

# TM Forum Specification

## Service Test Management API REST Specification

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## INTRODUCTION

The following document is the specification of the REST API for Service Test Management. It includes the model definition as well as all available operations. Possible actions are creating, updating and retrieving Service Test.

The Service Test API provides a standardized mechanism for placing a service test with all of the necessary test parameters. The API consists of a simple set of operations that interact with CRM/Service Management systems in a consistent manner. A service test is a procedure intended to check the quality, performance, or reliability of a service.

Service Test Management API manages service test resource and service specification test resource:

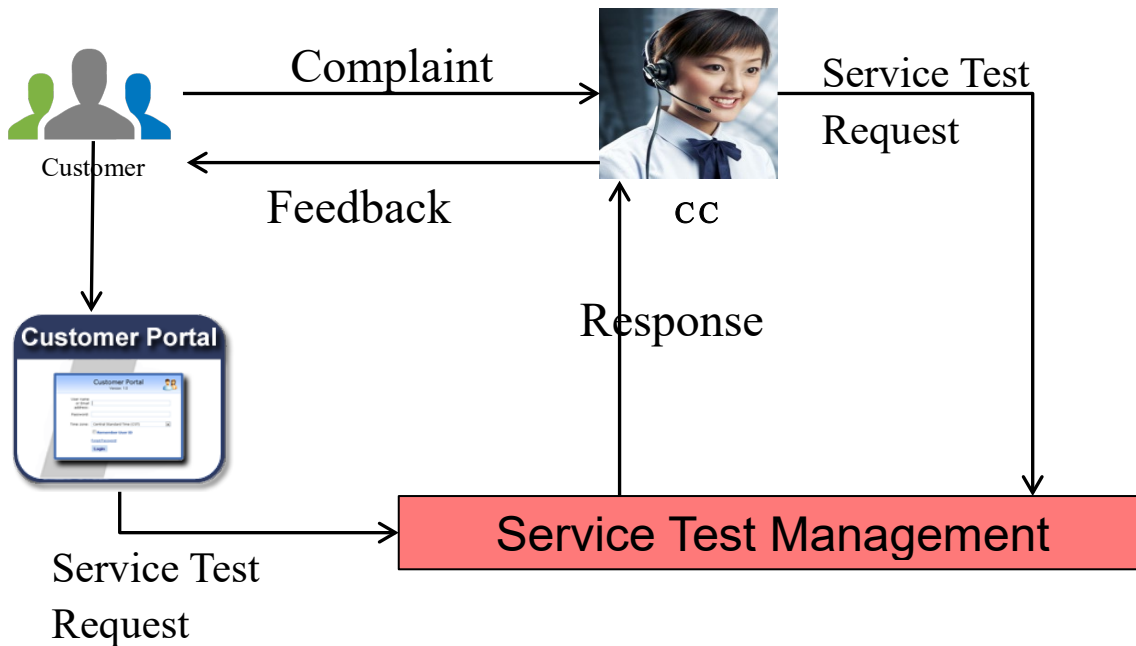
- A service test specification describes the service test in terms of parameters to be configured and measures to be taken.
- A service exists for a controlled test invocation on a service. The service test is executed according to a schedule. and contains service test configuration parameters that are to be applied at execution time, and service test measures that result.

## SAMPLE USE CASES

### Service Test for Customer Experience Assurance

The Service Test can be used for customer experience assurance while:

- The subscriber can launch service test from Self Service Portal to make sure the service quality while his/her experience is not good.
- The Call Center operator can execute service test to check the quality and analyze root cause for response while one customer has complaint



It could improve customer experience and increase FCR(First Call Resolution) much.

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### Planned Service Test for Importance Service

The test job can be defined for some important services that the test will be executed against them periodically to assure the service quality and find potential service downgrading in advance to avoid massive impact to customers.



## 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.

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. All resources and sub-resources of this API have a `@type` attributes that can be provided when this is useful. Such as `ServiceTest`, `ServiceTestSpecification` Entity. 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 `ServiceRef`) to explicitly denote the actual entity type of the referred class. Notice that in reference entities the `@type`, when used, denotes the class types of the reference itself, such as `ServiceRef`, 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.

Notice that because these meta-attributes have a generic meaning we will not repeat their definition in the resource description tables of each resource and each sub-resource.

