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# Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

* x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

* y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
* z the third digit is incremented when editorial only changes have been incorporated in the document.

# 1 Scope

The present document specifies the stage 2 and stage 3 of generic management services for mobile network.

# 2 References

- The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] Void

[3] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage3".

[4] ITU-T Recommendation X.733 (02/92): "Information technology - Open Systems Interconnection - Systems Management: Alarm reporting function".

[5] 3GPP TS 28.531: "Management and orchestration; Provisioning".

[6] Void

[7] Void

[8] Void

[9] Void

[10] Void

[11] 3GPP TS 28.622: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[12] Void

[13] 3GPP TS 28.533: "Management and orchestration; Architecture framework"

[14] Void

[15] 3GPP TS 32.158: "Management and orchestration; Design rules for REpresentational State Transfer (REST) Solution Sets (SS)".

[16] 3GPP TS 32.302: "Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (IRP); Information Service (IS)".

[17] Void

[18] 3GPP TS 28.552: " Management and orchestration; 5G performance measurements".

[19] 3GPP TS 32.401: "Telecommunication management; Perfomance Measurement (PM); Concept and requirements".

[20] ISO 8601:2004: "Data elements and interchange formats – Information interchange – Representation of dates and times".

[21] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects ".

[22] W3C REC-xmlschema-0-20010502: "XML Schema Part 0: Primer".

[23] W3C REC-xmlschema-1-20010502: "XML Schema Part 1: Structures".

[24] W3C REC-xmlschema-2-20010502: "XML Schema Part 2: Datatypes".

[25] W3C REC-xml-names-19990114: "Namespaces in XML".

[26] 3GPP TS 32.111-2: " Telecommunication management; Fault Management; Part 2: Alarm Integration Reference Point (IRP): Information Service (IS)".

[27] IETF RFC 6455: "The WebSocket Protocol".

[28] IETF RFC 793: "Transmission Control Protocol".

[29] 3GPP TS 28.550: "Management and orchestration; Performance assurance".

[30] IETF RFC 3339: "Date and Time on the Internet: Timestamps".

[31] 3GPP TS 33.210: "Network Domain Security (NDS); IP network layer security"

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

**Matching-Criteria-Attributes:** See its definition in [26].

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

FS Fault Supervision

MnS Management Service

# 4 Overview

The generic management services concept follows the management service concepts as defined in TS 28.533 [13].

# 5 Void

# 6 Void

# 7 Void

# 8 Void

# 9 Void

# 10 Management services – Stage 2

## 10.1 Generic provisioning management service

### 10.1.1 Operations and notifications

#### 10.1.1.1 createMOI operation

##### 10.1.1.1.1 Description

This operation is invoked by Generic Provisioning MnS consumer to request the Generic Provisioning MnS producer to create a Managed Object instance in the MIB maintained by the Generic Provisioning MnS producer. This operation will create only one Managed Object instance.

The Generic Provisioning MnS consumer supplies the values of all attributes that are supported, i.e. a) attributes whose Support Qualifier is M and b) attributes whose Support Qualifier is O. The special cases are:

1) If the attribute has a default value specified. In such case, if the Generic Provisioning MnS consumer supplies a value, the supplied value is used; otherwise, the default value is used.

2) If the attribute is specified as capable of carrying a null value or carrying no information. In such case, if the Generic Provisioning MnS consumer supplies a (non-null) value, the supplied value is used; otherwise, the null value is used.

3) If the attribute does not have a default value specified and is specified as incapable of carrying null value and incapable of carrying no information, if there is a Generic Provisioning MnS producer defined default value, then that value will be used.

##### 10.1.1.1.2 Input parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| managedObjectClass | M | class | This parameter specifies the class of the new managed object instance. |
| managedObjectInstance | M | DN | This parameter specifies the instance of the managed object that is to be created and registered. This is a full DN according to 3GPP TS 32.300 [5]. |
| referenceObjectInstance | O | SS dependant | This parameter may have a null value. When this parameter is supplied, it specifies an existing instance of a managed object, called the reference object, of the same class as the new object to be created. Attribute values associated with the reference object instance are assigned to the attributes of the new managed object, except for those specified by the attributeListIn parameter. |
| attributeListIn | M | LIST OF SEQUENCE< attribute name, attribute value> | This parameter may have a null value. When this parameter is supplied, it contains a list of name/value pairs specifying attribute identifiers and their values to be assigned to the new managed object. These values override the values for the corresponding attributes derived from either the reference object (if the referenceObjectInstance parameter is supplied) or the default value set specified in the definition of the managed object's class. |

##### 10.1.1.1.3 Output parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter name | Support Qualifier | Matching Information / Legal Values | Comment |
| attributeListOut | M | LIST OF SEQUENCE< attribute name, attribute value> | This list of name/value pairs contains the attributes of the new managed object and the actual value assigned to each. |
| status | M | ENUM (OperationSucceeded, OperationFailed) |  |

##### 10.1.1.1.4 Results

In case of success, the ManagedEntity instance has been created with the supplied DN. In case of failure, indication of the failure is provided in the Output parameters.

#### 10.1.1.2 getMOIAttributes operation

##### 10.1.1.2.1 Definition

This operation is invoked by Generic Provisioning MnS consumer to request the retrieval of management information (Managed Object attribute names and values) from the MIB maintained by Generic Provisioning MnS producer. One or several Managed Objects may be retrieved - based on the containment hierarchy.

A SS may choose to split this operation in several operations (e.g. operations to get "handlers" or "iterators" to Managed Objects fulfilling the scope/filter criteria and other operations to retrieve attribute names/values from these "handlers").

##### 10.1.1.2.2 Input Parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Qualifier | Information Type | Comment |
| baseObjectInstance | M | DN | The MO instance that is to be used as the starting point for the selection of managed objects to which the filter (when supplied) is to be applied. This is a full DN according to 3GPP TS 32.300 [5]. |
| scope | M | SEQUENCE <  ENUM {  BASE\_ONLY, BASE\_NTH\_LEVEL,  BASE\_SUBTREE,  BASE\_ALL},  Level>  Note: the Level contains valid information if BASE\_NTH\_LEVEL or BASE\_SUBTREE is used. | This parameter defines how many levels of the containment hierarchy to select for the filter.  The selection starts from the base object given by the baseObjectInstance parameter. Its level is considered to be at zero.  The levels of selection that may be performed are:   * BASE\_ONLY: select the base object value of Level is ignored; * BASE\_NTH\_LEVEL: select all *n*th level (indicated by the value of Level) subordinate objects; * BASE\_SUBTREE: select the base object and all of its subordinates down to and including the *n*th level; * BASE\_ALL: select the base object and all of its subordinates; value of Level is ignored. |
| filter | M | See Comment. | This parameter defines a filter test to be applied to the selected (see scope) MOs. If the filter is empty, all selected MOs are used.  The actual syntax and capabilities of the filter is SS specific. However, each SS should support a filter consisting of one or several assertions that may be grouped using the logical operators AND, OR and NOT. Each assertion is a logical expression of attribute existence, attribute value comparison ("equal to X, less than Y" etc.) and MO Class. |
| attributeListIn | M | LIST OF attribute name. | This parameter identifies the attributes to be returned by this operation. An empty list means "Return all attributes". |

##### 10.1.1.2.3 Output Parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Qualifier | Matching Information | Comment |
| managedObjectClass | M | ManagedEntity class | For each returned MO: The class of the MO. |
| managedObjectInstance | M | ManagedEntity DN | For each returned MO: The name of the MO. This is a full DN according to 3GPP TS 32.300 [5]. |
| attributeListOut | M | LIST OF SEQUENCE< attribute name, attribute value > | For each returned MO: A list of name/value pairs for MO. |
| status | M | ENUM (OperationSucceeded, OperationFailed) | An operation may fail because of a specified or unspecified reason. |

##### 10.1.1.2.4 Results

In case of success, all of the ManagedEntity instances selected for retrieval are returned. In case of failure, a specified or unspecified reason may be provided in the Output parameters.

#### 10.1.1.3 modifyMOIAttributes operation

##### 10.1.1.3.1 Description

This service operation is invoked by Generic Provisioning MnS consumer to request the modification of one or more Managed Object instances from Generic Provisioning MnS producer. Attributes of one or several Managed Objects may be modified.

##### 10.1.1.3.2 Input parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| baseObjectInstance | M | DN | The MO instance that is to be used as the starting point for the selection of managed objects to which the filter (when supplied) is to be applied. This is a full DN according to 3GPP TS 32.300 [5]. |
| scope | M | See corresponding parameter in getMOIAttributes. | See corresponding parameter in getMOIAttributes. |
| filter | M | See comment. | See corresponding parameter in getMOIAttributes. |
| modificationList | M | LIST OF SEQUENCE <attribute identifier, [attribute values], ENUM( replace, add values, remove values, set to default)>  See Comment for when attribute values are require and when they are optional. | This parameter contains a set of attribute modification specifications, each of which contains:  1). attribute identifier: the identifier of the attribute whose value(s) is (are) to be modified.  2). attribute value: the value(s) to be used in the modification of the attribute. The use of this parameter is defined by the modify operator. This parameter is optional when the set to default modify operator is specified and if supplied, shall be ignored.  3). modify operator: the way in which the attribute values(s) (if supplied) is(are) to be applied to the attribute. The possible operators are:  a) replace: the attribute value(s) specified shall be used to replace the current values(s) of the attribute;  b) add values: the attribute values(s) specified shall be added to the current value(s) of the attribute. This operator shall only be applied to a set-valued attribute and shall perform a set union (in the mathematical sense) between the current values(s) of the attribute and the attribute value(s) specified. Value(s) specified in the attribute value parameter which is(are) already in the current values of the attribute shall not cause an error to be returned.  c) remove values: the attribute value(s) specified shall be removed from the current values(s) of the attribute. This operator shall only be applied to a set-valued attribute and shall perform a set difference (in the mathematical sense) between the current value(s) of the attribute and the attribute values(s) specified. Value(s) specified in the attribute value parameter which is(are) not in the current value(s) of the attribute shall not cause an error to be returned;    d) set to default: when this operator is applied to a single-valued attribute, the value of the attribute shall be set to its default value. When this operator is applied to a set–valued attribute, the value(s) of the attribute shall be set to their default value(s) and only as many values as defined by the default shall be assigned. If there is no default value defined, an error shall be returned.  Note: Set is used here in the mathematical sense so that a set-valued attribute is an unordered set of unique values.  The modify operator is optional, and if it is not specified, the replace operator shall be assumed.  The modificationList parameter contains a single set of attribute modification specifications and this same set is applied to each MO instance to be modified. |

##### 10.1.1.3.3 Output parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter name | Support Qualifier | Matching Information / Legal Values | Comment |
| modificationListOut | M | LIST OF SEQUENCE< ManagedEntity DN, ManagedEntity class, LIST OF SEQUENCE< attribute name, attribute value >> | This parameter will provide for each managed object instance the full DN of the managed object instance, the managedObjectClass, and a list of name/value pairs with the values of all the attributes of the modified managed object instance after modification. The form of this information is SS dependant and may be provided in one or many data structures. |
| status | M | ENUM (OperationSucceeded, OperationFailed, OperationPartiallySucceeded) | An operation may fail because of a specified or unspecified reason and no attributes have been updated. The operation is only successful if all specified attributes of all selected objects are actually modified. Otherwise, the operation is partially successful. |

In lieu of a synchronization parameter, best effort synchronization will apply; that is, all managed objects selected for this operation will perform the operation if possible regardless of whether some managed objects fail to perform it.

##### 10.1.1.3.4 Results

In case of success, all of the ManagedEntity instances selected for modification are modified. In case of failure, a specified or unspecified reason may be provided in the Output parameters.

#### 10.1.1.4 deleteMOI operation

##### 10.1.1.4.1 Description

This service operation is invoked by Generic Provisioning MnS consumer to request the deletion of one or more Managed Object instances in the MIB maintained by the Generic Provisioning MnS producer.

##### 10.1.1.4.2 Input parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| baseObjectInstance | M | DN | The MO instance that is to be used as the starting point for the selection of managed objects to which the filter (when supplied) is to be applied. This is a full DN according to 3GPP TS 32.300 [5]. |
| scope | M | See corresponding parameter in getMOIAttributes. | See corresponding parameter in getMOIAttributes. |
| filter | M | See comment. | See corresponding parameter in getMOIAttributes. |

##### 10.1.1.4.3 Output parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter name | Support Qualifier | Matching Information / Legal Values | Comment |
| deletionList | M | LIST OF SEQUENCE< ManagedEntity DN, ManagedEntity class name> | If the base object alone is specified, then this parameter is optional; otherwise it contains a list of managedObjectInstance/managedObjectClass pairs identifying the managed objects deleted. |
| status | M | ENUM (OperationSucceeded, OperationFailed, OperationPartiallySucceeded) | An operation may fail because of a specified or unspecified reason. The operation is partially successful if some, but not all, objects selected to be deleted are actually deleted. |

In lieu of a synchronization parameter, best effort synchronization will apply; that is, all managed objects selected for this operation will perform the operation if possible regardless of whether some managed objects fail to perform it.

##### 10.1.1.4.4 Results

In case of success, all of the ManagedEntity instances selected for deletion are deleted. In case of failure, a specified or unspecified reason may be provided in the Output parameters.

#### 10.1.1.5 subscribe operation

##### 10.1.1.5.1 Definition

The authorized management service consumer invokes this operation to establish subscription to receive network events via notifications, under the filter constraint specified in this operation.

##### 10.1.1.5.2 Input Parameters

| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| consumerReference | M | ntfManagerReference | It specifies the reference of the authorized consumer to which notifications shall be sent. |
| timeTick | O | ntfTimeTick  The value is in unit of whole minute. | It specifies the value of a timer held for the subject management service consumer.  This value is Integer greater or equal to 15, OR special infinite value  A special infinite value is assumed when parameter is absent or present but equal to zero. |
| filter | O | This Attribute represents the filter of a subscription. The filter can be applied to parameters of notifications defined as filterable. | It specifies a filter constraint that service provider shall use to filter notification.  If this parameter is absent, then no filter constraint shall be applied. |

##### 10.1.1.5.3 Output Parameters

| Parameter Name | Support Qualifier | Matching Information /  Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| subscriptionId | M | ntfSubscriptionId. | It holds an identity of this subscription. |
| status | M | ENUM (OperationSucceeded, OperationFailedExistingSubscription, OperationFailed) | If subscription is created, status = OperationSuceeded.  If operation is failed, the reason may be specified. |

#### 10.1.1.6 unsubscribe operation

##### 10.1.1.6.1 Definition

The authorized consumer invokes this operation to cancel subscriptions. The authorized consumer can cancel one subscription made with a consumerReference by providing the corresponding subscriptionId or all subscriptions made with the same consumerReference by leaving the subscriptionId parameter absent.

##### 10.1.1.6.2 Input Parameters

| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| consumerReference | M | This attribute contains the reference of a manager. It uniquely identifies a subscriber | It specifies the reference of the authorized consumer to which notifications shall be sent. |
| subscriptionId | O | A unique identifier that is SS dependent. | It holds a subscriptionId carried as the output parameter in the subscribe operation. |

##### 10.1.1.6.3 Output Parameters

| Parameter Name | Support Qualifier | Matching Information /  Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| status | M | ENUM (OperationSucceeded, OperationFailed) | If subscription is deleted, status = OperationSucceeded.  If operation is failed, status = OperationFailed. |

#### 10.1.1.7 Notification notifyMOICreation

##### 10.1.1.7.1 Definition

This notification notifies the subscribed consumers that a new Managed Object Instance has been created.

##### 10.1.1.7.2 Input parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| objectClass | M | It shall carry the ManagedEntity class name. | It specifies the class name of the IOC. A network event has occurred in an instance of this class. |
| objectInstance | M | It shall carry  the DN of the ManagedEntitiy. | It specifies a new instance of the above IOC in which the network event related to by carrying the Distinguished Name (DN) for the instance. |
| notificationId | M | This is an identifier for the notification, which may be used to correlate notifications. | The identifier of the notification shall be chosen to be unique across all notifications of a particular managed object instance throughout the time that correlation is significant, it uniquely identifies the notification from other notifications generated by the subject MOI. |
| notificationType | M | It specifies the type of provisioning management services related notifications. The value “notifyMOICreation” shall be carried. | It specifies the type of notification. |
| eventTime | M | It indicates the MOICreation event time. | The semantics of Generalised Time specified by RFC 3339 [30] shall be used here. |
| systemDN | M | It shall carry the DN of management service providers. | - |
| correlatedNotifications | CM | It specifies a set of notifications that are correlated to the subject notification. | The condition is that the MnS producer support the correlation of notifications |
| additionalText | O | It can contain further information in text on the event of the ManagedEntity(s). | - |
| sourceIndicator | O | ENUM(  Resource\_operation,  Management\_operation,  SON\_operation,Unknown) | This parameter, when present, indicates the source of the operation that led to the generation of this notification. It can have one of the following values:  1. resource operation: The notification was generated in response to an internal operation of the resource;  2. management operation: The notification was generated in response to a management operation applied across the managed object boundary external to the managed object;  3. SON operation: The notification was generated as result of a SON (Self Organising Network) process like self-configuration, self-optimization, self-healing etc. .  4. unknown: It is not possible to determine the source of the operation.  Remark: A provisioning MnS provider may not in any case be aware that SON operation lead to the generation of this generation. In this case another value than SON\_operation for sourceIndicator might be sent. |
| attributeList | O | LIST OF SEQUENCE <AttributeName, AttributeValue> | The attributes (name/value pairs) of the created MOI. |

##### 10.1.1.7.3 Triggering event

###### 10.1.1.7.3.1 From-state

stateBeforeObjectCreation.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| stateBeforeObjectCreation | The number of instances of the IOC ManagedEntity is equal to N. |

###### 10.1.1.7.3.2 To-state

stateAfterObjectCreation.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| stateAfterObjectCreation | The number of instances of the IOC ManagedEntity is equal to N + 1. |

#### 10.1.1.8 Notification notifyMOIDeletion

##### 10.1.1.8.1 Definition

This notification notifies the subscribed consumers that an existing Managed Object Instance has been deleted.

##### 10.1.1.8.2 Input parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| objectClass | M | It shall carry the ManagedEntity class name. | It specifies the class name of the IOC. A network event has occurred in an instance of this class. |
| objectInstance | M | It shall carry  the DN of the ManagedEntitiy. | It specifies an existing instance of the above IOC in which the network event related to by carrying the Distinguished Name (DN) for the instance. |
| notificationId | M | This is an identifier for the notification, which may be used to correlate notifications. | The identifier of the notification shall be chosen to be unique across all notifications of a particular managed object throughout the time that correlation is significant, it uniquely identifies the notification from other notifications generated by the subject MOI. |
| notificationType | M | It specifies the type of provisioning management services related notifications. The value “notifyMOIDeletion” shall be carried. | It specifies the type of notification. |
| eventTime | M | It indicates the MOIDeletion event time. | The semantics of Generalised Time specified by RFC 3339 [30] shall be used here. |
| systemDN | M | It shall carry the DN of management service providers. | - |
| correlatedNotifications | CM | It specifies a set of notifications that are correlated to the subject notification. | The condition is that the MnS producer support the correlation of notifications |
| additionalText | O | It can contain further information in text on the event of the ManagedEntity(s). | - |
| sourceIndicator | O | ENUM(  Resource\_operation,  Management\_operation,  SON\_operation,Unknown) | This parameter, when present, indicates the source of the operation that led to the generation of this notification. It can have one of the following values:  1. resource operation: The notification was generated in response to an internal operation of the resource;  2. management operation: The notification was generated in response to a management operation applied across the managed object boundary external to the managed object;  3. SON operation: The notification was generated as result of a SON (Self Organising Network) process like self-configuration, self-optimization, self-healing etc. .  4. unknown: It is not possible to determine the source of the operation.  Remark: A provisioning MnS provider may not in any case be aware that SON operation lead to the generation of this generation. In this case another value than SON\_operation for sourceIndicator might be sent. |
| attributeList | O | LIST OF SEQUENCE <AttributeName, AttributeValue> | The attributes (name/value pairs) of the deleted MOI. |

##### 10.1.1.8.3 Triggering event

###### 10.1.1.8.3.1 From-state

stateBeforeObjectDeletion.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| stateBeforeObjectDeletion | The number of instances of the IOC ManagedEntity is equal to N. |

###### 10.1.1.8.3.2 To-state

stateAfterObjectDeletion.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| stateAfterObjectDeletion | The number of instances of the IOC ManagedEntity is equal to N - 1. |

#### 10.1.1.9 Notification notifyMOIAttributeValueChanges

##### 10.1.1.9.1 Definition

This notification notifies the subscribed consumers that changes of one or several attributes of a Managed Object Instance in the NRM.

##### 10.1.1.9.2 Input parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| objectClass | M | It shall carry the ManagedEntity class name. | It specifies the class name of the IOC. A network event has occurred in an instance of this class. |
| objectInstance | M | It shall carry  the DN of the ManagedEntitiy. | It specifies the existing instance of the above IOC in which the network event related to by carrying the Distinguished Name (DN) for the instance. |
| notificationId | M | This is an identifier for the notification, which may be used to correlate notifications. | The identifier of the notification shall be chosen to be unique across all notifications of a particular managed object throughout the time that correlation is significant, it uniquely identifies the notification from other notifications generated by the subject Information Object. |
| notificationType | M | It specifies the type of provisioning management services related notifications. The value “notifyMOIAttributeValueChange” shall be carried. | It specifies the type of notification. |
| eventTime | M | It indicates the MOIAttributeValueChange event time. | The semantics of Generalised Time specified by RFC 3339 [30]] shall be used here. |
| systemDN | M | It shall carry the DN of management service providers. | - |
| correlatedNotifications | CM | It specifies a set of notifications that are correlated to the subject notification. | The condition is that the MnS producer support the correlation of notifications |
| additionalText | O | It can contain further information in text on the event of the ManagedEntity(s). | - |
| sourceIndicator | O | ENUM(  Resource\_operation,  Management\_operation,  SON\_operation,Unknown) | This parameter, when present, indicates the source of the operation that led to the generation of this notification. It can have one of the following values:  1. resource operation: The notification was generated in response to an internal operation of the resource;  2. management operation: The notification was generated in response to a management operation applied across the managed object boundary external to the managed object;  3. SON operation: The notification was generated as result of a SON (Self Organising Network) process like self-configuration, self-optimization, self-healing etc. .  4. unknown: It is not possible to determine the source of the operation.  Remark: A provisioning MnS provider may not in any case be aware that SON operation lead to the generation of this generation. In this case another value than SON\_operation for sourceIndicator might be sent. |
| attributeValueChange | M | LIST OF SEQUENCE <AttributeName, NewAttributeValue,  CHOICE [NULL, OldAttributeValue]> | The changed attributes (name/value pairs) of the MOI (with both new and, optionally, old values). |

##### 10.1.1.9.3 Triggering event

###### 10.1.1.9.3.1 From-state

stateBeforeAttributeValueChange.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| stateBeforeAttributeValueChange | The subject attribute has a value at time T1. |

###### 10.1.1.9.3.2 To-state

stateAfterAttributeValueChange.

|  |  |  |
| --- | --- | --- |
| Assertion Name | Definition | |
| stateAfterAttributeValueChange | | The subject attribute has been changed to a value other than the value at time T1. |

### 10.1.2 Managed Information

#### 10.1.2.1 ManagedEntity << ProxyClass>>

##### 10.1.2.1.1 Definition

The ProxyClass ManagedEntity represents the role that can be played by an instance of an IOC defined in NRMs, e.g. Generic NRM, NR and NG-RAN NRM, or 5GC NRM. ManagedEntity is used in the specification of provisioning operations to represent an instance of an IOC defined in these NRMs.

## 10.2 Generic fault supervision management service

### 10.2.1 Operations and notifications

#### 10.2.1.1 Operation and notification of fault supervision data report management service

##### 10.2.1.1.1 subscribe

###### 10.2.1.1.1.1 Definition

The authorized management service consumer invokes this operation to establish subscription to receive network events via notifications, under the filter constraint specified in this operation.

###### 10.2.1.1.1.2 Input Parameters

| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| consumerReference | M | NtfSubscriber.ntfManagerReference | It specifies the reference of the authorized consumer to which notifications shall be sent. |
| timeTick | O | NtfSubscription.ntfTimeTick | It specifies the value of a timer held for the subject management service consumer.  The value is in unit of whole minute.  A special infinite value is assumed when parameter is absent or present but equal to zero. |
| filter | O | This Attribute represents the filter of a subscription. The filter can be applied to parameters of notifications defined as filterable. | It specifies a filter constraint that service provider shall use to filter notification of the alarms.  If this parameter is absent, then no filter constraint shall be applied. |

###### 10.2.1.1.1.3 Output Parameters

| Parameter Name | Support Qualifier | Matching Information /  Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| subscriptionId | M | NtfSubscription.ntfSubscriptionId. | It holds an unambiguous identity of this subscription. |
| status | M | ENUM (OperationSucceeded, OperationFailedExistingSubscription, OperationFailed) | If subscriptionCreated is true, status = OperationSuceeded.  If operation\_failed\_existing\_subscription is true, status = OperationFailedExistingSubscription  If operation\_failed is true, status = OperationFailed. |

###### 10.2.1.1.1.4 Pre-condition

notificationCategoriesNotAllSubscribed OR notificationCategoriesParameterAbsentAndNotAllSubscribed.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| notificationCategoriesNotAllSubscribed | At least one notificationCategory identified in the notificationCategories input parameter is supported by management service producer and is not a member of the ntfNotificationCategorySet attribute of an NtfSubscription which is involved in a subscription relationship with the NtfSubscriber identified by the managerReference input parameter. |
| notificationCategoriesParameterAbsentAndNotAllSubscribed | The notificationCategories input parameter is absent and at least one notificationCategory supported by management service producer is not a member of the ntfNotificationCategorySet attribute of an ntfSsubscription which is involved in a subscription relationship with the NtfSubscriber identified by the managerReference input parameter. |

###### 10.2.1.1.1.5 Post-condition

subscriberPossiblyCreated AND subscriptionCreated.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| subscriberPossiblyCreated | An NtfSubscriber with an ntfManagerReference attribute equal to the value of the managerReference input parameter is involved in a subscriptionRegistration relationship. |
| subscriptionCreated | An NtfSubscription has been created according to the following rules:  - ntfSubscriptionState attribute value has been set to "notSuspended";  - ntfTimeTick attribute value has been set to the value of the timeTick input parameter if This value was higher or equal to 15, or set to 15 if this parameter value was between 1 and 15, or set to a special infinite value if the parameter value was lower or equal to 0 or if parameter was absent;  - ntfTimeTickTimer has been reset with the value of timeTick attribute;  - ntfFilter attribute value has been set to the value of the filter input parameter if present;  - NtfSubscription is involved in a subscription relationship with the NtfSubscriber identified by the managerReference input parameter;  - attribute ntfNotificationCategorySet of NtfSubscription contains EITHER the notification categories identified by the notificationCategories input parameter that were not already contained in the ntfNotificationCategorySet attribute of other NtfSubscription of the same NtfSubscriber identified by the managerReference input parameter OR if notificationCategories input parameter is absent, all notification categories supported by management service producer that were not already contained in the ntfNotificationCategorySet attribute of other subscriptions of the same NtfSubscriber identified by the managerReference input parameter. |

###### 10.2.1.1.1.6 Exceptions

|  |  |
| --- | --- |
| Name | Definition |
| operation\_failed\_existing\_subscription | **Condition:** (notificationCategoriesNotAllSubscribed OR notificationCategoriesParameterAbsentAndNotAllSubscribed) not true  **Returned Information:** The output parameter status  **Exit state:** Entry State |
| operation\_failed | **Condition:** Post-condition is false  **Returned Information:** The output parameter status  **Exit state:** Entry State |

##### 10.2.1.1.2 unsubscribe

###### 10.2.1.1.2.1 Definition

The authorized consumer invokes this operation to cancel subscriptions. The authorized consumer can cancel one subscription made with a consumerReference by providing the corresponding subscriptionId or all subscriptions made with the same consumerReference by leaving the subscriptionId parameter absent.

###### 10.2.1.1.2.2 Input Parameters

| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| consumerReference | M | DN | It specifies the reference of the authorized consumer to which notifications shall be sent. |
| subscriptionId | O | A unique identifier that is SS dependent. | It holds a subscriptionId carried as the output parameter in the subscribe operation. |

###### 10.2.1.1.2.3 Output Parameters

| Parameter Name | Support Qualifier | Matching Information /  Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| status | M | ENUM (OperationSucceeded, OperationFailed) | If (subscriptionDeleted OR allSubscriptionDeleted) is true, status = OperationSucceeded.  If operation\_failed is true, status = OperationFailed. |

###### 10.2.1.1.2.4 Pre-condition

validSubscriptionId&ManagerReference OR subscriptionIdAbsent&ValidManagerReference.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| validSubscriptionId&ManagerReference | The NtfSubscription identified by subscriptionId input parameter is involved in a subscription relationship with the NtfSubscriber identified by the managerReference input parameter. |
| subscriptionIdAbsent&ValidManagerReference | The subscriptionId input parameter is absent and the NtfSubscriber identified by the managerReference input parameter exists. |

###### 10.2.1.1.2.5 Post-condition

subscriptionDeleted OR allSubscriptionDeleted.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| subscriptionDeleted | The NtfSubscription identified by subscriptionId input parameter is no more involved in a subscription relationship with the NtfSubscriber identified by the managerReference input parameter and has been deleted. If this NtfSubscriber has no more NtfSubscription, it is deleted as well. |
| allSubscriptionDeleted | "In the case subscriptionId input parameter was absent, the NtfSubscriber identified by the managerReference input parameter is no more involved in any subscription relationship and is deleted, the corresponding NtfSubscription have been deleted as well. |

###### 10.2.1.1.2.6 Exceptions

|  |  |
| --- | --- |
| Name | Definition |
| operation\_failed | **Condition:** Pre-condition is false or post-condition is false  **Returned Information:** The output parameter status  **Exit state:** Entry State |

##### 10.2.1.1.3 getAlarmList

###### 10.2.1.1.3.1 Definition

The authorized consumer invokes this operation to request the service provider to provide either the complete list of AlarmInformation instances in the AlarmList or only a part of this list (partial alarm alignment).

The parameters baseObjectClass and baseObjectInstance are used to identify the part of the alarm list to be returned. If they are absent, then the complete alarm list shall be provided (full alarm alignment). If they identify a particular class instance, then only a) the AlarmInformation instances related to this class instance and b) the AlarmInformation instances related to the subordinate class instances of this class instance shall be provided (partial alarm alignment). An instance-a is said to be subordinate to instance-b if the DN of the latter is part of the DN of the former.

There are two modes of operation. One mode is synchronous. In this mode, the list of AlarmInformation instances in AlarmList is returned synchronously with the operation. The other mode is asynchronous. In this mode, the list of AlarmInformation instances is returned via alarm notifications. In asynchronous mode of operation, the only information returned synchronously is the status of the operation. A method allowing to abort an ongoing alarm alignment process shall be available in the asynchronous mode. The mode of operation to be used is determined by means outside the scope of specification. To use asynchronous mode, the authorized consumer needs to have established a subscription via the subscribe operation.

###### 10.2.1.1.3.2 Input Parameters

| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| alarmAckState | O | ENUM (all alarms, all active alarms, all active and acknowledged alarms, all active and unacknowledged, all Cleared and unacknowledged alarms, all unacknowledged) | It carries a constraint. The FaultSupervision MnS producer shall apply it on AlarmInformation instances in AlarmList when constructing its output parameter AlarmInformationList. |
| baseObjectClass | O, see note 1 | This parameter is either absent or carries the object class of a certain class. | See how this attribute is used to support full alarm alignment and partial alarm alignment in 10.2.1.1.3.1.  See note 2. |
| baseObjectInstance | O, see note 1 | This parameter is either absent or carries the DN of a certain class instance. | See how this attribute is used to support full alarm alignment and partial alarm alignment in 10.2.1.1.3.1.  See note 2. |
| filter | O | N/A | It carries a filter constraint.  If the filter is present, the service provider shall apply it on AlarmInformation instances in AlarmList when constructing its output parameter AlarmInformationList.  If the filter is not present, all of the AlarmInformation instances included by the scope are selected. |
| NOTE 1: If the notification notifyAlarmListRebuilt supports indicating that only a part of the alarm list has been rebuilt then the operation getAlarmList shall support partial alarm alignment.  NOTE 2: The legal values of the parameters baseObjectClass and baseObjectInstance are restricted to those carried by the parameters baseObjectClass and baseObjectInstance in the recent notifyAlarmListRebuilt notifications. The timeline for "recent" is vendor-specific. | | | |

###### 10.2.1.1.3.3 Output Parameters

Table 10.2.1.1.3.3-1: Output Parameters for the operation getAlarmList

| Parameter Name | Support Qualifier | Matching Information /  Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| alarmInformationList | M | List of AlarmInformation. | It carries the requested AlarmInformation instances.  Case when synchronous mode of operation is used:  (a) The service provider shall apply the constraints expressed in alarmAckState and filter to AlarmInformation instances when constructing this output parameter.  Case when asynchronous mode of operation is used (i.e. this output parameter is conveyed via notifications):  (a) If the filter parameter is present, the service provider shall apply the constraint when constructing this output parameter. Furthermore, if the alarmAckState constraint is present, the service provider shall apply that constraint as well. The filter constraint, if any, that is currently active in the notification channel is not used for the construction of this output parameter.  (b) If the filter parameter is absent, the service provider shall apply the filter constraint currently active in the notification channel when constructing this output parameter. If the alarmAckState constraint is present, the service provider shall apply that constraint as well. |
| status | M | ENUM (OperationSucceeded, OperationFailed) | If all the AlarmInformation are returned, status = OperationSucceeded.  If operation is failed, status = OperationFailed. |

The following table lists the set of sub-elements of the alarmInformationList attribute, and alarmInformationList forms a list of such sets.

Table 10.2.1.1.3.3-2: Sub-elements of the alarmInformationList attribute

| Name | Qualifier | Matching Information | Comment |
| --- | --- | --- | --- |
| notificationType | M | "notifyNewAlarm"  or  "notifyChangedAlarm"  or  "notifyClearedAlarm" | The parameter carries  - notifyNewAlarm in case the alarm has not yet changed and has not yet been cleared.  - notifyChangedAlarm in case the alarm has changed but has not yet been cleared.  - notifyClearedAlarm in case the alarm has been cleared but not yet acknowledged. |
| alarmType | M | AlarmInformation.eventType | This parameter indicates "Communications Alarm", "Processing Error Alarm", "Environmental Alarm". "Quality Of Service Alarm" or "Equipment Alarm" for non-security-related alarms.  It indicates "Integrity Violation", "Operational Violation", "Physical Violation", "Security Service or Mechanism Violation" or "Time Domain Violation" for security alarms. |
| objectClass, objectInstance | M | MonitoredEntity.objectClass where the MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation.  MonitoredEntity.objectInstance where the MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |  |
| notificationId | M | This carries the semantics of notification identifier. |  |
| eventTime | O | AlarmInformation.alarmRaisedTime or  AlarmInformation.alarmChangedTime or  AlarmInformation.alarmClearedTime | The parameter carries the  - alarmRaisedTime in case notificationType carries notifyNewAlarm  - alarmChangedTime in case notificationType carries notifyChangedAlarm  - alarmClearedTime in case notificationType carries notifyClearedAlarm  The availability and accuracy of time carried by the time parameters in individual entries of the list (i.e. eventTime, alarmRaisedTime, alarmClearedTime and ackTime) shall be "best effort".  Reason: An Management System is not required to persistently store these times or other alarm information (as in case of synchronization information may be provided by the NE), while also some NE's do not keep these times (and a later attempt to retrieve the alarm data from the NEs will not deliver these time data). |
| systemDN | C | See usage of this attribute in Notification header - see [16]. | Presence dependent on solution set.  See usage of this attribute in Notification header - see [16]. |
| alarmId | M | AlarmInformation.alarmId |  |
| alarmRaisedTime | M | AlarmInformation.alarmRaisedTime | The availability and accuracy of time carried by the time parameters in individual entries of the list (i.e. eventTime, alarmRaisedTime, alarmClearedTime and ackTime) shall be "best effort".  Reason: A Management System is not required to persistently store these times or other alarm information (as in case of synchronization information may be provided by the NE), while also some NE's do not keep these times (and a later attempt to retrieve the alarm data from the NEs will not deliver these time data). |
| alarmChangedTime | O | AlarmInformation.alarmChangedTime | not applicable if the severity of related alarm was not changed  The availability and accuracy of time carried by the time parameters in individual entries of the list (i.e. eventTime, alarmRaisedTime, alarmChangedTime, alarmClearedTime and ackTime) shall be "best effort".  Reason: A Management System is not required to persistently store these times or other alarm information (as in case of synchronization information may be provided by the NE), while also some NE's do not keep these times (and a later attempt to retrieve the alarm data from the NEs will not deliver these time data). |
| alarmClearedTime | M | AlarmInformation.alarmClearedTime | not applicable if related alarm was not cleared  The availability and accuracy of time carried by the time parameters in individual entries of the list (i.e. eventTime, alarmRaisedTime, alarmClearedTime and ackTime) shall be "best effort".  Reason: A Management System is not required to persistently store these times or other alarm information (as in case of synchronization information may be provided by the NE), while also some NE's do not keep these times (and a later attempt to retrieve the alarm data from the NEs will not deliver these time data). |
| probableCause | M | AlarmInformation.probableCause |  |
| perceivedSeverity | M | AlarmInformation.perceivedSeverity |  |
| rootCauseIndicator | O | AlarmInformation.rootCauseIndicator |  |
| specificProblem | O | AlarmInformation.specificProblem |  |
| backedUpStatus | O | AlarmInformation.backedUpStatus | not applicable if related alarm is a security alarm |
| trendIndication | O | AlarmInformation.trendIndication | not applicable if related alarm is a security alarm |
| thresholdInfo | O | AlarmInformation.thresholdInfo | not applicable if related alarm is a security alarm |
| stateChangeDefinition | O | AlarmInformation.stateChange | not applicable if related alarm is a security alarm |
| monitoredAttributes | O | AlarmInformation.monitoredAttributes | not applicable if related alarm is a security alarm |
| proposedRepairActions | O | AlarmInformation.proposedRepairActions | not applicable if related alarm is a security alarm |
| additionalText | O | AlarmInformation.additionalText |  |
| additionalInformation | O | AlarmInformation.additionalInformation |  |
| ackTime | M | AlarmInformation.ackTime | not applicable if related alarm was not acknowledged nor unacknowledged  The availability and accuracy of time carried by the time parameters in individual entries of the list (i.e. eventTime, alarmRaisedTime, alarmClearedTime and ackTime) shall be "best effort".  Reason: A Management System is not required to persistently store these times or other alarm information (as in case of synchronization information may be provided by the NE), while also some NE's do not keep these times (and a later attempt to retrieve the alarm data from the NEs will not deliver these time data). |
| ackUserId | M | AlarmInformation.ackUserId | not applicable if related alarm was not acknowledged nor unacknowledged |
| ackSystemId | O | AlarmInformation.ackSystemId | not applicable if related alarm was not acknowledged nor unacknowledged |
| ackState | M | AlarmInformation.ackState | not applicable if related alarm was not acknowledged nor unacknowledged |
| clearUserId | O | AlarmInformation.clearUserId | not applicable if related alarm was not cleared |
| clearSystemId | O | AlarmInformation.clearSystemId | not applicable if related alarm was not cleared |
| backUpObject | O | MonitoredEntity.objectInstance where the MonitoredEntity is identified by relation-BackUpObject-AlarmInformation of the new AlarmInformation. | not applicable if related alarm is a security alarm |
| correlatedNotifications | O | The set of CorrelatedNotification related to this AlarmInformation. |  |
| comments | M | The set of Comment instances involved in a relationship with this AlarmInformation. | not applicable if the related alarm has no appended comments |
| serviceUser | M | AlarmInformation.serviceUser | not applicable if related alarm is not a security alarm |
| serviceProvider | M | AlarmInformation.serviceProvider | not applicable if related alarm is not a security alarm |
| securityAlarmDetector | M | AlarmInformation.securityAlarmDetector | not applicable if related alarm is not a security alarm |

###### 10.2.1.1.3.4 Exceptions and Constraints

| Exception Name | Definition |
| --- | --- |
| operation\_failed | **Condition:** Operation is failed  **Returned Information:** The output parameter status  **Exit state:** Entry State |

##### 10.2.1.1.4 notifyNewAlarm

###### 10.2.1.1.4.1 Definition

A new AlarmInformation has been added in the AlarmList. The subscribed consumers are notified of this fact if the added AlarmInformation satisfies the current filter constraint of their subscription.

###### 10.2.1.1.4.2 Input Parameters

There are two tables for Input Parameters. If alarmType parameter indicates "Communications Alarm", "Processing Error Alarm", "Environmental Alarm". "Quality Of Service Alarm" or "Equipment Alarm", the first table (see Table 10.2.1.1.4.2.1) shall be applicable for this notifyNewAlarm. If alarmType parameter indicates "Integrity Violation", "Operational Violation", "Physical Violation", "Security Service or Mechanism Violation" or "Time Domain Violation", the second table (see Table 10.2.1.1.4.2.2) shall be applicable.

