224       "name": string, ?
1225       "description": string, ?
1226       "created": string, ?
1227       "updated": string, ?
1228       "properties": { "key": string, + }, ?
1229       ... entry specific data ...
1230       "operations": [
1231         { "rel": "edit", "href": string }, ?
1232         { "rel": "delete", "href": string } ?
1233       ] ?
1234       ...
1235     } +
1236   ], ?
1237   "operations": [ { "rel": "add", "href": string } ? ]
1238   ...
1239 }
```

1240 **XML serialization:**

```

1241 <Collection resourceURI="xs:anyURI" xmlns="http://schemas.dmtf.org/cimi/1">
1242   <id> xs:anyURI </id>
1243   <count> xs:integer </count>
1244   <ResourceSpecificElementName>
1245     <id> xs:anyURI </id>
1246     <name> xs:string </name> ?
1247     <description> xs:string </description> ?
1248     <created> xs:dateTime </created> ?
1249     <updated> xs:dateTime </updated> ?
1250     <property key="xs:string"> xs:string </property> *
1251     ... entry specific data ...
1252     <operation rel="edit" href="xs:anyURI"/> ?
1253     <operation rel="delete" href="xs:anyURI"/> ?
1254     <xs:any>*
1255   </ResourceSpecificElementName> *
1256   <operation rel="add" href="xs:anyURI"/> ?
1257   <xs:any>*
1258 </Collection>

```

1259 Where the "resourceURI" attributes shall contain the collection or resource specific URIs for that type of
 1260 collection, and "resourceSpecificGroupingName" and "ResourceSpecificElementName" shall be replaced
 1261 with the name of the collection-specific resource name, e.g. "machines" in JSON or "Machine" in XML.

1262 **5.5.12.1 Adding items to collections**

1263 Adding new resources to collections shall be done by invoking the "add" operation of the collection. The
 1264 contents of the request body will be either a representation of the new resource being added to the
 1265 collection, or a representation of the Template associated with the new resource being created. Each
 1266 resource that requires the use of a Template indicates this in its definition.

1267 For example, to add a new Volume to a Machine's "volumes" collection, the "add" operation's request
 1268 body will be serialized as follows:

1269 **JSON serialization:**

```

1270 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineVolume",
1271   "initialLocation": string,
1272   "volume": { "href": string }
1273 }

```

1274 **XML serialization:**

```

1275 <MachineVolume xmlns="http://schemas.dmtf.org/cimi/1">
1276   <initialLocation> xs:string </initialLocation>
1277   <volume href="xs:string"/>
1278 </MachineVolume>

```

1279 Note that while deleting this type of resource from the collection will delete and remove the resource from
 1280 the collection, it shall not delete the referenced target resource itself - in this case the Volume.

1281 When creating a new resource that requires the use of a Template, the "add" operation shall contain:

- 1282 • The "common attributes" as defined by clause 5.10.1.
- 1283 • The resource specific data needed to create it. This data will either be a reference to the
 1284 resource-specific Template resource or the resource-specific Template resource itself inlined.
- 1285 • In the XML case, a wrapper element (named <ResourceNameCreate>).

1286 For example, to create a new Machine (which requires the use of a Template) and add it to the
 1287 MachineCollection, the "add" operation of the MachineCollection will be serialized as follows:

1288 **JSON serialization:**

```
1289 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineCreate", ?
1290   "name": string, ?
1291   "description": string, ?
1292   "properties": { "key": string, + }, ?
1293   "machineTemplate": { "href": string ?}
1294   ...
1295 }
```

1296 **XML serialization:**

```
1297 <MachineCreate xmlns="http://schemas.dmtf.org/cimi/1">
1298   <name> xs:string </name> ?
1299   <description> xs:string </description> ?
1300   <property key="xs:string"> xs:string </property> *
1301   <machineTemplate href="xs:anyURI"? />
1302   <xs:any>*
1303 </MachineCreate>
```

1304 The MachineCollection will have a new Machine:

1305 **JSON serialization:**

```
1306 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Machine",
1307   "id": string,
1308   "name": string,
1309   ...
1310 }
```

1311 **XML serialization:**

```
1312 <Machine xmlns="http://schemas.dmtf.org/cimi/1">
1313   <id> xs:anyURI </id>
1314   <name> xs:string </name>
1315   ...
1316 </Machine>
```

1317 The processing of the "add" operation shall adhere to the semantics defined in clause 4.2.1.1.

1318 Regardless of whether a Template is used, the "add" operation shall create the new resource and add it
 1319 to the collection and a reference (URI) to the new entry shall be returned in the response message in the
 1320 HTTP Location header.

1321 **5.5.13 "Any" type**

1322 Some attributes are polymorphic and can hold various data types, the list of which is indicated in their
 1323 description. In such cases, the type of the attribute will be indicated as "any" in the model representation.

1324 **5.6 Units**

1325 Some of the resources defined by this specification have attributes that describe an amount of something
 1326 that belongs to, or is associated with, that resource. For example, the `Machine` resource has a `memory`
 1327 attribute that describes "the size of the memory allocated to this machine." The allowable units of these
 1328 attributes are listed in the following table. Their meaning is defined in [IEC 80000-13:2008](#). Their numerical
 1329 equivalents are provided here for convenience:

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

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

1330 5.7 Relationship semantics

1331 A reference between two resource instances has the semantics of a simple "association." In particular,
 1332 unless specified otherwise, (a) the same referred instance can be referred by other resource instances,
 1333 i.e., be "shared," and (b) the referred resource instance is not affected when deleting the referring
 1334 resource instance (i.e., the Delete operation is a "shallow delete" by default).

1335 The embedding of a sub-resource inside another resource, has the semantics of a "composition" (or
 1336 whole-part relationship in UML). In particular, unless specified otherwise, (a) an embedded sub-resource
 1337 cannot be shared by several resource instances, and (b) when deleting an embedding resource instance,
 1338 the embedded sub-resource instances are also deleted.

1339 5.8 Operations

1340 All resource operations defined by this specification are optional for Providers to support. Consumers, via
 1341 examination of an resource's ResourceMetadata, will be able to determine which operations are
 1342 supported. However, even for those operations that are supported Consumers will still need to examine
 1343 each resource's representation to determine which operations are supported at that moment. Whether an
 1344 operation is supported will be based on a number of factors, including state of the resource and access
 1345 control rights of the Consumer. Also see clause 4.2.

1346 5.9 Alternative model formats

1347 Because it is expected that this specification will be implemented by using a variety of technologies, as a
 1348 convenience, the definition of the model elements are provided in alternative formats that are easily
 1349 consumable by technology-specific tooling.

1350 This model is also available in a CIM/MOF format [CIMI-CIM].

1351 In the event of inconsistencies between the various formats, the normative text within this specification
 1352 takes precedence over the XML Schemas and alternative formats, which in turn take precedence over
 1353 examples.

1354 5.10 Resources

1355 The following clauses detail the attributes of the resources defined by the CIMI model.

1356 5.10.1 Common attributes

1357 Except for ResourceMetadata, the resources described by this document share the following common
 1358 attributes.

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

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

1359 The following describes the serialization of these attributes in both JSON and XML:

1360 **JSON serialization:**

```

1361 "id": string,
1362 "name": string, ?
1363 "description": string, ?
1364 "created": string, ?
1365 "updated": string, ?
1366 "properties": { "key": string, + }, ?
    
```

1367 **XML serialization:**

```

1368 <id> xs:anyURI </id>
1369 <name> xs:string </name> ?
1370 <description> xs:string </description> ?
1371 <created> xs:dateTime </created> ?
1372 <updated> xs:dateTime </updated> ?
1373 <property key="xs:string"> xs:string </property> *
    
```

1374 **5.11 Resource Metadata**

1375 Implementations of this specification should allow for Consumers to discover the metadata associated
 1376 with each supported resource. Doing so allows for the discovery of Provider defined constraints on the
 1377 CIMI defined attributes as well as discovery of any new extension attributes or operations that the
 1378 Provider may have defined. ResourceMetadata can also be used to express any Provider specific
 1379 capabilities or features. The mechanism by which this metadata is made available will be protocol
 1380 specific.

1381 Note that while this specification does not restrict the editability of the ResourceMetadata attributes, it is
 1382 expected that these types of features will be reserved for administrative type of Consumers, which means
 1383 that these attributes will be read-only for most Consumers.

1384 Each resource's metadata will contain the following pieces of information:

Name	ResourceMetadata													
Type URI	http://schemas.dmtf.org/cimi/1/ResourceMetadata													
Attribute	Type	Description												
id	<i>ref</i>	The unique self-reference to this resource; assigned upon resource creation. This attribute value is immutable , and shall be unique in the Provider's cloud. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only												
typeURI	<i>URI</i>	A unique URI associated with, and denoting, this resource type. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write												
name	<i>string</i>	The name of the resource type. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write												
attributes	<i>attribute[]</i>	A set of Provider defined metadata that can be used by clients to discover any metadata associated with each attribute, as well as the set of extension attributes. Each attribute will contain the following nested data: <table border="1" style="margin-left: 20px;"> <tr> <td>Name</td> <td colspan="2"><i>attribute</i></td> </tr> <tr> <td>Data</td> <td>Type</td> <td>Description</td> </tr> <tr> <td>name</td> <td><i>string</i></td> <td>The name of the attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> <tr> <td>namespace</td> <td><i>URI</i></td> <td>The namespace in which this attribute is defined. It is recommended that a dereference of this URI returns information about the attribute. This shall not be present when describing a CIMI defined attribute, but shall be present when describing a non-CIMI defined attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> </table>	Name	<i>attribute</i>		Data	Type	Description	name	<i>string</i>	The name of the attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	namespace	<i>URI</i>	The namespace in which this attribute is defined. It is recommended that a dereference of this URI returns information about the attribute. This shall not be present when describing a CIMI defined attribute, but shall be present when describing a non-CIMI defined attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
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Data	Type	Description												
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		<table border="1"> <tr> <td>type</td> <td><i>string</i></td> <td> The data type of the attribute. This shall not be present when describing a CIMI defined attribute, but shall be present when describing a non-CIMI defined attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write </td> </tr> <tr> <td>required</td> <td><i>boolean</i></td> <td> Indicates whether this resource requires this attribute to be present. When absent the implied value is "false." Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write </td> </tr> <tr> <td>constraints</td> <td><i>any</i></td> <td> Type specific data that describes the constraints of this attribute. When absent there are no constraints. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write </td> </tr> </table> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>	type	<i>string</i>	The data type of the attribute. This shall not be present when describing a CIMI defined attribute, but shall be present when describing a non-CIMI defined attribute. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	required	<i>boolean</i>	Indicates whether this resource requires this attribute to be present. When absent the implied value is "false." Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	constraints	<i>any</i>	Type specific data that describes the constraints of this attribute. When absent there are no constraints. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write									
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constraints	<i>any</i>	Type specific data that describes the constraints of this attribute. When absent there are no constraints. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write																		
capabilities	<i>capability[]</i>	<p>A set of Provider defined metadata that can be used by Consumer to discover any capability or feature provided by this Provider.</p> <p>Each capability will contain the following nested data:</p> <table border="1"> <thead> <tr> <th>Name</th> <td colspan="2"><i>capability</i></td> </tr> <tr> <th>Data</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>name</td> <td><i>string</i></td> <td> The name of the capability. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write </td> </tr> <tr> <td>uri</td> <td><i>URI</i></td> <td> A URI that uniquely identifies the capability at a global level. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write </td> </tr> <tr> <td>description</td> <td><i>string</i></td> <td> The human readable description of the semantic of the capability. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write </td> </tr> <tr> <td>value</td> <td><i>any</i></td> <td> The value of the capability. The specific type will vary depending on the definition of the capability. When not present the capability defaults to a "boolean" type with a value of "true" indicating that the specific capability is supported by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write </td> </tr> </tbody> </table> <p>Constraints: Provider: support optional; mutable</p>	Name	<i>capability</i>		Data	Type	Description	name	<i>string</i>	The name of the capability. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write	uri	<i>URI</i>	A URI that uniquely identifies the capability at a global level. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	description	<i>string</i>	The human readable description of the semantic of the capability. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write	value	<i>any</i>	The value of the capability. The specific type will vary depending on the definition of the capability. When not present the capability defaults to a "boolean" type with a value of "true" indicating that the specific capability is supported by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
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Data	Type	Description																		
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		Consumer: support optional; read-write																								
actions	<i>action[]</i>	<p>A set of Provider defined operations that can be used by clients to act on the resource. Note that this attribute is called "actions" so as not to conflict with the ResourceMetadata resource's operations.</p> <p>Each operation will contain the following nested data:</p> <table border="1"> <thead> <tr> <th>Name</th> <th colspan="2"><i>action</i></th> </tr> <tr> <th>Data</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>name</td> <td><i>string</i></td> <td>The name of the operation. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> <tr> <td>uri</td> <td><i>URI</i></td> <td>A URI that uniquely identifies the operation at a global level. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> <tr> <td>description</td> <td><i>string</i></td> <td>The human readable description of the semantic of the operation. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write</td> </tr> <tr> <td>method</td> <td><i>string</i></td> <td>The protocol dependent verb to use to perform the operation. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> <tr> <td>inputMessage</td> <td><i>string</i></td> <td>The body mimeType of the request message; it may depend on the model format chosen by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> <tr> <td>outputMessage</td> <td><i>string</i></td> <td>The body mimeType of the response message; it may depend on the model format chosen by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</td> </tr> </tbody> </table> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>	Name	<i>action</i>		Data	Type	Description	name	<i>string</i>	The name of the operation. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	uri	<i>URI</i>	A URI that uniquely identifies the operation at a global level. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	description	<i>string</i>	The human readable description of the semantic of the operation. Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write	method	<i>string</i>	The protocol dependent verb to use to perform the operation. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	inputMessage	<i>string</i>	The body mimeType of the request message; it may depend on the model format chosen by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write	outputMessage	<i>string</i>	The body mimeType of the response message; it may depend on the model format chosen by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
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outputMessage	<i>string</i>	The body mimeType of the response message; it may depend on the model format chosen by the Provider. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write																								

1385 The following describes the serialization of the resource in both JSON and XML:

1386 **JSON media type:** application/json

1387 **JSON serialization:**

```

1388 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ResourceMetadata",
1389   "id": string,
1390   "typeURI": URI,
1391   "name": string,
```

```

1392 "attributes" : [
1393   { "name": string,
1394     "namespace": string, ?
1395     "type": string, ?
1396     "required": boolean, ?
1397     ...constraints...? } *
1398 ], ?
1399 "capabilities": [
1400   { "name": string, ?
1401     "uri": string,
1402     "description": string, ?
1403     "value": any } *
1404 ], ?
1405 "actions" : [
1406   { "name": string,
1407     "uri": string,
1408     "description": string, ?
1409     "method": string,
1410     "inputMessage": string, ?
1411     "outputMessage": string ? }, *
1412 ], ?
1413 "operations": [
1414   { "rel": "edit", "href": string } ?
1415   { "rel": "delete", "href": string }, ?
1416 ] ?
1417 ...
1418 }
    
```

1419 **XML media type:** application/xml

1420 **XML serialization:**

```

1421 <ResourceMetadata xmlns="http://schemas.dmtf.org/cimi/1">
1422   <id> xs:anyURI </id>
1423   <name> xs:string </name>
1424   <typeURI> xs:anyURI </typeURI>
1425   <attribute name="xs:string" namespace="xs:anyURI"? type="xs:string"
1426     required="xs:boolean"? >
1427     ...constraints...?
1428   </attribute> *
1429   <capability name="xs:string"? uri="xs:anyURI" description="xs:string"?>
1430     xs:any*
1431   </capability> *
1432   <action name="xs:string" uri="xs:anyURI" description="xs:string"?
1433     method="xs:string" inputMessage="xs:string"?
1434     outputMessage="xs:string"? /> *
1435   <operation rel="edit" href="xs:anyURI"/> ?
1436   <operation rel="delete" href="xs:anyURI"/> ?
1437   <xs:any>*
1438 </ResourceMetadata>
    
```

1439 Additional metadata about the resource or attributes may be included by the Provider.

1440 5.11.1 Attribute types

1441 The following describes the values, syntax, and serialization of the "constraints" attribute (sub-attribute of
 1442 "attributes"), which has a type of "any."

1443 **type="string"**

1444 The JSON shall be of the form:

```

1445 "values": [ string, + ] ?
    
```

1446 The XML shall be of the form:

```
1447 <value> xs:string </value> *
```

1448 **type="integer"**

1449 The JSON shall be of the form:

```
1450 "values": [ number, + ], ?
1451 "ranges": [ { "low": number, "high": number }, + ] ?
```

1452 The XML shall be of the form:

```
1453 <value> xs:integer </value> *
1454 <range low="xs:integer" high="xs:integer"/> *
```

1455 The total value space of an 'integer' attribute is the accumulation of all values and ranges.

1456 **type="boolean"**

1457 The JSON shall be of the form:

```
1458 "value": boolean ?
```

1459 The XML shall be of the form:

```
1460 <value> xs:boolean </value> ?
```

1461 Only one 'value' is permitted. It indicates whether the attribute is required to be either 'true' or 'false'.

1462 5.11.1.1 Examples

1463 The following shows a sample metadata document for a VolumeConfiguration resource in XML that lists
1464 the allowable values for the "format" attribute and has been extended with a "Location" string attribute:

```
1465 <ResourceMetadata xmlns="http://schemas.dmtf.org/cimi/1">
1466   <id> http://example.org/types/VC </id>
1467   <typeURI> http://schemas.dmtf.org/cimi/1/VolumeConfiguration </typeURI>
1468   <name> VolumeConfiguration </name>
1469   <attribute name="format" type="string" required="false">
1470     <value> ext4 </value>
1471     <value> ntfs </value>
1472   </attribute>
1473   <attribute name="Location" namespace="http://example.org/" type="string"/>
1474 </ResourceMetadata>
```

1475 The following shows the same VolumeConfiguration but the "Location" attribute is restricted to a set of
1476 values and is required:

```
1477 <ResourceMetadata xmlns="http://schemas.dmtf.org/cimi/1">
1478   <id> http://example.org/types/VC </id>
1479   <typeURI> http://schemas.dmtf.org/cimi/1/VolumeConfiguration </typeURI>
1480   <name> VolumeConfiguration </name>
1481   <attribute name="format" type="string" required="false">
1482     <value> ext4 </value>
1483     <value> ntfs </value>
1484   </attribute>
1485   <attribute name="Location" namespace="http://example.org/" type="string"
1486     required="true">
1487     <value> NYC </value>
1488     <value> LAX </value>
1489   </attribute>
1490 </ResourceMetadata>
```

1491 The following shows the same VolumeConfiguration serialized in JSON:


```

1492 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
1493     "id": "http://example.org/types/VC",
1494     "typeURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
1495     "name": "VolumeConfiguration",
1496     "attributes": [
1497         { "name": "format",
1498           "type": "string",
1499           "required": false,
1500           "values": [ "ext4", "ntfs" ]
1501         },
1502         { "name": "Location",
1503           "namespace": "http://example.org",
1504           "type": "string",
1505           "required": true,
1506           "values": [ "NYC", "LAX" ]
1507         }
1508     ]
1509 }

```

1510 The following shows a Volume serialized in JSON which provides an action of data compression. In this
 1511 specific example the method returned (POST) is for the CIMI HTTP protocol; should another protocol be
 1512 implemented (e.g. SOAP) the "method" will be different :

```

1513 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
1514     "id": "http://example.org/types/V",
1515     "typeURI": "http://schemas.dmtf.org/cimi/1/Volume",
1516     "name": "Volume",
1517     "actions": [
1518         {
1519             "name": "compress",
1520             "uri": "http://example.org/cimi/action/compress"
1521             "description": "Compress the data stored in the volume",
1522             "method": "POST"
1523         }
1524     ]
1525 }

```

1526 5.11.2 Capabilities

1527 The following table describes the capability URIs defined by this specification. Providers may define new
 1528 URIs and it is recommended that these URIs be dereferencable such that Consumers can discover the
 1529 details of the new capability. The "Resource Name" column contains the name of the resource that may
 1530 contain the specified capability within its ResourceMetadata. The "Capability Name" column contains the
 1531 name of the specified capability and shall be unique within the scope of the corresponding resource. Each
 1532 capability's URI shall be constructed by appending the "Resource Name", a slash(/), and the "Capability
 1533 Name" to "http://schemas.dmtf.org/cimi/1/capability/". For example, the Machine's "InitialState" capability
 1534 would have a URI of:

```

1535 http://schemas.dmtf.org/cimi/1/capability/Machine/InitialState

```

1536 Note that capabilities that apply to the Provider in general, and are not specific to any one resource, are
 1537 associated with the Cloud Entry Point resource (in case a capability would apply only to the
 1538 CloudEntryPoint resource itself, its definition would say so).

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

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

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

1539 The following example shows the ResourceMetadata for a Machine that advertises some of its
 1540 capabilities:

1541 **JSON serialization:**

```

1542 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ResourceMetadata",
1543   "id": "http://example.com/types/Machine",
1544   "typeURI": "http://schemas.dmtf.org/cimi/1/Machine",
1545   "name": "Machine",
1546   "capabilities": [
1547     { "uri":
1548       "http://schemas.dmtf.org/cimi/1/capability/Machine/MachineConfigByValue",
1549       "value": true },
1550     { "uri":
1551       "http://schemas.dmtf.org/cimi/1/capability/Machine/MachineImageByValue",
1552       "value": true },
1553     { "uri":
1554       "http://schemas.dmtf.org/cimi/1/capability/Machine/DefaultInitialState",
1555       "value": "STARTED" }
    ]
    
```

```
1556     }
1557 }
```

1558 XML serialization:

```
1559 <ResourceMetadata xmlns="http://schemas.dmtf.org/cimi/1">
1560   <id> http://example.org/types/Machine </id>
1561   <typeURI> http://schemas.dmtf.org/cimi/1/Machine </typeURI>
1562   <name> Machine </name>
1563   <capability
1564     uri="http://schemas.dmtf.org/cimi/1/capability/Machine/MachineConfigByValue">
1565     true
1566   </capability>
1567   <capability
1568     uri="http://schemas.dmtf.org/cimi/1/capability/Machine/MachineImageByValue">
1569     true
1570   </capability>
1571   <capability
1572     uri="http://schemas.dmtf.org/cimi/1/capability/Machine/DefaultInitialState">
1573     STARTED
1574   </capability>
1575 </ResourceMetadata>
```

1576 5.11.3 ResourceMetadata Collection

1577 A ResourceMetadata Collection resource represents the collection of ResourceMetadata resources within
 1578 a Provider and follows the Collection pattern defined in clause 5.5.12. Note that modifications of the
 1579 resources within this collection will typically be reserved for administrator type of CIMI Consumers. This
 1580 resource shall be serialized as follows:

1581 JSON serialization:

```
1582 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ResourceMetadataCollection",
1583   "id": string,
1584   "count": number,
1585   "resourceMetadatas": [
1586     { "resourceURI": "http://schemas.dmtf.org/cimi/1/ResourceMetadata",
1587       "id": string,
1588       ... remaining ResourceMetadata attributes ...
1589     }, +
1590   ], ?
1591   "operations": [ { "rel": "add", "href": string } ? ]
1592   ...
1593 }
```

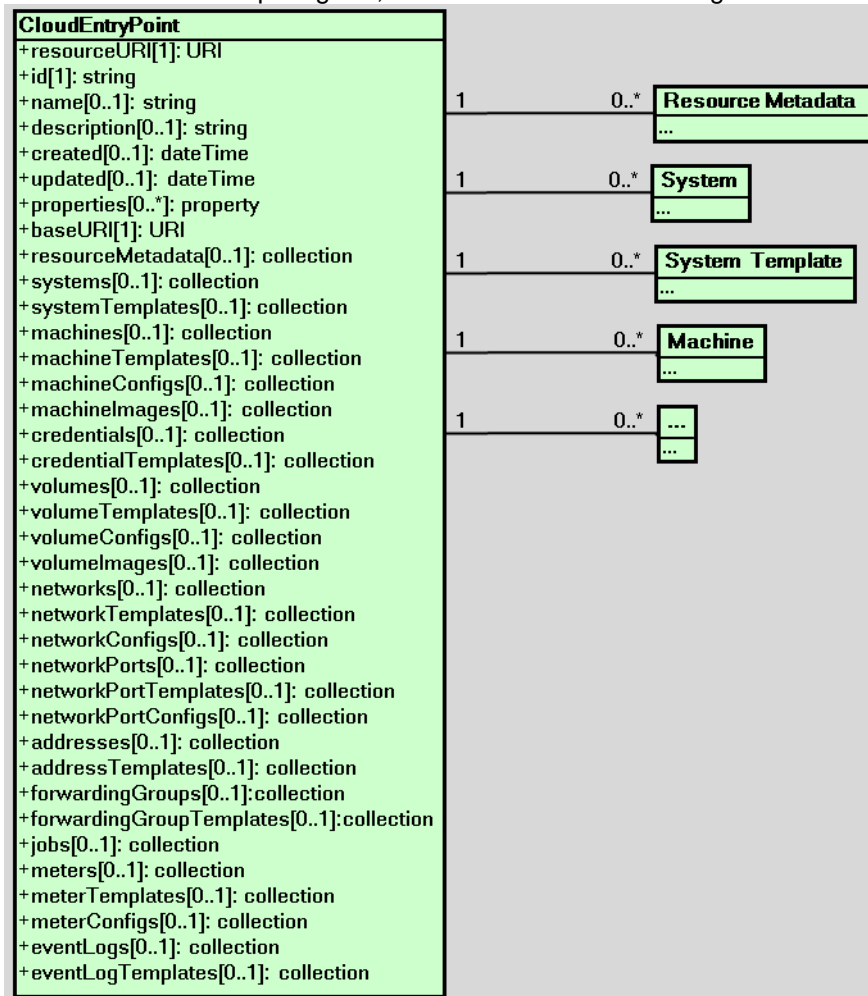
1594 XML serialization:

```
1595 <Collection
1596   resourceURI="http://schemas.dmtf.org/cimi/1/ResourceMetadataCollection"
1597   xmlns="http://schemas.dmtf.org/cimi/1">
1598   <id> xs:anyURI </id>
1599   <count> xs:integer </count>
1600   <ResourceMetadata>
1601     <id> xs:anyURI </id>
1602     ... remaining ResourceMetadata attributes ...
1603   </ResourceMetadata> *
1604   <operation rel="add" href="xs:anyURI"/> ?
1605   <xs:any>*
1606 </Collection>
```

1607 **5.12 Cloud Entry Point**

1608 The Cloud Entry Point represents the entry point into the cloud defined by the CIMI Model. The Cloud
 1609 Entry Point implements a catalog of resources, such as Systems, System Templates, Machines, Machine
 1610 Templates, etc., that can be queried and browsed by the Consumer.

1611 Figure 1 illustrates the Cloud Entry Point and its relationship to other resources. Although this drawing is
 1612 in the style of a Resource Relationship diagram, the use of UML is neither rigorous nor normative.



1613

1614

Figure 1 - Cloud Entry Point

1615 When a Consumer issues a read on the Cloud Entry Point resource, then the Provider shall return a
 1616 Cloud Entry Point resource that only catalogs resources that this Consumer is allowed to perform
 1617 operations on.

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

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

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

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

1618 Each of the collections mentioned above will be defined within the related resource definition clauses. For
 1619 example, the MachineCollection resource will be defined in clause 5.14.2 as part of the Machine related
 1620 resources.

1621 The following describes the serialization of the resource in both JSON and XML:

1622 **JSON media type:** application/json

1623 **JSON serialization:**

```

1624 { "resourceURI": "http://schemas.dmtf.org/cimi/1/CloudEntryPoint",
1625   "id": string,
1626   "name": string, ?
1627   "description": string, ?
1628   "created": string, ?
1629   "updated": string, ?
1630   "properties": { "key": string, + }, ?
1631   "baseURI": string,
```



```

1632     "resourceMetadata": { "href": string }, ?
1633     "systems": { "href": string }, ?
1634     "systemTemplates": { "href": string }, ?
1635     "machines": { "href": string }, ?
1636     "machineTemplates": { "href": string }, ?
1637     "machineConfigs": { "href": string }, ?
1638     "machineImages": { "href": string }, ?
1639     "credentials": { "href" string }, ?
1640     "credentialTemplates": { "href" string }, ?
1641     "volumes": { "href": string }, ?
1642     "volumeTemplates": { "href": string }, ?
1643     "volumeConfigs": { "href": string }, ?
1644     "volumeImages": { "href": string }, ?
1645     "networks": { "href": string }, ?
1646     "networkTemplates": { "href": string }, ?
1647     "networkConfigs": { "href": string }, ?
1648     "networkPorts": { "href": string }, ?
1649     "networkPortTemplates": { "href": string }, ?
1650     "networkPortConfigs": { "href": string }, ?
1651     "addresses": { "href": string }, ?
1652     "addressTemplates": { "href": string }, ?
1653     "forwardingGroups" { "href": string }, ?
1654     "forwardingGroupTemplates" { "href": string }, ?
1655     "jobs": { "href": string }, ?
1656     "meters": { "href": string }, ?
1657     "meterTemplates": { "href": string }, ?
1658     "meterConfigs": { "href": string }, ?
1659     "eventLogs": { "href": string }, ?
1660     "eventLogTemplates": { "href": string }, ?
1661     "operations": [
1662         { "rel": "edit", "href": string }, ?
1663     ] ?
1664     ...
1665 }
    
```

1666 **XML media type:** application/xml

1667 **XML serialization:**

```

1668 <CloudEntryPoint xmlns="http://schemas.dmtf.org/cimi/1">
1669   <id> xs:anyURI </id>
1670   <name> xs:string </name> ?
1671   <description> xs:string </description> ?
1672   <created> xs:dateTime </created> ?
1673   <updated> xs:dateTime </updated> ?
1674   <property key="xs:string"> xs:string </property> *
1675   <baseURI> xs:anyURI </baseURI>
1676   <resourceMetadata href="xs:anyURI"/> ?
1677   <systems href="xs:anyURI"/> ?
1678   <systemTemplates href="xs:anyURI"/> ?
1679   <machines href="xs:anyURI"/> ?
1680   <machineTemplates href="xs:anyURI"/> ?
1681   <machineConfigs href="xs:anyURI"/> ?
1682   <machineImages href="xs:anyURI"/> ?
1683   <credentials href="xs:anyURI"/> ?
1684   <credentialTemplates href="xs:anyURI"/> ?
1685   <volumes href="xs:anyURI"/> ?
1686   <volumeTemplates href="xs:anyURI"/> ?
1687   <volumeConfigs href="xs:anyURI"/> ?
1688   <volumeImages href="xs:anyURI"/> ?
1689   <networks href="xs:anyURI"/> ?
1690   <networkTemplates href="xs:anyURI"/> ?
1691   <networkConfigs href="xs:anyURI"/> ?
1692   <networkPorts href="xs:anyURI"/> ?
    
```

```

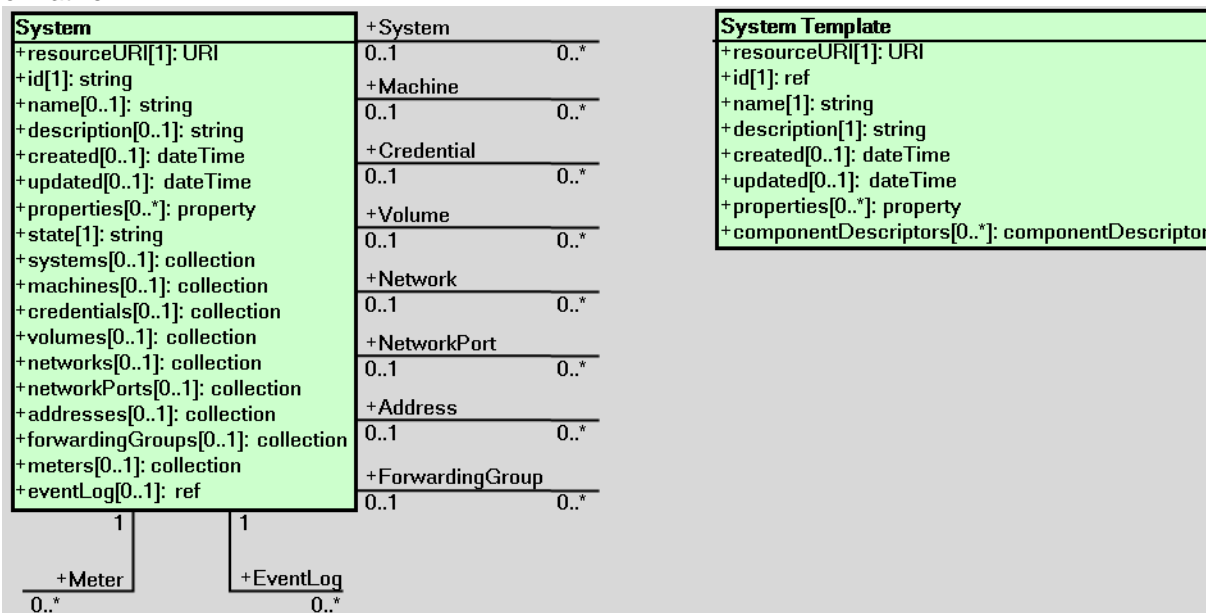
1693 <networkPortTemplates href="xs:anyURI"/> ?
1694 <networkPortConfigs href="xs:anyURI"/> ?
1695 <addresses href="xs:anyURI"/> ?
1696 <addressTemplates href="xs:anyURI"/> ?
1697 <forwardingGroups href="xs:anyURI"/> ?
1698 <forwardingGroupTemplates href="xs:anyURI"/> ?
1699 <jobs href="xs:anyURI"/> ?
1700 <meters href="xs:anyURI"/> ?
1701 <meterTemplates href="xs:anyURI"/> ?
1702 <meterConfigs href="xs:anyURI"/> ?
1703 <eventLogs href="xs:anyURI"/> ?
1704 <eventLogTemplates href="xs:anyURI"/> ?
1705 <operation rel="edit" href="xs:anyURI"/> ?
1706 <xs:any>*
1707 </CloudEntryPoint>
    
```

1708 **5.12.1 Operations**

1709 This resource supports the Read and Update operations.

1710 **5.13 System resources and relationships**

1711 Figure 2 illustrates the resources involved in constructing a System and their relationships. Although this
 1712 drawing is in the style of a Resource Relationship diagram, the use of UML is neither rigorous nor
 1713 normative.



1714 **Figure 2 - System resources**

1715 **5.13.1 System**

1716 A System is a realized resource that consists of one or more Networks, Volumes, Machines, (and others)
 1717 that could be connected and associated with each other. A System can be created from the interpretation
 1718 of a SystemTemplate. A System can be operated and managed as a single resource and usually forms a
 1719 stack of service. For example, a shopping cart system consists of machines for web servers and
 1720 databases, network addresses for public access, and volumes for database files. A System may directly
 1721 provide a user-facing component, or may provide an infrastructure component.

1722 A System has several "top-level" attributes that are collections of references to resources that are owned
 1723 by the System. A resource that is owned by a System has its lifecycle directly tied to the lifecycle of the
 1724 System. In particular, when a System is deleted, all of its owned resources shall also be deleted.
 1725 Generally, operations on a System will translate into operations on its owned resources.

1726 However, a resource owned by a System may in turn refer to some other resources that are not owned by
 1727 this System, e.g., a Machine in a System can refer to a Volume that is not owned by this System. More
 1728 precisely, the following rules apply:

- 1729 • By default, all resources that are created as the result of a System creation are also owned by
 1730 the System. (This rule can be overridden by subsequent modifications to the top-level System
 1731 collection attributes.)
- 1732 • Ownership of a resource to a System is expressed by including the reference to the resource in
 1733 the appropriate top-level System collection attribute, or by ownership to a sub-System of this
 1734 System (i.e., ownership is transitive across hierarchies of Systems).
- 1735 • When a resource other than a System is added to an existing System (i.e., becomes owned by
 1736 the System by insertion of its reference to the appropriate top-level System collection attribute)
 1737 other resources already referred by this added resource are by default not owned by the
 1738 System. (This rule can be overridden by subsequent modifications to the top-level System
 1739 collection attributes.)

1740 A resource shall not be owned by more than one System at any point in time (unless there is an
 1741 ownership relationship between these Systems). Note that a resource does not need to be owned by a
 1742 System (i.e. part of any of its collection attributes) to be referenced/used by a resource in the System. By
 1743 not including it in any of the collections, the resource will simply not be part of any actions performed on
 1744 the System.

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

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

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

1745 **JSON media type:** application/json

1746 **JSON serialization:**

```

1747 { "resourceURI": "http://schemas.dmtf.org/cimi/1/System",
1748   "id": string,
1749   "name": string, ?
1750   "description": string, ?
1751   "created": string, ?
1752   "updated": string, ?
1753   "properties": { "key": string, + }, ?
1754   "state": string,
1755   "systems": { "href": string }, ?
1756   "machines": { "href": string }, ?
1757   "credentials": { "href": string }, ?
    