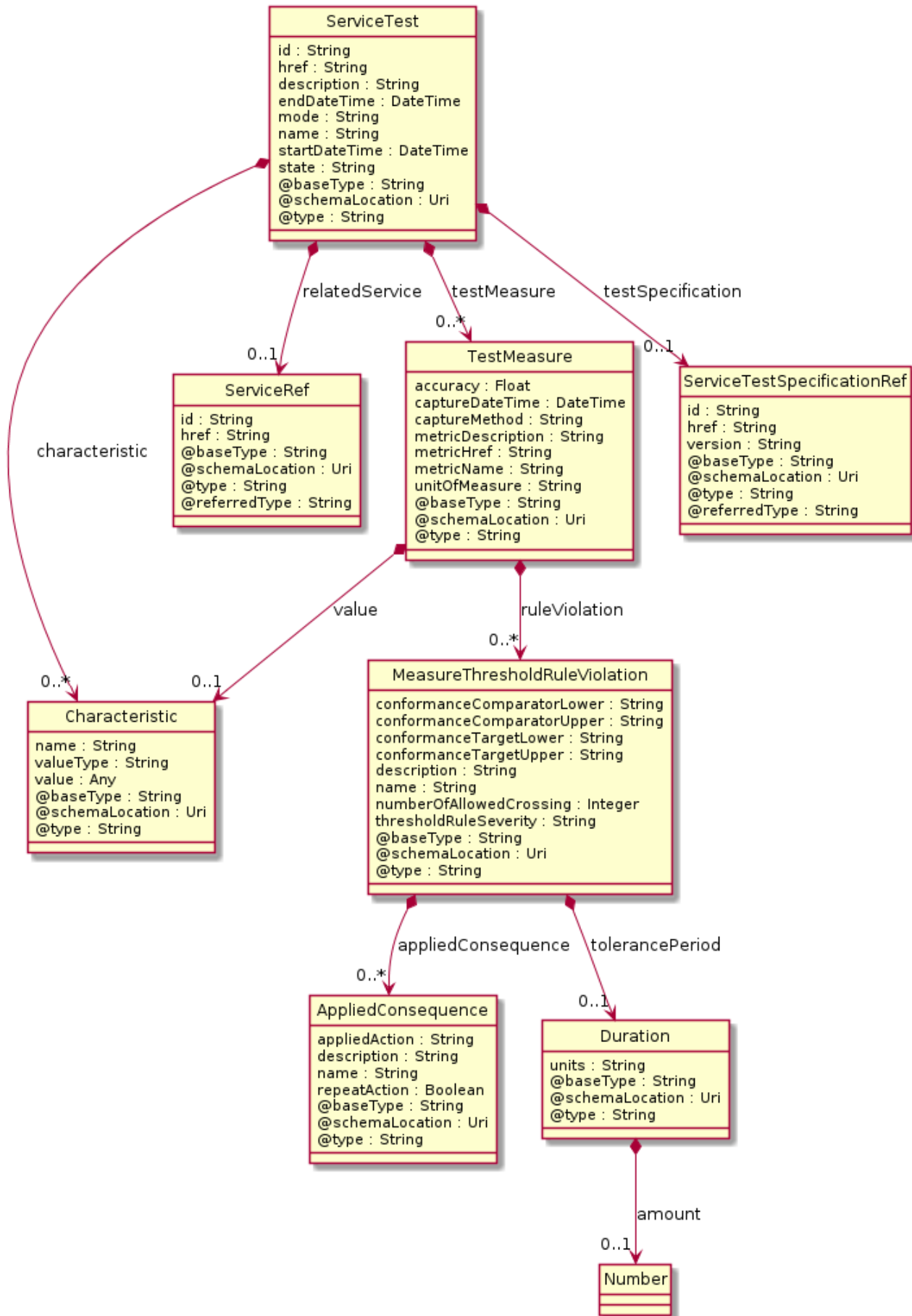
## RESOURCE MODEL

### Managed Entity and Task Resource Models

#### Service Test resource

A service test is an entity that exists for a controlled test invocation on a service. The service test is executed according to a schedule and contains service test configuration parameters that are to be applied at execution time, and service test measures that result.

#### Resource model



**Field descriptions**ServiceTest fields

characteristic	A list of characteristics (Characteristic [*]). List of characteristics with values that define the test run.
description	A string. Description of the service test.
endDateTime	A date time (DateTime). The end date and time of the service test.
href	A string. Hyperlink to access the service test.
id	A string. The identifier of the service test.
mode	A string. An indication of whether the service test is running in "PROACTIVE" or "ONDEMAND" mode.
name	A string. The name of the service test.
relatedService	A service reference (ServiceRef). The actual service being tested.
startDateTime	A date time (DateTime). The start date and time of the service test.
state	A string. The actual state the service test is in.
testMeasure	A list of test measures (TestMeasure [*]). The results of the test in terms of the measured metrics.
testSpecification	A service test specification reference (ServiceTestSpecificationRef). The specification for this test.

AppliedConsequence sub-resource

An Applied Consequence defines the action (prescribed action or notification) to take when a MeasureThresholdRuleViolation occurs.

appliedAction	A string. The action for a violated threshold. This could be a hyperlink to the action.
description	A string. A narrative that explains in detail what the consequence is.
name	A string. A word, term, or phrase by which Consequence is known and distinguished from other MetricDefMeasureConsequences.
repeatAction	A boolean. An indicator used to specify that a consequence should cease being applied if a value is in the same range as the previous value or continue being applied if a value is in the same range as the previous value. If the repeatAction is True, if the consequence is always applied as soon as the MetricMeasure value is in the range of values and if the repeatAction is False, the

consequence is applied only if the previous MetricMeasure value was not in the same range.

#### Characteristic sub-resource

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

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.

#### Duration sub-resource

A time interval in a given unit of time.

amount	A number (Number). Time interval (number of seconds, minutes, hours, etc.).
units	A string. Unit of time (seconds, minutes, hours, etc.).

#### MeasureThresholdRuleViolation sub-resource

A measureThresholdRuleViolation is a violation of a rule that defines the in the MericDefMeasureThresholdRule.

appliedConsequence	A list of applied consequences (AppliedConsequence [*]). An Applied Consequence defines the action (prescribed action or notification) to take when a MeasureThresholdRuleViolation occurs.
conformanceComparatorLower	A string. An operator that when applied on a value specifies whether a threshold is crossed or ceased to be crossed. This operator is used to compare with the conformanceTargetLower.
conformanceComparatorUpper	A string. An operator that when applied on a value specifies whether a threshold is crossed or ceased to be crossed. This operator is used to compare with the conformanceTargetUpper.
conformanceTargetLower	A string. A value used to determine if the threshold is crossed or ceases to be crossed. It represents the lower limit. The value should be less than the conformanceTargetUpper. The conformance comparators should also be logically defined so as to not lead to a logically impossible condition.
conformanceTargetUpper	A string. A value used to determine if the threshold is crossed or ceases to be crossed. It represents the Upper limit. The value should be greater than the conformanceTargetLower. The conformance comparators should also be logically defined so as to not lead to a logically impossible condition.
description	A string. Description for the MericDefMeasureThresholdRule .

name	A string. Name for the MetricDefMeasureThresholdRule .
numberOfAllowedCrossing	An integer. The number of allowed crossing occurrences in reference to the tolerancePeriod without a consequence being initiated.
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.
tolerancePeriod	A duration (Duration). An interval of time of allowed crossing occurrences before a consequence being initiated.

