TM Forum Specification

AI Management API Component Suite User Guide

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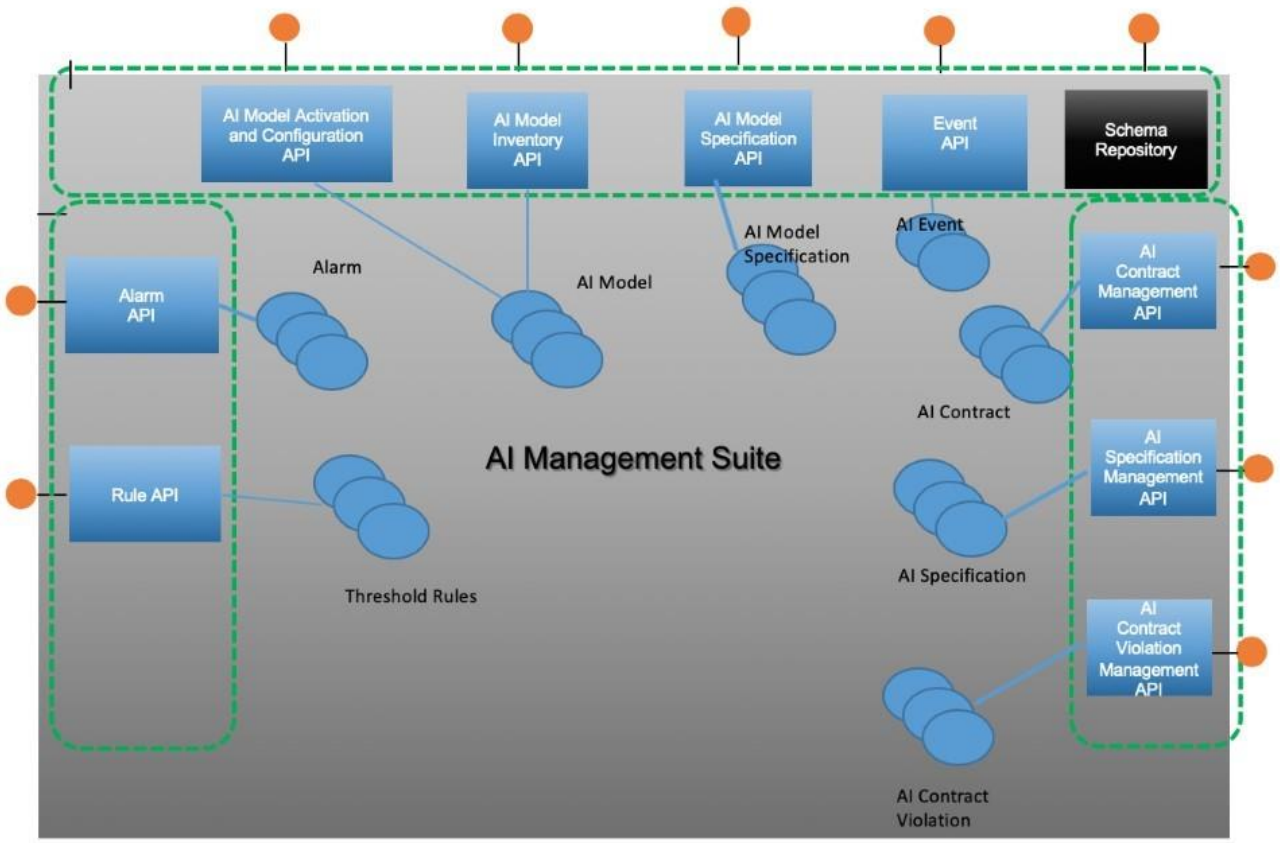
Introduction

The following document is the user guide of the REST API for the AI Management Suite. It includes the model definition as well as all available operations.

The following figure illustrates the different elements of the API Management Suite:



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SAMPLE USE CASES

Following is an example use case for an Image Segmentation and Classification model.

Use case

- Deep Learning Convolutional Neural Network
- Image segmentation and classification – technology types and proportions present in PCP
- Model trained on ImageNet and 'repurposed' through transfer learning to this use case

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Scenarios

Scenario	Additional
AI Management system provisions the model contract at deployment time and subscribes to all dependencies and constraints.	
AI Management system updates the model contract in-life.	Change to the distribution ranges for PCP types
'Read-only' system subscribes to notifications for the software library dependency.	
A new PCP type comes into use	The external dependency is updated indicating that a new PCP type is in use and hence the model is no longer valid.
An audit of the model takes place	The audit takes place within the expected interval and the constraint is updated to reflect the new audit expiry date.
Image quality falls below the minimum threshold for an extended period of time	Alerts are sent to the subscribed entities followed by the model transitioning to the DEGRADED state.
The AI Management system queries the current operating state of the model	
The AI Management system queries the current model contract	

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The elements present in the PCP Model Specification are related to the training data sets, software libraries,

Gpu and the PCP and Connector types in use.

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Model Specification - Dependencies

Dependency	Type	Description	Actions
PCP types in use	**External** Entity_Id=xyz Entity_version=1.0	The model uses knowledge of the geometry of different PCP types to mask the image and focus on the internals of the PCP. If new types come into use, the model will malfunction. *The dependency could be modelled as subscription to an entity with a specific version number.*	T=0: Alert (dependency triggered) T=0: Alert (state change) T=0: operatingState=DEGRADED T=86400: Alert (state change) T=86400: operatingState=STOPPED
Connector types in use	**External** Entity_Id=xyz Entity_version=1.0	The model attempts to classify which connector types are present in the PCP and in what proportions. If new types come into use, the model will malfunction. *The dependency could be modelled as subscription to an entity with a specific version number.*	T=0: Alert (dependency triggered) T=0: Alert (state change) T=0: operatingState=DEGRADED T=86400: Alert (state change) T=86400: operatingState=STOPPED
Training data	**External** Entity_Id=xyz Entity_version=1.0	Performance of the model is dictated by the quality of its training data and associated labelling. If new labelled data becomes available, or the training data is found to be in error, the model may need to be retrained. *The dependency could be modelled as subscription to an entity with a specific version number.*	T=0: Alert (dependency triggered) T=0: Alert (state change) T=0: operatingState=DEGRADED
Software libraries	**External** Entity_Id=xyz Entity_version=1.0	The model is built using Tensorflow. Any errors that emerge in the Tensorflow libraries (eg tf.keras.optimizers v2.2.0) should be propagated to the model users in case action is required – eg to redeploy with updated libraries. *Each dependency could be modelled as subscription to an entity with a specific version number.*	T=0: Alert (dependency triggered) T=0: Alert (state change) T=0: operatingState=DEGRADED

The elements enforced by the PCP Model Contract are the image input quality, the distribution of PCP types in input data, the distribution of PCP and Connector types in the output.

Model Contract - Constraints

Constraint	Type	Description	Actions
Input image quality	**Threshold** < x%	A percentage of images will not be usable due to quality issues. But the model should provide alerts and eventually stop if the proportion of usable images falls below the specified threshold. This is likely to be calculated as a moving average over past *n* images.	T=0: Alert (constraint triggered) T=3600: Alert (state change) T=3600: operatingState=DEGRADED
Distribution of PCP types in input data	**Range** Type_1: 20±10% Type_2: 10±10% Type_3: 40±10% Type_4: 30±10%	The proportions of PCP types seen in the input data is expected to sit within a range that reflects the known population seen in inventory data, either at training time or subsequently during operation. If these proportions shift significantly, the accuracy of the model may be compromised. Alternatively, the model may be seeing data that is markedly different to its training conditions. In either case investigation and retraining may be indicated. This is likely to be calculated as moving averages over relatively long time windows (eg days)	T=0: Alert (constraint triggered) T=259200: Alert (state change) T=259200: operatingState=DEGRADED
Distribution of Connector technology types in output classifications	**Range** Type_1: 60±10% Type_2: 15±10% Type_3: 25±10%	The model attempts to classify the different connector types seen in images. The proportions these occur in will naturally change over time to more recent types but a significant shift may indicate either a fault or that the model should be retrained to reflect current conditions. This is likely to be calculated as moving averages over relatively long time windows (eg days)	T=0: Alert (constraint triggered) T=259200: Alert (state change) T=259200: operatingState=DEGRADED

The elements present in the AI Model specification contains information about the model development history, the Inherited model, the model contract version history and the Model evaluation data.

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Model Specification

Item	Description	Example
Model specification/history	The model development history and model specification as preserved in a model repository – eg MLFlow. Includes: • Link to model code (eg versioned in Git) • Training history • Test performance metrics	http://link.to.mlflow.server/#/models/pcpsegmentation/versions/1
Inherited model	Reference to the exact model that was used, via transfer learning, to create this model	https://link.to.model.repo/modelID=14272.3.1
Model training data	A link to a repository where the data used to train the model is preserved.	https://link.to.data.repo/minio/trainingdata/dataID=325215.1
Model evaluation data	A link to a repository where the data used to evaluate the model is preserved.	https://link.to.data.repo/minio/trainingdata/dataID=191215.1
Model data sheet	Link to a digital document that provide a top level description of this model. Includes: • Administrative information • Provenance • Model metrics • Digital safety test information • Restrictions on use • Supported contract schema	Microsoft excel Worksheet
Deployment record	Link to a digital document that preserves the deployment approval for this model.	https://link.to.model.repo/deploymentRecordID=57432.1
Model contract version history	Link to the model contract for this model, including past versions	https://gitlab.server/modelcontracts/57432/blob/master/contract

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Support of polymorphism and extension patterns

Support of polymorphic collections and types and schema based extension is provided by means of a list of generic meta-attributes that we describe below. Polymorphism in collections occurs when entities inherit from base entities, for instance a BillingAccount and SettlementAccount inheriting properties from the abstract Account entity.

Generic support of polymorphism and pattern extensions is described in the TMF API Guidelines v3.0 Part 2 document.

The @type attribute provides a way to represent the actual class type of an entity. For example, within a list of Account instances some may be instances of BillingAccount where other could be instances of SettlementAccount. The @type gives this information. All resources and sub-resources of this API have a @type attributes that can be provided when this is useful.

The @referredType can be used within reference entities (like for instance an AccountRef object) to explicitly denote the actual entity type of the referred class. Notice that in reference entities the @type, when used, denotes the class type of the reference itself, such as BillingAccountRef or SettlementAccountRef, and not the class type of the referred object. However, since reference classes are rarely sub-classed, @type is generally not useful in reference objects.

The @schemaLocation property can be used in resources to allow specifying user-defined properties of an Entity or to specify the expected characteristics of an entity.

The @baseType attribute gives a way to provide explicitly the base of class of a given resource that has been extended.

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RESOURCE MODEL

Managed Entity and Task Resource Models

Ai Contract Specification resource

A template of an agreement that can be used when establishing partnerships.

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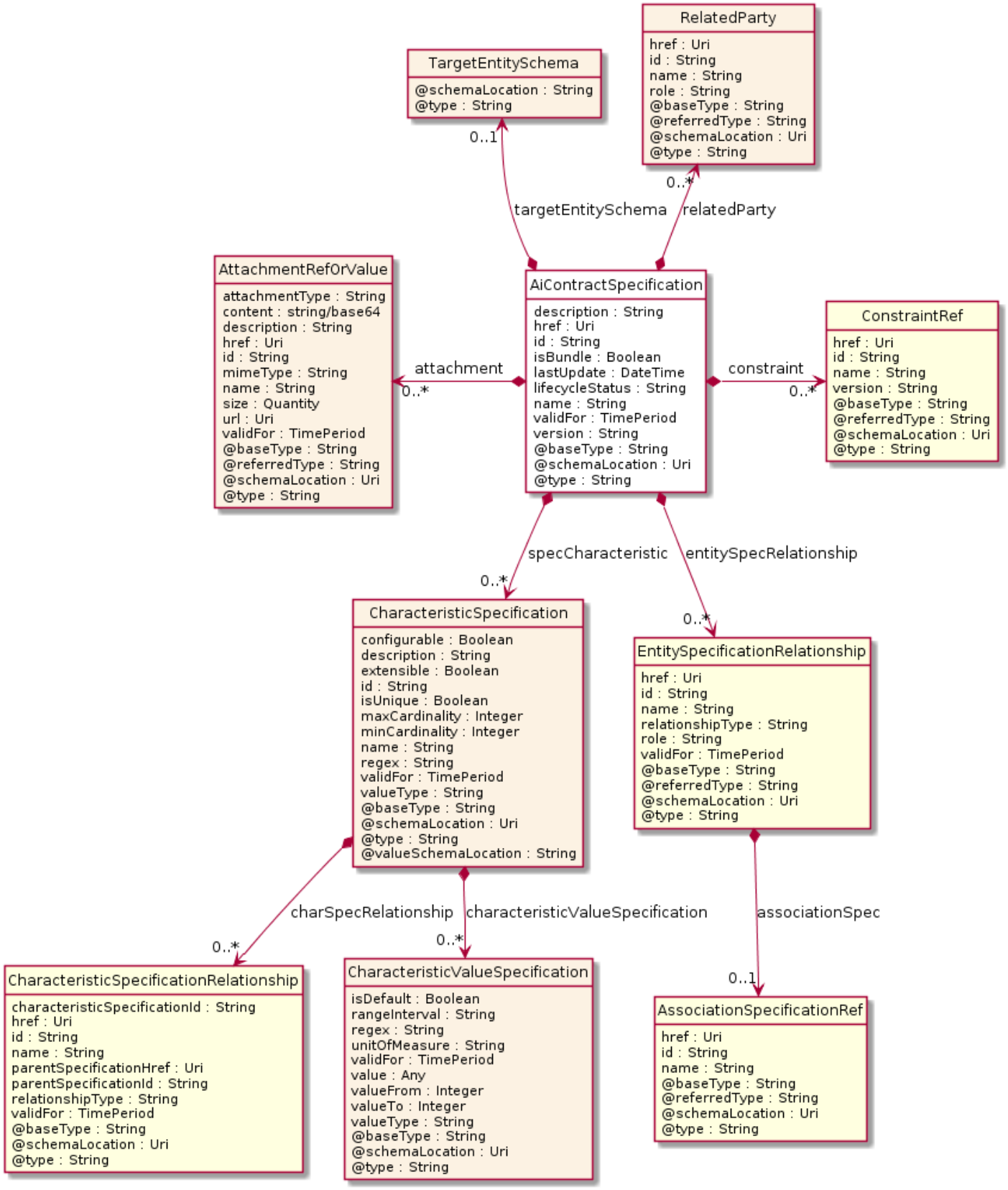
Resource model



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Field descriptions

AiContractSpecification fields

description	A string. Description of the specification.
isBundle	A boolean. isBundle determines whether specification represents a single specification (false), or a bundle of specifications (true).
lastUpdate	A date time (DateTime). Date and time of the last update of the specification.
lifecycleStatus	A string. Used to indicate the current lifecycle status of this catalog item.
name	A string. Name given to the specification.
version	A string. specification version.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
attachment	A list of attachment ref or values (AttachmentRefOrValue [*]). Attachments that may be of relevance to this specification, such as picture, document, media.
constraint	A list of constraint references (ConstraintRef [*]). This is a list of constraint references applied to this specification.
entitySpecRelationship	A list of entity specification relationships (EntitySpecificationRelationship [*]). Relationship to another specification.
relatedParty	A list of related parties (RelatedParty [*]). Parties who manage or otherwise have an interest in this specification.
specCharacteristic	A list of characteristic specifications (CharacteristicSpecification [*]). List of characteristics that the entity can take.
targetEntitySchema	A target entity schema (TargetEntitySchema). Pointer to a schema that defines the target entity.
validFor	A time period. The period for which this REST resource is valid.

AttachmentRefOrValue sub-resource

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An attachment by value or by reference. An attachment complements the description of an element, for example through a document, a video, a picture.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
description	A string. A narrative text describing the content of the attachment.
href	An uri (Uri). URI for this Attachment.
id	A string. Unique identifier for this particular attachment.
url	An uri (Uri). Uniform Resource Locator, is a web page address (a subset of URI).
name	A string. The name of the attachment.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
attachmentType	A string. Attachment type such as video, picture.
content	A base 6 4 (Base64). The actual contents of the attachment object, if embedded, encoded as base64.
mimeType	A string. Attachment mime type such as extension file for video, picture and document.
size	A quantity (Quantity). The size of the attachment.
validFor	A time period. The period of time for which the attachment is valid.

CharacteristicSpecification sub-resource

This class defines a characteristic specification.

@valueSchemaLocation	A string. This (optional) field provides a link to the schema describing the value type.
configurable	A boolean. If true, the Boolean indicates that the target Characteristic is configurable.
description	A string. A narrative that explains the CharacteristicSpecification.
extensible	A boolean. An indicator that specifies that the values for the characteristic can be extended by adding new values when instantiating a characteristic for a resource.

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id	A string. Unique ID for the characteristic.
isUnique	A boolean. An indicator that specifies if a value is unique for the specification. Possible values are; "unique while value is in effect" and "unique whether value is in effect or not".
maxCardinality	An integer. The maximum number of instances a CharacteristicValue can take on. For example, zero to five phone numbers in a group calling plan, where five is the value for the maxCardinality.
minCardinality	An integer. The minimum number of instances a CharacteristicValue can take on. For example, zero to five phone numbers in a group calling plan, where zero is the value for the minCardinality.
name	A string. A word, term, or phrase by which this characteristic specification is known and distinguished from other characteristic specifications.
regex	A string. A rule or principle represented in regular expression used to derive the value of a characteristic value.
valueType	A string. A kind of value that the characteristic can take on, such as numeric, text and so forth.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
charSpecRelationship	A list of characteristic specification relationships (CharacteristicSpecificationRelationship [*]). An aggregation, migration, substitution, dependency or exclusivity relationship between/among Specification Characteristics.
characteristicValueSpecification	A list of characteristic value specifications (CharacteristicValueSpecification [*]). A CharacteristicValueSpecification object is used to define a set of attributes, each of which can be assigned to a corresponding set of attributes in a CharacteristicSpecification object. The values of the attributes in the CharacteristicValueSpecification object describe the values of the attributes that a corresponding Characteristic object can take on.
validFor	A time period. The period of time for which a characteristic is applicable.

CharacteristicSpecificationRelationship sub-resource

An aggregation, migration, substitution, dependency or exclusivity relationship between/among Characteristic specifications. The specification characteristic is embedded within the specification whose ID and href are in this entity, and identified by its ID.

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href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
characteristicSpecificationId	A string. Unique identifier of the characteristic within the specification.
name	A string. Name of the target characteristic within the specification.
parentSpecificationHref	An uri (Uri). Hyperlink reference to the parent specification containing the target characteristic.
parentSpecificationId	A string. Unique identifier of the parent specification containing the target characteristic.
relationshipType	A string. Type of relationship such as aggregation, migration, substitution, dependency, exclusivity.
validFor	A time period. The period for which the object is valid.

CharacteristicValueSpecification sub-resource

specification of a value (number or text or an object) that can be assigned to a Characteristic.

@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
isDefault	A boolean. If true, the Boolean Indicates if the value is the default value for a characteristic.
rangeInterval	A string. An indicator that specifies the inclusion or exclusion of the valueFrom and valueTo attributes. If applicable, possible values are "open", "closed", "closedBottom" and "closedTop".
regex	A string. A regular expression constraint for given value.
unitOfMeasure	A string. A length, surface, volume, dry measure, liquid measure, money, weight, time, and the like. In general, a determinate quantity or magnitude of the kind designated, taken as a standard of comparison for others of the same kind, in assigning to them numerical values, as 1 foot, 1 yard, 1 mile, 1 square foot.

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validFor	A time period. The period of time for which a value is applicable.
value	An any (Any). A discrete value that the characteristic can take on, or the actual value of the characteristic.
valueFrom	An integer. The low range value that a characteristic can take on.
valueTo	An integer. The upper range value that a characteristic can take on.
valueType	A string. A kind of value that the characteristic value can take on, such as numeric, text and so forth.

EntitySpecificationRelationship sub-resource

A migration, substitution, dependency or exclusivity relationship between/among entity specifications.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
associationSpec	An association specification reference (AssociationSpecificationRef). A specification for an association used by this relationship.
relationshipType	A string. Type of relationship such as migration, substitution, dependency, exclusivity.
role	A string. The association role for this entity specification.
validFor	A time period. The period for which the entitySpecRelationship is valid.

Quantity sub-resource

An amount in a given unit.

amount	A float. Numeric value in a given unit.
units	A string. Unit.

RelatedParty sub-resource

Related Entity reference. A related party defines party or party role linked to a specific entity.

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@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
role	A string. Role played by the related party.

TargetEntitySchema sub-resource

The reference object to the schema and type of target entity which is described by a specification.

@schemaLocation	A string. This field provides a link to the schema describing the target entity.
@type	A string. Class type of the target entity.

AssociationSpecificationRef relationship

reference to an AssociationSpecification object.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

ConstraintRef relationship

Constraint reference. The Constraint resource represents a policy/rule applied to an entity or entity spec.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.

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href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
version	A string. constraint version.

Json representation sample

We provide below the json representation of an example of a 'AiContractSpecification' resource object


```
{
   "href": "https://tmforum.com/tmf-api/AIManagment/v4/aiContractSpecification/2435",
   "id": "2435",
   "description": "This an AI Management Contract Specification",
   "lastUpdate": "2020-07-31T00:00:00.000Z",
   "lifecycleStatus": "Active",
   "name": "AI Management Contract Specification for PCP",
   "version": "1.0",
   "validFor": {
      "startDateTime": "2020-01-05T12:00:56.982Z",
      "endDateTime": "9999-12-31T23:59:59.999Z"
   }
}
```


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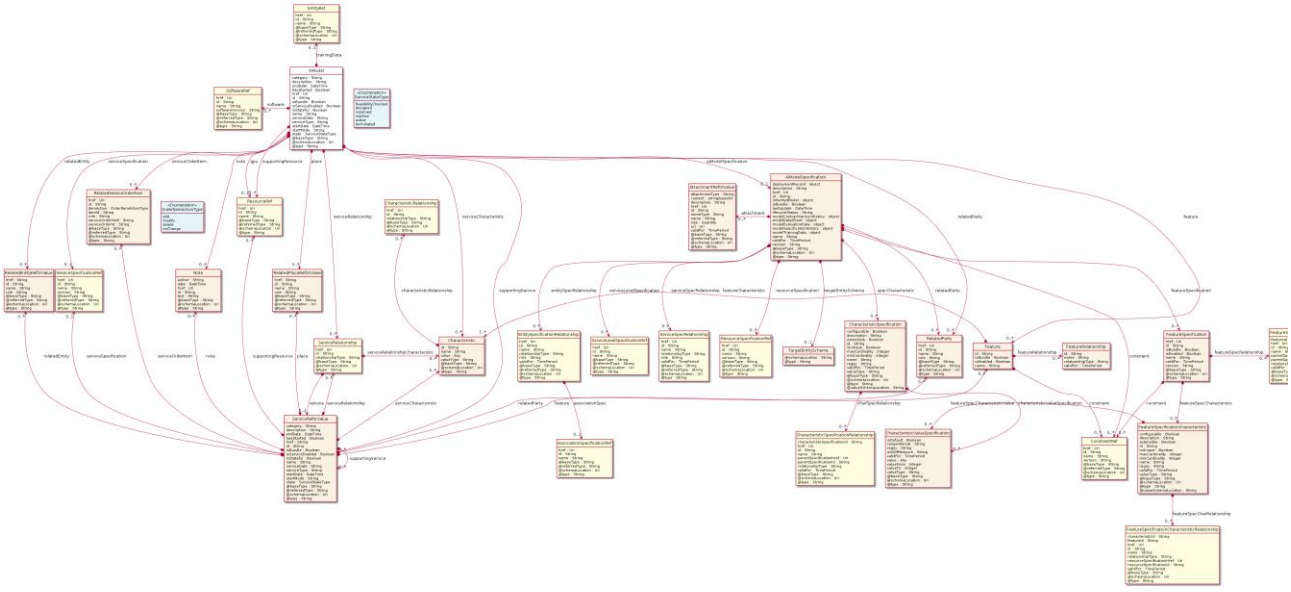
AI Model resource

AiModel is a base class for defining the AiModel hierarchy.

Resource model



Field descriptions

AiModel fields

category	A string. Is it a customer facing or resource facing service.
description	A string. Free-text description of the service.
endDate	A date time (DateTime). Date when the service ends.
hasStarted	A boolean. If TRUE, this Service has already been started.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
isBundle	A boolean. If true, the service is a ServiceBundle which regroup a service hierachy. If false, the service is a 'atomic' service (hierachy leaf).
isServiceEnabled	A boolean. If FALSE and hasStarted is FALSE, this particular Service has NOT been enabled for use - if FALSE and hasStarted is TRUE then the service has failed.
isStateful	A boolean. If TRUE, this Service can be changed without affecting any other services.
name	A string. Name of the service.
serviceDate	A string. Date when the service was created (whatever its status).

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serviceType	A string. Business type of the service.
startDate	A date time (DateTime). Date when the service starts.
startMode	A string. This attribute is an enumerated integer that indicates how the Service is started, such as: 0: Unknown; 1: Automatically by the managed environment; 2: Automatically by the owning device; 3: Manually by the Provider of the Service; 4: Manually by a Customer of the Provider; 5: Any of the above.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
aiModelSpecification	An ai model specification (AiModelSpecification). AiModelSpecification is a class that offers characteristics to describe a type of service. Functionally, it acts as a template by which Services may be instantiated. By sharing the same specification, these services would therefore share the same set of characteristics.
gpu	A resource reference (ResourceRef). Reference to GPU in Inventory.
software	A list of software references (SoftwareRef [*]). Reference to Software in Inventory.
trainingData	An entity reference (EntityRef). Reference to training data set.
feature	A list of features (Feature [*]). A list of feature associated with this service.
note	A list of notes (Note [*]). A list of notes made on this service.
place	A list of related place ref or values (RelatedPlaceRefOrValue [*]). A list of places (Place [*]). Used to define a place useful for the service (for example a geographical place whre the service is installed).
relatedEntity	A list of related entity ref or values (RelatedEntityRefOrValue [*]). A list of related entity in relationship with this service.
relatedParty	A list of related parties (RelatedParty [*]). A list of related party references (RelatedParty [*]). A related party defines party or party role linked to a specific entity.
serviceCharacteristic	A list of characteristics (Characteristic [*]). A list of characteristics that characterize this service (ServiceCharacteristic [*]).

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serviceOrderItem	A list of related service order items (RelatedServiceOrderItem [*]). A list of service order items related to this service.
serviceRelationship	A list of service relationships (ServiceRelationship [*]). A list of service relationships (ServiceRelationship [*]). Describes links with other service(s) in the inventory.
serviceSpecification	A service specification reference (ServiceSpecificationRef). The specification from which this service was instantiated.
state	A service state type (ServiceStateType). The life cycle state of the service, such as designed, reserved, active, etc...
supportingResource	A list of resource references (ResourceRef [*]). A list of supporting resources (SupportingResource [*]).Note: only Service of type RFS can be associated with Resources.
supportingService	A list of service ref or values (ServiceRefOrValue [*]). A list of supporting services (SupportingService [*]). A collection of services that support this service (bundling, link CFS to RFS).

AiModelSpecification sub-resource

AiModelSpecification is a class that offers characteristics to describe a type of service.
Functionally, it acts as a template by which Services may be instantiated. By sharing the same specification, these services would therefore share the same set of characteristics.

description	A string. Description of the specification.
isBundle	A boolean. isBundle determines whether specification represents a single specification (false), or a bundle of specifications (true).
lastUpdate	A date time (DateTime). Date and time of the last update of the specification.
lifecycleStatus	A string. Used to indicate the current lifecycle status of this catalog item.
name	A string. Name given to the specification.
version	A string. specification version.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

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deploymentRecord	An object (Object).
inheritedModel	An object (Object).
modelContractVersionHistory	An object (Object).
modelDataSheet	An object (Object).
modelEvaluationData	An object (Object).
modelSpecificationHistory	An object (Object).
modelTrainingData	An object (Object).
featureSpecification	A list of feature specifications (FeatureSpecification [*]). A list of Features for this specification.
resourceSpecification	A list of resource specification references (ResourceSpecificationRef [*]). A list of resource specification references (ResourceSpecificationRef [*]). The ResourceSpecification is required for a service specification with type ResourceFacingServiceSpecification (RFSS).
serviceLevelSpecification	A list of service level specification references (ServiceLevelSpecificationRef [*]). A list of service level specifications related to this service specification, and which will need to be satisifiable for corresponding service instances; e.g. Gold, Platinum.
serviceSpecRelationship	A list of service spec relationships (ServiceSpecRelationship [*]). A list of service specifications related to this specification, e.g. migration, substitution, dependency or exclusivity relationship.
attachment	A list of attachment ref or values (AttachmentRefOrValue [*]). Attachments that may be of relevance to this specification, such as picture, document, media.
constraint	A list of constraint references (ConstraintRef [*]). This is a list of constraint references applied to this specification.
entitySpecRelationship	A list of entity specification relationships (EntitySpecificationRelationship [*]). Relationship to another specification.
relatedParty	A list of related parties (RelatedParty [*]). Parties who manage or otherwise have an interest in this specification.
specCharacteristic	A list of characteristic specifications (CharacteristicSpecification [*]). List of characteristics that the entity can take.
targetEntitySchema	A target entity schema (TargetEntitySchema). Pointer to a schema that defines the target entity.