```

```

1758 "volumes": { "href": string }, ?
1759 "networks": { "href": string }, ?
1760 "networkPorts": { "href": string }, ?
1761 "addresses": { "href": string }, ?
1762 "forwardingGroups": { "href": string }, ?
1763 "meters": { "href": string }, ?
1764 "eventLog": { "href": string }, ?
1765 "operations": [
1766   { "rel": "edit", "href": string }, ?
1767   { "rel": "delete", "href": string }, ?
1768   { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
1769   { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string }, ?
1770   { "rel": "http://schemas.dmtf.org/cimi/1/action/restart", "href": string },
1771   ?
1772   { "rel": "http://schemas.dmtf.org/cimi/1/action/pause", "href": string }, ?
1773   { "rel": "http://schemas.dmtf.org/cimi/1/action/suspend", "href": string },
1774   ?
1775   { "rel": "http://schemas.dmtf.org/cimi/1/action/export", "href": string } ?
1776 ] ?
1777 ...
1778 }

```

1779 **XML media type:** application/xml

1780 **XML serialization:**

```

1781 <System xmlns="http://schemas.dmtf.org/cimi/1">
1782   <id> xs:anyURI </id>
1783   <name> xs:string </name> ?
1784   <description> xs:string </description> ?
1785   <created> xs:dateTime </created> ?
1786   <updated> xs:dateTime </updated> ?
1787   <property key="xs:string"> xs:string </property> *
1788   <state> xs:string </state>
1789   <systems href="xs:anyURI"/> ?
1790   <machines href="xs:anyURI"/> ?
1791   <credentials href="xs:anyURI"/> ?
1792   <volumes href="xs:anyURI"/> ?
1793   <networks href="xs:anyURI"/> ?
1794   <networkPorts href="xs:anyURI"/> ?
1795   <addresses href="xs:anyURI"/> ?
1796   <forwardingGroups href="xs:anyURI"/> ?
1797   <meters href="xs:anyURI"/> ?
1798   <eventLog href="xs:anyURI"/> ?
1799   <operation rel="edit" href="xs:anyURI"/> ?
1800   <operation rel="delete" href="xs:anyURI"/> ?
1801   <operation rel="http://schemas.dmtf.org/cimi/1/action/start"
1802     href="xs:anyURI"/> ?
1803   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
1804     href="xs:anyURI"/> ?
1805   <operation rel="http://schemas.dmtf.org/cimi/1/action/restart"
1806     href="xs:anyURI"/> ?
1807   <operation rel="http://schemas.dmtf.org/cimi/1/action/pause"
1808     href="xs:anyURI"/> ?
1809   <operation rel="http://schemas.dmtf.org/cimi/1/action/suspend"
1810     href="xs:anyURI"/> ?
1811   <operation rel="http://schemas.dmtf.org/cimi/1/action/export"
1812     href="xs:anyURI"/> ?
1813   <xs:any>*
1814 </System>

```

1815 **5.13.1.1 Collections**

1816 The following describes the collection resources owned by Systems.

 1817 **5.13.1.1.1 SystemSystem Collection**

1818 The resource type for each item of this collection is "SystemSystem", defined as follows:

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

 1819 **JSON serialization:**

```

1820 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemSystemCollection",
1821   "id": string,
1822   "count": number,
1823   "systemSystems": [
1824     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemSystem",
1825       "id": string,
1826       "name": string, ?
1827       "description": string, ?
1828       "created": string, ?
1829       "updated": string, ?
1830       "properties": { "key": string, + }, ?
1831       "system": { "href": string },
1832       "operations": [
1833         { "rel": "edit", "href": string }, ?
1834         { "rel": "delete", "href": string } ?
1835       ] ?
1836       ...
1837     }, +
1838   ], ?
1839   "operations": [ { "rel": "add", "href": string } ? ]
1840   ...
1841 }
```

 1842 **XML serialization:**

```

1843 <Collection
1844   resourceURI="http://schemas.dmtf.org/cimi/1/SystemSystemCollection"
1845   xmlns="http://schemas.dmtf.org/cimi/1">
1846   <id> xs:anyURI </id>
1847   <count> xs:integer </count>
1848   <SystemSystem>
1849     <id> xs:anyURI </id>
1850     <name> xs:string </name> ?
1851     <description> xs:string </description> ?
1852     <created> xs:dateTime </created> ?
1853     <updated> xs:dateTime </updated> ?
1854     <property key="xs:string"> xs:string </property> *
1855     <system href="xs:anyURI"/>
1856     <operation rel="edit" href="xs:anyURI"/> ?
1857     <operation rel="delete" href="xs:anyURI"/> ?
1858     <xs:any>*
1859   </SystemSystem> *
1860   <operation rel="add" href="xs:anyURI"/> ?
```

```
1861     <xs:any>*
1862 </Collection>
```

1863 5.13.1.1.2 SystemMachine Collection

1864 The resource type for each item of this collection is “SystemMachine”, defined as follows:

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

1865 JSON serialization:

```
1866 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemMachineCollection",
1867   "id": string,
1868   "count": number,
1869   "systemMachines": [
1870     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemMachine",
1871       "id": string,
1872       "name": string, ?
1873       "description": string, ?
1874       "created": string, ?
1875       "updated": string, ?
1876       "properties": { "key": string, + }, ?
1877       "machine": { "href": string },
1878       "operations": [
1879         { "rel": "edit", "href": string }, ?
1880         { "rel": "delete", "href": string } ?
1881       ] ?
1882       ...
1883     }, +
1884   ], ?
1885   "operations": [ { "rel": "add", "href": string } ? ]
1886   ...
1887 }
```

1888 XML serialization:

```
1889 <Collection
1890   resourceURI="http://schemas.dmtf.org/cimi/1/SystemMachineCollection"
1891   xmlns="http://schemas.dmtf.org/cimi/1">
1892   <id> xs:anyURI </id>
1893   <count> xs:integer </count>
1894   <SystemMachine>
1895     <id> xs:anyURI </id>
1896     <name> xs:string </name> ?
1897     <description> xs:string </description> ?
1898     <created> xs:dateTime </created> ?
1899     <updated> xs:dateTime </updated> ?
1900     <property key="xs:string"> xs:string </property> *
1901     <machine href="xs:anyURI"/>
1902     <operation rel="edit" href="xs:anyURI"/> ?
1903     <operation rel="delete" href="xs:anyURI"/> ?
1904     <xs:any>*
1905   </SystemMachine> *
1906   <operation rel="add" href="xs:anyURI"/> ?
1907   <xs:any>*
```


1908 </Collection>

1909 5.13.1.1.3 SystemCredential Collection

1910 The resource type for each item of this collection is "SystemCredential", defined as follows:

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

1911 JSON serialization:

```

1912 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemCredentialCollection",
1913   "id": string,
1914   "count": number,
1915   "systemCredentials": [
1916     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemCredential",
1917       "id": string,
1918       "name": string, ?
1919       "description": string, ?
1920       "created": string, ?
1921       "updated": string, ?
1922       "properties": { "key": string, + }, ?
1923       "credential": { "href": string },
1924       "operations": [
1925         { "rel": "edit", "href": string }, ?
1926         { "rel": "delete", "href": string } ?
1927       ] ?
1928       ...
1929     }, +
1930   ], ?
1931   "operations": [ { "rel": "add", "href": string } ? ]
1932   ...
1933 }
```

1934 XML serialization:

```

1935 <Collection
1936   resourceURI="http://schemas.dmtf.org/cimi/1/SystemCredentialCollection"
1937   xmlns="http://schemas.dmtf.org/cimi/1">
1938   <id> xs:anyURI </id>
1939   <count> xs:integer </count>
1940   <SystemCredential>
1941     <id> xs:anyURI </id>
1942     <name> xs:string </name> ?
1943     <description> xs:string </description> ?
1944     <created> xs:dateTime </created> ?
1945     <updated> xs:dateTime </updated> ?
1946     <property key="xs:string"> xs:string </property> *
1947     <credential href="xs:anyURI"/>
1948     <operation rel="edit" href="xs:anyURI"/> ?
1949     <operation rel="delete" href="xs:anyURI"/> ?
1950     <xs:any*>
1951   </SystemCredential> *
1952   <operation rel="add" href="xs:anyURI"/> ?
1953   <xs:any*>
1954 </Collection>
```

1955 **5.13.1.1.4 SystemVolume Collection**

1956 The resource type for each item of this collection is "SystemVolume", defined as follows:

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

1957 **JSON serialization:**

```

1958 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemVolumeCollection",
1959   "id": string,
1960   "count": number,
1961   "systemVolumes": [
1962     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemVolume",
1963       "id": string,
1964       "name": string, ?
1965       "description": string, ?
1966       "created": string, ?
1967       "updated": string, ?
1968       "properties": { "key": string, + }, ?
1969       "volume": { "href": string },
1970       "operations": [
1971         { "rel": "edit", "href": string }, ?
1972         { "rel": "delete", "href": string } ?
1973       ] ?
1974       ...
1975     }, +
1976   ], ?
1977   "operations": [ { "rel": "add", "href": string } ? ]
1978   ...
1979 }

```

1980 **XML serialization:**

```

1981 <Collection
1982   resourceURI="http://schemas.dmtf.org/cimi/1/SystemVolumeCollection"
1983   xmlns="http://schemas.dmtf.org/cimi/1">
1984   <id> xs:anyURI </id>
1985   <count> xs:integer </count>
1986   <SystemVolume>
1987     <id> xs:anyURI </id>
1988     <name> xs:string </name> ?
1989     <description> xs:string </description> ?
1990     <created> xs:dateTime </created> ?
1991     <updated> xs:dateTime </updated> ?
1992     <property key="xs:string"> xs:string </property> *
1993     <volume href="xs:anyURI"/>
1994     <operation rel="edit" href="xs:anyURI"/> ?
1995     <operation rel="delete" href="xs:anyURI"/> ?
1996     <xs:any>*
1997   </SystemVolume> *
1998   <operation rel="add" href="xs:anyURI"/> ?
1999   <xs:any>*
2000 </Collection>

```

2001 **5.13.1.1.5 SystemNetwork Collection**

2002 The resource type for each item of this collection is “SystemNetwork”, defined as follows:

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

2003 **JSON serialization:**

```

2004 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemNetworkCollection",
2005   "id": string,
2006   "count": number,
2007   "systemNetworks": [
2008     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemNetwork",
2009       "id": string,
2010       "name": string, ?
2011       "description": string, ?
2012       "created": string, ?
2013       "updated": string, ?
2014       "properties": { "key": string, + }, ?
2015       "network": { "href": string },
2016       "operations": [
2017         { "rel": "edit", "href": string }, ?
2018         { "rel": "delete", "href": string } ?
2019       ] ?
2020       ...
2021     }, +
2022   ], ?
2023   "operations": [ { "rel": "add", "href": string } ? ]
2024   ...
2025 }
    
```

2026 **XML serialization:**

```

2027 <Collection
2028   resourceURI="http://schemas.dmtf.org/cimi/1/SystemNetworkCollection"
2029   xmlns="http://schemas.dmtf.org/cimi/1">
2030   <id> xs:anyURI </id>
2031   <count> xs:integer </count>
2032   <SystemNetwork>
2033     <id> xs:anyURI </id>
2034     <name> xs:string </name> ?
2035     <description> xs:string </description> ?
2036     <created> xs:dateTime </created> ?
2037     <updated> xs:dateTime </updated> ?
2038     <property key="xs:string"> xs:string </property> *
2039     <network href="xs:anyURI"/>
2040     <operation rel="edit" href="xs:anyURI"/> ?
2041     <operation rel="delete" href="xs:anyURI"/> ?
2042     <xs:any>*
2043   </SystemNetwork> *
2044   <operation rel="add" href="xs:anyURI"/> ?
2045   <xs:any>*
2046 </Collection>
    
```

2047 **5.13.1.1.6 SystemNetworkPort Collection**

2048 The resource type for each item of this collection is "SystemNetwork", defined as follows:

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

2049 **JSON serialization:**

```

2050 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemNetworkPortCollection",
2051   "id": string,
2052   "count": number,
2053   "systemNetworkPorts": [
2054     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemNetworkPort",
2055       "id": string,
2056       "name": string, ?
2057       "description": string, ?
2058       "created": string, ?
2059       "updated": string, ?
2060       "properties": { "key": string, + }, ?
2061       "networkPort": { "href": string },
2062       "operations": [
2063         { "rel": "edit", "href": string }, ?
2064         { "rel": "delete", "href": string } ?
2065       ] ?
2066       ...
2067     }, +
2068   ], ?
2069   "operations": [ { "rel": "add", "href": string } ? ]
2070   ...
2071 }

```

2072 **XML serialization:**

```

2073 <Collection
2074   resourceURI="http://schemas.dmtf.org/cimi/1/SystemNetworkPortCollection"
2075   xmlns="http://schemas.dmtf.org/cimi/1">
2076   <id> xs:anyURI </id>
2077   <count> xs:integer </count>
2078   <SystemNetworkPort>
2079     <id> xs:anyURI </id>
2080     <name> xs:string </name> ?
2081     <description> xs:string </description> ?
2082     <created> xs:dateTime </created> ?
2083     <updated> xs:dateTime </updated> ?
2084     <property key="xs:string"> xs:string </property> *
2085     <networkPort href="xs:anyURI"/>
2086     <operation rel="edit" href="xs:anyURI"/> ?
2087     <operation rel="delete" href="xs:anyURI"/> ?
2088     <xs:any>*
2089   </SystemNetworkPort> *
2090   <operation rel="add" href="xs:anyURI"/> ?
2091   <xs:any>*
2092 </Collection>

```

2093 **5.13.1.1.7 SystemAddress Collection**

2094 The resource type for each item of this collection is “SystemAddress”, defined as follows:

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

2095 **JSON serialization:**

```

2096 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemAddressCollection",
2097   "id": string,
2098   "count": number,
2099   "systemAddresses": [
2100     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemAddress",
2101       "id": string,
2102       "name": string, ?
2103       "description": string, ?
2104       "created": string, ?
2105       "updated": string, ?
2106       "properties": { "key": string, + }, ?
2107       "address": { "href": string },
2108       "operations": [
2109         { "rel": "edit", "href": string }, ?
2110         { "rel": "delete", "href": string } ?
2111       ] ?
2112       ...
2113     }, +
2114   ], ?
2115   "operations": [ { "rel": "add", "href": string } ? ]
2116   ...
2117 }
    
```

2118 **XML serialization:**

```

2119 <Collection
2120   resourceURI="http://schemas.dmtf.org/cimi/1/SystemAddressCollection"
2121   xmlns="http://schemas.dmtf.org/cimi/1">
2122   <id> xs:anyURI </id>
2123   <count> xs:integer </count>
2124   <SystemAddress>
2125     <id> xs:anyURI </id>
2126     <name> xs:string </name> ?
2127     <description> xs:string </description> ?
2128     <created> xs:dateTime </created> ?
2129     <updated> xs:dateTime </updated> ?
2130     <property key="xs:string"> xs:string </property> *
2131     <address href="xs:anyURI"/>
2132     <operation rel="edit" href="xs:anyURI"/> ?
2133     <operation rel="delete" href="xs:anyURI"/> ?
2134     <xs:any>*
2135   </SystemAddress> *
2136   <operation rel="add" href="xs:anyURI"/> ?
2137   <xs:any>*
2138 </Collection>
    
```

2139 **5.13.1.1.8 SystemForwardingGroup Collection**

2140 The resource type for each item of this collection is "SystemForwardingGroup", defined as follows:

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

2141 **JSON serialization:**

```

2142 { "resourceURI":
2143   "http://schemas.dmtf.org/cimi/1/SystemForwardingGroupCollection",
2144   "id": string,
2145   "count": number,
2146   "systemForwardingGroups": [
2147     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemForwardingGroup",
2148       "id": string,
2149       "name": string, ?
2150       "description": string, ?
2151       "created": string, ?
2152       "updated": string, ?
2153       "properties": { "key": string, + }, ?
2154       "forwardingGroup": { "href": string },
2155       "operations": [
2156         { "rel": "edit", "href": string }, ?
2157         { "rel": "delete", "href": string } ?
2158       ] ?
2159       ...
2160     }, +
2161   ], ?
2162   "operations": [ { "rel": "add", "href": string } ? ]
2163   ...
2164 }

```

2165 **XML serialization:**

```

2166 <Collection
2167   resourceURI="http://schemas.dmtf.org/cimi/1/SystemForwardingGroupCollection"
2168   xmlns="http://schemas.dmtf.org/cimi/1">
2169   <id> xs:anyURI </id>
2170   <count> xs:integer </count>
2171   <SystemForwardingGroup>
2172     <id> xs:anyURI </id>
2173     <name> xs:string </name> ?
2174     <description> xs:string </description> ?
2175     <created> xs:dateTime </created> ?
2176     <updated> xs:dateTime </updated> ?
2177     <property key="xs:string"> xs:string </property> *
2178     <forwardingGroup href="xs:anyURI"/>
2179     <operation rel="edit" href="xs:anyURI"/> ?
2180     <operation rel="delete" href="xs:anyURI"/> ?
2181     <xs:any>*
2182   </SystemForwardingGroup> *
2183   <operation rel="add" href="xs:anyURI"/> ?
2184   <xs:any>*
2185 </Collection>

```

2186 **5.13.1.1.9 SystemMeter Collection**

2187 The resource type for each item of this collection is “Meter” as defined in clause 5.17.3.

2188 **JSON serialization:**

```
2189 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemMeterCollection",
2190   "id": string,
2191   "count": number,
2192   "meters": [
2193     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
2194       "id": string,
2195       ... remaining Meter attributes ...
2196     }, +
2197   ], ?
2198   "operations": [ { "rel": "add", "href": string } ? ]
2199   ...
2200 }
```

2201 **XML serialization:**

```
2202 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/SystemMeterCollection"
2203   xmlns="http://schemas.dmtf.org/cimi/1">
2204   <id> xs:anyURI </id>
2205   <count> xs:integer </count>
2206   <Meter>
2207     <id> xs:anyURI </id>
2208     ... remaining Meter attributes ...
2209   </Meter> *
2210   <operation rel="add" href="xs:anyURI"/> ?
2211   <xs:any>*
2212 </Collection>
```

2213 **5.13.1.2 Operations**

2214 This resource supports the Read, Update, and Delete operations. Create is supported via the System
2215 Collection resource.

2216 The following custom operations are also defined:

2217 **Starting/Stopping/Restarting/Pausing/Suspending the Machines in a System**

2218 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/xxx

2219 Where "xxx" is either "start", "stop", "restart", "pause", or "suspend".

2220 This operation will recursively perform the requested operation on each component of the System
2221 (Machine or sub-System). Note that not all Machines need to be in the same state for this operation to be
2222 available and the impact that this operation will have will vary depending on the component's current
2223 state; see clause 5.14.1.2 for more details about performing operations on Machines. If a Machine is in a
2224 state that makes this operation invalid, that Machine will not be affected by the operation.

2225 To start, stop, restart, pause, or suspend the Machines in a System, a POST is sent to the appropriate
2226 URI of the System where the HTTP request body shall be as described in the "Operations" clause of the
2227 Machine resource; see clause 5.14.1.2.

2228 **Exporting a System**

2229 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/export

2230 This operation is defined to export a System. If an export package exists at that URI, it is updated with the
2231 values of the System and any component management resources. Otherwise, a new export package is

2232 created at that URI with a Media Type as specified by the "format" parameter. Other formats may be used
2233 if supported, but are not specified by this standard.

2234 Input parameters:

- 2235 • "format" - type: string - optional
2236 Indicates the Media Type of the exported data. If not present, the default value shall be
2237 "application/ovf."
2238
- 2239 • "destination" - type: URI - optional
2240 The location to where the exported data is placed. If not present, the HTTP response Location
2241 header shall contain the URL to the exported data. Based on the specific protocol specified within
2242 the URI, the Consumer might need to provide additional information (such as credentials) in the
2243 "properties" field. In the case of HTTP, a PUT shall be used to place the data at the specified
2244 location.

2245 Output parameters: None.

2246 HTTP protocol

2247 To export a System, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/export" URI of the
2248 System where the HTTP request body shall be as described below.

2249 **JSON media type:** application/json

2250 **JSON serialization:**

```
2251 { "action": "http://schemas.dmtf.org/cimi/1/action/export",
2252   "format": string, ?
2253   "destination": string, ?
2254   "properties": { "key": string, + } ?
2255   ...
2256 }
```

2257 **XML media type:** application/xml

2258 **XML serialization**

```
2259 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2260   <action http://schemas.dmtf.org/cimi/1/action/export </action>
2261     <format> xs:string </format> ?
2262     <destination> xs:anyURI </destination> ?
2263     <property key="xs:string"> xs:string </property> *
2264     <xs:any>*
2265   </Action>
```

2266 5.13.2 System Collection

2267 A System Collection resource represents the collection of System resources within a Provider and follows
2268 the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

2269 **JSON serialization:**

```
2270 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemCollection",
2271   "id": string,
2272   "count", number,
2273   "systems": [
2274     { "resourceURI": "http://schemas.dmtf.org/cimi/1/System",
2275       "id": string,
2276       ... remaining System attributes ...
2277     }, +
```



```

2278 ], ?
2279 "operations": [
2280   { "rel": "add", "href": string }, ?
2281   { "rel": "http://schemas.dmtf.org/cimi/1/action/import", "href": string } ?
2282 ]
2283 ...
2284 }

```

2285 **XML serialization:**

```

2286 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/SystemCollection"
2287   xmlns="http://schemas.dmtf.org/cimi/1">
2288   <id> xs:anyURI </id>
2289   <count> xs:integer </count>
2290   <System>
2291     <id> xs:anyURI </id>
2292     ... remaining System attributes ...
2293   </System> *
2294   <operation rel="add" href="xs:anyURI"/> ?
2295   <operation rel="http://schemas.dmtf.org/cimi/1/import" href="xs:anyURI"/> ?
2296   <xs:any*>
2297 </Collection>

```

2298 **5.13.2.1 Operations**

2299 **NOTE:** The "add" operation requires a SystemTemplate to be used.

2300 Resources created during the process of creating a System shall be "owned" by the System (see 5.13.1).
 2301 For example, a "componentDescriptor" that references a MachineTemplate, and within that
 2302 MachineTemplate is a reference to a VolumeTemplate, will result in a reference to the new Machine
 2303 being added to the System.machines attribute and a reference to the new Volume being added to the
 2304 System.volumes attribute. However, if this MachineTemplate refers to an existing Volume, this Volume
 2305 will not be added to the top-level System attributes.

2306 The following custom operations are also defined:

2307 **Importing a System**

2308 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/import

2309 This operation will import/deserialize a System. Not only will a System be created, but Machines,
 2310 Volumes, and Networks and possibly recursive Systems and their components may also be created
 2311 corresponding to imported descriptor entries. More detail about this process is in ANNEX A.

2312 Input parameters:

- 2313 • "source" - type: URI - mandatory
- 2314 The location from which the imported data will be retrieved. Based on the specific protocol
- 2315 specified within the URI, the Consumer might need to provide additional information (such as
- 2316 credentials) in the "properties" field.

2317 Output parameters: None.

2318 **HTTP protocol**

2319 To import a SystemTemplate, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/import" URI of
 2320 the System Collection where the HTTP request body shall be as described below.

2321 **JSON media type:** application/json

2322 **JSON serialization:**

```

2323 { "action": "http://schemas.dmtf.org/cimi/1/action/import",

```

```

2324     "source": string, ?
2325     "properties": { "key": string, + } ?
2326     ...
2327 }
    
```

2328 **XML media type:** application/xml

2329 **XML serialization**

```

2330 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2331   <action> http://schemas.dmtf.org/cimi/1/action/import </action>
2332   <source> xs:anyURI </source> ?
2333   <property key="xs:string"> xs:string </property> *
2334   <xs:any>*
2335 </Action>
    
```

2336 **5.13.3 System Template**

2337 The System Template contains the set of individual descriptors that are necessary to create the
 2338 components of a System. Each component descriptor can be considered to be the persisted view of the
 2339 create operation that instantiates the component. In practice, the Provider will interpret the set of
 2340 component descriptors as a set of creation operations to be executed in an order compatible with the
 2341 dependencies (e.g., attachments or references between components) that are manifest between these
 2342 components.

2343 A System Template may include component references in the descriptors, used to express links between
 2344 components of the resulting System. A component reference uses the "name" of the target (referred)
 2345 component. For example, <volume href="#newVolume"/> would reference a Volume named
 2346 "newVolume."

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

				<p>Provider: support mandatory; mutable Consumer: support optional; read-write</p>
		properties	<i>map</i>	<p>The key/value pairs that will be associated with a System component created from this component descriptor.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support optional; read-write</p>
		type	<i>URI</i>	<p>The TypeURI of the component to be created from this component descriptor, e.g., for a machine:</p> <p>http://schemas.dmtf.org/cimi/1/Machine</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
		component Template	any	<p>Reference either to a component Template or to the Template data itself inlined (i.e., the Template "value").</p> <p>Note that the exact name of this attribute will vary depending on the type of resource being created, e.g., MachineTemplate for a Machine.</p> <p>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.</p> <p>Note that the attributes of theTemplate may be specified rather than a reference to an existing Template resource.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
		quantity	<i>integer</i>	<p>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.)</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>
		<p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; 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 System.</p> <p>Note that the attributes of the MeterTemplate may be specified rather than a reference</p>		

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

2347 **JSON media type:** application/json

2348 **JSON serialization:**

```

2349 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemTemplate",
2350   "id": string,
2351   "name": string, ?
2352   "description": string, ?
2353   "created": string, ?
2354   "updated": string, ?
2355   "properties": { "key": string, + }, ?
2356   "componentDescriptors": [
2357     { "name": string, ?
2358       "description": string, ?
2359       "properties": { "name": string, + }, ?
2360       "type": string,
2361       "componentTemplate": {
2362         "href": string, ?
2363         ... ComponentTemplate attributes ... ?
2364       }
2365     }, +
2366   ], ?
2367   "meterTemplates": [
2368     { "href": string, ?
2369       ... MeterTemplate attributes ... ?
2370     }, *
2371   ], ?
2372   "eventLogTemplate": {
2373     "href": string, ?
2374     ... EventLogTemplate attributes ... ?
2375   }, ?
2376   "operations": [
2377     { "rel": "edit", "href": string }, ?
2378     { "rel": "delete", "href": string }, ?
2379     { "rel": "http://schemas.dmtf.org/cimi/1/action/export", "href": string } ?
2380   ] ?
2381   ...
2382 }
    
```

2383 **XML media type:** application/xml

2384 **XML serialization:**

```

2385 <SystemTemplate xmlns="http://schemas.dmtf.org/cimi/1">
2386   <id> xs:anyURI </id>
2387   <name> xs:string </name> ?
2388   <description> xs:string </description> ?
2389   <created> xs:dateTime </created> ?
2390   <updated> xs:dateTime </updated> ?
    