#### TestMeasure sub-resource

A TestMeasure specifies a measure of a specific aspect of a product, service, or resource test, such as lost packets or connectivity status.

accuracy	A float. The number of digits of accuracy captured for associated Metrics.
captureDateTime	A date time (DateTime). The date and time that the metric was captured.
captureMethod	A string. The method used to capture the Metrics (This may be replaced by a set of entities similar to the Performance Monitoring Ref).
metricDescription	A string. Brief description of the metric.
metricHref	A string. Hyperlink to access a metric for detail information.
metricName	A string. The name of the metric.
ruleViolation	A list of measure threshold rule violations (MeasureThresholdRuleViolation [*]). A list of rules that were violated in this test measure.
unitOfMeasure	A string. The unit of measure for the metric values, such as meters, cubic yards, kilograms [ISO 1000].
value	A characteristic (Characteristic). The value of Metric in the test. This also could be a document to record all values captured during the service test.

#### ServiceRef relationship

Service reference, for when Service is used by other entities.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
href	A string. reference of the service.
id	A string. Id of the service.

#### ServiceTestSpecificationRef relationship

The service test specification used by the service test.

@referredType	A string. The actual type of the target instance when needed for disambiguation.
href	A string. Hyperlink to access a service test specification.
id	A string. Identifier of a service test specification.
version	A string. Version of a service test specification.

### Json representation sample

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

```
{
  "href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTest/3112",
  "id": "3112",
  "description": "This service test is a simple one",
  "endDateTime": "2016-03-02T24:00:00",
  "mode": "PROACTIVE",
  "startDateTime": "2016-03-02T00:00:00",
  "state": "Completed",
  "relatedService": {
    "href": "https://mycsp.com:8080/tmf-api/serviceManagement/v3/service/21",
    "id": "21",
    "name": "gameService"
  },
  "testSpecification": {
    "href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTestSpecification/22",
    "id": "22",
    "@referredType": "PerformanceTestSpecification"
  },
  "characteristic": [
    {
      "name": "number",
      "valueType": "integer",
      "value": 3
    },
    {
      "name": "restart",
      "valueType": "boolean",
      "value": true
    }
  ],
  "testMeasure": [
    {
      "accuracy": 0.0001,
      "captureDateTime": "2016-03-02T11:12:00",
      "captureMethod": "automatic capture by instrument",
      "metricDescription": "This is the flow speed in a service",
      "metricHref": "https://mycsp.com:8080/tmf-api/metricManagement/v3/metric/21",
      "metricName": "Flow speed",
      "unitOfMeasure": "A second",
      "value": {
        "valueType": "bits",
```

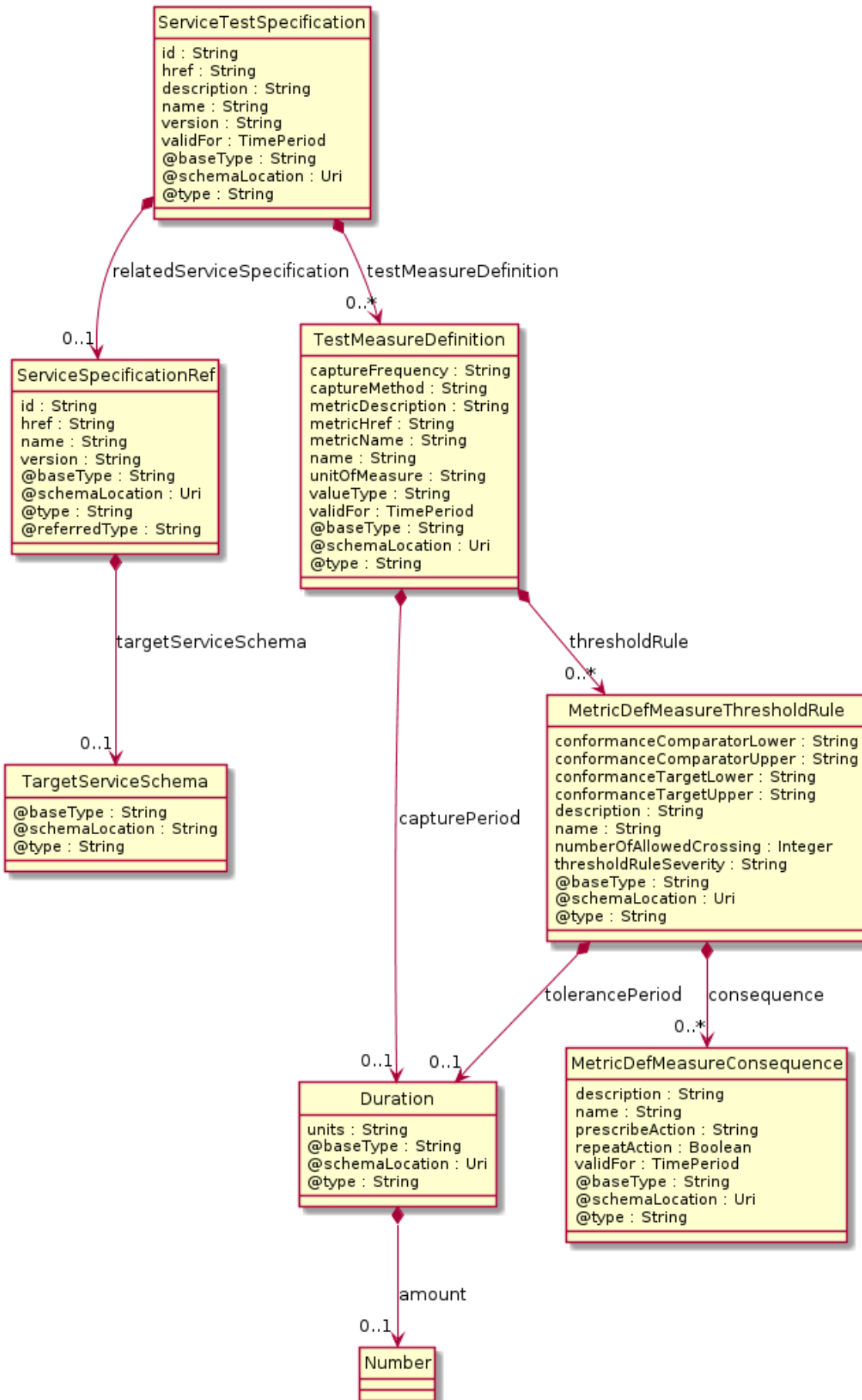
```
"value": {
  "@type": "integer",
  "value": 3000
},
"ruleViolation": [
  {
    "conformanceTargetUpper": "2500",
    "conformanceComparatorUpper": "greater than ",
    "description": "This speed is greater than the target upper",
    "name": "tooMuchTraffic",
    "numberOfAllowedCrossing": 0,
    "thresholdRuleSeverity": "1",
    "appliedConsequence": [
      {
        "appliedAction": "sendWarning",
        "description": "send a warning to the system",
        "name": "sendWarning",
        "repeatAction": false
      },
      {
        "appliedAction": "generateReport",
        "description": "generate a waring report ",
        "name": "generateReport",
        "repeatAction": false
      }
    ]
  }
]
],
"@type": "PerformanceTest",
"@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/Service/PerformanceTest.schema.json",
"@baseType": "ServiceTest"
}
```