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validFor	A time period. The period for which this REST resource is valid.

AttachmentRefOrValue sub-resource

An attachment by value or by reference. An attachment complements the description of an element, for example through a document, a video, a picture.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
description	A string. A narrative text describing the content of the attachment.
href	An uri (Uri). URI for this Attachment.
id	A string. Unique identifier for this particular attachment.
url	An uri (Uri). Uniform Resource Locator, is a web page address (a subset of URI).
name	A string. The name of the attachment.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
attachmentType	A string. Attachment type such as video, picture.
content	A base 6 4 (Base64). The actual contents of the attachment object, if embedded, encoded as base64.
mimeType	A string. Attachment mime type such as extension file for video, picture and document.
size	A quantity (Quantity). The size of the attachment.
validFor	A time period. The period of time for which the attachment is valid.

Characteristic sub-resource

Describes a given characteristic of an object or entity through a name/value pair.

@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
characteristicRelationship	A list of characteristic relationships (CharacteristicRelationship [*]). Another Characteristic that is related to the current Characteristic;.

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id	A string. Unique identifier of the characteristic.
name	A string. Name of the characteristic.
value	An any (Any). The value of the characteristic.
valueType	A string. Data type of the value of the characteristic.

CharacteristicRelationship sub-resource

Another Characteristic that is related to the current Characteristic;.

href	An uri (Uri). Hyperlink reference.
id	A string. Unique identifier of the characteristic.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
relationshipType	A string. The type of relationship.

CharacteristicSpecification sub-resource

This class defines a characteristic specification.

@valueSchemaLocation	A string. This (optional) field provides a link to the schema describing the value type.
configurable	A boolean. If true, the Boolean indicates that the target Characteristic is configurable.
description	A string. A narrative that explains the CharacteristicSpecification.
extensible	A boolean. An indicator that specifies that the values for the characteristic can be extended by adding new values when instantiating a characteristic for a resource.
id	A string. Unique ID for the characteristic.
isUnique	A boolean. An indicator that specifies if a value is unique for the specification. Possible values are; "unique while value is in effect" and "unique whether value is in effect or not".
maxCardinality	An integer. The maximum number of instances a CharacteristicValue can take on. For example, zero to five phone numbers in a group calling plan, where five is the value for the maxCardinality.

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minCardinality	An integer. The minimum number of instances a CharacteristicValue can take on. For example, zero to five phone numbers in a group calling plan, where zero is the value for the minCardinality.
name	A string. A word, term, or phrase by which this characteristic specification is known and distinguished from other characteristic specifications.
regex	A string. A rule or principle represented in regular expression used to derive the value of a characteristic value.
valueType	A string. A kind of value that the characteristic can take on, such as numeric, text and so forth.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
charSpecRelationship	A list of characteristic specification relationships (CharacteristicSpecificationRelationship [*]). An aggregation, migration, substitution, dependency or exclusivity relationship between/among Specification Characteristics.
characteristicValueSpecification	A list of characteristic value specifications (CharacteristicValueSpecification [*]). A CharacteristicValueSpecification object is used to define a set of attributes, each of which can be assigned to a corresponding set of attributes in a CharacteristicSpecification object. The values of the attributes in the CharacteristicValueSpecification object describe the values of the attributes that a corresponding Characteristic object can take on.
validFor	A time period. The period of time for which a characteristic is applicable.

CharacteristicSpecificationRelationship sub-resource

An aggregation, migration, substitution, dependency or exclusivity relationship between/among Characteristic specifications. The specification characteristic is embedded within the specification whose ID and href are in this entity, and identified by its ID.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.

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@type	A string. When sub-classing, this defines the sub-class Extensible name.
characteristicSpecificationId	A string. Unique identifier of the characteristic within the specification.
name	A string. Name of the target characteristic within the specification.
parentSpecificationHref	An uri (Uri). Hyperlink reference to the parent specification containing the target characteristic.
parentSpecificationId	A string. Unique identifier of the parent specification containing the target characteristic.
relationshipType	A string. Type of relationship such as aggregation, migration, substitution, dependency, exclusivity.
validFor	A time period. The period for which the object is valid.

CharacteristicValueSpecification sub-resource

specification of a value (number or text or an object) that can be assigned to a Characteristic.

@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
isDefault	A boolean. If true, the Boolean Indicates if the value is the default value for a characteristic.
rangeInterval	A string. An indicator that specifies the inclusion or exclusion of the valueFrom and valueTo attributes. If applicable, possible values are "open", "closed", "closedBottom" and "closedTop".
regex	A string. A regular expression constraint for given value.
unitOfMeasure	A string. A length, surface, volume, dry measure, liquid measure, money, weight, time, and the like. In general, a determinate quantity or magnitude of the kind designated, taken as a standard of comparison for others of the same kind, in assigning to them numerical values, as 1 foot, 1 yard, 1 mile, 1 square foot.
validFor	A time period. The period of time for which a value is applicable.
value	An any (Any). A discrete value that the characteristic can take on, or the actual value of the characteristic.
valueFrom	An integer. The low range value that a characteristic can take on.
valueTo	An integer. The upper range value that a characteristic can take on.

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valueType	A string. A kind of value that the characteristic value can take on, such as numeric, text and so forth.

EntitySpecificationRelationship sub-resource

A migration, substitution, dependency or exclusivity relationship between/among entity specifications.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
associationSpec	An association specification reference (AssociationSpecificationRef). A specification for an association used by this relationship.
relationshipType	A string. Type of relationship such as migration, substitution, dependency, exclusivity.
role	A string. The association role for this entity specification.
validFor	A time period. The period for which the entitySpecRelationship is valid.

Feature sub-resource

Configuration feature.

constraint	A list of constraint references (ConstraintRef [*]). This is a list of feature constraints.
featureCharacteristic	A list of characteristics (Characteristic [1..*]). This is a list of Characteristics for a particular feature.
featureRelationship	A list of feature relationships (FeatureRelationship [*]). Configuration feature.
id	A string. Unique identifier of the feature.
isBundle	A boolean. True if this is a feature group. Default is false.
isEnabled	A boolean. True if this feature is enabled. Default is true.
name	A string. This is the name for the feature.

FeatureRelationship sub-resource

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Configuration feature.

id	A string. Unique identifier of the target feature.
name	A string. This is the name of the target feature.
relationshipType	A string. This is the type of the feature relationship.
validFor	A time period. The period for which this feature relationship is valid.

FeatureSpecification sub-resource

Specification for resource, service or product features.

href	An uri (Uri). Hyperlink reference.
id	A string. Identifier of the feature specification. Must be locally unique within the containing specification, thus allowing direct access to the feature spec.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
constraint	A list of constraint references (ConstraintRef [*]). This is a list of feature constraints.
featureSpecCharacteristic	A list of feature specification characteristics (FeatureSpecificationCharacteristic [*]). This is a list of characteristics for a particular feature.
featureSpecRelationship	A list of feature specification relationships (FeatureSpecificationRelationship [*]). A dependency, exclusivity or aggratation relationship between/among feature specifications.
isBundle	A boolean. A flag indicating if this is a feature group (true) or not (false).
isEnabled	A boolean. A flag indicating if the feature is enabled (true) or not (false).
name	A string. Unique name given to the feature specification.
validFor	A time period. The period for which this feature specification is valid.
version	A string. Version of the feature specification.

FeatureSpecificationCharacteristic sub-resource

Configuration feature characteristic specification.

@valueSchemaLocation	A string. This (optional) field provides a link to the schema describing the value type.

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configurable	A boolean. If true, the Boolean indicates that the target Characteristic is configurable.
description	A string. A narrative that explains the CharacteristicSpecification.
extensible	A boolean. An indicator that specifies that the values for the characteristic can be extended by adding new values when instantiating a characteristic for a resource.
id	A string. Unique ID for the characteristic.
isUnique	A boolean. An indicator that specifies if a value is unique for the specification. Possible values are; "unique while value is in effect" and "unique whether value is in effect or not".
maxCardinality	An integer. The maximum number of instances a CharacteristicValue can take on. For example, zero to five phone numbers in a group calling plan, where five is the value for the maxCardinality.
minCardinality	An integer. The minimum number of instances a CharacteristicValue can take on. For example, zero to five phone numbers in a group calling plan, where zero is the value for the minCardinality.
name	A string. A word, term, or phrase by which this characteristic specification is known and distinguished from other characteristic specifications.
regex	A string. A rule or principle represented in regular expression used to derive the value of a characteristic value.
valueType	A string. A kind of value that the characteristic can take on, such as numeric, text and so forth.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
featureSpecCharRelationship	A list of feature specification characteristic relationships (FeatureSpecificationCharacteristicRelationship [*]). An aggregation, migration, substitution, dependency or exclusivity relationship between/among feature characteristics.
featureSpecCharacteristicValue	A list of characteristic value specifications (CharacteristicValueSpecification [*]). Used to define a set of attributes, each of which can be assigned to a corresponding set of attributes in a FeatureCharacteristic object.

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validFor	A time period. The period of time for which a characteristic is applicable.

FeatureSpecificationCharacteristicRelationship sub-resource

An aggregation, migration, substitution, dependency or exclusivity relationship between/among FeatureSpecificationCharacteristics.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
characteristicId	A string. Unique identifier of the characteristic within the the target feature specification.
featureId	A string. Unique identifier of the target feature specification within the resource specification.
name	A string. Name of the target characteristic.
relationshipType	A string. Type of relationship such as aggregation, migration, substitution, dependency, exclusivity.
resourceSpecificationHref	An uri (Uri). Hyperlink reference to the resource specification containing the target feature and feature characteristic.
resourceSpecificationId	A string. Unique identifier of the resource specification containing the target feature and feature characteristic.
validFor	A time period. The period for which the object is valid.

FeatureSpecificationRelationship sub-resource

Relationship between feature specifications.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.

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@type	A string. When sub-classing, this defines the sub-class Extensible name.
featureId	A string. Unique identifier of the target feature specification.
name	A string. This is the name of the target feature specification.
parentSpecificationHref	An uri (Uri). Hyperlink reference to the parent specification containing the target feature.
parentSpecificationId	A string. Unique identifier of the parent specification containing the target feature.
relationshipType	A string. This is the type of the feature specification relationship.
validFor	A time period. The period for which this feature spoecification relationship is valid.

Note sub-resource

Extra information about a given entity.

href	An uri (Uri). Hyperlink reference.
id	A string. Identifier of the note within its containing entity (may or may not be globally unique, depending on provider implementation).
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
author	A string. Author of the note.
date	A date time (DateTime). Date of the note.
text	A string. Text of the note.

Quantity sub-resource

An amount in a given unit.

amount	A float. Numeric value in a given unit.
units	A string. Unit.

RelatedEntityRefOrValue sub-resource

A reference to an entity, where the type of the entity is not known in advance. A related entity defines a entity described by reference or by value linked to a specific entity. The polymorphic attributes @type, @schemaLocation & @referredType are related to the Entity and not the RelatedEntityRefOrValue class itself.

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@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	A string. Reference of the related entity.
id	A string. Unique identifier of a related entity.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
role	A string.

RelatedParty sub-resource

Related Entity reference. A related party defines party or party role linked to a specific entity.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
role	A string. Role played by the related party.

RelatedPlaceRefOrValue sub-resource

Related Entity reference. A related place defines a place described by reference or by value linked to a specific entity. The polymorphic attributes @type, @schemaLocation & @referredType are related to the place entity and not the RelatedPlaceRefOrValue class itself.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. A user-friendly name for the place, such as [Paris Store], [London Store], [Main Home].
href	A string. Unique reference of the place.

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id	A string. Unique identifier of the place.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
role	A string.

RelatedServiceOrderItem sub-resource

RelatedServiceOrderItem (a ServiceOrder item) .The service order item which triggered service creation/change/termination.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
@referredType	A string. The actual type of the target instance when needed for disambiguation.
itemAction	An order item action type (OrderItemActionType). Action of the order item for this service.
itemId	A string. Identifier of the order item where the service was managed.
role	A string. role of the service order item for this service.
serviceOrderHref	A string. Reference of the related entity.
serviceOrderId	A string. Unique identifier of a related entity.

ServiceRefOrValue sub-resource

A Service to be created defined by value or existing defined by reference. The polymorphic attributes @type, @schemaLocation & @referredType are related to the Service entity and not the RelatedServiceRefOrValue class itself.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the service.
href	A string. Reference of the service.

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id	A string. Unique identifier of the service.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
category	A string. Is it a customer facing or resource facing service.
description	A string. Free-text description of the service.
endDate	A date time (DateTime). Date when the service ends.
hasStarted	A boolean. If TRUE, this Service has already been started.
isBundle	A boolean. If true, the service is a ServiceBundle which regroup a service hierachy. If false, the service is a 'atomic' service (hierachy leaf).
isServiceEnabled	A boolean. If FALSE and hasStarted is FALSE, this particular Service has NOT been enabled for use - if FALSE and hasStarted is TRUE then the service has failed.
isStateful	A boolean. If TRUE, this Service can be changed without affecting any other services.
serviceDate	A string. Date when the service was created (whatever its status).
serviceType	A string. Business type of the service.
startDate	A date time (DateTime). Date when the service starts.
startMode	A string. This attribute is an enumerated integer that indicates how the Service is started, such as: 0: Unknown; 1: Automatically by the managed environment; 2: Automatically by the owning device; 3: Manually by the Provider of the Service; 4: Manually by a Customer of the Provider; 5: Any of the above.
feature	A list of features (Feature [*]). A list of feature associated with this service.
note	A list of notes (Note [*]). A list of notes made on this service.
place	A list of related place ref or values (RelatedPlaceRefOrValue [*]). A list of places (Place [*]). Used to define a place useful for the service (for example a geographical place whre the service is installed).
relatedEntity	A list of related entity ref or values (RelatedEntityRefOrValue [*]). A list of related entity in relationship with this service.
relatedParty	A list of related parties (RelatedParty [*]). A list of related party references (RelatedParty [*]). A related party defines party or party role linked to a specific entity.

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serviceCharacteristic	A list of characteristics (Characteristic [*]). A list of characteristics that characterize this service (ServiceCharacteristic [*]).
serviceOrderItem	A list of related service order items (RelatedServiceOrderItem [*]). A list of service order items related to this service.
serviceRelationship	A list of service relationships (ServiceRelationship [*]). A list of service relationships (ServiceRelationship [*]). Describes links with other service(s) in the inventory.
serviceSpecification	A service specification reference (ServiceSpecificationRef). The specification from which this service was instantiated.
state	A service state type (ServiceStateType). The life cycle state of the service, such as designed, reserved, active, etc...
supportingResource	A list of resource references (ResourceRef [*]). A list of supporting resources (SupportingResource [*]).Note: only Service of type RFS can be associated with Resources.
supportingService	A list of service ref or values (ServiceRefOrValue [*]). A list of supporting services (SupportingService [*]). A collection of services that support this service (bundling, link CFS to RFS).

ServiceRelationship sub-resource

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
relationshipType	A string.
service	A service ref or value (ServiceRefOrValue). A Service to be created defined by value or existing defined by reference. The polymorphic attributes @type, @schemaLocation & @referredType are related to the Service entity and not the RelatedServiceRefOrValue class itself.
serviceRelationshipCharacteristic	A list of characteristics (Characteristic [*]). Describes a given characteristic of an object or entity through a name/value pair.

ServiceSpecRelationship sub-resource

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A dependency, substitution or exclusivity relationship between/among service specifications.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
relationshipType	A string. Type of relationship such as dependency, substitution or exclusivity.
role	A string. The association role for this service specification.
validFor	A time period. The period for which the serviceSpecRelationship is valid.

TargetEntitySchema sub-resource

The reference object to the schema and type of target entity which is described by a specification.

@schemaLocation	A string. This field provides a link to the schema describing the target entity.
@type	A string. Class type of the target entity.

AssociationSpecificationRef relationship

reference to an AssociationSpecification object.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

ConstraintRef relationship

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Constraint reference. The Constraint resource represents a policy/rule applied to an entity or entity spec.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
version	A string. constraint version.

EntityRef relationship

Entity reference schema to be use for all entityRef class.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.

ResourceRef relationship

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.

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@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

ResourceSpecificationRef relationship

Resources are physical or non-physical components (or some combination of these) within an enterprise's infrastructure or inventory. They are typically consumed or used by services (for example a physical port assigned to a service) or contribute to the realization of a Product (for example, a SIM card). They can be drawn from the Application, Computing and Network domains, and include, for example, Network Elements, software, IT systems, content and information, and technology components.
A ResourceSpecification is an abstract base class for representing a generic means for implementing a particular type of Resource. In essence, a ResourceSpecification defines the common attributes and relationships of a set of related Resources, while Resource defines a specific instance that is based on a particular ResourceSpecification.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
version	A string. Resource Specification version.

ServiceLevelSpecificationRef relationship

A Service Level Specification represents a pre-defined or negotiated set of Service Level Objectives. In addition, certain consequences are associated with not meeting the Service Level Objectives. Service Level Agreements are expressed in terms of Service Level Specifications.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.

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@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

ServiceSpecificationRef relationship

Service specification reference: ServiceSpecification(s) required to realize a ProductSpecification.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
version	A string. Service specification version.

SoftwareRef relationship

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
softwareVersion	A string. software version.

Json representation sample

We provide below the json representation of an example of a 'AiModel' resource object

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```
{
  "id": "5351",
  "href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351",
  "serviceType": "AI PCP",
  "@type": "AIModel",
  "name": "PCP  AI Model serial 1355615",
  "description": "Instantiation of a a PCP AI Service Model",
  "state": "active",
  "category": "CFS",
  "startDate": "2018-01-15T12:26:11.747Z",
  "serviceSpecification": {
    "@type": "ServiceSpecification",
    "id": "1212",
    "href": "https://mycsp.com:8080/tmf-
api/serviceCatalogManagement/v4/serviceSpecification/PCPAIModelAsAServiceSpecification",
    "name": "PCPAIModelAsAServiceSpecification",
    "version": "1.0.0",
    "@referredType": "AIModelSpecification"
  },
  "relatedEntity": [
    {
      "@type": "EntityRef",
      "id": "1212",
      "href": "https://mycsp.com:8080/tmf-api/entityInventory/v4/entity/PCPMonitor42",
      "name": "PCP Types",
      "@referredType": "PCPMonitor",
      "role": "PCP Monitor"
    },
    {
      "@type": "EntityRef",
      "id": "1212",
      "href": "https://mycsp.com:8080/tmf-api/entityInventory/v4/entity/ConnectorMonitor42",
      "name": "Connector Types ",
      "@referredType": "ConnectorMonitor",
      "role": "Connector Monitor"
    }
  ],
  "serviceCharacteristic": [
    {
      "name": "trainedPCPTypes",
      "valueType": "StringArray",
      "value": [
        "Type_1",
        "Type_2",
        "Type_3",
        "Type_4"
      ]
    },
    {
      "name": "trainedConnectorTypes",
      "valueType": "StringArray",
      "value": [
        "CType_1",
        "CType_2",
        "CType_3",
```


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```
            "CType_4"
          ]
        }
    ],
    "software": [
        {
            "href": "https://mycsp.com:8080/tmf-api/resourceInventory/v4/Software/tf.keras.optimizers",
            "id": " tf.keras.optimizers",
            "softwareVersion": "v2.2.0",
            "@type": "SoftwareRef",
            "@referredType": "Software"
        }
    ],
    "gpu": {
        "href": "https://mycsp.com:8080/tmf-api/resourceInventory/v4/GPU/5645",
        "id": "5645",
        "@type": "PhysicalResourceRef",
        "@referredType": "GPU"
    },
    "relatedParty": [
        {
            "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/party/456",
            "id": "456",
            "name": "John Doe",
            "role": "user",
            "@referredType": "Individual"
        }
    ],
    "place": [
        {
            "href": "https://mycsp.com:8080/tmf-api/geographicAddressManagement/v4/geographicAddress/2435",
            "id": "2435",
            "name": "Model primary location",
            "@referredType": "GeographicAddress",
            "role": "InstallationAddress"
        }
    ],
    "note": [
        {
            "author": "Harvey Poupon",
            "date": "2018-01-15T12:26:11.748Z",
            "text": "This AIModel was installed automatically, no issues were noted in testing."
        }
    ],
    "@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/AIModel.schema.json"
}
```


Ai Model Specification resource

AiModelSpecification is a class that offers characteristics to describe a type of service.
Functionally, it acts as a template by which Services may be instantiated. By sharing the same specification, these services would therefore share the same set of characteristics.

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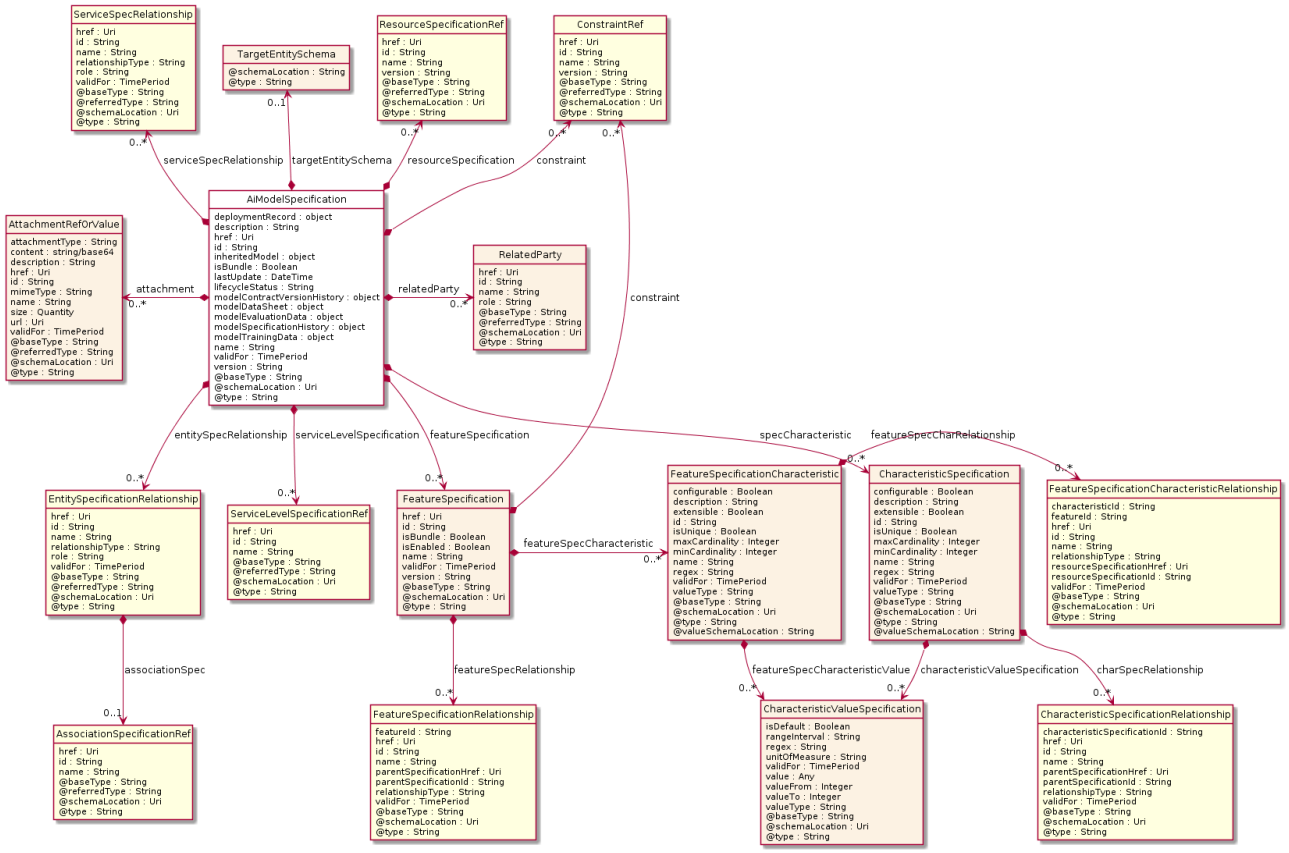
Resource model



Field descriptions

AiModelSpecification fields

description	A string. Description of the specification.
isBundle	A boolean. isBundle determines whether specification represents a single specification (false), or a bundle of specifications (true).
lastUpdate	A date time (DateTime). Date and time of the last update of the specification.
lifecycleStatus	A string. Used to indicate the current lifecycle status of this catalog item.
name	A string. Name given to the specification.
version	A string. specification version.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.

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@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
deploymentRecord	An object (Object).
inheritedModel	An object (Object).
modelContractVersionHistory	An object (Object).
modelDataSheet	An object (Object).
modelEvaluationData	An object (Object).
modelSpecificationHistory	An object (Object).
modelTrainingData	An object (Object).
featureSpecification	A list of feature specifications (FeatureSpecification [*]). A list of Features for this specification.
resourceSpecification	A list of resource specification references (ResourceSpecificationRef [*]). A list of resource specification references (ResourceSpecificationRef [*]). The ResourceSpecification is required for a service specification with type ResourceFacingServiceSpecification (RFSS).
serviceLevelSpecification	A list of service level specification references (ServiceLevelSpecificationRef [*]). A list of service level specifications related to this service specification, and which will need to be satisifiable for corresponding service instances; e.g. Gold, Platinum.
serviceSpecRelationship	A list of service spec relationships (ServiceSpecRelationship [*]). A list of service specifications related to this specification, e.g. migration, substitution, dependency or exclusivity relationship.
attachment	A list of attachment ref or values (AttachmentRefOrValue [*]). Attachments that may be of relevance to this specification, such as picture, document, media.
constraint	A list of constraint references (ConstraintRef [*]). This is a list of constraint references applied to this specification.
entitySpecRelationship	A list of entity specification relationships (EntitySpecificationRelationship [*]). Relationship to another specification.
relatedParty	A list of related parties (RelatedParty [*]). Parties who manage or otherwise have an interest in this specification.

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specCharacteristic	A list of characteristic specifications (CharacteristicSpecification [*]). List of characteristics that the entity can take.
targetEntitySchema	A target entity schema (TargetEntitySchema). Pointer to a schema that defines the target entity.
validFor	A time period. The period for which this REST resource is valid.

AttachmentRefOrValue sub-resource

An attachment by value or by reference. An attachment complements the description of an element, for example through a document, a video, a picture.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
description	A string. A narrative text describing the content of the attachment.
href	An uri (Uri). URI for this Attachment.
id	A string. Unique identifier for this particular attachment.
url	An uri (Uri). Uniform Resource Locator, is a web page address (a subset of URI).
name	A string. The name of the attachment.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
attachmentType	A string. Attachment type such as video, picture.
content	A base 6 4 (Base64). The actual contents of the attachment object, if embedded, encoded as base64.
mimeType	A string. Attachment mime type such as extension file for video, picture and document.
size	A quantity (Quantity). The size of the attachment.
validFor	A time period. The period of time for which the attachment is valid.

CharacteristicSpecification sub-resource

This class defines a characteristic specification.

@valueSchemaLocation	A string. This (optional) field provides a link to the schema describing the value type.