Table 10.2.1.1.4.2.1: Input Parameters for notification related to Non-security alarm

| Parameter Name | Qualifier | Matching Information/ Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| objectClass | M | MonitoredEntity.objectClass  It shall carry the MonitoredEntity class name. | The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| objectInstance | M | MonitoredEntity.objectInstance  It shall carry the Distinguished Name (DN) of the instance of MonitoredEntity class. | The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| notificationId | M | This is an identifier for the notification, which may be used to correlate notifications. The identifier of the notification shall be chosen to be unique across all notifications of a particular managed object throughout the time that correlation is significant, it uniquely identifies the notification from other notifications generated by the subject Information Object. |  |
| eventTime | M | AlarmInformation.alarmRaisedTime |  |
| systemDN | C | It shall carry the DN of service providers. |  |
| notificationType | M | "notifyNewAlarm". |  |
| probableCause | M | AlarmInformation.probableCause |  |
| perceivedSeverity | M | AlarmInformation.perceivedSeverity |  |
| rootCauseIndicator | O | It indicates that this AlarmInformation is the root cause of the events captured by the notifications whose identifiers are in the related CorrelatedNotification instances. | "Yes", "No" |
| alarmType | M | AlarmInformation.eventType | The notification structure defined by this table is applicable if this parameter indicates "Communications Alarm", "Processing Error Alarm", "Environmental Alarm". "Quality Of Service Alarm" or "Equipment Alarm". |
| specificProblem | O | AlarmInformation.specificProblem |  |
| correlatedNotifications | O | The set of CorrelatedNotification related to this AlarmInformation. |  |
| backedUpStatus | O | AlarmInformation.backedUpStatus |  |
| backUpObject | O | MonitoredEntity.objectInstance  It carries the DN of the back up object. | The object is identified by relation-BackUpObject-AlarmInformation of the new AlarmInformation. |
| trendIndication | O | AlarmInformation.trendIndication |  |
| thresholdInfo | O | AlarmInformation.thresholdInfo |  |
| stateChangeDefinition | O | AlarmInformation.stateChangeDefinition |  |
| monitoredAttributes | O | AlarmInformation.monitoredAttributes |  |
| proposedRepairActions | O | AlarmInformaton.proposedRepairActions |  |
| additionalText | O | AlarmInformation.additionalText |  |
| additionalInformation | O | AlarmInformation.additionalInformation |  |
| alarmId | M | AlarmInformation.alarmId |  |
| NOTE: MonitoredEntity represents objects that can have an alarmed state. | | | |

Table 10.2.1.1.4.2.2: Input Parameters for notification related to security alarm

| Parameter Name | Qualifier | Matching Information/ Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| objectClass | M | MonitoredEntity.objectClass  It shall carry the MonitoredEntity class name. | The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| objectInstance | M | MonitoredEntity.objectInstance  It shall carry the Distinguished Name (DN) of the instance of MonitoredEntity class. | The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| notificationId | M | This is an identifier for the notification, which may be used to correlate notifications. The identifier of the notification shall be chosen to be unique across all notifications of a particular managed object throughout the time that correlation is significant, it uniquely identifies the notification from other notifications generated by the subject Information Object. |  |
| eventTime | M | AlarmInformation.alarmRaisedTime |  |
| systemDN | C | It shall carry the DN of service providers. |  |
| notificationType | M | "notifyNewAlarm". |  |
| probableCause | M | AlarmInformation.probableCause |  |
| perceivedSeverity | M | AlarmInformation.perceivedSeverity |  |
| rootCauseIndicator | O | It indicates that this AlarmInformation is the root cause of the events captured by the notifications whose identifiers are in the related CorrelatedNotification instances. | "Yes", "No" |
| alarmType | M | AlarmInformation.eventType | The notification structure of this table is applicable if this parameter indicates "Integrity Violation", "Operational Violation", "Physical Violation", "Security Service or Mechanism Violation", "Time Domain Violation". |
| correlatedNotifications | O | The set of CorrelatedNotification related to this AlarmInformation. |  |
| additionalText | O | AlarmInformation.additionalText |  |
| additionalInformation | O | AlarmInformation.additionalInformation |  |
| serviceUser | M | AlarmInformation.securityServiceUser | This may contain no information if the identify of the service-user (requesting the service) is not known. |
| serviceProvider | M | AlarmInformation.securityServiceProvider | This shall always identify the service-provider receiving a service request, from serviceUser, that provokes the security alarm. |
| securityAlarmDetector | M | AlarmInformation.securityAlarmDetector | This may contain no information if the detector of the security alarm is the serviceProvider. |
| alarmId | M | AlarmInformation.alarmId |  |
| NOTE: MonitoredEntity represents objects that can have an alarmed state. | | | |

###### 10.2.1.1.4.3 Triggering event

10.2.1.1.4.3.1 From-state

noMatchedAlarm.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| noMatchedAlarm | AlarmList does not contain an AlarmInformation that has the following properties:  Its matching-criteria-attributes values are identical to that of the newly generated network alarm and it is involved in relation-AlarmObject-AlarmInformation with the same MonitoredEntity as the one identified by the newly generated network alarm. |

10.2.1.1.4.3.2 To-state

newAlarmInAlarmList.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| newAlarmInAlarmList | AlarmList contains an AlarmInformation holding information conveyed by the newly generated network alarm. This AlarmInformation is involved in relation-AlarmObject-AlarmInformation with the same MonitoredEntity as the one identified by the newly generated network alarm.  The following attributes of the AlarmInformation shall be populated with information in the newly generated alarm.  alarmId, notificationId, alarmRaisedTime, eventType, probableCause, perceivedSeverity.  The following attributes of the same AlarmInformation shall be populated with information in the newly generated alarm if the information is present (in the newly generated alarm) and if the attribute is supported:  specificProblem, backedUpStatus, trendIndication, thresholdInfo, stateChangeDefinition, monitoredAttributes, proposedRepairActions, additionalText, additionalInformation. |

##### 10.2.1.1.5 notifyChangedAlarm

###### 10.2.1.1.5.1 Definition

The subscribed consumer is notified regarding changes in AlarmInformation in AlarmList. This notification is only triggered by a change in perceivedSeverity attribute value (except to the value "Cleared"). The AlarmInformation carried in the notification shall satisfy the current filter constraint of the consumer's subscription.

The notification shall contain all parameters that are filterable and are present in the original (related) notifyNewAlarm notification.

10.2.1.1.5.2 Input Parameters

| Parameter Name | Qualifier | Matching Information/ Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| objectClass | M | MonitoredEntity.objectClass  It shall carry the MonitoredEntity class name. | The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| objectInstance | M | MonitoredEntity.objectInstance  It shall carry the Distinguished Name (DN) of the instance of MonitoredEntity class. | The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| notificationId | M | This is an identifier for the notification, which may be used to correlate notifications. The identifier of the notification shall be chosen to be unique across all notifications of a particular managed object throughout the time that correlation is significant, it uniquely identifies the notification from other notifications generated by the subject Information Object. |  |
| eventTime | M | AlarmInformation.alarmChangedTime |  |
| systemDN | C | It shall carry the DN of service providers. |  |
| notificationType | M | "notifyChangedAlarm" |  |
| probableCause | M | AlarmInformation.probableCause |  |
| perceivedSeverity | M | AlarmInformation.perceivedSeverity |  |
| alarmType | M | AlarmInformation.eventType |  |
| alarmId | M | AlarmInformation.alarmId |  |
| NOTE: MonitoredEntity represents objects that can have an alarmed state. | | | |

###### 10.2.1.1.5.3 Triggering event

10.2.1.1.5.3.1 From-state

alarmMatched AND alarmNotCleared AND alarmChanged.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| alarmMatched | The matching-criteria-attributes of the newly generated network alarm has values that are identical (matches) with ones in one AlarmInformation in AlarmList. |
| alarmNotCleared | The perceivedSeverity of the newly generated network alarm is not Cleared. |
| alarmChanged | The perceivedSeverity of the newly generated network alarm and of the matched AlarmInformation are different. |

10.2.1.1.5.3.2 To-state

informationUpdate.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| informationUpdate | * The AlarmInformation identified in alarmMatched in from-state has been updated according to the following rules: perceivedSeverity is updated; * notificationId is updated; * alarmChangedTime is updated; * ackTime, ackUserId and ackSystemId are updated to contain no information; * ackState is updated to "unacknowledged"; |

##### 10.2.1.1.6 notifyAlarmListRebuilt

###### 10.2.1.1.6.1 Definition

This interface supports notifying the alarm list rebuilding information if part or all of AlarmList has been rebuilt.

###### 10.2.1.1.6.2 Input Parameters

| Parameter Name | Qualifier | Legal type | Comment |
| --- | --- | --- | --- |
| objectClass | M | -- | It identifies the object class that changed state. |
| objectInstance | M | -- | It identifies the object instance that changed state. |
| notificationId | M | -- | It identifies the notification that carries the AlarmInformation. |
| eventTime | M | -- | It identifies the last time when the event occurred. |
| systemDN | C | -- | It identifies the DN of service providers. |
| notificationType | M | "notifyAlarmListRebuilt". |  |
| reason | M | "System-NE communication error", "System restarts", "indeterminate". Other values can be added. | It carries the reason why the system has rebuilt the AlarmList. This may carry different reasons than that carried by the immediate previous notifyPotentialFaultyAlarmList. |
| alarmListAlignmentRequirement | O | "alignmentRequired",  "alignmentNotRequired" | It carries an enumeration of "alignmentRequired" and "alignmentNotRequired". |

###### 10.2.1.1.6.3 Triggering event

10.2.1.1.6.3.1 From-state

alarmListRebuilt\_0 OR alarmListRebuilt\_1.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| alarmListRebuilt\_0 | Provider has cold-started, initialized, re-initialized or rebooted and it has initiated procedure to rebuild its AlarmList. |
| alarmListRebuilt\_1 | Provider loses confidence in part or whole of its AlarmList. Provider has initiated procedure to repair its AlarmList. |

10.2.1.1.6.3.2 To-state

alarmListRebuilt\_2.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| alarmListRebuilt\_2 | Provider rebuilds the whole or part of AlarmList. |

##### 10.2.1.1.7 notifyCorrelatedNotificationChanged

###### 10.2.1.1.7.1 Definition

The set of CorrelatedNotification has been created, updated or removed. The subscribed consumers are notified of this fact if the changes satisfy the current filter constraint of their subscription.

###### 10.2.1.1.7.2 Input Parameters

| Parameter Name | Qualifier | Matching Information/ Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| objectClass | M | MonitoredEntity.objectClass  It shall carry the MonitoredEntity class name. | The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| objectInstance | M | MonitoredEntity.objectInstance  It shall carry the Distinguished Name (DN) of the instance of MonitoredEntity class. | The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| notificationId | M | This is an identifier for the notification, which may be used to correlate notifications. The identifier of the notification shall be chosen to be unique across all notifications of a particular managed object throughout the time that correlation is significant, it uniquely identifies the notification from other notifications generated by the subject Information Object. |  |
| eventTime | M | It carries the time when the CorrelatedNotification is added. |  |
| systemDN | C | It shall carry the DN of service providers. |  |
| notificationType | M | "notifyCorrelatedNotificationChanged" |  |
| correlatedNotifications | M | The set of CorrelatedNotification related to this AlarmInformation. |  |
| alarmId | M | AlarmInformation.alarmId |  |
| rootCauseIndicator | O | AlarmInformation.rootCauseIndicator |  |
| NOTE: MonitoredEntity represents objects that can have an alarmed state. | | | |

###### 10.2.1.1.7.3 Triggering event

10.2.1.1.7.3.1 From-state

newAlarmCorrelationInfoIsAvailable AND alarmInformationExists.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| newAlarmCorrelationInfoIsAvailable | New alarm correlation information is available but not yet conveyed to any consumer. |
| alarmInformationExists | The AlarmInformation is in AlarmList. |

10.2.1.1.7.3.2 To-state

alarmCorrelatedInfoUpdated.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| alarmCorrelatedInfoUpdated | The set of CorrelatedNotification network slice instances has been created, updated or removed. |

##### 10.2.1.1.8 getAlarmCount

###### 10.2.1.1.8.1 Definition

An authorized consumer wishes to know the amount of AlarmInformation kept in the AlarmList. The authorized consumer requests the counts via this operation. Possible usage is for authorized consumer to find out the number of AlarmInformation in AlarmList before invoking getAlarmList operation.

###### 10.2.1.1.8.2 Input Parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Qualifier | Information Type | Comment |
| filter | O | N/A | It carries a filter constraint. The operation shall apply it when counting the AlarmInformation instances in AlarmList.  Case when synchronous mode of operation is used for getAlarmList:  (a) If this parameter is present, the operation shall count the AlarmInformation instances which satisfy both (a) this filter constraint and (b) the condition set by input parameter alarmAckState.  (b) If this parameter is absent, the operation shall count all AlarmInformation instances that satisfy the condition set by input parameter alarmAckState.  Case when asynchronous mode of operation is used for getAlarmList:  (a) If this parameter is present, the operation shall count all AlarmInformation instances that satisfy this filter constraint and the condition set by input parameter alarmAckState.  (b) If this parameter is absent, the operation shall count AlarmInformation instances that satisfy (a) the filter constraint currently active in the notification channel established between the authorized consumer and the service provider and (b) the condition set by input parameter alarmAckState. |
| alarmAckState | O | ENUM (all alarms, all active alarms, all active and acknowledged alarms, all active and unacknowledged, all cleared and unacknowledged alarms, all unacknowledged) | It carries a constraint. The operation shall apply it on AlarmInformation instances in AlarmList when counting. |

###### 10.2.1.1.8.3 Output Parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Qualifier | Matching Information | Comment |
| criticalCount, majorCount, minorCount, warningCount, indeterminateCount, clearedCount | M | N/A | They carry the number of AlarmInformation in AlarmList that has the following properties.  Case when synchronous mode of operation is used:  (a) The operation shall apply the constraints expressed in alarmAckState and filter to AlarmInformation instances when counting.  Case when asynchronous mode of operation is used (i.e. this output parameter is conveyed via notifications):  (a) If the filter parameter is present, the operation shall apply the constraint when counting. Furthermore, if the alarmAckState constraint is present, the operation shall apply that constraint as well. The filter constraint, if any, that is currently active in the notification channel is not used for the counting.  (b) If the filter parameter is absent, the operation shall apply the filter constraint currently active in the notification channel when counting. If the alarmAckState constraint is present, the operation shall apply that constraint as well. |
| status | M | ENUM (OperationSucceeded, OperationFailed) | If allAlarmInformationCounted is true, status = OperationSucceeded.  If operation\_failed is true, status = OperationFailed. |

###### 10.2.1.1.8.4 Pre-condition

There are no pre-conditions.

###### 10.2.1.1.8.5 Post-condition

allAlarmInformationCounted.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| allAlarmInformationCounted | All AlarmInformation that satisfy the constraints expressed in input parameters filter and alarmAckState and are present in the AlarmList at the moment of this operation invocation are counted and the result returned.  All AlarmInformation in AlarmList remains unchanged as the result of this operation. |

###### 10.2.1.1.8.6 Exceptions

|  |  |
| --- | --- |
| Name | Definition |
| operation\_failed | **Condition:** the pre-condition is false or the post-condition is true.  **Returned Information:** The output parameter status.  **Exit state:** Entry state. |
| filter\_complexity\_limit | **Condition:** Operation not performed because the filter parameter is too complex.  **Returned Information**: The output parameter status.  **Exit state:** Entry state. |

##### 10.2.1.1.9 setComment

###### 10.2.1.1.9.1 Definition

The authorized consumer invokes this operation to record a comment in one or more AlarmInformation instances in AlarmList.

###### 10.2.1.1.9.2 Input Parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Qualifier | Information Type | Comment |
| alarmInformation ReferenceList | M | List of AlarmInformation.alarmId | It carries one or more identifiers identifying AlarmInformation instances in the AlarmList. |
| commentUserId | M | The Comment.commentUserId where Comment is involved in relation-AlarmInformation-Comment with an AlarmInformation. |  |
| commentSystemId | O | The Comment.commentSystemId where Comment is involved in relation-AlarmInformation-Comment with an AlarmInformation. |  |
| commentText | M | The comment.commentText where Comment is involved in relation-AlarmInformation-Comment with an AlarmInformation. |  |

###### 10.2.1.1.9.3 Output Parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Qualifier | Matching Information | Comment |
| badAlarm Information ReferenceList | M | List of pair of AlarmInformation.alarmId and the failure reason. | If allUpdated is true, it contains no information.  If someUpdated is true, then it contains identifications of AlarmInformation that are not present in AlarmList or that they are present, but AlarmInformation.comments has not changed, in contrast to authorized consumer's request. |
| status | M | ENUM( Operation succeeded, Operation failed, Operation partially failed) | If allUpdated is true, then status = OperationSucceeded.  If someUpdated is true, then status = OperationPartiallyFailed.  If exception operationFailed is raised, then status = OperationFailed. |

#### 10.2.1.2 Fault supervision data control management service

##### 10.2.1.2.1 acknowledgeAlarms

###### 10.2.1.2.1.1 Definition

The authorized consumer invokes this operation to acknowledge one or more alarms.

###### 10.2.1.2.1.2 Input Parameters

| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| alarmInformationReferenceList | M | List of AlarmInformation.alarmId and AlarmInformation.perceivedSeverity | It carries one or more identifiers identifying AlarmInformation instances in AlarmList, including optionally the perceivedSeverity of the AlarmInformation instance that is going to be acknowledged.  alarmInformationReferenceList  { alarmId - Mandatory;  perceivedSeverity - Optional  } |
| ackUserId | M | AlarmInformation.ackUserId | It identities the user acknowledging the alarm. |
| ackSystemId | O | AlarmInformation.ackSystemId | It identifies the authorized consumer. It may be absent implying that the consumer does not wish this information be kept in AlarmInformation in AlarmList. |

###### 10.2.1.2.1.3 Output Parameters

| Parameter Name | Support Qualifier | Matching Information /  Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| badAlarm Information ReferenceList | M | List of pair of AlarmInformation.alarmId, ENUM (UnknownAlarmId, AcknowledgmentFailed, WrongPerceivedSeverity) and additional failure reason. | If all alarms are acknowledged, it contains no information.  If some alarms are acknowledged, then it contains identifications of AlarmInformation that are (a) present in input parameter AlarmInformationReferenceList but are absent in the AlarmList = UnknownAlarmId; or  (b) present in input parameter AlarmInformationReferenceList and are present in the AlarmList but the Acknowledgement Information (see note below table) has not changed, in contrast to the consumer's request = AcknowledgmentFailed; or  (c) present in input parameter AlarmInformationReferenceList and are present in the AlarmList but the perceivedSeverity to be acknowledged has changed and/or is different within the Alarm List = WrongPerceivedSeverity (applicable only if perceivedSeverity was provided). |
| status | M | ENUM (OperationSucceeded, OperationFailed, OperationPartiallySucceeded) | If some alarms are acknowledged, status = OperationPartiallySuceeded.  If all alarms acknowledged, status = OperationSucceeded.  If operation is failed is true, status = OperationFailed. |

NOTE: Acknowledgement Information is defined as the information contained in AlarmInformation.ackTime, AlarmInformation.ackUserId, AlarmInformaton.ackSystemId, AlarmInformation.ackState.

###### 10.2.1.2.1.4 Exceptions and Constraints

| Exception Name | Definition |
| --- | --- |
| operation\_failed | **Condition:** Operation is failed  **Returned Information:** The output parameter status  **Exit state:** Entry State |

##### 10.2.1.2.2 unacknowledgeAlarms

###### 10.2.1.2.2.1 Definition

The authorized consumer invokes this operation to remove acknowledgement information kept in one or more AlarmInformation instances.

###### 10.2.1.2.2.2 Input Parameters

| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| alarmInformationReferenceList | M | List of AlarmInformation.alarmId | It carries one or more identifiers identifying AlarmInformation in AlarmList. |
| ackUserId | M | AlarmInformation.ackUserId | It identities the user that invokes this operation. |
| ackSystemId | O | AlarmInformation.ackSystemId | It identifies the authorized consumer. |

###### 10.2.1.2.2.3 Output Parameters

| Parameter Name | Support Qualifier | Matching Information /  Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| badAlarmInformationReferenceList | M | List of pair of AlarmInformation.alarmId and the failure reason. | If all alarms are unacknowledged, it contains no information.  If some alarms are unacknowledged, then it contains identifications of AlarmInformation that are  (a) present in input parameter AlarmInformationReferenceList but are absent in the AlarmList; or  (b) present in input parameter AlarmInformationReferenceList and are present in the AlarmList but the Acknowledgement Information (see note below table) has not changed, in contrast to consumer's request. |
| status | M | ENUM (OperationSucceeded, OperationFailed, OperationPartiallySucceeded) | If some alarms are unacknowledged, status = OperationPartiallySucceeded.  If all alarms are unacknowledged, status = OperationSucceeded.  If operationfisailed, status = OperationFailed. |

NOTE: Acknowledgement Information is defined as the information contained in AlarmInformation.ackTime, AlarmInformation.ackUserId, AlarmInformaton.ackSystemId, AlarmInformation.ackState.

###### 10.2.1.2.2.4 Exceptions and constraints

| Exception Name | Definition |
| --- | --- |
| operation\_failed | **Condition:** Operation is failed  **Returned Information:** The output parameter status  **Exit state:** Entry State |

##### 10.2.1.2.3 clearAlarms

###### 10.2.1.2.3.1 Definition

The authorized consumer invokes this operation to clear one or more AlarmInformation instances in AlarmList. For example, this operation can be used to support the manual clearing of the ADMC (automatic detection and manual clearing, see also 3GPP TS 32.111-1 [3]) alarms.

###### 10.2.1.2.3.2 Input Parameters

| Parameter Name | Support Qualifier | Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| alarmInformation ReferenceList | M | List of AlarmInformation.alarmId | It carries one or more identifiers identifying AlarmInformation instances in the AlarmList. |
| clearUserId | M | AlarmInformation.clearUserId | It identities the user clearing the alarm. |
| clearSystemId | O | AlarmInformation.clearSystemId | It identifies the authorized consumer. It may be absent implying that consumer does not wish this information be known to the service provider. |

###### 10.2.1.2.3.3 Output Parameters

| Parameter Name | Support Qualifier | Matching Information /  Information Type / Legal Values | Comment |
| --- | --- | --- | --- |
| badAlarmInformation ReferenceList | M | List of pair of AlarmInformation.alarmId and the failure reason. | If all alarms are cleared, it contains no information.  If some alarms are cleared, then it contains identifications of AlarmInformation that are not present in AlarmList or that are present in AlarmList but remain unchanged, in contrast to consumer's request. |
| status | M | ENUM( OperationSucceeded, OperationFailed, OperationPartiallySucceeded) | If all alarms are cleared, then status = OperationSucceeded.  If some alarms are cleared, then status = OperationPartiallySucceeded.  If operation is failed, then status = OperationFailed. |

###### 10.2.1.2.3.4 Exceptions and Constraints

| Exception Name | Definition |
| --- | --- |
| operation\_failed | **Condition:** Operation is failed  **Returned Information:** The output parameter status  **Exit state:** Entry State |

##### 10.2.1.2.4 notifyClearedAlarm

###### 10.2.1.2.4.1 Definition

This interface notifies the alarm clearing information if it satisfies filter constraint in AlarmInformation. The notification shall satisfy all filter constraint and notify in the notifyNewAlarmNotification.

###### 10.2.1.2.4.2 Input Parameters

| Parameter Name | Qualifier | Legal type | Comment |
| --- | --- | --- | --- |
| objectClass | M | -- | It identifies the object class whose perceived severity level is cleared. |
| objectInstance | M | -- | It identifies the object instance whose perceived severity level is cleared. |
| notificationId | M | -- | It identifies the notification that carries the AlarmInformation. |
| eventTime | M | -- | It identifies the last time when the event occurred. |
| systemDN | C | -- | It identifies the DN of service prod. |
| notificationType | M | "notifyClearedAlarm" |  |
| probableCause | M | -- |  |
| perceivedSeverity | M | -- | Its value shall indicate Cleared. |
| alarmType | M | -- |  |
| correlated Notifications | O | The set of CorrelatedNotification related to this AlarmInformation. | It contains references to other AlarmInformation instances whose perceivedSeverity levels are Cleared as well. In this way, perceivedSeverity level of multiple AlarmInformation instances can be Cleared by one notification. |
| clearUserId | O | -- | It carries the identity of the user who invokes the clearAlarms operation. |
| clearSystemId | O | -- | It carries the identity of the authorized consumer. |
| alarmId | M | -- | It identifies one AlarmInformation in the AlarmList. |

###### 10.2.1.2.4.3 Triggering event

10.2.1.2.4.3.1 From-state

alarmMatchedAndCleared OR clearedByProvider.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| alarmMatchedAndCleared | The matching-criteria-attributes of the newly generated network alarm have values that are identical (matched) with ones in one AlarmInformation in AlarmList and the perceivedSeverity of the matched AlarmInformation is not Cleared  AND  The perceivedSeverity of the newly generated network alarm is cleared. |
| clearedByProvider | Reception of a valid clearAlarms operation that identifies the subject AlarmInformation instances. This triggering event shall occur regardless of the perceivedSeverity state of the identified AlarmInformation instances. |

10.2.1.2.4.3.2 To-state

alarmInformationCleared\_1 OR alarmInformationCleared\_2.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| alarmInformationCleared\_1 | Case if From-state is alarmMatchedAndCleared:  The following attributes of the subject AlarmInformation are updated:  notificationId, perceivedSeverity (updated to Cleared), alarmClearedTime. |
| alarmInformationCleared\_2 | Case if From-state is clearedByProvider:  The following attributes of the subject AlarmInformation are updated:  notificationId, perceivedSeverity (updated to Cleared), alarmClearedTime, alarmClearedUserId, alarmClearedSystemId. |

##### 10.2.1.2.5 notifyAckStateChanged

###### 10.2.1.2.5.1 Definition

This interface indicates two types of AckStateChanged alarm, which are acknowledged alarm and unacknowledged alarm respectively. The capability of acknowledging alarms is vendor defined.

The relative state change information of these two types of alarm has been referred to stateChangeDefinition as specific attributes of AlarmInformation. The notification shall satisfy all filter constraint and notify in the notifyNewAlarmNotification.

###### 10.2.1.2.5.2 Input Parameters

These parameters are filters for the interfaces.

| Parameter Name | Qualifier | Legal type | Comment |
| --- | --- | --- | --- |
| objectClass | M | -- | It identifies the object class that changed state. |
| objectInstance | M | -- | It identifies the object instance that changed state. |
| notificationId | M | -- | It identifies the notification that carries the AlarmInformation. |
| eventTime | M | -- | It identifies the last time when the event occurred. |
| systemDN | C | -- | It identifies the DN of service providers. |
| notificationType | M | "notifyAckStateChanged". |  |
| probableCause | M | -- | It qualifies alarm and provides further information than eventType. |
| perceivedSeverity | M | -- | It indicates the relative level of urgency for operator attention. |
| alarmType | M | -- | The notification structure defined by this table is applicable if this parameter indicates "Communications Alarm", "Processing Error Alarm", "Environmental Alarm". "Quality Of Service Alarm" or "Equipment Alarm". |
| alarmId | M | -- | It identifies one AlarmInformation in the AlarmList. |
| ackState | M | -- | It identifies the Acknowledgement State of the alarm. |
| ackUserId | M | -- | It identifies the last user who has changed the Acknowledgement State. |
| ackSystemId | O | -- | It identifies the system (the authorized consumer) that last changed the ackState of an alarm, i.e. acknowledged or unacknowledged the alarm. |

###### 10.2.1.2.5.3 Triggering event

10.2.1.2.5.3.1 From-state

ackedByConsumer OR ackedByProvider AND alarmInformationExists.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| ackedByConsumer | Reception of an acknowledgeAlarms operation and a subsequent operation success return. |
| ackedByProvider | Reception of a local (non-standard) acknowlegeAlarms equivalent operation and a subsequent operation success return. |
| alarmInformationExists | The AlarmInformation exists in AlarmList. |

10.2.1.2.5.3.2 To-state

alarmAckStateHasChanged.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| alarmAckStateHasChanged | The AlarmInformation.ackState of the AlarmInformation identified by from-state assertion alarmInformationExists have been updated. Specifically, the following attributes of the subject AlarmInformation are updated:  -- notificationId, ackTime, ackUserId, ackState, ackSystemId. |

##### 10.2.1.2.6 notifyComments

###### 10.2.1.2.6.1 Definition

The subscribed authorized consumer instances are notified regarding the addition of a Comment instance to an AlarmInformation instance in the AlarmList. The AlarmInformation carried in the notification shall satisfy the current filter constraint of the subscription.

The notification shall contain all parameters that are filterable and are present in the original (related) notifyNewAlarm notification.

Service provider shall support this notification if it supports the operation setComment.

###### 10.2.1.2.6.2 Input Parameters

| Parameter Name | Qualifier | Matching Information | Comment |
| --- | --- | --- | --- |
| objectClass | M,Y | MonitoredEntity.objectClass | The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| objectInstance | M,Y | MonitoredEntity.objectInstance | The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| notificationId | M,N | -- |  |
| eventTime | M,Y | Comment.commentTime |  |
| systemDN | C,Y | -- |  |
| notificationType | M,Y | "notifyComments" |  |
| alarmType | M,Y | AlarmInformation.eventType |  |
| probableCause | M,Y | AlarmInformation.probableCause |  |
| perceived Severity | M,Y | AlarmInformation.perceivedSeverity |  |
| comments | M,N | The set of Comment instances involved in a relationship with this AlarmInformation. |  |
| alarmId | M,N | AlarmInformation.alarmId |  |

###### 10.2.1.2.6.3 Trigger event

10.2.1.2.6.3.1 From-state

commentSetByServiceConsumer OR commentSetInternallyByServiceprovider AND alarmInformationExists.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| commentSetByServiceConsumer | Reception of a successful setComment operation from the service consumer. |
| commentSetInternallyByServiceprovider | Setting of the comment internally by the service producer based on local events. |
| alarmInformationExists | The AlarmInformation is in AlarmList. |

10.2.1.2.6.3.2 To-state

commentInserted.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| commentInserted | One Comment has been created and it is involved in a relationship with the AlarmInformation identified by from-state assertion alarmInformationExists. The following attributes of the newly created Comment instance shall be populated:  commentTime, commentText, commentUserId and commentSystemId. |

##### 10.2.1.2.7 notifyPotentialFaultyAlarmList

###### 10.2.1.2.7.1 Definition

The service provider maintains an AlarmList. They can lose confidence in the integrity of its AlarmList. Under this condition, service provider related AlarmList shall invoke notifyPotentialFaultyAlarmList. They then can begin to rebuild the faulty AlarmList, if found necessary. After the successful rebuilt or the discovery that rebuilt is not necessary, they shall invoke notifyAlarmListRebuilt notification.

This notification can identify a set of AlarmInformation that is potentially faulty or unreliable. This identification is done in the following way. If the MOI of an AlarmInformation is the same or is a subordinate to the MOI carried in the notification, then the AlarmInformation may be faulty or unreliable.

This notification can identify all the AlarmInformation instances of the AlarmList that are potentially faulty or unreliable. In this case, the notification shall carry a MOI identifying the service provider.

The authorized consumer behaviour, on reception of this notifyPotentialFaultyAlarmList notification, is not specified. The authorized consumer behaviour is considered not essential for the specification of the interface itself. However, the following are recommended actions the uthorized consumer should take, in case it receives this notification.

1) The uthorized consumer should not perform any task requiring the integrity of the AlarmInformation identified as faulty or unreliable by the subject notification.

2) The uthorized consumer should not invoke operations that require integrity of the AlarmList such as getAlarmList., acknolwedgeAlarms operations.

###### 10.2.1.2.7.2 Input Parameters

| Parameter Name | Qualifier | Matching Information | Comment |
| --- | --- | --- | --- |
| objectClass | M,Y | It identifies  a) the class of the instance identified by systemDN or  b) the class of MonitoredEntity. | If it identifies the class of the instance identified in systemDN, then all AlarmInformation instances in the AlarmList may not be reliable.  If it identifies the class of MonitoredEntity, then some or all AlarmInformation instances in the AlarmList may not be reliable. See next parameter for the identification of the set of AlarmInformation that may not be reliable. |
| objectInstance | M,Y | It identifies  a) the instance identified by systemDN or  b) an instance of MonitoredEntity. | If it identifies the instance identified by systemDN, then all AlarmInformation instances in the AlarmList may not be reliable.  If it identifies an instance of MonitoredENtity, then AlarmInformation of this instance and AlarmInformation of its subordinate instances may not be reliable. |
| notificationId | M,N | -- |  |
| eventTime | M,Y | -- |  |
| systemDN | C,Y | -- |  |
| notificationType | M,Y | "notifyPotentialFaultyAlarmList". |  |
| reason | M,N | "serviceprovider-NE communication error", " serviceprovider restarts", "indeterminate". Other values can be added. | It carries the reason why the service provider has to rebuild its AlarmList. |

###### 10.2.1.2.7.3 Trigger event

10.2.1.2.7.3.1 From-state

faultyAlarmListDetected.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| faultyAlarmListDetected | Service provider detects faults in part or whole of its AlarmList. |

10.2.1.2.7.3.2 To-state

faultyAlarmList

|  |  |
| --- | --- |
| Assertion Name | Definition |
| faultyAlarmList | Service provider initiates the AlarmList rebuild process. |

##### 10.2.1.2.8 notifyChangedAlarmGeneral

###### 10.2.1.2.8.1 Definition

The subscribed authorized consumer instances are notified regarding changes in backedUpStatus, backUpObject, trendIndication, thresholdInfo, stateChangeDefinition, monitoredAttributes, proposedRepairActions, additionalText, additionalInformation, serviceUser, serviceProvider or securityAlarmDetector of an AlarmInformation instance in the AlarmList. This notification is triggered by value change in one or some of these attributes. The AlarmInformation carried in the notification shall satisfy the current filter constraint of the subscription.

The notification shall contain all parameters holding a value.

###### 10.2.1.2.8.2 Input Parameters

There are two tables for Input Parameters. If alarmType parameter indicates "Communications Alarm", "Processing Error Alarm", "Environmental Alarm". "Quality Of Service Alarm" or "Equipment Alarm", the first table (see clause 10.2.1.2.z.2) shall be applicable. If alarmType parameter indicates "Integrity Violation", "Operational Violation", "Physical Violation", "Security Service or Mechanism Violation" or "Time Domain Violation", the second table (see clause 10.2.1.2.z.3) shall be applicable.

| Parameter Name | Qualifier | Matching Information | Comment |
| --- | --- | --- | --- |
| objectClass | M,Y | MonitoredEntity.objectClass | It shall carry the MonitoredEntity class name. The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| objectInstance | M,Y | MonitoredEntity.objectInstance | It shall carry the DN of the MonitoredEntity. The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| notificationId | M,N | -- |  |
| eventTime | M,Y | AlarmInformation.alarmChangedTime |  |
| systemDN | C,Y | -- |  |
| notificationType | M,Y | "notifyChangedAlarmGeneral". |  |
| probableCause | M,Y | AlarmInformation.probableCause |  |
| perceivedSeverity | M,Y | AlarmInformation.perceivedSeverity |  |
| rootCauseIndicator | O,N | It indicates that this AlarmInformation is the root cause of the events captured by the notifications whose identifiers are in the related CorrelatedNotification instances. | “Yes”, “No” |
| alarmType | M,Y | AlarmInformation.eventType | The notification structure defined by this table is applicable if this parameter indicates "Communications Alarm", "Processing Error Alarm", "Environmental Alarm". "Quality Of Service Alarm" or "Equipment Alarm". |
| specificProblem | O,N | AlarmInformation.specificProblem |  |
| correlatedNotifications | O,N | The set of CorrelatedNotification related to this AlarmInformation. |  |
| backedUpStatus | O,N | AlarmInformation.backedUpStatus |  |
| backUpObject | O,N | MonitoredEntity.objectInstance | It carries the DN of the back up object. The object is identified by relation-BackUpObject-AlarmInformation of the new AlarmInformation. |
| trendIndication | O,N | AlarmInformation.trendIndication |  |
| thresholdInfo | O,N | AlarmInformation.thresholdInfo |  |
| stateChangeDefinition | O,N | AlarmInformation.stateChange |  |
| monitoredAttributes | O,N | AlarmInformation.monitoredAttributes |  |
| proposedRepairActions | O,N | AlarmInformaton.proposedRepairActions |  |
| additionalText | O,N | AlarmInformation.additionalText |  |
| additionalInformation | O,N | AlarmInformation.additionalInformation |  |
| alarmId | M,N | AlarmInformation.alarmId |  |
| changedAlarmAttributes | M,N | LIST OF SEQUENCE <AttributeName, OldAttributeValue> | The changed alarm attributes (name/value pairs) (with old values). |

###### 10.2.1.2.8.3 Input Parameters for notification related to security alarm

| Parameter Name | Qualifier | Matching Information | Comment |
| --- | --- | --- | --- |
| objectClass | M,Y | MonitoredEntity.objectClass | It shall carry the MonitoredEntity class name. The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| objectInstance | M,Y | MonitoredEntity.objectInstance | It shall carry the DN of the MonitoredEntity. The MonitoredEntity is identified by the relation-AlarmedObject-AlarmInformation of the new AlarmInformation. |
| notificationId | M,N | -- |  |
| eventTime | M,Y | AlarmInformation.alarmChangedTime |  |
| systemDN | C,Y | -- |  |
| notificationType | M,Y | "notifyChangedAlarmGeneral". |  |
| probableCause | M,Y | AlarmInformation.probableCause |  |
| perceivedSeverity | M,Y | AlarmInformation.perceivedSeverity |  |
| rootCauseIndicator | O,N | It indicates that this AlarmInformation is the root cause of the events captured by the notifications whose identifiers are in the related CorrelatedNotification instances. | “Yes”, “No” |
| alarmType | M,Y | AlarmInformation.eventType | The notification structure of this table is applicable if this parameter indicates "Integrity Violation", "Operational Violation", "Physical Violation", "Security Service or Mechanism Violation", "Time Domain Violation". |
| correlatedNotifications | O,N | The set of CorrelatedNotification related to this AlarmInformation. |  |
| additionalText | O,N | AlarmInformation.additionalText |  |
| additionalInformation | O,N | AlarmInformation.additionalInformation |  |
| serviceUser | M,N | AlarmInformation.serviceUser | This may contain no information if the identify of the service-user (requesting the service) is not known. |
| serviceProvider | M,N | AlarmInformation.serviceProvider | This shall always identify the service-provider receiving a service request, from serviceUser, that provokes the security alarm. |
| securityAlarmDetector | M,N | AlarmInformation.securityAlarmDetector | This may contain no information if the detector of the security alarm is the serviceProvider. |
| alarmId | M,N | AlarmInformation.alarmId |  |
| changedAlarmAttributes | M,N | LIST OF SEQUENCE <AttributeName, OldAttributeValue> | The changed alarm attributes (name/value pairs) (with old values). |

###### 10.2.1.2.8.4 Trigger event

10.2.1.2.8.4.1 From-state

alarmMatched AND alarmNotCleared AND alarmChanged.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| alarmMatched | The matching-criteria-attributes of the newly generated network alarm has values that are identical (matches) with ones in one AlarmInformation in AlarmList. |
| alarmChanged | The backedUpStatus, backUpObject, trendIndication, thresholdInfo, stateChangeDefinition, monitoredAttributes, proposedRepairActions, additionalText, additionalInformation, serviceUser, serviceProvider or securityAlarmDetector of the newly generated network alarm and of the matched AlarmInformation are different. |

10.2.1.2.8.4.2 To-state

informationUpdate.

|  |  |
| --- | --- |
| Assertion Name | Definition |
| informationUpdate | The AlarmInformation identified in alarmMatched in from-state has been updated according to the following rules: backedUpStatus, backUpObject, trendIndication, thresholdInfo, stateChangeDefinition, monitoredAttributes, proposedRepairActions, additionalText, additionalInformation, serviceUser, serviceProvider or securityAlarmDetector is updated;  notificationId is updated;  alarmChangedTime is updated;  ackTime, ackUserId and ackSystemId are updated to contain no information;  ackState is updated to "unacknowledged"; |

### 10.2.2 Managed information

#### 10.2.2.1 Alarm information, alarm state change and Information Object Classes

##### 10.2.2.1.1 Imported information entities and local labels

None.

##### 10.2.2.1.2 Class diagram

###### 10.2.2.1.2.1 Introduction

This clause introduces the fault supervision related classes (i.e. IOCs, SupportIOCs). The intent is to identify the information required for the Fault management service implementation of its operations and notification emission. This clause provides the overview of all support object classes in UML. Subsequent clauses provide more detailed specification of various aspects of these support object classes.

###### 10.2.2.1.2.2 Attributes and relationships



##### 10.2.2.1.3 Information Object Class Definitions

###### 10.2.2.1.3.1 AlarmInformation

10.2.2.1.3.1.1 Definition

AlarmInformation contains information about alarm condition of an alarmed MonitoredEntity.

One FaultSupervision MnS producer is related to at most one AlarmList. The management service producer or the related AlarmList assigns an identifier, called alarmId, to each AlarmInformation in the AlarmList. An alarmId unambiguously identifies one AlarmInformation in the AlarmList.

10.2.2.1.3.1.2 Attribute

|  |  |
| --- | --- |
| **Attribute name** | **Support Qualifier** |
| alarmId | M |
| notificationId | M |
| alarmRaisedTime | M |
| alarmClearedTime | M |
| alarmChangedTime | O |
| eventType | M |
| probableCause | M |
| perceivedSeverity | M |
| rootCauseIndicator | O |
| specificProblem | O |
| backedUpStatus | O |
| trendIndication | O |
| thresholdInfo | O |
| stateChangeDefinition | O |
| monitoredAttributes | O |
| proposedRepairActions | O |
| additionalText | O |
| additionalInformation | O(see note 3) |
| ackTime | M |
| ackUserId | M |
| ackSystemId | O |
| ackState | M |
| clearUserId | O (see note 1) |
| clearSystemId | O (see note 1) |
| serviceUser | O (see note 2) |
| serviceProvider | O (see note 2) |
| securityAlarmDetector | O (see note 2) |
| NOTE 1: These attributes and qualifiers are applicable only if the management service producer supports clearAlarms() (they are absent if clearAlarms() is not supported).  NOTE 2: These attributes are supported if the management service producer emits notifyNewAlarm that carries security alarm information.  NOTE 3: This attribute is optionally populated whenever vendor specific attributes are needed. A specific condition for this optional population is when an alarm presented by the Management system (e.g. Management system user interface) has different values of perceived severity, and / or alarm type, compared with the values presented to the Itf-N. | |

10.2.2.1.3.1.3 State diagram

Alarms have states. The alarm state information is captured in AlarmInformation in AlarmList.

The solid circle icon represents the Start State. The double circle icon represents the End State. In this state, the alarm is Cleared and acknowledged. The AlarmInformation shall not be accessible via the Service interface and is removed from the AlarmList.

Note the state diagram uses " X / Y ^ Z " to label the arc that indicates state transition. The meanings of X, Y and Z are:

- X identifies the triggering event;

- Y identifies the action of FaultSupervision MnS producer because of the triggering event;

- Z is the notification to be emitted by FaultSupervision MnS producer because of the triggering event.

Note that acknowledgeAlarm^notifyAckStateChanged and the unacknowledgeAlarm^notifyAckStateChange refer to cases when the request of the management service consumer is successful for the AlarmInformation concerned. They do not refer to the cases when the request is a failure since in the failure cases, no state transition would occur.

Note that, to reduce cluttering to the diagram, the setComment^notifyComment is not included in the figure . One transition should be applied from unack&unclear to itself. Similarly, another transition should be applied from ack&unclear to itself. Another one is from unack&clear to itself.

"PS" used in the state diagram stands for "perceived severity".

Figure 10.2.2.1.3.1.3-1 is used if it supports ^notifyChangedAlarm and Figure 10.2.2.1.3.1.3-2 is used if it does not support ^notifyChangedAlarm.



Figure 10.2.2.1.3.1.3-1 notifyChangedAlarm supported



Figure 10.2.2.1.3.1.3-2 notifyChangedAlarm not supported

###### 10.2.2.1.3.2 AlarmList

10.2.2.1.3.2.1 Definition

FaultSupervision MnS producer maintains an AlarmList that contains currently active alarms (i.e. AlarmInformation whose perceivedSeverity is not Cleared) and alarms that are Cleared but not yet acknowledged.

10.2.2.1.3.2.2 Attribute

There is no additional attribute defined for this class besides those inherited.

###### 10.2.2.1.3.3 FSMnSProducer

10.2.2.1.3.3.1 Definition

FSMnSProducer is the representation of the entity who provides the fault supervision management service(s) and contains the AlarmList.

10.2.2.1.3.3.2 Attribute

There is no additional attribute defined for this class besides those inherited.

10.2.2.1.3.3.3 Notification Table

| **Name** | **Qualifier** | **Notes** |
| --- | --- | --- |
| notifyAlarmListRebuilt | M |  |
| notifyPotentialFaultyAlarmList | O | . |

###### 10.2.2.1.3.4 Comment

10.2.2.1.3.4.1 Definition

Comment contains commentary and associated information such as the time when the commentary is made.