```

```

2391 <property key="xs:string"> xs:string </property> *
2392 <componentDescriptor>
2393   <name> xs:string </name> ?
2394   <description> xs:string </description> ?
2395   <property name="xs:string"> xs:string </property> *
2396   <type> xs:anyURI </type>
2397   <componentTemplate href="xs:anyURI"? >
2398     ... ComponentTemplate attributes ... ?
2399   </componentTemplate> *
2400 </componentDescriptor> *
2401 <meterTemplate href="xs:anyURI"? >
2402   ... MeterTemplate attributes ... ?
2403 </meterTemplate> *
2404 <eventLogTemplate href="xs:anyURI"? >
2405   ... EventLogTemplate attributes ... ?
2406 </eventLogTemplate> ?
2407 <operation rel="edit" href="xs:anyURI"/> ?
2408 <operation rel="delete" href="xs:anyURI"/> ?
2409 <operation rel="http://schemas.dmtf.org/cimi/1/action/export"
2410 href="xs:anyURI"/> ?
2411 <xs:any>*
2412 </SystemTemplate>

```

2413 **5.13.3.1 Operations**

2414 This resource supports the Read, Update, and Delete operations. Create is supported via the System
 2415 Template Collection resource.

2416 The following custom operations are also defined:

2417 **Exporting a SystemTemplate**

2418 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/export

2419 This operation is defined to export a System Template. If an export package exists at that URI, it is
 2420 updated with the values of the System Template and any component management resources. Otherwise
 2421 a new export package is created at that URI with a Media Type as specified by the "format" parameter.
 2422 Other formats may be used if supported, but are not specified by this standard.

2423 Input parameters:

- 2424 • "format" - type: string - optional
 2425 Indicates the Media Type of the exported data. If not present, the default value shall be
 2426 "application/ovf."
 2427
- 2428 • "destination" - type: URI - optional
 2429 The location to where the exported data is placed. If not present, the HTTP response Location
 2430 header shall contain the URL to the exported data. Based on the specific protocol specified within
 2431 the URI, the Consumer might need to provide additional information (such as credentials) in the
 2432 "properties" field. In the case of HTTP, a PUT shall be used to place the data at the specified
 2433 location.

2434 Output parameters: None.

2435 **HTTP protocol**

2436 To export a SystemTemplate, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/export" URI of
 2437 the System Template where the HTTP request body shall be as described below.

2438 **JSON media type:** application/json

2439 **JSON serialization:**

```
2440 { "action": "http://schemas.dmtf.org/cimi/1/action/export",
2441   "format": string, ?
2442   "destination": string, ?
2443   "properties": { "key": string, + } ?
2444   ...
2445 }
```

2446 **XML media type:** application/xml

2447 **XML serialization**

```
2448 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2449   <action> http://schemas.dmtf.org/cimi/1/action/export </action>
2450   <format> xs:string </format> ?
2451   <destination> xs:anyURI </destination> ?
2452   <property key="xs:string"> xs:string </property> *
2453   <xs:any>*
2454 </Action>
```

2455 5.13.4 System Template Collection

2456 A System Template Collection resource represents the collection of System Template resources within a
2457 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
2458 follows:

2459 **JSON serialization:**

```
2460 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemTemplateCollection",
2461   "id": string,
2462   "count": number,
2463   "systemTemplates": [
2464     { "resourceURI": "http://schemas.dmtf.org/cimi/1/SystemTemplate",
2465       "id": string,
2466       ... remaining SystemTemplate attributes ...
2467     }, +
2468   ], ?
2469   "operations": [
2470     { "rel": "add", "href": string }, ?
2471     { "rel": "http://schemas.dmtf.org/cimi/1/action/import", "href": string } ?
2472   ]
2473   ...
2474 }
```

2475 **XML serialization:**

```
2476 <Collection
2477   resourceURI="http://schemas.dmtf.org/cimi/1/SystemTemplateCollection"
2478   xmlns="http://schemas.dmtf.org/cimi/1">
2479   <id> xs:anyURI </id>
2480   <count> xs:integer </count>
2481   <SystemTemplate>
2482     <id> xs:anyURI </id>
2483     ... remaining SystemTemplate attributes ...
2484   </SystemTemplate> *
2485   <operation rel="add" href="xs:anyURI"/> ?
2486   <operation rel="http://schemas.dmtf.org/cimi/1/import" href="xs:anyURI"/> ?
2487   <xs:any>*
2488 </Collection>
```

2489 **5.13.4.1 Operations**

2490 The following custom operations are defined:

2491 **Importing a SystemTemplate**

2492 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/import

2493 This operation will import/deserialize a SystemTemplate. Not only will a System Template be created, but
 2494 Machine Templates, Volume Templates, and Network Templates and possibly recursive System
 2495 Templates and their components may also be created, corresponding to imported descriptor entries.
 2496 More detail about this process is in ANNEX A.

2497 Input parameters:

- 2498 • "source" - type: URI - mandatory
- 2499 The location from which the imported data will be retrieved. Based on the specific protocol
- 2500 specified within the URI, the Consumer might need to provide additional information (such as
- 2501 credentials) in the "properties" field.

2502 Output parameters: None.

2503 **HTTP protocol**

2504 To import a SystemTemplate, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/import" URI of
 2505 the System Template Collection where the HTTP request body shall be as described below.

2506 **JSON media type:** application/json

2507 **JSON serialization:**

```
2508 { "action": "http://schemas.dmtf.org/cimi/1/action/import",
2509   "source": string, ?
2510   "properties": { "key": string, + } ?
2511   ...
2512 }
```

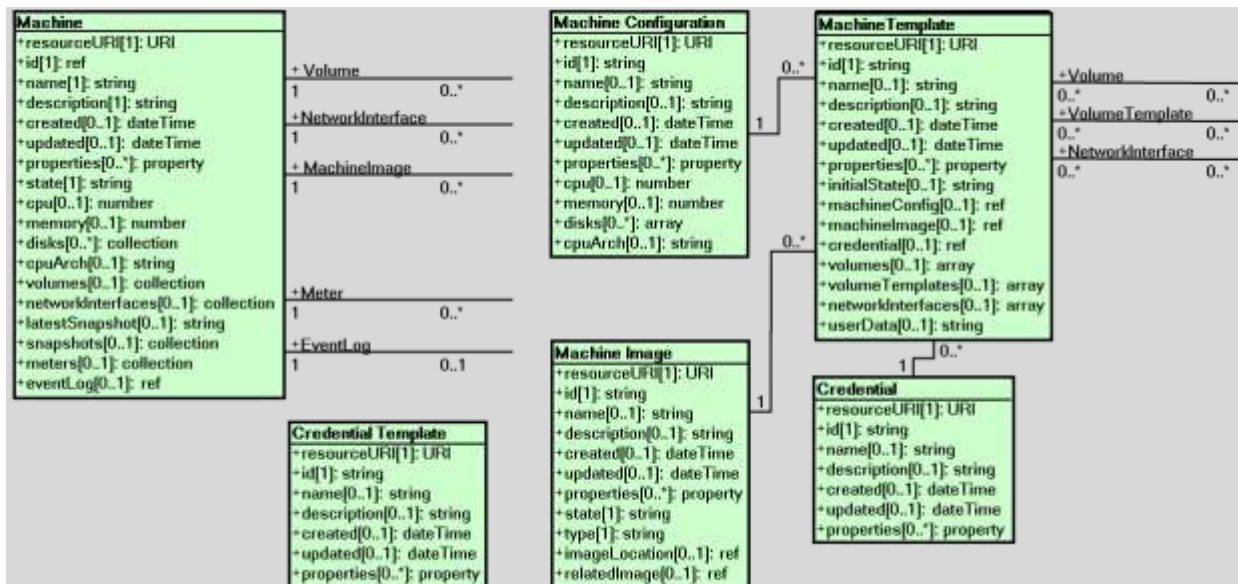
2513 **XML media type:** application/xml

2514 **XML serialization**

```
2515 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2516   <action> http://schemas.dmtf.org/cimi/1/action/import </action>
2517   <source> xs:anyURI </source> ?
2518   <property key="xs:string"> xs:string </property> *
2519   <xs:any>*
2520 </Action>
```

2521 **5.14 Machine resources and relationships**

2522 Figure 3 illustrates the resources involved in constructing a Machine and their relationships. Although this
 2523 drawing is in the style of a Resource Relationship diagram, the use of UML is neither rigorous nor
 2524 normative.



2525 **Figure 3 - Machine resources**

2526 **5.14.1 Machine**

2527 An instantiated compute resource that encapsulates both CPU and Memory.

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

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

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

2528 The following describes the serialization of the resource in both JSON and XML:

2529 **JSON media type:** application/json

2530 **JSON serialization:**

```

2531 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Machine",
2532   "id": string,
2533   "name": string, ?
2534   "description": string, ?
2535   "created": string, ?
2536   "updated": string, ?
2537   "properties": { "key": string, + }, ?
2538   "state": string,
2539   "cpu": number,
2540   "memory": number,
2541   "disks" : { "href": string }, ?
2542   "cpuArch": string, ?
2543   "volumes": { "href": string }, ?
2544   "networkInterfaces": { "href": string }, ?
2545   "latestSnapshot": string, ?
2546   "snapshots": { "href": string }, ?
2547   "meters": { "href": string }, ?
2548   "eventLog": { "href": string }, ?
2549   "operations": [
2550     { "rel": "edit", "href": string }, ?
2551     { "rel": "delete", "href": string }, ?
2552     { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
2553     { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string }, ?
2554     { "rel": "http://schemas.dmtf.org/cimi/1/action/restart", "href": string },
2555   ]
    
```

```

2556 { "rel": "http://schemas.dmtf.org/cimi/1/action/pause", "href": string }, ?
2557 { "rel": "http://schemas.dmtf.org/cimi/1/action/suspend", "href": string }
2558 ?
2559 { "rel": "http://schemas.dmtf.org/cimi/1/action/snapshot", "href": string }
2560 ?
2561 { "rel": "http://schemas.dmtf.org/cimi/1/action/restore", "href": string }
2562 ?
2563 ]
2564 ...
2565 }
    
```

2566 **XML media type:** application/xml

2567 **XML serialization:**

```

2568 <Machine xmlns="http://schemas.dmtf.org/cimi/1">
2569   <id> xs:anyURI </id>
2570   <name> xs:string </name> ?
2571   <description> xs:string </description> ?
2572   <created> xs:dateTime </created> ?
2573   <updated> xs:dateTime </updated> ?
2574   <property key="xs:string"> xs:string </property> *
2575   <state> xs:string </state>
2576   <cpu> xs:integer </cpu>
2577   <memory> xs:integer </memory>
2578   <disks href="xs:anyURI"/> ?
2579   <cpuArch> xs:string </cpuArch> ?
2580   <volumes href="xs:anyURI"/> ?
2581   <networkInterfaces href="xs:anyURI"/> ?
2582   <latestSnapshot> xs:anyURI </latestSnapshot> ?
2583   <snapshots href="xs:anyURI"/> ?
2584   <meters href="xs:anyURI"/> ?
2585   <eventLog href="xs:anyURI"/> ?
2586   <operation rel="edit" href="xs:anyURI"/> ?
2587   <operation rel="delete" href="xs:anyURI"/> ?
2588   <operation rel="http://schemas.dmtf.org/cimi/1/action/start"
2589 href="xs:anyURI"/> ?
2590   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
2591 href="xs:anyURI"/> ?
2592   <operation rel="http://schemas.dmtf.org/cimi/1/action/restart"
2593 href="xs:anyURI"/> ?
2594   <operation rel="http://schemas.dmtf.org/cimi/1/action/pause"
2595 href="xs:anyURI"/> ?
2596   <operation rel="http://schemas.dmtf.org/cimi/1/action/suspend"
2597 href="xs:anyURI"/> ?
2598   <operation rel="http://schemas.dmtf.org/cimi/1/action/capture"
2599 href="xs:anyURI"/> ?
2600   <operation rel="http://schemas.dmtf.org/cimi/1/action/snapshot"
2601 href="xs:anyURI"/> ?
2602   <operation rel="http://schemas.dmtf.org/cimi/1/action/restore"
2603 href="xs:anyURI"/> ?
2604   <xs:any>*
2605 </Machine>
    
```

2606 **5.14.1.1 Collections**

2607 The following describes the collection resources owned by Machines.

2608 **5.14.1.1.1 Disk Collection**

2609 The resource type for each item of this collection is "Disk", as defined as follows:

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

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

2610 **JSON serialization:**

```

2611 { "resourceURI": "http://schemas.dmtf.org/cimi/1/DiskCollection",
2612   "id": string,
2613   "count": number,
2614   "disks": [
2615     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Disk",
2616       "id": string,
2617       "name": string, ?
2618       "description": string, ?
2619       "created": string, ?
2620       "updated": string, ?
2621       "properties": { "key": string, + }, ?
2622       "capacity": number,
2623       "initialLocation": string, ?
2624       "operations": [
2625         { "rel": "edit", "href": string }, ?
2626         { "rel": "delete", "href": string } ?
2627       ] ?
2628       ...
2629     }, +
2630   ], ?
2631   "operations": [ { "rel": "add", "href": string } ? ]
2632   ...
2633 }

```

2634 **XML serialization:**

```

2635 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/DiskCollection"
2636   xmlns="http://schemas.dmtf.org/cimi/1">
2637   <id> xs:anyURI </id>
2638   <count> xs:integer </count>
2639   <Disk>
2640     <id> xs:anyURI </id>
2641     <name> xs:string </name> ?
2642     <description> xs:string </description> ?
2643     <created> xs:dateTime </created> ?
2644     <updated> xs:dateTime </updated> ?
2645     <property key="xs:string"> xs:string </property> *
2646     <capacity> xs:integer </capacity>
2647     <initialLocation> xs:string </initialLocation> ?
2648     <operation rel="edit" href="xs:anyURI"/> ?
2649     <operation rel="delete" href="xs:anyURI"/> ?
2650     <xs:any>*
2651   </Disk> *

```

```

2652     <operation rel="add" href="xs:anyURI"/> ?
2653     <xs:any>*
2654 </Collection>
    
```

2655 5.14.1.1.2 MachineVolume Collection

2656 The resource type for each item of this collection is “MachineVolume”, defined as follows:

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

2657 JSON serialization:

```

2658 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineVolumeCollection",
2659   "id": string,
2660   "count": number,
2661   "machineVolumes": [
2662     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineVolume",
2663       "id": string,
2664       "name": string, ?
2665       "description": string, ?
2666       "created": string, ?
2667       "updated": string, ?
2668       "properties": { "key": string, + }, ?
2669       "initialLocation": string, ?
2670       "volume": { "href": string },
2671       "operations": [
2672         { "rel": "edit", "href": string }, ?
2673         { "rel": "delete", "href": string } ?
2674       ] ?
2675       ...
2676     }, +
2677   ], ?
2678   "operations": [ { "rel": "add", "href": string } ? ]
2679   ...
2680 }
    
```

2681 XML serialization:

```

2682 <Collection
2683   resourceURI="http://schemas.dmtf.org/cimi/1/MachineVolumeCollection"
2684   xmlns="http://schemas.dmtf.org/cimi/1">
2685   <id> xs:anyURI </id>
2686   <count> xs:integer </count>
2687   <MachineVolume>
2688     <id> xs:anyURI </id>
2689     <name> xs:string </name> ?
2690     <description> xs:string </description> ?
    
```

```

2691 <created> xs:dateTime </created> ?
2692 <updated> xs:dateTime </updated> ?
2693 <property key="xs:string"> xs:string </property> *
2694 <initialLocation> xs:string </initialLocation> ?
2695 <volume href="xs:anyURI"/>
2696 <operation rel="edit" href="xs:anyURI"/> ?
2697 <operation rel="delete" href="xs:anyURI"/> ?
2698 <xs:any>*
2699 </MachineVolume> *
2700 <operation rel="add" href="xs:anyURI"/> ?
2701 <xs:any>*
2702 </Collection>
    
```

2703 **5.14.1.1.3 MachineNetworkInterface Collection**

2704 The resource type for each item of this collection is “MachineNetworkInterface”, defined as follows:

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

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

 2705 **JSON serialization:**

```

2706 { "resourceURI":
2707     "http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceCollection",
2708     "id": string,
2709     "count": number,
2710     "machineNetworkInterfaces": [
2711         { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineNetworkInterface",
2712           "id": string,
2713           "name": string, ?
2714           "description": string, ?
2715           "created": string, ?
2716           "updated": string, ?
2717           "properties": { "key": string, + }, ?
2718           "addresses": { "href": string },
2719           "network": { "href": string },
2720           "networkPort": { "href": string }, ?
2721           "state": string, ?
2722           "macAddress": string, ?
2723           "mtu": number, ?
2724           "operations": [
2725             { "rel": "edit", "href": string }, ?
2726             { "rel": "delete", "href": string } ?
2727           ] ?
2728           ...
2729         }, +
2730     ], ?
2731     "operations": [ { "rel": "add", "href": string } ? ]
2732     ...
2733 }
    
```

 2734 **XML serialization:**

```

2735 <Collection
2736 resourceURI="http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceCollection"
2737   xmlns="http://schemas.dmtf.org/cimi/1">
2738   <id> xs:anyURI </id>
2739   <count> xs:integer </count>
2740   <MachineNetworkInterface>
2741     <id> xs:anyURI </id>
2742     <name> xs:string </name> ?
2743     <description> xs:string </description> ?
2744     <created> xs:dateTime </created> ?
2745     <updated> xs:dateTime </updated> ?
2746     <property key="xs:string"> xs:string </property> *
2747     <addresses href="xs:anyURI"/>
2748     <network href="xs:anyURI"/>
2749     <networkPort href="xs:anyURI"/> ?
2750     <state> xs:string </state> ?
2751     <macAddress> xs:string </macAddress> ?
2752     <mtu> xs:integer </mtu> ?
2753     <operation rel="edit" href="xs:anyURI"/> ?
2754     <operation rel="delete" href="xs:anyURI"/> ?
2755     <xs:any>*
2756   </MachineNetworkInterface> *
2757   <operation rel="add" href="xs:anyURI"/> ?
2758   <xs:any>*
2759 </Collection>
    
```

2760 **5.14.1.1.4 MachineNetworkInterfaceAddress Collection**

2761 The resource type for each item of this collection is "MachineNetworkInterfaceAddress", defined as
 2762 follows:

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

2763 **JSON serialization:**

```

2764 { "resourceURI":
2765   "http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceAddressCollection",
2766   "id": string,
2767   "count": number,
2768   "machineNetworkInterfaceAddresses": [
2769     { "resourceURI":
2770       "http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceAddress",
2771       "id": string,
2772       "name": string, ?
2773       "description": string, ?
2774       "created": string, ?
2775       "updated": string, ?
2776       "properties": { "key": string, + }, ?
2777       "address": { "href": string },
2778       "operations": [
2779         { "rel": "edit", "href": string }, ?
2780         { "rel": "delete", "href": string } ?
2781       ] ?
2782       ...
2783     }, +
2784   ], ?
2785   "operations": [ { "rel": "add", "href": string } ? ]
2786   ...
2787 }

```

2788 **XML serialization:**

```

2789 <Collection
2790 resourceURI="http://schemas.dmtf.org/cimi/1/MachineNetworkInterfaceAddressColle
2791 ction"
2792   xmlns="http://schemas.dmtf.org/cimi/1">
2793   <id> xs:anyURI </id>
2794   <count> xs:integer </count>
2795   <MachineNetworkInterfaceAddress>
2796     <id> xs:anyURI </id>
2797     <name> xs:string </name> ?
2798     <description> xs:string </description> ?
2799     <created> xs:dateTime </created> ?
2800     <updated> xs:dateTime </updated> ?
2801     <property key="xs:string"> xs:string </property> *
2802     <address href="xs:anyURI"/>
2803     <operation rel="edit" href="xs:anyURI"/> ?
2804     <operation rel="delete" href="xs:anyURI"/> ?
2805     <xs:any>*
2806   </MachineNetworkInterfaceAddress> *
2807   <operation rel="add" href="xs:anyURI"/> ?

```



```
2808     <xs:any>*
2809 </Collection>
```

2810 5.14.1.1.5 MachineSnapshot Collection

2811 The resource type for each item of this collection is “MachineSnapshot”, defined as follows:

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

2812 JSON serialization:

```
2813 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineSnapshotCollection",
2814   "id": string,
2815   "count": number,
2816   "machineSnapshots": [
2817     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineSnapshot",
2818       "id": string,
2819       "name": string, ?
2820       "description": string, ?
2821       "created": string, ?
2822       "updated": string, ?
2823       "properties": { "key": string, + }, ?
2824       "snapshot": { "href": string },
2825       "operations": [
2826         { "rel": "edit", "href": string }, ?
2827         { "rel": "delete", "href": string } ?
2828       ] ?
2829       ...
2830     }, +
2831   ], ?
2832   "operations": [ { "rel": "add", "href": string } ? ]
2833   ...
2834 }
```

2835 XML serialization:

```
2836 <Collection
2837 resourceURI="http://schemas.dmtf.org/cimi/1/MachineSnapshotCollection"
2838   xmlns="http://schemas.dmtf.org/cimi/1">
2839   <id> xs:anyURI </id>
2840   <count> xs:integer </count>
2841   <MachineSnapshot>
2842     <id> xs:anyURI </id>
2843     <name> xs:string </name> ?
2844     <description> xs:string </description> ?
2845     <created> xs:dateTime </created> ?
2846     <updated> xs:dateTime </updated> ?
2847     <property key="xs:string"> xs:string </property> *
2848     <snapshot href="xs:anyURI"/>
2849     <operation rel="edit" href="xs:anyURI"/> ?
2850     <operation rel="delete" href="xs:anyURI"/> ?
2851     <xs:any>*
2852   </MachineSnapshot> *
2853   <operation rel="add" href="xs:anyURI"/> ?
2854   <xs:any>*
2855 </Collection>
```

2856 **5.14.1.1.6 MachineMeter Collection**

2857 The resource type for each item of this collection is “Meter” as defined in clause 5.17.3.

2858 **JSON serialization:**

```

2859 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineMeterCollection",
2860   "id": string,
2861   "count": number,
2862   "meters": [
2863     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
2864       "id": string,
2865       ... remaining Meter attributes ...
2866     }, +
2867   ], ?
2868   "operations": [ { "rel": "add", "href": string } ? ]
2869   ...
2870 }

```

2871 **XML serialization:**

```

2872 <Collection
2873   resourceURI="http://schemas.dmtf.org/cimi/1/MachineMeterCollection"
2874   xmlns="http://schemas.dmtf.org/cimi/1">
2875   <id> xs:anyURI </id>
2876   <count> xs:integer </count>
2877   <Meter>
2878     <id> xs:anyURI </id>
2879     ... remaining Meter attributes ...
2880   </Meter> *
2881   <operation rel="add" href="xs:anyURI"/> ?
2882   <xs:any>*
2883 </Collection>

```

2884 **5.14.1.2 Operations**2885 This resource supports the Read, Update, and Delete operations. Create is supported via the Machine
2886 Collection resource.

2887 The following custom operations are also defined:

2888 **Starting a Machine**2889 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/start

2890 This operation will start a Machine.

2891 Input parameters: None.

2892 Output parameters: None.

2893 During the processing of this operation, the Machine shall be in the “STARTING” state.

2894 Upon successful completion of this operation, the Machine shall be in the "STARTED" state.

2895 When a Machine is in the "STOPPED" state, starting it is the virtual equivalent of powering on a physical
2896 machine. There is no restored CPU or Memory state, so the guest OS will typically perform boot or
2897 installation tasks.

2898 If the Machine was in the "SUSPENDED" or "PAUSED" state, starting it has the effect of resuming it.

2899 **HTTP protocol**

2900 To start a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/start" URI of the Machine
 2901 where the HTTP request body shall be as described below.

2902 **JSON media type:** application/json

2903 **JSON serialization:**

```
2904 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
2905   "action": "http://schemas.dmtf.org/cimi/1/action/start",
2906   "properties": { "key": string, + } ?
2907   ...
2908 }
```

2909 **XML media type:** application/xml

2910 **XML serialization**

```
2911 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2912   <action> http://schemas.dmtf.org/cimi/1/action/start </action>
2913   <property key="xs:string"> xs:string </property> *
2914   <xs:any>*
2915 </Action>
```

2916 Upon successful processing of the request, the HTTP response body will be empty.

2917 **Stopping a Machine**

2918 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

2919 This operation will stop, or shutdown, a Machine.

2920 Input parameters:

- 2921 • "force" - type: boolean - optional
- 2922 A flag to indicate whether the Provider shall simulate a power off condition (force=true) or shall
- 2923 simulate a shutdown operation that allows applications to save their state and the file system to
- 2924 be made consistent (force=false). Inclusion of this parameter by Consumers is optional and when
- 2925 not specified, the Provider may choose either mechanism. Providers are encouraged to advertise
- 2926 this choice via the MachineStopForceDefault capability.

2927 Output parameters: None.

2928 During the processing of this operation, the Machine shall be in the "STOPPING" state.

2929 Upon successful completion of this operation, the Machine will be in the "STOPPED" state. Stopping a
 2930 Machine with force=true is the virtual equivalent of powering off a physical machine. There is no saved
 2931 CPU or Memory state. Stopping a Machine with force=false results in a machine with consistent file
 2932 systems.

2933 A Consumer may reissue a stop operation when the state is STOPPING, perhaps with force=true, but
 2934 Providers shall not issue a force=true stop operation on their own.

2935 **HTTP protocol**

2936 To stop a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the Machine
 2937 where the HTTP request body shall be as described below.

2938 **JSON media type:** application/json

2939 **JSON serialization:**

```
2940 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
2941   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
```

```

2942     "force": boolean, ?
2943     "properties": { "key": string, + } ?
2944     ...
2945 }

```

2946 **XML media type:** application/xml

2947 XML serialization

```

2948 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2949   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
2950   <force> xs:boolean </force> ?
2951   <property key="xs:string"> xs:string </property> *
2952   <xs:any>*
2953 </Action>

```

2954 Upon successful processing of the request, the HTTP response body will be empty.

2955 Restarting a Machine

2956 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/restart

2957 This operation will restart a Machine. If the Machine is in the "STARTED" state, this operation will have
 2958 the semantic effect of executing the "stop" and then "start" operations. If the Machine is in the
 2959 "STOPPED" state, this operation will have the semantic effect of executing the "start" operation.

2960 Input parameters:

- 2961 • "force" - type: boolean - optional
- 2962 A flag to indicate whether the Provider shall simulate a power off condition (force=true) or shall
- 2963 simulate a shutdown operation that allows applications to save their state and the file system to
- 2964 be made consistent (force=false). Inclusion of this parameter by Consumers is optional and when
- 2965 not specified, the Provider may choose either mechanism. Providers are encouraged to advertise
- 2966 this choice via the MachineStopForceDefault capability.

2967 Output parameters: None.

2968 During the processing of this operation, the Machine shall be in the "STOPPING" and/or "STARTING"
 2969 states, as appropriate depending on its initial state.

2970 Upon successful completion of this operation, the Machine will be in the "STARTED" state. Restarting a
 2971 Machine is the virtual equivalent of powering off, and then powering on a physical machine. There is no
 2972 restored CPU or Memory state, so the guest OS will typically perform boot or installation tasks.

2973 HTTP protocol

2974 To restart a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/restart" URI of the
 2975 Machine where the HTTP request body shall be as described below.

2976 **JSON media type:** application/json

2977 JSON serialization:

```

2978 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
2979   "action": "http://schemas.dmtf.org/cimi/1/action/restart",
2980   "force": boolean, ?
2981   "properties": { "key": string, + } ?
2982   ...
2983 }

```

2984 **XML media type:** application/xml

2985 **XML serialization**

```
2986 <Action xmlns="http://schemas.dmtf.org/cimi/1">
2987   <action> http://schemas.dmtf.org/cimi/1/action/restart </action>
2988   <force> xs:boolean </force> ?
2989   <property key="xs:string"> xs:string </property> *
2990   <xs:any>*
2991 </Action>
```

2992 Upon successful processing of the request, the HTTP response body will be empty.

2993 **Pausing a Machine**

2994 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/pause

2995 This operation will pause a Machine.

2996 Input parameters: None.

2997 Output parameters: None.

2998 During the processing of this operation, the Machine shall be in the "PAUSING" state.

2999 Upon successful completion of this operation, the Machine will be in the "PAUSED" state. Pausing a
3000 Machine will keep the Machine and its resources instantiated, but the Machine will not be available to
3001 perform any tasks. The current state of the CPU and Memory will be retained in volatile memory.

3002 **HTTP protocol**

3003 To pause a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action.pause" URI of the
3004 Machine where the HTTP request body shall be as described below.

3005 **JSON media type:** application/json

3006 **JSON serialization:**

```
3007 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
3008   "action": "http://schemas.dmtf.org/cimi/1/action/pause",
3009   "properties": { "name": string, + } ?
3010   ...
3011 }
```

3012 **XML media type:** application/xml

3013 **XML serialization**

```
3014 <Action xmlns="http://schemas.dmtf.org/cimi/1">
3015   <action> http://schemas.dmtf.org/cimi/1/action/pause </action>
3016   <property name="xs:string"> xs:string </property> *
3017   <xs:any>*
3018 </Action>
```

3019 Upon successful processing of the request, the HTTP response body will be empty.

3020 **Suspending a Machine**

3021 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/suspend

3022 This operation will suspend a Machine.

3023 Input parameters: None.

3024 Output parameters: None.

3025 During the processing of this operation, the Machine shall be in the "SUSPENDING" state.

3026 Upon successful completion of this operation, the Machine will be in the "SUSPENDED" state.

3027 Suspending a Machine will keep the Machine and its resources instantiated, but the Machine will not be
3028 available to perform any tasks. The current state of the CPU and Memory will be retained in non-volatile
3029 memory.

3030 HTTP protocol

3031 To suspend a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/suspend" URI of the
3032 Machine where the HTTP request body shall be as described below.

3033 **JSON media type:** application/json

3034 JSON serialization:

```
3035 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
3036   "action": "http://schemas.dmtf.org/cimi/1/action/suspend",
3037   "properties": { "name": string, + } ?
3038   ...
3039 }
```

3040 **XML media type:** application/xml

3041 XML serialization

```
3042 <Action xmlns="http://schemas.dmtf.org/cimi/1">
3043   <action> http://schemas.dmtf.org/cimi/1/action/suspend </action>
3044   <property name="xs:string"> xs:string </property> *
3045   <xs:any>*
3046 </Action>
```

3047 Upon successful processing of the request, the HTTP response body will be empty.

3048 Capturing a Machine

3049 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/capture

3050 This operation will create a new Machine Image from an existing Machine. This operation is defined
3051 within the Machine Image resource; see 5.14.7.1 for more details. Note that while this operation is
3052 performed against a Machine Image, its presence in the Machine serialization is used to advertise
3053 support for the operation.

3054 Snapshotting a Machine

3055 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/snapshot

3056 This operation will create a new SNAPSHOT Machine Image from an existing Machine. This operation is
3057 defined within the Machine Image resource; see 5.14.7.1 for more details. Note that while this operation
3058 is performed against a Machine Image, its presence in the Machine serialization is used to advertise
3059 support for the operation.

3060 Restoring a Machine

3061 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/restore

3062 This operation will restore a Machine from a previously created Machine Image.

3063 Input parameters:

- 3064 • "image" - type: URI - mandatory
- 3065 A reference to the Machine Image.

3066 Output parameters: None.

3067 During the processing of this operation, the Machine shall be in the "RESTORING" state.

3068 Upon successful completion of this operation, the Machine will be in the same state as the specified in the
3069 Machine Image, if specified.

3070 Note that Providers can indicate support for restoring from non-SNAPSHOT Machine Images via the
3071 Machine "RestoreFromImage" capability. When this capability is not supported, but the restore operation
3072 is supported, then that indicates it only supports restoring from SNAPSHOT Machine Images.

3073 HTTP protocol

3074 To restore a Machine, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/restore" URI of the
3075 Machine where the HTTP request body shall be as described below.

3076 **JSON media type:** application/json

3077 JSON serialization:

```
3078 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
3079   "action": "http://schemas.dmtf.org/cimi/1/action/restore",
3080   "image": string,
3081   "properties": { "name": string, + } ?
3082   ...
3083 }
```

3084 **XML media type:** application/xml

3085 XML serialization

```
3086 <Action xmlns="http://schemas.dmtf.org/cimi/1">
3087   <action> http://schemas.dmtf.org/cimi/1/action/restore </action>
3088   <image href="xs:anyURI"/>
3089   <property name="xs:string"> xs:string </property> *
3090   <xs:any>*
3091 </Action>
```

3092 Where the "image" URI is a reference to the Machine Image to be used.

3093 Upon successful processing of the request, the HTTP response body will be empty.

3094 5.14.2 Machine Collection

3095 A Machine Collection resource represents the collection of Machine resources within a Provider and
3096 follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:
3097

3098 **JSON serialization:**

```

3099 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineCollection",
3100     "id": string,
3101     "count": number,
3102     "machines": [
3103         { "resourceURI": "http://schemas.dmtf.org/cimi/1/Machine",
3104           "id": string,
3105           ... remaining Machine attributes ...
3106         }, +
3107     ], ?
3108     "operations": [ { "rel": "add", "href": string } ? ]
3109     ...
3110 }
    
```

3111 **XML serialization:**

```

3112 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/MachineCollection"
3113     xmlns="http://schemas.dmtf.org/cimi/1">
3114     <id> xs:anyURI </id>
3115     <count> xs:integer </count>
3116     <Machine>
3117         <id> xs:anyURI </id>
3118         ... remaining Machine attributes ...
3119     </Machine> *
3120     <operation rel="add" href="xs:anyURI"/> ?
3121     <xs:any>*
3122 </Collection>
    
```

3123 **5.14.2.1 Operations**

3124 NOTE: The "add" operation requires a MachineTemplate be used.

3125 Within the NetworkInterface portion of the MachineTemplate, there may be a reference to an Address
 3126 resource. If one is not provided, the Provider shall create one on the Consumer's behalf. In these cases,
 3127 and unless some action is taken to change this behavior, the Address will be bound to the new Machine
 3128 that is created and shall be deleted by the Provider when the Machine is deleted. Additionally, if these
 3129 Provider-created Address resources are disassociated from the Machine, the Provider shall delete them.
 3130 If the Consumer does provide an Address resource, the Address shall not be deleted when the Machine
 3131 is deleted and it is then up to the Consumer to delete the Address through some other mechanism.

3132 Upon successful processing of the "add" operation, unless otherwise specified via the MachineTemplate
 3133 "initialState" attribute, or unless determined by the MachineImage, the state of the new Machine shall be
 3134 the value of the DefaultInitialState capability. If no DefaultInitialState capability is defined and the
 3135 MachineImage doesn't imply any particular state, the default value is "STOPPED."

3136 **5.14.3 Machine Template**

3137 A Machine Template represents the set of metadata and instructions used in the creation of a Machine.

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

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

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

		<table border="1"> <tr> <td>networkPort</td> <td><i>ref</i></td> <td> A reference to the NetworkPort for this network interface. 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. If this attribute is provided, the "network" attribute in the referenced NetworkPort shall have the same value as the "network" attribute in this networkInterface. Constraints: Provider: support optional; mutable Consumer: support optional; read-write </td> </tr> <tr> <td>state</td> <td><i>string</i></td> <td> The state of an interface configurable to be "Active" or "Passive." A passive interface is in a standby mode ready to forward traffic if the primary interface fails. Constraints: Provider: support optional; mutable Consumer: support optional; read-write </td> </tr> <tr> <td>mtu</td> <td><i>integer</i></td> <td> To set the largest supported packet size. Constraints: Provider: support optional; mutable Consumer: support optional; read-write </td> </tr> </table>	networkPort	<i>ref</i>	A reference to the NetworkPort for this network interface. 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. If this attribute is provided, the "network" attribute in the referenced NetworkPort shall have the same value as the "network" attribute in this networkInterface. Constraints: Provider: support optional; mutable Consumer: support optional; read-write	state	<i>string</i>	The state of an interface configurable to be "Active" or "Passive." A passive interface is in a standby mode ready to forward traffic if the primary interface fails. Constraints: Provider: support optional; mutable Consumer: support optional; read-write	mtu	<i>integer</i>	To set the largest supported packet size. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
networkPort	<i>ref</i>	A reference to the NetworkPort for this network interface. 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. If this attribute is provided, the "network" attribute in the referenced NetworkPort shall have the same value as the "network" attribute in this networkInterface. Constraints: Provider: support optional; mutable Consumer: support optional; read-write									
state	<i>string</i>	The state of an interface configurable to be "Active" or "Passive." A passive interface is in a standby mode ready to forward traffic if the primary interface fails. Constraints: Provider: support optional; mutable Consumer: support optional; read-write									
mtu	<i>integer</i>	To set the largest supported packet size. Constraints: Provider: support optional; mutable Consumer: support optional; read-write									
		Constraints: Provider: support optional; mutable Consumer: support optional; read-write									
userData	<i>string</i>	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. Constraints: Provider: support optional; mutable Consumer: support optional; read-write									
meterTemplates	<i>meterTemplates[]</i>	A list of references to Meter Templates that shall be used to create and connect a set of new Meters to the new Machine. Note that the attributes of the MeterTemplate may be specified rather than a reference to an existing MeterTemplate resource. Constraints: Provider: support optional; mutable Consumer: support optional; read-write									
eventLogTemplate	<i>ref</i>	A reference to an EventLogTemplate that shall be used to create and connect a new EventLog to the new Machine. Note that the attributes of the EventLogTemplate may be specified rather than a reference to an existing EventLogTemplate resource. Constraints: Provider: support optional; mutable Consumer: support optional; read-write									

3138 The following describes the serialization of the resource in both JSON and XML:

3139 **JSON media type:** application/json

3140 **JSON serialization:**

```

3141 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineTemplate",
3142   "id": string,
3143   "name": string, ?
3144   "description": string, ?
3145   "created": string, ?
3146   "updated": string, ?
3147   "properties": { "key": string, + }, ?
3148   "initialState": string, ?
3149   "machineConfig": {
3150     "href": string | ... MachineConfiguration attributes ...
3151   }, ?
3152   "machineImage": {
3153     "href": string | ... MachineImage attributes ...
3154   }, ?
3155   "credential": {
3156     "href": string | ... CredentialTemplate attributes ...
3157   }, ?
3158   "volumes": [
3159     { "initialLocation": string?, "href": string }, +
3160   ], ?
3161   "volumeTemplates": [
3162     { "initialLocation": string?,
3163       "href": string, ?
3164       ... VolumeTemplate attributes ... ?
3165     }, +
3166   ], ?
3167   "networkInterfaces": [
3168     { "addresses": [
3169       {"href": string}, +
3170     ],
3171       "network": {"href": string},
3172       "networkPort": {"href": string}, ?
3173       "state": string,
3174       "mtu": number ?
3175     }, +
3176   ], ?
3177   "userData": string, ?
3178   "meterTemplates": [
3179     { "href": string, ?
3180       ... MeterTemplate attributes ... ?
3181     }, *
3182   ], ?
3183   "eventLogTemplate": {
3184     "href": string, ?
3185     ... EventLogTemplate attributes ... ?
3186   }, ?
3187   "operations": [
3188     { "rel": "edit", "href": string }, ?
3189     { "rel": "delete", "href": string } ?
3190   ] ?
3191   ...
3192 }
```

3193 **XML media type:** application/xml

3194 **XML serialization:**