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configurable	A boolean. If true, the Boolean indicates that the target Characteristic is configurable.
description	A string. A narrative that explains the CharacteristicSpecification.
extensible	A boolean. An indicator that specifies that the values for the characteristic can be extended by adding new values when instantiating a characteristic for a resource.
id	A string. Unique ID for the characteristic.
isUnique	A boolean. An indicator that specifies if a value is unique for the specification. Possible values are; "unique while value is in effect" and "unique whether value is in effect or not".
maxCardinality	An integer. The maximum number of instances a CharacteristicValue can take on. For example, zero to five phone numbers in a group calling plan, where five is the value for the maxCardinality.
minCardinality	An integer. The minimum number of instances a CharacteristicValue can take on. For example, zero to five phone numbers in a group calling plan, where zero is the value for the minCardinality.
name	A string. A word, term, or phrase by which this characteristic specification is known and distinguished from other characteristic specifications.
regex	A string. A rule or principle represented in regular expression used to derive the value of a characteristic value.
valueType	A string. A kind of value that the characteristic can take on, such as numeric, text and so forth.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
charSpecRelationship	A list of characteristic specification relationships (CharacteristicSpecificationRelationship [*]). An aggregation, migration, substitution, dependency or exclusivity relationship between/among Specification Characteristics.
characteristicValueSpecification	A list of characteristic value specifications (CharacteristicValueSpecification [*]). A CharacteristicValueSpecification object is used to define a set of attributes, each of which can be assigned to a corresponding set of attributes in a CharacteristicSpecification object. The values of the attributes in the

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	CharacteristicValueSpecification object describe the values of the attributes that a corresponding Characteristic object can take on.
validFor	A time period. The period of time for which a characteristic is applicable.

CharacteristicSpecificationRelationship sub-resource

An aggregation, migration, substitution, dependency or exclusivity relationship between/among Characteristic specifications. The specification characteristic is embedded within the specification whose ID and href are in this entity, and identified by its ID.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
characteristicSpecificationId	A string. Unique identifier of the characteristic within the specification.
name	A string. Name of the target characteristic within the specification.
parentSpecificationHref	An uri (Uri). Hyperlink reference to the parent specification containing the target characteristic.
parentSpecificationId	A string. Unique identifier of the parent specification containing the target characteristic.
relationshipType	A string. Type of relationship such as aggregation, migration, substitution, dependency, exclusivity.
validFor	A time period. The period for which the object is valid.

CharacteristicValueSpecification sub-resource

specification of a value (number or text or an object) that can be assigned to a Characteristic.

@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
isDefault	A boolean. If true, the Boolean Indicates if the value is the default value for a characteristic.

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rangeInterval	A string. An indicator that specifies the inclusion or exclusion of the valueFrom and valueTo attributes. If applicable, possible values are "open", "closed", "closedBottom" and "closedTop".
regex	A string. A regular expression constraint for given value.
unitOfMeasure	A string. A length, surface, volume, dry measure, liquid measure, money, weight, time, and the like. In general, a determinate quantity or magnitude of the kind designated, taken as a standard of comparison for others of the same kind, in assigning to them numerical values, as 1 foot, 1 yard, 1 mile, 1 square foot.
validFor	A time period. The period of time for which a value is applicable.
value	An any (Any). A discrete value that the characteristic can take on, or the actual value of the characteristic.
valueFrom	An integer. The low range value that a characteristic can take on.
valueTo	An integer. The upper range value that a characteristic can take on.
valueType	A string. A kind of value that the characteristic value can take on, such as numeric, text and so forth.

EntitySpecificationRelationship sub-resource

A migration, substitution, dependency or exclusivity relationship between/among entity specifications.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
associationSpec	An association specification reference (AssociationSpecificationRef). A specification for an association used by this relationship.
relationshipType	A string. Type of relationship such as migration, substitution, dependency, exclusivity.
role	A string. The association role for this entity specification.
validFor	A time period. The period for which the entitySpecRelationship is valid.

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FeatureSpecification sub-resource

Specification for resource, service or product features.

href	An uri (Uri). Hyperlink reference.
id	A string. Identifier of the feature specification. Must be locally unique within the containing specification, thus allowing direct access to the feature spec.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
constraint	A list of constraint references (ConstraintRef [*]). This is a list of feature constraints.
featureSpecCharacteristic	A list of feature specification characteristics (FeatureSpecificationCharacteristic [*]). This is a list of characteristics for a particular feature.
featureSpecRelationship	A list of feature specification relationships (FeatureSpecificationRelationship [*]). A dependency, exclusivity or aggratation relationship between/among feature specifications.
isBundle	A boolean. A flag indicating if this is a feature group (true) or not (false).
isEnabled	A boolean. A flag indicating if the feature is enabled (true) or not (false).
name	A string. Unique name given to the feature specification.
validFor	A time period. The period for which this feature specification is valid.
version	A string. Version of the feature specification.

FeatureSpecificationCharacteristic sub-resource

Configuration feature characteristic specification.

@valueSchemaLocation	A string. This (optional) field provides a link to the schema describing the value type.
configurable	A boolean. If true, the Boolean indicates that the target Characteristic is configurable.
description	A string. A narrative that explains the CharacteristicSpecification.
extensible	A boolean. An indicator that specifies that the values for the characteristic can be extended by adding new values when instantiating a characteristic for a resource.

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id	A string. Unique ID for the characteristic.
isUnique	A boolean. An indicator that specifies if a value is unique for the specification. Possible values are; "unique while value is in effect" and "unique whether value is in effect or not".
maxCardinality	An integer. The maximum number of instances a CharacteristicValue can take on. For example, zero to five phone numbers in a group calling plan, where five is the value for the maxCardinality.
minCardinality	An integer. The minimum number of instances a CharacteristicValue can take on. For example, zero to five phone numbers in a group calling plan, where zero is the value for the minCardinality.
name	A string. A word, term, or phrase by which this characteristic specification is known and distinguished from other characteristic specifications.
regex	A string. A rule or principle represented in regular expression used to derive the value of a characteristic value.
valueType	A string. A kind of value that the characteristic can take on, such as numeric, text and so forth.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
featureSpecCharRelationship	A list of feature specification characteristic relationships (FeatureSpecificationCharacteristicRelationship [*]). An aggregation, migration, substitution, dependency or exclusivity relationship between/among feature characteristics.
featureSpecCharacteristicValue	A list of characteristic value specifications (CharacteristicValueSpecification [*]). Used to define a set of attributes, each of which can be assigned to a corresponding set of attributes in a FeatureCharacteristic object.
validFor	A time period. The period of time for which a characteristic is applicable.

FeatureSpecificationCharacteristicRelationship sub-resource

An aggregation, migration, substitution, dependency or exclusivity relationship between/among FeatureSpecificationCharacteristics.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.

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@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
characteristicId	A string. Unique identifier of the characteristic within the the target feature specification.
featureId	A string. Unique identifier of the target feature specification within the resource specification.
name	A string. Name of the target characteristic.
relationshipType	A string. Type of relationship such as aggregation, migration, substitution, dependency, exclusivity.
resourceSpecificationHref	An uri (Uri). Hyperlink reference to the resource specification containing the target feature and feature characteristic.
resourceSpecificationId	A string. Unique identifier of the resource specification containing the target feature and feature characteristic.
validFor	A time period. The period for which the object is valid.

FeatureSpecificationRelationship sub-resource

Relationship between feature specifications.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
featureId	A string. Unique identifier of the target feature specification.
name	A string. This is the name of the target feature specification.
parentSpecificationHref	An uri (Uri). Hyperlink reference to the parent specification containing the target feature.
parentSpecificationId	A string. Unique identifier of the parent specification containing the target feature.

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relationshipType	A string. This is the type of the feature specification relationship.
validFor	A time period. The period for which this feature spoecification relationship is valid.

Quantity sub-resource

An amount in a given unit.

amount	A float. Numeric value in a given unit.
units	A string. Unit.

RelatedParty sub-resource

Related Entity reference. A related party defines party or party role linked to a specific entity.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
role	A string. Role played by the related party.

ServiceSpecRelationship sub-resource

A dependency, substitution or exclusivity relationship between/among service specifications.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

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relationshipType	A string. Type of relationship such as dependency, substitution or exclusivity.
role	A string. The association role for this service specification.
validFor	A time period. The period for which the serviceSpecRelationship is valid.

TargetEntitySchema sub-resource

The reference object to the schema and type of target entity which is described by a specification.

@schemaLocation	A string. This field provides a link to the schema describing the target entity.
@type	A string. Class type of the target entity.

AssociationSpecificationRef relationship

reference to an AssociationSpecification object.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

ConstraintRef relationship

Constraint reference. The Constraint resource represents a policy/rule applied to an entity or entity spec.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

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version	A string. constraint version.

ResourceSpecificationRef relationship

Resources are physical or non-physical components (or some combination of these) within an enterprise's infrastructure or inventory. They are typically consumed or used by services (for example a physical port assigned to a service) or contribute to the realization of a Product (for example, a SIM card). They can be drawn from the Application, Computing and Network domains, and include, for example, Network Elements, software, IT systems, content and information, and technology components.
A ResourceSpecification is an abstract base class for representing a generic means for implementing a particular type of Resource. In essence, a ResourceSpecification defines the common attributes and relationships of a set of related Resources, while Resource defines a specific instance that is based on a particular ResourceSpecification.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
version	A string. Resource Specification version.

ServiceLevelSpecificationRef relationship

A Service Level Specification represents a pre-defined or negotiated set of Service Level Objectives. In addition, certain consequences are associated with not meeting the Service Level Objectives. Service Level Agreements are expressed in terms of Service Level Specifications.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

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Json representation sample

We provide below the json representation of an example of a 'AiModelSpecification' resource object


```
{
   "id": "7655",
   "href": "https://mycsp.com:8080/tmf-
api/serviceCatalogManagement/v4/serviceSpecification/PCPAIModelAsAServiceSpecification",
   "@type": "AIModelSpecification",
   "name": "PCP AIModelAsAService Specification",
   "description": "This service specification describes an AI Model as a Service.",
   "version": "2.1",
   "validFor": {
      "startDateTime": "2017-08-23T00:00",
      "endDateTime": "2018-03-25T00:00"
   },
   "lastUpdate": "2017-08-27T00:00:00.000Z",
   "lifecycleStatus": "Active",
   "isBundle": false,
   "modelSpecificationHistory": {
      "description": "Model development history and model specification as preserved in a model repository",
      "url": "http://link.to.mlflow.server/#/models/pcpsegmentation/versions/1"
   },
   "inheritedModel": {
      "description": "Reference to the exact model that was used, via transfer learning, to create this model",
      "url": "https://link.to.model.repo/modelID=14272.3.1"
   },
   "modelTrainingData": {
      "description": "A link to a repository where the data used to train the model is preserved",
      "url": "https://link.to.data.repo/minio/trainingdata/dataID=325215.1"
   },
   "modelEvaluationData": {
      "description": "A link to a repository where the data used to evaluate the model is preserved",
      "url": "https://link.to.data.repo/minio/trainingdata/dataID=191215.1"
   },
   "modelDataSheet": {
      "description": "Link to a digital document that provide a top level description of this model",
      "url": "https://mycsp.com:7070/docloader?docnum=3534536",
      "mimeType": "application/vnd.ms-excel"
   },
   "deploymentRecord": {
      "description": "Link to a digital document that preserves the deployment approval for this model",
      "url": "https://link.to.model.repo/deploymentRecordID=57432.1"
   },
   "modelContractVersionHistory": {
      "description": "Link to the model contract for this model, including past versions",
      "url": "https://gitlab.server/modelcontracts/57432/blob/master/contract"
   },
   "serviceSpecCharacteristic": [
      {
         "name": "trainedPCPTypes",
         "description": "The model uses knowledge of the geometry of different PCP types to mask the image and focus on
the internals of the PCP",
         "valueType": "object",
         "configurable": false,
```


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```
      "validFor": {
        "startDateTime": "2017-08-12T00:00",
        "endDateTime": "2018-03-07T00:00"
      },
      "minCardinality": 0,
      "maxCardinality": 1,
      "isUnique": true,
      "regex": "",
      "extensible": false,
      "serviceSpecCharacteristicValue": [
        {
          "valueType": "StringArray",
          "isDefault": false,
          "value": [
            "Type_1",
            "Type_2",
            "Type_3",
            "Type_4"
          ],
          "validFor": {
            "startDateTime": "2017-08-06T00:00",
            "endDateTime": "2018-03-07T00:00"
          }
        }
      ]
    },
    {
      "name": "trainedConnectorTypes",
      "description": "ConnectorType parameters for this resource facing service spec ",
      "valueType": "object",
      "configurable": true,
      "validFor": {
        "startDateTime": "2017-08-17T00:00",
        "endDateTime": "2018-03-12T00:00"
      },
      "minCardinality": 0,
      "maxCardinality": 1,
      "isUnique": true,
      "regex": "",
      "extensible": true,
      "serviceSpecCharacteristicValue": [
        {
          "valueType": "StringArray",
          "isDefault": false,
          "value": [
            "CType_1",
            "CType_2",
            "CType_3",
            "CType_4"
          ],
          "validFor": {
            "startDateTime": "2017-08-06T00:00",
            "endDateTime": "2018-03-07T00:00"
          }
        }
```


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```
        ]
      }
    ],
    "relatedParty": [
      {
        "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/organization/3643",
        "id": "3643",
        "name": "Firewall Express",
        "role": "Supplier"
      }
    ],
    "targetServiceSchema": {
      "@type": "AIModel",
      "@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/AIM/AIModel.schema.json"
    },
    "@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/AIM/AIModelSpecification.schema.json",
    "@baseType": "ServiceSpecification"
}
```


Ai Contract resource

An Ai Contract represents a contract or arrangement, either written or verbal and sometimes enforceable by law, such as a service level agreement or a customer price agreement. An agreement involves a number of other business entities, such as products, services, and resources and/or their specifications.

Resource model

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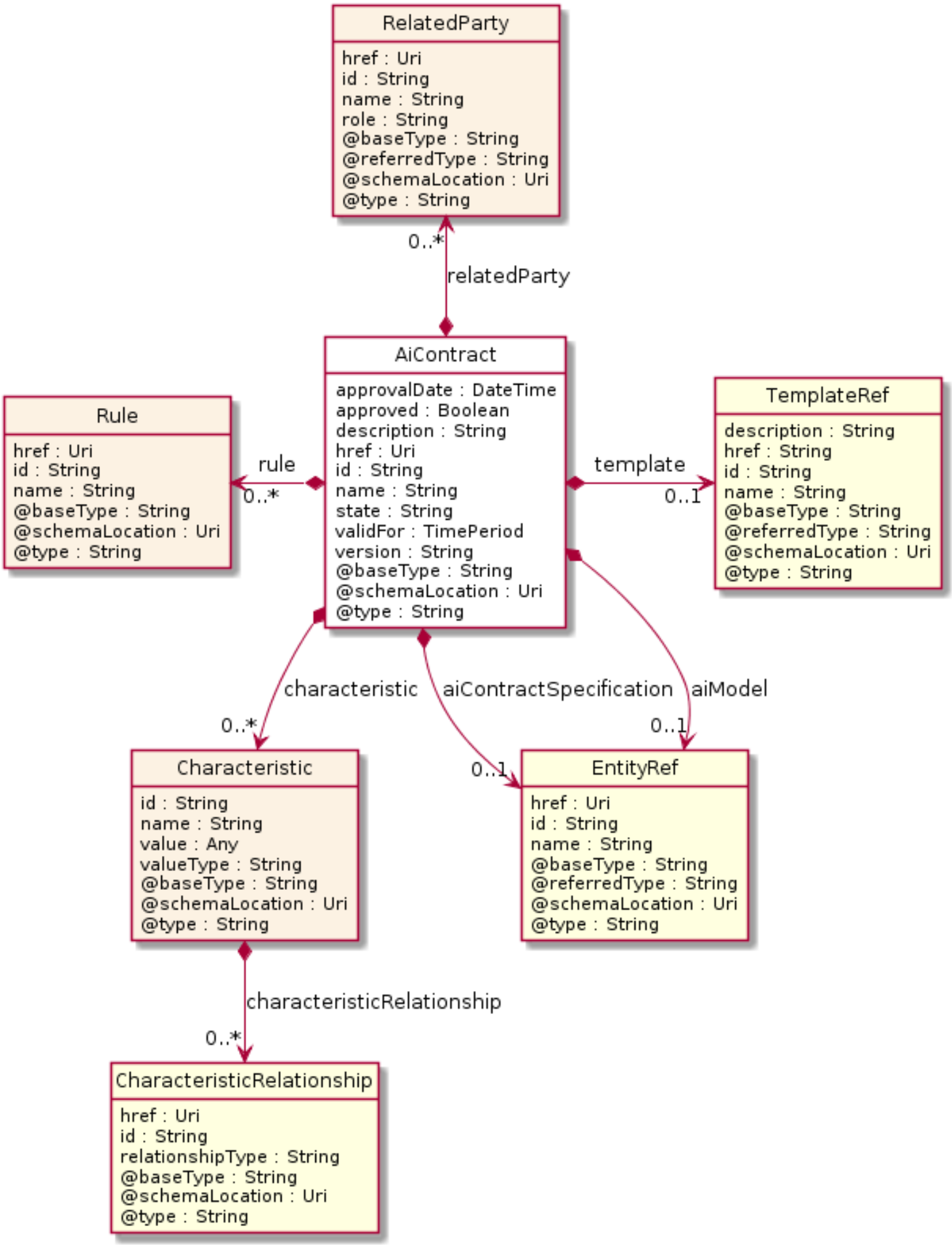
RelatedParty
href : Uri
id : String
name : String
role : String
@baseType : String
@referredType : String
@schemaLocation : Uri
@type : String
0..*
relatedParty
AiContract
approvalDate : DateTime
approved : Boolean
description : String
href : Uri
id : String
name : String
state : String
validFor : TimePeriod
version : String
@baseType : String
@schemaLocation : Uri
@type : String
Rule
href : Uri
id : String
name : String
@baseType : String
@schemaLocation : Uri
@type : String
rule
0..*
template
0..1
TemplateRef
description : String
href : String
id : String
name : String
@baseType : String
@referredType : String
@schemaLocation : Uri
@type : String
characteristic
0..*
aiContractSpecification
0..1
aiModel
0..1
Characteristic
id : String
name : String
value : Any
valueType : String
@baseType : String
@schemaLocation : Uri
@type : String
EntityRef
href : Uri
id : String
name : String
@baseType : String
@referredType : String
@schemaLocation : Uri
@type : String
characteristicRelationship
0..*
CharacteristicRelationship
href : Uri
id : String
relationshipType : String
@baseType : String
@schemaLocation : Uri
@type : String

Field descriptions

AiContract fields

approvalDate	A date time (DateTime).
approved	A boolean.
description	A string. Description of the Service Level Agreement (SLA).
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
name	A string. Name of the Service Level Agreement (SLA).
state	A string. State of the Service Level Agreement (SLA).
version	A string. Version of the Service Level Agreement (SLA).
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
aiContractSpecification	An entity reference (EntityRef). Reference to the AI Model Specification.
aiModel	An entity reference (EntityRef). Reference to the AI Model.
characteristic	A list of characteristics (Characteristic [*]). Describes a given characteristic of an object or entity through a name/value pair.
relatedParty	A list of related parties (RelatedParty [*]). Related Entity reference. A related party defines party or party role linked to a specific entity.
rule	A list of rules (Rule [*]).
template	A template reference (TemplateRef).
validFor	A time period. Period where the clauses of the SLA are applicable.

Characteristic sub-resource

Describes a given characteristic of an object or entity through a name/value pair.

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@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
characteristicRelationship	A list of characteristic relationships (CharacteristicRelationship [*]). Another Characteristic that is related to the current Characteristic;.
id	A string. Unique identifier of the characteristic.
name	A string. Name of the characteristic.
value	An any (Any). The value of the characteristic.
valueType	A string. Data type of the value of the characteristic.

CharacteristicRelationship sub-resource

Another Characteristic that is related to the current Characteristic;.

href	An uri (Uri). Hyperlink reference.
id	A string. Unique identifier of the characteristic.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
relationshipType	A string. The type of relationship.

RelatedParty sub-resource

Related Entity reference. A related party defines party or party role linked to a specific entity.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.

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@type	A string. When sub-classing, this defines the sub-class Extensible name.
role	A string. Role played by the related party.

Rule sub-resource

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
name	A string. The name of the rule.

EntityRef relationship

Entity reference schema to be use for all entityRef class.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.

TemplateRef relationship

href	A string.
id	A string.
@baseType	A string. When sub-classing, this defines the super-class.

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@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
@referredType	A string. The actual type of the target instance when needed for disambiguation.
description	A string.
name	A string.

Json representation sample

We provide below the json representation of an example of a 'AiContract' resource object


```
{
  "id": "5351",
  "href": "https://mycsp.com:8080/tmf-api/serviceInventory/v4/service/5351",
  "approvalDate": "2018-01-15T12:26:11.747Z",
  "approved": true,
  "description": "This  is an AI contract ",
  "state": "Active",
  "version": "1.0",
  "aiContractSpecification": {
    "href": "https://mycsp.com:8080/tmf-api/AIManagment/v4/aiContractSpecification/2435",
    "id": "2435"
  },
  "aiModelSpecification": {
    "href": "https://mycsp.com:8080/tmf-api/AIManagment/v4/aiModelSpecification/42",
    "id": "42",
    "@referredType": "AiModelSpecification"
  },
  "relatedParty": [
    {
      "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/organization/ACME",
      "id": "456",
      "name": "ACME",
      "role": "ContractOwner",
      "@referredType": "Organization"
    }
  ],
  "rule": [
    {
      "id": "ImageQuality-1920",
      "href": "http://api/thresholdRule/ImageQuality-1920",
      "@referredType": "SimpleThresholdRule"
    }
  ]
}
```


Ai Contract Violation resource

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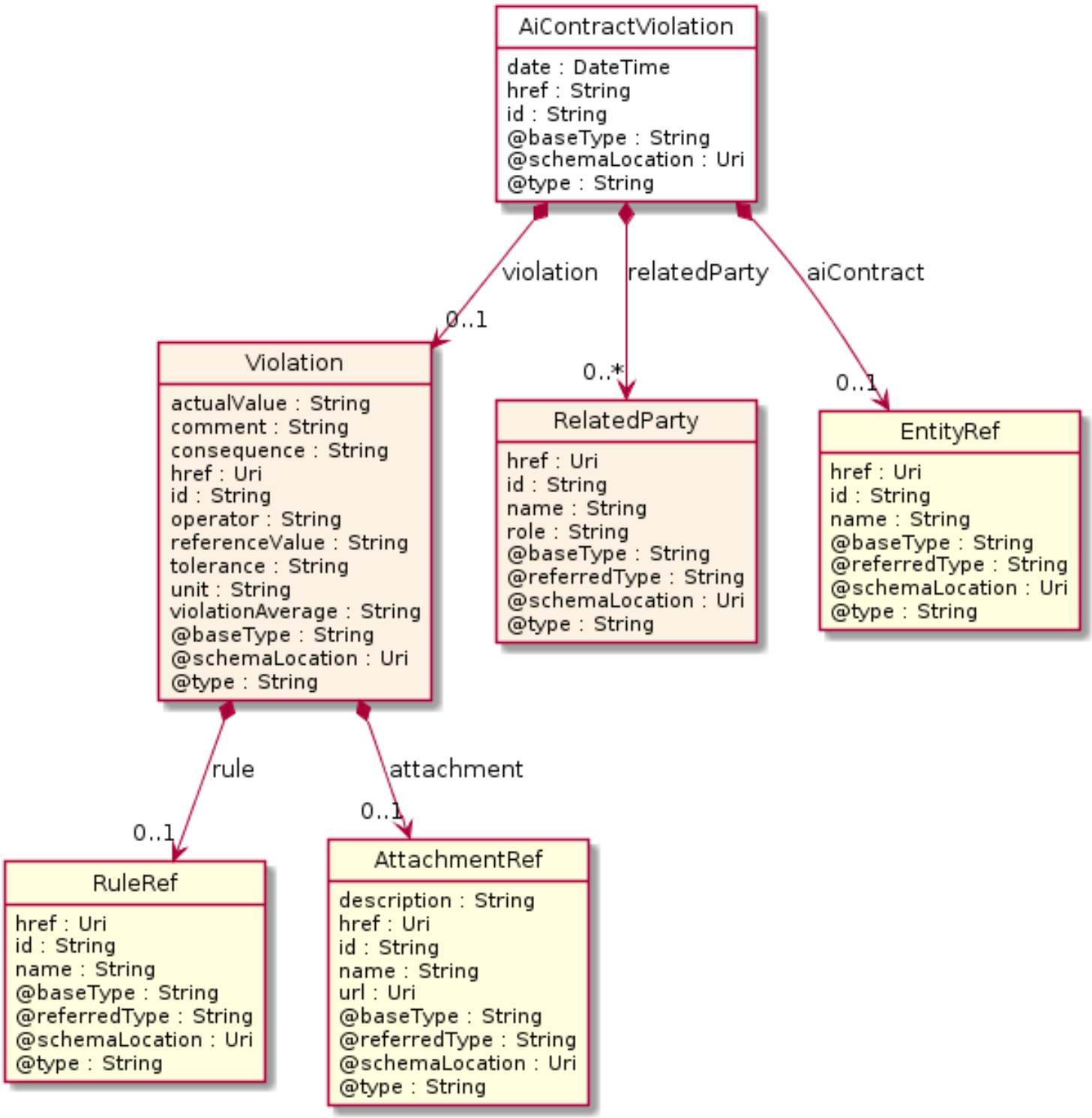
Resource model



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Field descriptions

AiContractViolation fields

href	A string.
id	A string.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
aiContract	An entity reference (EntityRef). Entity reference schema to be use for all entityRef class.
date	A date time (DateTime).
href	A string.
id	A string.
relatedParty	A list of related parties (RelatedParty [*]). Related Entity reference. A related party defines party or party role linked to a specific entity.
violation	A violation (Violation).

RelatedParty sub-resource

Related Entity reference. A related party defines party or party role linked to a specific entity.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
role	A string. Role played by the related party.

Violation sub-resource

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href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
actualValue	A string.
attachment	An attachment reference (AttachmentRef). An attachment complements the description of an element (for instance a product) through video, pictures.
comment	A string.
consequence	A string.
operator	A string.
referenceValue	A string.
rule	A rule reference (RuleRef). Rule is a common pattern or Template for the SLA parameters, metrics, and thresholds.
tolerance	A string.
unit	A string.
violationAverage	A string.

AttachmentRef relationship

Attachment reference. An attachment complements the description of an element (for instance a product) through video, pictures.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). URL serving as reference for the attachment resource.
id	A string. Unique-Identifier for this attachment.
@baseType	A string. When sub-classing, this defines the super-class.

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@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
description	A string. A narrative text describing the content of the attachment.
url	An uri (Uri). Link to the attachment media/content.

EntityRef relationship

Entity reference schema to be use for all entityRef class.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.