10.2.2.1.3.4.2 Attribute

|  |  |
| --- | --- |
| **Attribute Name** | **Support Qualifier** |
| commentTime | M |
| commentText | M |
| commentUserId | M |
| commentSystemId | O |

###### 10.2.2.1.3.5 CorrelatedNotification

10.2.2.1.3.5.1 Definition

It identifies one MonitoredEntity. For that MonitoredEntity identified, a set of notification identifiers is also identified. One or more CorrelatedNotification instances can be related to an AlarmInformation. In this case, the information of the AlarmInformation is said to be correlated to information carried in the notifications identified by the CorrelatedNotification instances. See further definition of correlated notification in ITU-T Recommendation X.733 [4], clause 8.1.2.9.

The notification identified by the CorrelatedNotification, as defined in ITU-T and used here, can carry all types of information and not restricted to carrying alarm information only. For example, a notification, identified by the CorrelatedNotification, can indicate a managed instance attribute value change. In this case, the information of the AlarmInformation is said to be correlated to the managed instance attribute value change event.

The meaning of correlation is dependent on the type of notification itself. See the comment column of the correlatedNotification input parameter for each type of notification, such as notifyNewAlarm.

Notification carries AlarmInformation. The AlarmInformation instances referred to by the correlatedNotification may or may not exist in the AlarmList. For example, the AlarmInformation carried by the identified notification may have been acknowledged and Cleared and therefore, no longer exist in the AlarmList.

10.2.2.1.3.5.2 Attribute

|  |  |
| --- | --- |
| **Attribute Name** | **Support Qualifier** |
| source | M |
| notificationIdSet | M |

###### 10.2.2.1.3.6 MonitoredEntity

10.2.2.1.3.6.1 Definition

It represents classes that can have an alarmed state. The types of classes that can have alarmed state are:

a) All classes whose Notification Tables include alarm notifications.

b) VSE subclass of 3GPP defined classes and VSE defined classes that can have alarmed state.

The objectClass and objectInstance of this class identifies an instance of this class. The AlarmInformation uses this information in two places. In one place, the information is used to identify the instance that is in alarmed state. In another place, the information is used to identify an instance that can be used as the back up network resource for the instance that is in alarmed state.

10.2.2.1.3.6.2 Attribute

There is no attribute for this class.

##### 10.2.2.1.4 Information relationships definition

###### 10.2.2.1.4.1 relation-FSMnSProducer-AlarmList (M)

10.2.2.1.4.1.1 Definition

This represents the relationship between FSMnSProducer and AlarmList.

10.2.2.1.4.1.2 Role

There is no role defined for this relationship.

10.2.2.1.4.1.3 Constraint

There is no constraint for this relationship.

###### 10.2.2.1.4.2 relation-AlarmList-AlarmInformation (M)

10.2.2.1.4.2.1 Definition

This represents the relationship between AlarmList and AlarmInformation.

10.2.2.1.4.2.2 Role

|  |  |
| --- | --- |
| **Name** | **Definition** |
| identifyAlarmInformation | It represents a capability to obtain the information contained in AlarmInformation. |

10.2.2.1.4.2.3 Constraint

|  |  |
| --- | --- |
| **Name** | **Definition** |
| inv\_ hasAlarmInformation1 | No AlarmInformation playing the role of theAlarmInformation shall have its perceivedSeverity = "cleared" and its ackState = "acknowledged". |
| inv\_ hasAlarmInformation2 | The alarmId of all AlarmInformation instances playing the role of theAlarmInformation are distinct. |

###### 10.2.2.1.4.3 relation-AlarmInformation-Comment (M)

10.2.2.1.4.3.1 Definition

This represents the relationship between AlarmInformation and Comment.

10.2.2.1.4.3.2 Role

|  |  |
| --- | --- |
| **Name** | **Definition** |
| comment | It represents a capability to obtain the information contained in Comment. |

10.2.2.1.4.3.3 Constraint

There is no constraint.

###### 10.2.2.1.4.4 relation-AlarmInformation-CorrelatedNotification (M)

10.2.2.1.4.4.1 Definition

This represents the relationship between AlarmInformation and CorrelatedNotification.

10.2.2.1.4.4.2 Role

|  |  |
| --- | --- |
| **Name** | **Definition** |
| correlatedNotification | It represents a capability to obtain the information contained in CorrelatedNotification. |

10.2.1.4.4.3 Constraint

There is no constraint.

###### 10.2.2.1.4.5 relation-AlarmedObject-AlarmInformation (M)

10.2.2.1.4.5.1 Definition

This represents the relationship between MonitoredEntity and AlarmInformation.

10.2.2.1.4.5.2 Role

|  |  |
| --- | --- |
| **Name** | **Definition** |
| objectClass/objectInstance | It represents the capability to obtain the identification, in terms of objectClass and objectInstance, of alarmed network resource. |

10.2.2.1.4.5.3 Constraint

|  |  |
| --- | --- |
| **Name** | **Definition** |
| inv\_relation-AI-ME | All AlarmInformation involved in this relationship with the same MonitoredEntity shall have at least one different value in the following attributes: eventType, probableCause and specificProblem. |

###### 10.2.2.1.4.6 relation-backUpObject-AlarmInformation (O)

10.2.2.1.4.6.1 Definition

The relationship represents the relationship between AlarmInformation and the backUpObject.

10.2.2.1.4.6.2 Role

|  |  |
| --- | --- |
| **Name** | **Definition** |
| backUpObject | It represents a capability to obtain the identification, in terms of objectClass and objectInstance, of the backUpObject. |

10.2.2.1.4.6.3 Constraint

|  |  |
| --- | --- |
| **Name** | **Definition** |
| inv\_identifyBackUpObject | This relationship is present if and only if the AlarmInformation.backedUpStatus attribute is present and is indicating true. |

##### 10.2.2.1.5 Information attribute definition

###### 10.2.2.1.5.1 Definition and legal values

| **Name** | **Definition** | **Legal Values** |
| --- | --- | --- |
| alarmId | It identifies one AlarmInformation in the AlarmList. |  |
| notificationId | It identifies the notification that carries the AlarmInformation. |  |
| alarmRaisedTime | It indicates the date and time when the alarm is first raised by the alarmed resource. | All values indicating valid time. |
| alarmChangedTime | It indicates the last date and time when the AlarmInformation is changed by the alarmed resource. Changes to AlarmInformation caused by invocations of the management service consumer would not change this date and time. | All values indicating valid time. |
| alarmClearedTime | It indicates the date and time when the alarm is Cleared. | All values indicating valid time. |
| eventType | It indicates the type of event. See Annex A for information on event type. | See Annex A. |
| probableCause | It qualifies alarm and provides further information than eventType. See Annex B for a complete listing. | See Annex B. |
| perceivedSeverity | It indicates the relative level of urgency for operator attention. | Critical, Major, Minor, Warning, Indeterminate, Cleared: see ITU-T Recommendation X.733 [4]. This IRP does not recommend the use of indeterminate. |
| specificProblem | It provides further qualification on the alarm than probableCause. This attribute value shall be single-value and of simple type such as integer or string. See definition in ITU-T Recommendation X.733 [4] clause 8.1.2.2. | Provided by vendor. |
| backedUpStatus | It indicates if an object (the MonitoredEntity) has a back up. See definition in ITU-T Recommendation X.733 [4] clause 8.1.2.4. | All values that carry the semantics of backedUpStatus defined by ITU-T X.733 [4] clause 8.1.2.4. |
| trendIndication | It indicates if some observed condition is getting better, worse, or not changing. | "Less severe", "no change", "more severe": see definition in ITU-T Recommendation X.733 [4] clause 8.1.2.6. |
| thresholdInfo | It indicates the crossed threshold information such as:  - The identifier of the monitored attribute whose value has crossed a threshold,  - The threshold settings,  - The observed value that have crossed a threshold, etc.  See definition in ITU-T Recommendation X.733 [4] clause 8.1.2.7. See also for information in TS 32.401 [19] clause 5.6. |  |
| stateChangeDefinition | It indicates MO attribute value changes. See definition in ITU-T Recommendation X.733 [4] clause 8.1.2.10. |  |
| monitoredAttributes | It indicates MO attributes whose value changes are being monitored. See definition in ITU-T Recommendation X.733 [4] clause 8.1.2.11. |  |
| proposedRepairActions | It indicates proposed repair actions. See definition in ITU-T Recommendation X.733 [4] clause 8.1.2.12. |  |
| additionalText | It carries semantics that is outside the scope of this management service specification. It may provide the identity of the NE (e.g. RNC, Node-B) from which the alarm has been originated. It corresponds to the "user label" attribute of the object class representing the NE in the Generic Network Resource Model specified in TS 28.622 [11].  It can contain further information on the alarm. | N/A |
| additionalInformation | This attribute when present allows the inclusion of a set of vendor specific alarm information in the alarm.  A specific condition for this optional population is when an alarm presented by the Management System (e.g. via the user interface) has different values of perceived severity, and / or alarm type, compared with the values presented to the Itf-N.  Any other uses of additional information on the alarm and its semantics is outside the scope of the present document | The additional information field is a list of one or more information parts.  The present document allows the support of two such information parts to carry  - vendor defined perceived severity  - vendor defined alarm type  using defined identification.  Other vendor specific information parts are allowed by using vendor specific identifications. |
| ackTime | It identifies the time when the alarm has been acknowledged or unacknowledged the last time, i.e. it registers the time when ackState changes. | All values that indicate valid time that are later than that carried in alarmRaisedTime. |
| ackUserId | It identifies the last user who has changed the Acknowledgement State. | It can be used to identify the human operator such as "John Smith" or it can identify a group, such as "Team Six", or it can contain no information such as "". |
| ackSystemId | It identifies the system (Management System) that last changed the ackState of an alarm, i.e. acknowledged or unacknowledged the alarm. | It can be used to identify the system, such as "system 6" or it can contain no information such as "". |
| ackState | It identifies the Acknowledgement State of the alarm. | Acknowledged: the alarm has been acknowledged.  Unacknowledged: the alarm has been unacknowledged or the alarm has never been acknowledged. |
| commentTime | It carries the time when the comment has been added to the alarm. |  |
| commentText | It carries the textual comment. |  |
| commentUserId | It carries the identification of the user who made the comment. |  |
| commentSystemId | It carries the identification of the system (Management System) from which the comment is made. That system supports the user that made the comment. |  |
| rootCauseIndicator | It indicates that this AlarmInformation is the root cause of the events captured by the notifications whose identifiers are in the related CorrelatedNotification instances. | "Yes", "No" |
| source | It identifies one MonitoredEntity. | All values that carry the semantics of DN. |
| notificationIdSet | It carries one or more notification identifiers. |  |
| clearUserId | It carries the identity of the user who invokes the clearAlarms operation. | It can be used to identify the human operator such as "John Smith" or it can identify a group, such as "Team Six", or it can contain no information such as "". |
| clearSystemId | It carries the identity of the system in consuming the fault management service. That management service consumer supports the user who invokes the clearAlarms(). | It can be used to identify the system, such as "system 6" or it can contain no information such as "". |
| serviceUser | It identifies the service-user whose request for service provided by the serviceProvider led to the generation of the security alarm. | This attribute may carry no information if the server user is not identifiable. |
| serviceProvider | It identifies the service-provider whose service is requested by the serviceUser and the service request provokes the generation of the security alarm. |  |
| securityAlarmDetector | It carries the identity of the detector of the security alarm. | This attribute may carry no information if the security alarm detector is not identifiable. |

###### 10.2.2.1.5.2 Constraints

|  |  |
| --- | --- |
| **Name** | **Definition** |
| inv\_alarmChangedTime | Time indicated shall be later than that carried in alarmRaisedTime. |
| inv\_alarmClearedTime | Time indicated shall be later than that carried in alarmRaisedTime. |
| inv\_ackTime | Time indicated shall be later than that carried in alarmRaisedTime. |
| inv\_notificationId | NotificationIds shall be chosen to be unique across all notifications of a particular Managed Object (representing the NE) throughout the time that alarm correlation is significant. The algorithm by which alarm correlation is accomplished is outside the scope of this IRP. |

#### 10.2.2.2 Subscription information, subscription state and Information Object Classes

##### 10.2.2.2.1 Imported information entities and local labels

None.

##### 10.2.2.2.2 Class Diagram

###### 10.2.2.2.2.1 Attributes and relationships

This clause depicts the set of Support IOCs that encapsulate information within the notification IRP. The intent is to identify the information required for the notification IRP implementation of its operations and notification emission. This clause provides the overview of all Support IOCs in UML. Subsequent clauses provide more detailed specification of various aspects of these Support IOCs.



###### 10.2.2.2.2.2 Inheritance

This clause depicts the inheritance relationships that exist between Support IOCs.



##### 10.2.2.2.3 Information object classes definition

###### 10.2.2.2.3.1 NtfSubscriber

10.2.2.2.3.1.1 Definition

This Support IOC represents a Subscriber from a notification perspective: a subscriber is fully identified by a management service consumer reference. A management service consumer using multiple management service consumer reference attributes to subscribe will result in multiple NtfSubscriber instances.

10.2.2.2.3.1.2 Attributes

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Support Qualifier | Read Qualifier | Write Qualifier |
| ntfConsumerReference | M | M | M |

###### 10.2.2.2.3.2 NtfSubscription

10.2.2.2.3.2.1 Definition

This Support IOC represents a subscription that has been requested by a management service consumer and created.

10.2.2.2.3.2.2 Attributes

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Support Qualifier | Read Qualifier | Write Qualifier |
| ntfSubscriptionId | M | M | - |
| ntfSubscriptionState | M | M | M |
| ntfTimeTick | M | M | M |
| ntfTimeTickTimer | M | - | - |
| ntfNotificationCategorySet | M | M | M |
| ntfFilter | M | M | M |

10.2.2.2.3.2.3 Void

###### 10.2.2.2.3.3 NotificationIRP

10.2.2.2.3.3.1 Definition

This Support IOC represents a notification IRP. It inherits from Support IOC ManagedGenericIRP.

##### 10.2.2.2.4 Information relationship definitions

###### 10.2.2.2.4.1 relation-ntfSubscriber-ntfSubscription (M)

10.2.2.2.4.1.1 Definition

This relationship defines the relationship between a NtfSubscriber and its current subscriptions.

10.2.2.2.4.1.2 Roles

|  |  |
| --- | --- |
| Name | Definition |
| theNtfSubscriber | This role represents the one who has subscribed. It can be played by instances of Support IOC NtfSubscriber |
| theNtfSubscription | This role represents the subscriptions which were made and not unsubscribed. It can be played by instances of Support IOC NtfSubscription |

10.2.2.2.4.1.3 Constraints

|  |  |
| --- | --- |
| Name | Definition |
| inv\_notificationCategoriesAllDistinct | The notification categories contained in the ntfNotificationCategorySet attribute of NtfSubscription playing the role theNtfSubscription are all distinct from each other. |

###### 10.2.2.2.4.2 relation-ntfIRP-ntfSubscriber (M)

10.2.2.2.4.2.1 Definition

This relationship defines the relationship between the NotificationIRP and the current subscribers of notifications.

10.2.2.2.4.2.2 Roles

|  |  |
| --- | --- |
| Name | Definition |
| theNtfSubscriber | This role represents the entities to which IRPAgent will notify events. It is played by instances of Support IOC NtfSubscriber |
| theNotificationIRP | This role represents the NotificationIRP to which an IRPManager has subscribed. It is played by instances of Support IOC NotificationIRP |

10.2.2.2.4.2.3 Constraints

|  |  |
| --- | --- |
| Name | Definition |
| inv\_uniqueManagerReference | All NtfSubscriber involved in the subscriptionRegistration relationship are distinguished from each other by their ntfManagerReference Attribute. |

##### 10.2.2.2.5 Information attribute definitions

###### 10.2.2.2.5.0 Introduction

This clause defines the semantics of the Attributes used in Support IOCs.

###### 10.2.2.2.5.1 Definitions and legal values

| Attribute Name | Definition | Legal Values |
| --- | --- | --- |
| ntfSubscriptionId | It identifies uniquely a subscription | N/A |
| ntfSubscriptionState | It indicates the activation state of a subscription | "suspended": the subscription is suspended  "notSuspended": the subscription is active |
| ntfTimeTick | This attribute represents the initial value of ntfTimeTickTimer. It is in unit of whole minute. This value defines a time window within which management service consumer intends to invoke getSubscriptionStatus (or subscribe) operation to confirm its subscription. A special value indicates infinity which is such that timer will never expire and management service producer needs other means to decide when to delete resources allocated to the management service consumer | Integer greater or equal to 15, OR special infinite value |
| ntfTimeTickTimer | This attribute represents the current value of a timer | integer greater or equal to zero |
| ntfNotificationCategorySet | This attribute represents a set of notification categories (see also Definition of notification category in clause 3.1) |  |
| ntfFilter | This attribute represents the filter of a subscription. The filter can be applied to parameters of notification header (see Notificationmaanagement service producer interface) and to parameters of notifications defined as filterable to  IManagement service producer shall notifymanagement service consumer if the event satisfies the filter constraint. |  |
| ntfConsumerReference | This attribute contains the reference of a consumer. It uniquely identifies a subscriber |  |

###### 10.2.2.2.5.2 Constraints

- "ntfTimeTickTimer is lower.

## 10.3 Generic performance assurance management service

### 10.3.1 Operations and notifications

#### 10.3.1.1 Operation and notification of performance data file report management service

##### 10.3.1.1.1 Notification notifyFileReady (M)

###### 10.3.1.1.1.1 Definition

This notification supports the authorized consumer to be notified about the readiness of the performance data file (see annex A for the performance data file definition) by the performance data reporting related service producer.

After the performance data file has been prepared ready for the consumer(s), the performance data reporting related service producer emits the notification to the subject consumer(s) who have subscribed to this notification.

###### 10.3.1.1.1.2 Notification information

Table 10.3.1.1.1.2-1: Notification Information

| **Parameter Name** | **Qualifier** | **Information Type** | **Comment** |
| --- | --- | --- | --- |
| objectClass | M, Y | Type of the performance data reporting related producer, e.g., "NFPerformanceDataReportingServiceProducer", "NSSIPerformanceDataReportingServiceProducer", "NSIPerformanceDataReportingServiceProducer", "NWPerformanceDataReportingServiceProducer" or "NF". | It indicates the class, whose instance emitted this notification. The class indicates the type of the performance data reporting related service producer. |
| objectInstance | M, Y | Identifier of the performance data reporting related service producer | It identifies the performance data reporting related service producer, who actually emitted the notification. |
| notificationId | M, N | This is an identifier of the notification, which may be used to correlate notifications. | The unique identifier of the notification across all notifications sent by a particular management service producer throughout the time that correlation is significant.  How identifiers of notifications are re-used to correlate notifications is outside of the scope of the present document. |
| eventTime | M, Y | It indicates the event occurrence time. | The semantics of Generalised Time specified by ITU-T shall be used here. |
| notificationType | M, Y | "notifyFileReady " | The type of notification, and it shall be assigned to "notifyFileReady" for this notification. |
| fileInfoList | M, N | List of struct <  fileLocation,  fileSize  fileReadyTime  fileExpirationTime  fileCompression,  fileFormat,  >.  Each element is defined as following:  - fileLocation: It identifies the location of the file. The location may be a directory path or a URL.  E.g.:  "\\202.112.101.1\D:\user\performanceFiles\<xxx>" or  "[ftp://nms.telecom\_org.com/datastore/<xxx>](ftp://nms.telecom_org.com/datastore/%3cxxx%3e), where <xxx> is the filename and the file naming convention is defined in Annex A.3.  - fileSize: It identifies the size of the file. Its value is positive Integer (the unit is byte).  - fileReadyTime: It identifies the date and time when the file was last closed and made available in the management service producer and the file content will not be changed.  - fileExpirationTime: It identifies the date and time beyond which the file may be deleted. It shall not be empty and shall be later than fileReadyTime.  - fileCompression: It identifies the name of the compression algorithm used for the file. An empty fileCompression means that there is no compression on the file. Choice of compression algorithm is vendor-specific but is encouraged to use industrial standard algorithm such as GZIP.  - fileFormat: It identifies the encoding technique used by the file. Its value should indicate the version of the file format specification plus to indicate if "ASN1" or "XML-schema" is used. | It specifies the information of each available file. |
| additionalText | O, N | It provides additional information for this notification. | It carries vendor-specific semantics not defined in the present document. |

##### 10.3.1.1.2 Notification notifyFilePreparationError (M)

###### 10.3.1.1.2.1 Definition

This notification supports the authorized consumer to be notified about the occurrence of an error during the preparation of the performance data file by the performance data reporting related service producer. When such error occurs, the management service producer emits the notification to the authorized consumer(s) who have subscribed to this notification when the reporting period arrives.

###### 10.3.1.1.2.2 Notification information

| **Parameter Name** | **Qualifier** | **Information Type** | **Comment** |
| --- | --- | --- | --- |
| objectClass | M, Y | See Table 10.3.1.1.1.2-1. | See Table 10.3.1.1.1.2-1. |
| objectInstance | M, Y | See Table 10.3.1.1.1.2-1. | See Table 10.3.1.1.1.2-1. |
| notificationId | M, N | See Table 10.3.1.1.1.2-1. | See Table 10.3.1.1.1.2-1. |
| eventTime | M, Y | See Table 10.3.1.1.1.2-1. | See Table 10.3.1.1.1.2-1. |
| notificationType | M, Y | "notifyFilePreparationError" | The type of notification, and it shall be assigned to "notifyFilePreparationError" for this notification. |
| fileInfoList | M, N | See Table 10.3.1.1.1.2-1. | If file is kept, this parameter identifies the file whose preparation provoked an error. If file is not generated, this parameter is empty. |
| reason | M, N | It specifies the reason of the error occurred during the performance data file preparation. | The detailed reason is given, including   * errorInPreparation * hardDiskFull * hardDiskFailure * tooManyFiles * collectionTimeOut * incompleteTruncatedFile * corruptedFile * lowMemory * dataNotAvailable |
| additionalText | O, N | See Table 10.3.1.1.1.2-1. | See Table 10.3.1.1.1.2-1. |

##### 10.3.1.1.3 Operation subscribe (M)

###### 10.3.1.1.3.1 Definition

This operation enables the authorized consumer to subscribe to the notification(s) related to the services provided by the management service producer.

###### 10.3.1.1.3.2 Input parameters

| **Parameter Name** | **Qualifier** | **Information Type** | **Comment** |
| --- | --- | --- | --- |
| consumerReference | M | It specifies the reference of the consumer to which the notifications shall be sent. | The format of the reference may have dependency on the solution set. |
| timeTick | O | It specifies the value of a timer the subscription is hold by the management service producer for the subject consumer.  The value is in unit of whole minute. | A special infinite value is assumed when parameter is absent or present but equal to zero. |
| filter | O | It specifies a filter constraint that management service producer shall use to filter notification(s).  Filter constraint grammar is solution set dependent | If this parameter is absent, then no filter constraint shall be applied. |

###### 10.3.1.1.3.3 Output parameters

| **Parameter Name** | **Qualifier** | **Matching Information** | **Comment** |
| --- | --- | --- | --- |
| subscriptionId | M | An unambiguous identity of this subscription. |  |
| status | M | ENUM (OperationSucceeded, OperationFailedExistingSubscription, OperationFailed) | If subscription is successfully created, status = OperationSuceeded.  If subscription is not created because it is duplicated or conflict with existing subscription(s), status = OperationFailedExistingSubscription  If the operation is failed for any other reason than being duplicated or conflict with existing subscription(s), status = OperationFailed. |

###### 10.3.1.1.3.4 Exceptions

|  |  |
| --- | --- |
| **Name** | **Definition** |
| operation\_failed\_existing\_subscription | **Condition:** The subscription is duplicated or conflict with existing subscription(s)  **Returned Information:** The output parameter status |
| operation\_failed | **Condition:** The operation is failed for any other reason than being duplicated or conflict with subscription(s)  **Returned Information:** The output parameter status |

##### 10.3.1.1.4 Operation unsubscribe (M)

###### 10.3.1.1.4.1 Definition

This operation enables the authorized consumer cancel subscription(s) at a management service producer.

The consumer can cancel one subscription made with a consumerReference by providing the corresponding subscriptionId or all subscriptions made with the same consumerReference by leaving the subscriptionId parameter absent.

###### 10.3.1.1.4.2 Input parameters

| **Parameter Name** | **Qualifier** | **Information Type** | **Comment** |
| --- | --- | --- | --- |
| consumerReference | M | It specifies the reference of the consumer whose subscription(s) are to be cancelled. | The format of the reference may have dependency on the solution set. |
| subscriptionId | O | It holds a subscriptionId carried as the output parameter in the subscribe operation. | If this parameter is absent, all subscriptions made with the same consumerReference shall be cancelled. |

###### 10.3.1.1.4.3 Output parameters

| **Parameter Name** | **Qualifier** | **Matching Information** | **Comment** |
| --- | --- | --- | --- |
| status | M | ENUM (OperationSucceeded, OperationFailed) | If subscription(s) as identified in the input parameter are cancelled, status = OperationSucceeded.  If the operation is failed, status = OperationFailed. |

###### 10.3.1.1.4.4 Exceptions

|  |  |
| --- | --- |
| **Name** | **Definition** |
| Operation\_failed | **Condition:** the operation is failed  **Returned Information:** The output parameter status |

##### 10.3.1.1.5 Operation listAvailableFiles (M)

###### 10.3.1.1.5.1 Definition

This operation allows the consumer to list all or specified available management data files stored in the performance data reporting related service producer.

The performance data reporting related service producer shall only provide the information about the available management data files that are created for the subject consumer.

A Solution Set may choose to split this operation in several operations (e.g. operations to get "iterator" which fulfil the criteria and other operations to retrieve the detailed information of the files from the "iterator").

###### 10.3.1.1.5.2 Input parameters

| **Parameter Name** | **Qualifier** | **Information type** | **Comment** |
| --- | --- | --- | --- |
| managementDataType | M | It specifies the type of the management data stored in the file.  For performance data files, the value is assigned to "PM". |  |
| beginTime | M | The consumer requests to list information about the available file(s) whose ready time(s) are later or equal to this time.  This parameter is expressed in UTC time. | This parameter indicates date and time.  If this parameter is empty, no restriction on begin time is applied on the file ready time. |
| endTime | M | The consumer requests to list information about the available file(s) whose ready time(s) are earlier than this time.  This parameter is expressed in UTC time. | This parameter indicates date and time.  If this parameter is empty, no restriction on end time is applied on the file ready time. |

###### 10.3.1.1.5.3 Output parameters

| **Parameter Name** | **Qualifier** | **Matching Information** | **Comment** |
| --- | --- | --- | --- |
| fileInfoList | M | See the fileInfoList defined in notifyFileReady notification (clause 10.3.1.1.1) | See the fileInfoList defined in notifyFileReady notification (clause 10.3.1.1.1) |
| status | M | ENUM (Success, Failure) |  |

###### 10.3.1.1.5.4 Exceptions

| **Exception Name** | **Definition** |
| --- | --- |
| invalidTimes | **Condition:** Either beginTime or endTime is invalid.  **Returned information:** output parameter status is set to Failure. |

#### 10.3.1.2 Operation and notification of performance threshold monitoring service

##### 10.3.1.2.1 Notification notifyThresholdCrossing (M)

###### 10.3.1.2.1.1 Definition

This notification supports the threshold monitoring notification target to be notified when the performance threshold is crossed or reached.

###### 10.3.1.2.1.2 Notification information

| **Parameter Name** | **Qualifier** | **Information Type** | **Comment** |
| --- | --- | --- | --- |
| objectClass | M, Y | “ManagedElement” (see TS 28.622 [11]), or “performance threshold monitoring service” | It indicates the class, whose instance emitted this notification. The sender could be NF, or the performance threshold monitoring service producer. |
| objectInstance | M, Y | DN of the instance of the “ManagedElement”, or the identifier of the performance threshold monitoring service producer | It identifies the instance of the sender of this notification. The sender could be NF, or the performance threshold monitoring service producer. |
| notificationId | M, N | This is an identifier of the notification, which may be used to correlate notifications. | The unique identifier of the notification across all notifications sent by a particular management service producer throughout the time that correlation is significant.  How identifiers of notifications are re-used to correlate notifications is outside of the scope of the present document. |
| eventTime | M, Y | It indicates the event occurrence time. | The semantics of Generalised Time specified by ITU-T shall be used here. |
| notificationType | M, Y | "notifyThresholdCrossing " | The type of notification, and it shall be assigned to "notifyThresholdCrossing" for this notification. |
| startOfMonitoringGP | M, Y | It indicates the start of the monitoring granularity period. | The semantics of Generalised Time specified by ITU-T shall be used here. |
| endOfMonitoringGP | M, Y | It indicates the end of the monitoring granularity period. | The semantics of Generalised Time specified by ITU-T shall be used here. |
| monitoredObjectInstance | M, Y | DN of the monitored object instance | The DN of the object instance for which the measurementTypeName reported by this notification is monitored. |
| thresholdLevel | M, Y | It indicates the level of the threshold which is crossed or reached. |  |
| measurementTypeName | M, Y | The measurementType shall be in one of the following form:  - "family.measurementName.subcounter" for monitoring the measurement types with subcounters defined.  - "family.measurementName" for monitoring the measurement types without subcounters defined. | It indicates the name of the measurement type whose value has reached or crossed the threshold. |
| measurementValue | M, Y | The type of the measurementValue for the measurement type is specified in the performance measurement definition in TS 28.552 [18]. | It indicates the value of the measurement type which has reached or crossed the threshold. |
| additionalText | O, N | It provides additional information for this notification. | It carries vendor-specific semantics not defined in the present document. |

### 10.3.2 Managed information

#### 10.3.2.1 Performance data file definition

##### 10.3.2.1.1 File generation and reporting

The performance data reporting related service producer generates the performance date file(s) for the consumer(s) and emits the "notifyFileReady" or "notifyFilePreparationError" notifications to the subject consumer(s) who have subscribed to these notifications.

How the measurement job control related service producer provides the measurement results to the performance data reporting related service producer is out of scope of the present specification.

The performance data reporting related service producer shall be able to allow the consumer to access the file using the following file transfer protocols, and the performance data reporting related service producer shall always act server while the consumer shall always act as the initiator (client) of file transfer actions:

- FTP;

- SFTP.

##### 10.3.2.1.2 Performance data file content description

Table 10.3.2.1.2-1 lists all the file content items. It also provides an explanation of the individual items.

Table 10.3.2.1.2-1: File Content Description

| File Content Item | Description |
| --- | --- |
| measDataCollection | This is the top-level tag, which identifies the file as a collection of measurement data. The file content is made up of a header ("measFileHeader"), the collection of measurement result items ("measData"), and a measurement file footer ("measFileFooter"). |
| measFileHeader | This is the measurement result file header to be inserted in each file. It includes a version indicator, the name, type and vendor name of the sending service producer, and a time stamp ("collectionBeginTime"). |
| measData | The "measData" construct represents the sequence of zero or more measurement result items contained in the file. It can be empty in case no measurement data can be provided. The individual "measData" elements can appear in any order.  Each "measData" element contains the identifier of the measured entity ("measuredEntityId") and the list of measurement results pertaining to that measured entity ("measInfo"). |
| measFileFooter | The measurement result file footer to be inserted in each file. It includes a time stamp, which refers to the end of the overall measurement collection interval that is covered by the collected measurement results being stored in this file. |
| fileFormatVersion | This parameter identifies the file format version applied by the sender. The format version defined in the present document shall be the abridged number and version of this 3GPP document (see below).  The abridged number and version of a 3GPP document is constructed from its version specific full reference "3GPP […] (yyyy-mm)" by:  - removing the leading "3GPP TS";  - removing everything including and after the version third digit, representing editorial only changes, together with its preceding dot character;  - from the resulting string, removing leading and trailing white space, replacing every multi character white space by a single space character and changing the case of all characters to uppercase. |
| senderName | The senderName uniquely identifies performance data reporting related service producer that assembled this measurement file. |
| senderType | This is a user configurable identifier of the type of performance data reporting related service producer that generated the file, e.g. NF performance data reporting service producer, or NSI performance data reporting service producer. The string may be empty (i.e. string size =0) in case the "senderType" is not configured in the sender. |
| vendorName | The "vendorName" identifies the vendor of the performance data reporting related service producer that provided the measurement file. The string may be empty (i.e. string size =0) if the "vendorName" is not configured in the sender. |
| collectionBeginTime | The "collectionBeginTime" is a time stamp that refers to the start of the first measurement collection interval (granularity period) that is covered by the collected measurement results that are stored in this file. |
| measuredEntityUserName | This is the user definable name ("userLabel") defined for the measured entity in 3GPP TS 28.622 [11]. The string may be empty (i.e. string size =0) if the "measuredEntityUserName" is not configured in the CM applications. |
| measuredEntityDn | This is the Distinguished Name (DN) defined for the measured entity in 3GPP TS 32.300 [21]. It is unique across an operator's network. The string may be empty (i.e. string size =0) if the "measuredEntityDn" is not configured in the CM applications. |
| measuredEntitySoftwareVersion | This is the software version ("swVersion") defined for the measured entity in 3GPP TS 28.622 [11]. This is an optional parameter which allows post-processing systems to take care of vendor specific measurements modified between software versions. |
| measInfo | The sequence of measurements, values and related information. It includes a list of measurement types ("measTypes") and the corresponding results ("measValues"), together with the time stamp ("measTimeStamp") and granularity period ("granularityPeriod") pertaining to these measurements. |
| measInfoId | This attribute associates a tag name with the set of measurements defined by a *measInfo* property. This is an optional parameter that may be used to assign unique names to categories of measurements grouped together by measInfo elements. It allows parsing tools to easily isolate measurement sets by name. |
| measTimeStamp | Time stamp referring to the end of the granularity period. |
| jobId | The "jobId" is an optional item represents the measurement job with which measurement result contained in the file is associated. |
| granularityPeriod | Granularity period of the measurement(s) in seconds. |
| reportingPeriod | Reporting period of the measurement(s) in seconds. |
| measTypes | This is the list of measurement types for which the following, analogous list of measurement values ("measValues") pertains. |
| measValues | This parameter contains the list of measurement results for the resource being measured, e.g. trunk, cell. It includes an identifier of the resource ("measObjInstId"), the list of measurement result values ("measResults") and a flag that indicates whether the data is reliable ("suspectFlag"). |
| measObjInstId | In case the measuredEntity is a ManagedElement, the "measObjInstId" field contains the local distinguished name (LDN) of the measured object within the scope defined by the "measuredEntityDn" (see 3GPP TS 32.300 [21]). The concatenation of the "measuredEntityDn" and the "measObjInstId" yields the DN of the measured object. The "measObjInstId" is therefore empty if the "measuredEntityDn" already specifies completely the DN of the measured object, which is the case for all measurements specified on measured entity (e.g., NF) level. For example, if the measured object is a "ManagedElement" representing RNC "RNC-Gbg-1", then the "measuredEntityDn" will be for instance "DC=a1.companyNN.com,SubNetwork=1,IRPAgent=1,SubNetwork=CountryNN,MeContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1", and the "measObjInstId" will be empty. On the other hand, if the measured object is a "UtranCell" representing cell "Gbg-997" managed by that RNC, then the "measuredEntityDn" will be for instance the same as above, i.e. "DC=a1.companyNN.com,SubNetwork=1,IRPAgent=1,SubNetwork=CountryNN,MeContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1", and the "measObjInstId" will be for instance "RncFunction=RF-1,UtranCell=Gbg-997". The class of the "measObjInstId" is defined in item F of each measurement definition template.  In case the measuredEntity is not a ManagedElement, the value of this attribute is empty (i.e. string size =0). |
| measResults | This parameter contains the sequence of result values for the observed measurement types. The "measResults" sequence shall have the same number of elements, which follow the same order as the measTypes sequence. The NULL value is reserved to indicate that the measurement item is not applicable or could not be retrieved for the object instance. |
| suspectFlag | Used as an indication of quality of the scanned data. FALSE in the case of reliable data, TRUE if not reliable. The default value is "FALSE", in case the suspect flag has its default value it may be omitted. |
| timestamp | This tag carries the time stamp that refers to the end of the measurement collection interval (granularity period) that is covered by the collected measurement results that are stored in this file. The minimum required information within timestamp is year, month, day, hour, minute, and second. |

The measInfo contains the sequence of measurements, values and related information, in a table-oriented structure.

The representation of all timestamps in PM files shall follow the representations allowed by the ISO 8601 [20].   
The precise format for timestamp representation shall be determined by the technology used for encoding the PM file (e.g. ASN.1, XML DTD, and XML Schema). The choice of technology should ensure that this representation is derived from ISO 8601 [20]. Based on the representation used, the timestamp shall refer to either UTC time or local time or local time with offset from UTC.

##### 10.3.2.1.3 File naming convention

###### 10.3.2.1.3.1 Generic file naming convention

The following generic convention shall be applied for naming the files containing different management data:

<managementData\_type><file\_ready\_date>< file\_ready\_time><file\_expiration\_delta\_time>  
[<specificData\_extension>][<separator><RC>]

1) The managementData\_type field is the type of the management data contained in the file, the value of managementData\_type field including:

* "PM" for performance data files,

2) The file\_ready\_date field is of the form YYYYMMDD, where:

* - YYYY is the year in four-digit notation;
* - MM is the month in two digit notation (01 - 12);
* - DD is the day in two digit notation (01 - 31).
* The file\_ready\_date is the date when the file was last closed and made available for upload and the file content will not be changed.

3) The file\_ready\_time field is of the form HHMMshhmm, where:

* - HH is the two digit hour of the day (local time), based on 24 hour clock (00 - 23);
* - MM is the two digit minute of the hour (local time, 00 - 59);
* - s is the sign of the local time differential from UTC (+ or -), in case the time differential to UTC is 0 then the sign may be arbitrarily set to "+" or "-";
* - hh is the two digit number of hours of the local time differential from UTC (00 - 23);
* - mm is the two digit number of minutes of the local time differential from UTC (00 - 59).
* The file\_ready\_time is the time when the file was last closed and made available for upload and the file content will not be changed.

4) To reduce length of the file name, the file\_expiration\_delta\_time field could be a delta time interval from file ready time. The unit is hour.

5) The specificData\_extension field is used to extend the extra file naming convention for a specific type of management data.

6) The RC parameter is a running count, starting with the value of "1", and shall be appended only if the filename is not unique, i.e. more than one file is generated and all other parameters of the file name are identical.

7) The separator field is "\_-\_", which is an underscore character (\_), followed by a minus character (-), followed by an underscore character (\_).

###### 10.3.2.1.3.2 Performance data file specific extension

The following convention defined as <specificData\_extension> of the generic file naming convention (as defined annex A.3.1) shall be applied for performance data file naming:

<Type><Startdate>.<Starttime>-[<Enddate>.]<Endtime>[\_-<jobIdList>][\_<UniqueId>][\_-\_<RC>]

1) The Type field indicates if the file contains measurement results for single or multiple measured objects and/or granularity periods where:

* - "A" means single measured object, single granularity period (this is used when granularity period is equal to reporting period);
* - "B" indicates multiple measured objects, single granularity period (this is used when granularity period is equal to reporting period);
* - "C" signifies single measured object, multiple granularity periods (this is used when reporting period is multiples of the granularity period and will contain multiple measurement reports);
* - "D" stands for multiple measured objects, multiple granularity periods (this is used when reporting period is multiples of the granularity period and will contain multiple measurement reports).

2) The Startdate field indicates the date when the granularity period began if the Type field is set to A or B. If the Type field is either "C" or "D" then Startdate contains the date when the first granularity period of the measurement results contained in the file started. The Startdate field is of the form YYYYMMDD, where:

* - YYYY is the year in four-digit notation;
* - MM is the month in two digit notation (01 - 12);
* - DD is the day in two-digit notation (01 - 31).

3) The Starttime field indicates the time when the granularity period began if the Type field is set to A or B. If the Type field is either "C" or "D" then Starttime contains the time when the first granularity period of the measurement results contained in the file began. The Starttime field is of the form HHMMshhmm, where:

* - HH is the two-digit hour of the day (local time), based on 24-hour clock (00 - 23);
* - MM is the two digit minute of the hour (local time), possible values are 00, 05, 10, 15, 20, 25, 30, 35, 40, 45, 50, and 55;
* - s is the sign of the local time differential from UTC (+ or -), in case the time differential to UTC is 0 then the sign may be arbitrarily set to "+" or "-";
* - hh is the two-digit number of hours of the local time differential from UTC (00-23);
* - mm is the two digit number of minutes of the local time differential from UTC (00-59).

4) The Enddate field shall only be included if the Type field is set to "C" or "D", i.e. measurement results for multiple granularity periods are contained in the file. It identifies the date when the last granularity period of these measurements ended, and its structure corresponds to the Startdate field.

5) The Endtime field indicates the time when the granularity period ended if the Type field is set to A or B. If the Type field is either "C" or "D" then Endtime contains the time when the last granularity period of the measurement results contained in the file ended. Its structure corresponds to the Starttime field, however, the allowed values for the minute of the hour are 05, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, and 00.

6) UniqueId. This is the DN of the measured NF, NSI, NSSI, or network/subnetwork, as defined in annex A.2 (e.g. a measObjInstId). The field may be omitted only if the distinguishedName is not available from the CM applications.

7) The RC parameter is a running count, starting with the value of "1", and shall be appended only if the filename is otherwise not unique, i.e. more than one file is generated and all other parameters of the file name are identical. Therefore it may only be used by the EM, since the described situation cannot occur with NE generated files. Note that the delimiter for this field, \_-\_, is an underscore character (\_), followed by a minus character (-), followed by an underscore character (\_).

8) jobIdList indicates the measurement job id(s) that the performance data file is associated with.

Some examples describing file-naming convention:

1) file name: A20000626.2315+0200-2330+0200\_gNBId,   
meaning: file produced for gNB <gNBId> on June 26, 2000, granularity period 15 minutes from 23:15 local to 23:30 local, with a time differential of +2 hours against UTC.

2) file name: B20021224.1700-1130-1705-1130\_-job10\_S-NSSAI,  
meaning: file containing results for multiple measured objects, generated for measurement job job10, produced for NSI <S-NSSAI> on December 24, 2002, granularity period 5 minutes from 17:00 local to 17:05 local, with a time differential of –11:30 hours against UTC.

3) file name: D20050907.1030+0000-20050909.1500+0000\_SubnetworkId\_-\_2,  
meaning: file containing results subnetwork <SubnetworkId>, start of first granularity period 07 September 2005, 10:30 local, end of last granularity period 09 September 2005, 15:00 local, with a time differential of 0 against UTC. This is the second file for this subnetwork/granularity period combination.

4) file name: C20050907.1030+0000-20050909.1500+0000\_gNBId,  
meaning: file produced for the gNB <gNBId>, start of first granularity period 07 September 2005, 10:30 local, end of last granularity period 09 September 2005, 15:00 local, with a time differential of 0 against UTC.

##### 10.3.2.1.4 Void

## 10.4 Streaming data reporting service

### 10.4.1 Operations and notifications

#### 10.4.1.1 establishStreamingConnection operation (M)

##### 10.4.1.1.1 Definition

This operation enables the streaming data reporting producer to establish a connection to the streaming data reporting consumer (i.e. streaming target). The connection establishement includes the exchange of meta-data (producer informs consumer about its own identity and the nature of the data to be reported via streaming) phase and the actual connection (a data pipe for streaming) establishment.

Established connection supports stream multiplexing (one connection supports one or more reporting streams simultaneously).

Upon successful connection establishment, the consumer is aware of the producer's identity, the list of reporting streams and the nature of data being reported on each of the streams.