```

3195 <MachineTemplate xmlns="http://schemas.dmtf.org/cimi/1">
3196   <id> xs:anyURI </id>
3197   <name> xs:string </name> ?
```

```

3198 <description> xs:string </description> ?
3199 <created> xs:dateTime </created> ?
3200 <updated> xs:dateTime </updated> ?
3201 <property key="xs:string"> xs:string </property> *
3202 <initialState> xs:string </initialState> ?
3203 <machineConfig href="xs:anyURI"?>
3204     ... MachineConfiguration attributes ... ?
3205 </machineConfig> ?
3206 <machineImage href="xs:anyURI"?>
3207     ... MachineImage attributes ... ?
3208 </machineImage> ?
3209 <credential href="xs:anyURI"?>
3210     ... CredentialTemplate attributes ... ?
3211 </credential> ?
3212 <volume initialLocation="xs:string"? href="xs:anyURI" /> *
3213 <volumeTemplate initialLocation="xs:string"? href="xs:anyURI"? >
3214     ... VolumeTemplate attributes ... ?
3215 </volumeTemplate> *
3216 <networkInterface>
3217     <address href="xs:anyURI"/> *
3218     <network href="xs:anyURI"/>
3219     <networkPort href="xs:anyURI"/> ?
3220     <state> xs:string </state>
3221     <mtu> xs:integer </mtu> ?
3222 </networkInterface> *
3223 <meterTemplate href="xs:anyURI"? >
3224     ... MeterTemplate attributes ... ?
3225 </meterTemplate> *
3226 <eventLogTemplate href="xs:anyURI"? >
3227     ... EventLogTemplate attributes ... ?
3228 </eventLogTemplate> ?
3229 <userData> xs:string </userData> ?
3230 <operation rel="edit" href="xs:anyURI"/> ?
3231 <operation rel="delete" href="xs:anyURI"/> ?
3232 <xs:any>*
3233 </MachineTemplate>
    
```

3234 Injection of user-defined data

3235 To simplify the customization of individual Machines, it is possible to pass arbitrary data into the new
 3236 Machine by using the `userData` parameter. The value of this parameter shall be the Base64-encoded
 3237 payload. The Provider shall arrange for this data to be available from inside the Machine by using one of
 3238 the following three methods:

- 3239 1. *Metadata server*: The data can be retrieved from within the instance by using an HTTP GET
 3240 request to `http://169.254.169.254/cimi/latest/user-data`.
- 3241 2. *Disk*: The Machine will have access to a Disk with an ISO 9660 file system on it. The data can be
 3242 found in a file at `<location>/cimi/user-data`.
- 3243 3. *Image modification*: The Provider modifies the root file system of the machine image just before
 3244 launching the machine. In UNIX-like operating systems, the data can be found in the file
 3245 `/var/lib/cimi/user-data`.

3246 It is strongly recommended that Providers implement a metadata server, or, failing that, injection via Disk,
 3247 as image modification is brittle and may not work for every operating system in use. The Provider shall
 3248 indicate which of these three methods is supported with the Machine 'UserData' capability in the
 3249 ResourceMetadata for Machines. The value for this feature shall be one of `metadata`, `disk`, or `imgmod`,
 3250 corresponding to the three methods listed above.

3251 The Provider shall preserve this data across restarts of the machine. The data will be the Base64-
 3252 decoded version of the data that was passed into the MachineCreate request.

3253 **5.14.3.1 Operations**

3254 This resource supports the Read, Update, and Delete operations. Create is supported via the Machine
3255 Template Collection resource.

3256 **5.14.4 Machine Template Collection**

3257 A Machine Template Collection resource represents the collection of Machine Template resources within
3258 a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
3259 follows:

3260 **JSON serialization:**

```
3261 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineTemplateCollection",
3262   "id": string,
3263   "count": number,
3264   "machineTemplates": [
3265     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineTemplate",
3266       "id": string,
3267       ... remaining MachineTemplate attributes ...
3268     }, +
3269   ], ?
3270   "operations": [ { "rel": "add", "href": string } ? ]
3271   ...
3272 }
```

3273 **XML serialization:**

```
3274 <Collection
3275   resourceURI="http://schemas.dmtf.org/cimi/1/MachineTemplateCollection"
3276   xmlns="http://schemas.dmtf.org/cimi/1">
3277   <id> xs:anyURI </id>
3278   <count> xs:integer </count>
3279   <MachineTemplate>
3280     <id> xs:anyURI </id>
3281     ... remaining MachineTemplate attributes ...
3282   </MachineTemplate> *
3283   <operation rel="add" href="xs:anyURI"/> ?
3284   <xs:any>*
3285 </Collection>
```

3286 **5.14.4.1 Operations**

3287 This resource supports the Read and Update operations. Creation of new Machine Template resources
3288 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

3289 **5.14.5 Machine Configuration**

3290 The Machine Configuration resource represents the set of configuration values that define the (virtual)
3291 hardware resources of a to-be-realized Machine Instance. Machine Configurations are created by
3292 Providers and may, at the Providers discretion, be created by Consumers.

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

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

3293 NOTE: The disk attributes "format" will not appear on Machine resources because after the Machine is created, the
 3294 user of the Machine will be able to modify this attribute of a disk, possibly without the Provider's knowledge. Therefore
 3295 these attributes might not be an aspect of the Machine that the Provider can reliably manage.

3296 **JSON media type:** application/json

3297 **JSON serialization:**

```

3298 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineConfiguration",
3299   "id": string,
3300   "name": string, ?
3301   "description": string, ?
3302   "created": string, ?
3303   "updated": string, ?
3304   "properties": { "key": string, + }, ?
3305   "cpu": number,
3306   "memory": number,
3307   "disks" : [
    
```

```

3308     { "capacity": number,
3309       "format": string,
3310       "initialLocation": string?
3311     }, +
3312   ], ?
3313   "cpuArch": string, ?
3314   "operations": [
3315     { "rel": "edit", "href": string }, ?
3316     { "rel": "delete", "href": string } ?
3317   ] ?
3318   ...
3319 }

```

3320 **XML media type:** application/xml

3321 **XML serialization:**

```

3322 <MachineConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
3323   <id> xs:anyURI </id>
3324   <name> xs:string </name> ?
3325   <description> xs:string </description> ?
3326   <created> xs:dateTime </created> ?
3327   <updated> xs:dateTime </updated> ?
3328   <property key="xs:string"> xs:string </property> *
3329   <cpu> xs:integer </cpu>
3330   <memory> xs:integer </memory>
3331   <disk>
3332     <capacity> xs:integer </capacity>
3333     <format> xs:string </format>
3334     <initialLocation> xs:string </initialLocation> ?
3335   </disk> *
3336   <cpuArch> xs:string </cpuArch> ?
3337   <operation rel="edit" href="xs:anyURI"/> ?
3338   <operation rel="delete" href="xs:anyURI"/> ?
3339   <xs:any*
3340 </MachineConfiguration>

```

3341 5.14.5.1 Operations

3342 This resource supports the Read, Update, and Delete operations. Create is supported via the Machine
3343 Configuration Collection resource.

3344 5.14.6 Machine Configuration Collection

3345 A Machine Configuration Collection resource represents the collection of Machine Configuration
3346 resources within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource
3347 shall be serialized as follows:

3348 **JSON serialization:**

```

3349 { "resourceURI":
3350   "http://schemas.dmtf.org/cimi/1/MachineConfigurationCollection",
3351   "id": string,
3352   "count": number,
3353   "machineConfigurations": [
3354     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineConfiguration",
3355       "id": string,
3356       ... remaining MachineConfiguration attributes ...
3357     }, +
3358   ], ?
3359   "operations": [ { "rel": "add", "href": string } ? ]
3360   ...
3361 }

```


3362 **XML serialization:**

```

3363 <Collection
3364     resourceURI="http://schemas.dmtf.org/cimi/1/MachineConfigurationCollection"
3365     xmlns="http://schemas.dmtf.org/cimi/1">
3366     <id> xs:anyURI </id>
3367     <count> xs:integer </count>
3368     <MachineConfiguration>
3369         <id> xs:anyURI </id>
3370         ... remaining MachineConfiguration attributes ...
3371     </MachineConfiguration> *
3372     <operation rel="add" href="xs:anyURI"/> ?
3373     <xs:any>*
3374 </Collection>
    
```

3375 **5.14.6.1 Operations**

3376 This resource supports the Read and Update operations. Creation of new Machine Configuration
 3377 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

3378 **5.14.7 Machine Image**

3379 This resource represents the information necessary for hardware virtualized resources to create a
 3380 Machine Instance; it contains configuration data such as startup instructions, including possible
 3381 combinations of the following items, depending on the 'type' of Machine Image created:

- 3382 • the software image (i.e., a copy of an installed Machine), which is to be instantiated on the disk
 3383 and other virtual resources. The image can be a snapshot that consists of disk images plus
 3384 memory and other resource state information.
- 3385 • installation software, which, when executed on the hardware (virtual) resources, builds the
 3386 machine instance
- 3387 • both a disk image and a set of software and parameters in order to install new components not
 3388 included in the original disk image

3389

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

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

3390 The following describes the serialization of the resource in both JSON and XML:

3391 **JSON media type:** application/json

3392

3393 **JSON serialization:**

```

3394 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineImage",
3395     "id": string,
3396     "name": string, ?
3397     "description": string, ?
3398     "created": string, ?
3399     "updated": string, ?
3400     "properties": { "key": string, + }, ?
3401     "state": string,
3402     "type": string,
3403     "imageLocation": string,
3404     "relatedImage": { "href": string }, ?
3405     "operations": [
3406         { "rel": "edit", "href": string }, ?
3407         { "rel": "delete", "href": string } ?
3408     ] ?
3409     ...
3410 }

```

3411 **XML media type:** application/xml

3412 **XML serialization:**

```

3413 <MachineImage xmlns="http://schemas.dmtf.org/cimi/1">
3414   <id> xs:anyURI </id>
3415   <name> xs:string </name> ?
3416   <description> xs:string </description> ?
3417   <created> xs:dateTime </created> ?
3418   <updated> xs:dateTime </updated> ?
3419   <property key="xs:string"> xs:string </property> *
3420   <state> xs:string </state>
3421   <type> xs:string </type>
3422   <imageLocation> xs:anyURI </imageLocation>
3423   <relatedImage href="xs:anyURI"/> ?
3424   <operation rel="edit" href="xs:anyURI"/> ?
3425   <operation rel="delete" href="xs:anyURI"/> ?
3426   <xs:any>*
3427 </MachineImage>

```

3428 **5.14.7.1 Operations**

3429 This resource supports the Read, Update, and Delete operations. Create is supported via the Machine
 3430 Image Collection resource.

3431 When creating a new Machine Image the representation of the new Machine Image may include a
 3432 reference in the "imageLocation" attribute. Providers shall inspect this reference (most likely via an HTTP
 3433 HEAD) to determine if any special processing is required. This specification defines the following
 3434 additional steps that Providers shall take depending on the type of resource being referenced:

3435 **http://schemas.dmtf.org/cimi/1/Machine**

3436 If the "imageLocation" is a reference to a Machine, the Provider shall create a new Machine Image based
 3437 on the Machine being referenced. Upon completion of the create operation, the Machine Image's
 3438 "imageLocation" attribute shall not reference the Machine (as the Machine might change over time), but
 3439 instead it shall reference the (or contain the data of a) static representation of the Machine.

3440 5.14.8 Machine Image Collection

3441 A Machine Image Collection resource represents the collection of Machine Image resources within a
3442 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
3443 follows:

3444 JSON serialization:

```
3445 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineImageCollection",
3446   "id": string,
3447   "count": number,
3448   "machineImages": [
3449     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MachineImage",
3450       "id": string,
3451       ... remaining MachineImage attributes ...
3452     }, +
3453   ], ?
3454   "operations": [ { "rel": "add", "href": string } ? ]
3455   ...
3456 }
```

3457 XML serialization:

```
3458 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/MachineImageCollection"
3459   xmlns="http://schemas.dmtf.org/cimi/1">
3460   <id> xs:anyURI </id>
3461   <count> xs:integer </count>
3462   <MachineImage>
3463     <id> xs:anyURI </id>
3464     ... remaining MachineImage attributes ...
3465   </MachineImage> *
3466   <operation rel="add" href="xs:anyURI"/> ?
3467   <xs:any>*
3468 </Collection>
```

3469 5.14.8.1 Operations

3470 This resource supports the Read and Update operations. Creation of new Machine Image resources are
3471 supported via a POST to the "add" operation's URI as described in clause 4.2.1.1, where the request
3472 body and the way it is processed is described in clause 5.14.7.1.

3473 5.14.9 Credential

3474 A Credential resource contains the information required to create the initial administrative superuser of a
3475 newly created Machine or to represent the credentials needed to perform some operation. Due to the
3476 variation between operating systems and Providers, this specification does not mandate one particular
3477 set of attributes that all implementations need to support. However, Providers are expected to extend this
3478 resource with additional attributes to meet their requirements.

3479 For example, a Provider might extend this resource with username and password attributes, which would
3480 then be the login information for new Machines. These extension attributes would appear as siblings to
3481 the common attributes like "name" and "description."

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

3482 Some common extension attributes that Providers might use include:

3483 **UserName/Password:**

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

3484

3485 **Public key:**

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

3486 **JSON media type:** application/json

3487 **JSON serialization:**

```

3488 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Credential",
3489   "id": string,
3490   "name": string, ?
3491   "description": string, ?
3492   "created": string, ?
3493   "updated": string, ?
3494   "properties": { "key": string, + }, ?
3495   "operations": [
3496     { "rel": "edit", "href": string } ?
3497     { "rel": "delete", "href": string } ?
3498   ] ?
3499   ...
3500 }
```

3501 **XML media type:** application/xml

3502 **XML serialization:**

```

3503 <Credential xmlns="http://schemas.dmtf.org/cimi/1">
3504   <id> xs:anyURI </id>
3505   <name> xs:string </name> ?
3506   <description> xs:string </description> ?
3507   <created> xs:dateTime </created> ?
3508   <updated> xs:dateTime </updated> ?
3509   <property key="xs:string"> xs:string </property> *
3510   <operation rel="edit" href="xs:anyURI"/> ?
3511   <operation rel="delete" href="xs:anyURI"/> ?
3512   <xs:any*>
3513 </Credential>
```

3514 **5.14.9.1 Operations**

3515 This resource supports the Read, Update, and Delete operations. Create is supported via the Credential
3516 Collection resource.

3517 **5.14.10 Credential Collection**

3518 A Credential Collection resource represents the collection of Credential resources within a Provider and
 3519 follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

3520 **JSON serialization:**

```

3521 { "resourceURI": "http://schemas.dmtf.org/cimi/1/CredentialCollection",
3522   "id": string,
3523   "count": number,
3524   "credential": [
3525     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Credential",
3526       "id": string,
3527       ... remaining Credential attributes ...
3528     }, +
3529   ], ?
3530   "operations": [ { "rel": "add", "href": string } ? ]
3531   ...
3532 }
```

3533 **XML serialization:**

```

3534 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/CredentialCollection"
3535   xmlns="http://schemas.dmtf.org/cimi/1">
3536   <id> xs:anyURI </id>
3537   <count> xs:integer </count>
3538   <Credential>
3539     <id> xs:anyURI </id>
3540     ... remaining Credential attributes ...
3541   </Credentials> *
3542   <operation rel="add" href="xs:anyURI"/> ?
3543   <xs:any>*
3544 </Collection>
```

3545 **5.14.10.1 Operations**

3546 NOTE: The "add" operation requires a CredentialTemplate be used.

3547 **5.14.11 Credential Template**

3548 This resource captures the configuration values for realizing a Credential resource. A Credential
 3549 Template may be used to create multiple Credentials.

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

3550 The following describes the serialization of the resource in both JSON and XML:

3551 **JSON media type:** application/json

3552 **JSON serialization:**

```

3553 { "resourceURI": "http://schemas.dmtf.org/cimi/1/CredentialTemplate",
3554   "id": string,
3555   "name": string, ?
3556   "description": string, ?
3557   "created": string, ?
3558   "updated": string, ?
3559   "properties": { "key": string, + }, ?
3560   "operations": [
```

```

3561     { "rel": "edit", "href": string }, ?
3562     { "rel": "delete", "href": string } ?
3563   ] ?
3564   ...
3565 }

```

3566 **XML media type:** application/xml

3567 **XML serialization:**

```

3568 <CredentialTemplate xmlns="http://schemas.dmtf.org/cimi/1">
3569   <id> xs:anyURI </id>
3570   <name> xs:string </name> ?
3571   <description> xs:string </description> ?
3572   <created> xs:dateTime </created> ?
3573   <updated> xs:dateTime </updated> ?
3574   <property key="xs:string"> xs:string </property> *
3575   <operation rel="edit" href="xs:anyURI"/> ?
3576   <operation rel="delete" href="xs:anyURI"/> ?
3577   <xs:any>*
3578 </CredentialTemplate>

```

3579 5.14.11.1 Operations

3580 This resource supports the Read, Update, and Delete operations. Create is supported via the Credential
3581 Template Collection resource.

3582 5.14.12 Credential Template Collection

3583 A Credential Template Collection resource represents the collection of CredentialTemplate resources
3584 within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be
3585 serialized as follows:

3586 **JSON serialization:**

```

3587 { "resourceURI":
3588   "http://schemas.dmtf.org/cimi/1/CredentialTemplateCollection",
3589   "id": string,
3590   "count": number,
3591   "credentialTemplates": [
3592     { "resourceURI": "http://schemas.dmtf.org/cimi/1/CredentialTemplate",
3593       "id": string,
3594       ... remaining CredentialTemplate attributes ...
3595     }, +
3596   ], ?
3597   "operations": [ { "rel": "add", "href": string } ? ]
3598   ...
3599 }
3600

```

3601 **XML serialization:**

```

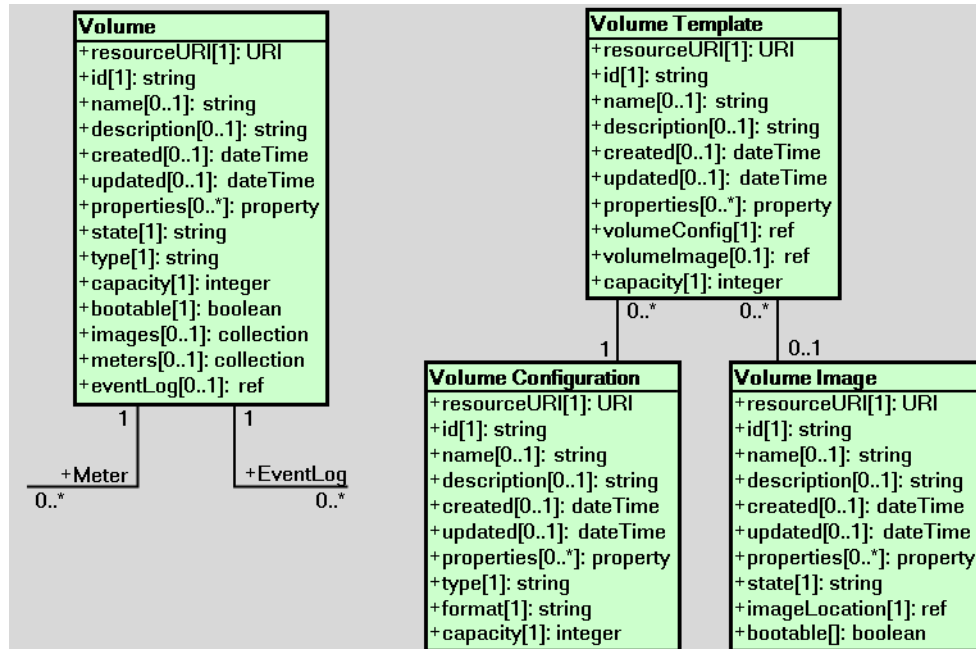
3602 <Collection
3603   resourceURI="http://schemas.dmtf.org/cimi/1/CredentialTemplateCollection"
3604   xmlns="http://schemas.dmtf.org/cimi/1">
3605   <id> xs:anyURI </id>
3606   <count> xs:integer </count>
3607   <CredentialTemplate>
3608     <id> xs:anyURI </id>
3609     ... remaining CredentialTemplate attributes ...
3610   </CredentialTemplate> *
3611   <operation rel="add" href="xs:anyURI"/> ?
3612   <xs:any*>
3613 </Collection>
    
```

3614 **5.14.12.1 Operations**

3615 This resource supports the Read and Update operations. Creation of new Credential Template resources
 3616 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

3617 **5.15 Volume resources and relationships**

3618 Figure 4 illustrates the resources involved in constructing a Volume and their relationships. Although this
 3619 drawing is in the style of a Resource Relationship diagram, the use of UML is neither rigorous nor
 3620 normative.



3621 **Figure 4 - Volume resources**

3622 **5.15.1 Volume**

3623 A Volume represents storage at either the block or the file-system level. Volumes can be connected to
 3624 Machines. Once connected, Volumes can be accessed by processes on that Machine.

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

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

3625 The following describes the serialization of the resource in both JSON and XML:

3626 **JSON media type:** application/json

3627 **JSON serialization:**

```

3628 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Volume",
3629   "id": string,
3630   "name": string, ?
3631   "description": string, ?
3632   "created": string, ?
3633   "updated": string, ?
3634   "properties": { "key": string, + }, ?
3635   "state": string,
3636   "type": string,
3637   "capacity": number,
3638   "bootable": boolean,
3639   "images": { "href": string }, ?
3640   "meters": { "href": string }, ?
3641   "eventLog": { "href": string }, ?
3642   "operations": [
3643     { "rel": "edit", "href": string }, ?
3644     { "rel": "delete", "href": string } ?
3645   ] ?
3646   ...
3647 }
```

3648 **XML media type:** application/xml

3649 **XML serialization:**

```

3650 <Volume xmlns="http://schemas.dmtf.org/cimi/1">
3651   <id> xs:anyURI </id>
3652   <name> xs:string </name> ?
3653   <description> xs:string </description> ?
3654   <created> xs:dateTime </created> ?
3655   <updated> xs:dateTime </updated> ?
3656   <property key="xs:string"> xs:string </property> *
3657   <state> xs:string </state>
3658   <type> xs:anyURI </type>
3659   <capacity> xs:integer </capacity>
3660   <bootable> xs:boolean </bootable>
3661   <images href="xs:anyURI"/> ?
3662   <meters href="xs:anyURI"/> ?
3663   <eventLog href="xs:anyURI"/> ?
3664   <operation rel="edit" href="xs:anyURI"/> ?
3665   <operation rel="delete" href="xs:anyURI"/> ?
3666   <xs:any*>
3667 </Volume>
```

3668 **5.15.1.1 Collections**

3669 The following describes the collection resources owned by Volumes.

 3670 **5.15.1.1.1 VolumeVolumelImage Collection**

3671 The resource type for each item of this collection is "VolumeVolumelImage", defined as follows:

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

 3672 **JSON serialization:**

```

3673 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeVolumeImageCollection",
3674   "id": string,
3675   "count": number,
3676   "volumeVolumeImages": [
3677     { "resourceURI":
3678       "http://schemas.dmtf.org/cimi/1/VolumeVolumeImage",
3679       "id": string,
3680       "name": string, ?
3681       "description": string, ?
3682       "created": string, ?
3683       "updated": string, ?
3684       "properties": { "key": string, + }, ?
3685       "volumeImage": { "href": string },
3686       "operations": [
3687         { "rel": "edit", "href": string }, ?
3688         { "rel": "delete", "href": string } ?
3689       ] ?
3690       ...
3691     }, +
3692   ], ?
3693   "operations": [ { "rel": "add", "href": string } ? ]
3694   ...
3695 }
```

 3696 **XML serialization:**

```

3697 <Collection
3698   resourceURI="http://schemas.dmtf.org/cimi/1/VolumeVolumeImageCollection"
3699   xmlns="http://schemas.dmtf.org/cimi/1">
3700   <id> xs:anyURI </id>
3701   <count> xs:integer </count>
3702   <VolumeVolumeImage>
3703     <id> xs:anyURI </id>
3704     <name> xs:string </name> ?
3705     <description> xs:string </description> ?
3706     <created> xs:dateTime </created> ?
3707     <updated> xs:dateTime </updated> ?
3708     <property key="xs:string"> xs:string </property> *
3709     <volumeImage href="xs:anyURI"/>
3710     <operation rel="edit" href="xs:anyURI"/> ?
3711     <operation rel="delete" href="xs:anyURI"/> ?
3712     <xs:any>*
3713   </VolumeVolumeImage> *
```

```

3714     <operation rel="add" href="xs:anyURI"/> ?
3715     <xs:any>*
3716 </Collection>

```

3717 5.15.1.1.2 VolumeMeter Collection

3718 The resource type for each item of this collection is “Meter” as defined in clause 5.17.3.

3719 JSON serialization:

```

3720 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeMeterCollection",
3721   "id": string,
3722   "count": number,
3723   "meters": [
3724     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
3725       "id": string,
3726       ... remaining Meter attributes ...
3727     }, +
3728   ], ?
3729   "operations": [ { "rel": "add", "href": string } ? ]
3730   ...
3731 }

```

3732 XML serialization:

```

3733 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/VolumeMeterCollection"
3734   xmlns="http://schemas.dmtf.org/cimi/1">
3735   <id> xs:anyURI </id>
3736   <count> xs:integer </count>
3737   <Meter>
3738     <id> xs:anyURI </id>
3739     ... remaining Meter attributes ...
3740   </Meter> *
3741   <operation rel="add" href="xs:anyURI"/> ?
3742   <xs:any>*
3743 </Collection>

```

3744 5.15.1.2 Operations

3745 This resource supports the Read, Update, and Delete operations. Create is supported via the Volume
3746 Collection resource.

3747 5.15.2 Volume Collection

3748 A Volume Collection resource represents the collection of Volumes within a Provider and follows the
3749 Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

3750 JSON serialization:

```

3751 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeCollection",
3752   "id": string,
3753   "count": number,
3754   "volumes": [
3755     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Volume",
3756       "id": string,
3757       ... remaining Volume attributes ...
3758     }, +
3759   ], ?
3760   "operations": [ { "rel": "add", "href": string } ? ]
3761   ...
3762 }

```

3763 **XML serialization:**

```

3764 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/VolumeCollection"
3765     xmlns="http://schemas.dmtf.org/cimi/1">
3766   <id> xs:anyURI </id>
3767   <count> xs:integer </count>
3768   <Volume>
3769     <id> xs:anyURI </id>
3770     ... remaining Volume attributes ...
3771   </Volume> *
3772   <operation rel="add" href="xs:anyURI"/> ?
3773   <xs:any>*
3774 </Collection>
    
```

3775 **5.15.2.1 Operations**

3776 NOTE: The "add" operation requires a VolumeTemplate be used.

3777 **5.15.3 Volume Template**

3778 This resource captures the configuration values for realizing a Volume. A Volume Template may be used
 3779 to create multiple Volumes.

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

3780 The following describes the serialization of the resource in both JSON and XML:

3781 **JSON media type:** application/json

3782 **JSON serialization:**

```

3783 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeTemplate",
3784   "id": string,
3785   "name": string, ?
3786   "description": string, ?
3787   "created": string, ?
3788   "updated": string, ?
3789   "properties": { "key": string, + }, ?
3790   "volumeConfig": {
3791     "href": string | ... VolumeConfiguration attributes ...
3792   },
3793   "volumeImage": { "href": string }, ?
3794   "meterTemplates": [
3795     { "href": string, ?
3796       ... MeterTemplate attributes ... ?
3797     }, *
3798   ], ?
3799   "eventLogTemplate": {
3800     "href": string, ?
3801     ... EventLogTemplate attributes ... ?
3802   }, ?
3803   "operations": [
3804     { "rel": "edit", "href": string }, ?
3805     { "rel": "delete", "href": string } ?
3806   ] ?
3807   ...
3808 }

```

3809 **XML media type:** application/xml

3810 **XML serialization:**

```

3811 <VolumeTemplate xmlns="http://schemas.dmtf.org/cimi/1">
3812   <id> xs:anyURI </id>
3813   <name> xs:string </name> ?
3814   <description> xs:string </description> ?
3815   <created> xs:dateTime </created> ?
3816   <updated> xs:dateTime </updated> ?
3817   <property key="xs:string"> xs:string </property> *
3818   <volumeConfig href="xs:anyURI"?>
3819     ... VolumeConfiguration attributes ... ?
3820   </volumeConfig>
3821   <volumeImage href="xs:anyURI"/> ?
3822   <meterTemplate href="xs:anyURI"? >
3823     ... MeterTemplate attributes ... ?
3824   </meterTemplate> *
3825   <eventLogTemplate href="xs:anyURI"? >
3826     ... EventLogTemplate attributes ... ?
3827   </eventLogTemplate> ?
3828   <operation rel="edit" href="xs:anyURI"/> ?
3829   <operation rel="delete" href="xs:anyURI"/> ?
3830   <xs:any*
3831 </VolumeTemplate>

```

3832 5.15.3.1 Operations

3833 This resource supports the Read, Update, and Delete operations. Create is supported via the Volume
3834 Template Collection resource.

3835 **5.15.4 Volume Template Collection**

3836 A Volume Template Collection resource represents the collection of VolumeTemplate resources within a
3837 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
3838 follows:
3839

3840 **JSON serialization:**

```

3841 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeTemplateCollection",
3842     "id": string,
3843     "count": number,
3844     "volumeTemplates": [
3845       { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeTemplate",
3846         "id": string,
3847         ... remaining volumeTemplate attributes ...
3848       }, +
3849     ], ?
3850     "operations": [ { "rel": "add", "href": string } ? ]
3851     ...
3852 }
    
```

3853 **XML serialization:**

```

3854 <Collection
3855     resourceURI="http://schemas.dmtf.org/cimi/1/VolumeTemplateCollection"
3856     xmlns="http://schemas.dmtf.org/cimi/1">
3857   <id> xs:anyURI </id>
3858   <count> xs:integer </count>
3859   <VolumeTemplate>
3860     <id> xs:anyURI </id>
3861     ... remaining VolumeTemplates attributes ...
3862   </VolumeTemplate> *
3863   <operation rel="add" href="xs:anyURI"/> ?
3864   <xs:any>*
3865 </Collection>
    
```

3866 **5.15.4.1 Operations**

3867 This resource supports the Read and Update operations. Creation of new Volume Template resources
 3868 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

3869 **5.15.5 Volume Configuration**

3870 The Volume Configuration resource represents the set of configuration values needed to create a Volume
 3871 with certain characteristics. Volume Configurations are created by Providers and may, at the Providers
 3872 discretion, be created by Consumers.

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

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

3873 The following describes the serialization of the resource in both JSON and XML:

3874 **JSON media type:** application/json

3875 **JSON serialization:**

```

3876 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
3877   "id": string,
3878   "name": string, ?
3879   "description": string, ?
3880   "created": string, ?
3881   "updated": string, ?
3882   "properties": { "key": string, + }, ?
3883   "type": string,
3884   "format": string,
3885   "capacity": number,
3886   "operations": [
3887     { "rel": "edit", "href": string }, ?
3888     { "rel": "delete", "href": string } ?
3889   ] ?
3890   ...
3891 }
```

3892 **XML media type:** application/xml

3893 **XML serialization:**

```

3894 <VolumeConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
3895   <id> xs:anyURI </id>
3896   <name> xs:string </name> ?
3897   <description> xs:string </description> ?
3898   <created> xs:dateTime </created> ?
3899   <updated> xs:dateTime </updated> ?
3900   <property key="xs:string"> xs:string </property> *
3901   <type> xs:anyURI </type>
3902   <format> xs:string </format>
3903   <capacity> xs:integer </capacity>
3904   <operation rel="edit" href="xs:anyURI"/> ?
3905   <operation rel="delete" href="xs:anyURI"/> ?
3906   <xs:any*>
3907 </VolumeConfiguration>
```

3908 5.15.5.1 Operations

3909 This resource supports the Read, Update, and Delete operations. Create is supported via the Volume
 3910 Configuration Collection resource.

3911 **5.15.6 Volume Configuration Collection**

3912 A Volume Configuration Collection resource represents the collection of Volume Configuration resources
 3913 within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be
 3914 serialized as follows:

3915 **JSON serialization:**

```

3916 { "resourceURI":
3917     "http://schemas.dmtf.org/cimi/1/VolumeConfigurationCollection",
3918     "id": string,
3919     "count": number,
3920     "volumeConfigurations": [
3921         { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeConfiguration",
3922           "id": string,
3923           ... remaining VolumeConfiguration attributes ...
3924         }, +
3925     ], ?
3926     "operations": [ { "rel": "add", "href": string } ? ]
3927     ...
3928 }
    
```

3929 **XML serialization:**

```

3930 <Collection
3931     resourceURI="http://schemas.dmtf.org/cimi/1/VolumeConfigurationCollection"
3932     xmlns="http://schemas.dmtf.org/cimi/1">
3933     <id> xs:anyURI </id>
3934     <count> xs:integer </count>
3935     <VolumeConfiguration>
3936         <id> xs:anyURI </id>
3937         ... remaining VolumeConfiguration attributes ...
3938     </VolumeConfiguration> *
3939     <operation rel="add" href="xs:anyURI"/> ?
3940     <xs:any>*
3941 </Collection>
    
```

3942 **5.15.6.1 Operations**

3943 This resource supports the Read and Update operations. Creation of new Volume Image resources are
 3944 supported via a POST to the "add" operations' URI as described in clause 4.2.1.1.

3945 **5.15.7 Volume Image**

3946 This resource represents an image that could be placed on a pre-loaded volume.

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

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

3947 The following describes the serialization of the resource in both JSON and XML:

3948 **JSON media type:** application/json

3949 **JSON serialization:**

```

3950 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeImage",
3951   "id": string,
3952   "name": string, ?
3953   "description": string, ?
3954   "created": string, ?
3955   "updated": string, ?
3956   "properties": { "key": string, + }, ?
3957   "state": string,
3958   "imageLocation": { "href": string },
3959   "bootable": boolean,
3960   "operations": [
3961     { "rel": "edit", "href": string }, ?
3962     { "rel": "delete", "href": string } ?
3963   ] ?
3964   ...
3965 }
```

3966 **XML media type:** application/xml

3967 **XML serialization:**