RuleRef relationship

Rule reference. Rule is a common pattern or Template for the SLA parameters, metrics, and thresholds.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

Json representation sample

We provide below the json representation of an example of a 'AiContractViolation' resource object

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```
{
  "href": "https:/host:port/tmf-api/AIMAnagementAPI/v4/aiContractViolation/4242",
  "id": "4242",
  "aiContract": {
    "href": "http://tmf.com/AIMAnagement/aiContract/4242",
    "id": "4242"
  },
  "date": "2020-07-31T00:00:00.00Z",
  "relatedParty": [
    {
      "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/organization/3643",
      "id": "3643",
      "name": "BT",
      "role": "Supplier",
      "@referredType": "Organization"
    }
  ],
  "violation": {
    "unit": "percentage",
    "referenceValue": "10",
    "operator": "GT",
    "actualValue": "12",
    "comment": "Input image quality proportion % of usable image above limit.",
    "consequence": "Alarm",
    "rule": {
      "id": "42",
      "href": "http/tmf.com/AIManagement/rule/42",
      "@referredType": "ThresholdRule"
    }
  }
}
```


Alarm resource

This resource represents an alarm supporting the information model defined in ITU-T X.733.

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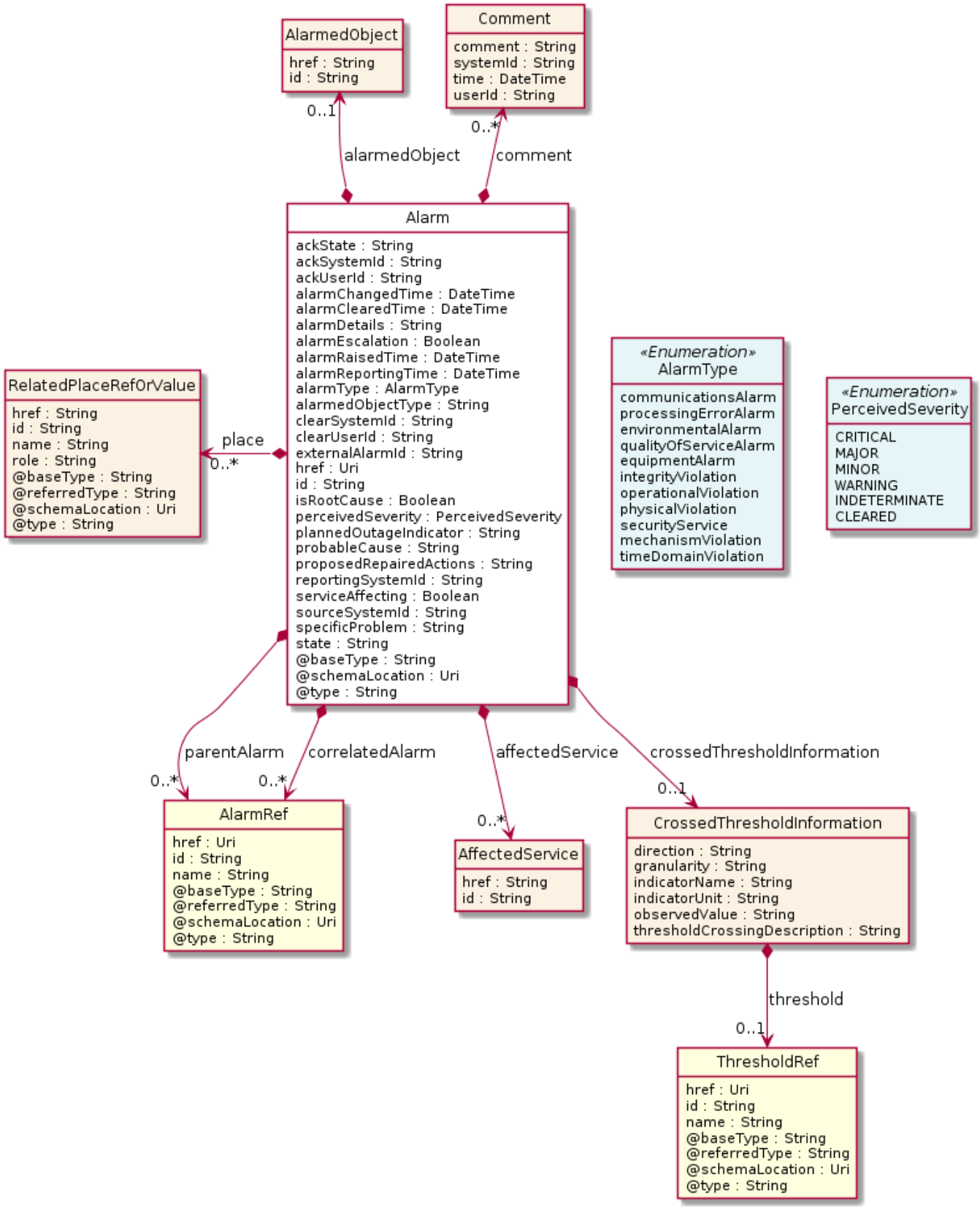
Resource model



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Field descriptions

Alarm fields

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
ackState	A string. Provides the Acknowledgement State of the alarm (unacknowledged | acknowledged).
ackSystemId	A string. Provides the name of the system that last changed the ackState of an alarm, i.e. acknowledged or unacknowledged the alarm.
ackUserId	A string. Provides the id of the user who has last changed the ack state of the alarm, i.e. acknowledged or unacknowledged the alarm.
affectedService	A list of affected services (AffectedService [*]).
alarmChangedTime	A date time (DateTime). Indicates the last date and time when the alarm is changed on the alarm-owning system. Any change to the alarm whether coming from the alarmed resource or triggered by a change from the client is changing this time.
alarmClearedTime	A date time (DateTime). Indicates the time (as a date + time) at which the alarm is cleared at the source.
alarmDetails	A string. Contains further information on the alarm.
alarmEscalation	A boolean. Indicates if this alarm has been escalated or not.
alarmRaisedTime	A date time (DateTime). Indicates the time (as a date + time) at which the alarm occurred at its source.
alarmReportingTime	A date time (DateTime). Indicates the time (as a date + time) at which the alarm was reported by the owning OSS. It might be different from the alarmRaisedTime. For instance, if the alarm list is maintained by an EMS, the alarmRaisedtime would be the time the alarm was detected by the NE, while the alarmReportingTime would be the time this alarm was stored in the alarm list of the EMS.

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alarmType	An alarm type (AlarmType). Categorizes the alarm (X.733 8.1.1, 3GPP TS 32.111-2 Annex A).
alarmedObject	An alarmed object (AlarmedObject). Identifies the managed object instance associated with the alarm.
alarmedObjectType	A string. The type (class) of the managed object associated with the event.
clearSystemId	A string. Provides the id of the system where the user who invoked the alarmCleared operation is located.
clearUserId	A string. Provides the id of the user who invoked the alarmCleared operation.
comment	A list of comments (Comment [*]). Indicates the comments entered on the alarm.
correlatedAlarm	A list of alarm references (AlarmRef [*]).
crossedThresholdInformation	A crossed threshold information (CrossedThresholdInformation). Identifies the details of the threshold that has been crossed.
externalAlarmId	A string. An identifier of the alarm in the source system.
isRootCause	A boolean. Indicates whether the alarm is a root cause alarm..
parentAlarm	A list of alarm references (AlarmRef [*]).
perceivedSeverity	A perceived severity (PerceivedSeverity). This datatype lists the possible severities that can be allocated to a Alarm. The values are consistent with ITU-T Recommendation X.733. This specification does not recommend the use of indeterminate.
place	A list of related place ref or values (RelatedPlaceRefOrValue [*]). Related Entity reference. A related place defines a place described by reference or by value linked to a specific entity. The polymorphic attributes @type, @schemaLocation & @referredType are related to the place entity and not the RelatedPlaceRefOrValue class itself.
plannedOutageIndicator	A string. Indicates that the Managed Object (related to this alarm) is in planned outage (in planned maintenance, or out-of-service).
probableCause	A string. Provides the probable cause of the alarm. The values are consistent with ITU-T Recommendation X.733 or 3GPP TS 32.111-2 Annex B.
proposedRepairedActions	A string. Indicates proposed repair actions, if known to the system emitting the alarm.
reportingSystemId	A string. Reporting system identity.

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serviceAffecting	A boolean. Indicates whether the alarm affects service or not.
sourceSystemId	A string. Source system identity.
specificProblem	A string. Provides more specific information about the alarm.
state	A string. Defines the alarm state during its life cycle (raised | updated | cleared).

AffectedService sub-resource

href	A string. Provides the identifier of the service affected by the alarm.
id	A string.

AlarmedObject sub-resource

Identifies the managed object instance associated with the alarm.

href	A string. A reference to the managed object associated with the event.
id	A string. The identifier of the managed object associated with the event.

Comment sub-resource

Indicates the comments entered on the alarm.

comment	A string. Indicates the text of the comment.
systemId	A string. Indicates the system identifier on which the client set the comment.
time	A date time (DateTime). Indicates the time commenting the alarm.
userId	A string. Indicates the user commenting the alarm.

CrossedThresholdInformation sub-resource

Identifies the details of the threshold that has been crossed.

direction	A string. Indicates the threshold crossing direction: up or down.
granularity	A string. Indicates the granularity at which the indicator is evaluated for threshold crossing.
indicatorName	A string. Indicates the name of indicator which crossed the threshold.
indicatorUnit	A string. Indicates the unit of the measurement of the indicator corresponding to the threshold that has been crossed.
observedValue	A string. Indicates the value of the indicator which crossed the threshold.

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threshold	A threshold reference (ThresholdRef).
thresholdCrossingDescription	A string. Indicates further information on the threshold crossing alarm.

RelatedPlaceRefOrValue sub-resource

Related Entity reference. A related place defines a place described by reference or by value linked to a specific entity. The polymorphic attributes @type, @schemaLocation & @referredType are related to the place entity and not the RelatedPlaceRefOrValue class itself.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. A user-friendly name for the place, such as [Paris Store], [London Store], [Main Home].
href	A string. Unique reference of the place.
id	A string. Unique identifier of the place.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
role	A string.

AlarmRef relationship

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

ThresholdRef relationship

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@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

Json representation sample

We provide below the json representation of an example of a 'Alarm' resource object


```
{
  "id": "8675309",
  "href": "https://host:port/alarmManagement/v4/alarm/8675309",
  "@type": "Alarm",
  "@schemaLocation": "https:://host:port/Alarm.schema.json",
  "externalAlarmId": "8675309",
  "state": "updated",
  "perceivedSeverity": "MAJOR",
  "alarmedObjectType": "AIModel",
  "alarmedObject": {
    "id": "5351",
    "href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351"
  },
  "sourceSystemId": "aiOps-1",
  "alarmDetails": "operationalState=degraded",
  "alarmRaisedTime": "2019-07-03T03:32:17.235Z",
  "alarmReportingTime": "2019-07-03T03:32:17.552Z",
  "alarmChangedTime": "2019-07-03T03:32:52.744Z",
  "comment": [
    {
      "userId": "bob@example.net",
      "systemId": "ems-1",
      "time": "2019-07-03T03:37:33.827Z",
      "comment": "Dispatched"
    }
  ],
  "crossedThresholdInformation": {
    "direction": "string",
    "granularity": "string",
    "indicatorName": "ImageQuality",
    "indicatorUnit": "percentage",
    "observedValue": "20",
    "thresholdCrossingDescription": "Input image quality proportion % of usable image",
    "threshold": {
      "id": "ImageQuality-1920",
```


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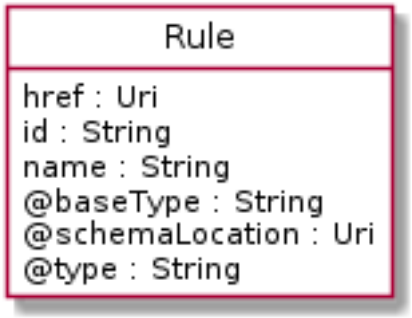
```
        "href": "http://api/thresholdRule/ImageQuality-1920",
        "@referredType": "simpleThresholdRule"
      }
    }
}
```

Rule resource

Resource model



Field descriptions

Rule fields

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
name	A string. The name of the rule.

Json representation sample

We provide below the json representation of an example of a 'Rule' resource object

```
{
  "href": "https://AIManagementAPI/v4/rule/42",
  "id": "42"
}
```

Event resource

event with common attributes.

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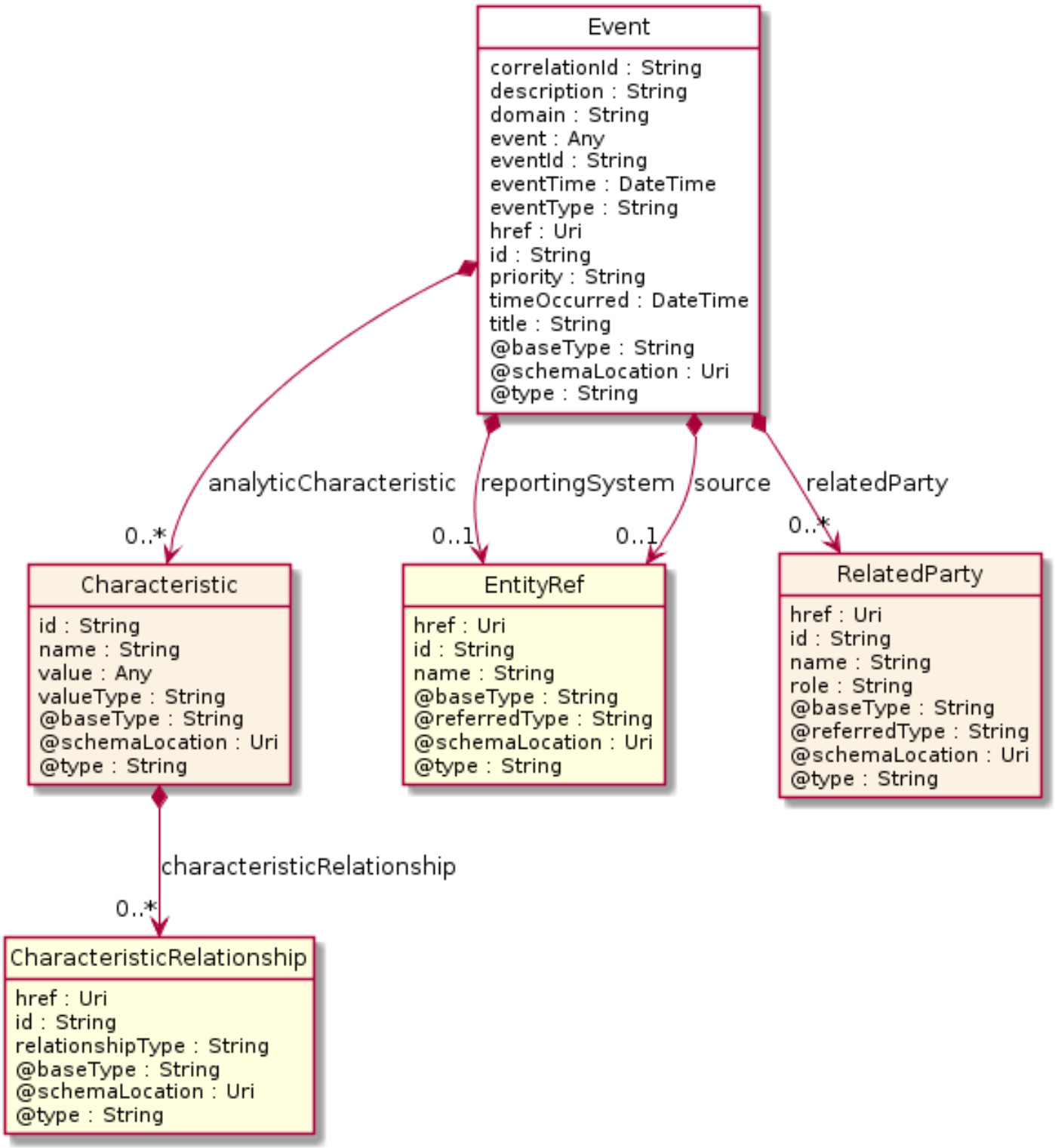
Resource model



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Field descriptions

Event fields

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
analyticCharacteristic	A list of characteristics (Characteristic [*]). Describes a given characteristic of an object or entity through a name/value pair.
correlationId	A string. The correlation id for this event.
description	A string. An explnatory of the event.
domain	A string. The domain of the event.
event	An any (Any). The event linked to the involved resource object.
eventId	A string. The identifier of the notification.
eventTime	A date time (DateTime). Time of the event occurrence.
eventType	A string. The type of the notification.
priority	A string. A priority.
relatedParty	A list of related parties (RelatedParty [*]). Related Entity reference. A related party defines party or party role linked to a specific entity.
reportingSystem	An entity reference (EntityRef). Reporting System described by EntityRef.
source	An entity reference (EntityRef). Source Entity described by EntityRef.
timeOccurred	A date time (DateTime). The time the event occurred.
title	A string. The title of the event.

Characteristic sub-resource

Describes a given characteristic of an object or entity through a name/value pair.

@baseType	A string. When sub-classing, this defines the super-class.

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@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
characteristicRelationship	A list of characteristic relationships (CharacteristicRelationship [*]). Another Characteristic that is related to the current Characteristic;.
id	A string. Unique identifier of the characteristic.
name	A string. Name of the characteristic.
value	An any (Any). The value of the characteristic.
valueType	A string. Data type of the value of the characteristic.

CharacteristicRelationship sub-resource

Another Characteristic that is related to the current Characteristic;.

href	An uri (Uri). Hyperlink reference.
id	A string. Unique identifier of the characteristic.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
relationshipType	A string. The type of relationship.

RelatedParty sub-resource

Related Entity reference. A related party defines party or party role linked to a specific entity.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

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role	A string. Role played by the related party.

EntityRef relationship

Entity reference schema to be use for all entityRef class.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
@referredType	A string. The actual type of the target instance when needed for disambiguation.
name	A string. Name of the related entity.

Json representation sample

We provide below the json representation of an example of a 'Event' resource object


```
{
  "@type": "Event",
  "@schemaLocation": "http://myscp.com/schemas/Common/Event.schema.json",
  "@baseType": "event",
  "eventId": "256c42f0-7cae-4cfe-8b96-f5773796f8ff",
  "eventTime": "2019-11-02T14:20:54.000Z",
  "eventType": "AlarmCreateNotification",
  "correlationId": "238764827364827t367",
  "domain": "domain-x",
  "title": "Mail service not responding",
  "description": "The mail service is no longer responding and sending mails",
  "timeOccurred": "2019-11-02T14:20:54.000Z",
  "priority": "Normal",
  "source": {
    "id": "12345",
    "href": "http://myscp.com/relatedEntity/12345"
  },
  "reportingSystem": {
    "id": "34534",
    "href": "http://myscp.com/reportingEntity/12345",
    "name": "name"
  },
  "relatedParty": [
    {
      "id": "12312",
      "href": "http://myscp.com/party/12345",
      "role": "Owner",
      "@referredType": "Organization"
    }
```


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```
  ],
  "event": {
    "alarm": {
      "@type": "Alarm",
      "@schemaLocation": "http://myscp.com/registry/Alarm.schema.json",
      "@baseType": "Alarm",
      "externalAlarmId": "8675309",
      "state": "updated",
      "perceivedSeverity": "major",
      "alarmedObjectType": "AIModel",
      "alarmedObject": {
        "id": "5351",
        "href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351"
      },
      "sourceSystemId": "aiOps-1",
      "alarmDetails": "operationalState=degraded",
      "alarmRaisedTime": "2019-07-03T03:32:17.235Z",
      "alarmReportingTime": "2019-07-03T03:32:17.552Z",
      "alarmChangedTime": "2019-07-03T03:32:52.744Z",
      "comment": [
        {
          "userId": "bob@example.net",
          "systemId": "ems-1",
          "time": "2019-07-03T03:37:33.827Z",
          "comment": "Dispatched"
        }
      ],
      "crossedThresholdInformation": {
        "direction": "string",
        "granularity": "string",
        "indicatorName": "ImageQuality",
        "indicatorUnit": "percentage",
        "observedValue": "20",
        "thresholdCrossingDescription": "Input image quality proportion % of usable image",
        "threshold": {
          "id": "ImageQuality-1920",
          "href": "http://api/thresholdRule/ImageQuality-1920",
          "@referredType": "simpleThresholdRule"
        },
        "@type": "CrossedThresholdInformation"
      }
    }
  }
}
```


Monitor resource

Monitoring of resources.

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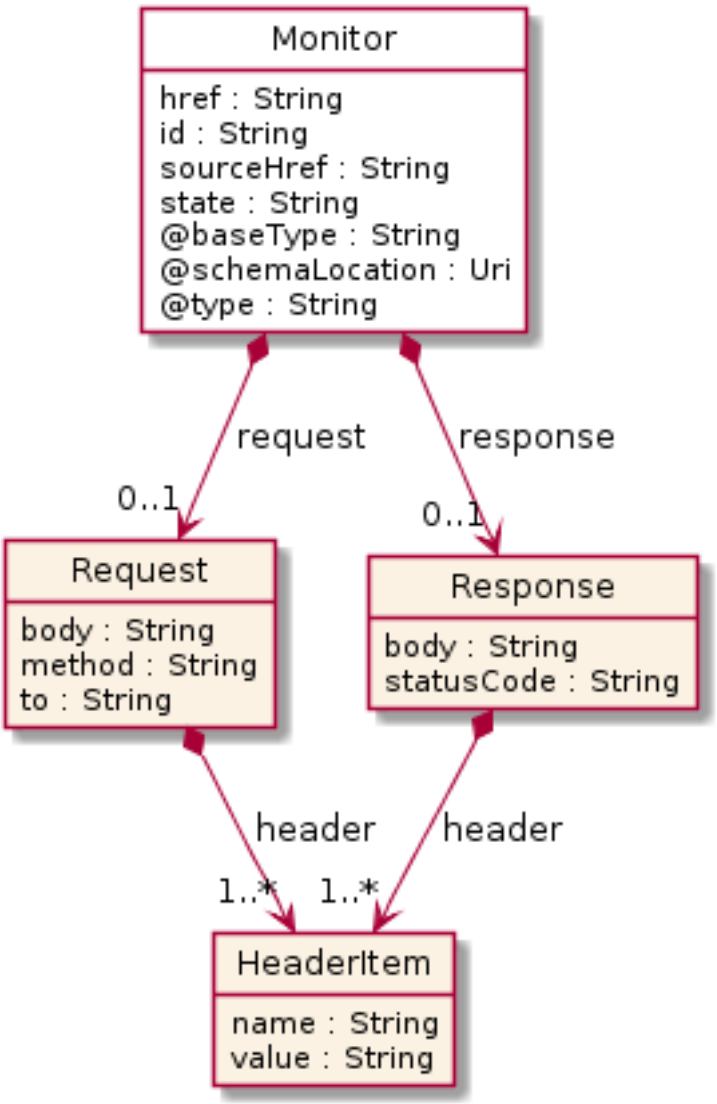
Resource model



Field descriptions

Monitor fields

href	A string. reference to this monitor.
id	A string. Identifier of an instance of the monitor. Required to be unique within the resource type. Used in URIs as the identifier for specific instances of a type.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

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href	A string. reference to this monitor.
id	A string. Identifier of an instance of the monitor. Required to be unique within the resource type. Used in URIs as the identifier for specific instances of a type.
request	A request (Request). Represents the request.
response	A response (Response). Represents the response.
sourceHref	A string. The monitored resource href.
state	A string. The Monitor state of the resource. InProgress, InError, Completed.

HeaderItem sub-resource

An item typically included in a request or response.

name	A string. The name of the header item, e.g. locale.
value	A string. The value of the header item, e.g. en-us.

Request sub-resource

A response to a request.

body	A string. The body of the request. For example for an HTTP request might contain content of a form .
header	A list of header items (HeaderItem [1..*]). Items included in the header of the request. For example for an HTTP request might contain requested locale, basic authentication.
method	A string. The protocol of the request, e.g. http.
to	A string. The target of the request, e.g. a URL for an HTTP request.

Response sub-resource

A response to a request.

body	A string. The body of the response. For example for an HTTP response might contain HTML for rendering.
header	A list of header items (HeaderItem [1..*]). Items included in the header of the response. For example for an HTTP response might contain negotiated locale.
statusCode	A string. The status of the response. For example for an HTTP response would be codes such as 200, 400, etc.

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Json representation sample

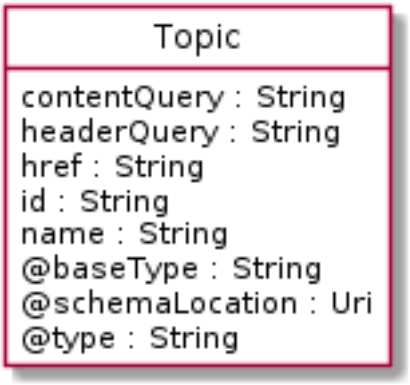
We provide below the json representation of an example of a 'Monitor' resource object


```
{
  "id": "44555",
  "href": "https://serverlocation:port/AIManagementAPI/v4/monitor/44555",
  "state": "completed",
  "request": {
    "method": "POST",
    "to": "http://serverlocation:port/AIManagementAPI/v4/AiModel",
    "body": "AI Model Body from AI Model Resource",
    "header": [
      {
        "name": "locale",
        "value": "en-us"
      }
    ]
  },
  "response": {
    "statusCode": "201",
    "body": " AI Model Body from AI Model Resource ",
    "header": [
      {
        "name": "locale",
        "value": "en-us"
      }
    ]
  },
  "sourceHref": " http://serverlocation:port/AIManagementAPI/v4/AiModel/42 ",
  "@type": "Monitor"
}
```


Topic resource

Is a event channel provided by the Event Streaming API.

Resource model



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Field descriptions

Topic fields

href	A string. Reference of the related entity.
id	A string. The identifier of the notification.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
contentQuery	A string. is the filter that will be applied on the content of the Event.
headerQuery	A string. is the filter that will be applied on the Event header properties.
href	A string. Reference of the related entity.
id	A string. The identifier of the notification.
name	A string. use to identify grouping of events, per domain, per event types, per access control-right and so on.

Json representation sample

We provide below the json representation of an example of a 'Topic' resource object

```
{
   "href": "https:/host:port/tmf-api/topic/v1/topic/AlarmTopic ",
   "name": "AlarmManagement-Montreal",
   "headerQuery": "eventType=AlarmCreateNotification&domain=Montreal",
   "contentQuery": "event.alarm.perceivedSeverity=CRITICAL",
   "id": "AlarmTopic"
}
```

Hub resource

A Hub is used to subscribe to an event notification.

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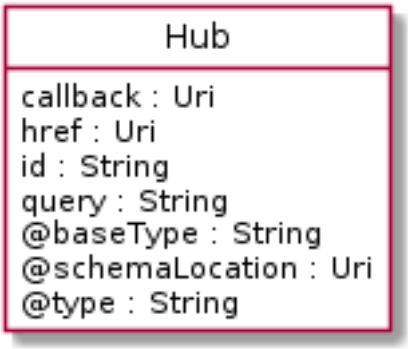
Resource model



Field descriptions

Hub fields

href	An uri (Uri). Hyperlink reference.
id	A string. The unique-id for your subscription - referenced when updating or deleting a subscription.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
callback	An uri (Uri). The URI that will be POSTed to when a notification is triggered.
id	A string. The unique-id for your subscription - referenced when updating or deleting a subscription.
query	A string. This is a query string used to filter notifications in the context of the notifier.

Json representation sample

We provide below the json representation of an example of a 'Hub' resource object


```
{
   "href": "https:/AIManagementAPI/v4/hub/5880",
   "callback": "http://www.tmforum.org/aListener",
   "id": "5880",
   "query": "event.alarm.alarmType=QualityOfServiceAlarm"
}
```


Algorithm Threshold Rule resource

A threshold rule that is a reference to an algorithm.

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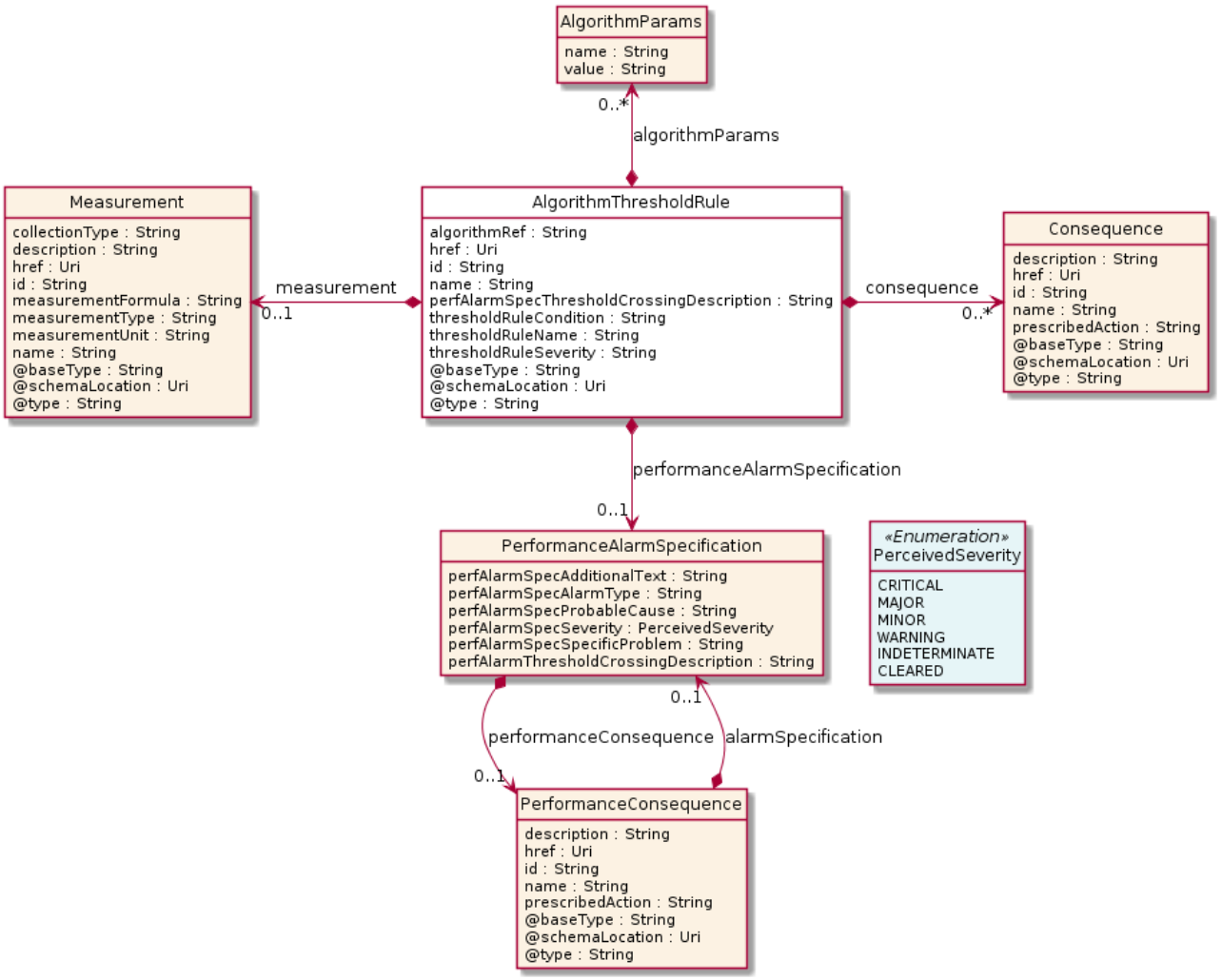
Resource model



Field descriptions

AlgorithmThresholdRule fields

perfAlarmSpecThresholdCrossingDescription	A string. A specific description of the threshold crossing (intended to be populated e under the alarm under CrossedThreshold structure).
thresholdRuleCondition	A string. A concrete threshold may have two possible values: \"Raise\" - a threshold was crossed or \"Clear\" - a threshold ceased crossing.
thresholdRuleName	A string. A word, term, or phrase by which a Performance threshold rule is known and distinguished from other threshold rules.
thresholdRuleSeverity	A string. A threshold can be generated in different severity levels. A crossing for each level may require a different condition and

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	possibly trigger a different consequence. The supported severity levels are equivalent to the possible severity level of alarms.
name	A string. The name of the rule.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
algorithmParams	A list of algorithm paramses (AlgorithmParams [*]).
algorithmRef	A string.
consequence	A list of consequences (Consequence [*]).
measurement	A measurement (Measurement). A counter/KPI to be used by the threshold rule.
performanceAlarmSpecification	A performance alarm specification (PerformanceAlarmSpecification). The specification of how to populate the alarm fields when generating a threshold crossing alarm.