The established connection may be kept "alive" either by built-in functionality of the solution set or by periodic reporting of empty stream data.

##### 10.4.1.1.2 Input parameters

| Parameter Name | Qualifier | Information type | Comment |
| --- | --- | --- | --- |
| producerId | M | The identity of the producer requesting the connection establishment. | DN of the streaming data reporting MnS producer. If the producer is not modeled as 3GPP NRM MOI, an alternative identifer other than DN may be used. |
| streamInfoList | M | List of StreamInfo | This parameter contains the list of meta-data about each reporting stream.  For streaming performance data reporting each StreamInfo includes:  - StreamType carrying the value "PERFORMANCE";  - SerializationFormat carrying the value "GPB" or "ASN1";  - streamId globally unique stream identifier;  - measObjDn: the DN of the measured object instance;  - measTypes: an ordered list of measurement type or KPI whose measurement values or KPI result values are to be reported by the Performance Data Stream Units (see Annex C of TS 28.550 [29]) via this stream;  - either:  - MeasurementReaderId DN of the MeasurementReader MOI (see clause 4.3.13 of 3GPP TS 28.622 [11]) for which the data is being reported;  - or:  - jobId globally unique identifier of a measurement job (see TS 28.550 [29]).  For proprietary data streaming reporting each StreamInfo includes:  - StreamType carrying the value "PROPRIETARY";  - streamId globally unique stream identifier;  - VsDataContainer (see clause 4.3.9 of 3GPP TS 28.622 [11]) providing the details about the data being reported. |

##### 10.4.1.1.3 Output parameters

| Parameter Name | Qualifier | Matching Information | Comment |
| --- | --- | --- | --- |
| connectionId | M | Identifier of the established streaming connection. | It identifies the established streaming connection. The format may have dependency on the solution set. |
| status | M | ENUM (Success, Failure) | An operation may fail because of a specified or unspecified reason. |

##### 10.4.1.1.4 Exceptions

| Exception Name | Definition |
| --- | --- |
| unexpectedStreams | **Condition:** Some information in the list of streamInfo was unexpected by the MnS consumer.  **Returned Information:** Name of the exception; status is set to "Failure". |

#### 10.4.1.2 terminateStreamingConnection operation (M)

##### 10.4.1.2.1 Definition

This operation enables the streaming data reporting producer to terminate the connection to the streaming data reporting consumer (i.e. streaming target).

Upon successful termination of the streaming connection, the producer stops reporting data to the consumer on this connection.

##### 10.4.1.2.2 Input parameters

| Parameter Name | Qualifier | Information type | Comment |
| --- | --- | --- | --- |
| connectionId | M | See clause 10.4.1.1.3 | It identifies the streaming connection being terminated. The format may have dependency on the solution set. |

##### 10.4.1.2.3 Output parameters

| Parameter Name | Qualifier | Matching Information | Comment |
| --- | --- | --- | --- |
| status | M | ENUM (Success, Failure) | An operation may fail because of a specified or unspecified reason. |

##### 10.4.1.2.4 Exceptions

| Exception Name | Definition |
| --- | --- |
| unknownConnection | **Condition:** the connectionId is invalid.  **Returned Information:** Name of the exception; status is set to "Failure". |

#### 10.4.1.3 reportStreamData operation (M)

##### 10.4.1.3.1 Definition

This operation enables the streaming data reporting producer to send a unit of streaming data to the streaming data reporting consumer.

##### 10.4.1.3.2 Input parameters

| Parameter Name | Qualifier | Information type | Comment |
| --- | --- | --- | --- |
| connectionId | M | See clause 10.4.1.1.3 | It identifies the streaming connection on which the reported data are being sent. The format may have dependency on the solution set. |
| streamingData | M | Unit of streaming data | This parameter contains the actual data (payload) being reported via stream.  For streaming performance data reporting each streamingData is encoded according to the format specified in the Annex C of 3GPP TS 28.550 [29].  For proprietary data streaming reporting each streamingData is encoded according to the format specified in the product documentation. |

##### 10.4.1.3.3 Output parameters

| Parameter Name | Qualifier | Matching Information | Comment |
| --- | --- | --- | --- |
| status | M | ENUM (Success, Failure) | An operation may fail because of a specified or unspecified reason. |

##### 10.4.1.3.4 Exceptions

| Exception Name | Definition |
| --- | --- |
|  |  |

#### 10.4.1.4 addStream operation (M)

##### 10.4.1.4.1 Definition

This operation allows the producer to add one or more reporting streams to an already established streaming connection.

##### 10.4.1.4.2 Input parameters

| Parameter Name | Qualifier | Information type | Comment |
| --- | --- | --- | --- |
| connectionId | M | See clause 10.4.1.1.3 | It identifies the streaming connection to which new reporting streams are being added. The format may have dependency on the solution set. |
| streamInfoList | M | List of StreamInfo | This parameter contains the list of meta-data about each reporting stream being added to the already established connection.  For streaming performance data reporting each StreamInfo includes:  - StreamType carrying the value "PERFORMANCE";  - SerializationFormat carrying the value "GPB" or "ASN1";  - streamId globally unique stream identifier;  - measObjDn: the DN of the measured object instance;  - measTypes: an ordered list of measurement type or KPI whose measurement values or KPI result values are to be reported by the Performance Data Stream Units (see Annex C of TS 28.550 [29]) via this stream;  - either:  - MeasurementReaderId DN of the MeasurementReader MOI (see clause 4.3.13 of 3GPP TS 28.622 [11]) for which the data is being reported;  - or:  - jobId globally unique identifier of a measurement job (see TS 28.550 [42]).  For proprietary data streaming reporting each StreamInfo includes:  - StreamType carrying the value "PROPRIETARY";  - streamId globally unique stream identifier;  - VsDataContainer (see clause 4.3.9 of 3GPP TS 28.622 [11]) providing the details about the data being reported. |

##### 10.4.1.4.3 Output parameters

| Parameter Name | Qualifier | Matching Information | Comment |
| --- | --- | --- | --- |
| streamInfoList | M | List of StreamInfo | This parameter contains the list of meta-data about each reporting stream that has been successfully added as a result of this operation.  For streaming performance data reporting each StreamInfo includes:  - StreamType carrying the value "PERFORMANCE";  - SerializationFormat carrying the value "GPB" or "ASN1";  - streamId globally unique stream identifier;  - measObjDn: the DN of the measured object instance;  - measTypes: an ordered list of measurement type or KPI whose measurement values or KPI result values are to be reported by the Performance Data Stream Units (see Annex C of TS 28.550 [29]) via this stream;  - either:  - MeasurementReaderId DN of the MeasurementReader MOI (see clause 4.3.13 of 3GPP TS 28.622 [11]) for which the data is being reported;  - or:  - jobId globally unique identifier of a measurement job (see TS 28.550 [42]).  For proprietary data streaming reporting each StreamInfo includes:  - StreamType carrying the value "PROPRIETARY";  - streamId globally unique stream identifier;  - VsDataContainer (see clause 4.3.9 of 3GPP TS 28.622 [11]) providing the details about the data being reported. |
| status | M | ENUM (Success, Failure, PartialSuccess) | An operation may fail because of a specified or unspecified reason. |

##### 10.4.1.4.4 Exceptions

| Exception Name | Definition |
| --- | --- |
| duplicateStream | **Condition:** One or more of stream identifiers in the streamInfoList already exist on this connection.  **Returned Information:** Name of the exception; status is set to "Failure" or "PartialSuccess". |
| unexpectedStreams | **Condition:** Some information in the list of streamInfo was unexpected by the MnS consumer.  **Returned Information:** Name of the exception; status is set to "Failure". |
| unknownConnection | **Condition:** the connectionId is invalid.  **Returned Information:** Name of the exception; status is set to "Failure". |

#### 10.4.1.5 deleteStream operation (M)

##### 10.4.1.5.1 Definition

This operation allows the producer to remove one or more reporting streams from an already established streaming connection.

##### 10.4.1.5.2 Input parameters

| Parameter Name | Qualifier | Information type | Comment |
| --- | --- | --- | --- |
| connectionId | M | See clause 10.4.1.1.3 | It identifies the streaming connection from which the reporting streams are being removed. The format may have dependency on the solution set. |
| streamIdList | M | List of stream identifiers | This parameter contains the list of identifiers for streams being removed from the already established connection.  For streaming performance data reporting streamId globally unique stream identifier.  For proprietary data streaming reporting streamId globally unique stream identifier. |

##### 10.4.1.5.3 Output parameters

| Parameter Name | Qualifier | Matching Information | Comment |
| --- | --- | --- | --- |
| status | M | ENUM (Success, Failure, PartialSuccess) | An operation may fail because of a specified or unspecified reason. |

##### 10.4.1.5.4 Exceptions

| Exception Name | Definition |
| --- | --- |
| unknownStreamId | **Condition:** One or more of stream identifiers in the streamIdList does not exist on this connection.  **Returned Information:** Name of the exception; status is set to "Failure" or "PartialSuccess". |
| unknownConnection | **Condition:** the connectionId is invalid.  **Returned Information:** Name of the exception; status is set to "Failure". |

#### 10.4.1.6 getConnectionInfo operation (M)

##### 10.4.1.6.1 Definition

This operation enables the streaming data reporting service producer to obtain information about one or more streaming connections.

##### 10.4.1.6.2 Input parameters

| Parameter Name | Qualifier | Information type | Comment |
| --- | --- | --- | --- |
| connectionIdList | M | List of streaming connection identifiers | This parameter contains the list of streaming connection identifiers for which the stream information is to be returned.  The empty list indicates the stream information for all connections are to be returned. |

##### 10.4.1.6.3 Output parameters

| Parameter Name | Qualifier | Matching Information | Comment |
| --- | --- | --- | --- |
| connectionInfoList | M | List of <connectionId, streamReporter, streamIdList> tuples | This parameter contains the list of meta-data about each streaming connection requested by this operation. Each entry in this list is a tuple of connectionId, streamReporter and streamIdList.  For streaming performance data reporting:  - streamReporter is the identity of the streaming data reporting MnS producer reporting data for this connectionId;  - streamIdList is the list of streamId globally unique stream identifiers.  For streaming proprietary data reporting:  - streamReporter is the identity of the streaming data reporting MnS producer reporting data for this connectionId;  - streamIdList is the list of streamId globally unique stream identifiers. |
| status | M | ENUM (Success, Failure, PartialSuccess) | An operation may fail because of a specified or unspecified reason. |

##### 10.4.1.6.4 Exceptions

| Exception Name | Definition |
| --- | --- |
| unknownConnectionId | **Condition:** One or more of connection identifiers in the connectionIdList is not known to this MnS consumer.  **Returned Information:** Name of the exception; status is set to "Failure" or "PartialSuccess". |

#### 10.4.1.7 getStreamInfo operation (M)

##### 10.4.1.7.1 Definition

This operation enables the streaming data reporting service producer to obtain information about one or more reporting streams.

##### 10.4.1.7.2 Input parameters

| Parameter Name | Qualifier | Information type | Comment |
| --- | --- | --- | --- |
| streamIdList | M | List of stream identifiers | This parameter contains the list of stream identifiers for which the stream information is to be returned.  The empty list indicates the stream information for all streams are to be returned.  For streaming performance data reporting streamId globally unique stream identifier.  For proprietary data streaming reporting streamId globally unique stream identifier. |

##### 10.4.1.7.3 Output parameters

| Parameter Name | Qualifier | Matching Information | Comment |
| --- | --- | --- | --- |
| streamInfoSumList | M | List of <StreamInfo, StreamReporters> tuples | This parameter contains the list of meta-data about each reporting stream requested by this operation. Each entry in this list is a tuple of StreamInfo and StreamReporters.  For streaming PM reporting each StreamInfo includes:  - StreamType carrying the value "PERFORMANCE";  - SerializationFormat carrying the value "GPB" or "ASN1";  - streamId globally unique stream identifier;  - measObjDn: the DN of the measured object instance;  - measTypes: an ordered list of measurement type or KPI whose measurement values or KPI result values are to be reported by the Performance Data Stream Units (see Annex C of TS 28.550 [42]) via this stream;  - either:  - MeasurementReaderId DN of the MeasurementReader MOI (see clause 4.3.13 of 3GPP TS 28.622 [11]) for which the data is being reported;  - or:  - jobId globally unique identifier of a measurement job (see TS 28.550 [29]).  For streaming performance data the StreamReporters is a list of the identities of the streaming data reporting MnS producer(s) reporting data for this streamId to this MnS consumer.  For proprietary data streaming reporting each StreamInfo includes:  - StreamType carrying the value "PROPRIETARY";  - streamId globally unique stream identifier;  - VsDataContainer (see clause 4.3.9 of 3GPP TS 28.622 [11]) providing the details about the data being reported.  For proprietary data streaming the StreamReporters is a list of the identities of the streaming data reporting MnS producer(s) reporting data for this streamId to this MnS consumer. |
| status | M | ENUM (Success, Failure, PartialSuccess) | An operation may fail because of a specified or unspecified reason. |

##### 10.4.1.7.4 Exceptions

| Exception Name | Definition |
| --- | --- |
| unknownStreamId | **Condition:** One or more of stream identifiers in the streamIdList is not known to this MnS consumer.  **Returned Information:** Name of the exception; status is set to "Failure" or "PartialSuccess". |

# 11 Management services – Stage 3

## 11.1 Generic provisioning management service

### 11.1.1 RESTful HTTP-based solution set

#### 11.1.1.1 Mapping of operations

##### 11.1.1.1.1 Introduction

The IS operations are mapped to SS equivalents according to table 11.1.1.1.1-1.

Table 11.1.1.1.1-1: Mapping of IS operations to SS equivalents

|  |  |  |  |
| --- | --- | --- | --- |
| **IS operation** | **HTTP Method** | **Resource URI** | **Qualifier** |
| createMOI | PUT | /{className}/{id} | M |
| getMOIAttributes | GET | /{className}/{id} | M |
| modifyMOIAttributes | PATCH | /{className}/{id} | M |
| deleteMOI | DELETE | /{className}/{id} | M |
| subscribe | POST | /subscriptions | M |
| unsubscribe | DELETE  DELETE | /subscriptions  /subscriptions/{subscriptionId} | M  M |

##### 11.1.1.1.2 Operation "createMOI"

This operation creates a resource representing a managed object instance.

Table 11.1.1.1.2-1: Mapping of IS operation input parameters to SS equivalents (HTTP PUT)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **SQ** |
| managedObjectClass  managedObjectInstance | path | /{className}/{id} | className: string  id: string | M |
| referenceObjectInstance | n/a | n/a | n/a | n/a |
| attributeListIn | request body | data | resourceCreation-RequestType | M |

Note 1: The IS parameter referenceObjectInstance has no SS equivalent in the present document.

Table 11.1.1.1.2-2: Mapping of IS operation output parameters to SS equivalents (HTTP PUT)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS operation parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| attributeListOut | response body | data | resourceCreation-ResponseType | M |
| status | response status codes  response body | n/a  error | n/a  error-ResponseType | M  M |

The message flow for creating a resource is as follows:

1. The Service Consumer sends a HTTP PUT request to the Service Provider.

* The target URI identifies the new resource to be created.
* The message body shall carry the complete resource representation.

2. The Service Provider sends a HTTP PUT response to the Service Consumer.

* On success, "201 Created" shall be returned. The Location header shall carry the URI of the new resource and the message body the complete representation of the new resource.
* On failure, an appropriate error code shall be returned. The response message body shall provide additional error information

##### 11.1.1.1.3 Operation "getMOIAttributes"

This operation retrieves one or multiple resources representing managed object instances.

Table 11.1.1.1.3-1: Mapping of IS operation input parameters to SS equivalents (HTTP GET)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **SQ** |
| baseObjectInstance | path | /{className}/{id} | className: string  id: string | M |
| scope | query | scope | scope-QueryType | M |
| filter | query | filter | filter-QueryType | M |
| attributeListIn | query | fields | fields-QueryType  style: form  explode: false | M |

Note 1: The scope query parameter is of type string in the present document. No scoping mechanism is specified.

Note 2: The filter query parameter is of type string in the present document. No filter language is specified.

Table 11.1.1.1.3-2: Mapping of IS operation output parameters to SS equivalents (HTTP GET)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **SQ** |
| attributeListOut | response body | data | resourceRetrieval-ResponseType | M |
| status | response status codes  response body | n/a  error | n/a  error-ResponseType | M  M |

The message flow for retrieval of one or multiple resources is as follows:

1. The Service Consumer sends a HTTP GET request to the Service Provider.

* - The target URI identifies the base resource.
* - The scope query parameter identifies other resources besides the base resource.
* - The filter query parameter is applied to the set of scoped resources. Only resources passing the filter criteria are targeted.
* - The fields query parameter identifies the attributes to be returned.

2. The Service Provider sends a HTTP GET response to the Service Consumer.

* - On success, "200 OK" shall be returned. The message body carries the requested information.
* - On failure, an appropriate error code shall be returned. The response message body shall provide additional error information

##### 11.1.1.1.4 Operation "modifyMOIAttributes"

This operation modifies one or multiple resources representing managed object instances.

Table 11.1.1.1.4-1: Mapping of IS operation input parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **SQ** |
| baseObjectInstance | path | /{className}/{id} | className: string  id: string | M |
| scope | query | scope | scope-QueryType | M |
| filter | query | filter | filter-QueryType | M |
| modificationList | request body | n/a | resourceModification-RequestType | M |

Note 1: The scope query parameter is of type string in the present document. No scoping mechanism is specified.

Note 2: The filter query parameter is of type string in the present document. No filter language is specified.

Table 11.1.1.1.4-2: Mapping of IS operation output parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **SQ** |
| modificationListOut | response body | data | resourceModification-ResponseType | M |
| status | response status codes  response body | n/a  error | n/a  error-ResponseType | M  M |

The message flow for modification of one or multiple resources is as follows:

1. The Service Consumer sends a HTTP PATCH request to the Service Provider.

* - The target URI identifies the base resource.
* - The scope query parameter identifies other resources besides the base resource.
* - The filter query parameter is applied to the set of scoped resources. Only resources passing the filter criteria are targeted.
* - The message body shall contain the patch document.

2. The Service Provider sends a HTTP PATCH response to the Service Consumer.

* - On success, "200 OK" shall be returned. The message body carries the modified resource representations.
* - On failure, an appropriate error code shall be returned. The response message body shall provide additional error information

##### 11.1.1.1.5 Operation "deleteMOI"

This operation deletes one or multiple resources representing managed object instances.

Table 11.1.1.1.5-1: Mapping of IS operation input parameters to SS equivalents (HTTP DELETE)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **SQ** |
| baseObjectInstance | path | /{className}/{id} | className: string  id: string | M |
| scope | query | scope | scope-QueryType | M |
| filter | query | filter | filter-QueryType | M |

Note 1: The scope query parameter is of type string in the present document. No scoping mechanism is specified.

Note 2: The filter query parameter is of type string in the present document. No filter language is specified.

Table 11.1.1.1.5-2: Mapping of IS operation output parameters to SS equivalents (HTTP DELETE)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **SQ** |
| deletionlist | response body | data | resourceDeletion-ResponseType | M |
| status | response status codes  response body | n/a  error | n/a  error-ResponseType | M  M |

The message flow for deletion of one or multiple resources is as follows:

1. The Service Consumer sends a HTTP DELETE request to the Service Provider.

* - The target URI identifies the base resource.
* - The scope query parameter identifies other resources besides the base resource.
* - The filter query parameter is applied to the set of scoped resources. Only resources passing the filter criteria are targeted.

2. The Service Provider sends a HTTP DELETE response to the Service Consumer.

* - On success, "200 OK" shall be returned. The message body carries the URIs of the deleted resources.
* - On failure, an appropriate error code shall be returned. The response message body shall provide additional error information

##### 11.1.1.1.6 Operation "subscribe"

See clause 11.2.1.1.8.

##### 11.1.1.1.7 Operation "unsubscribe"

See clause 11.2.1.1.9.

#### 11.1.1.2 Mapping of notifications

##### 11.1.1.2.1 Introduction

The IS notifications are mapped to SS equivalents according to table 11.1.1.2.1-1.

**Table 11.1.1.2.1-1: Mapping of IS notifications to SS equivalents**

|  |  |  |  |
| --- | --- | --- | --- |
| **IS notifications** | **HTTP Method** | **Resource URI** | **SQ** |
| notifyMOICreation | POST | /notificationSink | M |
| notifyMOIDeletion | POST | /notificationSink | M |
| notifyMOIAttributeValueChange | POST | /notificationSink | M |

##### 11.1.1.2.2 Notification "notifyMOICreation"

The IS notification parameters are mapped to SS equivalents according to table 11.1.1.2.2-1.

Table 11.1.1.2.2-1: Mapping of IS notification input parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **SQ** |
| objectClass  objectInstance | request body | href | uri-Type | M |
| notificationId | request body | notificationId | notificationId-Type | M |
| notificationType | request body | notificationType | notificationTyp-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| systemDN | request body | systemDN | systemDN-Type | M |
| correlatedNotifications | request body | correlatedNotifications | array(correlatedNotification-Type) | O |
| additionalText | request body | additionalText | additionalText-Type | O |
| sourceIndicator | request body | sourceIndicator | sourceIndicator-Type | O |
| attributeList | request body | attributes | array(attributeNameValuePair-Type) | O |

##### 11.1.1.2.3 Notification "notifyMOIDeletion"

The IS notification parameters are mapped to SS equivalents according to table 11.1.1.2.3-1.

Table 11.1.1.2.3-1: Mapping of IS notification input parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **SQ** |
| objectClass  objectInstance | request body | href | uri-Type | M |
| notificationId | request body | notificationId | notificationId-Type | M |
| notificationType | request body | notificationType | notificationType-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| systemDN | request body | systemDN | systemDN-Type | M |
| correlatedNotifications | request body | correlatedNotifications | array(correlatedNotification-Type) | O |
| additionalText | request body | additionalText | additionalText-Type | O |
| sourceIndicator | request body | sourceIndicator | sourceIndicator-Type | O |
| attributeList | request body | attributes | array(attributeNameValuePair-Type) | O |

##### 11.1.1.2.4 Notification "notifyMOIAttributeValueChange"

The IS notification parameters are mapped to SS equivalents according to table 11.1.1.2.4-1.

Table 11.1.1.2.4-1: Mapping of IS notification input parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **SQ** |
| objectClass  objectInstance | request body | href | uri-Type | M |
| notificationId | request body | notificationId | notificationId-Type | M |
| notificationType | request body | notificationType | notificationTyp-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| systemDN | request body | systemDN | systemDN-Type | M |
| correlatedNotifications | request body | correlatedNotifications | array(correlatedNotification-Type) | O |
| additionalText | request body | additionalText | additionalText-Type | O |
| sourceIndicator | request body | sourceIndicator | sourceIndicator-Type | O |
| attributeValueChange | request body | attributes | array(attributeNameValuePair-Type) | O |

#### 11.1.1.3 Resources

##### 11.1.1.3.1 Resource structure

Figure 11.1.1.3.1-1 shows the resource structure of the Provisioning MnS. The "subscriptions" resource is a collection resource.

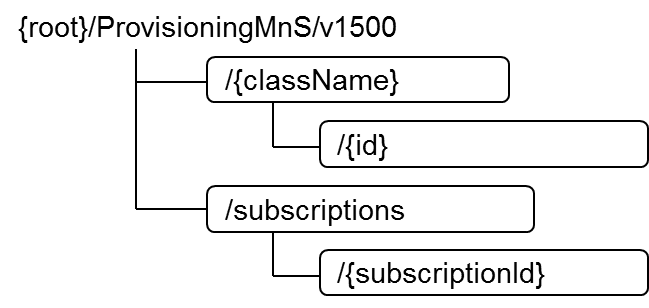


Figure 11.1.1.3.1-1: Resource URI structure of the Provisioning MnS

Table 11.1.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 11.1.1.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method | Description |
| MOI | /{className}/{id} | PUT | Creates a resource representing a managed object instance |
| MOI | /{className}/{id} | GET | Retrieves one or multiple resources representing managed object instances |
| MOI | /{className}/{id} | PATCH | Modifies one or multiple resources representing managed object instances |
| MOI | /{className}/{id} | DELETE | Deletes one or multiple resources representing managed object instances |
| subscriptions | /subscriptions | POST | Creates a subscription |
| subscriptions | /subscriptions | DELETE | Deletes all subscriptions made with a consumerReferenceId |
| subscription | /subscriptions/{subscriptionId} | DELETE | Deletes a single subscription |
| notificationSink | /notificationSink | POST | Sends notifications |

##### 11.1.1.3.2 Resource definitions

###### 11.1.1.3.2.1 Resource "/{className}/{id}"

11.1.1.3.2.1.1 Description

This resource represents a managed object instance.

11.1.1.3.2.1.2 URI

Resource URI: {DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/ProvMnS/v150/{className}/{id}

The resource URI variables a defined in the following table.

Table 11.1.1.3.2.1.2-1: URI variables

|  |  |
| --- | --- |
| **Name** | **Definition** |
| DN\_prefix\_authority\_part | See clause 4.4 of TS 32.158 [15] |
| DN\_prefix\_remainder | See clause 4.4 of TS 32.158 [15] |
| className | The class name of the resource to be targeted |
| id | The id of the resource to be targeted |

11.1.1.3.2.1.3 HTTP methods

11.1.1.3.2.1.3.1 HTTP PUT

This method shall support the URI query parameters specified in the following table.

**Table 11.1.1.3.2.1.3.1-1: URI query parameters supported by the PUT method on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
|  |  |  |  |

This method shall support the request data structures, the response data structures and response codes specified in the following table.

**Table 11.1.1.3.2.1.3.1-2: Data structures supported by the PUT request body on this resource**

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **SQ** |
| resourceCreation-RequestType | The resource representation of the resource to be created | M |

**Table 11.1.1.3.2.1.3.1-3: Data structures supported by the PUT Response Body on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **SQ** |
| resourceCreation-ResponseType | 200 OK | The resource representation of the resource created | M |
| error-Type | 4xx/5xx | Returned in case of an error | O |

11.1.1.3.2.1.3.2 HTTP GET

This method shall support the URI query parameters specified in the following table.

**Table 11.1.1.3.2.1.3.2-1: URI query parameters supported by the GET method on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| scope | scope-QueryType | This parameter extends the set of targeted resources beyond the base resource identified with the path component of the URI. No scoping mechanism is specified in the present release. | M |
| filter | filter-QueryType | This parameter reduces the targeted set of resources by applying a filter to the scoped set of resource representations. Only resources representations for which the filter construct evaluates to "true" are targeted. No filter language is specified in the present release. | M |
| fields | fields-QueryType | This parameter specifies the attributes of the scoped resources that are returned. The value is a comma-separated list of attribute names. | M |

This method shall support the request data structures, the response data structures and response codes specified in the following tables.

**Table 11.1.1.3.2.1.3.2-2: Data structures supported by the GET request body on this resource**

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **SQ** |
|  |  |  |

**Table 11.1.1.3.2.1.3.2-3: Data structures supported by the GET response body on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **SQ** |
| resourceRetrieval-ResponseType | 200 OK | The resource representations of the resources retrieved. | M |
| error-Type | 4xx/5xx | Returned in case of an error | M |

11.1.1.3.2.1.3.3 HTTP PATCH

This method shall support the URI query parameters specified in the following table.

**Table 11.1.1.3.2.1.3.3-1: URI query parameters supported by the PATCH method on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| scope | scope-QueryType | This parameter extends the set of targeted resources beyond the base resource identified with the path component of the URI. No scoping mechanism is specified in the present release. | M |
| filter | filter-QueryType | This parameter reduces the targeted set of resources by applying a filter to the scoped set of resource representations. Only resources representations for which the filter construct evaluates to "true" are targeted. No filter language is specified in the present release. | M |

This method shall support the request data structures, the response data structures and response codes specified in the following tables.

**Table 11.1.1.1.3.2.1.3.3-2: Data structures supported by the PATCH request body on this resource**

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **SQ** |
| resourceModification-RequestType | Describes the set of modifications to be applied to the targeted resources. | M |

**Table 11.1.1.3.2.1.3.3-3: Data structures supported by the PATCH response body on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **SQ** |
| resourceModification-ResponseType | 200 OK | The resources identified in the request for modification are returned. | M |
| error-Type | 4xx/5xx | Returned in case of an error | M |

11.1.1.3.2.1.3.4 HTTP DELETE

This method shall support the URI query parameters specified in the following table.

**Table 11.1.1.3.2.1.3.4-1: URI query parameters supported by the DELETE method on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| scope | scope-QueryType | This parameter extends the set of targeted resources beyond the base resource identified with the path component of the URI. No scoping mechanism is specified in the present release. | M |
| filter | filter-QueryType | This parameter reduces the targeted set of resources by applying a filter to the scoped set of resource representations. Only resources representations for which the filter construct evaluates to "true" are targeted. No filter language is specified in the present release. | M |

This method shall support the request data structures, the response data structures and response codes specified in the following tables.

**Table 11.1.1.3.2.1.3.4-2: Data structures supported by the DELETE request body on this resource**

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **SQ** |
| n/a | n/a | n/a |

**Table 11.1.1.3.12.1.3.4-3: Data structures supported by the DELETE response body on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **SQ** |
| resourceDeletion-ResponseType | 200 OK | The resources URI's deleted are returned. | M |
| error-Type | 4xx/5xx | Returned in case of an error | M |

###### 11.1.1.3.2.2 Resource "/subscriptions"

11.1.1.3.2.2.1 Description

This resource is a container resource for individual subscriptions.

11.1.1.3.2.2.2 URI

The resource URI is:

Resource URI: {DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/ProvMnS/v1510/

The resource URI variables are defined in the following table.

Table 11.1.1.3.2.2.2-1: URI variables

|  |  |
| --- | --- |
| **Name** | **Definition** |
| DN\_prefix\_authority\_part | See clause 4.4 of TS 32.158 [15] |
| DN\_prefix\_remainder | See clause 4.4 of TS 32.158 [15] |

11.1.1.3.2.2.3 HTTP methods

11.1.1.3.2.2.3.1 POST

This method shall support the URI query parameters specified in table 11.1.1.3.2.2.3.1-1.

Table 11.1.1.3.2.2.3.1-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Data type | Description | Qualifier |
| n/a | n/a | n/a | n/a |

This method shall support the request data structures specified in table 11.1.1.3.2.2.3.1-2 and the response data structures and response codes specified in table 11.1.1.3.2.2.3.1-3.

Table 11.1.1.3.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |
| --- | --- | --- |
| Data type | Description | SQ |
| subscription-RequestType | Details of the subscription to be created | M |

Table 11.1.1.3.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Response  codes | Description | SQ |
| subscription-ResponseType | 201 Created | In case of success the representation of the created subscription is returned. | M |
| error-Type | 4xx/5xx | In case of failure the error object is returned. | M |

11.1.1.3.2.2.3.2 DELETE

This method shall support the URI query parameters specified in table 11.1.1.3.2.2.3.2-1.

Table 11.1.1.3.2.2.3.2-1: URI query parameters supported by the DELETE method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Data type | Description | Qualifier |
| consumerReferenceId | consumerReferenceId-QueryType | Identifies the consumer whose subscriptions shall be deleted | M |

This method shall support the request data structures specified in table 11.1.1.3.2.2.3.2-2 and the response data structures and response codes specified in table 11.1.1.3.2.2.3.2-3.

Table 11.1.1.3.2.2.3.2-2: Data structures supported by the DELETE Request Body on this resource

|  |  |  |
| --- | --- | --- |
| Data type | Description | SQ |
| n/a | n/a | n/a |

Table 11.1.1.3.2.2.3.2-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Response  codes | Description | SQ |
| n/a | 204 No Content | In case of success no message body is returned | n/a |
| error-Type | 4xx/5xx | In case of failure the error object is returned. | M |

###### 11.1.1.3.2.4 Resource "/subscriptions /{subscriptionId}"

11.1.1.3.2.4.1 Description

This resource represents a subscription.

11.1.1.3.2.4.2 URI

The resource URI is:

Resource URI: {DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/ProvMnS/v1510/ subscriptions/{subscriptionId}

Table 11.1.1.3.2.4.2-1: URI variables

|  |  |
| --- | --- |
| Name | Definition |
| DN\_prefix\_authority\_part | See clause 4.4 of TS 32.158 [15] |
| DN\_prefix\_remainder | See clause 4.4 of TS 32.158 [15] |
| subscriptionId | Subscription identifier |

11.1.1.3.2.4.3 HTTP methods

11.1.1.3.2.4.3.1 DELETE

This method shall support the URI query parameters specified in table 11.1.1.3.2.4.3.1-1.

Table 11.1.1.3.2.4.3.1-1: URI query parameters supported by the DELETE method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Data type | Description | Qualifier |
| n/a | n/a | n/a | n/a |

This method shall support the request data structures specified in table 11.1.1.3.2.4.3.1-2 and the response data structures and response codes specified in table 11.1.1.3.2.4.3.1-3.

Table 11.1.1.3.2.4.3.1-2: Data structures supported by the DELETE Request Body on this resource

|  |  |  |
| --- | --- | --- |
| Data type | Description | SQ |
| n/a | n/a | n/a |

Table 11.1.1.3.2.4.3.1-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Response  codes | Description | SQ |
| n/a | 204 No Content | In case of success no message body is returned | M |
| error-Type | 4xx/5xx | In case of failure the error object is returned. | M |

#### 11.1.1.4 Data type definitions

##### 11.1.1.4.1 General

Table 11.1.1.4.1-1: Data types defined in this specification

|  |  |  |
| --- | --- | --- |
| Data type | Reference | Description |
| General types |  |  |
| dateTime-Type |  | Date and time |
| long-Type | 11.1.1.4.5.2 | Long type |
| uri-Type | 11.1.1.4.5.2 | Type of an URI |
| **Types used in paths** |  |  |
| className-PathType | 11.1.1.4.5.2 | Used in the path to identify a resource object |
| id-PathType | 11.1.1.4.5.2 | Used in the path to identify a resource object |
| **Types in query parts** |  |  |
| fields-QueryType | 11.1.1.4.3.1 | Used in the query part of HTTP GET to select the resource object properties (attributes) to be returned |
| filter-QueryType | 11.1.1.4.3.2 | Used in the query part of HTTP GET, HTTP PATCH and HTTP DELETE to filter scoped resource objects |
| scope-QueryType | 11.1.1.4.3.3 | Used in the query part of HTTP GET, HTTP PATCH and HTTP DELETE to extend the set of targeted resources beyond the base resource identified with the path component of the URI |
| **Types used in request bodies** |  |  |
| resourceCreation-RequestType | 11.1.1.4.3.4 | Used in the request body of HTTP PUT describing the resource to be created |
| resourceModification-RequestType | 11.1.1.4.3.5 | Used in the request body of HTTP PATCH describing the set of modifications to be applied to the targeted resources |
| subscription-RequestType | 11.1.1.4.3.12 | Used in the request body of HTTP POST on /subscriptions to create alarm notification subscriptions |
| **Types used in response bodies** |  |  |
| error-ResponseType | 11.1.1.4.3.6 |  |
| resourceCreation-ResponseType | 11.1.1.4.3.7 | Used in the response body of HTTP PUT describing the resource created |
| resourceDeletion-ResponseType | 11.1.1.4.3.8 | Used in the response body of HTTP DELETE identifying the URIs of the deleted resources |
| resourceModification-ResponseType | 11.1.1.4.3.9 | Used in the response body of HTTP PATCH describing the set of modified resources |
| resourceRetrieval-ResponseType | 11.1.1.4.3.10 | Used in the response body of HTTP GET to return the resources identified in the request for retrieval, or the selected attributes in case the fields query parameter is used |
| subscription-ResponseType | 11.1.1.4.3.13 | Used in the response body of HTTP POST on /subscriptions to create alarm notification subscriptions |
| **Types used for resources** |  |  |
| resourceRepresentationType | 11.1.1.4.3.11 | Used for resource representations |
| subscription-ResourceType |  | Representation of a subscription resource |
| **Types used in notifications** |  |  |
| notifyMOICreation-NotifType | 11.1.1.4.3.15 | Used in the request body of HTTP POST for the notification type notifyMOICreation |
| notifyMOIDeletion-NotifType | 11.1.1.4.3.16 | Used in the request body of HTTP POST for the notification type notifyMOIDeletion |
| notifyMOIAttributeValueChange-NotifType | 11.1.1.4.3.17 | Used in the request body of HTTP POST for the notification type notifyMOIAttributeValueChange |
| **Types referenced by the definitions above** |  |  |
| additionalText-Type | 11.1.1.4.5.2 | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] |
| attributeNameValuePair-Type | 11.1.1.4.4.1 | Attribute name and attribute value pair |
| correlatedNotification-Type | 11.1.1.4.4.2 | Describes the correlated notifications of a single source |
| notificationId-Type | 11.1.1.4.5.2 | Notification identifier as defined in ITU-T Rec. X. 733 [4] |
| notificationType-Type | 11.1.1.4.5.3 | Notification type (notifyMOICreation, etc.) |
| sourceIndicator-Type | 11.1.1.4.5.4 | Indicates the source of the operation that led to the generation of the notification. |

##### 11.1.1.4.2 Query, message body and resource data types

###### 11.1.1.4.2.1 Type fields-QueryType

Table 11.1.1.4.2.1-1: Definition of type fields-QueryType

|  |  |  |
| --- | --- | --- |
| Type | Definition | Description |
| fields-QueryType | array(string) | Used in the query part of HTTP GET to select the resource object properties (attributes) to be returned |

###### 11.1.1.4.2.2 Type filter-QueryType

**Table 11.1.1.4.2.2-1: Definition of type filter-QueryType**

|  |  |  |
| --- | --- | --- |
| **Type** | **Definition** | **Description** |
| filter-QueryType | string | Used in the query part of HTTP GET, HTTP PATCH and HTTP DELETE to filter scoped resource objects |

###### 11.1.1.4.2.3 Type scope-QueryType

Table 11.1.1.4.2.3-1: Definition of type scope-QueryType

|  |  |  |
| --- | --- | --- |
| **Type** | **Definition** | **Description** |
| scope-QueryType | string | Used in the query part of HTTP GET, HTTP PATCH and HTTP DELETE to extend the set of targeted resources beyond the base resource identified with the path component of the URI |

###### 11.1.1.4.2.4 Type resourceCreation-RequestType

Table 11.1.1.4.2.4-1: Definition of type resourceCreation-RequestType

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | resourceRepresentation-Type | Key indicating thev request body contains data. | M |

###### 11.1.1.4.2.5 Type resourceModification-RequestType

**Table 11.1.1.4.2.5-1: Definition of type resourceModification-RequestType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| n/a | object | Used in the request body of HTTP PATCH describing the set of modifications to be applied to the targeted resources | M |

###### 11.1.1.4.2.6 Type error-ResponseType

**Table 11.1.1.4.2.6-1: Definition of type error-ResponseType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| error | object | Key indicating the response body contains an error | M |
| > errorInfo | string | Attribute allowing to convey error information in string format | M |

###### 11.1.1.4.2.7 Type resourceCreation-ResponseType

**Table 11.1.1.4.2.7-1: Definition of type resourceCreation-ResponseType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | resourceRepresentation-Type | Used in the response body of HTTP PUT describing the resource created | M |

###### 11.1.1.4.2.8 Type resourceDeletion-ResponseType

**Table 11.1.1.4.2.8-1: Definition of type resourceDeletion-ResponseType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | array(uri-Type) | Used in the response body of HTTP DELETE identifying the URIs of the deleted resources | M |

###### 11.1.1.4.2.9 Type resourceModification-ResponseType

**Table 11.1.1.4.2.9-1: Definition of type resourceModification-ResponseType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | resourceRepresentation-Type | Used in the response body of HTTP PATCH describing the set of modified resources | M |

###### 11.1.1.4.2.10 Type resourceRetrieval-ResponseType

**Table 11.1.1.4.2.10-1: Definition of type resourceRetrieval-ResponseType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | resourceRepresentation-Type | Used in the response body of HTTP GET to return the resources identified in the request for retrieval, or the selected attributes in case the field query parameter is used | M |

###### 11.1.1.4.2.11 Type resourceRepresentation-Type

**Table 11.1.1.4.2.11-1: Definition of type resourceRepresentation-Type**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| href | uri-Type | The URI of the resource | M |
| class | string | The class name of the resource | M |
| id | string | The id of the resource object | M |
| attributes | object | The attributes object whose members are the class attributes and values. | M |

###### 11.1.1.4.2.12 Type subscription-RequestType

Table 11.1.1.4.2.12-1: Definition of type subscription-RequestType

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | subscription-ResourceType | Used in the request body of HTTP POST on /subscriptions describing the representation of the subscription to be created | M |

###### 11.1.1.4.2.13 Type subscription-ResponseType

Table 11.1.1.4.2.13-1: Definition of type subscription-ResponseType

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | subscription-ResourceType | Used in the response body of HTTP POST on /subscriptions describing the representation of the created subscription | M |

###### 11.1.1.4.2.14 Type subscription-ResourceType

Table 11.1.1.4.2.14-1: Definition of type subscription-ResourceType

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| consumerReference | uri-Type | The URI of the endpoint to send the notification to (/notificationSink). | M |
| timeTick | long-Type | Time window within which the subscriber intends to subscribe again to confirm its subscription, see clause 10.1.1.5.2. | O |
| filter | filter-Type | Filter settings for this subscription, to define the subset of all notifications this subscription relates to. A notification is sent to the subscriber if the filter matches, or if there is no filter. | O |

###### 11.1.1.4.2.15 Type notifyMOICreation-NotifType

Table 11.1.1.4.2.15-1: Definition of type notifyMOICreation-NotifType

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| header |  |  |  |
| > href | uri-Type | URI of the resource where the event (alarm) occurred | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyMOICreation) | M |
| > eventTime | dateTime-Type | Event (MOI creation) occurrence time | M |
| > systemDN | systemDN-Type | System DN | M |
| body |  |  |  |
| > correlatedNotifications | array(correlatedNotification-Type) | Set of all notifications to which this notification is considered to be correlated as defined in ITU-T Rec. X. 733 [4] | O |
| > additionalText | additionalText-Type | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] | O |
| > sourceIndicator | sourceIndicator-Type | Indicates the source of the operation that led to the generation of this notification. | O |
| > attributeList | array(attributeNameValuePair-Type) | The attributes (name/value pairs) of the created MOI. | O |

###### 11.1.1.4.2.16 Type notifyMOIDeletion-NotifType

Table 11.1.1.4.2.16-1: Definition of type notifyMOIDeletion-NotifType

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| header |  |  |  |
| > href | uri-Type | URI of the resource where the event (alarm) occurred | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyMOIDeletion) | M |
| > eventTime | dateTime-Type | Event (MOI creation) occurrence time | M |
| > systemDN | systemDN-Type | System DN | M |
| body |  |  |  |
| > correlatedNotifications | array(correlatedNotification-Type) | Set of all notifications to which this notification is considered to be correlated as defined in ITU-T Rec. X. 733 [4] | O |
| > additionalText | additionalText-Type | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] | O |
| > sourceIndicator | sourceIndicator-Type | Indicates the source of the operation that led to the generation of this notification. | O |
| > attributeList | array(attributeNameValuePair-Type) | The attributes (name/value pairs) of the deleted MOI. | O |

###### 11.1.1.4.2.17 Type notifyMOIAttributeValueChange-NotifType

Table 11.1.1.4.2.17-1: Definition of type notifyMOIAttributeValueChange-NotifType

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| header |  |  |  |
| > href | uri-Type | URI of the resource where the event (alarm) occurred | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyMOIAttributeValueChange) | M |
| > eventTime | dateTime-Type | Event (MOI creation) occurrence time | M |
| > systemDN | systemDN-Type | System DN | M |
| body |  |  |  |
| > correlatedNotifications | array(correlatedNotification-Type) | Set of all notifications to which this notification is considered to be correlated as defined in ITU-T Rec. X. 733 [4] | O |
| > additionalText | additionalText-Type | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] | O |
| > sourceIndicator | sourceIndicator-Type | Indicates the source of the operation that led to the generation of this notification. | O |
| > attributeList | array(attributeNameValuePair-Type) | The attributes (name/value pairs) of the modified MOI. | O |

##### 11.1.1.4.3 Referenced structured data types

###### 11.1.1.4.3.1 Type attributeNameValuePair-Type

Table 11.1.1.4.3.1-1: Definition of type attributeNameValuePair-Type

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| attributeName | string | Name of the attribute | M |
| attributeValue | anyType | Value of the attribute, can be any type | M |

###### 11.1.1.4.3.2 Type correlatedNotification-Type

Table 11.1.1.4.3.2-1: Definition of type correlatedNotification-Type

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| source | uri-Type | Source of the correlated notifications | M |
| notificationIds | array(notificationId-Type) | Notification identifiers of correlated notifications of that source | M |

###### 11.1.1.4.4 Simple data types and enumerations

11.1.1.4.4.1 General

This clause defines simple data types and enumerations that are used by the data structures defined in the previous clauses.