```

3968 <VolumeImage xmlns="http://schemas.dmtf.org/cimi/1">
3969   <id> xs:anyURI </id>
3970   <name> xs:string </name> ?
3971   <description> xs:string </description> ?
3972   <created> xs:dateTime </created> ?
3973   <updated> xs:dateTime </updated> ?
3974   <property key="xs:string"> xs:string </property> *
3975   <state> xs:string </state>
3976   <imageLocation href="xs:anyURI"/>
3977   <bootable> xs:boolean </bootable>
3978   <operation rel="edit" href="xs:anyURI"/> ?
3979   <operation rel="delete" href="xs:anyURI"/> ?
3980   <xs:any>*
3981 </VolumeImage>
```

3982 **5.15.7.1 Operations**

3983 This resource supports the Read, Update, and Delete operations. Create is supported via the Volume
3984 Image Collection resource.

3985 **5.15.8 Volume Image Collection**

3986 A Volume Image Collection resource represents the collection of Volume Image resources within a
3987 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
3988 follows:

3989 **JSON serialization:**

```
3990 { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeImageCollection",
3991   "id": string,
3992   "count": number,
3993   "volumeImages": [
3994     { "resourceURI": "http://schemas.dmtf.org/cimi/1/VolumeImage",
3995       "id": string,
3996       ... remaining VolumeImage attributes ...
3997     }, +
3998   ], ?
3999   "operations": [ { "rel": "add", "href": string } ? ]
4000   ...
4001 }
```

4002 **XML serialization:**

```
4003 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/VolumeImageCollection"
4004   xmlns="http://schemas.dmtf.org/cimi/1">
4005   <id> xs:anyURI </id>
4006   <count> xs:integer </count>
4007   <VolumeImage>
4008     <id> xs:anyURI </id>
4009     ... remaining VolumeImage attributes ...
4010   </VolumeImage> *
4011   <operation rel="add" href="xs:anyURI"/> ?
4012   <xs:any>*
4013 </Collection>
```

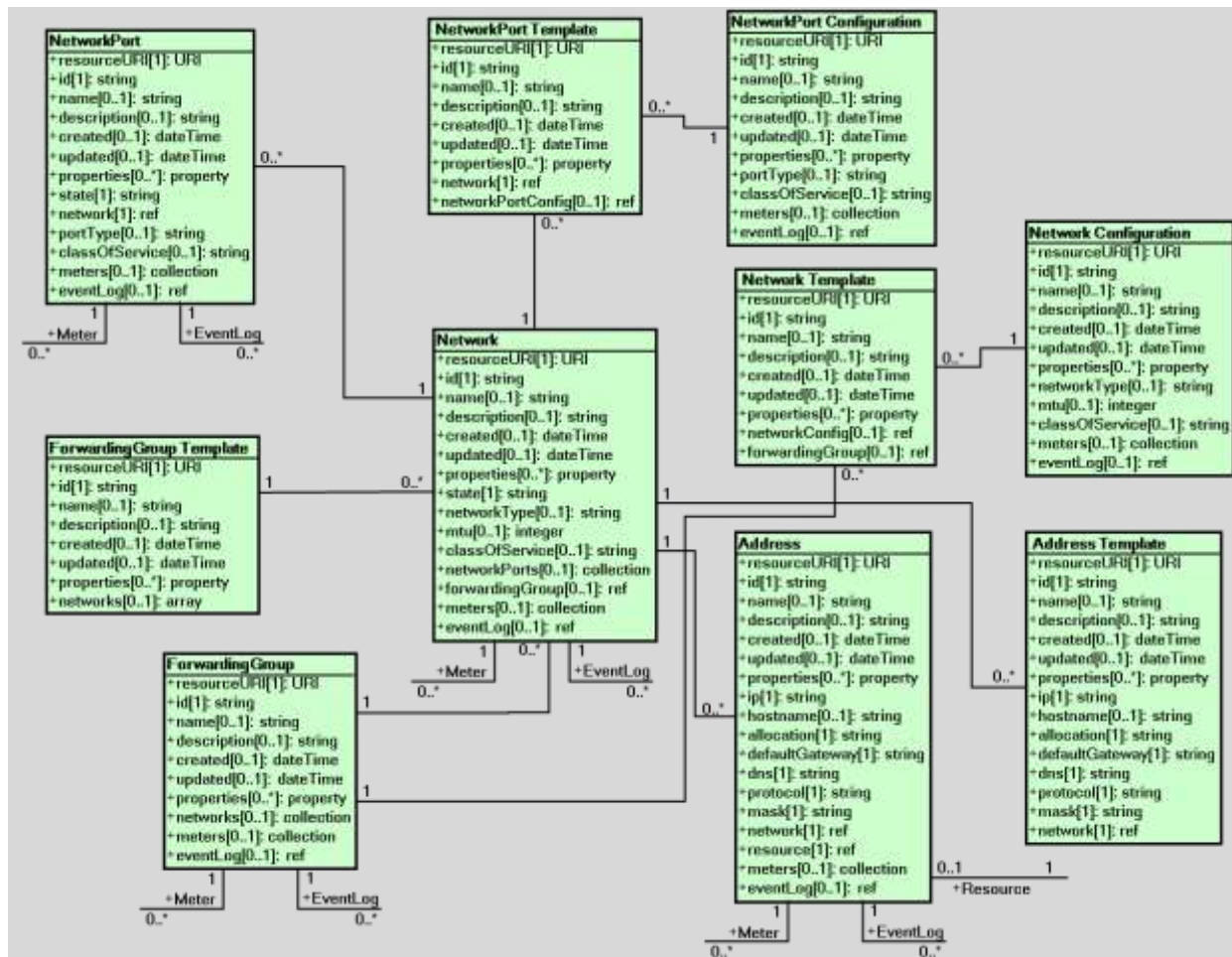
4014 **5.15.8.1 Operations**

4015 This resource supports the Read and Update operations. Creation of new Volume Image resources are
4016 supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

4017 During the creation of a new Volume Image resource, if the "imageLocation" attribute refers to an existing
4018 Volume, this shall be interpreted as a request to create a snapshot of the Volume. Once completed, the
4019 "imageLocation" attribute of the new Volume Image resource shall not refer to the original Volume,
4020 instead it shall refer to a static copy of the Volume. Additionally, the "image" attribute of the referenced
4021 Volume resource shall be updated to include a reference to this new Volume Image resource. During this
4022 process, the Provider may put the Volume into a "CAPTURING" state if necessary.

4023 **5.16 Network resources and relationships**

4024 Figure 5 illustrates the resources involved in constructing Networks and their Network Ports and their
4025 relationships. Although this drawing is in the style of a Resource Relationship diagram, the use of UML is
4026 neither rigorous nor normative.



4027 **Figure 5 - Network resources**

4028 **5.16.1 Network**

4029 A network is a collection of interconnected logical services with the purpose of forwarding data traffic
 4030 between end points.

4031 Networks in a ForwardingGroup should all have the same "networkType" attributes, which prevents a
 4032 Network with a "private" access attribute from being publicly forwarded because it is a member of a
 4033 ForwardingGroup that also contains Networks with a "public" access attribute.

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

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

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

4034 The following describes the serialization of the resource in both JSON and XML:

4035 **JSON media type:** application/json

4036 **JSON serialization:**

```

4037 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Network",
4038   "id": string,
4039   "name": string, ?
4040   "description": string, ?
4041   "created": string, ?
4042   "updated": string, ?
4043   "properties": { "key": string, + }, ?
4044   "state": string,
4045   "networkType": string, ?
4046   "mtu": number, ?
4047   "classOfService": string, ?
4048   "networkPorts": { "href": string }, ?
4049   "forwardingGroup": { "href": string }, ?
4050   "meters": { "href": string }, ?
4051   "eventLog": { "href": string }, ?
4052   "operations": [
4053     { "rel": "edit", "href": string }, ?
4054     { "rel": "delete", "href": string }, ?
4055     { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
4056     { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string } ?
4057   ] ?
4058   ...
4059 }
```

4060 **XML media type:** application/xml

4061 **XML serialization:**

```

4062 <Network xmlns="http://schemas.dmtf.org/cimi/1">
4063   <id> xs:anyURI </id>
4064   <name> xs:string </name> ?
4065   <description> xs:string </description> ?
4066   <created> xs:dateTime </created> ?
4067   <updated> xs:dateTime </updated> ?
4068   <property key="xs:string"> xs:string </property> *
4069   <state> xs:string </state>
4070   <networkType> xs:string </networkType> ?
4071   <mtu> xs:integer </mtu> ?
4072   <classOfService> xs:string </classOfService> ?
4073   <networkPorts href="xs:anyURI"/> ?
4074   <forwardingGroup href="xs:anyURI"/> ?
4075   <meters href="xs:anyURI"/> ?
4076   <eventLog href="xs:anyURI"/> ?
4077   <operation rel="edit" href="xs:anyURI"/> ?
4078   <operation rel="delete" href="xs:anyURI"/> ?
4079   <operation rel="http://schemas.dmtf.org/cimi/1/action/start">
```

```

4080 href="xs:anyURI"/> ?
4081 <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
4082 href="xs:anyURI"/> ?
4083 <xs:any>*
4084 </Network>

```

4085 5.16.1.1 Collections

4086 The following describes the collection resources owned by Networks.

4087 5.16.1.1.1 NetworkPort Collection

4088 When NetworkPorts are created via a Network's NetworkPortCollection's "add" operation, they shall
 4089 added to the global (Cloud Entry Point) NetworkPortCollection as well.

4090 As specified in clause 5.5.12, when a Network is deleted all of its collections, and resources in those
 4091 collections, shall also be deleted. This means that all of the NetworkPorts related to that Network shall
 4092 also be deleted.

4093 The resource type for each item of this collection is "NetworkPort" as defined in clause 5.16.7.

4094 JSON serialization:

```

4095 { "resourceURI":
4096   "http://schemas.dmtf.org/cimi/1/NetworkPortCollection",
4097   "id": string,
4098   "count": number,
4099   "networkports": [
4100     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPort",
4101       "id": string,
4102       ... remaining NetworkPort attributes ...
4103     }, +
4104   ] ?
4105   ...
4106 }

```

4107 XML serialization:

```

4108 <Collection
4109   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkNetworkPortCollection"
4110   xmlns="http://schemas.dmtf.org/cimi/1">
4111   <id> xs:anyURI </id>
4112   <count> xs:integer </count>
4113   <NetworkPort>
4114     <id> xs:anyURI </id>
4115     ... remaining NetworkPort attributes ...
4116   </NetworkPort> *
4117   <xs:any>*
4118 </Collection>

```

4119 5.16.1.1.2 NetworkMeter Collection

4120 The resource type for each item of this collection is "Meter" as defined in clause 5.17.3.

4121 JSON serialization:

```

4122 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkMeterCollection",
4123   "id": string,
4124   "count": number,
4125   "meters": [
4126     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
4127       "id": string,
4128       ... remaining Meter attributes ...

```



```

4129     }, +
4130   ], ?
4131   "operations": [ { "rel": "add", "href": string } ? ]
4132   ...
4133 }

```

4134 **XML serialization:**

```

4135 <Collection
4136   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkMeterCollection"
4137   xmlns="http://schemas.dmtf.org/cimi/1">
4138   <id> xs:anyURI </id>
4139   <count> xs:integer </count>
4140   <Meter>
4141     <id> xs:anyURI </id>
4142     ... remaining Meter attributes ...
4143   </Meter> *
4144   <operation rel="add" href="xs:anyURI"/> ?
4145   <xs:any>*
4146 </Collection>

```

4147 **5.16.1.2 Operations**

4148 This resource supports the Read, Update, and Delete operations. Create is supported via the Network
4149 Collection resource.

4150 The following custom operations are also defined:

4151 **Starting a Network**

4152 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/start

4153 This operation will start a Network.

4154 Input parameters: None.

4155 Output parameters: None.

4156 During the processing of this operation, the Network shall be in the "STARTING" state.

4157 Upon successful completion of this operation, the Network shall be in the "STARTED" state.

4158 **HTTP protocol**

4159 To start a Network, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/start" URI of the Network
4160 where the HTTP request body shall be as described below.

4161 **JSON media type:** application/json

4162 **JSON serialization:**

```

4163 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
4164   "action": "http://schemas.dmtf.org/cimi/1/action/start",
4165   "properties": { "key": string, + } ?
4166   ...
4167 }

```

4168 **XML media type:** application/xml

4169 **XML serialization**

```

4170 <Action xmlns="http://schemas.dmtf.org/cimi/1">
4171   <action> http://schemas.dmtf.org/cimi/1/action/start </action>
4172   <property key="xs:string"> xs:string </property> *

```

```
4173     <xs:any>*
4174 </Action>
```

4175 Upon successful processing of the request, the HTTP response body will be empty.

4176 **Stopping a Network**

4177 **/link@rel:** <http://schemas.dmtf.org/cimi/1/action/stop>

4178 This operation will stop a Network. When stopped, a Network shall not allow data to flow through it.

4179 Input parameters: None.

4180 Output parameters: None.

4181 During the processing of this operation, the Network shall be in the "STOPPING" state.

4182 Upon successful completion of this operation, the Network shall be in the "STOPPED" state.

4183 **HTTP Protocol**

4184 To stop a Network, a POST is sent to the "<http://schemas.dmtf.org/cimi/1/action/stop>" URI of the Network
4185 where the HTTP request body shall be as described below.

4186 **JSON media type:** application/json

4187 **JSON serialization:**

```
4188 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
4189   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
4190   "properties": { "key": string, + } ?
4191   ...
4192 }
```

4193 **XML media type:** application/xml

4194 **XML serialization**

```
4195 <Action xmlns="http://schemas.dmtf.org/cimi/1">
4196   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
4197   <property key="xs:string"> xs:string </property> *
4198   <xs:any>*
4199 </Action>
```

4200 Upon successful processing of the request, the HTTP response body will be empty.

4201 **5.16.2 Network Collection**

4202 A Network Collection resource represents the collection of Networks within a Provider and follows the
4203 Collection pattern that is defined in clause 5.5.12. This resource shall be serialized as follows:

4204 **JSON serialization:**

```
4205 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkCollection",
4206   "id": string,
4207   "count": number,
4208   "networks": [
4209     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Network",
4210       "id": string,
4211       ... remaining Network attributes ...
4212     }, +
4213   ], ?
4214   "operations": [ { "rel": "add", "href": string } ? ]
4215   ...
```

4216 }

4217 **XML serialization:**

```

4218 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/NetworkCollection"
4219     xmlns="http://schemas.dmtf.org/cimi/1">
4220   <id> xs:anyURI </id>
4221   <count> xs:integer </count>
4222   <Network>
4223     <id> xs:anyURI </id>
4224     ... remaining Network attributes ...
4225   </Network> *
4226   <operation rel="add" href="xs:anyURI"/> ?
4227   <xs:any>*
4228 </Collection>
    
```

4229 **5.16.2.1 Operations**

4230 NOTE: The "add" operation requires a NetworkTemplate be used.

4231 **5.16.3 Network Template**

4232 The Network Template is a set of configuration values for realizing a Network. An instance of Network
 4233 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. Note that the attributes of the NetworkConfiguration may be specified rather than a reference to an existing NetworkConfiguration resource. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
forwardingGroup	<i>ref</i>	A reference to a ForwardingGroup of which this Network will be a part. 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. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
meterTemplates	<i>meterTemplates[]</i>	A list of references to Meter Templates that shall be used to create and connect a set of new Meters to the new Network. Note that the attributes of the MeterTemplate may be specified rather than a reference to an existing MeterTemplate resource. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
eventLogTemplate	<i>ref</i>	A reference to an EventLogTemplate that shall be used to create and connect a new EventLog to the new Network. Note that the attributes of the EventLogTemplate may be specified rather than a reference to an existing EventLogTemplate resource. Constraints:

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

4234 The following describes the serialization of the resource in both JSON and XML:

4235 **JSON media type:** application/json

4236 **JSON serialization:**

```

4237 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkTemplate",
4238   "id": string,
4239   "name": string, ?
4240   "description": string, ?
4241   "created": string, ?
4242   "updated": string, ?
4243   "properties": { "key": string, + }, ?
4244   "networkConfig": {
4245     "href": string |... NetworkingConfiguration attributes ...
4246   }, ?
4247   "forwardingGroup": { "href": string }, ?
4248   "meterTemplates": [
4249     { "href": string, ?
4250       ... MeterTemplate attributes ... ?
4251     }, *
4252   ], ?
4253   "eventLogTemplate": {
4254     "href": string, ?
4255     ... EventLogTemplate attributes ... ?
4256   }, ?
4257   "operations": [
4258     { "rel": "edit", "href": string }, ?
4259     { "rel": "delete", "href": string } ?
4260   ] ?
4261   ...
4262 }
```

4263 **XML media type:** application/xml

4264 **XML serialization:**

```

4265 <NetworkTemplate xmlns="http://schemas.dmtf.org/cimi/1">
4266   <id> xs:anyURI </id>
4267   <name> xs:string </name> ?
4268   <description> xs:string </description> ?
4269   <created> xs:dateTime </created> ?
4270   <updated> xs:dateTime </updated> ?
4271   <property key="xs:string"> xs:string </property> *
4272   <networkConfig href="xs:anyURI"?>
4273     ... NetworkingConfiguration attributes ... ?
4274   </networkConfig> ?
4275   <forwardingGroup href="xs:anyURI"/> ?
4276   <meterTemplate href="xs:anyURI"? >
4277     ... MeterTemplate attributes ... ?
4278   </meterTemplate> *
4279   <eventLogTemplate href="xs:anyURI"? >
4280     ... EventLogTemplate attributes ... ?
4281   </eventLogTemplate> ?
4282   <operation rel="edit" href="xs:anyURI"/> ?
4283   <operation rel="delete" href="xs:anyURI"/> ?
4284   <xs:any>*
4285 </NetworkTemplate>
```

4286 **5.16.3.1 Operations**

4287 This resource supports the Read, Update and Delete operations. Create is supported via the Network
4288 Template Collection resource.

4289 **5.16.4 Network Template Collection**

4290 A Network Template Collection resource represents the collection of NetworkTemplates within a Provider
4291 and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

4292 **JSON serialization:**

```
4293 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkTemplateCollection",
4294   "id": string,
4295   "count": number,
4296   "networkTemplates": [
4297     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkTemplate",
4298       "id": string,
4299       ... remaining NetworkTemplate attributes ...
4300     }, +
4301   ], ?
4302   "operations": [ { "rel": "add", "href": string } ? ]
4303   ...
4304 }
```

4305 **XML serialization:**

```
4306 <Collection
4307   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkTemplateCollection"
4308   xmlns="http://schemas.dmtf.org/cimi/1">
4309   <id> xs:anyURI </id>
4310   <count> xs:integer </count>
4311   <NetworkTemplate>
4312     <id> xs:anyURI </id>
4313     ... remaining NetworkTemplate attributes ...
4314   </NetworkTemplate> *
4315   <operation rel="add" href="xs:anyURI"/> ?
4316   <xs:any>*
4317 </Collection>
```

4318 **5.16.4.1 Operations**

4319 This resource supports the Read and Update operations. Creation of new Network Template resources
4320 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

4321 **5.16.5 Network Configuration**

4322 The following set of configuration values represent the information needed to create a Network with
4323 certain characteristics.

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

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

4324 The following describes the serialization of the resource in both JSON and XML:

4325 **JSON media type:** application/json

4326 **JSON serialization:**

```

4327 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkConfiguration",
4328   "id": string,
4329   "name": string, ?
4330   "description": string, ?
4331   "created": string, ?
4332   "updated": string, ?
4333   "properties": { "key": string, + }, ?
4334   "networkType": string, ?
4335   "mtu": number, ?
4336   "classOfService": string, ?
4337   "operations": [
4338     { "rel": "edit", "href": string }, ?
4339     { "rel": "delete", "href": string } ?
4340   ] ?
4341   ...
4342 }
```

4343 **XML media type:** application/xml

4344 **XML serialization:**

```

4345 <NetworkConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
4346   <id> xs:anyURI </id>
4347   <name> xs:string </name> ?
4348   <description> xs:string </description> ?
4349   <created> xs:dateTime </created> ?
4350   <updated> xs:dateTime </updated> ?
4351   <property key="xs:string"> xs:string </property> *
4352   <networkType> xs:string </networkType> ?
4353   <mtu> xs:integer <mtu> ?
4354   <classOfService> xs:string </classOfService> ?
4355   <operation rel="edit" href="xs:anyURI"/> ?
4356   <operation rel="delete" href="xs:anyURI"/> ?
4357   <xs:any*>
```

4358 `</NetworkConfiguration>`

4359 **5.16.5.1 Operations**

4360 This resource supports the Read, Update, and Delete operations. Create is supported via the Network
4361 Configuration Collection resource.

4362 **5.16.6 Network Configuration Collection**

4363 A Network Configuration Collection resource represents the collection of Network Configurations within a
4364 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
4365 follows:

4366 **JSON serialization:**

```
4367 { "resourceURI":
4368   "http://schemas.dmtf.org/cimi/1/NetworkConfigurationCollection",
4369   "id": string,
4370   "count": number,
4371   "networkConfigurations": [
4372     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkConfiguration",
4373       "id": string,
4374       ... remaining NetworkConfiguration attributes ...
4375     }, +
4376   ], ?
4377   "operations": [ { "rel": "add", "href": string } ? ]
4378   ...
4379 }
```

4380 **XML serialization:**

```
4381 <Collection
4382   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkConfigurationCollection"
4383   xmlns="http://schemas.dmtf.org/cimi/1">
4384   <id> xs:anyURI </id>
4385   <count> xs:integer </count>
4386   <NetworkConfiguration>
4387     <id> xs:anyURI </id>
4388     ... remaining NetworkConfiguration attributes ...
4389   </NetworkConfiguration> *
4390   <operation rel="add" href="xs:anyURI"/> ?
4391   <xs:any*>
4392 </Collection>
```

4393 **5.16.6.1 Operations**

4394 This resource supports the Read and Update operations. Creation of new Network Configuration
4395 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.
4396

4397 **5.16.7 Network Port**

4398 A NetworkPort is a realized connection point between a Network and a resource - such as a Machine.

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

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

4399 The following describes the serialization of the resource in both JSON and XML:

4400 **JSON media type:** application/json

4401 **JSON serialization:**

```

4402 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPort",
4403   "id": string,
4404   "name": string, ?
4405   "description": string, ?
4406   "created": string, ?
4407   "updated": string, ?
4408   "properties": { "key": string, + }, ?
4409   "state": string,
4410   "network": { "href": string },
4411   "portType": string, ?
4412   "classOfService": string, ?
4413   "meters": { "href": string }, ?
4414   "eventLog": { "href": string }, ?
4415   "operations": [
4416     { "rel": "edit", "href": string }, ?
4417     { "rel": "delete", "href": string }, ?
4418     { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
4419     { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string } ?
4420   ] ?
4421   ...
4422 }
```

4423 **XML media type:** application/xml

4424 **XML serialization:**

```

4425 <NetworkPort xmlns="http://schemas.dmtf.org/cimi/1">
4426   <id> xs:anyURI </id>
4427   <name> xs:string </name> ?
4428   <description> xs:string </description> ?
4429   <created> xs:dateTime </created> ?
4430   <updated> xs:dateTime </updated> ?
4431   <property key="xs:string"> xs:string </property> *
4432   <state> xs:string </state>
4433   <network href="xs:anyURI"/>
4434   <portType> xs:string </portType> ?
4435   <classOfService> xs:string </classOfService> ?
4436   <meters href="xs:anyURI"/> ?
4437   <eventLog href="xs:anyURI"/> ?
4438   <operation rel="edit" href="xs:anyURI"/> ?
4439   <operation rel="delete" href="xs:anyURI"/> ?
4440   <operation rel="http://schemas.dmtf.org/cimi/1/action/start"
4441 href="xs:anyURI"/> ?
4442   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
4443 href="xs:anyURI"/> ?
```

```
4444     <xs:any>*
4445     </NetworkPort>
```

4446 5.16.7.1 Collections

4447 The following describes the collection resources owned by NetworkPorts.

4448 5.16.7.1.1 NetworkPortMeter Collection

4449 The resource type for each item of this collection is "Meter" as defined in clause 5.17.3.

4450 JSON serialization:

```
4451     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortMeterCollection",
4452       "id": string,
4453       "count": number,
4454       "meters": [
4455         { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
4456           "id": string,
4457           ... remaining Meter attributes ...
4458         }, +
4459       ], ?
4460       "operations": [ { "rel": "add", "href": string } ? ]
4461       ...
4462     }
```

4463 XML serialization:

```
4464     <Collection
4465       resourceURI="http://schemas.dmtf.org/cimi/1/NetworkPortMeterCollection"
4466       xmlns="http://schemas.dmtf.org/cimi/1">
4467       <id> xs:anyURI </id>
4468       <count> xs:integer </count>
4469       <Meter>
4470         <id> xs:anyURI </id>
4471         ... remaining Meter attributes ...
4472       </Meter> *
4473       <operation rel="add" href="xs:anyURI"/> ?
4474       <xs:any>*
4475     </Collection>
```

4476 5.16.7.2 Operations

4477 This resource supports the Read, Update, and Delete operations. Create is supported via the Network
4478 Port Collection resource.

4479 Deleting a NetworkPort shall remove that NetworkPort from the global (Cloud Entry Point) NetworkPort
4480 Collection as well as from its corresponding Network's NetworkPorts collection.

4481 The following custom operations are also defined:

4482 Starting a NetworkPort

4483 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/start

4484 This operation will start a NetworkPort.

4485 Input parameters: None.

4486 Output parameters: None.

4487 Upon successful completion of this operation, the NetworkPort shall be in the "STARTED" state.

4488 **HTTP Protocol**

4489 To start a NetworkPort, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/start" URI of the
4490 NetworkPort where the HTTP request body shall be as described below.

4491 **JSON media type:** application/json

4492 **JSON serialization:**

```
4493 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
4494   "action": "http://schemas.dmtf.org/cimi/1/action/start",
4495   "properties": { "key": string, + } ?
4496   ...
4497 }
```

4498 **XML media type:** application/xml

4499 **XML serialization**

```
4500 <Action xmlns="http://schemas.dmtf.org/cimi/1">
4501   <action> http://schemas.dmtf.org/cimi/1/action/start </action>
4502   <property key="xs:string"> xs:string </property> *
4503   <xs:any>*
4504 </Action>
```

4505 Upon successful processing of the request, the HTTP response body will be empty.

4506 **Stopping a NetworkPort**

4507 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

4508 This operation will stop a NetworkPort. When stopped, the NetworkPort is not available for use and no
4509 network traffic shall flow through it.

4510 Input parameters: None.

4511 Output parameters: None.

4512 Upon successful completion of this operation, the NetworkPort shall be in the "STOPPED" state.

4513 **HTTP Protocol**

4514 To stop a NetworkPort, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the
4515 NetworkPort where the HTTP request body shall be as described below.

4516 **JSON media type:** application/json

4517 **JSON serialization:**

```
4518 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
4519   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
4520   "properties": { "key": string, + } ?
4521   ...
4522 }
```

4523 **XML media type:** application/xml

4524 **XML serialization**

```
4525 <Action xmlns="http://schemas.dmtf.org/cimi/1">
4526   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
4527   <property key="xs:string"> xs:string </property> *
4528   <xs:any>*
4529 </Action>
```

4530 Upon successful processing of the request, the HTTP response body will be empty.

4531 **5.16.8 Network Port Collection**

4532 A NetworkPortCollection resource represents the collection of NetworkPorts within a Provider and follows
 4533 the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

4534 **JSON serialization:**

```

4535 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortCollection",
4536   "id": string,
4537   "count": number,
4538   "networkPorts": [
4539     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPort",
4540       "id": string,
4541       ... remaining NetworkPort attributes ...
4542     }, +
4543   ], ?
4544   "operations": [ { "rel": "add", "href": string } ? ]
4545   ...
4546 }
```

4547 **XML serialization:**

```

4548 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/NetworkPortCollection"
4549   xmlns="http://schemas.dmtf.org/cimi/1">
4550   <id> xs:anyURI </id>
4551   <count> xs:integer </count>
4552   <NetworkPort>
4553     <id> xs:anyURI </id>
4554     ... remaining NetworkPort attributes ...
4555   </NetworkPort> *
4556   <operation rel="add" href="xs:anyURI"/> ?
4557   <xs:any>*
4558 </Collection>
```

4559 **5.16.8.1 Operations**

4560 NOTE: The "add" operation requires a NetworkPortTemplate be used.

4561 When NetworkPorts are created via the global (Cloud Entry Point) NetworkPortCollection's "add"
 4562 operation, they are automatically added to the corresponding Network's "NetworkPort" collection resource
 4563 as well.

4564 **5.16.9 Network Port Template**

4565 The Network Port Template is a set of Configuration values for realizing a NetworkPort. A NetworkPort
 4566 Template may be used to create multiple NetworkPorts.

Name	NetworkPortTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/NetworkPortTemplate	
Attribute	Type	Description
network	ref	A reference to the network to be associated with this NetworkPort. When this Template is used to create a new NetworkPort via the global (Cloud Entry Point) NetworkPort Collection, this attribute shall be present. When this Template is used to create a new NetworkPort via a Network's NetworkPorts Collection then this attribute shall either be absent or shall have the same value as the "id" of the Network to which this NetworkPort is being added.
Constraints:		

		Provider: support mandatory; mutable Consumer: support mandatory; read-write
networkPortConfig	<i>ref</i>	A reference to the NetworkPortConfiguration that will be used to create a NetworkPort from this NetworkPort Template. Note that the attributes of the NetworkPortConfiguration may be specified rather than a reference to an existing NetworkPortConfiguration resource. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
meterTemplates	<i>meterTemplates[]</i>	A list of references to Meter Templates that shall be used to create and connect a set of new Meters to the new NetworkPort. Note that the attributes of the MeterTemplate may be specified rather than a reference to an existing MeterTemplate resource. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
eventLogTemplate	<i>ref</i>	A reference to an EventLogTemplate that shall be used to create and connect a new EventLog to the new NetworkPort. Note that the attributes of the EventLogTemplate may be specified rather than a reference to an existing EventLogTemplate resource. Constraints: Provider: support optional; mutable Consumer: support optional; read-write

4567 The following describes the serialization of the resource in both JSON and XML:

4568 **JSON media type:** application/json

4569 **JSON serialization:**

```

4570 { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortTemplate",
4571   "id": string,
4572   "name": string, ?
4573   "description": string, ?
4574   "created": string, ?
4575   "updated": string, ?
4576   "properties": { "key": string, + }, ?
4577   "network": { "href": string }, ?
4578   "networkPortConfig": {
4579     "href": string | ... NetworkPortConfiguration attributes ...
4580   },
4581   "meterTemplates": [
4582     { "href": string, ?
4583       ... MeterTemplate attributes ... ?
4584     }, *
4585   ], ?
4586   "eventLogTemplate": {
4587     "href": string, ?
4588     ... EventLogTemplate attributes ... ?
4589   }, ?
4590   "operations": [
4591     { "rel": "edit", "href": string }, ?
4592     { "rel": "delete", "href": string } ?
4593   ] ?
4594   ...
4595 }
```

4596 **XML media type:** application/xml

4597 **XML serialization:**

```

4598 <NetworkPortTemplate xmlns="http://schemas.dmtf.org/cimi/1">
4599   <id> xs:anyURI </id>
4600   <name> xs:string </name> ?
4601   <description> xs:string </description> ?
4602   <created> xs:dateTime </created> ?
4603   <updated> xs:dateTime </updated> ?
4604   <property key="xs:string"> xs:string </property> *
4605   <network href="xs:anyURI"/> ?
4606   <networkPortConfig href="xs:anyURI"?>
4607     ... NetworkPortConfiguration attributes ... ?
4608 </networkPortConfig>
4609   <meterTemplate href="xs:anyURI"? >
4610     ... MeterTemplate attributes ... ?
4611 </meterTemplate> *
4612   <eventLogTemplate href="xs:anyURI"? >
4613     ... EventLogTemplate attributes ... ?
4614 </eventLogTemplate> ?
4615   <operation rel="edit" href="xs:anyURI"/> ?
4616   <operation rel="delete" href="xs:anyURI"/> ?
4617   <xs:any>*
4618 </NetworkPortTemplate>

```

4619 **5.16.9.1 Operations**

4620 This resource supports the Read, Update, and Delete operations. Create is supported via the Network
 4621 Port Template Collection resource.

4622 **5.16.10 Network Port Template Collection**

4623 A Network Port Template Collection resource represents the collection of Network port Templates within a
 4624 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
 4625 follows:

4626 **JSON serialization:**

```

4627 { "resourceURI":
4628   "http://schemas.dmtf.org/cimi/1/NetworkPortTemplateCollection",
4629   "id": string,
4630   "count": number,
4631   "networkPortTemplates": [
4632     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortTemplate",
4633       "id": string,
4634       ... remaining NetworkPortTemplate attributes ...
4635     }, +
4636   ], ?
4637   "operations": [ { "rel": "add", "href": string } ? ]
4638   ...
4639 }

```

4640 **XML serialization:**

```

4641 <Collection
4642   resourceURI="http://schemas.dmtf.org/cimi/1/NetworkPortTemplateCollection"
4643   xmlns="http://schemas.dmtf.org/cimi/1">
4644   <id> xs:anyURI </id>
4645   <count> xs:integer </count>
4646   <NetworkPortTemplate>
4647     <id> xs:anyURI </id>
4648     ... remaining NetworkPortTemplate attributes ...

```

```

4649     </NetworkPortTemplate> *
4650     <operation rel="add" href="xs:anyURI"/> ?
4651     <xs:any>*
4652 </Collection>
    