### Service Test Specification resource

The service test specification describes the service test in terms of parameters to be configured and measures to be taken.

#### Resource model





**Field descriptions**ServiceTestSpecification fields

description	A string. Description of a service test specification.
href	A string. Hyperlink to access a service test specification.
id	A string. Identifier of a service test specification.
name	A string. Name of a service test specification.
relatedServiceSpecification	A service specification reference (ServiceSpecificationRef). The related service specification.
testMeasureDefinition	A list of test measure definitions (TestMeasureDefinition [*]). A list of definitions for the measurements for the test defined by this specification.
validFor	A time period. The period of time for which this specification is valid.
version	A string. Version of a service test specification.

Duration sub-resource

A time interval in a given unit of time.

amount	A number (Number). Time interval (number of seconds, minutes, hours, etc.).
units	A string. Unit of time (seconds, minutes, hours, etc.).

MetricDefMeasureConsequence sub-resource

A MetricDefMeasureConsequence defines the action (prescribed action or notification) to take when a MetricDefMeasureThresholdRule is crossed.

description	A string. A narrative that explains in detail what the consequence is.
name	A string. A word, term, or phrase by which a MetricDefMeasureConsequence is known and distinguished from other MetricDefMeasureConsequences.
prescribeAction	A string. Recommended remedy for a violated threshold. This could be the hyperlink to the action.
repeatAction	A boolean. An indicator used to specify that a consequence should cease being applied if a value is in the same range as the previous value or continue being applied if a value is in the same range as the previous value. If the repeatAction is True, if the consequence is always applied as soon as the MetricMeasure value is in the range of values and if the repeatAction is False, the

consequence is applied only if the previous MetricMeasure value was not in the same range.

validFor A time period. A valid duration of a thing.

#### MetricDefMeasureThresholdRule sub-resource

A MetricDefMeasureThresholdRule is a rule that defines the condition (raise or clear) to achieve to apply consequences when a threshold is crossed or ceased to be crossed. It also defines the severity of the raise or clear of the threshold.

conformanceComparatorLower	A string. An operator that when applied on a value specifies whether a threshold is crossed or ceased to be crossed. This operator is used to Service Test Management API REST Specification compare with the conformanceTargetLower.
conformanceComparatorUpper	A string. An operator that when applied on a value specifies whether a threshold is crossed or ceased to be crossed. This operator is used to compare with the conformanceTargetUpper.
conformanceTargetLower	A string. A value used to determine if the threshold is crossed or ceases to be crossed. It represents the lower limit. The value should be less than the conformanceTargetUpper. The conformance comparators should also be logically defined so as to not lead to a logically impossible condition.
conformanceTargetUpper	A string. A value used to determine if the threshold is crossed or ceases to be crossed. It represents the Upper limit. The value should be greater than the conformanceTargetLower. The conformance comparators should also be logically defined so as to not lead to a logically impossible condition.
consequence	A list of metric def measure consequences (MetricDefMeasureConsequence [*]). A list of consequences (actions, notifications) that will arise if the threshold is crossed.
description	A string. Description for the MetricDefMeasureThresholdRule .
name	A string. Name for the MetricDefMeasureThresholdRule .
numberOfAllowedCrossing	An integer. The number of allowed crossing occurrences in reference to the tolerancePeriod without a consequence being initiated.
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.

tolerancePeriod                    A duration (Duration). An interval of time of allowed crossing occurrences before a consequence being initiated.

#### TargetServiceSchema sub-resource

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

@schemaLocation            A string. This field provides a link to the schema describing the target service.

@type                            A string. Class type of the target service.

#### TestMeasureDefinition sub-resource

A TestMeasureDefinition specifies a measure of a specific aspect of a product, service, or resource test, such as lost packets or connectivity status.

captureFrequency            A string. The frequency of capture for the metric. Note: This may be replaced by a set of entities similar to the Performance Monitoring.

captureMethod                A string. The method used to capture the Metric. Note: This may be replaced by a set of entities similar to the Performance Monitoring.

capturePeriod                A duration (Duration). A period of the capture.

metricDescription            A string. Brief description of the metric.

metricHref                    A string. Hyperlink to access a metric for detail information.

metricName                    A string. The name of a metric that in the test measure.

name                            A string. The name of the TestMeasureDefinition.

thresholdRule                A list of metric def measure threshold rules (MetricDefMeasureThresholdRule [\*]). The rule(s) associated with the measure threshold.

unitOfMeasure                A string. Name of a service test specification.

validFor                        A time period. The time period for which this definition is valid.

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

#### 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.

href                            A string. Reference of the serviceSpecification.

id                                A string. Unique identifier of the service specification.

name	A string. Name of the requiredServiceSpecification.
targetServiceSchema	A target service schema (TargetServiceSchema). A target service schema reference (TargetServiceSchemaRef). The reference object to the schema and type of target service which is described by service specification.
version	A string. Service specification version.