11.1.1.4.4.2 Simple data types

Table 11.1.1.4.4.2-1: Simple data types

|  |  |  |
| --- | --- | --- |
| Type name | Type definition | Description |
| className-PathType | string | Used in the path component for the class name |
| subscriptionId-PathType | sring | Used in the path component to identify a subscription |
| id-PathType | string | Type used in the path component for the id. |
| consumerReferenceId-QueryType | uri-Type | Used in the query part of HTTP DELETE on /subscriptions to delate all subscriptions made with a specific consumerReferenceId |
| additionalText-Type | string | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] |
| filter-Type | string | Filter of a subscription resource |
| notificationId-Type | long | Notification identifier as defined in ITU-T Rec. X. 733 [4] |
| systemDN-Type | string | Type of the System DN |

11.1.1.4.4.3 Enumeration notificationType-Type

Table 11.1.1.4.4.3-1: Enumeration notificationType-Type

|  |  |
| --- | --- |
| Enumeration value | Description |
| notifyMOICreation | Notification type is notifyMOICreation |
| notifyMOIDeletion | Notification type is notifyMOIDeletion |
| notifyMOIAttributeValueChange | Notification type is notifyMOIAttributeValueChange |

11.1.1.4.4.4 Enumeration sourceIndicator-Type

Table 11.1.1.4.4.4-1: Enumeration sourceIndicator-Type

|  |  |
| --- | --- |
| Enumeration value | Description |
| resourceOperation | The notification was generated in response to an internal operation of the resource. |
| mangementOperation | The notification was generated in response to a management operation applied across the managed object boundary external to the managed object |
| sONOperation | The notification was generated as result of a SON (Self Organising Network) process like self-configuration, self-optimization, self-healing etc. . |
| unknown | It is not possible to determine the source of the operation. |

## 11.2 Generic fault supervision management service

### 11.2.1 RESTful HTTP-based solution set

#### 11.2.1.1 Mapping of operations

##### 11.2.1.1.1 Introduction

The IS operations are mapped to SS equivalents according to table 11.2.1.1.1-1.

Table 11.2.1.1.1-1: Mapping of IS operations to SS equivalents

|  |  |  |  |
| --- | --- | --- | --- |
| **IS operations** | **HTTP Method** | **Resource URI** | **Qualifier** |
| getAlarmList | GET | /alarms | M |
| getAlarmCount | GET | /alarms/$alarmsCount | O |
| setComment | POST | /alarms | O |
| POST | /alarms/{alarmId}/comment | O |
| acknowledgeAlarms | PATCH | /alarms or /alarms/{alarmId} | M |
| unacknowledgeAlarms | PATCH | /alarms | M |
| PATCH | /alarms/{alarmId} | M |
| clearAlarms | PATCH | /alarms | M |
| PATCH | /alarms/{alarmId} | M |
| subscribe | POST | /subscriptions | M |
| unsubscribe | DELETE | /subscriptions | M |
| DELETE | /subscriptions/{subscriptionId} | M |

The mapping of IS operation parameters to SS equivalents is specified in the following clauses.

##### 11.2.1.1.2 Operation getAlarmList

The IS operation parameters are mapped to SS equivalents according to table 11.2.1.1.2-1 and table 11.2.1.1.2-2.

Table 11.2.1.1.2-1: Mapping of IS operation input parameters to SS equivalents (HTTP GET)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| alarmAckState | query | alarmAckState | alarmAckState-QueryType | O |
| baseObjectClass  baseObjectInstance | query | href | href-QueryType | O |
|  |  |  |  |  |
| filter | query | filter | filter-QueryType | O |

Table 11.2.1.1.2-2: Mapping of IS operation output parameters to SS equivalents (HTTP GET)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| alarmInformationList | response body | n/a | alarms-ResponseType | M |
| status | response status codes | n/a | n/a | M |

The message flow is as follows:

1. The Service Consumer sends a HTTP GET request to the Service Provider.

* - The URI identifies the "…/alarms" collection resource.
* - The query part may contain three optional parameters: "alarmAckstate", "href" and "filter". Absence of the query part means all alarms shall be returned.
* - The request message body shall be empty.

2. The Service Provider sends a HTTP GET response to the Service Consumer.

* - On success "200 OK" shall be returned. The response message body shall carry the returned alarms. The response format is defined by "alarms-ResponseType ".
* - On failure, an appropriate error code shall be returned. The response message body may carry an error object.

##### 11.2.1.1.3 Operation getAlarmCount

The IS operation parameters are mapped to SS equivalents according to table 11.2.1.1.3-1 and table 11.2.1.1.3-2.

Table 11.2.1.1.3-1: Mapping of IS operation input parameters to SS equivalents (HTTP GET)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| alarmAckState | query | alarmAckState | alarmAckState-QueryType | O |
| filter | query | filter | filter-QueryType | O |

Table 11.2.1.1.3-2: Mapping of IS operation output parameters to SS equivalents (HTTP GET)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| criticalCount, majorCount, minorCount, warningCount, indeterminateCount, clearedCount | response body | n/a | alarmsCount-ResponseType | M |
| status | response status codes | n/a | n/a | M |

The message flow is as follows:

1. The Service Consumer sends a HTTP GET request to the Service Provider.

* - The URI identifies the "…/alarms/$alarmsCount" collection resource.
* - The query part may contain two optional parameters: "alarmAckstate" and "filter". Absence of the query part means all alarms shall be counted.
* - The request message body shall be empty.

2. The Service Provider sends a HTTP GET response to the Service Consumer.

* - On success "200 OK" shall be returned. The response message body shall carry the alarm count for all perceived severity values. The response format is defined by "alarmsCount-ResponseType ".
* - On failure, an appropriate error code shall be returned. The response message body may carry an error object.

##### 11.2.1.1.4 Operation setComment

In case a comment shall be added to a single alarm the IS operation parameters are mapped to SS equivalents according to table 11.2.1.1.4-1 and table 11.2.1.1.4-2.

Table 11.2.1.1.4-1: Mapping of IS operation input parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| alarmInformationReferenceList | path | /alarms/{alarmId}/comment | alarmId-PathType | M |
| commentUserId | request body | commentUserId | commentUserIdType | M |
| commentSystemId | request body | commentSystemId | commentSystemIdType | O |
| commentText | request body | commentText | commentText-Type | M |

Table 11.2.1.1.4-2: Mapping of IS operation output parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| badAlarmInformationReferenceList | response body | error | failedAlarms-ResponseType | M |
| status | response status codes | n/a | n/a | M |

The message flow for adding a comment to a single alarm is as follows:

1. The Service Consumer sends a HTTP POST request to the Service Provider.

* - The URI identifies the "…/alarms/{alarmId}/comment" alarm resource the comment shall be added to.
* - The query part shall be absent.
* - The request message body shall contain a JSON object with "commentUserId" and "commentText" properties. In addition to that the request object may contain the "commentSystemId" property. The request body format is defined by "comment-RequestType".

2. The Service Provider sends a HTTP POST response to the Service Consumer.

* - On success "201 Created " shall be returned. The response message body shall carry the representation of the created comment resource.
* - On failure, an appropriate error code shall be returned. The response message body shall return the alarmId that did not exist or were identifying an alarm to which the comment could not be added, together with the failure reason. The JSON document carried in the response shall comply to the "failedAlarms" schema.

In case a comment shall be added to multiple alarms the IS operation parameters are mapped to SS equivalents according to table 11.2.1.1.4-3 and table 11.2.1.1.4-4.

Table 11.2.1.1.4-3: Mapping of IS operation input parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| alarmInformationReferenceList | path  query | /alarms  alarmId | n/a  alarmIdList-QueryType | M  M |
| commentUserId | request body | commentUserId | commentUserId-Type | M |
| commentSystemId | request body | commentSystemId | commentSystemId-Type | O |
| commentText | request body | commentText | commentText-Type | M |

Table 11.2.1.1.4-4: Mapping of IS operation output parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| badAlarmInformationReferenceList | response body | error | failedAlarms-ResponseType | M |
| status | response status codes | n/a | n/a | M |

The message flow for adding a comment to multiple alarms is as follows:

1. The Service Consumer sends a HTTP POST request to the Service Provider.

* - The URI identifies the "…/alarms" alarm collection resource.
* - The query part identifies the alarm resources of the collection the comment shall be added to, for "example "…/alarms?alarmId=5&alarmId=7c".
* - The request message body shall contain a JSON object with "commentUserId" and "commentText" properties. In addition to that the request object may contain the "commentSystemId" property. The request body format is defined by "commentData-Type".

2. The Service Provider sends a HTTP GET response to the Service Consumer.

* - On success "201 Created " shall be returned. The response message body shall carry the representation of the created comment resource.
* - On failure, an appropriate error code shall be returned. The response message body shall return the alarmId that did not exist or were identifying an alarm to which the comment could not be added, together with the failure reason. The JSON document carried in the response shall comply to the "failedAlarms-Type" schema.

##### 11.2.1.1.5 Operation acknowledgeAlarms

In case a single alarm shall be acknowledged the IS operation parameters are mapped to SS equivalents according to table 11.2.1.1.5-1 and table 11.2.1.1.5-2.

Table 11.2.1.1.5-1: Mapping of IS operation input parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| alarmInformationAndSeverityReferenceList | path  query | /{alarmId}  perceivedSeverity | alarmId-PathType  perceivedSeverity-QueryType | M  O |
| ackUserId | request body | ackUserId | ackUserId-Type | M |
| ackSystemId | request body | ackSystemId | ackSystemId-Type | O |

Table 11.2.1.1.5-2: Mapping of IS operation output parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| badAlarmInformationReferenceList | response body | error | failedAlarms-ResponseType | M |
| status | response status codes | n/a | n/a | M |

The message flow for acknowledging a single alarm is as follows:

1. The Service Consumer sends a HTTP PATCH request to the Service Provider.

* - The URI identifies the "…/alarms/{alarmId}" alarm resource to be acknowledged.
* - The query part shall carry the "perceivedSeverity" parameter with the value of the alarm to be acknowledged.
* - The request message body contains a merge patch document. The document shall patch the "ackState" and "ackUserId" property of the identified alarm resource, and may patch the "ackSystemId" property. The patch document is defined by "patchAcknowledgeAlarms-Type".

2. The Service Provider sends a HTTP PATCH response to the Service Consumer.

* - On success "204 No Content" shall be returned. The response message body shall be empty.
* - On failure, an appropriate error code shall be returned. The response message body shall return the alarmId, together with failure reason. The JSON document carried in the response shall comply to the "failedAlarms-Type" schema.

In case multiple alarms shall be acknowledged the IS operation parameters are mapped to SS equivalents according to table 11.2.1.1.5-3 and table 11.2.1.1.5-4.

Table 11.2.1.1.5-3: Mapping of IS operation input parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| alarmInformationAndSeverity  ReferenceList | path  query | /alarms  alarmId | n/a  alarmIdAndPerceivedSeverityList-QueryType | M  M |
| ackUserId | request body | ackUserId | ackUserIdType | M |
| ackSystemId | request body | ackSystemId | ackSystemIdType | O |

Table 11.2.1.1.5-4: Mapping of IS operation output parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| badAlarmInformationReferenceList | response body | error | failedAlarms-ResponseType | M |
| status | response status codes | n/a | n/a | M |

The message flow for acknowledging multiple alarms is as follows:

1. The Service Consumer sends a HTTP PATCH request to the Service Provider.

* - The URI identifies the "…/alarms" collection resource.
* - The query part identifies the alarm resources of the collection to be acknowledged, for "example "…/alarms?alarmId=5&alarmId=7c".
* - The request message body contains a merge patch document. The document shall patch the "ackState" and "ackUserId" property of the identified alarm resources, and my patch the "ackSystemId" property. The patch document is defined by "patchAcknowledgeAlarms-RequestType".

2. The Service Provider sends a HTTP PATCH response to the Service Consumer.

* - On success "200 OK" shall be returned. The response message body shall be empty.
* - On failure, an appropriate error code shall be returned. The response message body shall return a list with the alarmId's that did not exist or were identifying alarms that could not be acknowledged, together with the failure reasons. The JSON document carried in the response shall comply to the "failedAlarms-Response Type" schema.

##### 11.2.1.1.6 Operation unacknowledgeAlarms

In case a single alarm shall be unacknowledged the IS operation parameters are mapped to SS equivalents according to table 11.2.1.1.6-1 and table 11.2.1.1.6-2.

Table 11.2.1.1.6-1: Mapping of IS operation input parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| alarmInformationReferenceList | path | /{alarmId} | alramId-QueryType | M |
| ackUserId | request body | ackUserId | ackUserId-Type | M |
| ackSystemId | request body | ackSystemId | ackSystemId-Type | O |

Table 11.2.1.1.6-2: Mapping of IS operation input parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| badAlarmInformationReferenceList | response body | error | failedAlarms-ResponseType | M |
| status | response status codes | n/a | n/a | M |

The message flow for unacknowledging a single alarm is as follows:

1. The Service Consumer sends a HTTP PATCH request to the Service Provider.

* - The URI identifies the "…/alarms/{alarmId}" alarm resource to be acknowledged.
* - The request message body contains a merge patch document. The document shall patch the "ackState" and "ackUserId" property of the identified alarm resource, and may patch the "ackSystemId" property. The patch document is defined by "patchAcknowledgeAlarms-RequestType".

2. The Service Provider sends a HTTP PATCH response to the Service Consumer.

* - On success "204 No Content" shall be returned. The response message body shall be empty.
* - On failure, an appropriate error code shall be returned. The response message body shall return the alarmId, together with failure reason. The JSON document carried in the response shall comply to the "failedAlarms-ResponseType" schema.

In case multiple alarms shall be unacknowledged the IS operation parameters are mapped to SS equivalents according to table 11.2.1.1.6-3 and table 11.2.1.1.6-4.

Table 11.2.1.1.6-3: Mapping of IS operation input parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| alarmInformationReferenceList | path  query | /alarms  alarmId | n/a  alarmId-QueryType | M  M |
| ackUserId | request body | ackUserId | ackUserId-Type | M |
| ackSystemId | request body | ackSystemId | ackSystemId-Type | O |

Table 11.2.1.1.6-4: Mapping of IS operation output parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| badAlarmInformationReferenceList | response body | error | failedAlarms-ResponseType | M |
| status | response status codes | n/a | n/a | M |

The message flow for unacknowledging multiple alarms is as follows:

1. The Service Consumer sends a HTTP PATCH request to the Service Provider.

* - The URI identifies the "…/alarms" collection resource.
* - The query part identifies the alarm resources of the collection to be unacknowledged, for "example "…/alarms?alarmId=5&alarmId=7c".
* - The request message body contains a merge patch document. The document shall patch the "ackState" and "ackUserId" property of the identified alarm resources, and my patch the "ackSystemId" property. The patch document is defined by "patchAcknowledgeAlarms-RequestType".

2. The Service Provider sends a HTTP PATCH response to the Service Consumer.

* - On success "200 OK" shall be returned. The response message body shall be empty.
* - On failure, an appropriate error code shall be returned. The response message body shall return a list with the alarmId's that did not exist or were identifying alarms that could not be unacknowledged, together with the failure reasons. The JSON document carried in the response shall comply to the "failedAlarms-Response Type" schema.

##### 11.2.1.1.7 Operation clearAlarms

In case a single alarm shall be cleared the IS operation parameters are mapped to SS equivalents according to table 11.2.1.1.7-1 and table 11.2.1.1.7-2.

Table 11.2.1.1.7-1: Mapping of IS operation input parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| alarmInformationReferenceList | path | /{alarmId} | alarmId-QueryType | M |
| clearUserId | request body | clearUserId | clearUserId-Type | M |
| clearSystemId | request body | clearSystemId | clearSystemId-Type | O |

Table 11.2.1.1.7-2: Mapping of IS operation output parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| badAlarmInformationReferenceList | response body | n/a | failedAlarms-ResponseType | M |
| status | response status codes | n/a | n/a | M |

The message flow for clearing a single alarm is as follows:

1. The Service Consumer sends a HTTP PATCH request to the Service Provider.

* - The URI identifies the "…/alarms/{alarmId}" alarm resource.
* - The query part is absent.
* - The request message body contains a merge patch document. The document shall patch the "clearUserId" property, may patch the "clearSystemId" property and shall patch the "perceivedSeverity" property of the identified alarm resource represented by an "alarmInformation" object. The patch document is defined by "patchClearAlarms-RequestType".

2. The Service Provider sends a HTTP PATCH response to the Service Consumer.

* - On success "204 No content" shall be returned. The response message body shall be empty.
* - On failure, an appropriate error code shall be returned. The response message body shall return the alarmId that did not exist or was identifying an alarm that could not be cleared together with a failure reason. The JSON document carried in the response shall comply to the "failedAlarms-ResponseType" schema.

In case multiple alarms shall be cleared the IS operation parameters are mapped to SS equivalents according to table 11.2.1.1.7-3 and table 11.2.1.1.7-4.

Table 11.2.1.1.7-3: Mapping of IS operation input parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| alarmInformationReferenceList | path  query | /alarms  alarmId | n/a  alarmId-QueryType | M  M |
| clearUserId | request body | clearUserId | clearUserId-Type | M |
| clearSystemId | request body | clearSystemId | clearSystemId-Type | O |

Table 11.2.1.1.7-4: Mapping of IS operation output parameters to SS equivalents (HTTP PATCH)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| badAlarmInformationReferenceList | response body | error | failedAlarms-ResponseType | M |
| status | response status codes | n/a | n/a | M |

The message flow for clearing multiple alarms is as follows:

1. The Service Consumer sends a HTTP PATCH request to the Service Provider.

* - The URI identifies the "…/alarms" collection resource.
* - The query part identifies the alarm resources of the collection for alarms to be cleared, for "example "…/alarms?alarmId=5&alarmId=7c".
* - The request message body contains a merge patch document. The document shall patch the "clearUserId" property, may patch the "clearSystemId" property and shall patch the "perceivedSeverity" property of the identified alarm resources represented by "alarmInformation" objects. The patch document is defined by "patchClearAlarms-RequestType".

2. The Service Provider sends a HTTP PATCH response to the Service Consumer.

* - On success "200 OK" shall be returned. The response message body shall be empty.
* - On failure, an appropriate error code shall be returned. The response message body shall return a list with the alarmId's that did not exist or were identifying alarms that could not be cleared, together with the failure reasons. The JSON document carried in the response shall comply to the "failedAlarms-ResponseType" schema.

##### 11.2.1.1.8 Operation subscribe

The IS operation parameters are mapped to SS equivalents according to table 11.2.1.1.8-1 and table 11.2.1.1.8-2.

Table 11.2.1.1.8-1: Mapping of IS operation input parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS operation parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| consumerReference | request body | consumerReference | uri-Type | M |
| timeTick | request body | timeTick | long-Type | O |
| filter | request body | filter | filter-Type | O |

Table 11.2.1.1.8-2: Mapping of IS operation output parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS operation parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| subscriptionId | Location header | n/a | uri-Type | M |
| status | response status code | n/a | n/a | M |

The procedure for subscribing to notifications is as follows:

1. The Service Consumer (notification subscriber) sends a HTTP POST request to the Service Provider.

* - The URI identifies the "…/subscriptions" collection resource.
* - The query part shall be absent. The request message body shall carry a data structure of type "subscriptionRequestType". This data structure contains filtering criteria and a client side URI to which the provider will subsequently send notifications about events that match the filter.

2. The Service Provider creates a new subscription for notifications related to fault management, and a resource that represents this subscription.

3. The Service Provider sends a HTTP POST response to the Service Consumer.

* - The Location header shall carry the URI of the created subscription resource. The successful subscription shall be returned with "201 Created". The message body carries the representation of the created subscription resource. On failure, the appropriate error code shall be returned. The response massage body may provide additional error information.

##### 11.2.1.1.9 Operation unsubscribe

In case one subscription shall be cancelled the IS operation parameters are mapped to SS equivalents according to table 11.2.1.1.9-1 and table 11.2.1.1.9-2.

Table 11.2.1.1.9-1: Mapping of IS operation input parameters to SS equivalents (HTTP DELETE)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS operation parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| consumerReference | -- | -- | -- | -- |
| subscriptionId | path | /subscriptions/{subscriptionId} | n/a | M |

Table 11.2.1.1.9-2: Mapping of IS operation output parameters to SS equivalents (HTTP DELETE)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS operation parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| status | response status codes | n/a | n/a | M |

The procedure for unsubscribing from one specific subscription is as follows:

1. The Service Consumer (notification subscriber) sends a HTTP DELETE request to the Service Provider.

* - The URI identifies the "…/subscriptions/{subscriptionId}" subscription resource.
* - The query part shall be absent.
* - The request message body shall be empty.

2. The Service Provider sends a HTTP DELETE response to the Service Consumer.

* - On success "204 No Content" shall be returned. The response message body shall be empty.
* - On failure, an appropriate error code shall be returned. The response message body may carry an error object.

In case all subscriptions made with a specific consumerReference shall be cancelled the IS operation parameters are mapped to SS equivalents according to table 11.2.1.1.9-3and table 11.2.1.1.9-4.

Table 11.2.1.1.9-3: Mapping of IS operation input parameters to SS equivalents (HTTP DELETE)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS operation parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| consumerReference | query | consumerReference | uri-Type | M |
| subscriptionId | -- | -- | -- | -- |

Table 11.2.1.1.9-4: Mapping of IS operation output parameters to SS equivalents (HTTP DELETE)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS operation parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| status | response status codes | n/a | n/a | M |

The procedure for unsubscribing from all subscription made with a specific consumerReference is as follows:

1. The Service Consumer (notification subscriber) sends a HTTP DELETE request to the Service Provider.

* - The URI identifies the "…/subscriptions" collection resource.
* - The query part identifies the consumer whose subscriptions shall be deleted, for "example "…/subscriptions?consumerReference= example.com/notificationSink".
* The request message body shall be empty.

2. The Service Provider sends a HTTP DELETE response to the Service Consumer.

* - On success "204 No Content" shall be returned. The response message body shall be empty.
* - On failure, an appropriate error code shall be returned. The response message body may carry an error object.

#### 11.2.1.2 Mapping of notifications

##### 11.2.1.2.1 Introduction

The IS notifications are mapped to SS equivalents according to table 11.2.1.2.1-1.

Table 11.2.1.2.1-1: Mapping of IS notifications to SS equivalents

|  |  |  |  |
| --- | --- | --- | --- |
| **IS operations** | **HTTP Method** | **Resource URI** | **SQ** |
| notifyNewAlarm | POST | /notificationSink | M |
| notifyNewSecurityAlarm | POST | /notificationSink | M |
| notifyAckStateChanged | POST | /notificationSink | M |
| notifyClearedAlarm | POST | /notificationSink | M |
| notifyAlarmListRebuilt | POST | /notificationSink | M |
| notifyChangedAlarm | POST | /notificationSink | M |
| notifyComments | POST | /notificationSink | M |
| notifyPotentialFaultyAlarmList | POST | /notificationSink | M |
| notifyCorrelatedNotificationChanged | POST | /notificationSink | M |
| notifyChangedAlarmGeneral | POST | /notificationSink | O |

##### 11.2.1.2.2 Notification notifyNewAlarm

The IS notification parameters are mapped to SS equivalents according to table 11.2.1.2.2-1.

Table 11.2.1.2.2-1: Mapping of IS notification parameters to SS equivalents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS notification parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| objectClass,  objectInstance | request body | href | uri-Type | M |
| notificationId | request body | notificationId | notificationId-Type | M |
| notificationType | request body | notificationType | notificationType-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| systemDN | request body | systemDN | systemDN-Type | C |
| probableCause | request body | probableCause | probableCause-Type | M |
| perceivedSeverity | request body | perceivedSeverity | perceivedSeverity-Type | M |
| rootCauseIndicator | request body | rootCauseIndicator | rootCauseIndicator-Type | O |
| alarmType | request body | alarmType | alarmType-Type | M |
| specificProblem | request body | specificProblem | specificProblem-Type | O |
| correlatedNotifications | request body | correlatedNotifications | array(correlatedNotification-Type) | O |
| backedUpStatus | request body | backedUpStatus | backedUpStatus-Type | O |
| backUpObject | request body | backUpObject | backUpObject-Type | O |
| trendIndication | request body | trendIndication | trendIndication-Type | O |
| thresholdInfo | request body | thresholdInfo | thresholdInfo-Type | O |
| stateChangeDefinition | request body | stateChangeDefinition | array(attributeValueChange-Type) | O |
| monitoredAttributes | request body | monitoredAttributes | array(attributeNameValuePair-Type) | O |
| proposedRepairActions | request body | proposedRepairActions | proposedRepairActions-Type | O |
| additionalText | request body | additionalText | additionalText-Type | O |
| additionalInformation | request body | additionalInformation | array(attributeNameValuePair-Type) | O |
| alarmId | request body | alarmId | alarmId-Type | O |

##### 11.2.1.2.3 Notification notifyNewSecurityAlarm

The IS notification parameters are mapped to SS equivalents according to table 11.2.1.2.3-1.

Table 11.2.1.2.3-1: Mapping of IS notification parameters to SS equivalents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS notification parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| objectClass,  objectInstance | request body | href | uri-Type | M |
| notificationId | request body | notificationId | notificationId-Type | M |
| notificationType | request body | notificationType | notificationType-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| systemDN | request body | systemDN | systemDN-Type | C |
| probableCause | request body | probableCause | probableCause-Type | M |
| perceivedSeverity | request body | perceivedSeverity | perceivedSeverity-Type | M |
| rootCauseIndicator | request body | rootCauseIndicator | rootCauseIndicator-Type | O |
| alarmType | request body | alarmType | alarmType-Type | M |
| correlatedNotifications | request body | correlatedNotifications | array(correlatedNotification-Type) | O |
| additionalText | request body | additionalText | additionalText-Type | O |
| additionalInformation | request body | additionalInformation | array(attributeNameValuePair-Type) | O |
| alarmId | request body | alarmId | alarmId-Type | O |
| serviceUser | request body | serviceUser | serviceUser-Type | M |
| serviceProvider | request body | serviceProvider | serviceProvider-Type | M |
| securityAlarmDetector | request body | securityAlarmDetector | securityAlarmDetector-Type | M |

##### 11.2.1.2.4 Notification notifyAckStateChanged

The IS notification parameters are mapped to SS equivalents according to table 11.2.1.2.4-1.

Table 11.2.1.2.4-1: Mapping of IS notification parameters to SS equivalents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS notification parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| objectClass,  objectInstance | request body | href | uri-Type | M |
| notificationId | request body | notificationId | notificationId-Type | M |
| notificationType | request body | notificationType | notificationType-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| systemDN | request body | systemDN | systemDN-Type | C |
| alarmId | request body | alarmId | alarmId-Type | M |
| alarmType | request body | alarmType | alarmType-Type | M |
| probableCause | request body | probableCause | probableCause-Type | M |
| perceivedSeverity | request body | perceivedSeverity | perceivedSeverity-Type | M |
| ackState | request body | ackState | ackState-Type | M |
| ackUserId | request body | ackUserId | ackUserId-Type | M |
| ackSystemId | request body | ackSystemId | ackSystemId-Type | O |

##### 11.2.1.2.5 Notification notifyClearedAlarm

The IS notification parameters are mapped to SS equivalents according to table 11.2.1.2.5-1.

Table 11.2.1.2.5-1: Mapping of IS notification parameters to SS equivalents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS notification parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| objectClass,  objectInstance | request body | href | uri-Type | M |
| notificationId | request body | notificationId | notificationId-Type | M |
| notificationType | request body | notificationType | notificationType-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| systemDN | request body | systemDN | systemDN-Type | C |
| alarmId | request body | alarmId | alarmId | M |
| alarmType | request body | alarmType | alarmType | M |
| probableCause | request body | probableCause | probableCause | M |
| perceivedSeverity | request body | perceivedSeverity | perceivedSeverity | M |
| correlatedNotifications | request body | correlatedNotifications | array(correlatedNotification-Type) | O |
| clearUserId | request body | clearUserId | clearUserId | O |
| clearSystemId | request body | clearSystemId | clearSystemId | O |

##### 11.2.1.2.6 Notification notifyAlarmListRebuilt

The IS notification parameters are mapped to SS equivalents according to table 11.2.1.2.6-1.

Table 11.2.1.2.6-1: Mapping of IS notification parameters to SS equivalents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS notification parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| objectClass,  objectInstance | request body | href | uri-Type | M |
| notificationId | request body | notificationId | notificationId-Type | M |
| notificationType | request body | notificationType | notificationType-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| systemDN | request body | systemDN | systemDN-Type | C |
| reason | request body | reason | reason-Type | M |
| alarmListAlignmentRequirement | request body | alarmListAlignmentRequirement | alarmListAlignmentRequirement-Type | O |

##### 11.2.1.2.7 Notification notifyChangedAlarm

The IS notification parameters are mapped to SS equivalents according to table 11.2.1.2.7-1.

Table 11.2.1.2.7-1: Mapping of IS notification parameters to SS equivalents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS notification parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| objectClass,  objectInstance | request body | href | uri-Type | M |
| notificationId | request body | notificationId | notificationId-Type | M |
| notificationType | request body | notificationType | notificationType-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| systemDN | request body | systemDN | systemDN-Type | C |
| alarmId | request body | alarmId | alarmId-Type | M |
| alarmType | request body | alarmType | alarmType-Type | M |
| probableCause | request body | probableCause | probableCause-Type | M |
| perceivedSeverity | request body | perceivedSeverity | perceivedSeverity-Type | M |

##### 11.2.1.2.8 Notification notifyComments

The IS notification parameters are mapped to SS equivalents according to table 11.2.1.2.8-1.

Table 11.2.1.2.8-1: Mapping of IS notification parameters to SS equivalents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS notification parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| objectClass,  objectInstance | request body | href | uri-Type | M |
| notificationId | request body | notificationId | notificationId-Type | M |
| notificationType | request body | notificationType | notificationType-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| systemDN | request body | systemDN | systemDN-Type | C |
| alarmId | request body | alarmId | alarmId-Type | M |
| alarmType | request body | alarmType | alarmType-Type | M |
| probableCause | request body | probableCause | probableCause-Type | M |
| perceivedSeverity | request body | perceivedSeverity | perceivedSeverity-Type | M |
| comments | request body | comments | array(comment-ResourceType) | M |

##### 11.2.1.2.9 Notification notifyPotentialFaultyAlarmList

The IS notification parameters are mapped to SS equivalents according to table 11.2.1.2.9-1.

Table 11.2.1.2.9-1: Mapping of IS notification parameters to SS equivalents

| IS notification parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| --- | --- | --- | --- | --- |
| objectClass,  objectInstance | request body | href | uri-Type | M |
| notificationId | request body | notificationId | notificationId-Type | M |
| notificationType | request body | notificationType | notificationType-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| systemDN | request body | systemDN | systemDN-Type | C |
| reason | request body | reason | Reason-Type | M |

##### 11.2.1.2.10 Notification notifyCorrelatedNotificationChanged

The IS notification parameters are mapped to SS equivalents according to table 11.2.1.2.10-1.

Table 11.2.1.2.10-1: Mapping of IS notification parameters to SS equivalents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS notification parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| objectClass,  objectInstance | request body | href | uri-Type | M |
| notificationId | request body | notificationId | notificationId-Type | M |
| notificationType | request body | notificationType | notificationType-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| systemDN | request body | systemDN | systemDN-Type | C |
| alarmId | request body | alarmId | alarmId-Type | M |
| correlatedNotifications | request body | correlatedNotifications | array(correlatedNotification-Type) | M |
| rootCauseIndicator | request body | rootCauseIndicator | rootCauseIndicator-Type | O |

##### 11.2.1.2.11 Notification notifyChangedAlarmGeneral

The IS notification parameters are mapped to SS equivalents according to table 11.2.1.2.11-1.

Table 11.2.1.2.11-1: Mapping of IS notification parameters to SS equivalents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS notification parameter name | SS parameter location | SS parameter name | SS parameter type | SQ |
| objectClass,  objectInstance | request body | href | uri-Type | M |
| notificationId | request body | notificationId | notificationId-Type | M |
| notificationType | request body | notificationType | notificationType-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| systemDN | request body | systemDN | systemDN-Type | C |
| alarmId | request body | alarmId | alarmId-Type | M |
| alarmType | request body | alarmType | alarmType-Type | M |
| probableCause | request body | probableCause |  | M |
| specificProblem | request body | specificProblem | specificProblem-Type | O |
| perceivedSeverity | request body | perceivedSeverity | perceivedSeverity-Type | M |
| backedUpStatus | request body | backedUpStatus | backedUpStatus-Type | O |
| backUpObject | request body | backUpObject | backUpObject-Type | O |
| trendIndication | request body | trendIndication | trendIndication-Type | O |
| thresholdInfo | request body | thresholdInfo | thresholdInfo-Type | O |
| correlatedNotifications | request body | correlatedNotifications | array(correlatedNotification-Type) | O |
| stateChangeDefinition | request body | stateChangeDefinition | array(attributeValueChange-Type) | O |
| monitoredAttributes | request body | monitoredAttributes | array(attributeNameValuePair-Type) | O |
| proposedRepairActions | request body | proposedRepairActions | proposedRepairActions-Type | O |
| additionalText | request body | additionalText | additionalText-Type | O |
| additionalInformation | request body | additionalInformation | array(attributeNameValuePair-Type) | O |
| rootCauseIndicator | request body | rootCauseIndicator | rootCauseIndicator-Type | O |
| changedAlarmAttributes | request body | changedAlarmAttributes | array(attributeNameValuePair-Type) | M |

#### 11.2.1.3 Resources

##### 11.2.1.3.1 Resource structure

Figure 11.2.1.3.1-1 shows the resource structure of the Fault Supervision MnS. The "alarms","comments" and "subscriptions" resource are collection resources.



Figure 11.2.1.3.1-1: Resource URI structure of the Fault MnS

Table 11.2.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 11.2.1.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method | Description |
| alarms | /alarms | GET | Retrieve all alarms or a filtered subset |
| POST | Add a comment to multiple alarms |
| PATCH | Clear, acknowledge or unacknowledge multiple alarms |
| alarm | /alarms/{alarmId} | PATCH | Clear, acknowledge or unacknowledge a single alarms |
| POST | Add a comment to a single alarm |
| $alarmCount | /alarms/$alarmCount | GET | Retrieve the alarm count per perceived severity |
| subscriptions | /subscriptions | POST | Create a subscription |
| subscriptions | /subscriptions | DELETE | Delete all subscriptions made with a consumerReferenceId |
| subscription | /subscriptions/{subscriptionId} | DELETE | Delete a single subscription |
| notificationSink | /notificationSink | POST | Send notifications |

##### 11.2.1.3.2 Resource definitions

###### 11.2.1.3.2.1 Resource "/alarms"

11.2.1.3.2.1.1 Description

This resource represents a collection of alarms.

11.2.1.3.2.1.2 URI

Resource URI: {DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/FaultMnS/v1500/alarms

The resource URI variables a defined in the following table.

Table 11.2.1.3.2.1.2-1: URI variables

|  |  |
| --- | --- |
| **Name** | **Definition** |
| DN\_prefix\_authority\_part | See clause 4.4 of TS 32.158 [15] |
| DN\_prefix\_remainder | See clause 4.4 of TS 32.158 [15] |

11.2.1.3.2.1.3 HTTP methods

11.2.1.3.2.1.3.1 HTTP GET

This method shall support the URI query parameters specified in the following table.

Table 11.2.1.3.2.1.3.1-1: URI query parameters supported by the GET method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **Qualifier** |
| alarmAckState | alarmAckState-QueryType |  | O |
| href | uri-Type |  | O |
| filter | filter-QueryType |  | O |

This method shall support the request data structures, the response data structures and response codes specified in the following table.

Table 11.2.1.3.2.1.3.1-2: Data structures supported by the GET Request Body on this resource

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **Qualifier** |
| n/a | n/a | n/a |

Table 11.2.1.3.2.1.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **Qualifier** |
| alarms-Type | 200 OK | The alarms returned. | M |
| error-Type | 4xx/5xx | Returned in case of an error | O |

11.2.1.3.2.1.3.2 HTTP POST

This method shall support the URI query parameters specified in the following table.

Table 11.2.1.3.2.1.3.2-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **Qualifier** |
| alarmIdList | Array of strings | Identifies the alarms the POST method shall be applied to. | O |

This method shall support the request data structures, the response data structures and response codes specified in the following table.

Table 11.2.1.3.2.1.3.2-2: Data structures supported by the POST Request Body on this resource

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **Qualifier** |
| comment-Type | JSON schema for the representation of a comment resource. | M |

Table 11.2.1.3.2.1.3.2-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **Qualifier** |
| n/a | 204 No Content | In case of success, the response body shall be empty. | M |
| failedAlarms-ResponseType | 4xx/5xx | In case of failure, the response body shall carry a JSON object described by the "failedAlarms-Type" format. | M |

11.2.1.3.2.1.3.3 HTTP PATCH

This method shall support the URI query parameters specified in the following table.

Table 11.2.1.3.2.1.3.3-1: URI query parameters supported by the PATCH method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **Qualifier** |
| alarmIds | array (alarmId-Type) | Identifies the alarms the PATCH shall be applied to | M |

This method shall support the request data structures, the response data structures and response codes specified in the following table.

Table 11.2.1.3.2.1.3.3-2: Data structures supported by the PATCH Request Body on this resource

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **Qualifier** |
| patchAcknowledgeAlarms-Type | Patch document for acknowledging one or multiple alarms | M |
| patchClearAlarms-Type | Patch document for clearing one or multiple alarms | M |

Table 11.2.1.3.2.1.3.3-3: Data structures supported by the PATCH Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **Qualifier** |
| n/a | 204 No Content | In case of success the response body shall be empty. | M |
| failedAlarms-ResponseType | 4xx/5xx | In case of failure, the response body shall carry a JSON object described by the "failedAlarms-Type" format. | M |

###### 11.2.1.3.2.2 Resource "alarms /{alarmId}"

11.2.1.3.2.2.1 Description

This resource represents an alarm.

11.2.1.3.2.2.2 URI

Resource URI: {DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/FaultMnS/v1500/alarms/{alarmId}

The resource URI variables a defined in the following table.

Table 11.2.1.3.2.2.2-1: URI variables

|  |  |
| --- | --- |
| **Name** | **Definition** |
| DN\_prefix\_authority\_part | See clause 4.4 of TS 32.158 [15] |
| DN\_prefix\_remainder | See clause 4.4 of TS 32.158 [15] |
| alarmId | String identifying an alarm |

11.2.1.3.2.2.3 HTTP methods

11.2.1.3.2.2.3.1 HTTP PATCH

This method shall support the URI query parameters specified in the following table.

Table 11.2.1.3.2.2.3.1-1: URI query parameters supported by the PATCH method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **Qualifier** |
| n/a | n/a | n/a | n/a |

This method shall support the request data structures, the response data structures and response codes specified in the following table.

Table 11.2.1.3.2.2.3.1-2: Data structures supported by the PATCH Request Body on this resource

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **Qualifier** |
| patchAcknowledgeAlarms-Type | Patch document for acknowledging an alarm | M |
| patchClearAlarms-Type | Patch document for clearing an alarm | M |

Table 11.2.1.3.2.2.3.1-3: Data structures supported by the PATCH Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **Qualifier** |
| n/a | 200 OK | In case of success the response body shall be empty. |  |
| failedAlarms-ResponseType | 4xx/5xx | In case of failure, the response body shall carry a JSON object described by the "failedAlarms-Type" format. |  |

###### 11.2.1.3.2.3 Resource "alarms/$alarmCount"

11.2.1.3.2.3.1 Definition

This resource holds metadata about the /alarms collection resource like the alarm count per perceived severity.

11.2.1.3.2.3.2 URI

Resource URI: {DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/FaultMnS/v1500/alarms/$alarmCount

The resource URI variables are defined in table 11.2.1.3.2.3.2-1.

Table 11.2.1.3.2.3.2-1: URI variables

|  |  |
| --- | --- |
| Name | Definition |
| DN\_prefix\_authority\_part | See clause 4.4 of TS 32.158 [15] |
| DN\_prefix\_remainder | See clause 4.4 of TS 32.158 [15] |

11.2.1.3.2.3.3 HTTP methods

11.2.1.3.2.3.3.1 GET

This method shall support the URI query parameters specified in table 11.2.1.3.2.3.3.1-1.

Table 11.2.1.3.2.3.3.3-1: URI query parameters supported by the GET method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Data type | Description | SQ |
| n/a |  |  |  |

This method shall support the request data structures specified in table 11.2.1.3.2.3.3.1-2 and the response data structures and response codes specified in table 11.2.1.3.2.3.3.1-3.

Table 11.2.1.3.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

|  |  |  |
| --- | --- | --- |
| Data type | Description | SQ |
|  |  |  |

Table 11.2.1.3.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Response  codes | Description | SQ |
| alarmsCount-Type | 200 OK | The alarm count per severity level returned. | M |
| error-Type | 4xx/5xx | Returned in case of an error | O |

###### 11.2.1.3.2.4 Resource "alarms/{alarmId}/comments"

11.2.1.3.2.4.1 Definition

This resource is a collection resource for comments attached to an alarm.

11.2.1.3.2.4.2 URI

Resource URI: {DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/FaultMnS/v1500/alarms/{alarmId}/comments

The resource URI variables are defined in the following table.

Table 11.2.1.3.2.4.2-1: URI variables

|  |  |
| --- | --- |
| **Name** | **Definition** |
| DN\_prefix\_authority\_part | See clause 4.4 of TS 32.158 [15] |
| DN\_prefix\_remainder | See clause 4.4 of TS 32.158 [15] |
| alarmed | Alarm identifier |

11.2.1.3.2.4.3 HTTP methods

11.2.1.3.2.4.3.1 POST

This method shall support the URI query parameters specified in the following table.