```

4653 **5.16.10.1 Operations**

4654 This resource supports the Read and Update operations. Creation of new Network Port Template
 4655 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

4656 **5.16.11 Network Port Configuration**

4657 The set of configuration values representing the information needed to create a NetworkPort with certain
 4658 characteristics.

Name	NetworkPortConfiguration	
Type URI	http://schemas.dmtf.org/cimi/1/NetworkPortConfiguration	
Attribute	Type	Description
portType	string	<p>Indicates that a port will be used as an Access port (a member of the network) or a Trunk port that becomes a transport for multiple networks.</p> <p>Allowable values include:</p> <p>ACCESS: a member of a network.</p> <p>TRUNK: transport more that one network.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
classOfService	string	<p>Indicates the Provider supported category, associated with a collection of attributes characterizing a level of a quality experience</p> <p>Example values:</p> <p>GOLD: High bandwidth, low latency, low jitter</p> <p>SILVER: An improved service experience over bronze for voice or video traffic</p> <p>BRONZE: Best effort</p> <p>The list of possible values, and their implied quality of service, is out of scope of this specifications.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>

4659 The following describes the serialization of the resource in both JSON and XML:

4660 **JSON media type:** application/json

4661 **JSON serialization:**

```

4662     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortConfiguration",
4663       "id": string,
4664       "name": string, ?
4665       "description": string, ?
4666       "created": string, ?
4667       "updated": string, ?
4668       "properties": { "key": string, + }, ?
4669       "portType": string, ?
4670       "classOfService": string, ?
4671       "operations": [
    
```

```

4672     { "rel": "edit", "href": string }, ?
4673     { "rel": "delete", "href": string } ?
4674   ] ?
4675   ...
4676 }

```

4677 **XML media type:** application/xml

4678 **XML serialization:**

```

4679 <NetworkPortConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
4680   <id> xs:anyURI </id>
4681   <name> xs:string </name> ?
4682   <description> xs:string </description> ?
4683   <created> xs:dateTime </created> ?
4684   <updated> xs:dateTime </updated> ?
4685   <property key="xs:string"> xs:string </property> *
4686   <portType> xs:string </portType> ?
4687   <classOfService> xs:string </classOfService> ?
4688   <operation rel="edit" href="xs:anyURI"/> ?
4689   <operation rel="delete" href="xs:anyURI"/> ?
4690   <xs:any>*
4691 </NetworkPortConfiguration>

```

4692 5.16.11.1 Operations

4693 This resource supports the Read, Update, and Delete operations. Create is supported via the Network
4694 Port Configuration Collection resource.

4695 5.16.12 Network Port Configuration Collection

4696 A NetworkPort Configuration Collection resource represents the collection of NetworkPortConfigurations
4697 within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be
4698 serialized as follows:

4699 **JSON serialization:**

```

4700 { "resourceURI":
4701   "http://schemas.dmtf.org/cimi/1/NetworkPortConfigurationCollection",
4702   "id": string,
4703   "count": number,
4704   "networkPortConfigurations": [
4705     { "resourceURI": "http://schemas.dmtf.org/cimi/1/NetworkPortConfiguration",
4706       "id": string,
4707       ... remaining NetworkPortConfiguration attributes ...
4708     }, +
4709   ], ?
4710   "operations": [ { "rel": "add", "href": string } ? ]
4711   ...
4712 }

```

4713 **XML serialization:**

```

4714 <Collection
4715 resourceURI="http://schemas.dmtf.org/cimi/1/NetworkPortConfigurationCollection"
4716 xmlns="http://schemas.dmtf.org/cimi/1">
4717   <id> xs:anyURI </id>
4718   <count> xs:integer </count>
4719   <NetworkPortConfiguration>
4720     <id> xs:anyURI </id>
4721     ... remaining NetworkPortConfiguration attributes ...
4722   </NetworkPortConfiguration> *
4723   <operation rel="add" href="xs:anyURI"/> ?

```



```
4724 <xs:any>*
4725 </Collection>
```

4726 **5.16.12.1 Operations**

4727 This resource supports the Read and Update operations. Creation of new NetworkPortConfiguration
 4728 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

4729 **5.16.13 Address**

4730 An Address represents an IP address, and its associated metadata, for a particular Network. When a
 4731 Consumer creates an Address resource it is the semantic equivalent of asking for a static IP address that
 4732 can then be associated with resources at a later point in time. Addresses that are manually created by
 4733 Consumers shall not be automatically deleted when the resource (e.g., a Machine) that is using that
 4734 Address is deleted because these manually created Addresses are expected to have a lifetime that is
 4735 different from the resources that use them. Addresses that are created by Providers on the Consumer's
 4736 behalf shall be deleted at the Provider's discretion. In particular, the Provider shall delete Addresses that
 4737 it created on behalf of the Consumer when the resource that is using that Address is deleted or when the
 4738 Address becomes disassociated from the resource.

4739 Addresses that are created by Providers may be converted to ones that are under the Consumer's control
 4740 (i.e., will not be deleted until explicitly requested by Consumers) by changing the "allocation" attribute
 4741 from "dynamic" to "static," if this feature supported by Providers.

Name	Address	
Type URI	http://schemas.dmtf.org/cimi/1/Address	
Attribute	Type	Description
ip	string	The IP address assigned to a virtual interface. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
hostname	string	The DNS resolvable name associated with this network interface. Constraints: Provider: support optional; mutable Consumer: support optional; read-write
allocation	string	The value is either " dynamic " or " static ". Expresses whether this address is controlled by the Provider or Consumer. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
defaultGateway	string	An IP address of a router that serves other networks. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
dns	string	The IP address of the Domain Name Service from host name to IP resolution. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
protocol	string	The selected network protocol, such as IPv4 or IPv6. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

mask	<i>string</i>	The network mask associated with this Address. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
network	<i>ref</i>	A reference to the Network with which this Address will be associated. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
resource	<i>ref</i>	A reference to the resource that is using this Address. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

4742 The following describes the serialization of the resource in both JSON and XML:

4743 **JSON media type:** application/json

4744 **JSON serialization:**

```

4745 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Address",
4746   "id": string,
4747   "name": string, ?
4748   "description": string, ?
4749   "created": string, ?
4750   "updated": string, ?
4751   "properties": { "key": string, + }, ?
4752   "ip": string,
4753   "hostname": string, ?
4754   "allocation": string,
4755   "defaultGateway": string,
4756   "dns": string,
4757   "protocol": string,
4758   "mask": string,
4759   "network": { "href": string },
4760   "resource": { "href": string }, ?
4761   "operations": [
4762     { "rel": "edit", "href": string }, ?
4763     { "rel": "delete", "href": string } ?
4764   ] ?
4765   ...
4766 }
```

4767 **XML media type:** application/xml

4768 **XML serialization:**

```

4769 <Address xmlns="http://schemas.dmtf.org/cimi/1">
4770   <id> xs:anyURI </id>
4771   <name> xs:string </name> ?
4772   <description> xs:string </description> ?
4773   <created> xs:dateTime </created> ?
4774   <updated> xs:dateTime </updated> ?
4775   <property key="xs:string"> xs:string </property> *
4776   <ip> xs:string </ip>
4777   <hostname> xs:string </hostname> ?
4778   <allocation> xs:string </allocation>
4779   <defaultGateway> xs:string </defaultGateway>
4780   <dns> xs:string </dns>
4781   <protocol> xs:string </protocol>
4782   <mask> xs:string </mask>
```

```

4783 <network href="xs:anyURI"/>
4784 <resource href="xs:anyURI"/> ?
4785 <operation rel="edit" href="xs:anyURI"/> ?
4786 <operation rel="delete" href="xs:anyURI"/> ?
4787 <xs:any>*
4788 </Address>
    
```

4789 **5.16.13.1 Operations**

4790 This resource supports the Read, Update, and Delete operations. Create is supported via the Address
 4791 Collection resource.

4792 **5.16.14 Address Collection**

4793 An Address Collection resource represents the collection of Addresses within a Provider that are
 4794 owned/managed by the Consumer Provider and follows the Collection pattern defined in clause 5.5.12.
 4795 This resource shall be serialized as follows:

4796 **JSON serialization:**

```

4797 { "resourceURI": "http://schemas.dmtf.org/cimi/1/AddressCollection",
4798   "id": string,
4799   "count": number,
4800   "addresses": [
4801     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Address",
4802       "id": string,
4803       ... remaining Address attributes ...
4804     }, +
4805   ], ?
4806   "operations": [ { "rel": "add", "href": string } ? ]
4807   ...
4808 }
    
```

4809 **XML serialization:**

```

4810 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/AddressCollection"
4811   xmlns="http://schemas.dmtf.org/cimi/1">
4812   <id> xs:anyURI </id>
4813   <count> xs:integer </count>
4814   <Address>
4815     <id> xs:anyURI </id>
4816     ... remaining Address attributes ...
4817   </Address> *
4818   <operation rel="add" href="xs:anyURI"/> ?
4819   <xs:any>*
4820 </Collection>
    
```

4821 **5.16.14.1 Operations**

4822 NOTE: The "add" operation requires an AddressTemplate be used.

4823 **5.16.15 Address Template**

4824 This resource captures the configuration values for realizing an Address. An Address Template may be
 4825 used to create multiple Addresses.

Name	AddressTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/AddressTemplate	
Attribute	Type	Description
ip	string	The IP address assigned to a virtual interface.

		<p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
hostname	<i>string</i>	<p>The DNS resolvable name associated with this network interface.</p> <p>Constraints: Provider: support optional; mutable Consumer: support optional; read-write</p>
allocation	<i>string</i>	<p>A value of either "dynamic" or "static". Expresses whether this address is controlled by the Provider or Consumer.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
defaultGateway	<i>string</i>	<p>An IP address of a router that serves other networks.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
dns	<i>string</i>	<p>The IP address of the Domain Name Service from host name to IP resolution.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
protocol	<i>string</i>	<p>The selected network protocol, such as IPv4 or IPv6.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
mask	<i>string</i>	<p>The network mask associated with this Address.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
network	<i>ref</i>	<p>A reference to the Network with which this Address will be associated.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>

4826 The following describes the serialization of the resource in both JSON and XML:

4827 **JSON media type:** application/json

4828 **JSON serialization:**

```

4829 { "resourceURI": "http://schemas.dmtf.org/cimi/1/AddressTemplate",
4830   "id": string,
4831   "name": string, ?
4832   "description": string, ?
4833   "created": string, ?
4834   "updated": string, ?
4835   "properties": { "key": string, + }, ?
4836   "ip": string,
4837   "hostname": string, ?
4838   "allocation": string,
4839   "defaultGateway": string,
4840   "dns": string,
4841   "protocol": string,
4842   "mask": string,

```

```

4843     "network": { "href": string },
4844     "operations": [
4845         { "rel": "edit", "href": string }, ?
4846         { "rel": "delete", "href": string } ?
4847     ] ?
4848     ...
4849 }
    
```

4850 **XML media type:** application/xml

4851 **XML serialization:**

```

4852 <AddressTemplate xmlns="http://schemas.dmtf.org/cimi/1">
4853   <id> xs:anyURI </id>
4854   <name> xs:string </name> ?
4855   <description> xs:string </description> ?
4856   <created> xs:dateTime </created> ?
4857   <updated> xs:dateTime </updated> ?
4858   <property key="xs:string"> xs:string </property> *
4859   <ip> xs:string </ip>
4860   <hostname> xs:string </hostname> ?
4861   <allocation> xs:string </allocation>
4862   <defaultGateway> xs:string </defaultGateway>
4863   <dns> xs:string </dns>
4864   <protocol> xs:string </protocol>
4865   <mask> xs:string </mask>
4866   <network href="xs:anyURI"/>
4867   <operation rel="edit" href="xs:anyURI"/> ?
4868   <operation rel="delete" href="xs:anyURI"/> ?
4869   <xs:any>*
4870 </AddressTemplate>
    
```

4871 5.16.15.1 Operations

4872 This resource supports the Read, Update, and Delete operations. Create is supported via the Address
4873 Template Collection resource.

4874 5.16.16 Address Template Collection

4875 An Address Template Collection resource represents the collection of Address Template resources within
4876 a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
4877 follows:

4878 **JSON serialization:**

```

4879 { "resourceURI": "http://schemas.dmtf.org/cimi/1/AddressTemplateCollection",
4880   "id": string,
4881   "count": number,
4882   "addressTemplates": [
4883     { "resourceURI": "http://schemas.dmtf.org/cimi/1/AddressTemplate",
4884       "id": string,
4885       ... remaining AddressTemplate attributes ...
4886     }, +
4887   ], ?
4888   "operations": [ { "rel": "add", "href": string } ? ]
4889   ...
4890 }
    
```

4891 **XML serialization:**

```

4892 <Collection
4893   resourceURI="http://schemas.dmtf.org/cimi/1/AddressTemplateCollection"
4894   xmlns="http://schemas.dmtf.org/cimi/1">
    
```

```

4895     <id> xs:anyURI </id>
4896     <count> xs:integer </count>
4897     <AddressTemplate>
4898         <id> xs:anyURI </id>
4899         ... remaining AddressTemplate attributes ...
4900     </AddressTemplate> *
4901     <operation rel="add" href="xs:anyURI"/> ?
4902     <xs:any>*
4903 </Collection>
    
```

4904 **5.16.16.1 Operations**

4905 This resource supports the Read and Update operations. Creation of new Address Template resources
 4906 are supported via a POST to the "addLink" URI as described in clause 4.2.1.1.

4907 **5.16.17 Forwarding Group**

4908 A Forwarding Group represents a collection of Networks that route to each other.

4909 Networks in a ForwardingGroup should all have the same "networkType" attributes, which prevents a
 4910 Network with a "private" networkType attribute from being publicly forwarded because it is a member of a
 4911 ForwardingGroup that also contains Networks with a "public" networkType attribute.

4912 Providers shall not allow two Networks to be forwardable to each other unless they are explicitly
 4913 connected by being part of a common ForwardingGroup.

Name	ForwardingGroup	
Type URI	http://schemas.dmtf.org/cimi/1/ForwardingGroup	
Attribute	Type	Description
networks	collection [Forwardin gGroupNe twork]	A reference to the list of references to the Networks in this Forwarding Group. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

4914 The following describes the serialization of the resource in both JSON and XML:

4915 **JSON media type:** application/json

4916 **JSON serialization:**

```

4917 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwrdingGroup",
4918   "id": string,
4919   "name": string, ?
4920   "description": string, ?
4921   "created": string, ?
4922   "updated": string, ?
4923   "properties": { "key": string, + }, ?
4924   "networks": [
4925     { "href": string }, +
4926   ], ?
4927   "operations": [
4928     { "rel": "edit", "href": string }, ?
4929     { "rel": "delete", "href": string } ?
4930   ] ?
4931   ...
4932 }
    
```

4933 **XML media type:** application/xml

4934 **XML serialization:**

```

4935 <ForwardingGroup xmlns="http://schemas.dmtf.org/cimi/1">
4936   <id> xs:anyURI </id>
4937   <name> xs:string </name> ?
4938   <description> xs:string </description> ?
4939   <created> xs:dateTime </created> ?
4940   <updated> xs:dateTime </updated> ?
4941   <property key="xs:string"> xs:string </property> *
4942   <network href="xs:anyURI"> *
4943   <operation rel="edit" href="xs:anyURI"/> ?
4944   <operation rel="delete" href="xs:anyURI"/> ?
4945   <xs:any>*
4946 </ForwardingGroup>
    
```

4947 **5.16.17.1 Collections**

4948 The following describes the collection resources owned by ForwardingGroups.

4949 **5.16.17.1.1 ForwardingGroupNetwork Collection**

4950 The resource type for each item of this collection is "ForwardingGroupNetwork", as defined as follows:

Name	ForwardingGroupNetwork	
Type URI	http://schemas.dmtf.org/cimi/1/ForwardingGroupNetwork	
Attribute	Type	Description
network	ref	A reference to a Network in the ForwardingGroup. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

4951 **JSON serialization:**

```

4952 { "resourceURI":
4953   "http://schemas.dmtf.org/cimi/1/ForwardingGroupNetworkCollection",
4954   "id": string,
4955   "count": number,
4956   "forwardingGroupNetworks": [
4957     { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroupNetwork",
4958       "id": string,
4959       "name": string, ?
4960       "description": string, ?
4961       "created": string, ?
4962       "updated": string, ?
4963       "properties": { "key": string, + }, ?
4964       "network": { "href": string },
4965       "operations": [
4966         { "rel": "edit", "href": string }, ?
4967         { "rel": "delete", "href": string } ?
4968       ] ?
4969       ...
4970     }, +
4971   ], ?
4972   "operations": [ { "rel": "add", "href": string } ? ]
4973   ...
4974 }
    
```

4975 **XML serialization:**

4976 <Collection

```

4977 resourceURI="http://schemas.dmtf.org/cimi/1/ForwardingGroupNetworkCollection"
4978     xmlns="http://schemas.dmtf.org/cimi/1">
4979     <id> xs:anyURI </id>
4980     <count> xs:integer </count>
4981     <ForwardingGroupNetwork>
4982         <id> xs:anyURI </id>
4983         <name> xs:string </name> ?
4984         <description> xs:string </description> ?
4985         <created> xs:dateTime </created> ?
4986         <updated> xs:dateTime </updated> ?
4987         <property key="xs:string"> xs:string </property> *
4988         <network href="xs:anyURI"/>
4989         <operation rel="edit" href="xs:anyURI"/> ?
4990         <operation rel="delete" href="xs:anyURI"/> ?
4991         <xs:any>*
4992     </ForwardingGroupNetwork> *
4993     <operation rel="add" href="xs:anyURI"/> ?
4994     <xs:any>*
4995 </Collection>

```

4996 5.16.17.2 Operations

4997 This resource supports the Read, Update, and Delete operations. Create is supported via the
4998 ForwardingGroup Collection resource.

4999 5.16.18 Forwarding Group Collection

5000 A Forwarding Group Collection resource represents the collection of Forwarding Groups within a Provider
5001 and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

5002 JSON serialization:

```

5003 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroupCollection",
5004   "id": string,
5005   "count": number,
5006   "forwardingGroups": [
5007     { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroup",
5008       "id": string,
5009       ... remaining ForwardingGroup attributes ...
5010     }, +
5011   ], ?
5012   "operations": [ { "rel": "add", "href": string } ? ]
5013   ...
5014 }

```

5015 XML serialization:

```

5016 <Collection
5017     resourceURI="http://schemas.dmtf.org/cimi/1/ForwardingGroupCollection"
5018     xmlns="http://schemas.dmtf.org/cimi/1">
5019     <id> xs:anyURI </id>
5020     <count> xs:integer </count>
5021     <ForwardingGroup>
5022         <id> xs:anyURI </id>
5023         ... remaining ForwardingGroup attributes ...
5024     </ForwardingGroup> *
5025     <operation rel="add" href="xs:anyURI"/> ?
5026     <xs:any>*
5027 </Collection>

```

5028 5.16.18.1 Operations

5029 NOTE: Tthe "add" operation requires a ForwardingGroupTemplate be used.

5030 **5.16.19 Forwarding Group Template**

5031 This resource captures the configuration values for realizing a ForwardingGroup. A Forwarding Group
 5032 Template may be used to create multiple ForwardingGroup.

Name	ForwardingGroupTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplate	
Attribute	Type	Description
networks	<i>ref[]</i>	An array of references to the networks in this Forwarding Group. Array item name: network Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

5033 The following describes the serialization of the resource in both JSON and XML:

5034 **JSON media type:** application/json

5035 **JSON serialization:**

```

5036 { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplate",
5037   "id": string,
5038   "name": string, ?
5039   "description": string, ?
5040   "created": string, ?
5041   "updated": string, ?
5042   "properties": { "key": string, + }, ?
5043   "networks": [
5044     { "href": string }, +
5045   ], ?
5046   "operations": [
5047     { "rel": "edit", "href": string }, ?
5048     { "rel": "delete", "href": string } ?
5049   ] ?
5050   ...
5051 }
```

5052 **XML media type:** application/xml

5053 **XML serialization:**

```

5054 <ForwardingGroupTemplate xmlns="http://schemas.dmtf.org/cimi/1">
5055   <id> xs:anyURI </id>
5056   <name> xs:string </name> ?
5057   <description> xs:string </description> ?
5058   <created> xs:dateTime </created> ?
5059   <updated> xs:dateTime </updated> ?
5060   <property key="xs:string"> xs:string </property> *
5061   <network href="xs:anyURI"> *
5062   <operation rel="edit" href="xs:anyURI"/> ?
5063   <operation rel="delete" href="xs:anyURI"/> ?
5064   <xs:any*
5065 </ForwardingGroupTemplate>
```

5066 **5.16.19.1 Operations**

5067 This resource supports the Read, Update, and Delete operations. Create is supported via the Forwarding
 5068 Group Template Collection resource.

5069 **5.16.20 Forwarding Group Template Collection**

5070 A Forwarding Group Template Collection resource represents the collection of Forwarding Group
5071 Template resources within a Provider and follows the Collection pattern defined in clause 5.5.12. This
5072 resource shall be serialized as follows:

5073 **JSON serialization:**

```
5074 { "resourceURI":
5075     "http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplateCollection",
5076     "id": string,
5077     "count": number,
5078     "forwardingGroupTemplates": [
5079         { "resourceURI": "http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplate",
5080           "id": string,
5081           ... remaining ForwardingGroupTemplate attributes ...
5082         }, +
5083     ], ?
5084     "operations": [ { "rel": "add", "href": string } ? ]
5085     ...
5086 }
```

5087 **XML serialization:**

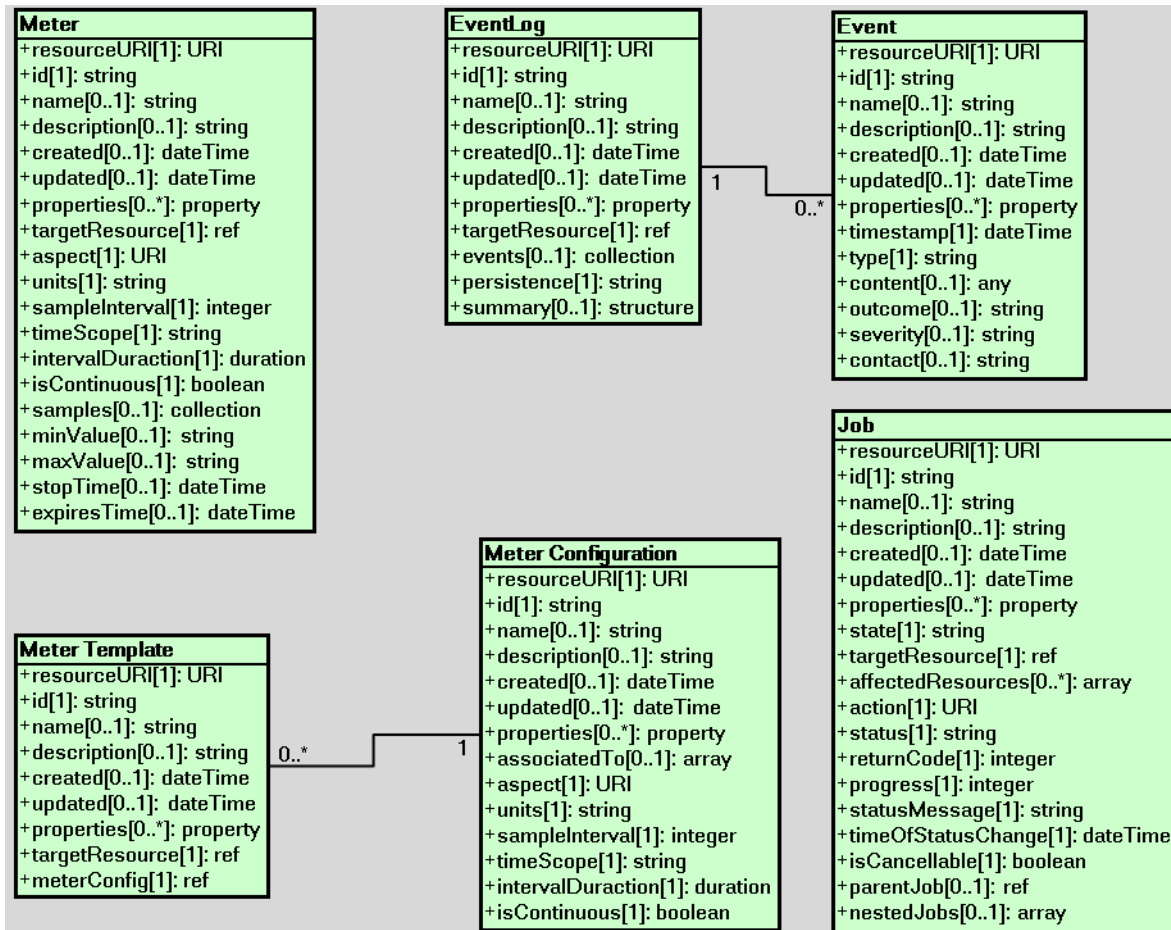
```
5088 <Collection
5089   resourceURI="http://schemas.dmtf.org/cimi/1/ForwardingGroupTemplateCollection"
5090   xmlns="http://schemas.dmtf.org/cimi/1">
5091   <id> xs:anyURI </id>
5092   <count> xs:integer </count>
5093   <ForwardingGroupTemplate>
5094     <id> xs:anyURI </id>
5095     ... remaining ForwardingGroupTemplate attributes ...
5096   </ForwardingGroupTemplate> *
5097   <operation rel="add" href="xs:anyURI"/> ?
5098   <xs:any>*
5099 </Collection>
```

5100 **5.16.20.1 Operations**

5101 This resource supports the Read and Update operations. Creation of new Forwarding Group Template
5102 resources are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

5103 **5.17 Monitoring resources and relationships**

5104 Figure 6 illustrates the resources involved in tracking the progress of operations, as well as, metering and
5105 monitoring the status of other resources. Although this drawing is in the style of a Resource Relationship
5106 diagram, the use of UML is neither rigorous nor normative.



5107 **Figure 6 - Monitoring resources**

5108 **5.17.1 Job**

5109 This resource represents a process (i.e., a sequence of one or more operations directed to accomplish a
5110 specific goal) that is performed by the Provider.

5111 If a Provider supports exposing Job resources to Consumers, each request from a Consumer that would
5112 result in a change to the environment shall result in a Job resource being created and an absolute URI
5113 reference to that Job resource shall be made available to the requesting Consumer. Providers may create
5114 additional Job resources for Provider initiated operations if the Provider chooses to expose these Jobs to
5115 Consumers.

5116 When a Job does not complete successfully (e.g., it is in the FAILED or STOPPED state), this
5117 specification does not place any requirements on the Provider to ensure that the affected resources are
5118 left in certain states. Based on the environmental conditions at that time, the Provider might choose to
5119 "undo" any impact of the operation; simply halt processing; attempt some kind of "cleanup" action; or
5120 choose to do something else. However, Providers shall list all resources impacted by the Job in the
5121 "affectedResources" attribute, thus allowing Consumers an opportunity to examine the state of each
5122 resource themselves. In cases where a resource has been deleted, references to that resource shall not
5123 appear in the "affectedResources" attribute.

5124 The Job resource allows for nesting of Jobs. The determination of when a single operation is converted
5125 into multiple nested Jobs is out of scope of this specification. However, if there are nested Jobs, the top-

5126 most Job resource shall report the overall status of all Jobs and shall only be in a "SUCCESS" state if all
 5127 nested Jobs are also in "SUCCESS" state. When nested Jobs are created, there is no requirement for
 5128 the top-most Job resource to reference all affected resources in its "affectedResources" attribute. The
 5129 Consumer will need to traverse the entire set of nested Jobs to determine the complete list of resources
 5130 impacted by the Jobs.

Name	Job	
Type URI	http://schemas.dmtf.org/cimi/1/Job	
Attribute	Type	Description
state	<i>string</i>	The state of the process associated with this operation. Allowable values include: QUEUED : Indicates that the operation has not yet begun processing. Allowable actions when in this state are: stop . RUNNING : Indicates that the operation is still being executed. Allowable action when in this state is: stop . FAILED : Indicates that the operation failed to complete successfully. SUCCESS : Indicates that the operation successfully completed. STOPPING : Indicates that the operation is in the process of being stopped. Allowable action when in this state is: stop . STOPPED : Indicates that the operation was stopped before completion. STOPPING and STOPPED states are optional and Providers may choose to support them or not. Providers may define additional values. <u>Constraints:</u> Provider : support mandatory; mutable Consumer : support mandatory; read-only
targetResource	<i>ref</i>	A reference to the top-level resource upon which the operation is being performed. Typically, this resource would be the resource on which the operation was invoked. Note that when an "add" Job is executed against a "Collection" resource (e.g. MachineCollection), the targetResource attribute shall reference the Collection resource - as that is the resource on which the operation was performed. Additionally, the newly created resource shall appear in the "affectedResources" attribute. <u>Constraints:</u> Provider : support mandatory; immutable Consumer : support mandatory; read-only
affectedResources	<i>ref[]</i>	A list of references to resources that have been impacted by this Job. Note that this list will always contain the "targetResource" reference. Array item name: affectedResource <u>Constraints:</u> Provider : support mandatory; mutable Consumer : support mandatory; read-only
action	<i>URI</i>	A URI that indicates the type of action being performed. <u>Constraints:</u> Provider : support mandatory; immutable Consumer : support mandatory; read-only

returnCode	<i>integer</i>	<p>The operation return code. The specific value will be specific to the implementation. Values in the range of 0 to 9999 are reserved for use by this specification.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
progress	<i>integer</i>	<p>An integer value in the range 0 ... 100 that indicates the progress of this Job. This value shall be 100 when the Job is no longer executing, regardless of the outcome.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
statusMessage	<i>string</i>	<p>This attribute is a human-readable string that provides information about the operation. It is used to further qualify or provide additional information about the current status of the operation. For example, this attribute may indicate the reason why the operation failed, or whether the operation was cancelled by the Consumer or the Provider.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
timeOfStatusChange	<i>dateTime</i>	<p>A timestamp indicating the last time that the status of the operation changed.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>
parentJob	<i>ref</i>	<p>A reference to the Job of which this resource is a subordinate.</p> <p>Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only</p>
nestedJobs	<i>ref[]</i>	<p>An array of references to a set of subordinate Job resources.</p> <p>Array item name: nestedJob</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only</p>

5131 The following describes the serialization of the resource in both JSON and XML:

5132 **JSON media type:** application/json

5133 **JSON serialization:**

```

5134 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Job",
5135   "id": string,
5136   "name": string, ?
5137   "description": string, ?
5138   "created": string, ?
5139   "updated": string, ?
5140   "properties": { "key": string, + }, ?
5141   "state": string,
5142   "targetResource": { "href": string },
5143   "affectedResources": [ { "href": string }, + ],
5144   "action": string,
5145   "returnCode": number,
5146   "progress": number,
5147   "statusMessage": string,
5148   "timeOfStatusChange": date,
    
```

```

5149     "isCancellable": boolean,
5150     "parentJob": { "href": string }, ?
5151     "nestedJobs": [
5152       { "href": string }, +
5153     ], ?
5154     "operations": [
5155       { "rel": "edit", "href": string }, ?
5156       { "rel": "delete", "href": string }, ?
5157       { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string } ?
5158     ] ?
5159     ...
5160   }

```

5161 **XML media type:** application/xml

5162 **XML serialization:**

```

5163 <Job xmlns="http://schemas.dmtf.org/cimi/1">
5164   <id> xs:anyURI </id>
5165   <name> xs:string </name> ?
5166   <description> xs:string </description> ?
5167   <created> xs:dateTime </created> ?
5168   <updated> xs:dateTime </updated> ?
5169   <property key="xs:string"> xs:string </property> *
5170   <state> xs:string </state>
5171   <targetResource href="xs:anyURI"/>
5172   <affectedResource href="xs:anyURI"/> +
5173   <action> xs:anyURI </action>
5174   <status> xs:string </status>
5175   <returnCode> xs:integer </returnCode>
5176   <progress> xs:integer </progress>
5177   <statusMessage> xs:string </statusMessage>
5178   <timeOfStatusChange> xs:dateTime </timeOfStatusChange>
5179   <isCancellable> xs:boolean </isCancellable>
5180   <parentJob href="xs:anyURI"/> ?
5181   <nestedJob href="xs:anyURI"/> *
5182   <operation rel="edit" href="xs:anyURI"/> ?
5183   <operation rel="delete" href="xs:anyURI"/> ?
5184   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
5185 href="xs:anyURI"/> ?
5186   <xs:any>*
5187 </Job>

```

5188 5.17.1.1 Operations

5189 This resource supports the Read, Update and Delete operations.

5190 Note that deleting a Job that is in the "RUNNING" state shall be the equivalent of first stopping the Job
5191 and then deleting it. A request to delete a running Job that does not support the "stop" action shall fail.

5192 The following custom operations are also defined:

5193 **Stopping a Job**

5194 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

5195 This operation will stop a Job.

5196 Input parameters: None.

5197 Output parameters: None.

5198 During the processing of this operation, the Job shall be in the "STOPPING" state.

5199 Upon successful completion of this operation, the Job shall be in the "STOPPED" state.

5200 **HTTP protocol**

5201 To stop a Job, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the Job where
5202 the HTTP request body shall be as described below.

5203 **JSON media type:** application/json

5204 **JSON serialization:**

```
5205 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
5206   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
5207   "properties": { "key": string, + } ?
5208   ...
5209 }
```

5210 **XML media type:** application/xml

5211 **XML serialization**

```
5212 <Action xmlns="http://schemas.dmtf.org/cimi/1">
5213   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
5214   <property key="xs:string"> xs:string </property> *
5215   <xs:any>*
5216 </Action>
```

5217 Upon successful processing of the request, the HTTP response body will be empty.

5218 **5.17.2 Job Collection**

5219 A Job Collection resource represents the collection of Jobs within a Provider and follows the Collection
5220 pattern defined in clause 5.5.12. This resource shall be serialized as follows:

5221 **JSON serialization:**

```
5222 { "resourceURI": "http://schemas.dmtf.org/cimi/1/JobCollection",
5223   "id": string,
5224   "count": integer,
5225   "jobs": [
5226     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Job",
5227       "id": string,
5228       ... remaining Job attributes ...
5229     }, +
5230   ], ?
5231   "operations": [ { "rel": "add", "href": string } ? ]
5232   ...
5233 }
```

5234 **XML serialization:**