### Json representation sample

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

```
{
  "description": "a service description",
  "href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTestSpecification/12",
  "id": "12",
  "version": "1.0",
  "name": "monkey test",
  "validFor": {
    "endTime": "2017-03-01T00:00:00",
    "startTime": "2016-03-01T00:00:00"
  },
  "testMeasureDefinition": [
    {
      "captureFrequency": "once",
      "captureMethod": "automatic capture by instrument",
      "metricDescription": "This is the flow speed in a service",
      "metricHref": "https://mycsp.com:8080/tmf-api/metricManagement/v3/metric/21",
      "metricName": "Flow speed",
      "name": "Definition of Flow speed",
      "unitOfMeasure": "A second",
      "valueType": "bits",
      "capturePeriod": {
        "amount": "5",
        "units": "seconds"
      },
    },
    {
      "thresholdRule": [
        {
          "conformanceTargetUpper": "2500",
          "conformanceComparatorUpper": "greater than ",
          "description": "This speed is greater than the target upper",
          "name": "tooMuchTraffic",
          "numberOfAllowedCrossing": 0,
          "thresholdRuleSeverity": "1",
          "tolerancePeriod": {
            "amount": "15",
            "units": "minutes"
          },
        },
        {
          "consequence": [
            {
              "prescribeAction": "sendWarning",
              "description": "send a warning to the system",
              "name": "sendWarning",
              "repeatAction": false,
              "validFor": {
```

```

        "endTime": "2017-03-01T00:00:00",
        "startTime": "2016-03-01T00:00:00"
    }
},
{
    "prescribeAction": "generateReport",
    "description": "generate a warning report ",
    "name": "generateReport",
    "repeatAction": false,
    "validFor": {
        "endTime": "2017-03-01T00:00:00",
        "startTime": "2016-03-01T00:00:00"
    }
}
]
},
{
    "validFor": {
        "endTime": "2017-03-01T00:00:00",
        "startTime": "2016-03-01T00:00:00"
    }
}
},
{
    "relatedServiceSpecification": {
        "href": "https://mycsp.com:8080/tmf-api/serviceCatalogManagement/v3/serviceSpecification/31",
        "id": "31",
        "@referredType": "vCPEServiceSpecification"
    },
    "@baseType": "ServiceTestSpecification",
    "@type": "PerformanceTestSpecification",
    "@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/service/PerformanceTestSpecification.schema.json"
}
}

```

## Notification Resource Models

6 notifications are defined for this API

Notifications related to ServiceTest:

- ServiceTestCreateNotification
- ServiceTestAttributeValueChangeNotification
- ServiceTestDeleteNotification

Notifications related to ServiceTestSpecification:

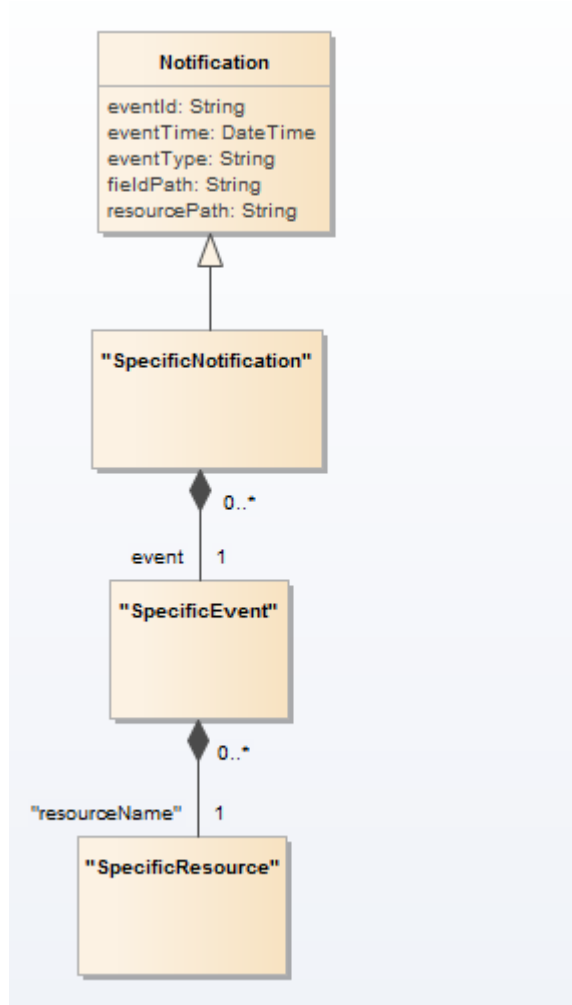
- ServiceTestSpecificationCreateNotification
- ServiceTestSpecificationAttributeValueChangeNotification
- ServiceTestSpecificationDeleteNotification

The notification structure for all notifications in this API follow the pattern depicted by the figure below.

A notification resource (depicted by "SpecificNotification" placeholder) is a sub class of a generic Notification structure containing an id of the event occurrence (eventId), an event timestamp (eventTime), and the name of the

notification resource (eventType).

This notification structure owns an event structure ("SpecificEvent" placeholder) linked to the resource concerned by the notification using the resource name as access field ("resourceName" placeholder).



## Service Test Create Notification

Notification ServiceTestCreateNotification case for resource ServiceTest

### Json representation sample

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

```

{
  "eventId": "00001",
  "eventTime": "2015-11-16T16:42:25-04:00",
  "eventType": "ServiceTestCreateNotification",
  "event": {
    "serviceTest": {
      "-- SEE ServiceTest RESOURCE SAMPLE --"
    }
  }
}

```

## Service Test Attribute Value Change Notification

Notification ServiceTestAttributeValueChangeNotification case for resource ServiceTest

### Json representation sample

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

```
{
  "eventId": "00001",
  "eventTime": "2015-11-16T16:42:25-04:00",
  "eventType": "ServiceTestAttributeValueChangeNotification",
  "event": {
    "serviceTest":
      [-- SEE ServiceTest RESOURCE SAMPLE --]
  }
}
```