Table 11.2.1.3.2.4.3.1-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **Qualifier** |
| n/a |  |  |  |

This method shall support the request data structures, and the response data structures and response codes specified in the following tables.

Table 11.2.1.3.2.4.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **Qualifier** |
| comment-RequestType | The representation of the comment to be added to an alarm. | M |

Table 11.2.1.3.2.4.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Response  codes | Description | SQ |
| comment-ResponseType | 201 Created | In case of success, the response body shall be described by the "comment-ResponseType" format. The commentTime property shall carry the value set by the server. | M |
| failedAlarms-ResponseType | 4xx/5xx | In case of failure, the response body shall be described by the "failedAlarms-ResponseType" format. | M |

###### 11.2.1.3.2.5 Resource "/{commentId}"

11.2.1.3.2.5.1 Definition

This resource represents a comment attached to an alarm.

11.2.1.3.2.5.2 URI

Resource URI: {DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/FaultMnS/v1500/alarms/{alarmId}/comments/{commentId}

The resource URI variables are defined in the following table.

Table 11.2.1.3.2.4.5-1: URI variables

|  |  |
| --- | --- |
| **Name** | **Definition** |
| DN\_prefix\_authority\_part | See clause 4.4 of TS 32.158 [15] |
| DN\_prefix\_remainder | See clause 4.4 of TS 32.158 [15] |
| alarmed | Alarm identifier |
| commentId | Comment identifier |

11.2.1.3.2.5.3 HTTP methods

None.

###### 11.2.1.3.2.6 Resource "/subscriptions"

11.2.1.3.2.6.1 Description

This resource is a container resource for individual subscriptions.

11.2.1.3.2.6.2 URI

The resource URI is:

Resource URI: {DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/FaultMnS/v1500/subscriptions

11.2.1.3.2.6.3 HTTP methods

11.2.1.3.2.6.3.1 POST

This method shall support the URI query parameters specified in table 11.2.1.3.2.6.3.1-1.

Table 11.2.1.3.2.6.3.1-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Data type | Description | Qualifier |
| n/a | n/a | n/a | n/a |

This method shall support the request data structures specified in table 11.2.1.3.2.6.3.1-2 and the response data structures and response codes specified in table 11.2.1.3.2.6.3.1-3.

Table 11.2.1.3.2.6.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |
| --- | --- | --- |
| Data type | Description | SQ |
| subscription-RequestType | Details of the subscription to be created | M |

Table 11.2.1.3.2.6.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Response  codes | Description | SQ |
| subscription-ResponseType | 201 Created | In case of success the representation of the created subscription is returned. | M |
| error-Type | 4xx/5xx | In case of failure the error object is returned. | M |

11.2.1.3.2.6.3.2 DELETE

This method shall support the URI query parameters specified in table 11.2.1.3.2.6.3.2-1.

Table 11.2.1.3.2.6.3.2-1: URI query parameters supported by the DELETE method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Data type | Description | Qualifier |
| consumerReferenceId | consumerReferenceId-QueryType | Identifies the consumer whose subscriptions shall be deleted | M |

This method shall support the request data structures specified in table 11.2.1.3.2.6.3.2-2 and the response data structures and response codes specified in table 11.2.1.3.2.6.3.2-3.

Table 11.2.1.3.2.6.3.2-2: Data structures supported by the DELETE Request Body on this resource

|  |  |  |
| --- | --- | --- |
| Data type | Description | SQ |
| n/a | n/a | n/a |

Table 11.2.1.3.2.5.3.2-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Response  codes | Description | SQ |
| n/a | 204 No Content | In case of success no message body is returned | n/a |
| error-Type | 4xx/5xx | In case of failure the error object is returned. | M |

###### 11.2.1.3.2.7 Resource "/subscriptions/{subscriptionId}"

11.2.1.3.2.7.1 Description

This resource represents a subscription.

11.2.1.3.2.7.2 URI

The resource URI is:

Resource URI: {DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/FaultMnS/v1500/ subscriptions/{subscriptionId}

Table 11.2.1.3.2.7.2-1: URI variables

|  |  |
| --- | --- |
| Name | Definition |
| DN\_prefix\_authority\_part | See clause 4.4 of TS 32.158 [15] |
| DN\_prefix\_remainder | See clause 4.4 of TS 32.158 [15] |
| subscriptionId | Subscription identifier |

11.2.1.3.2.7.3 HTTP methods

11.2.1.3.2.7.3.1 DELETE

This method shall support the URI query parameters specified in table 11.2.1.3.2.7.3.1-1.

Table 11.2.1.3.2.6.3.1-1: URI query parameters supported by the DELETE method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Data type | Description | Qualifier |
| n/a | n/a | n/a | n/a |

This method shall support the request data structures specified in table 11.2.1.3.2.7.3.1-2 and the response data structures and response codes specified in table 11.2.1.3.2.7.3.1-3.

Table 11.2.1.3.2.7.3.1-2: Data structures supported by the DELETE Request Body on this resource

|  |  |  |
| --- | --- | --- |
| Data type | Description | SQ |
| n/a | n/a | n/a |

Table 11.2.1.3.2.7.3.1-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Response  codes | Description | SQ |
| n/a | 204 No Content | In case of success no message body is returned | M |
| error-Type | 4xx/5xx | In case of failure the error object is returned. | M |

###### 11.2.1.3.2.8 Resource "/notificationSink"

11.2.1.3.2.8.1 Description

This resource represents a resource to which notifications are sent to.

11.2.1.3.2.8.2 URI

The resource URI is provided by the notification subscriber when creating the subscription.

11.2.1.3.2.8.3 HTTP methods

11.2.1.3.2.8.3.1 POST

This method shall support the URI query parameters specified in table 11.2.1.3.2.8.3.1-1.

Table 11.2.1.3.2.8.3.1-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Data type | Description | Qualifier |
| n/a | n/a | n/a | n/a |

This method shall support the request data structures specified in table 11.2.1.3.2.8.3.1-2 and the response data structures and response codes specified in table 11.2.1.3.2.8.3.1-3.

Table 11.2.1.3.2.8.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Data type | | Description | | SQ | |
| notifyNewAlarm-NotifType | | Type in case a notifyNewAlarm notification is sent | | M | |
| notifyNewSecurityAlarm-NotifType | | Type in case a notifyNewSecurityAlarm notification is sent | | M | |
| notifyAckStateChanged-NotifType | | Type in case a notifyAckStateChanged notification is sent | | M | |
| notifyClearedAlarm-NotifType | | Type in case a notifyClearedAlarm notification is sent | | M | |
| notifyAlarmListRebuilt-NotifType | | Type in case a notifyAlarmListRebuilt notification is sent | | M | |
| notifyChangedAlarm-NotifType | | Type in case a notifyChangedAlarm notification is sent | | M | |
| notifyComments-NotifType | | Type in case a notifyComments notification is sent | | M | |
| notifyPotentialFaultyAlarmList-NotifType | | Type in case a notifyPotentialFaultyAlarmList notification is sent | | M | |
| notifyCorrelatedNotificationChanged-NotifType | | Type in case a notifyCorrelatedNotificationChanged notification is sent | | M | |
| notifyChangedAlarmGeneral-NotifType | | Type in case a notifyChangedAlarmGeneral notification is sent | | M | |

Table 11.2.1.3.2.8.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Response  codes | Description | SQ |
| n/a | 204 No Content | In case of success no message body is returned | M |
| error-Type | 4xx/5xx | In case of failure the error object is returned. | M |

#### 11.2.1.4 Data type definitions

##### 11.2.1.4.1 General

Table 11.2.1.4.1-1: Data types defined in the present document

|  |  |  |
| --- | --- | --- |
| Data type | Reference | Description |
| **General types** |  |  |
| dateTime-Type |  | Date and time |
| float-Type |  | Float type |
| long-Type |  | Long type |
| uri-Type |  | Type of an URI |
| **Types used in paths** |  |  |
| alarmId-PathType |  | Used in the path to identify an alarm resource |
| subscriptionId-PathType |  | Used in the path to identify a subscription resource |
| **Types in query parts** |  |  |
| alarmIdAndPerceivedSeverityList-QueryType | 11.2.1.4.2.1 | Used in the query part of HTTP PATCH on /alarms to identify the alarms to be acknowledged |
| alarmIdList-QueryType | 11.2.1.4.2.2 | Used in the query part of HTTP POST on /alarms to identify the alarms a comment shall be added to and in HTTP PATCH on /alarms to identify the alarms to be cleared or unacknowledged |
| alarmAckState-QueryType | 11.2.1.4.4.4 | Used in the query part of HTTP GET on /alarms to discriminate alarms to be returned or counted |
| consumerReferenceId-QueryType | 11.2.1.4.4.2 | Used in the query part of HTTP DELETE on /Subscriptions to delete all subscriptions made with a specific consumerReferenceId |
| filter-QueryType | 11.2.1.4.4.2 | Used in the query part of HTTP GET on /alarms to discriminate alarms to be returned or counted |
| href-QueryType | 11.2.1.4.4.2 | Used in the query part of HTTP GET on /alarms to identify the base object of the tree for partial alarm alignment |
| perceivedSeverity-QueryType | 11.2.1.4.2.3 | Used in the query part in HTTP POST on /alarms/{alarmId} when acknowledging an alarm to indicate the perceived severity the alarm to acknowledge shall have, otherwise the alarm shall not be acknowledged |
| **Types used in request bodies** |  |  |
| comment-RequestType | 11.2.1.4.2.4 | Used in the request body of HTTP POST on /alarms describing the representation of a comment to be added to multiple alarms, or in the request body of HTTP POST on /alarms/{alarmId} describing the representation of a comment to be added to a single alarm |
| patchAcknowledgeAlarms-RequestType | 11.2.1.4.2.5 | Used in the request message body of HTTP PATCH to acknowledge alarms |
| patchUnacknowledgeAlarms-RequestType | 11.2.1.4.2.6 | Used in the request message body of HTTP PATCH to unacknowledge alarms |
| patchClearAlarms-RequestType | 11.2.1.4.2.7 | Used in the request body of HTTP PATCH to clear alarms |
| subscription-RequestType | 11.2.1.4.2.8 | Used in the request body of HTTP POST on /subscriptions to create alarm notification subscriptions |
| **Types used in response bodies** |  |  |
| alarms-ResponseType | 11.2.1.4.2.9 | Used in the response body of HTTP GET on /alarms to return complete alarm information |
| alarmsCount-ResponseType | 11.2.1.4.2.10 | Used in the response body of HTTP GET on /alarms to return alarm counts per perceived severity |
| comment-ResponseType | 11.2.1.4.2.11 | Used in the response body of HTTP POST on /alarms describing the representation of a comment added to multiple alarms, or in the response body of HTTP POST on /alarms/{alarmId} describing the representation of a comment added to a single alarm |
| error-ResponseType | 11.2.1.4.2.12 | Used in the response body of multiple HTTP methods on multiple resources in case of error |
| failedAlarms-ResponseType | 11.2.1.4.2.13 | Used in the response body of multiple HTTP methods to indicate error reasons per alarm id |
| subscription-ResponseType | 11.2.1.4.2.14 | Used in the response body of HTTP POST on /subscriptions to create alarm notification subscriptions |
| **Types used for resources** |  |  |
| alarm-ResourceType | 11.2.1.4.2.15 | Representation of an alarm resource |
| comment-ResourceType | 11.2.1.4.2.16 | Representation of a comment resource |
| subscription-ResourceType | 11.2.1.4.2.17 | Representation of a subscription resource |
| **Types used in notifications** |  |  |
| notifyNewAlarm-NotifType | 11.2.1.4.2.18 | Used in the request body of HTTP POST for the notification type notifyNewAlarm |
| notifyAckStateChanged-NotifType | 11.2.1.4.2.19 | Used in the request body of HTTP POST for the notification type notifyAckStateChanged |
| notifyClearedAlarm-NotifType | 11.2.1.4.2.20 | Used in the request body of HTTP POST for the notification type notifyClearedAlarm |
| notifyAlarmListRebuilt-NotifType | 11.2.1.4.2.21 | Used in the request body of HTTP POST for the notification type notifyAlarmListRebuilt |
| notifyChangedAlarm-NotifType | 11.2.1.4.2.22 | Used in the request body of HTTP POST for the notification type notifyChangedAlarm |
| notifyComments-NotifType | 11.2.1.4.2.23 | Used in the request body of HTTP POST for the notification type notifyComments |
| notifyPotentialFaultyAlarmList-NotifType | 11.2.1.4.2.24 | Used in the request body of HTTP POST for the notification type notifyPotentialFaultyAlarmList |
| notifyCorrelatedNotificationChanged-NotifType | 11.2.1.4.2.25 | Used in the request body of HTTP POST for the notification type notifyCorrelatedNotificationChanged |
| notifyChangedAlarmGeneralNotifType | 11.2.1.4.2.26 | Used in the request body of HTTP POST for the notification type notifyChangedAlarmGeneral |
| **Types referenced by the definitions above** |  |  |
| ackState-Type | 11.2.1.4.4.4 | Acknowledgement state, see clause 10.2.2.1.5.1 |
| ackSystemId-Type | 11.2.1.4.4.2 | Identifier of a system acknowledging an alarm, see clause 10.2.2.1.5.1 |
| ackUserId-Type | 11.2.1.4.4.2 | Identifier of a user acknowledging an alarm, see clause 10.2.2.1.5.1 |
| additionalText-Type | 11.2.1.4.4.2 | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] |
| alarmId-Type | 11.2.1.4.4.2 | Alarm identifier, see clause 10.2.2.1.5.1 |
| alarmIdAndPerceivedSeverity-Type | 11.2.1.4.3.1 |  |
| alarmListAlignmentRequirement-Type | 11.2.1.4.4.5 | Indicating if alarm list alignment is required or not |
| alarmsCountType | 11.2.1.4.3.2 |  |
| alarmType-Type | 11.2.1.4.4.6 | Alarm type as defined in ITU-T Rec. X. 733 [4] |
| attributeNameValuePair-Type | 11.2.1.4.3.3 | Attribute name and attribute value pair |
| attributeValueChange-Type | 11.2.1.4.3.4 | Attribute name with its old value and new value |
| backedUpStatus-Type | 11.2.1.4.4.2 | Indicating if the object emitting the alarm has been backed up as defined in ITU-T Rec. X. 733 [4] |
| backUpObject-Type | 11.2.1.4.4.2 | Indicating the backup object of the alarmed object as defined in ITU-T Rec. X. 733 [4] |
| clearSystemId-Type | 11.2.1.4.4.2 | Identifier of a system clearing an alarm, see clause 10.2.2.1.5.1 |
| clearUserId-Type | 11.2.1.4.4.2 | Identifier of a user clearing an alarm, see clause 10.2.2.1.5.1 |
| correlatedNotification-Type | 11.2.1.4.3.5 | Describes the correlated notifications of a single source |
| filter-Type | 11.2.1.4.4.2 | Filter of a subscription resource |
| header-Type | 11.2.1.4.3.6 | Notification header |
| indicationType | 11.2.1.4.4.7 |  |
| notificationId-Type | 11.2.1.4.4.2 | Notification identifier as defined in ITU-T Rec. X. 733 [4] |
| notificationType-Type | 11.2.1.4.4.8 | Notification type (notifyNewAlarm, etc.) |
| perceivedSeverity-Type | 11.2.1.4.4.9 | Perceived severity of an alarm as defined in ITU-T Rec. X. 733 [4] |
| probableCause-Type | 11.2.1.4.4.2 | Probable cause of an alarm as defined in ITU-T Rec. X.733 [4] |
| proposedRepairActions-Type | 11.2.1.4.4.2 | Used if the cause is known and the system being managed can suggest one or more solutions to fix the problem causing the alarm as defined in ITU-T Rec. X. 733 [4] |
| reason-Type | 11.2.1.4.4.2 | Indicating in notifyPotentialFaultyAlarmList the reason why the alarm list has to be rebuilt and in notifyAlarmListRebuilt the reason why the alarm list has been rebuilt |
| rootCauseIndicator-Type | 11.2.1.4.4.2 | Indicates if this event is the root cause of the events captured by the notifications whose identifiers are in the related correlatedNotifications attribute, see clause 10.2.2.1.5.1 |
| securityAlarmDetector-Type | 11.2.1.4.4.2 | Identity of the detector of the security alarm, see clause 10.2.2.1.5.1 |
| serviceProvider-Type | 11.2.1.4.4.2 | Identifies the service-provider whose service is requested by the serviceUser and the service request provokes the generation of the security alarm, see clause 10.2.2.1.5.1 |
| serviceUser-Type | 11.2.1.4.4.2 | Identifies the service-user whose request for service provided by the serviceProvider led to the generation of the security alarm, see clause 10.2.2.1.5.1 |
| specificProblem-Type | 11.2.1.4.4.2 | Identifies further refinements to the Probable cause of the alarm as defined in ITU-T Rec. X. 733 [4] |
| systemDN-Type | 11.2.1.4.4.2 | System DN |
| thresholdInfo-Type | 11.2.1.4.3.7 | Provides additional information for threshold crossing alarms as defined in ITU-T Rec. X. 733 [4] |
| thresholdLevel-Type | 11.2.1.4.3.8 | Used in the definition of thresholdInfo-Type as defined in ITU-T Rec. X. 733 [4] |
| trendIndication-Type | 11.2.1.4.4.10 | Severity trend of the alarmed object as defined in ITU-T Rec. X. 733 [4] |

Table 11.2.1.4.1-2: Data types imported

|  |  |  |
| --- | --- | --- |
| **Data type** | **Reference** | **Description** |
|  |  |  |

##### 11.2.1.4.2 Query, message body and resource data types

###### 11.2.1.4.2.1 Type alarmIdAndPerceivedSeverityList-QueryType

**Table 11.2.1.4.2.1-1: Definition of type alarmIdAndPerceivedSeverityList-QueryType**

|  |  |  |
| --- | --- | --- |
| **Type** | **Definition** | **Description** |
| alarmIdAndPerceivedSeverityList-QueryType | array(alarmIdAndPerceivedSeverity-Type) | Used in the query part of HTTP PATCH on /alarms to identify the alarms to be acknowledged |

###### 11.2.1.4.2.2 Type alarmIdList-QueryType

**Table 11.2.1.4.2.1-1: Definition of type alarmIdList-QueryType**

|  |  |  |
| --- | --- | --- |
| **Type** | **Definition** | **Description** |
| alarmIdList-QueryType | array(alarmId-Type) | Used in the query part of HTTP POST on /alarms to identify the alarms a comment shall be added to and in HTTP PATCH on /alarms to identify the alarms to be cleared or unacknowledged |

###### 11.2.1.4.2.3 Type perceivedSeverity-QueryType

**Table 11.2.1.4.2.3-1: Definition of type perceivedSeverity-QueryType**

|  |  |  |
| --- | --- | --- |
| **Type** | **Definition** | **Description** |
| perceivedSeverity-QueryType | perceivedSeverity-Type | Used in the query part in HTTP POST on /alarms/{alarmId} when acknowledging an alarm to indicate the perceived severity the alarm to acknowledge shall have, otherwise the alarm shall not be acknowledged |

###### 11.2.1.4.2.4 Type comment-RequestType

**Table 11.2.1.4.2.4-1: Definition of type comment-RequestType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | comment-ResourceType | Used in the request body of HTTP POST on /alarms describing the representation of a comment to be added to multiple alarms, or in the request body of HTTP POST on /alarms/{alarmId} describing the representation of a comment to be added to a single alarm. | M |

###### 11.2.1.4.2.5 Type patchAcknowledgeAlarms-RequestType

**Table 11.2.1.4.2.5-1: Definition of type patchAcknowledgeAlarms-RequestType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| ackUserId | ackUserId-Type | User acknowledging one or multiple alarms | M |
| ackSystemId | ackSystemId-Type | System acknowledging one or multiple alarms | O |
| ackState | type string, enum acknowledged | Indicates the ackState shall be set to acknowledged | M |

###### 11.2.1.4.2.6 Type patchUnacknowledgeAlarms-RequestType

**Table 11.2.1.4.2.6-1: Definition of type patchUnacknowledgeAlarms-RequestType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| ackUserId | ackUserId-Type | User acknowledging one or multiple alarms | M |
| ackSystemId | ackSystemId-Type | System acknowledging one or multiple alarms | O |
| ackState | type string, enum acknowledged | Indicates the ackState shall be set to unacknowledged | M |

###### 11.2.1.4.2.7 Type patchClearAlarms-RequestType

**Table 11.2.1.4.2.7-1: Definition of type patchClearAlarms-RequestType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| clearUserId | clearUserId-Type | User clearing one or multiple alarms | M |
| clearSystemId | clearSystemId-Type | System clearing one or multiple alarms | O |
| perceivedSeverity | type string, enum cleared | Indicates the perceivedSeverity shall be set to cleared | M |

###### 11.2.1.4.2.8 Type subscription-RequestType

**Table 11.2.1.4.2.8-1: Definition of type subscription-RequestType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | subscription-ResourceType | Used in the request body of HTTP POST on /subscriptions describing the representation of the subscription to be created | M |

###### 11.2.1.4.2.9 Type alarms-ResponseType

**Table 11.2.1.4.2.9-1: Definition of type alarms-ResponseType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | array(alarm-ResourceType) | Used in the response body of HTTP GET on /alarms to return complete alarm information | M |

###### 11.2.1.4.2.10 Type alarmsCount-ResponseType

**Table 11.2.1.4.2.10-1: Definition of type alarmsCount-ResponseType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | alarmsCount-Type |  | M |

###### 11.2.1.4.2.11 Type comment-ResponseType

**Table 11.2.1.4.2.11-1: Definition of type comment-ResponseType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | comment-ResourceType | Used in the response body of HTTP POST on /alarms describing the representation of a comment added to multiple alarms, or in the response body of HTTP POST on /alarms/{alarmId} describing the representation of a comment added to a single alarm. | M |

###### 11.2.1.4.2.12 Type error-ResponseType

**Table 11.2.1.4.2.12-1: Definition of type error-ResponseType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| error | object | Key indicating the response body contains error information | M |
| > errorInfo | string | Attribute allowing to convey error information in string format | M |

###### 11.2.1.4.2.13 Type failedAlarms-ResponseType

**Table 11.2.1.4.2.13-1: Definition of type failedAlarms-ResponseType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| error | object | Key indicating the response body contains error information | M |
| > alarmId | alarmId-Type | Indicating the alarms for which the action on the alarm could not be performed | M |
| > errorReason | string | Indicating the reason why the action could not be performed | M |

###### 11.2.1.4.2.14 Type subscription-ResponseType

**Table 11.2.1.4.2.14-1: Definition of type subscription-ResponseType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | subscription-ResourceType | Used in the response body of HTTP POST on /subscriptions describing the representation of the created subscription | M |

###### 11.2.1.4.2.15 Type alarm-ResourceType

**Table 11.2.1.4.2.15-1: Definition of type alarm-ResourceType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| header | header-Type | See clause ? | M |
| body | object |  | M |
| > alarmId | alarmId-Type | Alarm identifier, see clause 10.2.2.1.5.1 | M |
| > alarmType | alarmType-Type | Alarm type as defined in ITU-T Rec. X. 733 [4] | M |
| > alarmRaisedTime | dateTime-Type | Date and time when the alarm is first raised by the alarmed resource, see clause 10.2.2.1.5.1 | M |
| > alarmChangedTime | dateTime-Type | Last date and time when the alarm resource is changed by the alarmed resource, see clause 10.2.2.1.5.1 | O |
| > alarmClearedTime | dateTime-Type | Date and time when the alarm is cleared, see clause 10.2.2.1.5.1 | M |
| > probableCause | probableCause-Type | Probable cause of an alarm as defined in ITU-T Rec. X.733 [4] | M |
| > specificProblem | specificProblem-Type | Identifies further refinements to the Probable cause of the alarm as defined in ITU-T Rec. X. 733 [4] | O |
| > perceivedSeverity | perceivedSeverity-Type | Perceived severity of an alarm as defined in ITU-T Rec. X. 733 [4] | M |
| > backedUpStatus | backedUpStatus-Type | Indicating if the object emitting the alarm has been backed up as defined in ITU-T Recommendation X. 733 [4] | O |
| > backUpObject | backUpObject-Type | Indicating the backup object of the alarmed object as defined in ITU-T Rec. X. 733 [4] | O |
| > trendIndication | trendIndication-Type | Severity trend of the alarmed object as defined in ITU-T Rec. X. 733 [4] | O |
| > thresholdInfo | thresholdInfo-Type | Provides additional information for threshold crossing alarms as defined in ITU-T Rec. X. 733 [4] | O |
| > correlatedNotifications | array(correlatedNotification-Type) | Set of all notifications to which this notification is considered to be correlated as defined in ITU-T Rec. X. 733 [4] | O |
| > stateChangeDefinition | array(attributeValueChange-Type) | Indicates a state transition associated to an alarm as defined in ITU-T Rec. X. 733 [4] | O |
| > monitoredAttributes | array(attributeNameValuePair-Type) | Defines one or more attributes of the alarmed manged object and their corresponding values at the time of the alarm as defined in ITU-T Rec. X. 733 [4]. | O |
| > proposedRepairActions | proposedRepairActions-Type | Used if the cause is known and the system being managed can suggest one or more solutions to fix the problem causing the alarm as defined in ITU-T Rec. X. 733 [4] | O |
| > additionalText | additionalText-Type | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] | O |
| > additionalInformation | array(attributeNameValuePair-Type) | Allows the inclusion of a set of additional information in the event report as defined in ITU-T Rec. X. 733 [4] | O |
| > rootCauseIndicator | rootCauseIndicator-Type | Indicates if this event is the root cause of the events captured by the notifications whose identifiers are in the related correlatedNotifications attribute, see clause 10.2.2.1.5.1 | O |
| > comments | array(comment-ResourceType) | Set of all comments related to an alarm | M |
| > ackTime | dateTime-Type | Time when the alarm has been acknowledged or unacknowledged the last time, see clause 10.2.2.1.5.1 | M |
| > ackUserId | ackUserId-Type | Identifier of a user acknowledging an alarm, see clause 10.2.2.1.5.1 | M |
| > ackSystemId | ackSystemId-Type | Identifier of a system acknowledging an alarm, see clause 10.2.2.1.5.1 | O |
| > ackState | ackstate-Type | Acknowledgement state, see clause 10.2.2.1.5.1 | M |
| > clearUserId | clearUserId-Type | Identifier of a system clearing an alarm, see clause 10.2.2.1.5.1 | O |
| > clearSystemId | clearSystemId-Type | Identifier of a user clearing an alarm, see clause 10.2.2.1.5.1 | O |
| > serviceUser | serviceUser-Type | Identifies the service-user whose request for service provided by the serviceProvider led to the generation of the security alarm, see clause 10.2.2.1.5.1 | M |
| > serviceProvider | serviceProvider-Type | Identifies the service-provider whose service is requested by the serviceUser and the service request provokes the generation of the security alarm, see clause 10.2.2.1.5.1 | M |
| > securityAlarmDetector | securityAlarmDetector-Type | Identity of the detector of the security alarm, see clause 10.2.2.1.5.1 | M |

###### 11.2.1.4.2.16 Type comment-ResourceType

**Table 11.2.1.4.2.16-1: Definition of type comment-ResourceType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| commentTime | dateTime-Type | Time when the comment has been added to the alarm. Attribute is nullable. | M |
| commentText | string | Comment in text form | M |
| commentUserId | string | Identifier of the user who makes the comment | M |
| commentSystemId | string | Identifier of the system which makes the comment | O |

###### 11.2.1.4.2.17 Type subscription-ResourceType

**Table 11.2.1.4.2.17-1: Definition of type subscription-ResourceType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| consumerReference | uri-Type | The URI of the endpoint to send the notification to (/notificationSink). | M |
| timeTick | long-Type | Time window within which the subscriber intends to subscribe again to confirm its subscription, see clause 10.2.2.2.5.1 | O |
| filter | filter-Type | Filter settings for this subscription, to define the subset of all notifications this subscription relates to. A notification is sent to the subscriber if the filter matches, or if there is no filter. | O |

###### 11.2.1.4.2.18 Type notifyNewAlarm-NotifType

**Table 11.2.1.4.2.18-1: Definition of type notifyNewAlarm-NotifType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| header |  |  |  |
| > href | uri-Type | URI of the resource where the event (alarm) occurred | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyNewAlarm, etc.) | M |
| > eventTime | dateTime-Type | Event (alarm) occurrence time | M |
| > systemDN | systemDN-Type | System DN | C |
| body |  |  |  |
| > alarmId | alarmId-Type | Alarm identifier, see clause 10.2.2.1.5.1 | M |
| > alarmType | alarmType-Type | Alarm type as defined in ITU-T Rec. X. 733 [4] | M |
| > probableCause | probableCause-Type | Probable cause of an alarm as defined in ITU-T Rec. X.733 [4] | M |
| > specificProblem | specificProblem-Type | Identifies further refinements to the Probable cause of the alarm as defined in ITU-T Rec. X. 733 [4] | O |
| > perceivedSeverity | perceivedSeverity-Type | Perceived severity of an alarm as defined in ITU-T Rec. X. 733 [4] | M |
| > backedUpStatus | backedUpStatus-Type | Indicating if the object emitting the alarm has been backed up as defined in ITU-T Recommendation X. 733 [4] | O |
| > backUpObject | backUpObject-Type | Indicating the backup object of the alarmed object as defined in ITU-T Rec. X. 733 [4] | O |
| > trendIndication | trendIndication-Type | Severity trend of the alarmed object as defined in ITU-T Rec. X. 733 [4] | O |
| > thresholdInfo | thresholdInfo-Type | Provides additional information for threshold crossing alarms as defined in ITU-T Rec. X. 733 [4] | O |
| > correlatedNotifications | array(correlatedNotification-Type) | Set of all notifications to which this notification is considered to be correlated as defined in ITU-T Rec. X. 733 [4] | O |
| > stateChangeDefinition | array(attributeValueChange-Type) | Indicates a state transition associated to an alarm as defined in ITU-T Rec. X. 733 [4] | O |
| > monitoredAttributes | array(attributeNameValuePair-Type) | Defines one or more attributes of the alarmed manged object and their corresponding values at the time of the alarm as defined in ITU-T Rec. X. 733 [4]. | O |
| > proposedRepairActions | proposedRepairActions-Type | Used if the cause is known and the system being managed can suggest one or more solutions to fix the problem causing the alarm as defined in ITU-T Rec. X. 733 [4] | O |
| > additionalText | additionalText-Type | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] | O |
| > additionalInformation | array(attributeNameValuePair-Type) | Allows the inclusion of a set of additional information in the event report as defined in ITU-T Rec. X. 733 [4] | O |
| > rootCauseIndicator | rootCauseIndicator-Type | Indicates if this event is the root cause of the events captured by the notifications whose identifiers are in the related correlatedNotifications attribute, see clause 10.2.2.1.5.1 | O |

###### 11.2.1.4.2.19 Type notifyNewSecurityAlarm-NotifType

**Table 11.2.1.4.2.19-1: Definition of type notifyNewAlarm-NotifType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| header |  |  |  |
| > href | uri-Type | URI of the resource where the event (alarm) occurred | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyNewAlarm, etc.) | M |
| > eventTime | dateTime-Type | Event (alarm) occurrence time | M |
| > systemDN | systemDN-Type | System DN | C |
| body |  |  |  |
| > alarmId | alarmId-Type | Alarm identifier, see clause 10.2.2.1.5.1 | M |
| > alarmType | alarmType-Type | Alarm type as defined in ITU-T Rec. X. 733 [4] | M |
| > probableCause | probableCause-Type | Probable cause of an alarm as defined in ITU-T Rec. X.733 [4] | M |
| > perceivedSeverity | perceivedSeverity-Type | Perceived severity of an alarm as defined in ITU-T Rec. X. 733 [4] | M |
| > correlatedNotifications | array(correlatedNotification-Type) | Set of all notifications to which this notification is considered to be correlated as defined in ITU-T Rec. X. 733 [4] | O |
| > additionalText | additionalText-Type | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] | O |
| > additionalInformation | array(attributeNameValuePair-Type) | Allows the inclusion of a set of additional information in the event report as defined in ITU-T Rec. X. 733 [4] | O |
| > rootCauseIndicator | rootCauseIndicator-Type | Indicates if this event is the root cause of the events captured by the notifications whose identifiers are in the related correlatedNotifications attribute, see clause 10.2.2.1.5.1 | O |
| > serviceUser | serviceUser-Type | Identifies the service-user whose request for service provided by the serviceProvider led to the generation of the security alarm, see clause 10.2.2.1.5.1 | M |
| > serviceProvider | serviceProvider-Type | Identifies the service-provider whose service is requested by the serviceUser and the service request provokes the generation of the security alarm, see clause 10.2.2.1.5.1 | M |
| > securityAlarmDetector | securityAlarmDetector-Type | Identity of the detector of the security alarm, see clause 10.2.2.1.5.1 | M |

###### 11.2.1.4.2.19 notifyAckStateChanged-NotifType

**Table 11.2.1.4.2.19-1: Definition of type notifyAckStateChanged-NotifType**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| header |  |  |  |
| > href | uri-Type | URI of the resource where the event (alarm) occurred | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyNewAlarm, etc.) | M |
| > eventTime | dateTime-Type | Event (alarm) occurrence time | M |
| > systemDN | systemDN-Type | System DN | C |
| body |  |  |  |
| > alarmId | alarmId-Type | Alarm identifier, see clause 10.2.2.1.5.1 | M |
| > alarmType | alarmType-Type | Alarm type as defined in ITU-T Rec. X. 733 [4] | M |
| > probableCause | probableCause-Type | Probable cause of an alarm as defined in ITU-T Rec. X.733 [4] | M |
| > perceivedSeverity | perceivedSeverity-Type | Perceived severity of an alarm as defined in ITU-T Rec. X. 733 [4] | M |
| > ackState | ackState-Type | Acknowledgement state, see clause 10.2.2.1.5.1 | M |
| > ackUserId | ackUserId-Type | Identifier of a system acknowledging an alarm, see clause 10.2.2.1.5.1 | M |
| > ackSystemId | ackSystemId-Type | Identifier of a user acknowledging an alarm, see clause 10.2.2.1.5.1 | O |

###### 11.2.1.4.2.20 notifyClearedAlarm-NotifType

Table 11.2.1.4.2.20-1: Definition of type notifyClearedAlarm-NotifType

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| header |  |  |  |
| > href | uri-Type | URI of the resource where the event (alarm) occurred | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyNewAlarm, etc.) | M |
| > eventTime | dateTime-Type | Event (alarm) occurrence time | M |
| > systemDN | systemDN-Type | System DN | C |
| body |  |  |  |
| > alarmId | alarmId-Type | Alarm identifier, see clause 10.2.2.1.5.1 | M |
| > alarmType | alarmType-Type | Alarm type as defined in ITU-T Rec. X. 733 [4] | M |
| > probableCause | probableCause-Type | Probable cause of an alarm as defined in ITU-T Rec. X.733 [4] | M |
| > perceivedSeverity | perceivedSeverity-Type | Perceived severity of an alarm as defined in ITU-T Rec. X. 733 [4] | M |
| > correlated Notifications | array(correlatedNotification-Type) | Set of all notifications to which this notification is considered to be correlated as defined in ITU-T Rec. X. 733 [4] | O |
| > clearUserId | string | Identifier of a user clearing an alarm, see clause 10.2.2.1.5.1 | O |
| > clearSystemId | string | Identifier of a system clearing an alarm, see clause 10.2.2.1.5.1 | O |

###### 11.2.1.4.2.21 notifyAlarmListRebuilt-NotifType

Table 11.2.1.4.2.21-1: Definition of type notifyAlarmListRebuilt-NotifType

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| header |  |  |  |
| > href | uri-Type | URI of the resource where the event (alarm) occurred | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyNewAlarm, etc.) | M |
| > eventTime | dateTime-Type | Event (alarm) occurrence time | M |
| > systemDN | systemDN-Type | System DN | C |
| body |  |  |  |
| > reason | string | Indicating the reason why the alarm list has been rebuilt | M |
| > alarmListAlignmentRequirement | alarmListAlignmentRequirement-Type | Indicating if alarm list alignment is required or not | O |

###### 11.2.1.4.2.22 notifyChangedAlarm-NotifType

Table 11.2.1.4.2.22-1: Definition of type notifyChangedAlarm-NotifType

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| header |  |  |  |
| > href | uri-Type | URI of the resource where the event (alarm) occurred | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyNewAlarm, etc.) | M |
| > eventTime | dateTime-Type | Event (alarm) occurrence time | M |
| > systemDN | systemDN-Type | System DN | C |
| body |  |  |  |
| > alarmId | alarmId-Type | Alarm identifier, see clause 10.2.2.1.5.1 | M |
| > alarmType | alarmType-Type | Alarm type as defined in ITU-T Rec. X. 733 [4] | M |
| > probableCause | probableCause-Type | Probable cause of an alarm as defined in ITU-T Rec. X.733 [4] | M |
| > perceivedSeverity | perceivedSeverity-Type | Perceived severity of an alarm as defined in ITU-T Rec. X. 733 [4] | M |
| > correlated Notifications | array(correlatedNotification-Type) | Set of all notifications to which this notification is considered to be correlated as defined in ITU-T Rec. X. 733 [4] | O |

###### 11.2.1.4.2.23 notifyComments-NotifType

Table 11.2.1.4.2.23-1: Definition of type notifyComments-NotifType

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| header |  |  |  |
| > href | uri-Type | URI of the resource where the event (alarm) occurred | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyNewAlarm, etc.) | M |
| > eventTime | dateTime-Type | Event (alarm) occurrence time | M |
| > systemDN | systemDN-Type | System DN | C |
| body |  |  |  |
| > alarmId | alarmId-Type | Alarm identifier, see clause 10.2.2.1.5.1 | M |
| > alarmType | alarmType-Type | Alarm type as defined in ITU-T Rec. X. 733 [4] | M |
| > probableCause | probableCause-Type | Probable cause of an alarm as defined in ITU-T Rec. X.733 [4] | M |
| > perceivedSeverity | perceivedSeverity-Type | Perceived severity of an alarm as defined in ITU-T Rec. X. 733 [4] | M |
| > comments | array(comment-ResourceType) | Set of all comments related to an alarm | M |

###### 11.2.1.4.2.24 notifyPotentialFaultyAlarmList-NotifType

Table 11.2.1.4.2.24-1: Definition of type notifyPotentialFaultyAlarmList-NotifType

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| header |  |  |  |
| > href | uri-Type | URI of the resource where the event (alarm) occurred | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyNewAlarm, etc.) | M |
| > eventTime | dateTime-Type | Event (alarm) occurrence time | M |
| > systemDN | systemDN-Type | System DN | C |
| body |  |  |  |
| > reason | string | Indicating the reason why the alarm list has to be rebuilt. | M |

###### 11.2.1.4.2.25 notifyCorrelatedNotificationChanged-NotifType

Table 11.2.1.4.2.25-1: Definition of type notifyCorrelatedNotificationChanged-NotifType

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| header |  |  |  |
| > href | uri-Type | URI of the resource where the event (alarm) occurred | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyNewAlarm, etc.) | M |
| > eventTime | dateTime-Type | Event (alarm) occurrence time | M |
| > systemDN | systemDN-Type | System DN | C |
| body |  |  |  |
| > alarmId | alarmId-Type | Alarm identifier, see clause 10.2.2.1.5.1 | M |
| > correlated Notifications | array(correlatedNotification-Type) | Set of all notifications to which this notification is considered to be correlated as defined in ITU-T Rec. X. 733 [4] | O |
| > rootCauseIndicator | rootCauseIndicator-Type | Indicates if this event is the root cause of the events captured by the notifications whose identifiers are in the related correlatedNotifications attribute, see clause 10.2.2.1.5.1 | O |

###### 11.2.1.4.2.26 notifyChangedAlarmGeneralNotifType

Table 11.2.1.4.2.26-1: Definition of type notifyChangedAlarmGeneralNotifType

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| header |  |  |  |
| > href | uri-Type | URI of the resource where the event (alarm) occurred | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyNewAlarm, etc.) | M |
| > eventTime | dateTime-Type | Event (alarm) occurrence time | M |
| > systemDN | systemDN-Type | System DN | C |
| body |  |  |  |
| > alarmId | alarmId-Type | Alarm identifier, see clause 10.2.2.1.5.1 | M |
| > alarmType | alarmType-Type | Alarm type as defined in ITU-T Rec. X. 733 [4] | M |
| > probableCause | probableCause-Type | Probable cause of an alarm as defined in ITU-T Rec. X.733 [4] | M |
| > specificProblem | specificProblem-Type | Identifies further refinements to the Probable cause of the alarm as defined in ITU-T Rec. X. 733 [4] | M |
| > perceivedSeverity | perceivedSeverity-Type | Perceived severity of an alarm as defined in ITU-T Rec. X. 733 [4] | O |
| > backedUpStatus | backedUpStatus-Type | Indicating if the object emitting the alarm has been backed up as defined in ITU-T Recommendation X. 733 [4] | O |
| > backUpObject | backUpObject-Type | Indicating the backup object of the alarmed object as defined in ITU-T Rec. X. 733 [4] | O |
| > trendIndication | trendIndication-Type | Severity trend of the alarmed object as defined in ITU-T Rec. X. 733 [4] | O |
| > thresholdInfo | thresholdInfo-Type | Provides additional information for threshold crossing alarms as defined in ITU-T Rec. X. 733 [4] | O |
| > correlatedNotifications | array(correlatedNotification-Type) | Set of all notifications to which this notification is considered to be correlated as defined in ITU-T Rec. X. 733 [4] | O |
| > stateChangeDefinition | array(attributeValueChange-Type) | Indicates a state transition associated to an alarm as defined in ITU-T Rec. X. 733 [4] | O |
| > monitoredAttributes | array(attributeNameValuePair-Type) | Defines one or more attributes of the alarmed manged object and their corresponding values at the time of the alarm as defined in ITU-T Rec. X. 733 [4]. | O |
| > proposedRepairActions | proposedRepairActions-Type | Used if the cause is known and the system being managed can suggest one or more solutions to fix the problem causing the alarm as defined in ITU-T Rec. X. 733 [4] | O |
| > additionalText | additionalText-Type | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] | O |
| > additionalInformation | array(attributeNameValuePair-Type) | Allows the inclusion of a set of additional information in the event report as defined in ITU-T Rec. X. 733 [4] | O |
| > rootCauseIndicator | rootCauseIndicator-Type | Indicates if this event is the root cause of the events captured by the notifications whose identifiers are in the related correlatedNotifications attribute, see clause 10.2.2.1.5.1 | O |
| > changedAlarmAttributes | array(attributeNameValuePair-Type) | Indicating the alarm attributes that have changed | M |

##### 11.2.1.4.3 Referenced structured data types

###### 11.2.1.4.3.1 Type alarmIdAndPerceivedSeverity-Type

Table 11.2.1.4.3.1-1: Definition of type alarmIdAndPerceivedSeverity-Type

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| alarmId | alarmId-Type | Alarm identifier | M |
| perceivedSeverity | perceivedSeverity-Type | Perceived severity | O |

###### 11.2.1.4.3.2 Type alarmsCount-Type

Table 11.2.1.4.3.2-1: Definition of type alarmsCount-Type

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| criticalCount | integer | Number of alarms with perceived severity equal to critical | M |
| majorCount | integer | Number of alarms with perceived severity equal to major | M |
| minorCount | integer | Number of alarms with perceived severity equal to minor | M |
| warningCount | integer | Number of alarms with perceived severity equal to warning | M |
| indeterminateCount | integer | Number of alarms with perceived severity equal to indeterminate | M |
| clearedCount | integer | Number of alarms with perceived severity equal to cleared | M |

###### 11.2.1.4.3.3 Type attributeNameValuePair-Type

Table 11.2.1.4.3.3-1: Definition of type attributeNameValuePair-Type

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| attributeName | string | Name of the attribute | M |
| attributeValue | anyType | Value of the attribute, can be any type | M |

###### 11.2.1.4.3.4 Type attributeValueChange-Type

Table 11.2.1.4.3.4-1: Definition of type attributeValueChangeType-Type

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| attributeName | string | Name of the attribute | M |
| oldAttributeValue | anyType | Old value of the attribute, can be any type | M |
| newAttributeValue | anyType | New value of the attribute, can be any type | M |

###### 11.2.1.4.3.5 Type correlatedNotification-Type

Table 11.2.1.4.3.5-1: Definition of type correlatedNotification-Type

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| source | uri-Type | Source of the correlated notifications | M |
| notificationIds | array(notificationId-Type) | Notification identifiers of correlated notifications of that source | M |

###### 11.2.1.4.3.6 Type header-Type

Table 11.2.1.4.3.6-1: Definition of type header-Type

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| uri | uri-Type | URI of the resource where the event (alarm) occurred | M |
| notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | O |
| notificationType | notificationType-Type | Notification type (notifyNewAlarm, etc.) | M |
| eventTime | dateTime-Type | Event (alarm) occurrence time | M |
| systemDN | systemDN-Type | System DN | C |

###### 11.2.1.4.3.7 Type thresholdInfo-Type

Table 11.2.1.4.3.7-1: Definition of type thresholdInfo-Type

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| attributeName | string | The name of the threshold attribute that caused the notification (Rec. ITU-T X. 733 [4]). | M |
| observedValue | float-Type | The value of the gauge or counter which crossed the threshold. This may be different from the threshold value if, for example, the gauge may only take on discrete values. (Rec. ITU-T X. 733 [4]). | M |
| thresholdLevel | thresholdLevel-Type | In the case of a gauge the threshold level specifies a pair of threshold values, the first being the value of the crossed threshold and the second, its corresponding hysteresis; in the case of a counter the threshold level specifies only the threshold value (Rec. ITU-T X. 733 [4]). | O |
| armTime | dateTime-Type | For a gauge threshold, the time at which the threshold was last re-armed, namely the time after the previous threshold crossing at which the hysteresis value of the threshold was exceeded thus again permitting generation of notifications when the threshold is crossed. For a counter threshold, the later of the time at which the threshold offset was last applied, or the time at which the counter was last initialized (for resettable counters) (Rec. ITU-T X. 733 [4]). | O |

###### 11.2.1.4.3.8 Type thresholdLevel-Type

Table 11.2.1.4.3.8-1: Definition of type thresholdLevel-Type

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute name | Data type | Description | SQ |
| indication | indication-Type | Indicates if the hysterics values high and low apply to increasing gauges ("Up") or decreasing gauges ("Down"). For counters only the value "Up" is permitted. | M |
| high | float | Higher value of the hysterics when the event is triggered | M |
| low | float | Lower value of the hysteresis when the event is cleared | O |

##### 11.2.1.4.4 Simple data types and enumerations

###### 11.2.1.4.4.1 General

This clause defines simple data types and enumerations that are used by the data structures defined in the previous clauses.