AlgorithmParams sub-resource

name	A string.
value	A string.

Consequence sub-resource

A threshold crossing or a threshold ceased to be crossing results in a Performance consequence.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.

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@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
description	A string. A description of a Consequence.
name	A string. A word, term, or phrase by which a Consequence is known and distinguished from other measurements.
prescribedAction	A string. The suggested action.

Measurement sub-resource

A counter/KPI to be used by the threshold rule.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
collectionType	A string. This attribute indicates different forms in which the measurement data can be captured (please see details below).
description	A string. A description of the measurement.
measurementFormula	A string. A formula that is used to calculate a measurement (a string).
measurementType	A string. A category of the measurement (different SDOs may be using different categories).
measurementUnit	A string. The unit of the measurement (e.g. second, bytes, Celsius, etc.).
name	A string. A word, term, or phrase by which a measurement is known and distinguished from other measurements.

PerformanceAlarmSpecification sub-resource

The specification of how to populate the alarm fields when generating a threshold crossing alarm.

perfAlarmSpecAdditionalText	A string.
perfAlarmSpecAlarmType	A string.
perfAlarmSpecProbableCause	A string.

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perfAlarmSpecSeverity	A perceived severity (PerceivedSeverity). This datatype lists the possible severities that can be allocated to a Alarm. The values are consistent with ITU-T Recommendation X.733. This specification does not recommend the use of indeterminate.
perfAlarmSpecSpecificProblem	A string.
perfAlarmThresholdCrossingDescription	A string.
performanceConsequence	A performance consequence (PerformanceConsequence). A Consequence can be applied as a result of a threshold crossing or a threshold ceasing to be crossed.

PerformanceConsequence sub-resource

A Consequence can be applied as a result of a threshold crossing or a threshold ceasing to be crossed.

description	A string. A description of a Consequence.
name	A string. A word, term, or phrase by which a Consequence is known and distinguished from other measurements.
prescribedAction	A string. The suggested action.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
alarmSpecification	A performance alarm specification (PerformanceAlarmSpecification). The specification of how to populate the alarm fields when generating a threshold crossing alarm.

Json representation sample

We provide below the json representation of an example of a 'AlgorithmThresholdRule' resource object


```
{
  "perfAlarmSpecThresholdCrossingDescription": "Dropped Packets per second are over the limit",
  "thresholdRuleCondition": "Raise",
  "thresholdRuleName": "DroppedPacketsPPS",
  "thresholdRuleSeverity": "MAJOR",
  "name": "DroppedPacketsPPS",
  "href": "http://mycsp.com/rule/8794",
  "id": "8794",
  "@type": "AlgorithmThresholdRule",
  "algorithmParams": [
```


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```
      {
        "name": "sensitivity",
        "value": "0.2"
      }
    ],
    "algorithmRef": "a string ...",
    "measurement": {
      "id": "50",
      "name": "ImageQuality",
      "href": "http://mycsp.com/measurement/50",
      "description": "Input image quality proportion % of usable image",
      "measurementType": "MovingAverage",
      "measurementUnit": "percentage",
      "collectionType": "COUNTER",
      "measurementFormula": "X%"
    },
    "consequence": [
      {
        "@type": "PerformanceConsequence",
        "name": "Alarm Consequence",
        "description": "Alarm Consequence",
        "prescribedAction": "CreateAlarm",
        "alarmSpecification": {
          "perfAlarmSpecSeverity": "MAJOR",
          "perfeAlarmProbableCause": "Threshold Crossed",
          "perfAlarmSpecAdditionalText": "Input image quality degraded",
          "perfAlarmSpecThresholdCrossingDescription": " Input image quality is under threshold",
          "perfAlarmSpecRelatedEntity": {
            "operatingState": "DEGRADED"
          }
        }
      }
    ]
}
```


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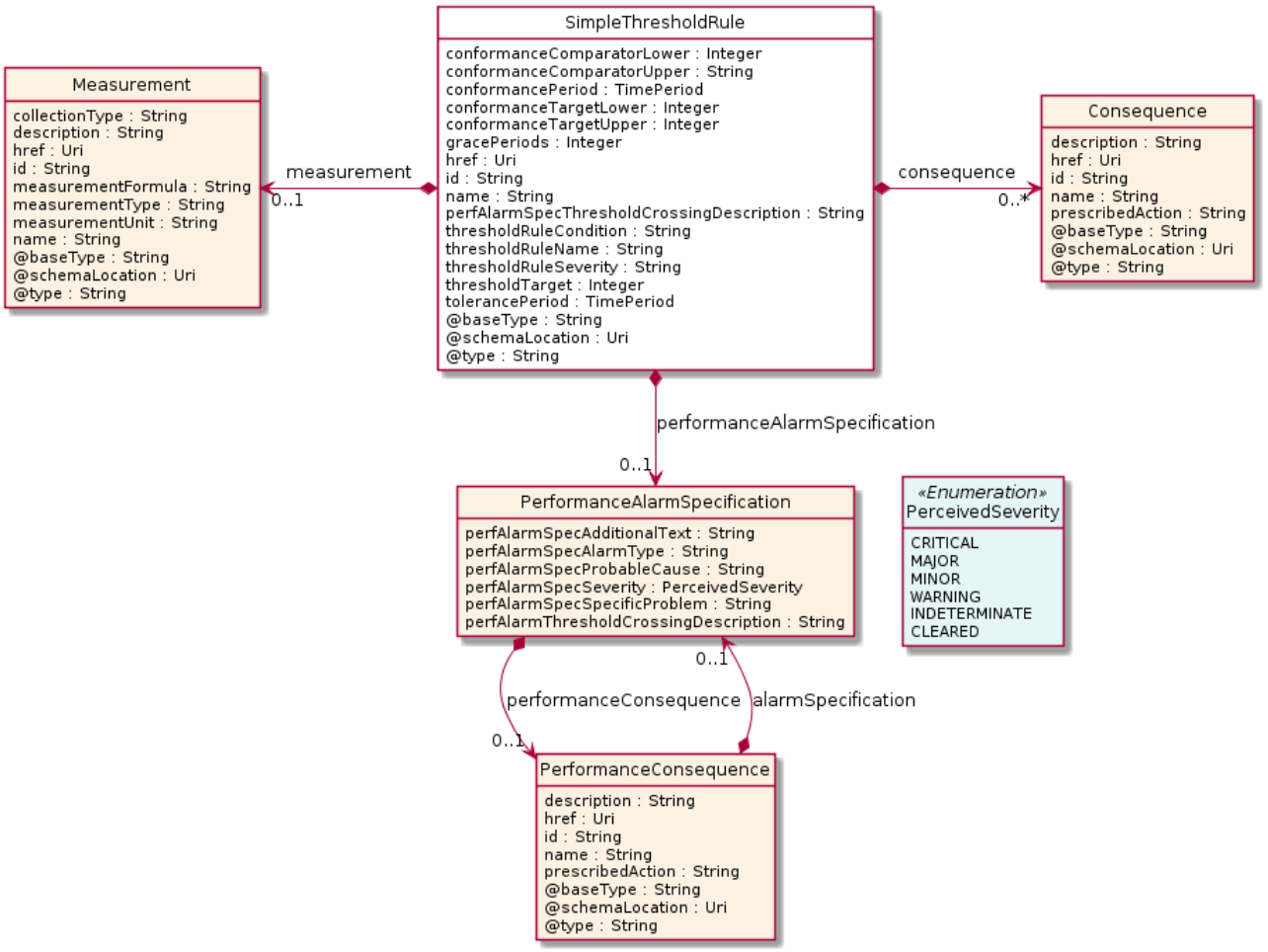
Simple Threshold Rule resource

A threshold rule that is based on explicit definition of attributes that represent a Boolean expression.

Resource model



Field descriptions

SimpleThresholdRule fields

perfAlarmSpecThresholdCrossingDescription	A string. A specific description of the threshold crossing (intended to be populated e under the alarm under CrossedThreshold structure).
thresholdRuleCondition	A string. A concrete threshold may have two possible values: \"Raise\" - a threshold was crossed or \"Clear\" - a threshold ceased crossing.
thresholdRuleName	A string. A word, term, or phrase by which a Performance threshold rule is known and distinguished from other threshold rules.

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thresholdRuleSeverity	A string. A threshold can be generated in different severity levels. A crossing for each level may require a different condition and possibly trigger a different consequence. The supported severity levels are equivalent to the possible severity level of alarms.
name	A string. The name of the rule.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
conformanceComparatorLower	An integer. An operator that when applied on a value (of conformanceTargetLower) specifies whether a Performance threshold rule is crossed or ceased to be crossed.
conformanceComparatorUpper	A string. An operator that when applied on a value (of conformanceTargetUpper) specifies whether a Performance threshold rule is crossed or ceased to be crossed.
conformancePeriod	A time period. A period of time, either as a deadline (endDateTime only) a startDateTime only, or both.
conformanceTargetLower	An integer. A value used to determine if the Performance threshold is crossed or ceased to be crossed, serving as an lower value.
conformanceTargetUpper	An integer. A value used to determine if the Performance threshold is crossed or ceased to be crossed, serving as an upper value.
gracePeriods	An integer. The number of times an objective can remain un-updated in reference to the conformancePeriod without a Performance threshold Consequence being initiated.
thresholdTarget	An integer. A percent that is used to specify when a warning should be used that indicates a Performance threshold is in danger of not being met.
tolerancePeriod	A time period. A period of time, either as a deadline (endDateTime only) a startDateTime only, or both.

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consequence	A list of consequences (Consequence [*]).
measurement	A measurement (Measurement). A counter/KPI to be used by the threshold rule.
performanceAlarmSpecification	A performance alarm specification (PerformanceAlarmSpecification). The specification of how to populate the alarm fields when generating a threshold crossing alarm.

Consequence sub-resource

A threshold crossing or a threshold ceased to be crossing results in a Performance consequence.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
description	A string. A description of a Consequence.
name	A string. A word, term, or phrase by which a Consequence is known and distinguished from other measurements.
prescribedAction	A string. The suggested action.

Measurement sub-resource

A counter/KPI to be used by the threshold rule.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
collectionType	A string. This attribute indicates different forms in which the measurement data can be captured (please see details below).

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description	A string. A description of the measurement.
measurementFormula	A string. A formula that is used to calculate a measurement (a string).
measurementType	A string. A category of the measurement (different SDOs may be using different categories).
measurementUnit	A string. The unit of the measurement (e.g. second, bytes, Celsius, etc.).
name	A string. A word, term, or phrase by which a measurement is known and distinguished from other measurements.

PerformanceAlarmSpecification sub-resource

The specification of how to populate the alarm fields when generating a threshold crossing alarm.

perfAlarmSpecAdditionalText	A string.
perfAlarmSpecAlarmType	A string.
perfAlarmSpecProbableCause	A string.
perfAlarmSpecSeverity	A perceived severity (PerceivedSeverity). This datatype lists the possible severities that can be allocated to a Alarm. The values are consistent with ITU-T Recommendation X.733. This specification does not recommend the use of indeterminate.
perfAlarmSpecSpecificProblem	A string.
perfAlarmThresholdCrossingDescription	A string.
performanceConsequence	A performance consequence (PerformanceConsequence). A Consequence can be applied as a result of a threshold crossing or a threshold ceasing to be crossed.

PerformanceConsequence sub-resource

A Consequence can be applied as a result of a threshold crossing or a threshold ceasing to be crossed.

description	A string. A description of a Consequence.
name	A string. A word, term, or phrase by which a Consequence is known and distinguished from other measurements.
prescribedAction	A string. The suggested action.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.

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@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
alarmSpecification	A performance alarm specification (PerformanceAlarmSpecification). The specification of how to populate the alarm fields when generating a threshold crossing alarm.

Json representation sample

We provide below the json representation of an example of a 'SimpleThresholdRule' resource object


```
{
  "id": "ImageQuality-1920",
  "href": "http://api/thresholdRule/ImageQuality-1920",
  "@type": "SimpleThresholdRule",
  "thresholdRuleName": "ImageQuality",
  "thresholdRuleSeverity": "MAJOR",
  "thresholdRuleCondition": "Raise",
  "measurement": {
    "id": "50",
    "name": "ImageQuality",
    "href": "http://mycsp.com/measurement/50",
    "description": "Input image quality proportion % of usable image",
    "measurementType": "MovingAverage",
    "measurementUnit": "percentage",
    "collectionType": "COUNTER",
    "measurementFormula": "X%"
  },
  "conformanceTargetUpper": 10,
  "conformanceTargetLower": 0,
  "conformanceComparatorUpper": "GT",
  "conformanceComparatorLower": 0,
  "conformancePeriod": {
    "startDateTime": "2018-01-15T12:26:11.747Z",
    "endDateTime": "2019-01-15T12:26:11.747Z"
  },
  "tolerancePeriod": {
    "startDateTime": "2019-07-15T12:26:11.747Z",
    "endDateTime": "2019-08-15T12:26:11.747Z"
  },
  "thresholdTarget": 0,
  "gracePeriods": 0,
  "consequence": [
    {
      "@type": "PerformanceConsequence",
      "name": "Alarm Consequence",
      "description": "Alarm Consequence",
      "prescribedAction": "CreateAlarm",
      "alarmSpecification": {
        "perfAlarmSpecSeverity": "MAJOR",
        "perfeAlarmProbableCause": "Threshold Crossed",
```


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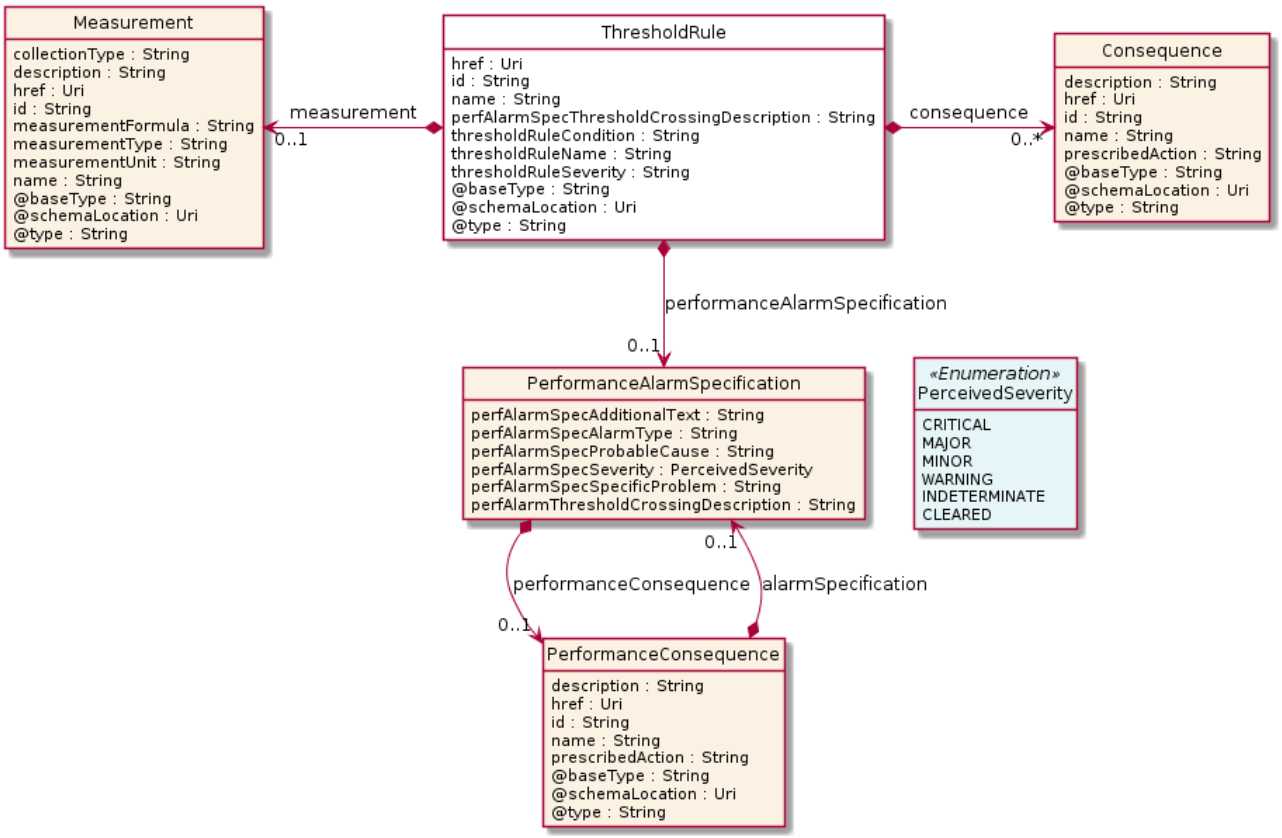
```
            "perfAlarmSpecAdditionalText": "Input image quality degraded",
            "perfAlarmSpecThresholdCrossingDescription": " Input image quality is under threshold",
            "perfAlarmSpecRelatedEntity": {
               "operatingState": "DEGRADED"
            }
         }
      }
   ]
}
```


Threshold Rule resource

ThresholdRule A base entity for concrete definition of thresholds. This datatype is abstract.

Resource model



Field descriptions

ThresholdRule fields

name	A string. The name of the rule.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.

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@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
consequence	A list of consequences (Consequence [*]).
measurement	A measurement (Measurement). A counter/KPI to be used by the threshold rule.
perfAlarmSpecThresholdCrossingDescription	A string. A specific description of the threshold crossing (intended to be populated e under the alarm under CrossedThreshold structure).
performanceAlarmSpecification	A performance alarm specification (PerformanceAlarmSpecification). The specification of how to populate the alarm fields when generating a threshold crossing alarm.
thresholdRuleCondition	A string. A concrete threshold may have two possible values: \"Raise\" - a threshold was crossed or \"Clear\" - a threshold ceased crossing.
thresholdRuleName	A string. A word, term, or phrase by which a Performance threshold rule is known and distinguished from other threshold rules.
thresholdRuleSeverity	A string. A threshold can be generated in different severity levels. A crossing for each level may require a different condition and possibly trigger a different consequence. The supported severity levels are equivalent to the possible severity level of alarms.

Consequence sub-resource

A threshold crossing or a threshold ceased to be crossing results in a Performance consequence.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.

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description	A string. A description of a Consequence.
name	A string. A word, term, or phrase by which a Consequence is known and distinguished from other measurements.
prescribedAction	A string. The suggested action.

Measurement sub-resource

A counter/KPI to be used by the threshold rule.

href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
collectionType	A string. This attribute indicates different forms in which the measurement data can be captured (please see details below).
description	A string. A description of the measurement.
measurementFormula	A string. A formula that is used to calculate a measurement (a string).
measurementType	A string. A category of the measurement (different SDOs may be using different categories).
measurementUnit	A string. The unit of the measurement (e.g. second, bytes, Celsius, etc.).
name	A string. A word, term, or phrase by which a measurement is known and distinguished from other measurements.

PerformanceAlarmSpecification sub-resource

The specification of how to populate the alarm fields when generating a threshold crossing alarm.

perfAlarmSpecAdditionalText	A string.
perfAlarmSpecAlarmType	A string.
perfAlarmSpecProbableCause	A string.
perfAlarmSpecSeverity	A perceived severity (PerceivedSeverity). This datatype lists the possible severities that can be allocated to a Alarm. The values are

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	consistent with ITU-T Recommendation X.733. This specification does not recommend the use of indeterminate.
perfAlarmSpecSpecificProblem	A string.
perfAlarmThresholdCrossingDescription	A string.
performanceConsequence	A performance consequence (PerformanceConsequence). A Consequence can be applied as a result of a threshold crossing or a threshold ceasing to be crossed.

PerformanceConsequence sub-resource

A Consequence can be applied as a result of a threshold crossing or a threshold ceasing to be crossed.

description	A string. A description of a Consequence.
name	A string. A word, term, or phrase by which a Consequence is known and distinguished from other measurements.
prescribedAction	A string. The suggested action.
href	An uri (Uri). Hyperlink reference.
id	A string. unique identifier.
@baseType	A string. When sub-classing, this defines the super-class.
@schemaLocation	An uri (Uri). A URI to a JSON-Schema file that defines additional attributes and relationships.
@type	A string. When sub-classing, this defines the sub-class Extensible name.
alarmSpecification	A performance alarm specification (PerformanceAlarmSpecification). The specification of how to populate the alarm fields when generating a threshold crossing alarm.

Json representation sample

We provide below the json representation of an example of a 'ThresholdRule' resource object


```
{
  "id": "1920",
  "thresholdRuleName": "DropPacketsHighRule",
  "@type": "AlgorithmThresholdRule ",
  "href": "http://api/thresholdrule/1920",
  "measurement": {
    "id": "",
    "name": "DroppedPacketsPPS",
    "href": "http://api/measurement/1225",
    "description": "The number of dropped packets per second",
    "measurementType": "Traffic",
    "measurementUnit": "packets per second",
```


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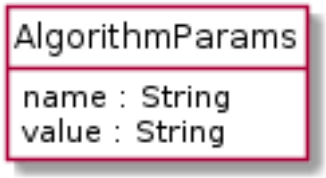
```
      "collectionType": "COUNTER",
      "measurementFormula": ""
    },
    "algorithmRef": "http://api/thresholdrulealgoritm/7000",
    "algorithmParams": [
      {
        "name": "sensitivity",
        "value": "0.2"
      }
    ],
    "genericPerformanceConsequence": [
      {
        "name": "",
        "Description": "",
        "prescribedAction": ""
      }
    ],
    "performanceAlarmSpecification": {
      "perfAlarmSpecSeverity": "MAJOR",
      "perfAlarmSpecProbableCause": "Threshold Crossed",
      "perfAlarmSpecAlarmType": "",
      "perfAlarmSpecSpecificProblem": "",
      "perfAlarmSpecAdditionalText": "Dropped Packets per second are over the limit"
    },
    "perfAlarmSpecThresholdCrossingDescription": "Dropped Packets per second are over the limit ",
    "thresholdRuleCondition": "Raise",
    "thresholdRuleSeverity": "MAJOR"
}
```


Algorithm Params resource

Resource model



Field descriptions

AlgorithmParams fields

name	A string.
value	A string.

Json representation sample

We provide below the json representation of an example of a 'AlgorithmParams' resource object

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```
{
   "name": "sensitivity",
   "value": "0.2"
}
```

Notification Resource Models

33 notifications are defined for this API

Notifications related to AiContractSpecification:
- AiContractSpecificationCreateEvent
- AiContractSpecificationDeleteEvent
- AiContractSpecificationAttributeValueChangeEvent

Notifications related to AiModel:
- AiModelCreateEvent
- AiModelAttributeValueChangeEvent
- AiModelStateChangeEvent
- AiModelDeleteEvent

Notifications related to AiModelSpecification:
- AiModelSpecificationCreateEvent
- AiModelSpecificationDeleteEvent
- AiModelSpecificationAttributeValueChangeEvent

Notifications related to AiContract:
- AiContractCreateEvent
- AiContractAttributeValueChangeEvent
- AiContractStateChangeEvent
- AiContractDeleteEvent

Notifications related to AiContractViolation:
- AiContractViolationCreateEvent
- AiContractViolationAttributeValueChangeEvent
- AiContractViolationDeleteEvent

Notifications related to Alarm:
- AlarmCreateEvent
- AlarmAttributeValueChangeEvent
- AlarmStateChangeEvent
- AlarmDeleteEvent

Notifications related to Rule:
- RuleCreateEvent
- RuleAttributeValueChangeEvent

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- RuleStateChangeEvent
- RuleDeleteEvent

Notifications related to Event:
- EventCreateEvent

Notifications related to Monitor:
- MonitorCreateEvent
- MonitorAttributeValueChangeEvent
- MonitorStateChangeEvent
- MonitorDeleteEvent

Notifications related to Topic:
- TopicCreateEvent
- TopicChangeEvent
- TopicDeleteEvent

The notification structure for all notifications in this API follow the pattern depicted by the figure below.
A notification event resource (depicted by "SpecificEvent" placeholder) is a sub class of a generic Event structure containing at least an id of the event occurrence (eventId), an event timestamp (eventTime), and the name of the resource (eventType).
This notification structure owns an event payload structure ("SpecificEventPayload" placeholder) linked to the resource concerned by the notification using the resource name as access field ("resourceName" placeholder).