## Service Test Delete Notification

Notification ServiceTestDeleteNotification case for resource ServiceTest

### Json representation sample

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

```
{
  "eventId": "00001",
  "eventTime": "2015-11-16T16:42:25-04:00",
  "eventType": "ServiceTestDeleteNotification",
  "event": {
    "serviceTest":
      [-- SEE ServiceTest RESOURCE SAMPLE --]
  }
}
```

## Service Test Specification Create Notification

Notification ServiceTestSpecificationCreateNotification case for resource ServiceTestSpecification

### Json representation sample

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

```
{
  "eventId": "00001",
  "eventTime": "2015-11-16T16:42:25-04:00",
  "eventType": "ServiceTestSpecificationCreateNotification",
  "event": {
    "serviceTestSpecification":
  }
```



```
    {-- SEE ServiceTestSpecification RESOURCE SAMPLE --}  
  }  
}
```

## Service Test Specification Attribute Value Change Notification

Notification ServiceTestSpecificationAttributeValueChangeNotification case for resource ServiceTestSpecification

### Json representation sample

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

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

## Service Test Specification Delete Notification

Notification ServiceTestSpecificationDeleteNotification case for resource ServiceTestSpecification

### Json representation sample

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

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

## 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 Part 1 document.

Notifications are also described in a subsequent section.

### Operations on Service Test

**List service tests****GET /serviceTest?fields=...&{filtering}****Description**

This operation list service test 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 service tests.

<b>Request</b>
GET {apiRoot}/serviceTest?fields=id,category,name,state&mode=PROACTIVE&state=Completed Accept: application/json
<b>Response</b>
200  [ { "href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTest/3112", "id": "3112", "description": "This service test is a simple one", "endDateTime": "2016-03-02T24:00:00", "mode": "PROACTIVE", "startDateTime": "2016-03-02T00:00:00", "state": "Completed", "relatedService": { "href": "https://mycsp.com:8080/tmf-api/serviceManagement/v3/service/21", "id": "21", "name": "gameService" }, "testSpecification": { "href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTestSpecification/22", "id": "22", "@referredType": "PerformanceTestSpecification" }, "characteristic": [ { "name": "number", "valueType": "integer", "value": 3 }, ], }, ]

```

    {
      "name": "restart",
      "valueType": "boolean",
      "value": true
    }
  ],
  "testMeasure": [
    {
      "accuracy": 0.0001,
      "captureDateTime": "2016-03-02T11:12:00",
      "captureMethod": "automatic capture by instrument",
      "metricDescription": "This is the flow speed in a service",
      "metricHref": "https://mycsp.com:8080/tmf-api/metricManagement/v3/metric/21",
      "metricName": "Flow speed",
      "unitOfMeasure": "A second",
      "value": {
        "valueType": "bits",
        "value": {
          "@type": "integer",
          "value": 3000
        }
      }
    },
    {
      "ruleViolation": [
        {
          "conformanceTargetUpper": "2500",
          "conformanceComparatorUpper": "greater than ",
          "description": "This speed is greater than the target upper",
          "name": "tooMuchTraffic",
          "numberOfAllowedCrossing": 0,
          "thresholdRuleSeverity": "1",
          "appliedConsequence": [
            {
              "appliedAction": "sendWarning",
              "description": "send a warning to the system",
              "name": "sendWarning",
              "repeatAction": false
            },
            {
              "appliedAction": "generateReport",
              "description": "generate a waring report ",
              "name": "generateReport",
              "repeatAction": false
            }
          ]
        }
      ]
    }
  ]
}
],
"@type": "PerformanceTest",
"@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/Service/PerformanceTest.schema.json",
"@baseType": "ServiceTest"
}
]

```

**Retrieve service test****GET /serviceTest/{id}?fields=...&{filtering}****Description**

This operation retrieves a service test 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 specific service test.

<b>Request</b>
<pre>GET {apiRoot}/serviceTest/3112 Accept: application/json</pre>
<b>Response</b>
<pre>200 {   "href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTest/3112",   "id": "3112",   "description": "This service test is a simple one",   "endDateTime": "2016-03-02T24:00:00",   "mode": "PROACTIVE",   "startDateTime": "2016-03-02T00:00:00",   "state": "Completed",   "relatedService": {     "href": "https://mycsp.com:8080/tmf-api/serviceManagement/v3/service/21",     "id": "21",     "name": "gameService"   },   "testSpecification": {     "href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTestSpecification/22",     "id": "22",     "@REFERREDTYPE": "PerformanceTestSpecification"   },   "characteristic": [     {       "name": "number",       "valueType": "integer",       "value": 3     }   ] }</pre>

```

    "name": "restart",
    "valueType": "boolean",
    "value": true
  }
],
"testMeasure": [
  {
    "accuracy": 0.0001,
    "captureDateTime": "2016-03-02T11:12:00",
    "captureMethod": "automatic capture by instrument",
    "metricDescription": "This is the flow speed in a service",
    "metricHref": "https://mycsp.com:8080/tmf-api/metricManagement/v3/metric/21",
    "metricName": "Flow speed",
    "unitOfMeasure": "A second",
    "value": {
      "valueType": "bits",
      "value": {
        "@type": "integer",
        "value": 3000
      }
    }
  },
  {
    "ruleViolation": [
      {
        "conformanceTargetUpper": "2500",
        "conformanceComparatorUpper": "greater than ",
        "description": "This speed is greater than the target upper",
        "name": "tooMuchTraffic",
        "numberOfAllowedCrossing": 0,
        "thresholdRuleSeverity": "1",
        "appliedConsequence": [
          {
            "appliedAction": "sendWarning",
            "description": "send a warning to the system",
            "name": "sendWarning",
            "repeatAction": false
          },
          {
            "appliedAction": "generateReport",
            "description": "generate a waring report ",
            "name": "generateReport",
            "repeatAction": false
          }
        ]
      }
    ]
  }
]
}
],
"@type": "PerformanceTest",
"@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/Service/PerformanceTest.schema.json",
"@baseType": "ServiceTest"
}

```

**Create service test****POST /serviceTest****Description**

This operation creates a service test entity.