###### 11.2.1.4.4.2 Simple data types

Table 11.2.1.4.3.2-1: Simple data types

|  |  |  |
| --- | --- | --- |
| Type name | Type definition | Description |
| alarmId-PathType | string | Used in the path to identify an alarm?? |
| subscriptionId-PathType | string |  |
| filter-QueryType | string | Used in the query part of HTTP GET on /alarms to discriminate alarms to be returned or counted |
| href-QueryType | string | Used in the query part of HTTP GET on /alarms to identify the base object of the tree for partial alarm alignment |
| consumerReferenceId-QueryType | uri-Type | Used in the query part of HTTP DELETE on /subscriptions to delate all subscriptions made with a specific consumerReferenceId |
| ackSystemId-Type | string | Identifier of the system that acknowledged or unacknowledged an alarm |
| ackUserId-Type | string | Identifier of the user that acknowledged or unacknowledged an alarm |
| additionalText-Type | string | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] |
| alarmId-Type | string | Alarm identifier, see clause 10.2.2.1.5.1 |
| backedUpStatus-Type | boolean | Indicating if the object emitting the alarm has been backed up as defined in ITU-T Rec. X. 733 [4] |
| backUpObject-Type | uri-Type | Indicating the backup object of the alarmed object as defined in ITU-T Rec. X. 733 [4] |
| clearSystemId-Type | string | Identifier of a system clearing an alarm, see clause 10.2.2.1.5.1 |
| clearUserId-Type | string | Identifier of a user clearing an alarm, see clause 10.2.2.1.5.1 |
| filter-Type | string | Filter of a subscription resource |
| notificationId-Type | long | Notification identifier as defined in ITU-T Rec. X. 733 [4] |
| probableCause-Type | string | Probable cause of an alarm as defined in ITU-T Rec. X. 733 [4] |
| proposedRepairActions-Type | string | Used if the cause is known and the system being managed can suggest one or more solutions to fix the problem causing the alarm as defined in ITU-T Rec. X. 733 [4] |
| reason-Type | string | Indicating in notifyPotentialFaultyAlarmList the reason why the alarm list has to be rebuilt and in notifyAlarmListRebuilt the reason why the alarm list has been rebuilt |
| rootCauseIndicator-Type | boolean | Root cause indicator see |
| securityAlarmDetector-Type | string | Identity of the detector of the security alarm, see clause 10.2.2.1.5.1 |
| serviceProvider-Type | string | Identifies the service-provider whose service is requested by the serviceUser and the service request provokes the generation of the security alarm, see clause 10.2.2.1.5.1 |
| serviceUser-Type | string | Identifies the service-user whose request for service provided by the serviceProvider led to the generation of the security alarm, see clause 10.2.2.1.5.1 |
| specificProblem-Type | string | Specific problem of an alarm as defined in ITU-T Rec. X. 733 [4] |
| systemDN-Type | string | Type of the System DN |

###### 11.2.1.4.4.3 Enumeration alarmAckState-QueryType

This type is used in the query part of HTTP GET on /alarms to discriminate alarms to be returned or counted.

Table 11.2.1.4.4.3-1: Enumeration alarmAckState-QueryType

|  |  |
| --- | --- |
| Enumeration value | Description |
| allAlarms | All alarms shall be returned or counted. |
| allActiveAlarms | All active alarms shall be returned or counted. |
| allActiveAndAcknowledgedAlarms | All active and acknowledged alarms shall be returned or counted. |
| allActiveAndUnacknowledgedAlarms | All active and unacknowledged alarms shall be returned or counted. |
| allClearedAndUnacknowledgedAlarms | All cleared and unacknowledged alarms shall be returned or counted. |
| allUnacknowledgedAlarms | All unacknowledged alarms shall be returned or counted |

###### 11.2.1.4.4.4 Enumeration ackState-Type

Table 11.2.1.4.4.4-1: Enumeration ackState-Type

|  |  |
| --- | --- |
| Enumeration value | Description |
| acknowledged | State acknowledged. |
| unacknowledged | State unacknowledged. |

###### 11.2.1.4.4.5 Enumeration alarmListAlignmentRequirement-Type

Table 11.2.1.4.4.5-1: Enumeration alarmListAlignmentRequirement-Type

|  |  |
| --- | --- |
| Enumeration value | Description |
| Alignment Required | Alarm list alignment is required |
| Alignment Not Required | Alarm list alignment is not required |

###### 11.2.1.4.4.6 Enumeration alarmType-Type

Table 11.2.1.4.4.6-1: Enumeration alarmType-Type

|  |  |
| --- | --- |
| Enumeration value | Description |
| Communications Alarm | An alarm of this type is principally associated with the procedures and/or processes required to convey information from one point to another (Rec. ITU-T X. 733 [4]). |
| Processing Error Alarm | An alarm of this type is principally associated with a software or processing fault (Rec. ITU-T X. 733 [4]). |
| Environmental Alarm | An alarm of this type is principally associated with a condition relating to an enclosure in which the equipment resides (Rec. ITU-T X. 733 [4]). |
| Quality Of Service Alarm | An alarm of this type is principally associated with a degradation in the  quality of a service (Rec. ITU-T X. 733 [4]). |
| Equipment Alarm | An alarm of this type is principally associated with an equipment fault (Rec. ITU-T X. 733 [4]). |
| Integrity Violation | An indication that information may have been illegally modified, inserted or deleted. |
| Operational Violation | An indication that the provision of the requested service was not possible due to the unavailability, malfunction or incorrect invocation of the service. |
| Physical Violation | An indication that a physical resource has been violated in a way that suggests a security attack. |
| Security Service or Mechanism Violation | An indication that a security attack has been detected by a security service or mechanism. |
| Time Domain Violation | An indication that an event has occurred at an unexpected or prohibited time. |

###### 11.2.1.4.4.7 Enumeration indication-Type

Table 11.2.1.4.4.7-1: Enumeration indication-Type

|  |  |
| --- | --- |
| Enumeration value | Description |
| Up | Indicates if the hysteris values high and low apply to increasing gauges |
| Down | Indicates if the hysteris values high and low apply to decreasing gauges |

###### 11.2.1.4.4.8 Enumeration notificationType-Type

Table 11.2.1.4.4.8-1: Enumeration notificationType-Type

|  |  |
| --- | --- |
| Enumeration value | Description |
| notifyNewAlarm | Notification type is notifyNewAlarm |
| notifyNewSecurityAlarm | Notification type is notifyNewSecurityAlarm |
| notifyAckStateChanged | Notification type is notifyAckStateChanged |
| notifyClearedAlarm | Notification type is notifyClearedAlarm |
| notifyAlarmListRebuiltAlarm | Notification type is notifyAlarmListRebuiltAlarm |
| notifyChangedAlarm | Notification type is notifyChangedAlarm |
| notifyComments | Notification type is notifyComments |
| notifyPotentialFaultyAlarmList | Notification type is notifyPotentialFaultyAlarmList |
| notifyCorrelatedNotificationChanged | Notification type is notifyCorrelatedNotificationChanged |
| notifyChangedAlarmGeneral | Notification type is notifyChangedAlarmGeneral |

###### 11.2.1.4.4.9 Enumeration perceivedSeverity-Type

Table 11.2.1.4.4.9-1: Enumeration perceivedSeverity-Type

|  |  |
| --- | --- |
| Enumeration value | Description |
| Critical | The Critical severity level indicates that a service affecting condition has occurred and an immediate corrective action is required (Rec. ITU-T X. 733 [4]). |
| Major | The Major severity level indicates that a service affecting condition has developed and an urgent corrective action is required (Rec. ITU-T X. 733 [4]). |
| Minor | The Minor severity level indicates the existence of a non-service affecting fault condition and that corrective action should be taken in order to prevent a more serious (for example, service affecting) fault (Rec. ITU-T X. 733 [4]). |
| Warning | The Warning severity level indicates the detection of a potential or impending service affecting fault, before any significant effects have been felt (Rec. ITU-T X. 733 [4]). |
| Indeterminate | The Indeterminate severity level indicates that the severity level cannot be determined (Rec. ITU-T X. 733 [4]). |
| Cleared | The Cleared severity level indicates the clearing of one or more previously reported alarms (Rec. ITU-T X. 733 [4]). |

###### 11.2.1.4.4.10 Enumeration trendIndication-Type

Table 11.2.1.4.4.10-1: Enumeration trendIndication-Type

|  |  |
| --- | --- |
| Enumeration value | Description |
| More Severe | Severity trend of the alarmed object is more severe (Rec. ITU-T X.733 [4]) |
| No change | Severity trend of the alarmed object is no change (Rec. ITU-T X.733 [4]) |
| Less severe | Severity trend of the alarmed object is less severe (Rec. ITU-T X.733 [4]) |

## 11.3 Generic performance assurance management service

### 11.3.1 RESTful HTTP-based solution set

#### 11.3.1.1 Performance data file reporting service

##### 11.3.1.1.1 Mapping of operations

###### 11.3.1.1.1.1 Introduction

The IS operations are mapped to SS equivalents according to table 11.3.1.1.1-1.

Table 11.3.1.1.1-1: Mapping of IS operations to SS equivalents

|  |  |  |  |
| --- | --- | --- | --- |
| **IS operation** | **HTTP Method** | **Resource URI** | **Qualifier** |
| listAvailableFiles | GET | /Files | M |
| subscribe | POST | /subscriptions | M |
| unsubscribe | DELETE | /subscriptions | M |
| DELETE | /subscriptions/{subscriptionId} | M |

###### 11.3.1.1.1.2 Operation "listAvailableFiles"

The IS operation parameters are mapped to SS equivalents according to table 11.3.1.1.1.2-1 and table 11.3.1.1.1.2-2.

Table 11.3.1.1.1.2-1: Mapping of IS operation input parameters to SS equivalents (HTTP GET)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| managementDataType | query | managementDataType | managementDataType-Type | M |
| beginTime | query | beginTime | dateTime-Type | M |
| endTime | query | endTime | dateTime-Type | M |

Table 11.3.1.1.1.2-2: Mapping of IS operation output parameters to SS equivalents (HTTP GET)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| fileInfoList | response body | n/a | fileInfoRetrieval-ResponseType | M |
| status | response status codes  response body | n/a  error | n/a  error-ResponseType | M |

The message flow is as follows:

1. The Service Consumer sends a HTTP GET request to the Service Provider.

* - The URI identifies the "…/Files" collection resource.
* - The query part may contain filter parameter. Absence of the query part means all available management data files shall be returned.
* - The request message body shall be empty.

2. The Service Provider sends a HTTP GET response to the Service Consumer.

* - On success "200 OK" shall be returned. The response message body shall carry the information of available files. The response format is defined by "fileInfoRetrieval-ResponseType ".
* - On failure, an appropriate error code shall be returned. The response message body may carry an error object.

###### 11.3.1.1.1.3 Operation "subscribe"

See clause 11.2.1.1.8, with the discrepance that the subscribe operation in this clause is for performance data file reporting related notifications (i.e., notifyFileReady and notifyFilePreparationError).

###### 11.3.1.1.1.4 Operation "unsubscribe"

See clause 11.2.1.1.9, with the discrepance that the unsubscribe operation in this clause is for performance data file reporting related notifications (i.e., notifyFileReady and notifyFilePreparationError).

##### 11.3.1.1.2 Mapping of notifications

###### 11.3.1.1.2.1 Introduction

The IS notifications are mapped to SS equivalents according to table 11.3.1.1.2.1-1.

**Table 11.3.1.1.2.1-1: Mapping of IS notifications to SS equivalents**

|  |  |  |  |
| --- | --- | --- | --- |
| **IS notifications** | **HTTP Method** | **Resource URI** | **SQ** |
| notifyFileReady | POST | /notificationSink | M |
| notifyFilePreparationError | POST | /notificationSink | M |

###### 11.3.1.1.2.2 Notification "notifyFileReady"

The IS notification parameters are mapped to SS equivalents according to table 11.3.1.1.2.2-1.

Table 11.3.1.1.2.2-1: Mapping of IS notification input parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **SQ** |
| objectClass | request body | href | uri-Type | M |
| objectInstance |
| notificationId | request body | notificationId | notificationId-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| notificationType | request body | notificationType | notificationType-Type | M |
| fileInfoList | request body | fileInfoList | array(fileInfo-Type) | M |
| additionalText | request body | additionalText | additionalText-Type | O |

###### 11.3.1.1.2.3 Notification "notifyFilePreparationError"

The IS notification parameters are mapped to SS equivalents according to table 11.3.1.1.2.3-1.

Table 11.3.1.1.2.3-1: Mapping of IS notification input parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **SQ** |
| objectClass | request body | href | uri-Type | M |
| objectInstance |
| notificationId | request body | notificationId | notificationId-Type | M |
| eventTime | request body | eventTime | dateTime-Type | M |
| notificationType | request body | notificationType | notificationType-Type | M |
| fileInfoList | request body | fileInfoList | array(fileInfo-Type) | M |
| reason | request body | reason | reason-Type | O |
| additionalText | request body | additionalText | additionalText-Type | O |

##### 11.3.1.1.3 Resources

###### 11.3.1.1.3.1 Resource structure

Figure 11.3.1.1.3.1-1 shows the resource structure of the performance data file reporting service.



Figure 11.3.1.1.3.1-1: Resource URI structure of the performance data file reporting service

Table 11.3.1.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 11.3.1.1.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method | Description |
| Files | Files | GET | Retrieve the information of the available files |
| subscriptions | /subscriptions | POST | Create a subscription |
| subscriptions | /subscriptions | DELETE | Delete all subscriptions made with a consumerReferenceId |
| subscription | /subscriptions/{subscriptionId} | DELETE | Delete a single subscription |
| notificationSink | /notificationSink | POST | Send notifications |

###### 11.3.1.1.3.2 Resource definitions

11.3.1.1.3.2.1 Resource “/Files”

11.3.1.1.3.2.1.1 Description

This resource represents the information about a collection of available files.

11.3.1.1.3.2.1.2 URI

Resource URI = {DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/PerfDataFileReportMnS/v1530/Files

The resource URI variables a defined in the following table.

Table 11.3.1.1.3.2.1.2-1: URI variables

|  |  |
| --- | --- |
| **Name** | **Definition** |
| DN\_prefix\_authority\_part | See clause 4.4 of TS 32.158 [15] |
| DN\_prefix\_remainder | See clause 4.4 of TS 32.158 [15] |

11.3.1.1.3.2.1.3 HTTP methods

11.3.1.1.3.2.1.3.1 HTTP GET

This method shall support the URI query parameters specified in the following table.

**Table 11.3.1.1.3.2.1.3.1-1: URI query parameters supported by the GET method on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| managementDataType | managementDataType | To filter the available files based on the management data type. | M |
| beginTime | dateTime-Type | To filter the available files who became ready no later than this time stamp. | M |
| endTime | dateTime-Type | To filter the available files who became ready no earlier than this time stamp. | M |

This method shall support the request data structures, the response data structures and response codes specified in the following tables.

**Table 11.3.1.1.3.2.1.3.1-2: Data structures supported by the GET request body on this resource**

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **SQ** |
|  |  |  |

**Table 11.3.1.1.3.2.1.3.1-3: Data structures supported by the GET response body on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **SQ** |
| fileInfoRetrieval-ResponseType | 200 OK | The resource representation of the infomraiton about the available files retrieved. | M |
| error-ResponseType | 4xx/5xx | Returned in case of an error | M |

11.3.1.1.3.2.2 Resource "/subscriptions"

11.3.1.1.3.2.2.1 Description

This resource is a container resource for individual subscriptions.

11.3.1.1.3.2.2.2 URI

The resource URI is:

Resource URI: {DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/PerfDataFileReportMnS/v1530/subscriptions

11.3.1.1.3.2.2.3 HTTP methods

11.3.1.1.3.2.2.3.1 POST

This method shall support the URI query parameters specified in table 11.3.1.1.3.2.2.3.1-1.

Table 11.3.1.1.3.2.2.3.1-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Data type | Description | Qualifier |
| n/a | n/a | n/a | n/a |

This method shall support the request data structures specified in table 9.3.2.6.3.1-2 and the response data structures and response codes specified in table 9.3.2.6.3.1-3.

Table 11.3.1.1.3.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |
| --- | --- | --- |
| Data type | Description | SQ |
| subscription-RequestType | Details of the subscription to be created | M |

Table 11.3.1.1.3.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Response  codes | Description | SQ |
| subscription-ResponseType | 201 Created | In case of success the representation of the created subscription is returned. | M |
| error-ResponseType | 4xx/5xx | In case of failure the error object is returned. | M |

11.3.1.1.3.2.2.3.2 DELETE

This method shall support the URI query parameters specified in table 11.3.1.1.3.2.2.3.2-1.

Table 11.3.1.1.3.2.2.3.2-1: URI query parameters supported by the DELETE method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Data type | Description | Qualifier |
| consumerReferenceId | consumerReferenceId-QueryType | Identifies the consumer whose subscriptions shall be deleted | M |

This method shall support the request data structures specified in table 11.3.1.1.3.2.2.3.2-2 and the response data structures and response codes specified in table 11.3.1.1.3.2.2.3.2-3.

Table 11.3.1.1.3.2.2.3.2-2: Data structures supported by the DELETE Request Body on this resource

|  |  |  |
| --- | --- | --- |
| Data type | Description | SQ |
| n/a | n/a | n/a |

Table 11.3.1.1.3.2.2.3.2-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Response  codes | Description | SQ |
| n/a | 204 No Content | In case of success no message body is returned | n/a |
| error-ResponseType | 4xx/5xx | In case of failure the error object is returned. | M |

11.3.1.1.3.2.3 Resource "/subscriptions/{subscriptionId}"

11.3.1.1.3.2.3.1 Description

This resource represents a subscription.

11.3.1.1.3.2.3.2 URI

The resource URI is:

Resource URI: {DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/PerfDataFileReportMnS/v1530/subscriptions/{subscriptionId}

Table 11.3.1.1.3.2.3.2-1: URI variables

|  |  |
| --- | --- |
| Name | Definition |
| DN\_prefix\_authority\_part | See clause 4.4 of TS 32.158 [15] |
| DN\_prefix\_remainder | See clause 4.4 of TS 32.158 [15] |
| subscriptionId | Subscription identifier |

11.3.1.1.3.2.3.3 HTTP methods

11.3.1.1.3.2.3.3.1 DELETE

This method shall support the URI query parameters specified in table 11.3.1.1.3.2.3.3-1.

Table 11.3.1.1.3.2.3.3-1: URI query parameters supported by the DELETE method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Data type | Description | Qualifier |
| n/a | n/a | n/a | n/a |

This method shall support the request data structures specified in table 11.3.1.1.3.2.3.3-2 and the response data structures and response codes specified in table 11.3.1.1.3.2.3.3-3.

Table 11.3.1.1.3.2.3.3-2: Data structures supported by the DELETE Request Body on this resource

|  |  |  |
| --- | --- | --- |
| Data type | Description | SQ |
| n/a | n/a | n/a |

Table 11.3.1.1.3.2.3.3-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Response  codes | Description | SQ |
| n/a | 204 No Content | In case of success no message body is returned | M |
| error-ResponseType | 4xx/5xx | In case of failure the error object is returned. | M |

11.3.1.1.3.2.4 Resource "/notificationSink"

11.3.1.1.3.2.4.1 Description

This resource represents a resource to which notifications are sent to.

11.3.1.1.3.2.4.2 URI

The resource URI is provided by the notification subscriber when creating the subscription.

11.3.1.1.3.2.4.3 HTTP methods

11.3.1.1.3.2.4.3.1 POST

This method shall support the URI query parameters specified in table 11.3.1.1.3.2.4.3.1-1.

Table 11.3.1.1.3.2.4.3.1-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Data type | Description | Qualifier |
| n/a | n/a | n/a | n/a |

This method shall support the request data structures specified in table 11.3.1.1.3.2.4.3.1-2 and the response data structures and response codes specified in table 11.3.1.1.3.2.4.3.1-3.

Table 11.3.1.1.3.2.4.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Data type | | Description | | SQ | |
| notifyFileReady-NotifType | | Type in case a notifyFileReady notification is sent | | M | |
| notifyFilePreparationError-NotifType | | Type in case a notifyFilePreparationError notification is sent | | M | |

Table 11.3.1.1.3.2.4.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Response  codes | Description | SQ |
| n/a | 204 No Content | In case of success no message body is returned | M |
| error-ResponseType | 4xx/5xx | In case of failure the error object is returned. | M |

##### 11.3.1.1.4 Data type definitions

###### 11.3.1.1.4.1 General

Table 11.3.1.1.4.1-1: Data types defined in this specification

|  |  |  |
| --- | --- | --- |
| **Data type** | **Reference** | **Description** |
| **General types** | | |
| dataTime-Type | 11.3.1.1.4.6.2 | Data type of date and time. |
| uri-Type | 11.3.1.1.4.6.2 | The data type of a URI. |
| **Types used in paths** | | |
|  |  |  |
| **Types used in query parts** | | |
| managementDataType-Type | 11.3.1.1.4.6.3 | Used in listing the information of available files describing the management data type of the files. |
| consumerReferenceId-QueryType | 11.3.1.1.4.6.2 | Used in the query part of HTTP DELETE on /Subscriptions to delete all subscriptions made with a specific consumerReferenceId |
| **Types used in request bodies** | | |
| subscription-RequestType | 11.3.1.1.4.4.1 | Used in the request body of HTTP POST on /subscriptions to create performance data file reporting notifications subscriptions. |
| **Types used in response bodies** | | |
| fileInfoRetrieval-ResponseType | 11.3.1.1.4.4.2 | Used in the response body of HTTP GET describing the information of the listed files. |
| error-ResponseType | 11.3.1.1.4.4.3 | Used in the response body describing the error. |
| **Types used for resources** | | |
| subscription-ResourceType | 11.3.1.1.4.4.4 | Representation of a subscription resource. |
| **Types used in notifications** |  |  |
| -NotifType | 11.3.1.1.4.4.5 | Used in the request body of HTTP POST for the notification type notifyFileReady. |
| notifyFilePreparationError-NotifType | 11.3.1.1.4.4.6 | Used in the request body of HTTP POST for the notification type notifyFilePreparationError notifyFileReady. |
| **Types referenced by the definitions above** | | |
| fileInfo-Type | 11.3.1.1.4.5.1 | Used for describing the file information. |
| notificationId-Type | 11.3.1.1.4.6.2 | Notification identifier as defined in ITU-T Rec. X. 733 [4] |
| notificationType-Type | 11.3.1.1.4.6.4 | Notification type (notifyFileReady, etc.) |
| additionalText-Type | 11.3.1.1.4.6.2 | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] |
| reason-Type | 11.3.1.1.4.6.2 | Used to describe the reason causing the file preparation error. |

Table 11.3.1.1.4.1-2: Data types imported

|  |  |  |
| --- | --- | --- |
| **Data type** | **Reference** | **Description** |
|  |  |  |

###### 11.3.1.1.4.2 Structured general data types

None.

###### 11.3.1.1.4.3 Structured path data types

None.

###### 11.3.1.1.4.4 Query, message body and resource data types

11.3.1.1.4.4.1 Type subscription-RequestType

Table 11.3.1.1.4.4.1-1: Definition of type subscription-RequestType

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | subscription-ResourceType | Used in the request body of HTTP POST on /subscriptions describing the representation of the subscription to be created | M |

11.3.1.1.4.4.2 Type fileInfoRetrieval-ResponseType

Table 11.3.1.1.4.4.2-1: Definition of type fileInfoRetrieval-ResponseType

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| data | array(fileInfoType) | The information of the available files | M |

11.3.1.1.4.4.3 Type error-ResponseType

Table 11.3.1.1.4.4.3-1: Definition of type error-ResponseType

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| error | object | Key indicating the response body containing an error | M |
| > errorInfo | string | Attribute allowing to convey error information in string format | M |

11.3.1.1.4.4.4 Type subscription-ResourceType

Table 11.3.1.1.4.4.4-1: Definition of type subscription-ResourceType

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| consumerReference | uri-Type | The URI of the endpoint to send the notification to (/notificationSink). | M |
| timeTick | long-Type | Time window within which the subscriber intends to subscribe again to confirm its subscription, see clause 6.2.2.5.1 | O |
| filter | filter-Type | Filter settings for this subscription, to define the subset of all notifications this subscription relates to. A notification is sent to the subscriber if the filter matches, or if there is no filter. | O |

11.3.1.1.4.4.5 Type notifyFileReady-NotifType

Table 11.3.1.1.4.4.5-1: Definition of type notifyFileReady-NotifType

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| header |  |  |  |
| > href | uri-Type | URI of the resource indicating the performance data file reporting service | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyFileReady, etc.) | M |
| > eventTime | dateTime-Type | Event occurrence time (e.g., the file ready time) | M |
| body |  |  |  |
| > fileInfoList | array(fileInfo-Type) | The information of the available files | M |
| > additionalText | additionalText-Type | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] | O |

11.3.1.1.4.4.6 Type notifyFilePreparationError-NotifType

Table 11.3.1.1.4.4.6-1: Definition of type notifyFilePreparationError-NotifType

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| header |  |  |  |
| > href | uri-Type | URI of the resource indicating the performance data file reporting service | M |
| > notificationId | notificationId-Type | Notification identifier as defined in ITU-T Rec. X. 733 [4] | M |
| > notificationType | notificationType-Type | Notification type (notifyFileReady, etc.) | M |
| > eventTime | dateTime-Type | Event occurrence time (e.g., the file ready time) | M |
| body |  |  |  |
| > fileInfoList | array(fileInfo-Type) | The information of the available files | M |
| > reason | reason-Type | The reason that caused the error of the file preparation. |  |
| > additionalText | additionalText-Type | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] | O |

###### 11.3.1.1.4.5 Referenced structured data types

11.3.1.1.4.5.1 Type fileInfo-Type

Table 11.3.1.1.4.5-1: Definition of fileInfo-Type

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| fileLocation | uri-Type | Usd to indicate the location of the file. | M |
| fileSize | long-Type | The size of the file with positive Integer value (the unit is byte). | M |
| fileReadyTime | dataTime-Type | Indicates the date and time when the file was last closed and made available in the management service producer and the file content will not be changed. | M |
| fileExpirationTime | dataTime-Type | Indicates the date and time beyond which the file may be deleted. | M |
| fileCompression | string | Identifies the name of the compression algorithm used for the file. | M |
| fileFormat | string | Identifies the encoding technique used by the file. Its value should indicate the version of the file format specification plus to indicate if "ASN1" or "XML-schema" is used. | M |

###### 11.3.1.1.4.6 Simple data types and enumerations

11.3.1.1.4.6.1 General

This clause defines simple data types and enumerations that are used by the data structures defined in the previous clauses.

11.3.1.1.4.6.2 Simple data types

Table 11.3.1.1.4.6.2-1: Simple data types

|  |  |  |
| --- | --- | --- |
| Type name | Type definition | Description |
| dataTime-Type | string | The data type for date and time in “date-time” format. |
| uri-Type | string | The type of a URI. |
| consumerReferenceId-QueryType | uri-Type | Used in the query part of HTTP DELETE on /subscriptions to delate all subscriptions made with a specific consumerReferenceId. |
| filter-Type | string | Filter of a subscription resource. |
| notificationId-Type | long | Notification identifier as defined in ITU-T Rec. X. 733 [4] |
| additionalText-Type | string | Allows a free form text description to be reported as defined in ITU-T Rec. X. 733 [4] |
| reason-Type | string | THe type for describing the reason that caused the file preparation error. |

11.3.1.1.4.6.3 Enumeration managementDataType-Type

Table 11.3.1.1.4.6.3-1: Enumeration managementDataType-Type

|  |  |
| --- | --- |
| Enumeration value | Description |
| PM | It indicates that the management data file type is “PM” |

11.3.1.1.4.6.4 Enumeration notificationType-Type

Table 11.3.1.1.4.6.4-1: Enumeration notificationType-Type

|  |  |
| --- | --- |
| Enumeration value | Description |
| notifyFileReady | Notification type is notifyFileReady |
| notifyFilePreparationError | Notification type is notifyFilePreparationError |

### 11.3.2 Performance data XML file format definition

#### 11.3.2.1 Introduction

This clause describes the format of performance data file. The XML file format definition is based on XML schema (see [22], [23], [24] and [25]).

#### 11.3.2.2 Mapping table

Table 11.3.2.2-1 maps the file content items in the clause 10.3.2.1.2 to those used in the XML schema based file format definitions. XML tag attributes are useful where data values bind tightly to its parent element. They have been used where appropriate.

Table 11.3.2.2-1: Mapping of File Content Items to XML tags

| File Content Item | XML schema based XML tag | Description |
| --- | --- | --- |
| measDataCollection | measDataFile |  |
| measFileHeader | fileHeader |  |
| measData | measData |  |
| measFileFooter | fileFooter |  |
| fileFormatVersion | fileHeader fileFormatVersion |  |
| senderName | fileSender senderName |  |
| senderType | fileSender senderType | For the XML schema based XML format, XML attribute specification "senderType " may be absent in case the "senderType" is not configured in the sender. |
| vendorName | fileHeader vendorName | For the XML schema based XML format, XML attribute specification "vendorName" may be absent in case the "vendorName" is not configured in the sender. |
| collectionBeginTime | measData beginTime |  |
| measuredEntityUserName | measuredEntity userLabel | For the XML schema based XML format, XML attribute specification "userLabel" may be absent in case the "nEUserName" is not configured in the CM applications. |
| measuredEntityDn | fileHeader dnPrefix  and measuredEntity  localDn | For the XML schema based XML format, the DN is split into the DN prefix and the Local DN (LDN) (see 3GPP TS 32.300 [21]). XML attribute specification "localDn" may be absent in case the LDN is not configured in the CM applications. |
| measuredEntitySoftwareVersion | measuredEntity swVersion | For the XML schema based XML format, XML attribute specification "swVersion" may be absent in case the "nESoftwareVersion" is not configured in the CM applications. |
| measInfo | measInfo |  |
| measInfoId | measInfoId |  |
| measTimeStamp | granPeriod endTime |  |
| jobId | jobId | This item is optional. |
| granularityPeriod | granPeriod duration | For the XML schema based XML format, the value of XML attribute specification "duration" shall use the truncated representation "PT*n*S" (see [24]). |
| reportingPeriod | repPeriod duration | For the XML schema based XML format, the value of XML attribute specification "duration" shall use the truncated representation "PT*n*S" (see [24]). |
| measTypes | measTypes  or measType | For the XML schema based XML format, depending on sender's choice for optional positioning presence, either XML element "measTypes" or XML elements "measType" will be used. |
| measValues | measValue |  |
| measObjInstId | measValue measObjLdn |  |
| measResults | measResults  or  r | For the XML schema based XML format, depending on sender's choice for optional positioning presence, either XML element "measResults" or XML elements "r" will be used. |
| suspectFlag | suspect |  |
| timeStamp | measData endTime |  |
| There is no corresponding File Content Item. | measType p | An optional positioning XML attribute specification of XML element "measType" (XML schema based), used to identify a measurement type for the purpose of correlation to a result. The value of this XML attribute specification is expected to be a non-zero, non-negative integer value that is unique for each instance of XML element "measType" that is contained within the measurement data collection file. |
| There is no corresponding File Content Item. | r p | An optional positioning XML attribute specification of XML element "r", used to correlate a result to a measurement type. The value of this XML attribute specification should match the value of XML attribute specification "p" of the corresponding XML element "measType" (XML schema based). |

#### 11.3.2.3 XML schema

##### 11.3.2.3.1 Performance data file XML schema

The following XML schema measData.xsd is the schema for performance measurements data XML files:

<?xml version="1.0" encoding="UTF-8"?>

<!--

3GPP TS 28.532 Measurements data XML file format definition

data file XML schema

measData.xsd

-->

<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:md="http://www.3gpp.org/ftp/specs/archive/28\_series/28.532#measData" targetNamespace="http://www.3gpp.org/ftp/specs/archive/28\_series/28.532#measData" elementFormDefault="qualified">

<!-- Measurement collection data file root XML element -->

<element name="MeasDataFile">

<complexType>

<sequence>

<element name="fileHeader">

<complexType>

<sequence>

<element name="fileSender">

<complexType>

<attribute name="senderName" type="string" use="optional"/>

<attribute name="senderType" type="string" use="optional"/>

</complexType>

</element>

<element name="MeasData">

<complexType>

<attribute name="beginTime" type="dateTime" use="required"/>

</complexType>

</element>

</sequence>

<attribute name="fileFormatVersion" type="string" use="required"/>

<attribute name="vendorName" type="string" use="optional"/>

<attribute name="dnPrefix" type="string" use="optional"/>

</complexType>

</element>

<element name="measData" minOccurs="0" maxOccurs="unbounded">

<complexType>

<sequence>

<element name="measuredEntity">

<complexType>

<attribute name="userLabel" type="string" use="optional"/>

<attribute name="localDn" type="string" use="optional"/>

<attribute name="swVersion" type="string" use="optional"/>

</complexType>

</element>

<element name="measInfo" minOccurs="0" maxOccurs="unbounded">

<complexType>

<sequence>

<element name="job" minOccurs="0">

<complexType>

<attribute name="jobId" type="string" use="required"/>

</complexType>

</element>

<element name="granPeriod">

<complexType>

<attribute name="duration" type="duration" use="required"/>

<attribute name="endTime" type="dateTime" use="required"/>

</complexType>

</element>

<element name="repPeriod" minOccurs="0">

<complexType>

<attribute name="duration" type="duration" use="required"/>

</complexType>

</element>

<choice>

<element name="measTypes">

<simpleType>

<list itemType="Name"/>

</simpleType>

</element>

<element name="measType" minOccurs="0" maxOccurs="unbounded">

<complexType>

<simpleContent>

<extension base="Name">

<attribute name="p" type="positiveInteger" use="required"/>

</extension>

</simpleContent>

</complexType>

</element>

</choice>

<element name="measValue" minOccurs="0" maxOccurs="unbounded">

<complexType>

<sequence>

<choice>

<element name="measResults">

<simpleType>

<list itemType="md:measResultType"/>

</simpleType>

</element>

<element name="r" minOccurs="0" maxOccurs="unbounded">

<complexType>

<simpleContent>

<extension base="md:measResultType">

<attribute name="p" type="positiveInteger" use="required"/>

</extension>

</simpleContent>

</complexType>

</element>

</choice>

<element name="suspect" type="boolean" minOccurs="0"/>

</sequence>

<attribute name="measObjLdn" type="string" use="required"/>

</complexType>

</element>

</sequence>

<attribute name="measInfoId" type="string" use="optional"/>

</complexType>

</element>

</sequence>

</complexType>

</element>

<element name="fileFooter">

<complexType>

<sequence>

<element name="MeasData">

<complexType>

<attribute name="endTime" type="dateTime" use="required"/>

</complexType>

</element>

</sequence>

</complexType>

</element>

</sequence>

</complexType>

</element>

<simpleType name="measResultType">

<union memberTypes="integer float string">

<simpleType>

<restriction base="string">

<enumeration value="NULL"/>

</restriction>

</simpleType>

</union>

</simpleType>

</schema>

##### 11.3.2.3.2 Performance data file XML header

The following header shall be used in actual XML measurement result files:

<?xml version="1.0" encoding="UTF-8"?>  
<?xml-stylesheet type="text/xsl" href="MeasData.xsl"?>  
<measDataFile  
 xmlns=  
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.532#measData"  
>

## 11.4 Streaming data reporting service

### 11.4.1 RESTful HTTP-based solution set

#### 11.4.1.1 Mapping of operations

##### 11.4.1.1.1 Introduction

The IS operations are mapped to SS equivalents according to table 11.4.1.1.1-1. The Streaming data reporting MnS shall use TLS as specified in TS 33.210 [31].

Table 11.4.1.1.1-1: Mapping of IS operations to SS equivalents

|  |  |  |  |
| --- | --- | --- | --- |
| **IS operation** | **Method/frame** | **Resource/URI** | **Qualifier** |
| establishStreamingConnection | HTTP POST (see NOTE) | /connections | M |
| HTTP GET (Upgrade, see NOTE) | /connections/{connectionId} | M |
| terminateStreamingConnection | WebSocket Close frame sent (frame with opcode of 0x8), and  WebSocket Close frame received (frame with opcode of 0x8 for successful case) | /connections/{connectionId} | M |
| reportStreamData | WebSocket Data frame sent (frame with opcode of 0x2) | /connections/{connectionId} | M |
| addStream | HTTP POST | /connections/{connectionId}/streams | M |
| deleteStream | HTTP DELETE | /connections/{connectionId}/streams | M |
| getConnectionInfo | HTTP GET | /connections | M |
| HTTP GET | /connections/{connectionId} | M |
| getStreamInfo | HTTP GET | /connections/{connectionId}/streams | M |
|  | HTTP GET | /connections/{connectionId}/streams/{streamId} | M |
| Note: the establishStreamingConnection is mapped to a HTTP POST operation followed by a HTTP GET operation. The HTTP POST operation is to provide the information in streamInfoList parameter to the consumer and receive the connectionId assigned by the consumer, while the HTTP GET (Upgrade) operation is to establish the WebSocket connection. | | | |

##### 11.4.1.1.2 Operation "establishStreamingConnection"

The IS operation parameters are mapped to SS equivalents according to the tables 11.4.1.1.2-1 through 11.4.1.1.2-4.

Table 11.4.1.1.2-1: Mapping of IS operation input parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS operation parameter name | SS parameter location | SS parameter name | SS parameter type | Qualifier |
| producerId | request body | producerId | String | M |
| streamInfoList | request body | streamInfoList | array(streamInfo-Type) | M |

Table 11.4.1.1.2-2: Mapping of IS operation output parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS operation parameter name | SS parameter location | SS parameter name | SS parameter type | Qualifier |
| connectionId | location header | n/a | uri-Type | M |
| status | response status codes  response body | n/a  error | n/a  error-ResponseType | M |

Table 11.4.1.1.2-3: Mapping of IS operation input parameters to SS equivalents (HTTP GET (Upgrade))

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| connectionId | Headers | Request-URI | String | n/a |
| -- | HTTP-Version (Request-Line) | -- | String (see Note 1) | M |
| -- | Upgrade Header | -- | Constant string: websocket | M |
| -- | Connection Header | -- | Constant string: Upgrade | M |
| -- | Sec-WebSocket-Key Header | -- | String (see Note 2) | M |
| -- | Sec-WebSocket-Version Header | -- | String (see Note 3) | M |
| -- | See Note 4. | | | |
| NOTE 1: The HTTP version shall be not earlier than HTTP/1.1.  NOTE 2: The valid value needs to be assigned according to WebSocket protocol (see IETF RFC 6455 [27]).  NOTE 3: The valid value needs to be assigned according to WebSocket protocol (see IETF RFC 6455 [27]).  NOTE 4: Other SS parameters (not listed in this table) independent from the Stage 2 may be used, according to the WebSocket protocol (see IETF RFC 6455 [27]). | | | | |

Table 11.4.1.1.2-4: Mapping of IS operation output parameters to SS equivalents (HTTP GET (Upgrade))

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| connectionId | n/a | -- | n/a | n/a |
| status | HTTP-Version (Response-Line) | -- | String (see Note 1) | M |
| Status-Code | -- | String |
| response body | error | error-ResponseType |
| -- | Upgrade Header |  | Constant string: websocket | M |
| -- | Connection Header | -- | Constant string: Upgrade | M |
|  | Sec-WebSocket-Accept Header | -- | String (see Note 2) | M |
| -- | See Note 3. | | | |
| NOTE 1: The HTTP version shall be not earlier than HTTP/1.1.  NOTE 2: The valid value needs to be assigned according to WebSocket protocol (see IETF RFC 6455 [27]).  NOTE 3: Other SS parameters (not listed in this table) independent from the Stage 2 may be used, according to the WebSocket protocol (see IETF RFC 6455 [27]). | | | | |



Figure 11.4.1.1.2-1: Message flow for establishing a streaming connection

The message flow for establishing a streaming connection illustrated on Figure 11.4.1.1.2-1 is as follows:

1. The performance data streaming service producer sends a HTTP POST request to the consumer.

* - The URI identifies the "…/connections" collection resource.
* - The request message body carries the information about the connecting producer identity via parameter "producerId" and about streams supported by the new connection via parameter "StreamInfoList".