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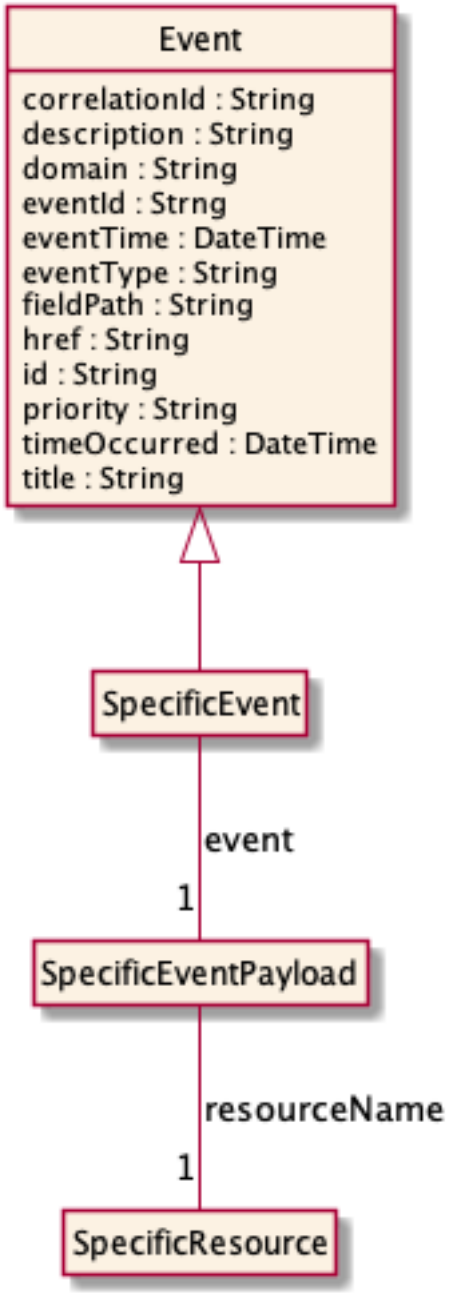

Ai Contract Specification Create Event

Notification AiContractSpecificationCreateEvent case for resource AiContractSpecification

Json representation sample

We provide below the json representation of an example of a 'AiContractSpecificationCreateEvent' notification event object

```
{
  "eventId":"00001",
  "eventTime":"2015-11-16T16:42:25-04:00",
  "eventType":"AiContractSpecificationCreateEvent",
```

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```
    "event": {
      "aiContractSpecification" :
         {-- SEE AiContractSpecification RESOURCE SAMPLE --}
    }
}
```

Ai Contract Specification Delete Event

Notification AiContractSpecificationDeleteEvent case for resource AiContractSpecification

Json representation sample

We provide below the json representation of an example of a 'AiContractSpecificationDeleteEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"AiContractSpecificationDeleteEvent",
    "event": {
      "aiContractSpecification" :
         {-- SEE AiContractSpecification RESOURCE SAMPLE --}
    }
}
```

Ai Contract Specification Attribute Value Change Event

Notification AiContractSpecificationAttributeValueChangeEvent case for resource AiContractSpecification

Json representation sample

We provide below the json representation of an example of a 'AiContractSpecificationAttributeValueChangeEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"AiContractSpecificationAttributeValueChangeEvent",
    "event": {
      "aiContractSpecification" :
         {-- SEE AiContractSpecification RESOURCE SAMPLE --}
    }
}
```

Ai Model Create Event

Notification AiModelCreateEvent case for resource AiModel

Json representation sample

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We provide below the json representation of an example of a 'AiModelCreateEvent' notification event object


```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"AiModelCreateEvent",
    "event": {
      "aiModel" :
         {-- SEE AiModel RESOURCE SAMPLE --}
   }
}
```


Ai Model Attribute Value Change Event

Notification AiModelAttributeValueChangeEvent case for resource AiModel

Json representation sample

We provide below the json representation of an example of a 'AiModelAttributeValueChangeEvent' notification event object


```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"AiModelAttributeValueChangeEvent",
    "event": {
      "aiModel" :
         {-- SEE AiModel RESOURCE SAMPLE --}
   }
}
```


Ai Model State Change Event

Notification AiModelStateChangeEvent case for resource AiModel

Json representation sample

We provide below the json representation of an example of a 'AiModelStateChangeEvent' notification event object


```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"AiModelStateChangeEvent",
    "event": {
      "aiModel" :
         {-- SEE AiModel RESOURCE SAMPLE --}
   }
}
```


Ai Model Delete Event

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Notification AiModelDeleteEvent case for resource AiModel

Json representation sample

We provide below the json representation of an example of a 'AiModelDeleteEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"AiModelDeleteEvent",
    "event": {
      "aiModel" :
         {-- SEE AiModel RESOURCE SAMPLE --}
   }
}
```

Ai Model Specification Create Event

Notification AiModelSpecificationCreateEvent case for resource AiModelSpecification

Json representation sample

We provide below the json representation of an example of a 'AiModelSpecificationCreateEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"AiModelSpecificationCreateEvent",
    "event": {
      "aiModelSpecification" :
         {-- SEE AiModelSpecification RESOURCE SAMPLE --}
   }
}
```

Ai Model Specification Delete Event

Notification AiModelSpecificationDeleteEvent case for resource AiModelSpecification

Json representation sample

We provide below the json representation of an example of a 'AiModelSpecificationDeleteEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"AiModelSpecificationDeleteEvent",
    "event": {
      "aiModelSpecification" :
         {-- SEE AiModelSpecification RESOURCE SAMPLE --}
```

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```
    }
}
```

Ai Model Specification Attribute Value Change Event

Notification AiModelSpecificationAttributeValueChangeEvent case for resource AiModelSpecification

Json representation sample

We provide below the json representation of an example of a 'AiModelSpecificationAttributeValueChangeEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"AiModelSpecificationAttributeValueChangeEvent",
    "event": {
      "aiModelSpecification" :
         {-- SEE AiModelSpecification RESOURCE SAMPLE --}
   }
}
```

Ai Contract Create Event

Notification AiContractCreateEvent case for resource AiContract

Json representation sample

We provide below the json representation of an example of a 'AiContractCreateEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"AiContractCreateEvent",
    "event": {
      "aiContract" :
         {-- SEE AiContract RESOURCE SAMPLE --}
   }
}
```

Ai Contract Attribute Value Change Event

Notification AiContractAttributeValueChangeEvent case for resource AiContract

Json representation sample

We provide below the json representation of an example of a 'AiContractAttributeValueChangeEvent' notification event object

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```
{
  "eventId":"00001",
  "eventTime":"2015-11-16T16:42:25-04:00",
  "eventType":"AiContractAttributeValueChangeEvent",
   "event": {
     "aiContract" :
        {-- SEE AiContract RESOURCE SAMPLE --}
  }
}
```

Ai Contract State Change Event

Notification AiContractStateChangeEvent case for resource AiContract

Json representation sample

We provide below the json representation of an example of a 'AiContractStateChangeEvent' notification event object

```
{
  "eventId":"00001",
  "eventTime":"2015-11-16T16:42:25-04:00",
  "eventType":"AiContractStateChangeEvent",
   "event": {
     "aiContract" :
        {-- SEE AiContract RESOURCE SAMPLE --}
  }
}
```

Ai Contract Delete Event

Notification AiContractDeleteEvent case for resource AiContract

Json representation sample

We provide below the json representation of an example of a 'AiContractDeleteEvent' notification event object

```
{
  "eventId":"00001",
  "eventTime":"2015-11-16T16:42:25-04:00",
  "eventType":"AiContractDeleteEvent",
   "event": {
     "aiContract" :
        {-- SEE AiContract RESOURCE SAMPLE --}
  }
}
```

Ai Contract Violation Create Event

Notification AiContractViolationCreateEvent case for resource AiContractViolation

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Json representation sample

We provide below the json representation of an example of a 'AiContractViolationCreateEvent' notification event object

```
{
  "eventId":"00001",
  "eventTime":"2015-11-16T16:42:25-04:00",
  "eventType":"AiContractViolationCreateEvent",
   "event": {
     "aiContractViolation" :
       {-- SEE AiContractViolation RESOURCE SAMPLE --}
  }
}
```

Ai Contract Violation Attribute Value Change Event

Notification AiContractViolationAttributeValueChangeEvent case for resource AiContractViolation

Json representation sample

We provide below the json representation of an example of a 'AiContractViolationAttributeValueChangeEvent' notification event object

```
{
  "eventId":"00001",
  "eventTime":"2015-11-16T16:42:25-04:00",
  "eventType":"AiContractViolationAttributeValueChangeEvent",
   "event": {
     "aiContractViolation" :
       {-- SEE AiContractViolation RESOURCE SAMPLE --}
  }
}
```

Ai Contract Violation Delete Event

Notification AiContractViolationDeleteEvent case for resource AiContractViolation

Json representation sample

We provide below the json representation of an example of a 'AiContractViolationDeleteEvent' notification event object

```
{
  "eventId":"00001",
  "eventTime":"2015-11-16T16:42:25-04:00",
  "eventType":"AiContractViolationDeleteEvent",
   "event": {
     "aiContractViolation" :
       {-- SEE AiContractViolation RESOURCE SAMPLE --}
  }
```

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```
}
```

Alarm Create Event

Notification AlarmCreateEvent case for resource Alarm

Json representation sample

We provide below the json representation of an example of a 'AlarmCreateEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"AlarmCreateEvent",
    "event": {
      "alarm" :
         {-- SEE Alarm RESOURCE SAMPLE --}
   }
}
```

Alarm Attribute Value Change Event

Notification AlarmAttributeValueChangeEvent case for resource Alarm

Json representation sample

We provide below the json representation of an example of a 'AlarmAttributeValueChangeEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"AlarmAttributeValueChangeEvent",
    "event": {
      "alarm" :
         {-- SEE Alarm RESOURCE SAMPLE --}
   }
}
```

Alarm State Change Event

Notification AlarmStateChangeEvent case for resource Alarm

Json representation sample

We provide below the json representation of an example of a 'AlarmStateChangeEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
```

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```
  "eventType":"AlarmStateChangeEvent",
   "event": {
     "alarm" :
        {-- SEE Alarm RESOURCE SAMPLE --}
   }
}
```

Alarm Delete Event

Notification AlarmDeleteEvent case for resource Alarm

Json representation sample

We provide below the json representation of an example of a 'AlarmDeleteEvent' notification event object

```
{
  "eventId":"00001",
  "eventTime":"2015-11-16T16:42:25-04:00",
  "eventType":"AlarmDeleteEvent",
   "event": {
     "alarm" :
        {-- SEE Alarm RESOURCE SAMPLE --}
   }
}
```

Rule Create Event

Notification RuleCreateEvent case for resource Rule

Json representation sample

We provide below the json representation of an example of a 'RuleCreateEvent' notification event object

```
{
  "eventId":"00001",
  "eventTime":"2015-11-16T16:42:25-04:00",
  "eventType":"RuleCreateEvent",
   "event": {
     "rule" :
        {-- SEE Rule RESOURCE SAMPLE --}
   }
}
```

Rule Attribute Value Change Event

Notification RuleAttributeValueChangeEvent case for resource Rule

Json representation sample

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We provide below the json representation of an example of a 'RuleAttributeValueChangeEvent' notification event object


```
{
  "eventId":"00001",
  "eventTime":"2015-11-16T16:42:25-04:00",
  "eventType":"RuleAttributeValueChangeEvent",
   "event": {
     "rule" :
        {-- SEE Rule RESOURCE SAMPLE --}
  }
}
```


Rule State Change Event

Notification RuleStateChangeEvent case for resource Rule

Json representation sample

We provide below the json representation of an example of a 'RuleStateChangeEvent' notification event object


```
{
  "eventId":"00001",
  "eventTime":"2015-11-16T16:42:25-04:00",
  "eventType":"RuleStateChangeEvent",
   "event": {
     "rule" :
        {-- SEE Rule RESOURCE SAMPLE --}
  }
}
```


Rule Delete Event

Notification RuleDeleteEvent case for resource Rule

Json representation sample

We provide below the json representation of an example of a 'RuleDeleteEvent' notification event object


```
{
  "eventId":"00001",
  "eventTime":"2015-11-16T16:42:25-04:00",
  "eventType":"RuleDeleteEvent",
   "event": {
     "rule" :
        {-- SEE Rule RESOURCE SAMPLE --}
  }
}
```


Event Create Event

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Notification EventCreateEvent case for resource Event

Json representation sample

We provide below the json representation of an example of a 'EventCreateEvent' notification event object


```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"EventCreateEvent",
    "event": {
      "event" :
         {-- SEE Event RESOURCE SAMPLE --}
   }
}
```


Monitor Create Event

Notification MonitorCreateEvent case for resource Monitor

Json representation sample

We provide below the json representation of an example of a 'MonitorCreateEvent' notification event object


```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"MonitorCreateEvent",
    "event": {
      "monitor" :
         {-- SEE Monitor RESOURCE SAMPLE --}
   }
}
```


Monitor Attribute Value Change Event

Notification MonitorAttributeValueChangeEvent case for resource Monitor

Json representation sample

We provide below the json representation of an example of a 'MonitorAttributeValueChangeEvent' notification event object


```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"MonitorAttributeValueChangeEvent",
    "event": {
      "monitor" :
         {-- SEE Monitor RESOURCE SAMPLE --}
   }
```


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```
}
```

Monitor State Change Event

Notification MonitorStateChangeEvent case for resource Monitor

Json representation sample

We provide below the json representation of an example of a 'MonitorStateChangeEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"MonitorStateChangeEvent",
    "event": {
      "monitor" :
         {-- SEE Monitor RESOURCE SAMPLE --}
   }
}
```

Monitor Delete Event

Notification MonitorDeleteEvent case for resource Monitor

Json representation sample

We provide below the json representation of an example of a 'MonitorDeleteEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"MonitorDeleteEvent",
    "event": {
      "monitor" :
         {-- SEE Monitor RESOURCE SAMPLE --}
   }
}
```

Topic Create Event

Notification TopicCreateEvent case for resource Topic

Json representation sample

We provide below the json representation of an example of a 'TopicCreateEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"TopicCreateEvent",
```

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```
    "event": {
      "topic" :
         {-- SEE Topic RESOURCE SAMPLE --}
    }
}
```

Topic Change Event

Notification TopicChangeEvent case for resource Topic

Json representation sample

We provide below the json representation of an example of a 'TopicChangeEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"TopicChangeEvent",
    "event": {
      "topic" :
         {-- SEE Topic RESOURCE SAMPLE --}
    }
}
```

Topic Delete Event

Notification TopicDeleteEvent case for resource Topic

Json representation sample

We provide below the json representation of an example of a 'TopicDeleteEvent' notification event object

```
{
   "eventId":"00001",
   "eventTime":"2015-11-16T16:42:25-04:00",
   "eventType":"TopicDeleteEvent",
    "event": {
      "topic" :
         {-- SEE Topic RESOURCE SAMPLE --}
    }
}
```

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API OPERATIONS

Remember the following Uniform Contract:

Operation on Entities	Uniform API Operation	Description
Query Entities	GET Resource	GET must be used to retrieve a representation of a resource.
Create Entity	POST Resource	POST must be used to create a new resource
Partial Update of an Entity	PATCH Resource	PATCH must be used to partially update a resource
Complete Update of an Entity	PUT Resource	PUT must be used to completely update a resource identified by its resource URI
Remove an Entity	DELETE Resource	DELETE must be used to remove a resource
Execute an Action on an Entity	POST on TASK Resource	POST must be used to execute Task Resources
Other Request Methods	POST on TASK Resource	GET and POST must not be used to tunnel other request methods.

Filtering and attribute selection rules are described in the TMF REST Design Guidelines.

Notifications are also described in a subsequent section.

Operations on Ai Contract Specification

List ai contract specifications

```
GET /aiContractSpecification?fields=...&{filtering}
```

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Description

This operation list ai contract specification entities.
Attribute selection is enabled for all first level attributes.
Filtering may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving AiContractSpecification resources.

Request

```
GET /tmf-api/AiM/v4/aiContractSpecification
Accept: application/json
```

Response

```
200

[
{
   "href": "https://tmforum.com/tmf-api/AIManagment/v4/aiContractSpecification/2435",
   "id": "2435",
   "description": "This an AI Management Contract Specification",
   "lastUpdate": "2020-07-31T00:00:00.000Z",
   "lifecycleStatus": "Active",
   "name": "AI Management Contract Specification for PCP",
   "version": "1.0",
   "validFor": {
      "startDateTime": "2020-01-05T12:00:56.982Z",
      "endDateTime": "9999-12-31T23:59:59.999Z"
   }
}
]
```

Retrieve ai contract specification

GET /aiContractSpecification/{id}?fields=...&{filtering}

Description

This operation retrieves an ai contract specification entity.
Attribute selection is enabled for all first level attributes.
Filtering on sub-resources may be available depending on the compliance level supported by an implementation.

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Usage Samples

Here's an example of a request for retrieving a AiContractSpecification resource.

Request
GET /tmf-api/AiM/v4/aiContractSpecification/2435 Accept: application/json
Response

200
 	
{
"href": "https://tmforum.com/tmf-api/AIManagment/v4/aiContractSpecification/2435",
"id": "2435",
"description": "This an AI Management Contract Specification",
"lastUpdate": "2020-07-31T00:00:00.000Z",
"lifecycleStatus": "Active",
"name": "AI Management Contract Specification for PCP",
"version": "1.0",
"validFor": {
"startDateTime": "2020-01-05T12:00:56.982Z",
"endDateTime": "9999-12-31T23:59:59.999Z"
}
}

Create ai contract specification

`POST /aiContractSpecification`

Description

This operation creates an ai contract specification entity.

Mandatory and Non Mandatory Attributes

The following tables provide the list of mandatory and non mandatory attributes when creating a AiContractSpecification, including any possible rule conditions and applicable default values. Notice that it is up to an implementer to add additional mandatory attributes.

Mandatory Attributes	Rule
name	

Non Mandatory Attributes	Rule
description	
isBundle	

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lastUpdate	
lifecycleStatus	
version	
@baseType	
@schemaLocation	
@type	
attachment	
constraint	
entitySpecRelationship	
relatedParty	
specCharacteristic	
targetEntitySchema	
validFor	

Additional Rules

The following table provides additional rules indicating mandatory fields in sub-resources or relationships when creating a AiContractSpecification resource.

Context	Mandatory Sub-Attributes
entitySpecRelationship	relationshipType

Usage Samples

Here's an example of a request for creating a AiContractSpecification resource. In this example the request only passes mandatory attributes.

Request

```
POST /tmf-api/AiM/v4/aiContractSpecification
Content-Type: application/json

{
   "name": "AI Management Contract Specification for PCP"
}
```

Response

```
201

{
   "href": "https://tmforum.com/tmf-api/AIManagment/v4/aiContractSpecification/2435",
   "id": "2435",
   "name": "AI Management Contract Specification for PCP"
}
```

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Patch ai contract specification

PATCH /aiContractSpecification/{id}

Description

This operation allows partial updates of an ai contract specification entity. Support of json/merge (https://tools.ietf.org/html/rfc7386) is mandatory, support of json/patch (http://tools.ietf.org/html/rfc5789) is optional.

Note: If the update operation yields to the creation of sub-resources or relationships, the same rules concerning mandatory sub-resource attributes and default value settings in the POST operation applies to the PATCH operation. Hence these tables are not repeated here.

Patchable and Non Patchable Attributes

The tables below provide the list of patchable and non patchable attributes, including constraint rules on their usage.

Patchable Attributes	Rule
description	
isBundle	
lifecycleStatus	
name	
version	
@baseType	
@schemaLocation	
@type	
attachment	
constraint	
entitySpecRelationship	
relatedParty	
specCharacteristic	
targetEntitySchema	
validFor	

Non Patchable Attributes	Rule
id	
href	
lastUpdate	

Usage Samples

Here's an example of a request for patching a AiContractSpecification resource.

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Request

```
PATCH /tmf-api/AiM/v4/aiContractSpecification/2435
Content-Type: application/merge-patch+json

{
   "name": "new name"
}
```

Response

```
200

{
   "href": "https://tmforum.com/tmf-api/AIManagment/v4/aiContractSpecification/2435",
   "id": "2435",
   "description": "This an AI Management Contract Specification",
   "lastUpdate": "2020-07-31T00:00:00.000Z",
   "lifecycleStatus": "Active",
   "name": "new name",
   "version": "1.0",
   "validFor": {
      "startDateTime": "2020-01-05T12:00:56.982Z",
      "endDateTime": "9999-12-31T23:59:59.999Z"
   }
}
```

Delete ai contract specification

`DELETE /aiContractSpecification/{id}`

Description

This operation deletes an ai contract specification entity.

Usage Samples

Here's an example of a request for deleting a AiContractSpecification resource.

Request

```
DELETE /tmf-api/AiM/v4/aiContractSpecification/42
```

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Response
204

Operations on Ai Model

List ai models

GET /aiModel?fields=...&{filtering}

Description

This operation list ai model entities.
Attribute selection is enabled for all first level attributes.
Filtering may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving AiModel resources.

Request
GET /tmf-api/AiM/v4/aiModel Accept: application/json

Response

200
 	
[
{
"id": "5351",
"href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351",
"serviceType": "AI PCP",
"@type": "AIModel",
"name": "PCP AI Model serial 1355615",
"description": "Instantiation of a a PCP AI Service Model",
"state": "active",
"category": "CFS",
"startDate": "2018-01-15T12:26:11.747Z",
"serviceSpecification": {
"@type": "ServiceSpecification",
"id": "1212",
"href": "https://mycsp.com:8080/tmf-

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```
api/serviceCatalogManagement/v4/serviceSpecification/PCPAIModelAsAServiceSpecification",
      "name": "PCPAIModelAsAServiceSpecification",
      "version": "1.0.0",
      "@referredType": "AIModelSpecification"
    },
    "relatedEntity": [
      {
        "@type": "EntityRef",
        "id": "1212",
        "href": "https://mycsp.com:8080/tmf-api/entityInventory/v4/entity/PCPMonitor42",
        "name": "PCP Types",
        "@referredType": "PCPMonitor",
        "role": "PCP Monitor"
      },
      {
        "@type": "EntityRef",
        "id": "1212",
        "href": "https://mycsp.com:8080/tmf-api/entityInventory/v4/entity/ConnectorMonitor42",
        "name": "Connector Types ",
        "@referredType": "ConnectorMonitor",
        "role": "Connector Monitor"
      }
    ],
    "serviceCharacteristic": [
      {
        "name": "trainedPCPTypes",
        "valueType": "StringArray",
        "value": [
          "Type_1",
          "Type_2",
          "Type_3",
          "Type_4"
        ]
      },
      {
        "name": "trainedConnectorTypes",
        "valueType": "StringArray",
        "value": [
          "CType_1",
          "CType_2",
          "CType_3",
          "CType_4"
        ]
      }
    ],
    "software": [
      {
        "href": "https://mycsp.com:8080/tmf-api/resourceInventory/v4/Software/tf.keras.optimizers",
        "id": " tf.keras.optimizers",
        "softwareVersion": "v2.2.0",
        "@type": "SoftwareRef",
        "@referredType": "Software"
      }
    ],
    "gpu": {
```


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```
      "href": "https://mycsp.com:8080/tmf-api/resourceInventory/v4/GPU/5645",
      "id": "5645",
      "@type": "PhysicalResourceRef",
      "@referredType": "GPU"
    },
    "relatedParty": [
      {
        "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/party/456",
        "id": "456",
        "name": "John Doe",
        "role": "user",
        "@referredType": "Individual"
      }
    ],
    "place": [
      {
        "href": "https://mycsp.com:8080/tmf-api/geographicAddressManagement/v4/geographicAddress/2435",
        "id": "2435",
        "name": "Model primary location",
        "@referredType": "GeographicAddress",
        "role": "InstallationAddress"
      }
    ],
    "note": [
      {
        "author": "Harvey Poupon",
        "date": "2018-01-15T12:26:11.748Z",
        "text": "This AIModel was installed automatically, no issues were noted in testing."
      }
    ],
    "@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/AIModel.schema.json"
}
]
```


Retrieve ai model

`GET /aiModel/{id}?fields=...&{filtering}`

Description

This operation retrieves an ai model entity.
Attribute selection is enabled for all first level attributes.
Filtering on sub-resources may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving a AiModel resource.

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Request

GET /tmf-api/AiM/v4/aiModel/5351
Accept: application/json

Response

200


```
{
  "id": "5351",
  "href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351",
  "serviceType": "AI PCP",
  "@type": "AIModel",
  "name": "PCP  AI Model serial 1355615",
  "description": "Instantiation of a a PCP AI Service Model",
  "state": "active",
  "category": "CFS",
  "startDate": "2018-01-15T12:26:11.747Z",
  "serviceSpecification": {
    "@type": "ServiceSpecification",
    "id": "1212",
    "href": "https://mycsp.com:8080/tmf-
api/serviceCatalogManagement/v4/serviceSpecification/PCPAIModelAsAServiceSpecification",
    "name": "PCPAIModelAsAServiceSpecification",
    "version": "1.0.0",
    "@referredType": "AIModelSpecification"
  },
  "relatedEntity": [
    {
      "@type": "EntityRef",
      "id": "1212",
      "href": "https://mycsp.com:8080/tmf-api/entityInventory/v4/entity/PCPMonitor42",
      "name": "PCP Types",
      "@referredType": "PCPMonitor",
      "role": "PCP Monitor"
    },
    {
      "@type": "EntityRef",
      "id": "1212",
      "href": "https://mycsp.com:8080/tmf-api/entityInventory/v4/entity/ConnectorMonitor42",
      "name": "Connector Types ",
      "@referredType": "ConnectorMonitor",
      "role": "Connector Monitor"
    }
  ],
  "serviceCharacteristic": [
    {
      "name": "trainedPCPTypes",
      "valueType": "StringArray",
      "value": [
```


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```
          "Type_1",
          "Type_2",
          "Type_3",
          "Type_4"
        ]
      },
      {
        "name": "trainedConnectorTypes",
        "valueType": "StringArray",
        "value": [
          "CType_1",
          "CType_2",
          "CType_3",
          "CType_4"
        ]
      }
    ],
    "software": [
      {
        "href": "https://mycsp.com:8080/tmf-api/resourceInventory/v4/Software/tf.keras.optimizers",
        "id": " tf.keras.optimizers",
        "softwareVersion": "v2.2.0",
        "@type": "SoftwareRef",
        "@referredType": "Software"
      }
    ],
    "gpu": {
      "href": "https://mycsp.com:8080/tmf-api/resourceInventory/v4/GPU/5645",
      "id": "5645",
      "@type": "PhysicalResourceRef",
      "@referredType": "GPU"
    },
    "relatedParty": [
      {
        "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/party/456",
        "id": "456",
        "name": "John Doe",
        "role": "user",
        "@referredType": "Individual"
      }
    ],
    "place": [
      {
        "href": "https://mycsp.com:8080/tmf-api/geographicAddressManagement/v4/geographicAddress/2435",
        "id": "2435",
        "name": "Model primary location",
        "@referredType": "GeographicAddress",
        "role": "InstallationAddress"
      }
    ],
    "note": [
      {
        "author": "Harvey Poupon",
        "date": "2018-01-15T12:26:11.748Z",
        "text": "This AIModel was installed automatically, no issues were noted in testing."
```


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```
      }
   ],
   "@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/AIModel.schema.json"
}
```

Create ai model

POST /aiModel

Description

This operation creates an ai model entity.

Mandatory and Non Mandatory Attributes

The following tables provide the list of mandatory and non mandatory attributes when creating a AiModel, including any possible rule conditions and applicable default values. Notice that it is up to an implementer to add additional mandatory attributes.

Mandatory Attributes	Rule
state	
aiModelSpecification	
software	

Non Mandatory Attributes	Rule
category	
description	
endDate	
hasStarted	
isBundle	
isServiceEnabled	
isStateful	
name	
serviceDate	
serviceType	
startDate	
startMode	
@baseType	
@schemaLocation	
@type	
gpu	
trainingData	
feature	
note	
place	
relatedEntity	
relatedParty	

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serviceCharacteristic	
serviceOrderItem	
serviceRelationship	
serviceSpecification	
supportingResource	
supportingService	

Usage Samples

Here's an example of a request for creating a AiModel resource. In this example the request only passes mandatory attributes.

Request

```
POST /tmf-api/AiM/v4/aiModel
Content-Type: application/json

{
  "state": "active",
  "software": [
    {
      "href": "https://mycsp.com:8080/tmf-api/resourceInventory/v4/Software/tf.keras.optimizers",
      "id": " tf.keras.optimizers",
      "softwareVersion": "v2.2.0",
      "@type": "SoftwareRef",
      "@referredType": "Software"
    }
  ]
}
```

Response

```
201

{
  "id": "5351",
  "href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351",
  "state": "active",
  "software": [
    {
      "href": "https://mycsp.com:8080/tmf-api/resourceInventory/v4/Software/tf.keras.optimizers",
      "id": " tf.keras.optimizers",
      "softwareVersion": "v2.2.0",
      "@type": "SoftwareRef",
      "@referredType": "Software"
    }
  ]
}
```

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Patch ai model

PATCH /aiModel/{id}

Description

This operation allows partial updates of an ai model entity. Support of json/merge (https://tools.ietf.org/html/rfc7386) is mandatory, support of json/patch (http://tools.ietf.org/html/rfc5789) is optional.

Note: If the update operation yields to the creation of sub-resources or relationships, the same rules concerning mandatory sub-resource attributes and default value settings in the POST operation applies to the PATCH operation. Hence these tables are not repeated here.

Patchable and Non Patchable Attributes

The tables below provide the list of patchable and non patchable attributes, including constraint rules on their usage.

Patchable Attributes	Rule
category	
description	
endDate	
hasStarted	
isBundle	
isServiceEnabled	
isStateful	
name	
serviceType	
startDate	
startMode	
@baseType	
@schemaLocation	
@type	
aiModelSpecification	
gpu	
software	
trainingData	
feature	
note	
place	
relatedEntity	
relatedParty	
serviceCharacteristic	
serviceOrderItem	
serviceRelationship	
serviceSpecification	
state	

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supportingResource	
supportingService	

Non Patchable Attributes	Rule
id	
href	
serviceDate	

Usage Samples

Here's an example of a request for patching a AiModel resource.

Request

```
PATCH /tmf-api/AiM/v4/aiModel/5351
Content-Type: application/merge-patch+json