**Mandatory and Non Mandatory Attributes**

The following tables provides the list of mandatory and non mandatory attributes when creating a ServiceTest, 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	
relatedService	
testSpecification	

Non Mandatory Attributes	Default Value	Rule
characteristic		
description		
endDateTime		
mode		
startDateTime		
state		
testMeasure		

**Usage Samples**

Here's an example of a request for creating a specific service test. In this example the request only passes mandatory attributes.

Request
<pre> POST {apiRoot}/serviceTest Content-Type: application/json  {   "description": "This service test is a simple one",   "endDateTime": "2016-03-02T24:00:00",   "mode": "PROACTIVE",   "startDateTime": "2016-03-02T00:00:00",   "state": "In Progress",   "relatedService": {     "href": "https://mycsp.com:8080/tmf-api/serviceManagement/v3/service/21",     "id": "21",     "name": "gameService"   } }, </pre>

```

"testSpecification": {
  "href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTestSpecification/22",
  "id": "22",
  "@referredType": "PerformanceTestSpecification"
}
}

```

## Response

201

```

{
  "href": "https://host:port/serviceTestManagement/v3/serviceTest/89757",
  "id": "89757",
  "description": "This service test is a simple one",
  "endDateTime": "2016-03-02T24:00:00",
  "mode": "PROACTIVE",
  "startDateTime": "2016-03-02T00:00:00",
  "state": "In Progress",
  "relatedService": {
    "href": "https://mycsp.com:8080/tmf-api/serviceManagement/v3/service/21",
    "id": "21",
    "name": "gameService"
  },
  "testSpecification": {
    "href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTestSpecification/22",
    "id": "22",
    "@referredType": "PerformanceTestSpecification"
  }
}

```

## Patch service test

**PATCH /serviceTest/{id}**

### Description

This operation allows partial updates of a service test 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
characteristic	
description	
endDateTime	
mode	
name	
relatedService	
startDateTime	
state	
testMeasure	
testSpecification	

Non Patchable Attributes	Rule
href	
id	

### Usage Samples

Here's an example of a request for patching a service test. In this example, a new state is set.

Request
PATCH {apiRoot}/serviceTest/3112 Content-Type: application/merge-patch+json  <pre>{   "state": "Completed" }</pre>
Response
200  <pre>{   "href": "https://host:port/serviceTestManagement/v3/serviceTest/89757",   "id": "89757",   "description": "This service test is a simple one",   "endDateTime": "2016-03-02T24:00:00",   "mode": "PROACTIVE",   "startDateTime": "2016-03-02T00:00:00",   "state": "Completed",   "relatedService": {     "href": "https://mycsp.com:8080/tmf-api/serviceManagement/v3/service/21",     "id": "21",     "name": "gameService"   },   "testSpecification": {</pre>

```
"href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTestSpecification/22",
"id": "22",
"@referredType": "PerformanceTestSpecification"
}
}
```

## Delete service test

**DELETE** /serviceTest/{id}

### Description

This operation deletes a service test entity.

### Usage Samples

Here's an example of a request for deleting a service test.

<b>Request</b>
DELETE {apiRoot}/serviceTest/3112
<b>Response</b>
204

## Operations on Service Test Specification

### List service test specifications

**GET** /serviceTestSpecification?fields=...&{filtering}

### Description

This operation list service test 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 multiple service test specifications.

<b>Request</b>
GET {apiRoot}/serviceTestSpecification?fields=description,href,id,version,name,validFor,relatedServiceSpecification&name=monkey%20test Accept: application/json
<b>Response</b>
200  [ { "description": "a service description", "href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTestSpecification/12", "id": "12", "version": "1.0", "name": "monkey test", "validFor": { "endDateTime": "2017-03-01T00:00:00", "startDateTime": "2016-03-01T00:00:00" }, "relatedServiceSpecification": { "href": "https://mycsp.com:8080/tmf-api/serviceCatalogManagement/v3/serviceSpecification/31", "id": "31", "@REFERREDType": "VCPEServiceSpecification" } } ]

## Retrieve service test specification

**GET** /serviceTestSpecification/{id}?fields=...&{filtering}

### Description

This operation retrieves a service test 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 specific service test specification.

<b>Request</b>
----------------

```
GET {apiRoot}/serviceTestSpecification/12
Accept: application/json
```

**Response**

200

```
{
  "description": "a service description",
  "href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTestSpecification/12",
  "id": "12",
  "version": "1.0",
  "name": "monkey test",
  "validFor": {
    "endDateTime": "2017-03-01T00:00:00",
    "startDateTime": "2016-03-01T00:00:00"
  },
  "testMeasureDefinition": [
    {
      "captureFrequency": "once",
      "captureMethod": "automatic capture by instrument",
      "metricDescription": "This is the flow speed in a service",
      "metricHref": "https://mycsp.com:8080/tmf-api/metricManagement/v3/metric/21",
      "metricName": "Flow speed",
      "name": "Definition of Flow speed",
      "unitOfMeasure": "A second",
      "valueType": "bits",
      "capturePeriod": {
        "amount": "5",
        "units": "seconds"
      },
      "thresholdRule": [
        {
          "conformanceTargetUpper": "2500",
          "conformanceComparatorUpper": "greater than ",
          "description": "This speed is greater than the target upper",
          "name": "tooMuchTraffic",
          "numberOfAllowedCrossing": 0,
          "thresholdRuleSeverity": "1",
          "tolerancePeriod": {
            "amount": "15",
            "units": "minutes"
          },
          "consequence": [
            {
              "prescribeAction": "sendWarning",
              "description": "send a warning to the system",
              "name": "sendWarning",
              "repeatAction": false,
              "validFor": {
                "endDateTime": "2017-03-01T00:00:00",
                "startDateTime": "2016-03-01T00:00:00"
              }
            }
          ]
        }
      ]
    }
  ]
}
```

```

    },
    {
      "prescribeAction": "generateReport",
      "description": "generate a waring report ",
      "name": "generateReport",
      "repeatAction": false,
      "validFor": {
        "endDateTime": "2017-03-01T00:00:00",
        "startDateTime": "2016-03-01T00:00:00"
      }
    }
  ]
}
},
"validFor": {
  "endDateTime": "2017-03-01T00:00:00",
  "startDateTime": "2016-03-01T00:00:00"
}
}
},
"relatedServiceSpecification": {
  "href": "https://mycsp.com:8080/tmf-api/serviceCatalogManagement/v3/serviceSpecification/31",
  "id": "31",
  "@referredType": "vCPEServiceSpecification"
},
"@baseType": "ServiceTestSpecification",
"@type": "PerformanceTestSpecification",
"@schemaLocation": "https://mycsp.com:8080/tmf-api/schema/service/PerformanceTestSpecification.schema.json"
}
}