```
5235 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/JobCollection"
5236   xmlns="http://schemas.dmtf.org/cimi/1">
5237   <id> xs:anyURI </id>
5238   <count> xs:integer </count>
5239   <Job>
5240     <id> xs:anyURI </id>
5241     ... remaining Job attributes ...
5242   </Job> *
5243   <operation rel="add" href="xs:anyURI"/> ?
5244   <xs:any>*
5245 </Collection>
```

5246 **5.17.3 Meter**

5247 This resource represents an available Meter of some property associated to a given resource.

5248 When a Meter's "targetResource" is deleted all Meters associated with that resource shall also be
5249 deleted. In other words, deleting a resource-specific MetersCollection (e.g. a Machine's MetersCollection)
5250 shall also result in the deletion of the Meters referenced from that collection.

Name	Meter	
Type URI	http://schemas.dmtf.org/cimi/1/Meter	
Attribute	Type	Description
targetResource	<i>ref</i>	A reference to the resource to which the Meter is related. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
aspect	<i>URI</i>	A unique identifier representing the aspect of the resource being metered. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
units	<i>string</i>	The name of the used units, e.g., kilobits per second, CPU usage percentage, etc. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
sampleInterval	<i>integer</i>	The time between consecutive samples in seconds. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
timeScope	<i>string</i>	The time scope to which this meter's value applies. Two possible values: "Point" indicates that the Meter applies to a point in time. "Interval" indicates that the Meter applies to a time interval. For instance, it would be possible to define a Meter whose purpose is to provide the daily average CPU usage. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
intervalDuration	<i>duration</i>	The interval duration when the timeScope is set to "Interval". Possible values: hourly, daily, weekly, monthly or yearly. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
isContinuous	<i>boolean</i>	This value indicates whether or not the Meter value is continuous or scalar. Performance Meters are an example of a linear metric. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
samples	<i>collection [Sample]</i>	A reference to the list of taken samples Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only

minValue	<i>string</i>	The expected minimal measure value. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
maxValue	<i>string</i>	The expected maximum measure value. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
stopTime	<i>dateTime</i>	The time from which the meter stops tracking samples. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
expiresTime	<i>dateTime</i>	The time from which the Meter is not monitored anymore. It implies the deletion of the Meter after this time. Note that a Meter might be deleted before this time if the resource being metered is deleted. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

5251 The following describes the serialization of the resource in both JSON and XML:

5252 **JSON media type:** application/json

5253 **JSON serialization:**

```

5254 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
5255   "id": string,
5256   "name": string, ?
5257   "description": string, ?
5258   "created": string, ?
5259   "updated": string, ?
5260   "properties": { "key": string, + }, ?
5261   "targetResource": { "href": string }, ?
5262   "aspect": string,
5263   "units": string,
5264   "sampleInterval": number,
5265   "timeScope": string,
5266   "intervalDuration": string,
5267   "isContinuous": boolean,
5268   "samples": { "href": string }, ?
5269   "minValue": string, ?
5270   "maxValue": string, ?
5271   "stopTime": string, ?
5272   "expiresTime": string, ?
5273   "operations": [
5274     { "rel": "edit", "href": string }, ?
5275     { "rel": "delete", "href": string }, ?
5276     { "rel": "http://schemas.dmtf.org/cimi/1/action/start", "href": string }, ?
5277     { "rel": "http://schemas.dmtf.org/cimi/1/action/stop", "href": string } ?
5278   ] ?
5279   ...
5280 }
```

5281 **XML media type:** application/xml

5282 **XML serialization:**

```

5283 <Meter xmlns="http://schemas.dmtf.org/cimi/1">
5284   <id> xs:anyURI </id>
5285   <name> xs:string </name> ?
5286   <description> xs:string </description> ?
5287   <created> xs:dateTime </created> ?
5288   <updated> xs:dateTime </updated> ?
5289   <property key="xs:string"> xs:string </property> *
5290   <targetResource href="xs:anyURI"/>
5291   <aspect> xs:anyURI </aspect>
5292   <units> xs:string </units>
5293   <sampleInterval> xs:integer </sampleInterval>
5294   <timeScope> xs:string <timeScope>
5295   <intervalDuration xs:duration </intervalDuration>
5296   <isContinuous> xs:boolean </isContinuous>
5297   <samples href="xs:anyURI"/> ?
5298   <minValue> xs:string </minValue> ?
5299   <maxValue> xs:string </maxValue> ?
5300   <stopTime> xs:dateTime </stopTime> ?
5301   <expiresTime> xs:dateTime </expiresTime> ?
5302   <operation rel="edit" href="xs:anyURI"/> ?
5303   <operation rel="delete" href="xs:anyURI"/> ?
5304   <operation rel="http://schemas.dmtf.org/cimi/1/action/start"
5305 href="xs:anyURI"/> ?
5306   <operation rel="http://schemas.dmtf.org/cimi/1/action/stop"
5307 href="xs:anyURI"/> ?
5308   <xs:any>*
5309 </Meter>
    
```

5310 **5.17.3.1 Collections**

5311 The following describes the collection resources owned by Meters.

5312 **5.17.3.1.1 Sample Collection**

5313 The resource type for each item of this collection is “Sample”, defined as follows:

Name	Sample	
Type URI	http://schemas.dmtf.org/cimi/1/Sample	
Attribute	Type	Description
timeStamp	dateTime	It indicates when the measure was taken (timeScope="Point"). When the timeScope is "Interval", it indicates the end of the time interval. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
value	string	It indicates the sampled value of the measure. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only

5314 **JSON serialization:**

```

5315 { "resourceURI": "http://schemas.dmtf.org/cimi/1/SampleCollection",
5316   "id": string,
5317   "count": number,
5318   "samples": [
    
```

```

5319     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Sample",
5320       "id": string,
5321       "name": string, ?
5322       "description": string, ?
5323       "created": string, ?
5324       "updated": string, ?
5325       "properties": { "key": string, + }, ?
5326       "timestamp": string,
5327       "value": string
5328       ...
5329     }, +
5330   ], ?
5331   ...
5332 }
    
```

5333 XML serialization:

```

5334 <Collection
5335   resourceURI="http://schemas.dmtf.org/cimi/1/SampleCollection"
5336   xmlns="http://schemas.dmtf.org/cimi/1">
5337   <id> xs:anyURI </id>
5338   <count> xs:integer </count>
5339   <Sample>
5340     <id> xs:anyURI </id>
5341     <name> xs:string </name> ?
5342     <description> xs:string </description> ?
5343     <created> xs:dateTime </created> ?
5344     <updated> xs:dateTime </updated> ?
5345     <property key="xs:string"> xs:string </property> *
5346     <sample timestamp="xs:dateTime" value="xs:string"/>
5347     <xs:any>*
5348   </Sample> *
5349   <xs:any>*
5350 </Collection>
    
```

5351 5.17.3.2 Operations

5352 This resource supports the Read, Update, and Delete operations. Create is supported via the Meter
5353 Collection resource.

5354 NOTE: The deletion of a Meter shall remove the Meter from the targetResource's "meter" attribute.

5355 The following custom operations are also defined:

5356 Starting a Meter

5357 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/start

5358 This operation will start a Meter.

5359 Input parameters: None.

5360 Output parameters: None.

5361 Upon successful completion of this operation, the Meter starts recording samples related to its associated
5362 resource.

5363 HTTP protocol

5364 To start a Meter, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/start" URI of the Meter
5365 where the HTTP request body shall be as described below.

5366 **JSON media type:** application/json

5367 **JSON serialization:**

```
5368 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
5369   "action": "http://schemas.dmtf.org/cimi/1/action/start",
5370   "properties": { "key": string, + } ?
5371   ...
5372 }
```

5373 **XML media type:** application/xml

5374 **XML serialization**

```
5375 <Action xmlns="http://schemas.dmtf.org/cimi/1">
5376   <action> http://schemas.dmtf.org/cimi/1/action/start </action>
5377   <property key="xs:string"> xs:string </property> *
5378   <xs:any>*
5379 </Action>
```

5380 Upon successful processing of the request, the HTTP response body will be empty.

5381 **Stopping a Meter**

5382 **/link@rel:** http://schemas.dmtf.org/cimi/1/action/stop

5383 This operation will stop a Meter.

5384 Input parameters: None.

5385 Output parameters: None.

5386 Upon successful completion of this operation, the Meter will no longer be recording samples related to its associated resource.

5388 **HTTP protocol**

5389 To stop a Meter, a POST is sent to the "http://schemas.dmtf.org/cimi/1/action/stop" URI of the Meter where the HTTP request body shall be as described below.

5391 **JSON media type:** application/json

5392 **JSON serialization:**

```
5393 { "resourceURI": "http://schemas.dmtf.org/cimi/1/Action",
5394   "action": "http://schemas.dmtf.org/cimi/1/action/stop",
5395   "properties": { "key": string, + } ?
5396   ...
5397 }
```

5398 **XML media type:** application/xml

5399 **XML serialization**

```
5400 <Action xmlns="http://schemas.dmtf.org/cimi/1">
5401   <action> http://schemas.dmtf.org/cimi/1/action/stop </action>
5402   <property key="xs:string"> xs:string </property> *
5403   <xs:any>*
5404 </Action>
```

5405 Upon successful processing of the request, the HTTP response body will be empty.

5406 **5.17.4 Meter Collection**

5407 A Meter Collection resource represents the collection of Meters within a Provider and follows the
 5408 Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

5409 **JSON serialization:**

```
5410 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterCollection",
5411   "id": string,
5412   "count": number,
5413   "meters": [
5414     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Meter",
5415       "id": string,
5416       ... remaining Meter attributes ...
5417     }, +
5418   ], ?
5419   "operations": [ { "rel": "add", "href": string } ? ]
5420   ...
5421 }
```

5422 **XML serialization:**

```
5423 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/MeterCollection"
5424   xmlns="http://schemas.dmtf.org/cimi/1">
5425   <id> xs:anyURI </id>
5426   <count> xs:integer </count>
5427   <Meter>
5428     <id> xs:anyURI </id>
5429     ... remaining Meter attributes ...
5430   </Meter> *
5431   <operation rel="add" href="xs:anyURI"/> ?
5432   <xs:any>*
5433 </Collection>
```

5434 **5.17.4.1 Operations**

5435 NOTE: The "add" operation requires a MeterTemplate be used.

5436 When Meters are created via the global (Cloud Entry Point) MeterCollection's "add" operation, they are
 5437 automatically added to the corresponding targetResource's "Meters" collection resource as well.

5438 **5.17.5 Meter Template**

5439 A Meter Template represents the information needed to create a new Meter.

Name	MeterTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/MeterTemplate	
Attribute	Type	Description
targetResource	ref	A reference to the resource that will be metered. The type of the resource shall be one of the "associatedTo" types listed in the Meter Configuration referenced. When this Template is used to create a new Meter via the global (Cloud Entry Point) Meters Collection, this attribute shall be present. When this Template is used to create a new Meter via a targetResource's Meters Collection then this attribute shall either be absent or shall have the same value as the "id" of the targetResource to which this Meter is being added. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
meterConfig	ref	A reference to the Meter Configuration that will be used to create a Meter from this

	<p>Meter Template.</p> <p>Note that the attributes of the MeterConfiguration may be specified rather than a reference to an existing MeterConfiguration resource.</p> <p>Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write</p>
--	---

5440 The following describes the serialization of the resource in both JSON and XML:

5441 **JSON media type:** application/json

5442 **JSON serialization:**

```
5443 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterTemplate",
5444   "id": string,
5445   "name": string, ?
5446   "description": string, ?
5447   "created": string, ?
5448   "updated": string, ?
5449   "properties": { "key": string, + }, ?
5450   "targetResource": { string },
5451   "meterConfig": {
5452     "href": string | ... MeterConfiguration attributes ...
5453   },
5454   "operations": [
5455     { "rel": "edit", "href": string }, ?
5456     { "rel": "delete", "href": string } ?
5457   ] ?
5458   ...
5459 }
```

5460 **XML media type:** application/xml

5461 **XML serialization:**

```
5462 <MeterTemplate xmlns="http://schemas.dmtf.org/cimi/1">
5463   <id> xs:anyURI </id>
5464   <name> xs:string </name> ?
5465   <description> xs:string </description> ?
5466   <created> xs:dateTime </created> ?
5467   <updated> xs:dateTime </updated> ?
5468   <property key="xs:string"> xs:string </property> *
5469   <targetResource href="xs:anyURI"/>
5470   <meterConfig href="xs:anyURI"?>
5471     ... MeterConfiguration attributes ... ?
5472   </meterConfig>
5473   <operation rel="edit" href="xs:anyURI"/> ?
5474   <operation rel="delete" href="xs:anyURI"/> ?
5475   <xs:any*>
5476 </MeterTemplate>
```

5477 5.17.6 Meter Template Collection

5478 A Meter Template Collection resource represents the collection of MeterTemplate resources within a
5479 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
5480 follows:

5481 **JSON serialization:**

```
5482 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterTemplateCollection",
5483   "id": string,
5484   "count": number,
```

```

5485 "meterTemplates": [
5486   { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterTemplate",
5487     "id": string,
5488     ... remaining MeterTemplate attributes ...
5489   }, +
5490 ], ?
5491 "operations": [ { "rel": "add", "href": string } ? ]
5492 ...
5493 }

```

5494 **XML serialization:**

```

5495 <Collection
5496   resourceURI="http://schemas.dmtf.org/cimi/1/MeterTemplateCollection"
5497   xmlns="http://schemas.dmtf.org/cimi/1">
5498   <id> xs:anyURI </id>
5499   <count> xs:integer </count>
5500   <MeterTemplate>
5501     <id> xs:anyURI </id>
5502     ... remaining MeterTemplate attributes ...
5503   </MeterTemplate> *
5504   <operation rel="add" href="xs:anyURI"/> ?
5505   <xs:any>*
5506 </Collection>

```

5507 **5.17.6.1 Operations**

5508 This resource supports the Read and Update operations. Creation of new Meter Template resources are
 5509 supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

5510 **5.17.7 Meter Configuration**

5511 A Meter Configuration represents the definition of a Meter.

Name	MeterConfiguration	
Type URI	http://schemas.dmtf.org/cimi/1/MeterConfiguration	
Attribute	Type	Description
associatedTo	URI[]	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 an resource type. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
aspect	URI	A unique identifier representing the aspect of the resource being metered. See the table below for the set of CIMI defined URIs. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
units	string	The human-readable name of the used units, e.g., kilobits per second, CPU usage percentage, etc. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
sampleInterval	integer	The time between consecutive samples in seconds. Constraints: Provider: support mandatory; mutable

		Consumer: support mandatory; read-write
timeScope	<i>string</i>	The time scope to which the Meter value applies. Two possible values: "Point" indicates that the Meter applies to a point in time. "Interval" indicates that the Meter applies to a time interval. For instance, it would be possible to define a MeterConfiguration whose purpose is to provide the daily average CPU usage. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
intervalDuration	<i>duration</i>	The interval duration when the timeScope is set to "Interval." Possible values: hourly, daily, weekly, monthly, or yearly. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
isContinuous	<i>boolean</i>	This value indicates whether the Meter value is continuous or scalar. Performance Meters are an example of a linear metric. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

5512 The following describes the serialization of the resource in both JSON and XML:

5513 **JSON media type:** application/json

5514 **JSON serialization:**

```

5515 { "resourcURI": "http://schemas.dmtf.org/cimi/1/MeterConfiguration",
5516   "id": string,
5517   "name": string, ?
5518   "description": string, ?
5519   "created": string, ?
5520   "updated": string, ?
5521   "properties": { "key": string, + }, ?
5522   "associatedTo": [
5523     { "href": string }, +
5524   ], ?
5525   "aspect": string,
5526   "units": string,
5527   "sampleInterval": number,
5528   "timeScope": string,
5529   "intervalDuration": string,
5530   "isContinuous": boolean,
5531   "operations": [
5532     { "rel": "edit", "href": string }, ?
5533     { "rel": "delete", "href": string } ?
5534   ] ?
5535   ...
5536 }
```

5537 **XML media type:** application/xml

5538 **XML serialization:**

```

5539 <MeterConfiguration xmlns="http://schemas.dmtf.org/cimi/1">
5540   <id> xs:anyURI </id>
5541   <name> xs:string </name> ?
5542   <description> xs:string </description> ?
5543   <created> xs:dateTime </created> ?
5544   <updated> xs:dateTime </updated> ?
```



```

5545 <property key="xs:string"> xs:string </property> *
5546 <associatedTo href="xs:anyURI"/> *
5547 <aspect> xs:anyURI </aspect>
5548 <units> xs:string </units>
5549 <sampleInterval> xs:integer </sampleInterval>
5550 <timeScope> xs:string </timeScope>
5551 <intervalDuration> xs:duration </intervalDuration>
5552 <isContinuous> xs:boolean </isContinuous>
5553 <operation rel="edit" href="xs:anyURI"/> ?
5554 <operation rel="delete" href="xs:anyURI"/> ?
5555 <xs:any>*
5556 </MeterConfiguration>
    
```

5557 The following table describes the "aspect" URIs defined by this specification. Providers may define new
 5558 aspect URIs and it is recommended that these URIs be dereferencable such that Consumers can
 5559 discover the details of the new aspect. For brevity the "URI" column in the table only shows the last part
 5560 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.

5561 **5.17.7.1 Operations**

5562 This resource supports the Read, Update, and Delete operations. Create is supported via the Meter
 5563 Configuration Collection resource.

5564 **5.17.8 Meter Configuration Collection**

5565 A Meter Configuration Collection resource represents the collection of Meter Configurations within a
 5566 Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be serialized as
 5567 follows:

5568 **JSON serialization:**

```

5569 { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterConfigurationCollection",
5570   "id": string,
5571   "count": number,
5572   "meterConfigurations": [
5573     { "resourceURI": "http://schemas.dmtf.org/cimi/1/MeterConfiguration",
5574       "id": string,
5575       ... remaining MeterConfiguration attributes ...
    
```

```

5576     }, +
5577     ], ?
5578     "operations": [ { "rel": "add", "href": string } ? ]
5579     ...
5580 }
    
```

5581 **XML serialization:**

```

5582 <Collection
5583     resourceURI="http://schemas.dmtf.org/cimi/1/MeterConfigurationCollection"
5584     xmlns="http://schemas.dmtf.org/cimi/1">
5585     <id> xs:anyURI </id>
5586     <count> xs:integer </count>
5587     <MeterConfiguration>
5588         <id> xs:anyURI </id>
5589         ... remaining MeterConfiguration attributes ...
5590     </MeterConfiguration> *
5591     <operation rel="add" href="xs:anyURI"/> ?
5592     <xs:any>*
5593 </Collection>
    
```

5594 **5.17.8.1 Operations**

5595 This resource supports the Read and Update operations. Creation of new Meter Configuration resources
 5596 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

5597 **5.17.9 Event Log**

5598 An resource that represents a registry of Events.

5599 When an EventLog's "targetResource" is deleted the EventLog associated with that resource may also be
 5600 deleted. In other words, deleting a resource (e.g. a Machine) may also result in the deletion of the
 5601 EventLog referenced from that resource. This behavior is denoted by the EventLog.Linked capability.

5602 When an EventLog is deleted all of its Events shall also be deleted.

Name	EventLog	
Type URI	http://schemas.dmtf.org/cimi/1/EventLog	
Attribute	Type	Description
targetResource	ref	A reference to the resource to which the Events are related. Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only
events	collection [Event]	A reference to the list of occurred Events. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
persistence	string	A value that indicates the persistence of the Events within the EventLog. For instance, daily, weekly, monthly, or yearly. Events that exceed the persistence duration may be deleted. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
summary	<unnamed structure>	A summary of all the events present in the EventLog when the read operation is performed, grouped by severity. Each summary attribute is an (unnamed) structure that has the following sub-

attributes:		
Attribute	Type	Description
low	<i>integer</i>	Number of occurred Events with a low severity. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
medium	<i>integer</i>	Number of occurred Events with a medium severity. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
high	<i>integer</i>	Number of occurred Events with a high severity. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
critical	<i>integer</i>	Number of occurred Events with a critical severity. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only
Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-only		

5603 The following describes the serialization of the resource in both JSON and XML:

5604 **JSON media type:** application/json

5605 **JSON serialization:**

```

5606 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLog",
5607   "id": string,
5608   "name": string, ?
5609   "description": string, ?
5610   "created": string, ?
5611   "updated": string, ?
5612   "properties": { "key": string, + }, ?
5613   "targetResource": { "href": string },
5614   "events": { "href": string },
5615   "persistence": string,
5616   "summary": {
5617     "low": number,
5618     "medium": number,
5619     "high": number,
5620     "critical": number
5621   }, ?
5622   "operations": [
5623     { "rel": "edit", "href": string }, ?
5624     { "rel": "delete", "href": string } ?
5625   ] ?
5626   ...
5627 }
```

5628 **XML media type:** application/xml

5629 **XML serialization:**

```

5630 <EventLog xmlns="http://schemas.dmtf.org/cimi/1">
5631   <id> xs:anyURI </id>
```

```

5632 <name> xs:string </name> ?
5633 <description> xs:string </description> ?
5634 <created> xs:dateTime </created> ?
5635 <updated> xs:dateTime </updated> ?
5636 <property key="xs:string"> xs:string </property> *
5637 <targetResource href="xs:anyURI"/>
5638 <events href="xs:anyURI"/>
5639 <persistence> xs:string </persistence>
5640 <summary>
5641 <low> xs:integer </low>
5642 <medium> xs:integer </medium>
5643 <high> xs:integer </high>
5644 <critical> xs:integer </critical>
5645 </summary>
5646 <operation rel="edit" href="xs:anyURI"/> ?
5647 <operation rel="delete" href="xs:anyURI"/> ?
5648 <xs:any*>
5649 </EventLog>

```

5650 5.17.9.1 Collections

5651 The following describes the collection resources owned by EventLogs.

5652 5.17.9.1.1 Event Collection

5653 The resource type for each item of this collection is “Event” as defined in clause 5.17.13.

5654 JSON serialization:

```

5655 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventCollection",
5656   "id": string,
5657   "count": number,
5658   "events": [
5659     { "resourceURI": "http://schemas.dmtf.org/cimi/1/Event",
5660       "id": string,
5661       ... remaining Event attributes ...
5662     }, +
5663   ], ?
5664   "operations": [ { "rel": "add", "href": string } ? ]
5665   ...
5666 }

```

5667 XML serialization:

```

5668 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/EventCollection"
5669   xmlns="http://schemas.dmtf.org/cimi/1">
5670   <id> xs:anyURI </id>
5671   <count> xs:integer </count>
5672   <Event>
5673     <id> xs:anyURI </id>
5674     ... remaining Event attributes ...
5675   </Event> *
5676   <operation rel="add" href="xs:anyURI"/> ?
5677   <xs:any*>
5678 </Collection>

```

5679 5.17.9.2 Operations

5680 This resource supports the Read, Update, and Delete operations.

5681 **5.17.10 Event Log Collection**

5682 A Event Log Collection resource represents the collection of Event Logs within a Provider and follows the
 5683 Collection pattern defined in clause 5.5.12. This resource shall be serialized as follows:

5684 **JSON serialization:**

```
5685 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLogCollection",
5686   "id": string,
5687   "count": number,
5688   "eventLogs": [
5689     { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLog",
5690       "id": string,
5691       ... remaining EventLog attributes ...
5692     }, +
5693   ], ?
5694   "operations": [ { "rel": "add", "href": string } ? ]
5695   ...
5696 }
```

5697 **XML serialization:**

```
5698 <Collection resourceURI="http://schemas.dmtf.org/cimi/1/EventLogCollection"
5699   xmlns="http://schemas.dmtf.org/cimi/1">
5700   <id> xs:anyURI </id>
5701   <count> xs:integer </count>
5702   <EventLog>
5703     <id> xs:anyURI </id>
5704     ... remaining EventLog attributes ...
5705   </EventLog> *
5706   <operation rel="add" href="xs:anyURI"/> ?
5707   <xs:any>*
5708 </Collection>
```

5709 **5.17.11 Event Log Template**

5710 An EventLog Template represents the information needed to create a new EventLog.

Name	EventLogTemplate	
Type URI	http://schemas.dmtf.org/cimi/1/EventLogTemplate	
Attribute	Type	Description
targetResource	ref	A reference to the resource to which the EventLog shall be connected. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write
persistence	string	A value that indicates the persistence of the Events in the new EventLog. For instance, daily, weekly, monthly, or yearly. Events that exceed the persistence duration may be deleted. Constraints: Provider: support mandatory; mutable Consumer: support mandatory; read-write

5711 The following describes the serialization of the resource in both JSON and XML:

5712 **JSON media type:** application/json

5713 **JSON serialization:**

```
5714 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLogTemplate",
5715   "id": string,
```

```

5716     "name": string, ?
5717     "description": string, ?
5718     "created": string, ?
5719     "updated": string, ?
5720     "properties": { "key": string, + }, ?
5721     "targetResource": { string },
5722     "persistence": string,
5723     "operations": [
5724         { "rel": "edit", "href": string }, ?
5725         { "rel": "delete", "href": string } ?
5726     ] ?
5727     ...
5728 }

```

5729 **XML media type:** application/xml

5730 **XML serialization:**

```

5731 <EventLogTemplate xmlns="http://schemas.dmtf.org/cimi/1">
5732   <id> xs:anyURI </id>
5733   <name> xs:string </name> ?
5734   <description> xs:string </description> ?
5735   <created> xs:dateTime </created> ?
5736   <updated> xs:dateTime </updated> ?
5737   <property key="xs:string"> xs:string </property> *
5738   <targetResource href="xs:anyURI"/>
5739   <persistence> xs:string </persistence>
5740   <operation rel="edit" href="xs:anyURI"/> ?
5741   <operation rel="delete" href="xs:anyURI"/> ?
5742   <xs:any>*
5743 </MeterTemplate>

```

5744 5.17.12 Event Log Template Collection

5745 A EventLog Template Collection resource represents the collection of EventLogTemplate resources
5746 within a Provider and follows the Collection pattern defined in clause 5.5.12. This resource shall be
5747 serialized as follows:

5748 **JSON serialization:**

```

5749 { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLogTemplateCollection",
5750   "id": string,
5751   "count": number,
5752   "eventLogTemplates": [
5753     { "resourceURI": "http://schemas.dmtf.org/cimi/1/EventLogTemplate",
5754       "id": string,
5755       ... remaining EventLogTemplate attributes ...
5756     }, +
5757   ], ?
5758   "operations": [ { "rel": "add", "href": string } ? ]
5759   ...
5760 }

```

5761 **XML serialization:**

```

5762 <Collection
5763   resourceURI="http://schemas.dmtf.org/cimi/1/EventLogTemplateCollection"
5764   xmlns="http://schemas.dmtf.org/cimi/1">
5765   <id> xs:anyURI </id>
5766   <count> xs:integer </count>
5767   <EventLogTemplate>
5768     <id> xs:anyURI </id>
5769     ... remaining EventLogTemplate attributes ...
5770   </EventLogTemplate> *

```

```
5771 <operation rel="add" href="xs:anyURI"/> ?
5772 <xs:any>*
5773 </Collection>
```

5774 **5.17.12.1 Operations**

5775 This resource supports the Read and Update operations. Creation of new EventLog Template resources
5776 are supported via a POST to the "add" operation's URI as described in clause 4.2.1.1.

5777 **5.17.13 Event**

5778 An resource that represents the occurrence of an event within the managed infrastructure. Some
5779 examples of Events may be:

- 5780 • Machine X has been rebooted by guest OS.
- 5781 • Machine X is not responding to platform services.
- 5782 • A new vCPU has been added to machine X following defined elasticity rules.

5783 The scope of the Event concept is any information that the Provider is able to track within its infrastructure
5784 and that can constitute useful information for the Consumer. Possible examples include, but are not
5785 limited to, errors and inconveniences that occur in the (virtual) resources assigned to Consumers;
5786 Provider-initiated actions, such as maintenance tasks; etc.

Name	Event	
Type URI	http://schemas.dmtf.org/cimi/1/Event	
Attribute	Type	Description
timestamp	<i>dateTime</i>	<p>The time of occurrence of the actual event. A datetime field formatted according to DSP4004, which follows ISO8601; the timestamp should preserve time zone information, i.e., include a local time component and an offset from UTC.</p> <p>For example, Monday, May 25, 2012, at 1:30:15 PM EST is represented as:</p> <pre>2012-05-25T13:30:15-05:00</pre> <p>NOTE: This attribute should not be confused with the time of creation of the Event resource instance, which is captured in the common "created" attribute.</p> <p>Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only</p>
type	<i>URI</i>	<p>A URI that uniquely identifies the type of the event. When the "content" attribute is present, this URI determines the actual data structure used for this content, e.g., to which schema it is associated.</p> <p>Constraints: Provider: support mandatory; immutable Consumer: support mandatory; read-only</p>
content	<i>any</i>	<p>A polymorphic attribute that represents detailed event data, the type of which will vary with the event "type." Typically, a data structure; for example:</p> <p>In the case of a monitoring event, the content will hold the target resource ID and type, measured attribute(s), and status value(s).</p> <p>In the case of an audit event conforming to the CADF model, the content will hold the detailed event structure that complies with CADF event schema.</p> <p>In the case of a CIM Indication, the content will hold the structure and attributes defined for such events.</p> <p>Constraints:</p>

		<p>Provider: support mandatory; immutable Consumer: support mandatory; read-only</p>
outcome	<i>string</i>	<p>A string value that characterizes the general significance of the event. A core set is defined that may be used regardless of the event type. For each event type, the definition of a core outcome value maybe refined in the context of this type, provided it does not conflict with the general meaning of the outcome given below.</p> <p>Core outcomes are:</p> <p>Pending: The event is about an action or process that is still ongoing.</p> <p>Unknown: The event is about a request or action that is not known by the Provider.</p> <p>Status: The event reports on the state or status of a resource.</p> <p>Success: The event reports on a successful outcome of some action or process.</p> <p>Warning: The event reports on a situation that requires attention or remedial action.</p> <p>Failure: The event reports on a failed outcome of some action or process.</p> <p>This set of core outcome values may be extended to accommodate possible outcomes of a specific event type. In this case, the extended set of values will apply to all events of this type.</p> <p>Constraints: Provider: support optional; immutable Consumer: support optional; read-only</p>
severity	<i>string</i>	<p>A value indicating the Event severity. Possible values are:</p> <p>critical</p> <p>high</p> <p>medium</p> <p>low</p> <p>The meaning of the severity level may vary depending on the event "type." When such an attribute is not relevant to a particular type of event, it should be omitted.</p> <p>Constraints: Provider: support optional; immutable Consumer: support optional; read-only</p>
contact	<i>string</i>	<p>A reference to a contact point or processing point to handle the event. The actual type of this content (e.g., email address, phone# of helpdesk or staff, message queue, URL...) is dependent on, and determined by the event "type." This attribute is mutable as it may be determined after event creation by the Provider.</p> <p>Constraints: Provider: support optional; immutable Consumer: support optional; read-only</p>

5787 NOTE: There exists a legacy of several event models that have been standardized or designed for various domains
5788 relevant to IT. The objective in CIMI is not to elect one particular event model, but to select as top-level event
5789 attributes the most immediately relevant data useful for event processing in a Cloud environment. Additional event
5790 data may still be represented in the variable content attribute that allows for mapping other event models into a CIMI
5791 event.

5792 The following describes the serialization of the resource in both JSON and XML:

5793 **JSON media type:** application/json

5794 **JSON serialization:**

5795

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


5796

```
  "id": string,
```



```

5797 "name": string, ?
5798 "description": string, ?
5799 "created": string, ?
5800 "updated": string, ?
5801 "properties": { "key": string, + }, ?
5802 "timestamp": string,
5803 "type": string,
5804 "content": any, ?
5805 "outcome": string, ?
5806 "severity": string, ?
5807 "contact": string, ?
5808 ...
5809 }
    
```

5810 **XML media type:** application/xml

5811 **XML serialization:**

```

5812 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5813   <id> xs:anyURI </id>
5814   <name> xs:string </name> ?
5815   <description> xs:string </description> ?
5816   <created> xs:dateTime </created> ?
5817   <updated> xs:dateTime </updated> ?
5818   <property key="xs:string"> xs:string </property> *
5819   <timestamp> xs:dateTime </timestamp>
5820   <type> xs:string </type>
5821   <content> xs:any* </content> ?
5822   <outcome> xs:string </outcome> ?
5823   <severity> xs:string </severity> ?
5824   <contact> xs:string </contact> ?
5825   <xs:any>*
5826 </Event>
    