{
   "name": "new name"
}
```

Response

```
200

{
   "id": "5351",
   "href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351",
   "serviceType": "AI PCP",
   "@type": "AIModel",
   "name": "new name",
   "description": "Instantiation of a a PCP AI Service Model",
   "state": "active",
   "category": "CFS",
   "startDate": "2018-01-15T12:26:11.747Z",
   "serviceSpecification": {
      "@type": "ServiceSpecification",
      "id": "1212",
      "href": "https://mycsp.com:8080/tmf-
api/serviceCatalogManagement/v4/serviceSpecification/PCPAIModelAsAServiceSpecification",
      "name": "PCPAIModelAsAServiceSpecification",
      "version": "1.0.0",
      "@referredType": "AIModelSpecification"
   },
   "relatedEntity": [
      {
         "@type": "EntityRef",
         "id": "1212",
```

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```
      "href": "https://mycsp.com:8080/tmf-api/entityInventory/v4/entity/PCPMonitor42",
      "name": "PCP Types",
      "@referredType": "PCPMonitor",
      "role": "PCP Monitor"
    },
    {
      "@type": "EntityRef",
      "id": "1212",
      "href": "https://mycsp.com:8080/tmf-api/entityInventory/v4/entity/ConnectorMonitor42",
      "name": "Connector Types ",
      "@referredType": "ConnectorMonitor",
      "role": "Connector Monitor"
    }
  ],
  "serviceCharacteristic": [
    {
      "name": "trainedPCPTypes",
      "valueType": "StringArray",
      "value": [
        "Type_1",
        "Type_2",
        "Type_3",
        "Type_4"
      ]
    },
    {
      "name": "trainedConnectorTypes",
      "valueType": "StringArray",
      "value": [
        "CType_1",
        "CType_2",
        "CType_3",
        "CType_4"
      ]
    }
  ],
  "software": [
    {
      "href": "https://mycsp.com:8080/tmf-api/resourceInventory/v4/Software/tf.keras.optimizers",
      "id": " tf.keras.optimizers",
      "softwareVersion": "v2.2.0",
      "@type": "SoftwareRef",
      "@referredType": "Software"
    }
  ],
  "gpu": {
    "href": "https://mycsp.com:8080/tmf-api/resourceInventory/v4/GPU/5645",
    "id": "5645",
    "@type": "PhysicalResourceRef",
    "@referredType": "GPU"
  },
  "relatedParty": [
    {
      "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/party/456",
      "id": "456",
```


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```
        "name": "John Doe",
        "role": "user",
        "@referredType": "Individual"
      }
    ],
    "place": [
      {
        "href": "https://mycsp.com:8080/tmf-api/geographicAddressManagement/v4/geographicAddress/2435",
        "id": "2435",
        "name": "Model primary location",
        "@referredType": "GeographicAddress",
        "role": "InstallationAddress"
      }
    ],
    "note": [
      {
        "author": "Harvey Poupon",
        "date": "2018-01-15T12:26:11.748Z",
        "text": "This AIModel was installed automatically, no issues were noted in testing."
      }
    ],
    "@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/AIModel.schema.json"
}
```


Delete ai model

`DELETE /aiModel/{id}`

Description

This operation deletes an ai model entity.

Usage Samples

Here's an example of a request for deleting a AiModel resource.

Request
DELETE /tmf-api/AiM/v4/aiModel/42
Response
204

Operations on Ai Model Specification

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List ai model specifications

GET /aiModelSpecification?fields=...&{filtering}

Description

This operation list ai model specification entities.
Attribute selection is enabled for all first level attributes.
Filtering may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving AiModelSpecification resources.

Request

```
GET /tmf-api/AiM/v4/aiModelSpecification
Accept: application/json
```

Response

```
200

[
{
  "id": "7655",
  "href": "https://mycsp.com:8080/tmf-
api/serviceCatalogManagement/v4/serviceSpecification/PCPAIModelAsAServiceSpecification",
  "@type": "AIModelSpecification",
  "name": "PCP AIModelAsAService Specification",
  "description": "This service specification describes an AI Model as a Service.",
  "version": "2.1",
  "validFor": {
    "startDateTime": "2017-08-23T00:00",
    "endDateTime": "2018-03-25T00:00"
  },
  "lastUpdate": "2017-08-27T00:00:00.000Z",
  "lifecycleStatus": "Active",
  "isBundle": false,
  "modelSpecificationHistory": {
    "description": "Model development history and model specification as preserved in a model repository",
    "url": "http://link.to.mlflow.server/#/models/pcpsegmentation/versions/1"
  },
  "inheritedModel": {
    "description": "Reference to the exact model that was used, via transfer learning, to create this model",
    "url": "https://link.to.model.repo/modelID=14272.3.1"
  },
  "modelTrainingData": {
```

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```
      "description": "A link to a repository where the data used to train the model is preserved",
      "url": "https://link.to.data.repo/minio/trainingdata/dataID=325215.1"
    },
    "modelEvaluationData": {
      "description": "A link to a repository where the data used to evaluate the model is preserved",
      "url": "https://link.to.data.repo/minio/trainingdata/dataID=191215.1"
    },
    "modelDataSheet": {
      "description": "Link to a digital document that provide a top level description of this model",
      "url": "https://mycsp.com:7070/docloader?docnum=3534536",
      "mimeType": "application/vnd.ms-excel"
    },
    "deploymentRecord": {
      "description": "Link to a digital document that preserves the deployment approval for this model",
      "url": "https://link.to.model.repo/deploymentRecordID=57432.1"
    },
    "modelContractVersionHistory": {
      "description": "Link to the model contract for this model, including past versions",
      "url": "https://gitlab.server/modelcontracts/57432/blob/master/contract"
    },
    "serviceSpecCharacteristic": [
      {
        "name": "trainedPCPTypes",
        "description": "The model uses knowledge of the geometry of different PCP types to mask the image and focus on
the internals of the PCP",
        "valueType": "object",
        "configurable": false,
        "validFor": {
          "startDateTime": "2017-08-12T00:00",
          "endDateTime": "2018-03-07T00:00"
        },
        "minCardinality": 0,
        "maxCardinality": 1,
        "isUnique": true,
        "regex": "",
        "extensible": false,
        "serviceSpecCharacteristicValue": [
          {
            "valueType": "StringArray",
            "isDefault": false,
            "value": [
              "Type_1",
              "Type_2",
              "Type_3",
              "Type_4"
            ],
            "validFor": {
              "startDateTime": "2017-08-06T00:00",
              "endDateTime": "2018-03-07T00:00"
            }
          }
        ]
      },
      {
        "name": "trainedConnectorTypes",
```


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```
        "description": "ConnectorType parameters for this resource facing service spec ",
        "valueType": "object",
        "configurable": true,
        "validFor": {
          "startDateTime": "2017-08-17T00:00",
          "endDateTime": "2018-03-12T00:00"
        },
        "minCardinality": 0,
        "maxCardinality": 1,
        "isUnique": true,
        "regex": "",
        "extensible": true,
        "serviceSpecCharacteristicValue": [
          {
            "valueType": "StringArray",
            "isDefault": false,
            "value": [
              "CType_1",
              "CType_2",
              "CType_3",
              "CType_4"
            ],
            "validFor": {
              "startDateTime": "2017-08-06T00:00",
              "endDateTime": "2018-03-07T00:00"
            }
          }
        ]
      }
    ],
    "relatedParty": [
      {
        "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/organization/3643",
        "id": "3643",
        "name": "Firewall Express",
        "role": "Supplier"
      }
    ],
    "targetServiceSchema": {
      "@type": "AIModel",
      "@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/AIM/AIModel.schema.json"
    },
    "@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/AIM/AIModelSpecification.schema.json",
    "@baseType": "ServiceSpecification"
}
]
```


Retrieve ai model specification

`GET /aiModelSpecification/{id}?fields=...&{filtering}`

Description

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This operation retrieves an ai model specification entity.
Attribute selection is enabled for all first level attributes.
Filtering on sub-resources may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving a AiModelSpecification resource.

Request

```
GET /tmf-api/AiM/v4/aiModelSpecification/7655
Accept: application/json
```

Response

```
200

{
  "id": "7655",
  "href": "https://mycsp.com:8080/tmf-
api/serviceCatalogManagement/v4/serviceSpecification/PCPAIModelAsAServiceSpecification",
  "@type": "AIModelSpecification",
  "name": "PCP AIModelAsAService Specification",
  "description": "This service specification describes an AI Model as a Service.",
  "version": "2.1",
  "validFor": {
    "startDateTime": "2017-08-23T00:00",
    "endDateTime": "2018-03-25T00:00"
  },
  "lastUpdate": "2017-08-27T00:00:00.000Z",
  "lifecycleStatus": "Active",
  "isBundle": false,
  "modelSpecificationHistory": {
    "description": "Model development history and model specification as preserved in a model repository",
    "url": "http://link.to.mlflow.server/#/models/pcpsegmentation/versions/1"
  },
  "inheritedModel": {
    "description": "Reference to the exact model that was used, via transfer learning, to create this model",
    "url": "https://link.to.model.repo/modelID=14272.3.1"
  },
  "modelTrainingData": {
    "description": "A link to a repository where the data used to train the model is preserved",
    "url": "https://link.to.data.repo/minio/trainingdata/dataID=325215.1"
  },
  "modelEvaluationData": {
    "description": "A link to a repository where the data used to evaluate the model is preserved",
    "url": "https://link.to.data.repo/minio/trainingdata/dataID=191215.1"
  },
```

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```
  "modelDataSheet": {
    "description": "Link to a digital document that provide a top level description of this model",
    "url": "https://mycsp.com:7070/docloader?docnum=3534536",
    "mimeType": "application/vnd.ms-excel"
  },
  "deploymentRecord": {
    "description": "Link to a digital document that preserves the deployment approval for this model",
    "url": "https://link.to.model.repo/deploymentRecordID=57432.1"
  },
  "modelContractVersionHistory": {
    "description": "Link to the model contract for this model, including past versions",
    "url": "https://gitlab.server/modelcontracts/57432/blob/master/contract"
  },
  "serviceSpecCharacteristic": [
    {
      "name": "trainedPCPTypes",
      "description": "The model uses knowledge of the geometry of different PCP types to mask the image and focus on
the internals of the PCP",
      "valueType": "object",
      "configurable": false,
      "validFor": {
        "startDateTime": "2017-08-12T00:00",
        "endDateTime": "2018-03-07T00:00"
      },
      "minCardinality": 0,
      "maxCardinality": 1,
      "isUnique": true,
      "regex": "",
      "extensible": false,
      "serviceSpecCharacteristicValue": [
        {
          "valueType": "StringArray",
          "isDefault": false,
          "value": [
            "Type_1",
            "Type_2",
            "Type_3",
            "Type_4"
          ],
          "validFor": {
            "startDateTime": "2017-08-06T00:00",
            "endDateTime": "2018-03-07T00:00"
          }
        }
      ]
    },
    {
      "name": "trainedConnectorTypes",
      "description": "ConnectorType parameters for this resource facing service spec ",
      "valueType": "object",
      "configurable": true,
      "validFor": {
        "startDateTime": "2017-08-17T00:00",
        "endDateTime": "2018-03-12T00:00"
      },
```


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```
        "minCardinality": 0,
        "maxCardinality": 1,
        "isUnique": true,
        "regex": "",
        "extensible": true,
        "serviceSpecCharacteristicValue": [
          {
            "valueType": "StringArray",
            "isDefault": false,
            "value": [
              "CType_1",
              "CType_2",
              "CType_3",
              "CType_4"
            ],
            "validFor": {
              "startDateTime": "2017-08-06T00:00",
              "endDateTime": "2018-03-07T00:00"
            }
          }
        ]
      }
    ],
    "relatedParty": [
      {
        "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/organization/3643",
        "id": "3643",
        "name": "Firewall Express",
        "role": "Supplier"
      }
    ],
    "targetServiceSchema": {
      "@type": "AIModel",
      "@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/AIM/AIModel.schema.json"
    },
    "@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/AIM/AIModelSpecification.schema.json",
    "@baseType": "ServiceSpecification"
}
```


Create ai model specification

`POST /aiModelSpecification`

Description

This operation creates an ai model specification entity.

Mandatory and Non Mandatory Attributes

The following tables provide the list of mandatory and non mandatory attributes when creating a AiModelSpecification, including any possible rule conditions and applicable default values. Notice that it is up to an implementer to add additional mandatory attributes.

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Mandatory Attributes	Rule
name	

Non Mandatory Attributes	Rule
description	
isBundle	
lastUpdate	
lifecycleStatus	
version	
@baseType	
@schemaLocation	
@type	
deploymentRecord	
inheritedModel	
modelContractVersionHistory	
modelDataSheet	
modelEvaluationData	
modelSpecificationHistory	
modelTrainingData	
featureSpecification	
resourceSpecification	
serviceLevelSpecification	
serviceSpecRelationship	
attachment	
constraint	
entitySpecRelationship	
relatedParty	
specCharacteristic	
targetEntitySchema	
validFor	

Additional Rules

The following table provides additional rules indicating mandatory fields in sub-resources or relationships when creating a AiModelSpecification resource.

Context	Mandatory Sub-Attributes
entitySpecRelationship	relationshipType

Usage Samples

Here's an example of a request for creating a AiModelSpecification resource. In this example the request only passes mandatory attributes.

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Request

POST /tmf-api/AiM/v4/aiModelSpecification
Content-Type: application/json
 	
{
"name": "PCP AIModelAsAService Specification"
}

Response

201
 	
{
"id": "7655",
"href": "https://mycsp.com:8080/tmf-api/serviceCatalogManagement/v4/serviceSpecification/PCPAIModelAsAServiceSpecification",
"name": "PCP AIModelAsAService Specification"
}

Patch ai model specification

PATCH /aiModelSpecification/{id}

Description

This operation allows partial updates of an ai model specification entity. Support of json/merge (https://tools.ietf.org/html/rfc7386) is mandatory, support of json/patch (http://tools.ietf.org/html/rfc5789) is optional.

Note: If the update operation yields to the creation of sub-resources or relationships, the same rules concerning mandatory sub-resource attributes and default value settings in the POST operation applies to the PATCH operation. Hence these tables are not repeated here.

Patchable and Non Patchable Attributes

The tables below provide the list of patchable and non patchable attributes, including constraint rules on their usage.

Patchable Attributes	Rule
description	
isBundle	
lifecycleStatus	
name	
version	
@baseType	

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@schemaLocation	
@type	
deploymentRecord	
inheritedModel	
modelContractVersionHistory	
modelDataSheet	
modelEvaluationData	
modelSpecificationHistory	
modelTrainingData	
featureSpecification	
resourceSpecification	
serviceLevelSpecification	
serviceSpecRelationship	
attachment	
constraint	
entitySpecRelationship	
relatedParty	
specCharacteristic	
targetEntitySchema	
validFor	

Non Patchable Attributes	Rule
id	
href	
lastUpdate	

Usage Samples

Here's an example of a request for patching a AiModelSpecification resource.

Request

```
PATCH /tmf-api/AiM/v4/aiModelSpecification/7655
Content-Type: application/merge-patch+json

{
   "name": "new name"
}
```

Response

```
200

{
   "id": "7655",
   "href": "https://mycsp.com:8080/tmf-
```

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```
api/serviceCatalogManagement/v4/serviceSpecification/PCPAIModelAsAServiceSpecification",
  "@type": "AIModelSpecification",
  "name": "new name",
  "description": "This service specification describes an AI Model as a Service.",
  "version": "2.1",
  "validFor": {
    "startDateTime": "2017-08-23T00:00",
    "endDateTime": "2018-03-25T00:00"
  },
  "lastUpdate": "2017-08-27T00:00:00.000Z",
  "lifecycleStatus": "Active",
  "isBundle": false,
  "modelSpecificationHistory": {
    "description": "Model development history and model specification as preserved in a model repository",
    "url": "http://link.to.mlflow.server/#/models/pcpsegmentation/versions/1"
  },
  "inheritedModel": {
    "description": "Reference to the exact model that was used, via transfer learning, to create this model",
    "url": "https://link.to.model.repo/modelID=14272.3.1"
  },
  "modelTrainingData": {
    "description": "A link to a repository where the data used to train the model is preserved",
    "url": "https://link.to.data.repo/minio/trainingdata/dataID=325215.1"
  },
  "modelEvaluationData": {
    "description": "A link to a repository where the data used to evaluate the model is preserved",
    "url": "https://link.to.data.repo/minio/trainingdata/dataID=191215.1"
  },
  "modelDataSheet": {
    "description": "Link to a digital document that provide a top level description of this model",
    "url": "https://mycsp.com:7070/docloader?docnum=3534536",
    "mimeType": "application/vnd.ms-excel"
  },
  "deploymentRecord": {
    "description": "Link to a digital document that preserves the deployment approval for this model",
    "url": "https://link.to.model.repo/deploymentRecordID=57432.1"
  },
  "modelContractVersionHistory": {
    "description": "Link to the model contract for this model, including past versions",
    "url": "https://gitlab.server/modelcontracts/57432/blob/master/contract"
  },
  "serviceSpecCharacteristic": [
    {
      "name": "trainedPCPTypes",
      "description": "The model uses knowledge of the geometry of different PCP types to mask the image and focus on
the internals of the PCP",
      "valueType": "object",
      "configurable": false,
      "validFor": {
        "startDateTime": "2017-08-12T00:00",
        "endDateTime": "2018-03-07T00:00"
      },
      "minCardinality": 0,
      "maxCardinality": 1,
      "isUnique": true,
```


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```
      "regex": "",
      "extensible": false,
      "serviceSpecCharacteristicValue": [
        {
          "valueType": "StringArray",
          "isDefault": false,
          "value": [
            "Type_1",
            "Type_2",
            "Type_3",
            "Type_4"
          ],
          "validFor": {
            "startDateTime": "2017-08-06T00:00",
            "endDateTime": "2018-03-07T00:00"
          }
        }
      ]
    },
    {
      "name": "trainedConnectorTypes",
      "description": "ConnectorType parameters for this resource facing service spec ",
      "valueType": "object",
      "configurable": true,
      "validFor": {
        "startDateTime": "2017-08-17T00:00",
        "endDateTime": "2018-03-12T00:00"
      },
      "minCardinality": 0,
      "maxCardinality": 1,
      "isUnique": true,
      "regex": "",
      "extensible": true,
      "serviceSpecCharacteristicValue": [
        {
          "valueType": "StringArray",
          "isDefault": false,
          "value": [
            "CType_1",
            "CType_2",
            "CType_3",
            "CType_4"
          ],
          "validFor": {
            "startDateTime": "2017-08-06T00:00",
            "endDateTime": "2018-03-07T00:00"
          }
        }
      ]
    }
  ],
  "relatedParty": [
    {
      "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/organization/3643",
      "id": "3643",
```


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```
        "name": "Firewall Express",
        "role": "Supplier"
      }
    ],
    "targetServiceSchema": {
      "@type": "AIModel",
      "@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/AIM/AIModel.schema.json"
    },
    "@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/AIM/AIModelSpecification.schema.json",
    "@baseType": "ServiceSpecification"
}
```


Delete ai model specification

`DELETE /aiModelSpecification/{id}`

Description

This operation deletes an ai model specification entity.

Usage Samples

Here's an example of a request for deleting a AiModelSpecification resource.

Request
DELETE /tmf-api/AiM/v4/aiModelSpecification/42
Response
204

Operations on Ai Contract

List ai contracts

`GET /aiContract?fields=...&{filtering}`

Description

This operation list ai contract entities.
Attribute selection is enabled for all first level attributes.
Filtering may be available depending on the compliance level supported by an implementation.

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Usage Samples

Here's an example of a request for retrieving AiContract resources.

Request

```
GET /tmf-api/AiM/v4/aiContract
Accept: application/json
```

Response

```
200

[
{
   "id": "5351",
   "href": "https://mycsp.com:8080/tmf-api/serviceInventory/v4/service/5351",
   "approvalDate": "2018-01-15T12:26:11.747Z",
   "approved": true,
   "description": "This  is an AI contract ",
   "state": "Active",
   "version": "1.0",
   "aiContractSpecification": {
      "href": "https://mycsp.com:8080/tmf-api/AIManagment/v4/aiContractSpecification/2435",
      "id": "2435"
   },
   "aiModelSpecification": {
      "href": "https://mycsp.com:8080/tmf-api/AIManagment/v4/aiModelSpecification/42",
      "id": "42",
      "@referredType": "AiModelSpecification"
   },
   "relatedParty": [
      {
         "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/organization/ACME",
         "id": "456",
         "name": "ACME",
         "role": "ContractOwner",
         "@referredType": "Organization"
      }
   ],
   "rule": [
      {
         "id": "ImageQuality-1920",
         "href": "http://api/thresholdRule/ImageQuality-1920",
         "@referredType": "SimpleThresholdRule"
      }
   ]
}
```

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```
]
```

Retrieve ai contract

GET /aiContract/{id}?fields=...&{filtering}

Description

This operation retrieves an ai contract entity.
Attribute selection is enabled for all first level attributes.
Filtering on sub-resources may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving a AiContract resource.

Request

```
GET /tmf-api/AiM/v4/aiContract/5351
Accept: application/json
```

Response

```
200

{
  "id": "5351",
  "href": "https://mycsp.com:8080/tmf-api/serviceInventory/v4/service/5351",
  "approvalDate": "2018-01-15T12:26:11.747Z",
  "approved": true,
  "description": "This  is an AI contract ",
  "state": "Active",
  "version": "1.0",
  "aiContractSpecification": {
    "href": "https://mycsp.com:8080/tmf-api/AIManagment/v4/aiContractSpecification/2435",
    "id": "2435"
  },
  "aiModelSpecification": {
    "href": "https://mycsp.com:8080/tmf-api/AIManagment/v4/aiModelSpecification/42",
    "id": "42",
    "@referredType": "AiModelSpecification"
  },
  "relatedParty": [
    {
      "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/organization/ACME",
      "id": "456",
      "name": "ACME",
```

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```
        "role": "ContractOwner",
        "@referredType": "Organization"
      }
    ],
    "rule": [
      {
        "id": "ImageQuality-1920",
        "href": "http://api/thresholdRule/ImageQuality-1920",
        "@referredType": "SimpleThresholdRule"
      }
    ]
}
```


Create ai contract

POST /aiContract

Description

This operation creates an ai contract entity.

Mandatory and Non Mandatory Attributes

The following tables provide the list of mandatory and non mandatory attributes when creating a AiContract, including any possible rule conditions and applicable default values. Notice that it is up to an implementer to add additional mandatory attributes.

Mandatory Attributes	Rule
state	
aiContractSpecification	
aiModelSpecification	
relatedParty.name	
relatedParty.role	
aiModel	

Non Mandatory Attributes	Rule
approvalDate	
approved	
description	
name	
version	
@baseType	
@schemaLocation	
@type	
characteristic	
relatedParty	
rule	
template	

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validFor	

Usage Samples

Here's an example of a request for creating a AiContract resource. In this example the request only passes mandatory attributes.

Request

```
POST /tmf-api/AiM/v4/aiContract
Content-Type: application/json

{
   "state": "Active",
   "aiContractSpecification": {
      "href": "https://mycsp.com:8080/tmf-api/AIManagment/v4/aiContractSpecification/2435",
      "id": "2435"
   },
   "aiModelSpecification": {
      "href": "https://mycsp.com:8080/tmf-api/AIManagment/v4/aiModelSpecification/42",
      "id": "42",
      "@referredType": "AiModelSpecification"
   }
}
```

Response

```
201

{
   "id": "5351",
   "href": "https://mycsp.com:8080/tmf-api/serviceInventory/v4/service/5351",
   "state": "Active",
   "aiContractSpecification": {
      "href": "https://mycsp.com:8080/tmf-api/AIManagment/v4/aiContractSpecification/2435",
      "id": "2435"
   },
   "aiModelSpecification": {
      "href": "https://mycsp.com:8080/tmf-api/AIManagment/v4/aiModelSpecification/42",
      "id": "42",
      "@referredType": "AiModelSpecification"
   }
}
```

Patch ai contract

`PATCH /aiContract/{id}`

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Description

This operation allows partial updates of an ai contract entity. Support of json/merge (https://tools.ietf.org/html/rfc7386) is mandatory, support of json/patch (http://tools.ietf.org/html/rfc5789) is optional.

Note: If the update operation yields to the creation of sub-resources or relationships, the same rules concerning mandatory sub-resource attributes and default value settings in the POST operation applies to the PATCH operation. Hence these tables are not repeated here.

Patchable and Non Patchable Attributes

The tables below provide the list of patchable and non patchable attributes, including constraint rules on their usage.

Patchable Attributes	Rule
approvalDate	
approved	
description	
name	
state	
version	
@baseType	
@schemaLocation	
@type	
aiContractSpecification	
aiModel	
characteristic	
relatedParty	
rule	
template	
validFor	

Non Patchable Attributes	Rule
id	
href	

Usage Samples

Here's an example of a request for patching a AiContract resource.

Request
PATCH /tmf-api/AiM/v4/aiContract/5351 Content-Type: application/merge-patch+json

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```
{
   "name": "new name"
}
```


Response


```
200

{
   "id": "5351",
   "href": "https://mycsp.com:8080/tmf-api/serviceInventory/v4/service/5351",
   "approvalDate": "2018-01-15T12:26:11.747Z",
   "approved": true,
   "description": "This  is an AI contract ",
   "state": "Active",
   "version": "1.0",
   "aiContractSpecification": {
      "href": "https://mycsp.com:8080/tmf-api/AIManagment/v4/aiContractSpecification/2435",
      "id": "2435"
   },
   "aiModelSpecification": {
      "href": "https://mycsp.com:8080/tmf-api/AIManagment/v4/aiModelSpecification/42",
      "id": "42",
      "@referredType": "AiModelSpecification"
   },
   "relatedParty": [
      {
         "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/organization/ACME",
         "id": "456",
         "name": "ACME",
         "role": "ContractOwner",
         "@referredType": "Organization"
      }
   ],
   "rule": [
      {
         "id": "ImageQuality-1920",
         "href": "http://api/thresholdRule/ImageQuality-1920",
         "@referredType": "SimpleThresholdRule"
      }
   ],
   "name": "new name"
}
```


Delete ai contract

`DELETE /aiContract/{id}`

Description

This operation deletes an ai contract entity.

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Usage Samples

Here's an example of a request for deleting a AiContract resource.

Request
DELETE /tmf-api/AiM/v4/aiContract/42
Response
204

Operations on Ai Contract Violation

List ai contract violations

```
GET /aiContractViolation?fields=...&{filtering}
```

Description

This operation list ai contract violation entities.
Attribute selection is enabled for all first level attributes.
Filtering may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving AiContractViolation resources.

Request
GET /tmf-api/AiM/v4/aiContractViolation Accept: application/json
Response
200 [{

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```
  "href": "https:/host:port/tmf-api/AIMAnagementAPI/v4/aiContractViolation/4242",
  "id": "4242",
  "aiContract": {
    "href": "http://tmf.com/AIMAnagement/aiContract/4242",
    "id": "4242"
  },
  "date": "2020-07-31T00:00:00.00Z",
  "relatedParty": [
    {
      "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/organization/3643",
      "id": "3643",
      "name": "BT",
      "role": "Supplier",
      "@referredType": "Organization"
    }
  ],
  "violation": {
    "unit": "percentage",
    "referenceValue": "10",
    "operator": "GT",
    "actualValue": "12",
    "comment": "Input image quality proportion % of usable image above limit.",
    "consequence": "Alarm",
    "rule": {
      "id": "42",
      "href": "http/tmf.com/AIManagement/rule/42",
      "@referredType": "ThresholdRule"
    }
  }
}
]
```


Retrieve ai contract violation

`GET /aiContractViolation/{id}?fields=...&{filtering}`

Description

This operation retrieves an ai contract violation entity.
Attribute selection is enabled for all first level attributes.
Filtering on sub-resources may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving a AiContractViolation resource.

Request

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GET /tmf-api/AiM/v4/aiContractViolation/4242
Accept: application/json

Response

200


```
{
   "href": "https:/host:port/tmf-api/AIMAnagementAPI/v4/aiContractViolation/4242",
   "id": "4242",
   "aiContract": {
      "href": "http://tmf.com/AIMAnagement/aiContract/4242",
      "id": "4242"
   },
   "date": "2020-07-31T00:00:00.00Z",
   "relatedParty": [
      {
         "href": "https://mycsp.com:8080/tmf-api/partyManagement/v4/organization/3643",
         "id": "3643",
         "name": "BT",
         "role": "Supplier",
         "@referredType": "Organization"
      }
   ],
   "violation": {
      "unit": "percentage",
      "referenceValue": "10",
      "operator": "GT",
      "actualValue": "12",
      "comment": "Input image quality proportion % of usable image above limit.",
      "consequence": "Alarm",
      "rule": {
         "id": "42",
         "href": "http/tmf.com/AIManagement/rule/42",
         "@referredType": "ThresholdRule"
      }
   }
}
```


Create ai contract violation

`POST /aiContractViolation`

Description

This operation creates an ai contract violation entity.