```

**Create service test specification**

**POST /serviceTestSpecification**

**Description**

This operation creates a service test specification entity.

**Mandatory and Non Mandatory Attributes**

The following tables provides the list of mandatory and non mandatory attributes when creating a ServiceTestSpecification, 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	
relatedServiceSpecification	

Non Mandatory Attributes	Default Value	Rule
description		
testMeasureDefinition		

Non Mandatory Attributes	Default Value	Rule
validFor		
version		

### Usage Samples

Here's an example of a request for creating a specific service test specification. In this example the request only passes mandatory attributes.

Request
POST {apiRoot}/serviceTestSpecification Content-Type: application/json  <pre>{   "description": "a service description",   "name": "monkey test",   "validFor": {     "endTime": "2017-03-01T00:00:00",     "startTime": "2016-03-01T00:00:00"   },   "relatedServiceSpecification": {     "href": "https://mycsp.com:8080/tmf-api/serviceCatalogManagement/v3/serviceSpecification/31",     "id": "31",     "@referredType": "vCPEServiceSpecification"   } }</pre>
Response
201  <pre>{   "description": "a service description",   "href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTestSpecification/12",   "id": "12",   "version": "1.0",   "name": "monkey test",   "validFor": {     "endTime": "2017-03-01T00:00:00",     "startTime": "2016-03-01T00:00:00"   },   "relatedServiceSpecification": {     "href": "https://mycsp.com:8080/tmf-api/serviceCatalogManagement/v3/serviceSpecification/31",     "id": "31",     "@referredType": "vCPEServiceSpecification"   } }</pre>

**Patch service test specification****PATCH /serviceTestSpecification/{id}****Description**

This operation allows partial updates of a service test 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	
name	
relatedServiceSpecification	
testMeasureDefinition	
version	

Non Patchable Attributes	Rule
href	
id	
validFor	

**Usage Samples**

Here's an example of a request for patching a service test specification. In this example, a new version is set, together with validity period.

Request
PATCH {apiRoot}/serviceTestSpecification/12 Content-Type: application/merge-patch+json  <pre>{   "name": "new name" }</pre>

Response
<pre> 200  {   "description": "a service description",   "href": "https://mycsp.com:8080/tmf-api/serviceTestManagement/v3/serviceTestSpecification/12",   "id": "12",   "version": "1.0",   "name": "new name",   "validFor": {     "endTime": "2017-03-01T00:00:00",     "startTime": "2016-03-01T00:00:00"   },   "relatedServiceSpecification": {     "href": "https://mycsp.com:8080/tmf-api/serviceCatalogManagement/v3/serviceSpecification/31",     "id": "31",     "@referredType": "vCPEServiceSpecification"   } } </pre>

### Delete service test specification

**DELETE** /serviceTestSpecification/{id}

#### Description

This operation deletes a service test specification entity.

#### Usage Samples

Here's an example of a request for deleting a service test specification.

Request
DELETE {apiRoot}/serviceTestSpecification/12
Response
204



## 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 part 1. Refer to the guidelines for more details.

### 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.

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

## 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.

<b>Request</b>
DELETE /api/hub/42 Accept: application/json
<b>Response</b>
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.

<b>Request</b>
POST /client/listener Accept: application/json  { "event": { EVENT BODY }, "eventType": "EVENT_TYPE" }
<b>Response</b>
201

For detailed examples on the general TM Forum notification mechanism, see the TMF REST Design Guidelines Part 1 document.

# Acknowledgements

## Version History

Release Number	Date	Release led by:	Description
Version 1.0.0	11/28/2016	Pierre Gauthier	
Version 2.0.0	28-Feb-2018	Hongxia Hao <a href="mailto:haohongxia@huawei.com">haohongxia@huawei.com</a>	<b>Main change points:</b> <ol style="list-style-type: none"> <li>1.Remove mandatory and non-mandatory related description to Conformance Profile document.</li> <li>2. Align with DG 3.0 , but no hypermedia</li> <li>3. Modify some names like RelatedClassRef (suggested by Mariano)</li> <li>4.Modify some typos</li> </ol>
Version 2.1.0	06-Dec-2018	Hongxia Hao	Updated to TM Forum new brand guidelines.
Version 2.1.1	27-Jun-2018	Adrienne Walcott	Formatting/style edits prior to R18 publishing.
Version 3.0	13-Jan-2019	Jonathan Goldberg <a href="mailto:Jonathan.Goldberg@amdocs.com">Jonathan.Goldberg@amdocs.com</a>	Schema alignment for NaaS APIs
Version 3.0.1	09-Apr-2019	Adrienne Walcott	Updated to reflect TM Forum Approved status

## Release History

Release Number	Date	Release led by:	Description
16.5.0	December 2016	Yisong Jiang in HUAWEI Pierre Gauthier	Initial Release
18.0.0	June 2018	Hongxia Hao <a href="mailto:haohongxia@huawei.com">haohongxia@huawei.com</a>	Updated Release
18.5.0	13-Jan-2019	Jonathan Goldberg	Schema alignment for NaaS APIs

Release Number	Date	Release led by:	Description
18.5.1	09-Apr-2019	Adrienne Walcott	Updated to reflect TM Forum Approved status

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