```

5827 The following table describes the "type" URIs that are defined or acknowledged by this specification.
 5828 Additional types may be added by a Provider, for example to characterize external events mapped into
 5829 CIMI events. It is recommended that these URIs be dereferencable such that Consumers can discover a
 5830 more detailed description of the type. Event types defined by this specification will share the same base
 5831 URI: http://schemas.dmtf.org/cimi/1/event/. For brevity, when the "Event Type" column in the table only
 5832 shows a relative URI (e.g., state) it shall be appended to the end of this base URI.

Event Type	Description						
state	<p>Events of this type report state information about CIMI run-time resources such as instances of Machines, Systems, Networks, and Volumes. This information includes reports on any change in the "state" of these resources.</p> <p>The content element associated with this event type has the following structure:</p> <table border="1"> <thead> <tr> <th>Data</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>resName</td> <td><i>string</i></td> <td>The name of the resource about the state of which is reported.</td> </tr> </tbody> </table> <p>Constraints: Provider: support optional; immutable Consumer: support optional; read-only</p>	Data	Type	Description	resName	<i>string</i>	The name of the resource about the state of which is reported.
Data	Type	Description					
resName	<i>string</i>	The name of the resource about the state of which is reported.					

	resource	<i>ref</i>	The reference to the resource about the state of which is reported. (Note: This reference may become invalid because the event might outlive the resource.) Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only															
	resType	<i>URI</i>	URI denoting this resource type (same as the type URI associated with the Resource type for this resource). Constraints: Provider: support optional; immutable Consumer: support optional; read-only.															
	state	<i>string</i>	The state reported for the resource. Shall be the same as the "state" attribute value (if any) of the run-time resource at the time the event is generated. Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only															
	previous	<i>string</i>	The previous state value, if the event reports a state change. Constraints: Provider: support optional; immutable Consumer: support optional; read-only.															
alarm	<p>Events of this type report errors or alarms occurring during management operations of Cloud resource. This information includes failures to provision resources, failures to fulfill requests to the CIMI interface, and any critical situation that needs be addressed in a timely manner.</p> <p>The content element associated with this event type has the following structure:</p> <table border="1"> <thead> <tr> <th>Data</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>resName</td> <td><i>string</i></td> <td>The name of the resource associated with this alarm, if applicable. Constraints: Provider: support optional; immutable Consumer: support optional; read-only. </td> </tr> <tr> <td>resource</td> <td><i>ref</i></td> <td>The reference to the resource associated with this alarm, if applicable. (Note: This reference may become invalid because the event might outlive the resource.) Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only </td> </tr> <tr> <td>restype</td> <td><i>URI</i></td> <td>URI denoting, this resource type associated with this alarm, if applicable (same as the type URI associated with the Resource type for this resource). Constraints: Provider: support optional; immutable Consumer: support optional; read-only </td> </tr> <tr> <td>code</td> <td><i>string</i></td> <td>An alarm code.</td> </tr> </tbody> </table>			Data	Type	Description	resName	<i>string</i>	The name of the resource associated with this alarm, if applicable. Constraints: Provider: support optional; immutable Consumer: support optional; read-only.	resource	<i>ref</i>	The reference to the resource associated with this alarm, if applicable. (Note: This reference may become invalid because the event might outlive the resource.) Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only	restype	<i>URI</i>	URI denoting, this resource type associated with this alarm, if applicable (same as the type URI associated with the Resource type for this resource). Constraints: Provider: support optional; immutable Consumer: support optional; read-only	code	<i>string</i>	An alarm code.
Data	Type	Description																
resName	<i>string</i>	The name of the resource associated with this alarm, if applicable. Constraints: Provider: support optional; immutable Consumer: support optional; read-only.																
resource	<i>ref</i>	The reference to the resource associated with this alarm, if applicable. (Note: This reference may become invalid because the event might outlive the resource.) Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only																
restype	<i>URI</i>	URI denoting, this resource type associated with this alarm, if applicable (same as the type URI associated with the Resource type for this resource). Constraints: Provider: support optional; immutable Consumer: support optional; read-only																
code	<i>string</i>	An alarm code.																

			Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only
	detail	string	The detailed information associated with the alarm. Constraints: Provider: support optional; immutable Consumer: support optional; read-only
model	Events of this type report changes in the CIMI resource model, which includes creation, modification, and destruction of resource instances; and updates to metadata (resource extensions, capabilities and constraints, etc.). The content element associated with this event type has the following structure:		
	Data	Type	Description
	resName	string	The name of the main model resource affected by the modification. Constraints: Provider: support optional; immutable Consumer: support optional; read-only
	resource	ref	The reference to the main model resource affected by the modification. (Note: This reference may become invalid because the event might outlive the resource.) Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only
	resType	URI	URI denoting, this resource type (same as the type URI associated with the Resource type for this resource). Constraints: Provider: support optional; immutable Consumer: support optional; read-only
	change	string	The kind of modification reported (create/update/delete). Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only
	detail	string	The detailed information associated with the change, typically the data for an update or creation, as used in a request. Constraints: Provider: support optional; immutable Consumer: support optional; read-only
access	Events of this type keep track of all requests to access some resource of a CIMI provider. The content element associated with this event type has the following structure:		
	Data	Type	Description
	operation	string	The method or name of the operation intended for this access (for the HTTP protocol, the HTTP method for the request). Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only
	resource	ref	The reference of the primary resource supporting the operation (for the HTTP protocol, the resource URI or the URI associated with the operation). (Note: This reference may become invalid because the event

			might outlive the resource.) Constraints: Provider: support mandatory; immutable Consumer: support optional; read-only
	detail	string	The detailed information associated with the change, typically the data for an update or creation, as used in a request Constraints: Provider: support optional; immutable Consumer: support optional; read-only
	initiator	string	The details identifying the request initiator, in case that information can be associated with the request. Constraints: Provider: support optional; immutable Consumer: support optional; read-only
http://schemas.dmtf.org/cloud/audit/1.0/	Events of this type represent events that have audit significance, as defined by CADF (...). This type can be subdivided further by extending the URI path (e.g., http://schemas.dmtf.org/cloud/audit/1.0/event/security, for security audit events). The content element associated with this event type has the same structure as the event serialization defined in CADF[...]:		

5833 The following describes the serialization of the "content" property for various types of events:

5834 **"state" event:**

5835 **JSON serialization:**

```
5836 { "id": string,
5837   ...
5838   "type": "http://schemas.dmtf.org/cimi/1/event/state",
5839   "content": {
5840     "resName": string,
5841     "resource" : { "href" : string },
5842     "resType" : string,
5843     "state" : string,
5844     "previous" : string ?
5845   }
5846   ...
5847 }
```

5848 **XML serialization:**

```
5849 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5850   ...
5851   <type> http://schemas.dmtf.org/cimi/1/event/state </type>
5852   <content>
5853     <resName> xs:string </resName>
5854     <resource href="xs:anyURI"/>
5855     <resType> xs:anyURI </resType>
5856     <state> xs:string </state>
5857     <previous> xs:string </previous> ?
5858   </content> ?
5859   ...
5860 </Event>
5861
```

5862 **"alarm" event:**

5863 **JSON serialization:**

```
5864 { "id": string,
5865   ...
5866   "type": "http://schemas.dmtf.org/cimi/1/event/alarm",
5867   "content": {
5868     "resName": string ?
5869     "resource" : { "href" : string }, ?
5870     "resType" : string ?
5871     "code" : string,
5872     "detail" : string ?
5873   }
5874   ...
5875 }
```

5876 **XML serialization:**

```
5877 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5878   ...
5879   <type> http://schemas.dmtf.org/cimi/1/event/alarm </type>
5880   <content>
5881     <resname> xs:string </resname> ?
5882     <resource href="xs:anyURI"/> ?
5883     <restype> xs:anyURI </restype> ?
5884     <code> xs:string </code>
5885     <detail> xs:string </detail> ?
5886   </content> ?
5887   ...
5888 </Event>
```

5889 **"model" event:**

5890 **JSON serialization:**

```
5891 { "id": string,
5892   ...
5893   "type": "http://schemas.dmtf.org/cimi/1/event/model",
5894   "content": {
5895     "resName": string, ?
5896     "resource" : { "href" : string }, ?
5897     "resType" : string, ?
5898     "change" : string,
5899     "detail" : string ?
5900   }
5901   ...
5902 }
```

5903 **XML serialization:**

```
5904 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5905   ...
5906   <type> http://schemas.dmtf.org/cimi/1/event/model </type>
5907   <content>
5908     <resname> xs:string </resname> ?
5909     <resource href="xs:anyURI"/> ?
5910     <restype> xs:anyURI </restype> ?
5911     <change> xs:string </change>
5912     <detail> xs:string </detail> ?
5913   </content> ?
5914   ...
5915 </Event>
```

5916 **"access" event:**

5917 **JSON serialization:**

```
5918 { "id": string,
5919   ...
5920   "type": "http://schemas.dmtf.org/cimi/1/event/access",
5921   "content": {
5922     "operation": string,
5923     "resource" : { "href" : string },
5924     "detail" : string, ?
5925     "initiator" : string ?
5926   }
5927   ...
5928 }
```

5929 **XML Serialization:**

```
5930 <Event xmlns="http://schemas.dmtf.org/cimi/1">
5931   ...
5932   <type> http://schemas.dmtf.org/cimi/1/event/access </type>
5933   <content>
5934     <operation> xs:string </operation>
5935     <resource href="xs:anyURI"/>
5936     <detail> xs:string </detail> ?
5937     <initiator> xs:string </initiator> ?
5938   </content> ?
5939   ...
5940 </Event>
```

5941 **5.17.13.1 Operations**

5942 This resource supports the Read, Update, and Delete operations.

5943 **6 Security considerations**

5944 There are many security mechanisms that can be used in conjunction with this specification. This
 5945 specification does not mandate any particular mechanism(s). Providers shall provide enough information
 5946 about their security mechanisms so that the Consumer can implement the necessary algorithms to
 5947 successfully communicate with the Provider.

**ANNEX A
(normative)**

OVF support in CIMI

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5949
5950
5951
5952

5953 This annex details how elements of the OVF descriptor are mapped to CIMI resources and their
5954 attributes. This definition allows the import of an OVF package to create multiple CIMI resources. This is
5955 done by specifying a reference to an OVF package in the import operation of a System Collection or
5956 System Template Collection (the Media Type at that URI shall be “application/ovf”). Please reference
5957 [DSP0243](#) for more information about OVF.

5958 Support for OVF import and export is optional for a Provider and it is an implementation choice as to how
5959 many of the attributes in the OVF package are exposed through CIMI resources. A Provider may support
5960 the import of OVF package for only Systems, only System Templates or both. Support for the actual
5961 import and export of OVF packages will typically be handled by a hypervisor under the management of
5962 the CIMI implementation, and thus the CIMI resources that are created reflect what the hypervisor did
5963 upon import and form a “View” into the results.

5964 The import of an OVF package can be reflected in the creation of templates that can be later used to
5965 create Systems, Machines and other component resources. The import of an OVF package can also be
5966 used to directly create Systems, Machines and other component resources, bypassing the step of
5967 creating templates.

5968 Clause 5.13.4 details how to import an OVF file to create a System Template (and component resources).
5969 The System Template thus created will contain a reference to a Machine Template for every
5970 VirtualSystem that is defined in the OVF Descriptor VirtualSystemCollection. Note that CIMI currently
5971 allows Systems of Systems, so for each VirtualSystemCollection encountered in a nested set of
5972 collections, a separate System Template is created within the parent System Template with Machine
5973 Templates for each of the contained VirtualSystems in that VirtualSystemCollection.

5974 The values of the attributes for the Machine Template are taken from the VirtualHardwareSection of the
5975 VirtualSystem description (required in OVF). If multiple VirtualHardwareSections are used for a given
5976 VirtualSystem (allowed in OVF), the result is implementation dependent, but the implementation might
5977 choose a Machine Template from an existing (perhaps static) set that best matches one of the
5978 VirtualHardwareSections. Items in the VirtualHardwareSection are mapped to CIMI Machine
5979 Configuration properties and the corresponding Machine Configuration resource is created and linked to
5980 from the created Machine Template for that VirtualSystem.

5981 The CIMI Volume Templates are created according to the DiskSection of the OVF Descriptor and can be
5982 shared among multiple VirtualSystems (CIMI Machine Templates) defined in the OVF Package. In
5983 addition, a new CIMI Machine Image resource may be created from the DiskSection if an ovf:fileRef for
5984 the virtual disk content is specified.

5985 The CIMI Network Templates are created according to the NetworkSection of the OVF Descriptor along
5986 with the Connection elements in the various VirtualHardwareSections that refer to these named networks.

5987 Clause 5.13.2.1 details how to import an OVF file to create a System (and component resources). The
5988 System thus created will contain a reference to a Machine for every VirtualSystem that is defined in the
5989 OVF Descriptor VirtualSystemCollection. Note that CIMI currently allows Systems of Systems, so for each
5990 VirtualSystemCollection encountered in a nested set of collections, a separate System is created within
5991 the parent System with Machines for each of the contained VirtualSystems in that
5992 VirtualSystemCollection.

- 5993 The values of the attributes for the Machine are taken from the VirtualHardwareSection of the
5994 VirtualSystem description (required in OVF). If multiple VirtualHardwareSections are used for a given
5995 VirtualSystem (allowed in OVF), the result is implementation dependent. Items in the
5996 VirtualHardwareSection are mapped to CIMI Machine Configuration properties and the corresponding
5997 Machine Configuration resource is created and linked to from the created Machine for that VirtualSystem.
- 5998 The CIMI Volumes are created according to the DiskSection of the OVF Descriptor and can be shared
5999 among multiple VirtualSystems (CIMI Machines) defined in the OVF Package. In addition, a new CIMI
6000 Machine Image resource may be created from the DiskSection if an ovf:fileRef for the virtual disk content
6001 is specified.
- 6002 The CIMI Networks are created according to the NetworkSection of the OVF Descriptor along with the
6003 Connection elements in the various VirtualHardwareSections that refer to these named networks.
- 6004

6005 **ANNEX B**
6006 **(informative)**

6007
6008
6009 **XML Schema**

6010 The XML Schema for the XML serialization of the CIMI model can be found at:

6011 http://schemas.dmtf.org/cimi/1/DSP8009_1.0.0e.xsd

6012 The schema provided does not intend to reflect every single modeling constraint and requirement
6013 specified in the model. This schema is designed to apply more broadly to any model-related serialized
6014 material found in Consumer requests as well as in Provider responses, and is intended to provide a
6015 preliminary, non-exhaustive syntactic check on these.

ANNEX C (informative)

Change log

Version	Date	Who	What
0.0.1	10/15/10	Gil, Jack	Initial Draft
0.0.2	10/19/10	Jack	Adding the attribute descriptions and high level operational descriptions on the entities
0.0.3	10/29/10	Gil	Add section on the "Initial Scenario" and the mapping of its required use cases to our model.
0.0.4	11/15/10	Gil	Removed 'definition' attribute from System Template, Machine Template, Volume Template, and Network Template (per 912). Added "networkInterfaces" attribute to Machine with sub-properties that define IP address – added "protocol", "subnet_mask", "default_gateway" and "dns_servers" to Network entity (per 910). Removed inline issues and created issues 928 , 929 , and 930 .
0.0.5	11/17/10	Gil	Change "Cloud Site" to "Site" per 882 . Added Job entity and removed 'progress' attributes per 911 . Added structure to Machine/disks and Machine/volumes per 915 .
0.0.6	12/01/10	Gil	Removed "jobs" attributes from System and System Template to complete 911 . Added "capacity" and "format", removed "type" from Machine/volumes to complete 915 .
0.0.7	12/10/10	Gil	Added Image entity to resolve 935 . Added new initial scenario to resolve 994 .
0.0.8	12/15/10	Gil	Removed "os" attribute from Machine Template to resolve 1032 . Added quantity/units sub-properties to describe memory and disk sizes and capacities for Machines and Machine Templates to resolve 1009 . Removed "based_on" attribute from System, Machine, Volume, and Network to resolve 1001 . Removed all template property descriptions to the effect that "changes to [this attribute] should correspondingly evaluate the [objects] that have been instantiated based on this [object template]" to resolve 1005 .
0.0.9	01/05/11	Gil	Add Update operation to all entities as resolution to 1003 . Change "Image" entity to "Machine Image" and updated description to resolve 1026 . Fixed some capitalization and terminology inconsistencies.
0.0.10	01/18/11	Gil	Add Provider entity as resolution to 1043 . Change "params" attribute to "properties" in all entities with that attribute – resolves 1002 .
0.0.11	01/19/11	Gil	Move "format" attribute from the Machine-Volume connection to Volume itself and remove "capacity" attribute from the Machine-Volume connection to resolve 956 . Add "properties" attribute to all entities that lacked it as completion of 1002 . Add "Read" operation to all entities that lacked it; homogenize the description of the "Read" operation across all entities - 1049
0.0.12	01/26/11	Gil	Further edits to tweak the resolution for 1043 .
0.0.13	02/02/11	Gil	Added "Create new Machine Image from existing Machine" scenario as per the decision of the WG on 02/02/2011.
0.0.14	02/09/11	Gil	Added "job_time" property to Provider entity as resolution of 1038 . Renamed Machine Template to Machine Configuration and created a new Machine Template entity that reflects the resolution of 1045 .
0.0.15	02/21/11	Gil	Added definition of "Template" as resolution of 1063 . Changed definitions of Machine Configuration and Machine image as

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Version	Date	Who	What
			resolution of 1069 . Updated UML diagram to remove all relationships that weren't explicitly defined as attributes of the relevant entities.
0.0.16	03/07/11	Gil	Add additional text to description of Template in section 3.2 to resolve 1044 . Add column to all entity tables to describe attribute data types to resolve 1073 . Changed the 'templates' attribute of Site to 'systemtemplates' to resolve 1075 . Changed the description of Machine Configuration to resolve 1079 .
0.0.17	03/22/11	Gil	Change attributes on Job entity to resolve 1080 . Added "guestInterface" attribute to Machine Configuration, Machine, Volume Template, and Volume to resolve 1083 . Changed description of the operations on Machine Configuration to resolve 1084 . Moved "hostname" attribute of Machine to a sub-property of the "networkinterface" to resolve 1087 . Added "volumes" and "volumetemplates" attributes to Provider entity to resolve 1089 . Removed "state" attributes from System Template and Machine Template to resolve 1093 .
0.0.18	03/23/11	Gil	Add constraint on relative URIs to heading of Section 4.2, "Attributes", to resolve 1100 . Add "volume" sub-attribute to "volumes" attribute of Machine to resolve 1110 . Applied consistent camelCased naming to resolve 1111 . Added definitions for "immutable/mutable" and "writeable/read-only" to heading of Section 4.2, "Attributes"; revised all mentions of immutable and mutable to agree with these definitions to resolve 1126 .
0.0.19	03/30/11	Gil	Add table that defines attributes common to all entities and remove those same attributes from the entity tables to resolve 1094 . Add Volume Configuration and Volume Image entities to resolve 1096 .
0.0.20	04/06/11	Gil	Add sub-section that describes unit attributes in both base-10 and base-2 (e.g., kilobyte, kibibyte), change memory units to base-2 names (e.g., kibibyte, mebibyte), change unit designators to singular, add reference to IEC 80000-13:2008 – all to resolve 1101 .
0.0.21	04/13/11	Doug	Renamed title of section 4.2 per 1153 . Expanded the text for the create operation of a System per 999 . Added the delete operation to the list of ops for Network per 1011 . Converted all pointers to URIs instead of the name of the type its points to per 1129 .
0.0.22	04/20/11	Doug	Added section 4.2.1 per 1113 and 1115 . Modified the definition of Site.Create per 1132 . Modified Site description per 1133 . Moved 'bootable' from volume Config to Volume Image per 1137 . Removed 'local' from Volume and Volume Config per 1138 . Modified definition of Volume per 1139 . Removed 'autoDelete' from Volume per 1140 .
0.0.23	04/27/11	Gil	Changed description of unit values in Section 4.2.2.1 to resolve 1157 . Change places where "mutable" is meant as "writeable" to use "writeable"; add Update operation to Provider entity to resolve 1158 .
0.0.24	05/11/11	Gil	Added Machine Admin entity to resolve 1164 . Added text describing the requirements on when a Job entity is created to resolve 1166 .
0.0.25	05/25/11	Gil	Added new Section 4.2 describing the facilities for retrieving metadata about the entities, added "Entity Metadata" to UML diagram, added "Type URI" to each entity type - to resolve 1135 . Changed description of VolumeConfiguration:format and removed Volume:format to resolve 1136 .
0.0.26	06/01/11	Gil	Added volumes and volumeTemplates attributes to the Machine Templates entity to resolved 1155 . Changed description of Provider entity to resolve 1174 . Chaged the description of the SystemTemplate.Update operation to resolve 1175 . Added Section 6 "Security" (plus relevant definitions) to resolve 1178 .

Version	Date	Who	What
0.0.27	06/07/11	Gil	Merged Site and Provider entities into new Cloud Entry Point entity to resolve 1192 and 1196 . Added operations and options to Machine and Machine template to resolve 1204 . Replaced "Create and deploy a Machine using a Provider created Machine Template" scenario and added "Create a Machine by passing a Machine Template by value", and "Create a Machine using a User created Machine Template" to resolve 1205 . Added "Create a Machine Template by specifying individual components" and "Create a Machine Template from a template file" scenarios to resolve 1206 . Added "Create new Machine Image from an image file" and "Create new Machine Image from Machine instance" scenarios to resolve 1207 .
0.0.28	06/09/2011	Gil	Added 'MeterTemplate' and 'Meter' entities and references to resolve 908 . Added Event and EventLog entities and references to resolve 909 . Added 'Cancel' operation and 'isCancellable' attribute to the Job entity to resolve 1012 . Added terminology definition for "Configuration" to resolve 1191 .
0.0.29	06/20/2011	Gil	Removed "Role in Use Cases" rows from entity tables to resolve 1223 . Fixed miscellaneous typos and miscapitalizations to resolve 1226 .
0.0.30	07/28/2011	Gil, Doug	Merged CM model and HTTP protocol documents. Added definitions of "Consumer" and "Provider" to Section 3, "Terms and Definitions"; made various changes to use these terms consistently throughout the document to resolve 1180 . Fix serializations to resolve 1219 . Added support for partial updates to resolve 1154 . Fixed the CloudEntryPoint to point to the Collection entities to resolve 1238 . Tweaked the uri field of EntityMetadata to resolve 1254 . Added resolution of 1171 from HTTP protocol doc. Changed Network Template and Network entities, added VSP Template, VSP Configuration, and VSP to resolve 1010 , 1085 , 1086 , and 1088 .
0.0.31	08/01/2011	Doug	Removed text that duplicates the HTTP spec to resolve 1193 .
0.0.32	08/22/2011	Doug	Added .../xs:any* to show explicit extensibility points to resolve 1271 . Added section 4.1.10 (Serialization of Array) and s/*/+g on array children to resolve 1270 .
0.0.33	08/24/2011	Doug	Used CIMI and Cloud Infrastructure Management Interface where appropriate. Added section 5.1 which points to the CIMI-CIM and CIMI-RNG docs. Add WIP front-matter.
0.0.34	08/28/2011	Doug	s/The follow describes/The following describes/. Fixed the heading style on the "Entities" section - it lost its style at some point. Added the serialization headers for the EntityMetadata JSON/XML - to match the other entities in the model. s/Entity/EntityMetadata/ in the XML to match the entity type and be more descriptive.
0.0.35	08/31/2011	Gil, Doug	Re-factor ER diagram into separate sub-diagrams and re-organize sections around these diagrams. Changed title of doc and added resolution of issue 1310 .
0.0.36	09/07/2011	Brightleaf	Various edits as part of the WIP release.
0.0.37	09/09/2011	Gil	Changed description of Job:isCancellable to resolve 1240 . Add Volumes and Networks to System entity to resolve 1245 . Changed title of Section 6.1.6 to "Control Machine State" to resolve 1246 . Added 'status' attribute to Network and changed VSP:state to VSP:status to resolve 1255 . Changed descriptions of 'imageLocation' and 'imageData' for both MachineImage and VolumeImage to resolve 1264 . Changed wording in 4th paragraph of 4.2.1.3.1 to resolve issue 1266 .
0.0.38	09/09/2011	Doug	Removed empty row in Machine table, filled in empty "Optionality"

Version	Date	Who	What
			cells for CEP.
0.0.39	09/12/2011	Doug	Added section "4.2.1 Operational Principles" to resolve HTTP issue 1172 .
0.0.40	09/21/2011	Doug	Lots of minor editorial changes to resolve 1269 .
0.0.41	09/21/2011	Doug	Added text about URIs to resolve issue 1267 . Modified the "properties" attribute to resolve issue 1352 . Fixed SystemTemplate, it was missing some name, description and networkInterface definition attributes in the pseudo-schema. Added "Model Semantics and Conventions" section to resolve issue 1274 . Made CEP.EntityMetadata a URI[] instead of a map to resolve issue 1243 . Make 'stop' action URIs consistent to resolve issue 1364 .
0.0.42	10/04/2011	Doug	Added typographical convention and preamble text to terms & def'n section to resolve issue 1272 . Removed "format" and "attachmentPoint" from Machine.disk to resolve issue 1241 . Removed disk.guestInterface from Machine and MachineConfig to resolve issue 1242 . Changed most uses of URI to "ref" in the model tables to resolve issue 1351 . Changed 'uri' to "self" on entities to resolve 1220 .
0.0.43	10/04/2011	Doug	Added support for CIMISelect query parameter to resolve issue 1384 . Clarified the optionality of the HTTP version header to resolve issue 1363 .
0.0.44	10/05/2011	Doug	Added start/restart to Machine's operations resolve issue 1369 . Cleaned up some text around Jobs to resolve issue 1194 . Tweak the optionality of some attributes to resolve issue 1412 . Add support for operations in EntityMetadata per issue 1168 . Added the definition of optional, mandatory and condition to resolve issue 1339 . Also moved some of the high-level topics about the model (units, identifier, ...) to a common spot at the start of section 5.
0.0.45	10/06/2011	Doug	Moved EntityMetadata into the Entities section to resolve issue 1415 . Add some clarifying text about routingGroups to resolve issue 1413 . Replace status with state on select resources to resolve issue 1095 . Define what 'ref' maps to for REST to resolve issue 1409 . Add pious advice about some network properties to resolve issue 1259 . Clean up some of the pointers in EventLog, Meter and Event to resolve issue 1383 . Add start/stop operations to Meter to resolve issue 1237 . Clarify the behavior when updating read-only properties to resolve issue 1118 . Adding RoutingGroup as a new entity to resolve issue 1260 .
0.0.45a	10/12/2011	Gil	Removed requirement to support TLS NULL cipher to resolve 1244 . Updated diagrams to match changes in the text.
0.0.46	10/18/2011	Doug	Added recommendation to use partial updates to avoid overwriting changes to resolve 1360 . Removed attr_regex feature to resolve 1418 . Clarify just how opaque our URIs really are to resolve 1417 .
0.0.47	10/26/2011	Doug	Added an 'extensibility" section to resolve issue 1356 . Explain what a missing attributes in the serializations mean, and fix some Optional vs Mandatory flags to resolve issue 1114 .
0.0.48	11/03/2011	Doug	Added text around our versioning scheme to resolve issue 1119 .
0.0.49	11/09/2011	Doug	Add new scope text to resolve issue 1435 . Fix the JSON serialization of "properties" to resolve issue 1436 .
0.0.50	11/14/2011	Doug	Added support for enum/query support for collections to resolve issue 1405 .
0.0.51	11/28/2011	Doug	Updated description of HTTP error code 501 to resolve issue 1442 .
0.0.52	11/30/2011	Doug	Remove Bibliography to resolve issue 1443 . Add networkInterfaces to MachineTemplate in machine.create() to resolve issue 1460 .

Version	Date	Who	What
			Added pause and resume operations to Machine to resolve issue 1434 .
0.0.53	12/06/2011	Doug	s/using/used/ to resolve issue 1466 . Removed the word "use" to resolve issue 1465 . Removed section 6 to resolve issue 1464 . Changed the use of the word "avoid" to resolve issue 1469 . Add 'aspect' to Meter(Template) to resolve issue 1444 . Tweaked the note at the end of MachineConfig to resolve issue 1454 .
0.0.54	12/07/2011	Doug	Removed 'protocol' from Machine and Volume entities to resolve issue 1247 . Complete the definition of SystemTemplate, add MachineAdminTemplate and RoutingGroupTemplate to resolve issue 1368 . Updated the state values on many entities to resolve issue 1446 . Use Job as the error response message and allow hierarchical jobs to resolve issue 1452 . s/Network/VSP/ in some VSP attributes to resolve issue 1471 .
0.0.55	12/08/2011	Doug	Add support for capturing a Machine to a MachineImage to resolve issue 1448 .
0.0.56	12/08/2011	Doug	Clarify initial state of new Machines to resolve issue 1478 .
0.0.57	12/14/2011	Doug	Minor typos to resolve issue 1486 .
0.0.58	01/05/2012	Doug	Added an "Operations" section (5.6) to resolve issue 1257 .
0.0.59	01/11/2012	Doug	Added 'suspend' to allowable actions for a Network in STARTED state to resolve issue 1500 . s/self/id/ to resolve issue 1496 . Add the notion of operations to '5.1 Extensions' to resolve issue 1511 . Minor wording fix to resolve issue 1502 . Lots of minor typos to resolve issue 1495 .
0.0.60	01/18/2012	Doug	Update boilerplate info.
0.0.61	01/19/2012	Doug	Tweak to security text to resolve issue 1521 . Add Protocol Authentication section to resolve issue 1520 . Added updated time to resolve issue 1485 . Add snapshots to machine image to resolve issue 1027 .
0.0.62	01/25/2012	Gil, Doug	Modify the Machine UML diagram to resolve issue 1507 . Make MachineAdmin.password write-only to resolve issue 1473 . Added capabilities to resolve issue 1488 .
0.0.63	02/01/2012	Doug	Fix the indenting of a paragraph to resolve issue 1533 . Add more details of the types used to resolve issue 1407 . Add cpuArch to Machine and MachineConfig to resolve issue 1217 . Change Machine Admin to Credentials to resolve issue 1532 . Add a forward and ack section to resolve issue 1530 . Add serialization rules to resolve issues 1453 and 1195 .
0.0.64	02/09/2012	Doug	Fix used of "*Link" phrases to resolve issue 1493 .
0.0.65	02/15/2012	Doug	Add consumer and provider constraints to each attribute to resolve issue 1515 . Fix specification of "number" in some resources to resolve issue 1501 . Clarify pass-by-value attributes and add some related capabilities to resolve issue 1497 .
0.0.66	02/23/2012	Doug	Clarify how Meters are created to resolve issue 1547 . Clear up whether networks can be connected when not part of the same routingGroup to resolve issue 1508 . Clarify routing of RoutingGroups to resolve issue 1499 . Use "passive" instead of "standby" for Networks to resolve issue 1556 .
0.0.67	02/29/2012	Doug	Add quotes to strings in CIMISelect to resolve issue 1557 .
0.0.68	03/07/2012	Doug	Remove job_time to resolve issue 1568 . Clarify the use of common attributes to resolve issue 1571 . Clarify 'method' to resolve issue 1570 . Add MixedNetwork capability to resolve issue 1566 . Add stop action to Job to resolve issue 1572 . Add DefaultInitialState to MachineTemplate to resolve issue 1573 . Add some text to Job

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			description to resolve issue 1574 .
0.0.69	03/14/2012	Doug	Disallow digits for identifier startChars to resolve issue 1599 . Add precedence to version header to resolve issue 1594 . Minor edits to Attribute Constraints to resolve issue 1565 . Remove hrefs from CIMISelect examples to resolve issue 1593 . Don't duplicate Template attributes to resolve issue 1592 . Put types in italics to resolve issue 1470 . Add CADF stuff to Events to resolve issue 1541 .
0.0.70	03/20/2012	Doug	Clarify that the Job header is an absolute URI to resolve issue 1606 . Use application/json and application/xml as the media-types to resolve issue 1456 . Add userData support to resolve issue 1483 . Define the semantics of System.delete to resolve issue 1558 . Add text around URI resolve algorithm to resolve issue 1472 . Remove "supportsSnapshot" to resolve issue 1479 .
0.0.71	03/21/2012	Doug	Clean-up EntityMetadata to resolve issue 1596 . Add networkInterface.network to resolve issue 1578 . Add Machine.InitialStates capability to resolve issue 1484 . Allow for Templates to be overridden to resolve issue 1516 . Add Address entity to resolve issue 1445 .
0.0.72	03/23/2012	Doug	Remove references to RelaxNG doc to resolve issue 1635 . Add support for OVF import/export to resolve issue 1447 .
0.0.73	03/27/2012	Doug	Redo how collections are handled to resolve issue 1359 .
0.0.74	03/28/2012	Doug	Make collections use generic wrappers to resolve issue 1644 .
0.0.75	03/28/2012	Doug	Use 'any' instead of 'abstract' type to resolve issue 1595 . Clarify some aspects around Jobs to resolve issue 1576 . Make CPU an integer to resolve issue 1636 . Add a force flag to machine.stop/restart to resolve issue 1577 .
0.0.76	04/04/2012	Doug	Removed "imageData" from MachineImage and VolumeImage to resolve issue 1203 . Added Addresses and AddressTemplates to CEP to resolve issue 1647 . Revert some collections to arrays to resolve issue 1648 .
0.0.77	04/11/2012	Doug	Update version of doc to 'e'. Fix typos to resolve issue 1653 . Modify the general REST usage section to resolve issue 1630 .
0.0.78	4/19/2012	Doug	Remove X- from CIMI http headers to resolve issue 1649 . Reduce Volume support to just "mapped" to resolve issue 1531 .
0.0.79	04/26/2012	Cathi	A Brightleaf review of v77. Technically this is a regression since it doesn't include the edits from v78 - those will be added back in for v80.
0.0.80	4/26/2012	Doug	Add back in the edits from v78.
0.0.81	04/26/2012	Doug	Add more text to the description of CEP to resolve issue 1688 . Add a capability example to resolve issue 1686 . Use http://schemas.dmtf.org/cimi/1 as our namespace to resolve issue 1641 . Big change to the networking stuff to resolve issues 1639 , 1638 , 1637 , 1633 , 1626 , 1625 , 1624 , 1623 . Reordering the sections (per the resolution of the networking issues) will be in the next version.
0.0.82	04/26/2012	Doug	Reorder some sections as part of the previous 8 networking issues.
0.0.83	05/02/2012	Doug	RESTful review to resolve issue 1710 .
0.0.84	05/02/2012	Doug	Use "Resource" instead of "Entity" to resolve issue 1711 .
0.0.85	05/02/2012	Doug	Clear up where the new resource appears in a Job to resolve issue 1714 . Add some clarifying text around collections to resolve issue 1715 . Move macAddress from m Address resource to Machine.networkInterface to resolve issue 1672 .
0.0.86	05/09/2012	Doug	s/rootURI/baseURI/ to resolve issue 1735 . s/MeterConfiguration/MeterConfig/ for attribute names to resolve

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			issue 1732 . For attributes like memory and capacity covert it from a structure to a single integer to resolve issue 1734 .
0.0.87	05/22/2012	Doug	Per cmwg msg 201205/msg00053.html reordered some stuff in System and CEP to align with the TOC.
0.0.88	05/23/2012	Doug	s/Credentials/Credential/g to resolve issue 1748 . Allow for non-snapshot images in machine.restore to resolve issue 1737 . Allow for config type of data to be passed by-value on create to resolve issue 1733 .
0.0.89	05/30/2012	Doug	Tweak our serialization text to resolve issue 1687 .
0.0.90	06/01/2012	Doug	Update UML diagrams to resolve issue 1652 .
0.0.91	06/06/2012	Doug	Allow for partial responses in the 202 cases to resolve issue 1750 . Inline "Events" into the EventLog.events collection to resolve issue 1761 . Make "meters" and "eventLogs" owned resources to resolve issue 1757 . Inline some collections to resolve issue 1749 .
0.0.92	06/13/2012	Doug	Add resource name to capability URIs to resolve issue 1766 . Remove CIMI from our query parameters to resolve issue 1767 .
0.0.93	06/19/2012	Doug	Add definition of Cloud to resolve issue 1629 . Allow CIMIFilter to operate over properties to resolve issue 1768 . Make samples a collection to resolve issue 1774 .
0.0.94	06/19/2012	Doug	Update security section(s) to resolve issue 1731 .
0.0.95	06/20/2012	Doug	s/operation/action/ to resolve issue 1782 .

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