Mandatory and Non Mandatory Attributes

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The following tables provide the list of mandatory and non mandatory attributes when creating a AiContractViolation, including any possible rule conditions and applicable default values. Notice that it is up to an implementer to add additional mandatory attributes.

Mandatory Attributes	Rule
violation	
aiContract	

Non Mandatory Attributes	Rule
@baseType	
@schemaLocation	
@type	
date	
relatedParty	

Additional Rules

The following table provides additional rules indicating mandatory fields in sub-resources or relationships when creating a AiContractViolation resource.

Context	Mandatory Sub-Attributes
violation	actualValue, consequence, operator, referenceValue
aiContract	id

Usage Samples

Here's an example of a request for creating a AiContractViolation resource. In this example the request only passes mandatory attributes.

Request

```
POST /tmf-api/AiM/v4/aiContractViolation
Content-Type: application/json

{
   "aiContract": {
      "href": "http://tmf.com/AIMAnagement/aiContract/4242",
      "id": "4242"
   },
   "violation": {
      "unit": "percentage",
      "referenceValue": "10",
      "operator": "GT",
      "actualValue": "12",
      "comment": "Input image quality proportion % of usable image above limit.",
      "consequence": "Alarm",
      "rule": {
```

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```
        "id": "42",
        "href": "http/tmf.com/AIManagement/rule/42",
        "@referredType": "ThresholdRule"
      }
   }
}
```


Response


```
201

{
   "href": "https:/host:port/tmf-api/AIMAnagementAPI/v4/aiContractViolation/4242",
   "id": "4242",
   "aiContract": {
      "href": "http://tmf.com/AIMAnagement/aiContract/4242",
      "id": "4242"
   },
   "violation": {
      "unit": "percentage",
      "referenceValue": "10",
      "operator": "GT",
      "actualValue": "12",
      "comment": "Input image quality proportion % of usable image above limit.",
      "consequence": "Alarm",
      "rule": {
         "id": "42",
         "href": "http/tmf.com/AIManagement/rule/42",
         "@referredType": "ThresholdRule"
      }
   }
}
```


Operations on Alarm

List alarms

`GET /alarm?fields=...&{filtering}`

Description

This operation list alarm entities.
Attribute selection is enabled for all first level attributes.
Filtering may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving Alarm resources.

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Request

GET /tmf-api/AiM/v4/alarm
Accept: application/json

Response

200


```
[
{
  "id": "8675309",
  "href": "https://host:port/alarmManagement/v4/alarm/8675309",
  "@type": "Alarm",
  "@schemaLocation": "https:://host:port/Alarm.schema.json",
  "externalAlarmId": "8675309",
  "state": "updated",
  "perceivedSeverity": "MAJOR",
  "alarmedObjectType": "AIModel",
  "alarmedObject": {
    "id": "5351",
    "href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351"
  },
  "sourceSystemId": "aiOps-1",
  "alarmDetails": "operationalState=degraded",
  "alarmRaisedTime": "2019-07-03T03:32:17.235Z",
  "alarmReportingTime": "2019-07-03T03:32:17.552Z",
  "alarmChangedTime": "2019-07-03T03:32:52.744Z",
  "comment": [
    {
      "userId": "bob@example.net",
      "systemId": "ems-1",
      "time": "2019-07-03T03:37:33.827Z",
      "comment": "Dispatched"
    }
  ],
  "crossedThresholdInformation": {
    "direction": "string",
    "granularity": "string",
    "indicatorName": "ImageQuality",
    "indicatorUnit": "percentage",
    "observedValue": "20",
    "thresholdCrossingDescription": "Input image quality proportion % of usable image",
    "threshold": {
      "id": "ImageQuality-1920",
      "href": "http://api/thresholdRule/ImageQuality-1920",
      "@referredType": "simpleThresholdRule"
    }
  }
}
```


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```
]
```

Retrieve alarm

GET /alarm/{id}?fields=...&{filtering}

Description

This operation retrieves an alarm entity.
Attribute selection is enabled for all first level attributes.
Filtering on sub-resources may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving a Alarm resource.

Request

```
GET /tmf-api/AiM/v4/alarm/8675309
Accept: application/json
```

Response

```
200

{
  "id": "8675309",
  "href": "https://host:port/alarmManagement/v4/alarm/8675309",
  "@type": "Alarm",
  "@schemaLocation": "https:://host:port/Alarm.schema.json",
  "externalAlarmId": "8675309",
  "state": "updated",
  "perceivedSeverity": "MAJOR",
  "alarmedObjectType": "AIModel",
  "alarmedObject": {
    "id": "5351",
    "href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351"
  },
  "sourceSystemId": "aiOps-1",
  "alarmDetails": "operationalState=degraded",
  "alarmRaisedTime": "2019-07-03T03:32:17.235Z",
  "alarmReportingTime": "2019-07-03T03:32:17.552Z",
  "alarmChangedTime": "2019-07-03T03:32:52.744Z",
  "comment": [
    {
      "userId": "bob@example.net",
      "systemId": "ems-1",
```

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```
        "time": "2019-07-03T03:37:33.827Z",
        "comment": "Dispatched"
      }
    ],
    "crossedThresholdInformation": {
      "direction": "string",
      "granularity": "string",
      "indicatorName": "ImageQuality",
      "indicatorUnit": "percentage",
      "observedValue": "20",
      "thresholdCrossingDescription": "Input image quality proportion % of usable image",
      "threshold": {
        "id": "ImageQuality-1920",
        "href": "http://api/thresholdRule/ImageQuality-1920",
        "@referredType": "simpleThresholdRule"
      }
    }
}
```


Create alarm

POST /alarm

Description

This operation creates an alarm entity.

Mandatory and Non Mandatory Attributes

The following tables provide the list of mandatory and non mandatory attributes when creating a Alarm, including any possible rule conditions and applicable default values. Notice that it is up to an implementer to add additional mandatory attributes.

Mandatory Attributes	Rule
alarmType	
perceivedSeverity	
probableCause	
alarmedObject	
sourceSystemId	
state	
alarmRaisedTime	

Non Mandatory Attributes	Rule
@baseType	
@schemaLocation	
@type	
ackState	
ackSystemId	
ackUserId	

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affectedService	
alarmChangedTime	
alarmClearedTime	
alarmDetails	
alarmEscalation	
alarmReportingTime	
alarmedObjectType	
clearSystemId	
clearUserId	
comment	
correlatedAlarm	
crossedThresholdInformation	
externalAlarmId	
isRootCause	
parentAlarm	
place	
plannedOutageIndicator	
proposedRepairedActions	
reportingSystemId	
serviceAffecting	
specificProblem	

Usage Samples

Here's an example of a request for creating a Alarm resource. In this example the request only passes mandatory attributes.

Request

```
POST /tmf-api/AiM/v4/alarm
Content-Type: application/json

{
   "state": "updated",
   "perceivedSeverity": "MAJOR",
   "alarmedObject": {
      "id": "5351",
      "href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351"
   },
   "sourceSystemId": "aiOps-1",
   "alarmRaisedTime": "2019-07-03T03:32:17.235Z"
}
```

Response

```
201
```

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```
{
  "id": "8675309",
  "href": "https://host:port/alarmManagement/v4/alarm/8675309",
  "state": "updated",
  "perceivedSeverity": "MAJOR",
  "alarmedObject": {
    "id": "5351",
    "href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351"
  },
  "sourceSystemId": "aiOps-1",
  "alarmRaisedTime": "2019-07-03T03:32:17.235Z"
}
```


Patch alarm

PATCH /alarm/{id}

Description

This operation allows partial updates of an alarm entity. Support of json/merge (https://tools.ietf.org/html/rfc7386) is mandatory, support of json/patch (http://tools.ietf.org/html/rfc5789) is optional.

Note: If the update operation yields to the creation of sub-resources or relationships, the same rules concerning mandatory sub-resource attributes and default value settings in the POST operation applies to the PATCH operation. Hence these tables are not repeated here.

Patchable and Non Patchable Attributes

The tables below provide the list of patchable and non patchable attributes, including constraint rules on their usage.

Patchable Attributes	Rule
@baseType	
@schemaLocation	
@type	
ackState	
ackSystemId	
ackUserId	
affectedService	
alarmChangedTime	
alarmClearedTime	
alarmDetails	
alarmEscalation	
alarmReportingTime	
alarmType	
alarmedObject	
alarmedObjectType	
clearSystemId	

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clearUserId	
comment	
correlatedAlarm	
crossedThresholdInformation	
externalAlarmId	
isRootCause	
parentAlarm	
perceivedSeverity	
place	
plannedOutageIndicator	
probableCause	
proposedRepairedActions	
reportingSystemId	
serviceAffecting	
specificProblem	
state	

Non Patchable Attributes	Rule
id	
href	
alarmRaisedTime	
sourceSystemId	

Usage Samples

Here's an example of a request for patching a Alarm resource.

Request

```
PATCH /tmf-api/AiM/v4/alarm/8675309
Content-Type: application/merge-patch+json

{
   "name": "new name"
}
```

Response

```
200

{
   "id": "8675309",
   "href": "https://host:port/alarmManagement/v4/alarm/8675309",
   "@type": "Alarm",
   "@schemaLocation": "https:://host:port/Alarm.schema.json",
   "externalAlarmId": "8675309",
```

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```
  "state": "updated",
  "perceivedSeverity": "MAJOR",
  "alarmedObjectType": "AIModel",
  "alarmedObject": {
    "id": "5351",
    "href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351"
  },
  "sourceSystemId": "aiOps-1",
  "alarmDetails": "operationalState=degraded",
  "alarmRaisedTime": "2019-07-03T03:32:17.235Z",
  "alarmReportingTime": "2019-07-03T03:32:17.552Z",
  "alarmChangedTime": "2019-07-03T03:32:52.744Z",
  "comment": [
    {
      "userId": "bob@example.net",
      "systemId": "ems-1",
      "time": "2019-07-03T03:37:33.827Z",
      "comment": "Dispatched"
    }
  ],
  "crossedThresholdInformation": {
    "direction": "string",
    "granularity": "string",
    "indicatorName": "ImageQuality",
    "indicatorUnit": "percentage",
    "observedValue": "20",
    "thresholdCrossingDescription": "Input image quality proportion % of usable image",
    "threshold": {
      "id": "ImageQuality-1920",
      "href": "http://api/thresholdRule/ImageQuality-1920",
      "@referredType": "simpleThresholdRule"
    }
  },
  "name": "new name"
}
```


Delete alarm

`DELETE /alarm/{id}`

Description

This operation deletes an alarm entity.

Usage Samples

Here's an example of a request for deleting a Alarm resource.

Request

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DELETE /tmf-api/AiM/v4/alarm/42
Response
204

Operations on Rule

List rules

GET /rule?fields=...&{filtering}

Description

This operation list rule entities.
Attribute selection is enabled for all first level attributes.
Filtering may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving Rule resources.

Request
GET /tmf-api/AiM/v4/rule Accept: application/json
Response

200
 	
[
{
"href": "https://AIManagementAPI/v4/rule/42",
"id": "42"
}
]

Retrieve rule

GET /rule/{id}?fields=...&{filtering}

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Description

This operation retrieves a rule entity.
Attribute selection is enabled for all first level attributes.
Filtering on sub-resources may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving a Rule resource.

Request
GET /tmf-api/AiM/v4/rule/42 Accept: application/json
Response

200
 	
{
"href": "https://AIManagementAPI/v4/rule/42",
"id": "42"
}

Create rule

`POST /rule`

Description

This operation creates a rule entity.

Mandatory and Non Mandatory Attributes

The following tables provide the list of mandatory and non mandatory attributes when creating a Rule, including any possible rule conditions and applicable default values. Notice that it is up to an implementer to add additional mandatory attributes.

Mandatory Attributes	Rule
name	
@type	

Non Mandatory Attributes	Rule
@baseType	

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@schemaLocation	

Usage Samples

Here's an example of a request for creating a Rule resource. In this example the request only passes mandatory attributes.

Request
POST /tmf-api/AiM/v4/rule Content-Type: application/json {}
Response

201
 	
{
"href": "https://AIManagementAPI/v4/rule/42",
"id": "42"
}

Patch rule

`PATCH /rule/{id}`

Description

This operation allows partial updates of a rule entity. Support of json/merge (https://tools.ietf.org/html/rfc7386) is mandatory, support of json/patch (http://tools.ietf.org/html/rfc5789) is optional.

Note: If the update operation yields to the creation of sub-resources or relationships, the same rules concerning mandatory sub-resource attributes and default value settings in the POST operation applies to the PATCH operation. Hence these tables are not repeated here.

Patchable and Non Patchable Attributes

The tables below provide the list of patchable and non patchable attributes, including constraint rules on their usage.

Patchable Attributes	Rule
@baseType	
@schemaLocation	
@type	

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name	

Non Patchable Attributes	Rule
id	
href	

Usage Samples

Here's an example of a request for patching a Rule resource.

Request

```
PATCH /tmf-api/AiM/v4/rule/42
Content-Type: application/merge-patch+json

{
   "name": "new name"
}
```

Response

```
200

{
   "href": "https://AIManagementAPI/v4/rule/42",
   "id": "42",
   "name": "new name"
}
```

Delete rule

`DELETE /rule/{id}`

Description

This operation deletes a rule entity.

Usage Samples

Here's an example of a request for deleting a Rule resource.

Request

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DELETE /tmf-api/AiM/v4/rule/42
Response
204

Operations on Event

List events

GET topic/{topicId}/event?fields=...&{filtering}

Description

This operation list event entities.
Attribute selection is enabled for all first level attributes.
Filtering may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving Event resources.

Request
GET /tmf-api/AiM/v4/event Accept: application/json
Response
200 [{ "@type": "Event", "@schemaLocation": "http://myscp.com/schemas/Common/Event.schema.json", "@baseType": "event", "eventId": "256c42f0-7cae-4cfe-8b96-f5773796f8ff", "eventTime": "2019-11-02T14:20:54.000Z", "eventType": "AlarmCreateNotification", "correlationId": "238764827364827t367", "domain": "domain-x", "title": "Mail service not responding", "description": "The mail service is no longer responding and sending mails",

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```
  "timeOccurred": "2019-11-02T14:20:54.000Z",
  "priority": "Normal",
  "source": {
    "id": "12345",
    "href": "http://myscp.com/relatedEntity/12345"
  },
  "reportingSystem": {
    "id": "34534",
    "href": "http://myscp.com/reportingEntity/12345",
    "name": "name"
  },
  "relatedParty": [
    {
      "id": "12312",
      "href": "http://myscp.com/party/12345",
      "role": "Owner",
      "@referredType": "Organization"
    }
  ],
  "event": {
    "alarm": {
      "@type": "Alarm",
      "@schemaLocation": "http://myscp.com/registry/Alarm.schema.json",
      "@baseType": "Alarm",
      "externalAlarmId": "8675309",
      "state": "updated",
      "perceivedSeverity": "major",
      "alarmedObjectType": "AIModel",
      "alarmedObject": {
        "id": "5351",
        "href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351"
      },
      "sourceSystemId": "aiOps-1",
      "alarmDetails": "operationalState=degraded",
      "alarmRaisedTime": "2019-07-03T03:32:17.235Z",
      "alarmReportingTime": "2019-07-03T03:32:17.552Z",
      "alarmChangedTime": "2019-07-03T03:32:52.744Z",
      "comment": [
        {
          "userId": "bob@example.net",
          "systemId": "ems-1",
          "time": "2019-07-03T03:37:33.827Z",
          "comment": "Dispatched"
        }
      ],
      "crossedThresholdInformation": {
        "direction": "string",
        "granularity": "string",
        "indicatorName": "ImageQuality",
        "indicatorUnit": "percentage",
        "observedValue": "20",
        "thresholdCrossingDescription": "Input image quality proportion % of usable image",
        "threshold": {
          "id": "ImageQuality-1920",
          "href": "http://api/thresholdRule/ImageQuality-1920",
```


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```
            "@referredType": "simpleThresholdRule"
          },
          "@type": "CrossedThresholdInformation"
        }
      }
    }
}
]
```

Retrieve event

GET topic/{topicId}/event/{id}?fields=...&{filtering}

Description

This operation retrieves an event entity.
Attribute selection is enabled for all first level attributes.
Filtering on sub-resources may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving a Event resource.

Request

```
GET /tmf-api/AiM/v4/event/42
Accept: application/json
```

Response

```
200

{
  "@type": "Event",
  "@schemaLocation": "http://myscp.com/schemas/Common/Event.schema.json",
  "@baseType": "event",
  "eventId": "256c42f0-7cae-4cfe-8b96-f5773796f8ff",
  "eventTime": "2019-11-02T14:20:54.000Z",
  "eventType": "AlarmCreateNotification",
  "correlationId": "238764827364827t367",
  "domain": "domain-x",
  "title": "Mail service not responding",
  "description": "The mail service is no longer responding and sending mails",
  "timeOccurred": "2019-11-02T14:20:54.000Z",
  "priority": "Normal",
  "source": {
    "id": "12345",
```

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```
    "href": "http://myscp.com/relatedEntity/12345"
  },
  "reportingSystem": {
    "id": "34534",
    "href": "http://myscp.com/reportingEntity/12345",
    "name": "name"
  },
  "relatedParty": [
    {
      "id": "12312",
      "href": "http://myscp.com/party/12345",
      "role": "Owner",
      "@referredType": "Organization"
    }
  ],
  "event": {
    "alarm": {
      "@type": "Alarm",
      "@schemaLocation": "http://myscp.com/registry/Alarm.schema.json",
      "@baseType": "Alarm",
      "externalAlarmId": "8675309",
      "state": "updated",
      "perceivedSeverity": "major",
      "alarmedObjectType": "AIModel",
      "alarmedObject": {
        "id": "5351",
        "href": "https://mycsp.com:8080/tmf-api/AIInventory/v4/AIModel/PCP5351"
      },
      "sourceSystemId": "aiOps-1",
      "alarmDetails": "operationalState=degraded",
      "alarmRaisedTime": "2019-07-03T03:32:17.235Z",
      "alarmReportingTime": "2019-07-03T03:32:17.552Z",
      "alarmChangedTime": "2019-07-03T03:32:52.744Z",
      "comment": [
        {
          "userId": "bob@example.net",
          "systemId": "ems-1",
          "time": "2019-07-03T03:37:33.827Z",
          "comment": "Dispatched"
        }
      ],
      "crossedThresholdInformation": {
        "direction": "string",
        "granularity": "string",
        "indicatorName": "ImageQuality",
        "indicatorUnit": "percentage",
        "observedValue": "20",
        "thresholdCrossingDescription": "Input image quality proportion % of usable image",
        "threshold": {
          "id": "ImageQuality-1920",
          "href": "http://api/thresholdRule/ImageQuality-1920",
          "@referredType": "simpleThresholdRule"
        },
        "@type": "CrossedThresholdInformation"
      }
```


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```
    }
  }
}
```

Create event

POST topic/{topicId}/event

Description

This operation creates an event entity.

Mandatory and Non Mandatory Attributes

The following tables provide the list of mandatory and non mandatory attributes when creating a Event, including any possible rule conditions and applicable default values. Notice that it is up to an implementer to add additional mandatory attributes.

Mandatory Attributes	Rule

Non Mandatory Attributes	Rule
@baseType	
@schemaLocation	
@type	
analyticCharacteristic	
correlationId	
description	
domain	
event	
eventId	
eventTime	
eventType	
priority	
relatedParty	
reportingSystem	
source	
timeOccurred	
title	

Usage Samples

Here's an example of a request for creating a Event resource. In this example the request only passes mandatory attributes.

Request

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POST /tmf-api/AiM/v4/event Content-Type: application/json {}
Response
201 {}

Operations on Monitor

List monitors

`GET /monitor?fields=...&{filtering}`

Description

This operation list monitor entities.
Attribute selection is enabled for all first level attributes.
Filtering may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving Monitor resources.

Request
GET /tmf-api/AiM/v4/monitor Accept: application/json
Response

200
 	
[
{
"id": "44555",
"href": "https://serverlocation:port/AIManagementAPI/v4/monitor/44555",
"state": "completed",
"request": {
"method": "POST",
"to": "http://serverlocation:port/AIManagementAPI/v4/AiModel",

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```
      "body": "AI Model Body from AI Model Resource",
      "header": [
        {
          "name": "locale",
          "value": "en-us"
        }
      ]
    },
    "response": {
      "statusCode": "201",
      "body": " AI Model Body from AI Model Resource ",
      "header": [
        {
          "name": "locale",
          "value": "en-us"
        }
      ]
    },
    "sourceHref": " http://serverlocation:port/AIManagementAPI/v4/AiModel/42 ",
    "@type": "Monitor"
}
]
```


Retrieve monitor

`GET /monitor/{id}?fields=...&{filtering}`

Description

This operation retrieves a monitor entity.
Attribute selection is enabled for all first level attributes.
Filtering on sub-resources may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving a Monitor resource.

Request
GET /tmf-api/AiM/v4/monitor/44555 Accept: application/json
Response
200 {

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```
  "id": "44555",
  "href": "https://serverlocation:port/AIManagementAPI/v4/monitor/44555",
  "state": "completed",
  "request": {
    "method": "POST",
    "to": "http://serverlocation:port/AIManagementAPI/v4/AiModel",
    "body": "AI Model Body from AI Model Resource",
    "header": [
      {
        "name": "locale",
        "value": "en-us"
      }
    ]
  },
  "response": {
    "statusCode": "201",
    "body": " AI Model Body from AI Model Resource ",
    "header": [
      {
        "name": "locale",
        "value": "en-us"
      }
    ]
  },
  "sourceHref": " http://serverlocation:port/AIManagementAPI/v4/AiModel/42 ",
  "@type": "Monitor"
}
```


Operations on Topic

List topics

`GET /topic?fields=...&{filtering}`

Description

This operation list topic entities.
Attribute selection is enabled for all first level attributes.
Filtering may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving Topic resources.

Request
GET /tmf-api/AiM/v4/topic Accept: application/json

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Response

200
 	
[
{
"href": "https:/host:port/tmf-api/topic/v1/topic/AlarmTopic ",
"name": "AlarmManagement-Montreal",
"headerQuery": "eventType=AlarmCreateNotification&domain=Montreal",
"contentQuery": "event.alarm.perceivedSeverity=CRITICAL",
"id": "AlarmTopic"
}
]

Retrieve topic

GET /topic/{id}?fields=...&{filtering}

Description

This operation retrieves a topic entity.
Attribute selection is enabled for all first level attributes.
Filtering on sub-resources may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving a Topic resource.

Request
GET /tmf-api/AiM/v4/topic/AlarmTopic Accept: application/json
Response
200 { "href": "https:/host:port/tmf-api/topic/v1/topic/AlarmTopic ", "name": "AlarmManagement-Montreal", "headerQuery": "eventType=AlarmCreateNotification&domain=Montreal", "contentQuery": "event.alarm.perceivedSeverity=CRITICAL", "id": "AlarmTopic"

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```
}
```

Create topic

POST /topic

Description

This operation creates a topic entity.

Mandatory and Non Mandatory Attributes

The following tables provide the list of mandatory and non mandatory attributes when creating a Topic, including any possible rule conditions and applicable default values. Notice that it is up to an implementer to add additional mandatory attributes.

Mandatory Attributes	Rule

Non Mandatory Attributes	Rule
@baseType	
@schemaLocation	
@type	
contentQuery	
headerQuery	
name	

Usage Samples

Here's an example of a request for creating a Topic resource. In this example the request only passes mandatory attributes.

Request

```
POST /tmf-api/AiM/v4/topic
Content-Type: application/json

{}
```

Response

```
201

{
   "href": "https:/host:port/tmf-api/topic/v1/topic/AlarmTopic ",
   "id": "AlarmTopic"
```

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```
}
```

Delete topic

`DELETE /topic/{id}`

Description

This operation deletes a topic entity.

Usage Samples

Here's an example of a request for deleting a Topic resource.

Request
DELETE /tmf-api/AiM/v4/topic/42
Response
204

Operations on Hub

List hubs

`GET topic/{topicId}/hub?fields=...&{filtering}`

Description

This operation list hub entities.
Attribute selection is enabled for all first level attributes.
Filtering may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving Hub resources.

Request

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GET /tmf-api/AiM/v4/hub
Accept: application/json

Response

200


```
[
{
   "href": "https:/AIManagementAPI/v4/hub/5880",
   "callback": "http://www.tmforum.org/aListener",
   "id": "5880",
   "query": "event.alarm.alarmType=QualityOfServiceAlarm"
}
]
```


Retrieve hub

GET topic/{topicId}/hub/{id}?fields=...&{filtering}

Description

This operation retrieves a hub entity.
Attribute selection is enabled for all first level attributes.
Filtering on sub-resources may be available depending on the compliance level supported by an implementation.

Usage Samples

Here's an example of a request for retrieving a Hub resource.

Request

GET /tmf-api/AiM/v4/hub/5880
Accept: application/json

Response

200


```
{
   "href": "https:/AIManagementAPI/v4/hub/5880",
   "callback": "http://www.tmforum.org/aListener",
   "id": "5880",
   "query": "event.alarm.alarmType=QualityOfServiceAlarm"
```


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```
}
```

Create hub

POST topic/{topicId}/hub

Description

This operation creates a hub entity.

Mandatory and Non Mandatory Attributes

The following tables provide the list of mandatory and non mandatory attributes when creating a Hub, including any possible rule conditions and applicable default values. Notice that it is up to an implementer to add additional mandatory attributes.

Mandatory Attributes	Rule
id	
callback	

Non Mandatory Attributes	Rule
@baseType	
@schemaLocation	
@type	
query	

Usage Samples

Here's an example of a request for creating a Hub resource. In this example the request only passes mandatory attributes.

Request

```
POST /tmf-api/AiM/v4/hub
Content-Type: application/json

{
   "callback": "http://www.tmforum.org/aListener",
   "id": "5880"
}
```

Response

```
201
```

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```
{
   "href": "https:/AIManagementAPI/v4/hub/5880",
   "callback": "http://www.tmforum.org/aListener",
   "id": "5880"
}
```


Delete hub

`DELETE topic/{topicId}/hub/{id}`

Description

This operation deletes a hub entity.

Usage Samples

Here's an example of a request for deleting a Hub resource.

Request
DELETE /tmf-api/AiM/v4/hub/42
Response
204

Operations on Algorithm Threshold Rule

Operations on Simple Threshold Rule

Operations on Threshold Rule

Operations on Algorithm Params

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API NOTIFICATIONS

For every single of operation on the entities use the following templates and provide sample REST notification POST calls.

It is assumed that the Pub/Sub uses the Register and UnRegister mechanisms described in the REST Guidelines reproduced below.

Register listener

POST /hub

Description

Sets the communication endpoint address the service instance must use to deliver information about its health state, execution state, failures and metrics. Subsequent POST calls will be rejected by the service if it does not support multiple listeners. In this case DELETE /api/hub/{id} must be called before an endpoint can be created again.

Behavior

Returns HTTP/1.1 status code 204 if the request was successful.

Returns HTTP/1.1 status code 409 if request is not successful.

Usage Samples

Here's an example of a request for registering a listener.

Request
POST /api/hub Accept: application/json {"callback": "http://in.listener.com"}
Response
201 Content-Type: application/json Location: /api/hub/42 {"id":"42","callback":"http://in.listener.com","query":null}

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Unregister listener

DELETE /hub/{id}

Description

Clears the communication endpoint address that was set by creating the Hub..

Behavior

Returns HTTP/1.1 status code 204 if the request was successful.

Returns HTTP/1.1 status code 404 if the resource is not found.

Usage Samples

Here's an example of a request for un-registering a listener.

Request
DELETE /api/hub/42 Accept: application/json
Response
204

Publish Event to listener

POST /client/listener

Description

Clears the communication endpoint address that was set by creating the Hub.

Provides to a registered listener the description of the event that was raised. The /client/listener url is the callback url passed when registering the listener.

Behavior

Returns HTTP/1.1 status code 201 if the service is able to set the configuration.

Usage Samples

Here's an example of a notification received by the listener. In this example “EVENT TYPE” should be replaced by one of the notification types supported by this API (see Notification resources Models section) and EVENT BODY refers to the data structure of the given notification type.

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Request

```
POST /client/listener
Accept: application/json

{
   "event": {
            EVENT BODY
         },
   "eventType": "EVENT_TYPE"
}
```

Response

201

For detailed examples on the general TM Forum notification mechanism, see the TMF REST Design Guidelines.

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Acknowledgements

Release History

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4.1.0	31-Jul-2020	Alan Pope	Final edits prior to publication

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