2. The consumer sends a HTTP POST response to the producer.

* - On success "201 Posted" shall be returned with the identifier of a newly created ".../connections/{connectionId}" resource.
* - On failure, an appropriate error code shall be returned. The response message body may carry an error object.

3. If step 2 is successful, the performance data streaming service producer sends a HTTP GET (upgrade) request to the consumer to establish the WebSocket connection.

* - The URI identifies the ".../connections/{connectionId}" resource with the /secure/flag;
* - The HTTP-version in the Request-line indicates the HTTP version which is no earlier than HTTP/1.1;
* - The Upgrade header is with value "websocket";
* - The Connection header is with value "Upgrade";
* - The Sec-WebSocket-Key header is with a valid value according to IETF RFC 6455 [27].
* - The Sec-WebSocket-Version header is with a valid according to IETF RFC 6455 [27].

4. The consumer sends a HTTP GET (Upgrade) response to the producer.

* - On success, "101 Switching Protocols" shall be returned;
* - On failure, an appropriate error code shall be returned. The response message body may carry an error object.
* - The HTTP-version in the Response-line indicates the HTTP version which is no earlier than HTTP/1.1;
* - The Upgrade header is with value "websocket";
* - The Connection header is with value "Upgrade";
* - The Sec-WebSocket-Accept header is with a valid value according to IETF RFC 6455 [27].

##### 11.4.1.1.3 Operation "terminateStreamingConnection"

The IS operation parameters are mapped to SS equivalents according to the tables 11.4.1.1.3-1 and 11.4.1.1.3-2.

Table 11.4.1.1.3-1: Mapping of IS operation input parameters to SS equivalents (WebSocket Close frame sent)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| connectionId | n/a | -- | n/a | n/a |
| -- | Opcode (see clause 5 of IETF RFC 6455 [27]) | -- | Constant value: 0x8 | M |

Table 11.4.1.1.3-2: Mapping of IS operation output parameters to SS equivalents (WebSocket Close frame received)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| status | Opcode | -- | For a successful operation, the Opcode is 0x8, and for an unsuccessful operation, the Opcode has a value other than 0x8 (see clause 5 of IETF RFC 6455 [27]). | M |

##### 11.4.1.1.4 Operation "reportStreamData"

The IS operation parameters are mapped to SS equivalents according to the tables 11.4.1.1.4-1 and 11.4.1.1.4-2.

Table 11.4.1.1.4-1: Mapping of IS operation input parameters to SS equivalents (WebSocket Data frame sent with Opcode of 0x2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| connectionId | n/a | -- | n/a | n/a |
| -- | Opcode (see clause 5 of IETF RFC 6455 [27]) | -- | Constant value: 0x2 ("binary") | M |
| streamingData | Payload data | streaming performance data payload  or  proprietary data payload | See Annex G of 3GPP TS 28.550 [c] for detailed definition of the streaming performance data payload format. | M |

The protocol stack with streaming performance data payloads formatted as per Annex G of 3GPP TS 28.550 [c] carried by WebSocket binary data frames (see clause 5.6 of IETF RFC 6455 [27]) is illustrated on Figure 11.4.1.1.4-1.

Table 11.4.1.1.4-2: Mapping of IS operation output parameters to SS equivalents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| status | n/a | -- See Note 1. | n/a | n/a |
| NOTE 1: The delivery of WebSocket Data frame is taken care of by the underlying TCP (see IETF RFC 793 [28]) which provides reliable data transmission and ensures the data delivery. There is no mechanism at WebSocket protocol level to report the delivery status for WebSocket Data frame. | | | | |

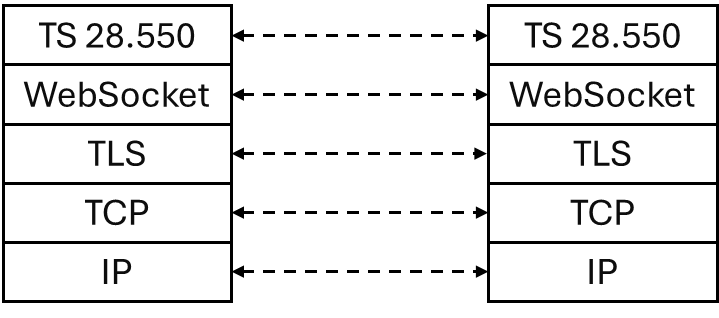


Figure 11.4.1.1.4-1: Protocol stack for streaming performance data reporting

##### 11.4.1.1.5 Operation "addStream"

The IS operation parameters are mapped to SS equivalents according to the tables 11.4.1.1.5-1 and 11.4.1.1.5-2.

Table 11.4.1.1.5-1: Mapping of IS operation input parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| connectionId | Headers | Request-URI | String | n/a |
| streamInfoList | request body | streamInfoList | array(streamInfo-Type) | M |

Table 11.4.1.1.5-2: Mapping of IS operation output parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| streamInfoList | response body | streamInfoList | array(streamInfo-Type) | M |
| status | response status codes  response body | n/a  error | n/a  error-ResponseType | M |

##### 11.4.1.1.6 Operation "deleteStream"

The IS operation parameters are mapped to SS equivalents according to the tables 11.4.1.1.6-1 and 11.4.1.1.6-2.

Table 11.4.1.1.6-1: Mapping of IS operation input parameters to SS equivalents (HTTP DELETE)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| connectionId | headers | Request-URI | String | n/a |
| streamIdList | path,  query | /connections/{connectionId}/streams,  streamIdList | array(streamId-Type) | M |

Table 11.4.1.1.6-2: Mapping of IS operation output parameters to SS equivalents (HTTP DELETE)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| status | response status codes  response body | n/a  error | n/a  error-ResponseType | M |

##### 11.4.1.1.7 Operation "getConnectionInfo"

The IS operation parameters are mapped to SS equivalents according to the tables 11.4.1.1.7-1 and 11.4.1.1.7-2.

Table 11.4.1.1.7-1: Mapping of IS operation input parameters to SS equivalents (HTTP GET)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| connectionId | headers | Request-URI | String | n/a |
| connectionIdList | path,  query | /connections,  /connections/{connectionId} | array(uri-Type) | M |

Table 11.4.1.1.7-2: Mapping of IS operation output parameters to SS equivalents (HTTP GET)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| connectionInfoList | response body | connectionInfoList | array(uri-Type, streamReporter-Type, streamIdList-Type) | M |
| status | response status codes  response body | n/a  error | n/a  error-ResponseType | M |

##### 11.4.1.1.8 Operation "getStreamInfo"

The IS operation parameters are mapped to SS equivalents according to the tables 11.4.1.1.8-1 and 11.4.1.1.8-2.

Table 11.4.1.1.8-1: Mapping of IS operation input parameters to SS equivalents (HTTP GET)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| connectionId | headers | Request-URI | String | n/a |
| streamIdList | path,  query | /connections/{connectionId}/streams,  streamIdList | array(streamId-Type) | M |

Table 11.4.1.1.8-2: Mapping of IS operation output parameters to SS equivalents (HTTP GET)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **Qualifier** |
| streamInfoSumList | response body | streamInfoSumList | array(streamInfo-Type, streamReporters-Type) | M |
| status | response status codes  response body | n/a  error | n/a  error-ResponseType | M |

#### 11.4.1.2 Mapping of notifications

Not applicable (no notifications defined in IS).

#### 11.4.1.3 Resources

##### 11.4.1.3.1 Resources structure

Figure 11.4.1.3.1-1 shows the resource structure of the Streaming data reporting service.



Figure 11.4.1.3.1-1: Resource URI structure of the Streaming data reporting service

Table 11.4.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method | Description |
| connections | /connections | POST | Inform consumer about reporting streams to be carried by the new connection and receive a new connection id. |
| GET | Obtain information about connections |
| connection | /connections/{connectionId} | GET (Upgrade) | Establish WebSocket for a given connection |
| GET | Obtain information about connection |
| WebSocket 0x2 | Send a unit of streaming data |
| WebSocket 0x8 | Terminate a WebSocket connection |
| streams | /connections/{connectionId}/streams | POST | Inform consumer about new reporting streams on an existing connection. |
| DELETE | Remove reporting streams from an existing connection |
| GET | Obtain information about streams |
| stream | /connections/{connectionId}/streams/{streamId} | GET | Obtain information about stream |

##### 11.4.1.3.2 Resources definitions

11.4.1.3.2.1 Resource "/connections"

11.4.1.3.2.1.1 Description

This resource represents a collection of connections and can be used to establish new connections or to obtain information about existing connections.

11.4.1.3.2.1.2 URI

The resource URI is: {root}/StreamingDataReportingMnS/{version}/connections

This resource shall support the resource URI variables defined in the table 11.4.1.3.2.1.2-1.

Table 11.4.1.3.2.1.2-1: URI variables

|  |  |
| --- | --- |
| Name | Definition |
| root | indicates the scheme ("http" or "https"), the host name and optional port, and an optional sequence of path segments that together represent a prefix path |

11.4.1.3.2.1.3 HTTP methods

11.4.1.3.2.1.3.1 HTTP POST

This method shall support the URI query parameters specified in the following table.

**Table 11.4.1.3.2.1.3.1-1: URI query parameters supported by the POST method on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| none supported |  |  |  |

This method shall support the request data structures, the response data structures and response codes specified in the following table.

**Table 11.4.1.3.2.1.3.1-2: Data structures supported by the POST request body on this resource**

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **SQ** |
| producerId | String representing the DN of the streaming data reporting MnS producer. | M |
| array(streamInfo-Type) | List of meta-data about each reporting stream. Where each reporting stream is represented by a streamInfo. |  |

**Table 11.4.1.3.2.1.3.1-3: Data structures supported by the POST Response Body on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **SQ** |
| error-ResponseType | 4xx/5xx | Returned in case of an error | M |
| uri-Type | 201 Posted | Connection identifier assigned by the MnS consumer | M |

11.4.1.3.2.1.3.2 HTTP GET

This method shall support the URI query parameters specified in the following table.

**Table 11.4.1.3.2.1.3.2-1: URI query parameters supported by the GET method on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| connectionIdList | array(uri-Type) | The list of connectionId for which the connection information is to be returned. | O |

This method shall support the request data structures, the response data structures and response codes specified in the following table.

**Table 11.4.1.3.2.1.3.2-2: Data structures supported by the GET request body on this resource**

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **SQ** |
| n/a | n/a | n/a |

**Table 11.4.1.3.2.1.3.2-3: Data structures supported by the GET Response Body on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **SQ** |
| error-ResponseType | 4xx/5xx | Returned in case of an error | M |
| array(uri-Type, streamReporter-Type, streamIdList-Type) | 200 OK | In case of success the representation of the retrieved information is returned. | M |
| 202 Partially retrieved | In case of partial success the representation of the retrieved information is returned. | M |

11.4.1.3.2.2 Resource "/connections/{connectionId}"

11.4.1.3.2.2.1 Description

This resource represents an individual connection and can be used for an "upgrade" to WebSocket as part of the connection establishment, or to obtain information about an existing connection, or to terminate an existing connection, or to send a unit of streaming data.

11.4.1.3.2.2.2 URI

The resource URI is: {root}/StreamingDataReportingMnS/{version}/connections/{connectionId}

This resource shall support the resource URI variables defined in the table 11.4.1.3.2.2.2-1.

Table 11.4.1.3.2.2.2-1: URI variables

|  |  |
| --- | --- |
| Name | Definition |
| root | See table 11.4.1.3.2.1.2-1 |
| connectionId | Represents identifier of an individual connection assigned by the MnS consumer during connection establishment |

11.4.1.3.2.2.3 HTTP methods

11.4.1.3.2.2.3.1 HTTP GET (Upgrade)

This method shall support the URI header parameters specified in the following table.

**Table 11.4.1.3.2.2.3.2-1: Header parameters supported by the GET request on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| connectionId | uri-Type | To indicate the ID (URI) of the connection being upgraded to WebSocket | M |
| Upgrade | Upgrade-HeaderType | To indicate the HTTP GET operation is to upgrade the connection to WebSocket protocol | M |
| Connection | Connection-HeaderType | To indicate the HTTP GET operation is to upgrade the connection to another protocol | M |
| Sec-WebSocket-Key | Sec-WebSocket-Key-HeaderType | The Sec-WebSocket-Key needed for establishing the WebSocket connection. | M |
| Sec-WebSocket-Version | Sec-WebSocket-Version-HeaderType | The Sec-WebSocket-Version needed for establishing the WebSocket connection. | M |

This method shall support the URI query parameters specified in the following table.

**Table 11.4.1.3.2.2.3.2-2: URI query parameters supported by the GET method on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| none supported |  |  |  |

This method shall support the request data structures, the response data structures and response codes specified in the following table.

**Table 11.4.1.3.2.2.3.2-3: Data structures supported by the GET request body on this resource**

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **SQ** |
| n/a | n/a | n/a |

**Table 11.4.1.3.2.2.3.2-4: Header parameters supported by the GET response on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| Upgrade | Upgrade-HeaderType | To indicate the HTTP GET operation is to upgrade the connection to WebSocket protocol | M |
| Connection | Connection-HeaderType | To indicate the HTTP GET operation is to upgrade the connection to another protocol | M |
| Sec-WebSocket-Accept | Sec-WebSocket-Accept-HeaderType | The Sec-WebSocket-Accept responded when establishing the WebSocket connection. | M |

**Table 11.4.1.3.2.2.3.2-5: Data structures supported by the GET response body on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **SQ** |
| n/a | 101 Switching Protocols | The status code indicating the connection has been successfully upgraded to WebSocket. | M |
| error-ResponseType | 4xx/5xx | Returned in case of an error | M |

11.4.1.3.2.2.3.2 HTTP GET

This method shall support the URI query parameters specified in the following table.

**Table 11.4.1.3.2.1.3.2-1: URI query parameters supported by the GET method on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| none supported |  |  |  |

This method shall support the request data structures, the response data structures and response codes specified in the following table.

**Table 11.4.1.3.2.1.3.2-2: Data structures supported by the GET request body on this resource**

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **SQ** |
| n/a | n/a | n/a |

**Table 11.4.1.3.2.1.3.2-3: Data structures supported by the GET Response Body on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **SQ** |
| error-ResponseType | 4xx/5xx | Returned in case of an error | M |
| uri-Type | 200 OK | In case of success the representation of the connectionId is returned. | M |
| streamReporter-Type | 200 OK | In case of success the representation of the streamReporter is returned. | M |
| streamIdList-Type | 200 OK | In case of success the representation of the streamIdList is returned. | M |

11.4.1.3.2.3 Resource "/connections/{connectionId}/streams"

11.4.1.3.2.3.1 Description

This resource represents a collection of reporting streams on a particular connection and can be used to add a new reporting stream to an existing connection, or to remove a reporting stream from an existing connection, or to obtain information about reporting streams.

11.4.1.3.2.3.2 URI

The resource URI is: {root}/StreamingDataReportingMnS/{version}/connections/{connectionId}/streams

This resource shall support the resource URI variables defined in the table 11.4.1.3.2.3.2-1.

Table 11.4.1.3.2.3.2-1: URI variables

|  |  |
| --- | --- |
| Name | Definition |
| root | See table 11.4.1.3.2.1.2-1 |
| connectionId | See table 11.4.1.3.2.2.2-1 |

11.4.1.3.2.3.3 HTTP methods

11.4.1.3.2.3.3.1 HTTP POST

This method shall support the URI query parameters specified in the following table.

**Table 11.4.1.3.2.3.3.1-1: URI query parameters supported by the POST method on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| none supported |  |  |  |

This method shall support the request data structures, the response data structures and response codes specified in the following table.

**Table 11.4.1.3.2.3.3.1-2: Data structures supported by the POST request body on this resource**

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **SQ** |
| array(streamInfo-Type) | The resource representation of the set of information about streams to be posted. | M |

**Table 11.4.1.3.2.3.3.1-3: Data structures supported by the POST Response Body on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **SQ** |
| array(streamInfo-Type) | 201 Posted | In case of success the representation of the posted information about streams is returned. | M |
| 202 Partially posted | In case of partial success the representation of the posted information about streams is returned. | M |
| error-ResponseType | 4xx/5xx | Returned in case of an error | M |

11.4.1.3.2.3.3.2 HTTP DELETE

This method shall support the URI query parameters specified in the following table.

Table 11.4.1.3.2.3.3.2-1: URI query parameters supported by the DELETE method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| streamIdList | array(streamId-Type) | The list of streamId for the stream(s) to be deleted. | M |

This method shall support the request data structures, the response data structures and response codes specified in the following table.

Table 11.4.1.3.2.3.3.2: Data structures supported by the DELETE request body on this resource

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **SQ** |
| n/a | n/a | n/a |

Table 11.4.1.3.2.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **SQ** |
| n/a | 204 No Content | In case of success no message body is returned | M |
| error-ResponseType | 4xx/5xx | Returned in case of an error | M |

11.4.1.3.2.3.3.3 HTTP GET

This method shall support the URI query parameters specified in the following table.

Table 11.4.1.3.2.3.3.3-1: URI query parameters supported by the GET method on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| streamIdList | array(streamId-Type) | The list of streamId for which the stream information are to be returned. | O |

This method shall support the request data structures, the response data structures and response codes specified in the following table.

Table 11.4.1.3.2.3.3.3-2: Data structures supported by the GET request body on this resource

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **SQ** |
| n/a | n/a | n/a |

Table 11.4.1.3.2.3.3.3-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **SQ** |
| array(streamInfo-Type, streamReporters-Type) | 200 OK | In case of success the representation of the retrieved stream information is returned. | M |
| 202 Partially retrieved | In case of partial success the representation of the retrieved stream information is returned. | M |
| error-ResponseType | 4xx/5xx | Returned in case of an error | M |

11.4.1.3.2.4 Resource "/connections/{connectionId}/streams/{streamId}"

11.4.1.3.2.4.1 Description

This resource represents an individual reporting stream on an existing connection and can be used to obtain information about reporting stream.

11.4.1.3.2.4.2 URI

The resource URI is: {root}/StreamingDataReportingMnS/{version}/connections/{connectionId}/streams/{streamId}

This resource shall support the resource URI variables defined in the table 11.4.1.3.2.4.2-1.

Table 11.4.1.3.2.4.2-1: URI variables

|  |  |
| --- | --- |
| Name | Definition |
| root | See table 11.4.1.3.2.1.2-1 |
| connectionId | See table 11.4.1.3.2.2.2-1 |
| streamId | Represents identifier of an individual stream. |

11.4.1.3.2.4.3 HTTP methods

11.4.1.3.2.4.3.1 HTTP GET

This method shall support the URI query parameters specified in the following table.

**Table 11.4.1.3.2.4.3.1-1: URI query parameters supported by the GET method on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Description** | **SQ** |
| none supported |  |  |  |

This method shall support the request data structures, the response data structures and response codes specified in the following table.

**Table 11.4.1.3.2.4.3.1-2: Data structures supported by the GET request body on this resource**

|  |  |  |
| --- | --- | --- |
| **Data type** | **Description** | **SQ** |
| n/a | n/a | n/a |

**Table 11.4.1.3.2.4.3.1-3: Data structures supported by the GET Response Body on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Response**  **codes** | **Description** | **SQ** |
| streamInfo-Type | 200 OK | In case of success the representation of the retrieved stream information is returned. | M |
| streamReporters-Type | 200 OK | In case of success the representation of the retrieved stream reporters information is returned. | M |
| error-ResponseType | 4xx/5xx | Returned in case of an error | M |

#### 11.4.1.4 Data type definitions

##### 11.4.1.4.1 General

Table 11.4.1.4.1-1: Data types defined

|  |  |  |
| --- | --- | --- |
| **Data type** | **Reference** | **Description** |
| **General types** | | |
| uri-Type | 11.4.1.4.3 | Used to represent a URI |
| **Types used in paths** | | |
| connectionId-Type | 11.4.1.4.3 | Used to indicate the connection as a context of the operation |
| streamId-Type | 11.4.1.4.3 | Used to indicate the stream as a context of the operation |
| **Types used in headers** | | |
| websocketHeaderConnection-Type | 11.4.1.4.3 | Header value for the upgrade request and response |
| websocketHeaderUpgrade-Type | 11.4.1.4.3 | Header value for the upgrade to WebSocket request and response |
| websocketHeader-Sec-WebSocket-Accept-Type | 11.4.1.4.3 | Header value for secure WebSocket response. Carries hash. |
| websocketHeader-Sec-WebSocket-Extensions-Type | 11.4.1.4.3 | Header value for secure WebSocket request. Carries protocol extensions. |
| websocketHeader-Sec-WebSocket-Key-Type | 11.4.1.4.3 | Header value for secure WebSocket request. Provides information to the server which is needed in order to confirm that the client is entitled to request an upgrade to WebSocket. |
| websocketHeader-Sec-WebSocket-Protocol-Type | 11.4.1.4.3 | Header value for secure WebSocket request. Carries a comma-separated list of subprotocol names, in the order of preference. |
| websocketHeader-Sec-WebSocket-Version-Type | 11.4.1.4.3 | Header value for secure WebSocket request and response. Carries the WebSocket protocol version to be used. |
| **Types used in query parts** | | |
| connectionId-Type | 11.4.1.4.3 | Used to indicate the connection as a context of the operation |
| streamId-Type | 11.4.1.4.3 | Used to indicate the stream as a context of the operation |
| **Types used in request bodies** | | |
| connectionRequest-Type | 11.4.1.4.2.2 | Used to carry the meta-data during connection establishment |
| streamInfo-Type | 11.4.1.4.2.5 | Reporting stream meta-data. |
| **Types used in response bodies** | | |
| failedConnectionResponse-Type | 11.4.1.4.2.4 | Used to carry the details of a failed connection establishment |
| connectionInfo-Type | 11.4.1.4.2.1 | Used to carry connection meta-data |
| errorResponse-Type | 11.4.1.4.2.3 | Used to carry the details of an error |
| streamInfo-Type | 11.4.1.4.2.5 | Used to carry the stream meta-data |
| streamInfoWithReporters-Type | 11.4.1.4.2.6 | Used to carry the augmented stream meta-data |
| **Types used for resources** | | |
| uri-Type | 11.4.1.4.3 | Used to represent resource URI |
| **Types referenced by the definitions above** | | |
| systemDN-Type | 11.4.1.4.3 | Used to represent DN of the reporting entity |
| producerId-Type | 11.4.1.4.3 | Used to identify the reporting entity |
| streamType-Type | 11.4.1.4.3 | Used to identify the type of a reporting stream |
| serializationFormat-Type | 11.4.1.4.3 | Used to identify serialization method |
| measObjDn-Type | 11.4.1.4.3 | Used to represent DN of the measured object instance |
| measTypes-Type | 11.4.1.4.3 | Used to represent an ordered list of measurement types or KPI |
| vsDataContainer-Type | Generic NRM | Used to represent details about proprietary data |

Table 11.4.1.4.1-2: Data types imported

|  |  |  |
| --- | --- | --- |
| **Data type** | **Reference** | **Description** |
| vsDataContainer-Type | Generic NRM | Vendor specific data container (see 3GPP TS 28.622 [11]). |

##### 11.4.1.4.2 Query, message body and resource data types

11.4.1.4.2.1 Type connectionInfo-Type

Table 11.4.1.4.2.1-1: Definition of type connectionInfo-Type

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| connection | connectionId-Type | Connection identifier | M |
| producer | producerId-Type | Producer identifier | M |
| streams | array(streamId-Type) | List of stream identifiers | M |

11.4.1.4.2.2 Type connectionRequest-Type

Table 11.4.1.4.2.2-1: Definition of type connectionRequest-Type

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| producer | producerId-Type | Producer identifier | M |
| streams | array(streamInfo-Type) | List of stream meta-data | M |

11.4.1.4.2.3 Type errorResponse-Type

Table 11.4.1.4.2.3-1: Definition of type errorResponse-Type

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| error | object | Key indicating the response body containing an error | M |
| > errorInfo | string | Attribute allowing to convey error information in string format | M |

11.4.1.4.2.4 Type failedConnectionResponse-Type

Table 11.4.1.4.2.4-1: Definition of type failedConnectionResponse-Type

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| error | object | Key indicating the response body containing an error | M |
| > streamId | array(streamId-Type) | Attribute conveying the list of "problematic" stream IDs | M |
| > errorReason | string | Attribute allowing to convey error information in string format |  |

11.4.1.4.2.5 Type streamInfo-Type

Table 11.4.1.4.2.5-1: Definition of type streamInfo-Type

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| streamId | streamId-Type | Stream identifier | M |
| streamType | streamType-Type | Enumerated stream type | M |
| serializationFormat | serializationFormat-Type | Enumerated serialization method | M |
| measObjDn | measObjDn-Type | DN of the measured object instance. Used for streaming performance data only. | CM |
| measTypes | measTypes-Type | Ordered list of measurement types or KPI. Used for streaming performance data only. | CM |
| vsDataContainer | vsDataContainer-Type | Details about proprietary data. Mandatory for proprietary data streaming only. | CM |

Table 11.4.1.4.2.5-2: Attribute constraints

|  |  |
| --- | --- |
| Name | Definition |
| measObjDn (support qualifier) | Attribute shall be present for streaming performance data only. |
| measTypes (support qualifier) | Attribute shall be present for streaming performance data only. |
| vsDataContainer (support qualifier) | Attribute shall be present for proprietary data streaming. |

11.4.1.4.2.6 Type streamInfoWithReporters-Type

Table 11.4.1.4.2.6-1: Definition of type streamInfoWithReporters-Type

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Data type** | **Description** | **SQ** |
| streamInfo | streamInfo-Type | Stream meta-data | M |
| reporters | producerId-Type | List of entities reporting streaming data | M |

##### 11.4.1.4.3 Simple data types and enumerations

11.4.1.4.3.1 General

This subclause defines simple data types and enumerations that are used by the data structures defined in the previous subclauses.

11.4.1.4.3.2 Simple data types

Table 11.4.1.4.3.2-1: Simple data types

|  |  |  |
| --- | --- | --- |
| Type name | Type definition | Description |
| measObjDn-Type | DN | See 3GPP TS 32.300 [21] |
| measTypes-Type | string | See 3GPP TS 28.550 [c] |
| websocketHeaderConnection-Type | Constant string "Upgrade" | Header value for the upgrade request and response. |
| websocketHeaderUpgrade-Type | Constant string "websocket" | Header value for the upgrade to WebSocket request and response. |
| websocketHeader-Sec-WebSocket-Accept-Type | string | Header value for secure WebSocket response. Carries hash. |
| websocketHeader-Sec-WebSocket-Extensions-Type | string | Header value for secure WebSocket request. Carries protocol extensions. |
| websocketHeader-Sec-WebSocket-Key-Type | string | Header value for secure WebSocket request. Provides information to the server which is needed in order to confirm that the client is entitled to request an upgrade to WebSocket. |
| websocketHeader-Sec-WebSocket-Protocol-Type | string | Header value for secure WebSocket request. Carries a comma-separated list of subprotocol names, in the order of preference. |
| websocketHeader-Sec-WebSocket-Version-Type | string | Header value for secure WebSocket request and response. Carries the WebSocket protocol version to be used. |
| connectionId-Type | uri-Type | Used to indicate the connection as a context of the operation |
| producerId-Type | systemDN-Type | Used to identify the reporting entity |
| serializationFormat-Type | enum | Enumerated serialization method with values: "GPB", "ASN1" |
| streamId-Type | string |  |
| streamType-Type | enum | Enumerated stream type with values: "PERFORMANCE", "PROPRIETARY" |
| systemDN-Type | DN | See 3GPP TS 32.300 [21] |
| uri-Type | string | Used to represent resource URI |

Annex A (normative):   
OpenAPI specification

## A.0 Introduction

This clause describes the capabilities of the service in the structure of the OpenAPI Specification Version 3.0.1 [A9]. The OpenAPI document is represented in the JSON format option.

## A.1 Generic provisioning management service

{

"openapi": "3.0.1",

"info": {

"title": "TS 28.532 Provisioning Management Service",

"version": "15.1.0",

"description": "OAS 3.0.1 specification of the Provisioning Management Service"

},

"servers": [

{

"url": "http://{DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/ProvMnS/v1500",

"variables": {

"DN\_prefix\_authority\_part": {

"description": "See clause 4.4 of TS 32.158",

"default": "example.com"

},

"DN\_prefix\_remainder": {

"description": "See clause 4.4 of TS 32.158",

"default": ""

}

}

}

],

"paths": {

"/{className}/{id}": {

"parameters": [

{

"name": "className",

"in": "path",

"required": true,

"schema": {

"$ref": "#/components/schemas/className-PathType"

}

},

{

"name": "id",

"in": "path",

"required": true,

"schema": {

"$ref": "#/components/schemas/id-PathType"

}

}

],

"put": {

"summary": "Creates a single resource",

"description": "With HTTP PUT resources are created.",

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/resourceCreation-RequestType"

}

}

}

},

"responses": {

"201": {

"description": "Success case (\"201 Created\"). The representation of the newly created resource shall be returned.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/resourceCreation-ResponseType"

}

}

}

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

},

"get": {

"summary": "Read resources",

"description": "With HTTP GET resources are read. The resources to be read are identified with the path component (base resource) and the query component (scope, filer) of the URI. The fields query component allows to select the resource properties to be returned.",

"parameters": [

{

"name": "scope",

"in": "query",

"description": "This parameter extends the set of targeted resources beyond the base resource identified with the path component of the URI. No scoping mechanism is specified in the present document.",

"required": true,

"schema": {

"$ref": "#/components/schemas/scope-QueryType"

}

},

{

"name": "filter",

"in": "query",

"description": "This parameter reduces the targeted set of resources by applying a filter to the scoped set of resource representations. Only resources representations for which the filter construct evaluates to \"true\" are targeted. No filter language is specified in the present document.",

"required": true,

"schema": {

"$ref": "#/components/schemas/filter-QueryType"

}

},

{

"name": "fields",

"in": "query",

"description": "This parameter specifies the attributes of the scoped resources that are returned. The value is a comma-separated list of attribute names.",

"required": true,

"schema": {

"$ref": "#/components/schemas/fields-QueryType"

},

"style": "form",

"explode": false

}

],

"responses": {

"200": {

"description": "Success case (\"200 OK\"). The resources identified in the request for retrieval are returned in the response message body. In case the fields query parameter is used, the selected attributes are returned.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/resourceRetrieval-ResponseType"

}

}

}

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

},

"patch": {

"summary": "Modify one or multiple resources",

"description": "With HTTP PATCH resources are modified. The resources to be modified are identified with the path component (base resource) and the query component (scope, filer) of the URI.",

"parameters": [

{

"name": "scope",

"in": "query",

"description": "This parameter extends the set of targeted resources beyond the base resource identified with the path component of the URI. No scoping mechanism is specified in the present document.",

"required": false,

"schema": {

"$ref": "#/components/schemas/scope-QueryType"

}

},

{

"name": "filter",

"in": "query",

"description": "This parameter reduces the targeted set of resources by applying a filter to the scoped set of resource representations. Only resources representations for which the filter construct evaluates to \"true\" are returned. No filter language is specified in the present document.",

"required": false,

"schema": {

"$ref": "#/components/schemas/filter-QueryType"

}

}

],

"requestBody": {

"description": "The request body describes changes to be made to the target resources as defined in RFC 7396 (JSON Merge Patch). The request body is of type object in the present document. No refined schema is defined.",

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/resourceModification-RequestType"

}

}

}

},

"responses": {

"200": {

"description": "Success case (\"200 OK\"). The modified resources identified in the request for modification are returned.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/resourceModification-ResponseType"

}

}

}

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

},

"delete": {

"summary": "Delete one or multiple resources",

"description": "With HTTP DELETE resources are deleted. The resources to be deleted are identified with the path component (base resource) and the query component (scope, filer) of the URI.",

"parameters": [

{

"name": "scope",

"in": "query",

"description": "This parameter extends the set of targeted resources beyond the base resource identified with the path component of the URI. No scoping mechanism is specified in the present document.",

"required": false,

"schema": {

"$ref": "#/components/schemas/scope-QueryType"

}

},

{

"name": "filter",

"in": "query",

"description": "This parameter reduces the targeted set of resources by applying a filter to the scoped set of resource representations. Only resources representations for which the filter construct evaluates to \"true\" are returned. No filter language is specified in the present document.",

"required": false,

"schema": {

"$ref": "#/components/schemas/filter-QueryType"

}

}

],

"responses": {

"200": {

"description": "Success case (\"200 OK\"). The resources URI's deleted are returned.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/resourceDeletion-ResponseType"

}

}

}

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

},

"/subscriptions": {

"post": {

"summary": "Create a subscription",

"description": "To create a subscription the representation of the subscription is POSTed on the /subscriptions collection resource.",

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/subscription-RequestType"

}

}

}

},

"responses": {

"201": {

"description": "Success case (\"201 Created\"). The representation of the newly created subscription resource shall be returned.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/subscription-ResponseType"

}

}

}

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

},

"delete": {

"summary": "Delete all subscriptions made with a specific consumerReferenceId",

"description": "The subscriptions are deleted by deleting the corresponding subscription resources. The resources to be deleted are identified with the path component of the URI pointing to the /subscription collection resource and filtering on the consumerReferenceId provided in the query part.",

"parameters": [

{

"name": "consumerReferenceId",

"in": "query",

"description": "Identifies the subscriptions to be deleted.",

"required": true,

"schema": {

"$ref": "#/components/schemas/consumerReferenceId-QueryType"

}

}

],

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The subscription resources have been deleted. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

},

"callbacks": {

"notifyMOICreation": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyMOICreation-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"notifyMOIDeletion": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyMOIDeletion-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"notifyMOIAttributeValueChange": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyMOIAttributeValueChange-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

}

}

}

},

"/subscriptions/{subscriptionId}": {

"delete": {

"summary": "Delete a single subscription",

"description": "The subscription is deleted by deleting the corresponding subscription resource. The resource to be deleted is identified with the path component of the URI.",

"parameters": [

{

"name": "subscriptionId",

"in": "path",

"description": "Identifies the subscription to be deleted.",

"required": true,

"schema": {

"$ref": "#/components/schemas/subscriptionId-PathType"

}

}

],

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The subscription resource has been deleted. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"components": {

"schemas": {

"attributeNameValuePair-Type": {

"type": "object",

"properties": {

"attributeName": {

"type": "string"

},

"attributeValue": {}

}

},

"dateTime-Type": {

"type": "string",

"format": "date-Time"

},

"long-Type": {

"type": "string",

"format": "long"

},

"uri-Type": {

"type": "string"

},

"header-Type": {

"description": "Header used in notifications as notification header",

"type": "object",

"properties": {

"uri": {

"$ref": "#/components/schemas/uri-Type"

},

"notificationId": {

"$ref": "#/components/schemas/notificationId-Type"

},

"notificationType": {

"$ref": "#/components/schemas/notificationType-Type"

},

"eventTime": {

"$ref": "#/components/schemas/dateTime-Type"

},

"systemDN": {

"$ref": "#/components/schemas/systemDN-Type"

}

}

},

"className-PathType": {

"type": "string"

},

"id-PathType": {

"type": "string"

},

"subscriptionId-PathType": {

"type": "string"

},

"consumerReferenceId-QueryType": {

"$ref": "#/components/schemas/uri-Type"

},

"fields-QueryType": {

"type": "array",

"items": {

"type": "string"

}

},

"filter-QueryType": {

"type": "string"

},

"scope-QueryType": {

"type": "string"

},

"resourceCreation-RequestType": {

"type": "object",

"properties": {

"data": {

"$ref": "#/components/schemas/resourceRepresentation-Type"

}

}

},

"resourceModification-RequestType": {

"type": "object"

},

"subscription-RequestType": {

"type": "object",

"properties": {

"data": {

"$ref": "#/components/schemas/subscription-ResourceType"

}

}

},

"error-ResponseType": {

"type": "object",

"properties": {

"error": {

"type": "object",

"properties": {

"errorInfo": {

"type": "string"

}

}

}

}

},

"resourceCreation-ResponseType": {

"type": "object",

"properties": {

"data": {

"$ref": "#/components/schemas/resourceRepresentation-Type"

}

}

},

"resourceDeletion-ResponseType": {

"type": "object",

"properties": {

"data": {

"type": "array",

"items": {

"$ref": "#/components/schemas/uri-Type"

}

}

}

},

"resourceModification-ResponseType": {

"type": "object",

"properties": {

"data": {

"type": "array",

"items": {

"$ref": "#/components/schemas/resourceRepresentation-Type"

}

}

}

},

"resourceRetrieval-ResponseType": {

"type": "object",

"properties": {

"data": {

"type": "array",

"items": {

"$ref": "#/components/schemas/resourceRepresentation-Type"

}

}

}

},

"subscription-ResponseType": {

"type": "object",

"properties": {

"data": {

"$ref": "#/components/schemas/subscription-ResourceType"

}

}

},

"resourceRepresentation-Type": {

"type": "object",

"properties": {

"href": {

"$ref": "#/components/schemas/uri-Type"

},

"class": {

"type": "string"

},

"id": {

"type": "string"

},

"attributes": {

"type": "object"

}

}

},

"subscription-ResourceType": {

"type": "object",

"properties": {

"consumerReference": {

"$ref": "#/components/schemas/uri-Type"

},

"timeTick": {

"$ref": "#/components/schemas/long-Type"

},

"filter": {

"$ref": "#/components/schemas/filter-Type"

}

}

},

"notifyMOICreation-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"correlatedNotifications": {

"type": "array",

"items": {

"$ref": "#/components/schemas/correlatedNotification-Type"

}

},

"additionalText": {

"$ref": "#/components/schemas/additionalText-Type"

},

"sourceIndicator": {

"$ref": "#/components/schemas/sourceIndicator-Type"

},

"attributeList": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeNameValuePair-Type"

}

}

}

}

}

},

"notifyMOIDeletion-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"correlatedNotifications": {

"type": "array",

"items": {

"$ref": "#/components/schemas/correlatedNotification-Type"

}

},

"additionalText": {

"$ref": "#/components/schemas/additionalText-Type"

},

"sourceIndicator": {

"$ref": "#/components/schemas/sourceIndicator-Type"

},

"attributeList": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeNameValuePair-Type"

}

}

}

}

}

},

"notifyMOIAttributeValueChange-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"correlatedNotifications": {

"type": "array",

"items": {

"$ref": "#/components/schemas/correlatedNotification-Type"

}

},

"additionalText": {

"$ref": "#/components/schemas/additionalText-Type"

},

"sourceIndicator": {

"$ref": "#/components/schemas/sourceIndicator-Type"

},

"attributeList": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeNameValuePair-Type"

}

}

}

}

}

},

"additionalText-Type": {

"type": "string"

},

"correlatedNotification-Type": {

"type": "object",

"properties": {

"source": {

"$ref": "#/components/schemas/uri-Type"

},

"notificationIds": {

"type": "array",

"items": {

"$ref": "#/components/schemas/notificationId-Type"

}

}

}

},

"filter-Type": {

"type": "string"

},

"notificationId-Type": {

"$ref": "#/components/schemas/long-Type"

},

"notificationType-Type": {

"type": "string",

"enum": [

"notifyMOICreation",

"notifyMOIDeletion",

"notifyMOIAttributeValueChange"

]

},

"sourceIndicator-Type": {

"type": "string",

"enum": [

"resourceOperation",

"mangementOperation",

"sONOperation",

"unknown"

]

},

"systemDN-Type": {

"type": "string"

}

}

}

}

## A.2 Generic fault supervision management service

{

"openapi": "3.0.1",

"info": {

"title": "TS 28.532 Fault Supervision Management Service",

"version": "15.1.0",

"description": "OAS 3.0.0 specification for the Fault Management Service (Fault MnS)"

},

"servers": [

{

"url": "http://{DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/FaultMnS/v1500",

"variables": {

"DN\_prefix\_authority\_part": {

"description": "See clause 4.4 of TS 32.158",

"default": "example.com"

},

"DN\_prefix\_remainder": {

"description": "See clause 4.4 of TS 32.158",

"default": ""

}

}

}

],

"paths": {

"/alarms": {

"get": {

"summary": "Retrieve alarms",

"description": "Retrieve the alarms identified by alarmAckState, href and filter.",

"parameters": [

{

"name": "alarmAckState",

"in": "query",

"required": false,

"schema": {

"$ref": "#/components/schemas/alarmAckState-QueryType"

}

},

{

"name": "href",

"in": "query",

"required": false,

"schema": {

"$ref": "#/components/schemas/href-QueryType"

}

},

{

"name": "filter",

"in": "query",

"required": false,

"schema": {

"$ref": "#/components/schemas/filter-QueryType"

}

}

],

"responses": {

"200": {

"description": "Success case (\"200 OK\"). Returns the alarms identified in the request.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/alarms-ResponseType"

}

}

}

},

"default": {

"description": "Response in case of error.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

},

"post": {

"summary": "Add a comment to multiple alarms",

"description": "Add a comment to multiple alarms",

"parameters": [

{

"name": "alarmId",

"in": "query",

"description": "Identifies the alarms to which the comment shall be added",

"required": true,

"schema": {

"$ref": "#/components/schemas/alarmIdList-QueryType"

}

}

],

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/comment-RequestType"

}

}

}

},

"responses": {

"201": {

"description": "Success case. The representation of the newly created comment resource shall be returned.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/comment-ResponseType"

}

}

}

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/failedAlarms-ResponseType"

}

}

}

}

}

},

"patch": {

"summary": "Clear, acknowledge or unacknowledge multiple alarms",

"description": "tba",

"parameters": [

{

"name": "alarmId",

"in": "query",

"description": "Identifies the alarms to be patched. The type shall be",

"required": true,

"schema": {

"oneOf": [

{

"$ref": "#/components/schemas/alarmIdList-QueryType"

},

{

"$ref": "#/components/schemas/alarmIdAndPerceivedSeverityList-QueryType"

}

]

}

}

],

"requestBody": {

"description": "Patch document",

"content": {

"application/json": {

"schema": {

"oneOf": [

{

"$ref": "#/components/schemas/patchAcknowledgeAlarms-RequestType"

},

{

"$ref": "#/components/schemas/patchUnacknowledgeAlarms-RequestType"

},

{

"$ref": "#/components/schemas/patchClearAlarms-RequestType"

}

]

}

}

}

},

"responses": {

"204": {

"description": "In case of success, the response body shall be empty."

},

"default": {

"description": "Response in case of error.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/failedAlarms-ResponseType"

}

}

}

}

}

}

},

"/alarms/$alarmsCount": {

"get": {

"summary": "Get the alarm count per perceived severity",

"parameters": [

{

"name": "alarmAckState",

"in": "query",

"required": false,

"schema": {

"$ref": "#/components/schemas/alarmAckState-QueryType"

}

},

{

"name": "filter",

"in": "query",

"required": false,

"schema": {

"$ref": "#/components/schemas/filter-QueryType"

}

}

],

"responses": {

"200": {

"description": "Success case (\"200 OK\"). The alarm count per perceived severity is returned"

},

"default": {

"description": "Response in case of error. The error case needs rework.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/alarmsCount-ResponseType"

}

}

}

}

}

}

},

"/alarms/{alarmId}": {

"patch": {

"summary": "Clear, acknowledge or unacknowledge a single alarm",

"description": "Clear, acknowledge or uncknowldege a single alarm by patching the alarm information",

"parameters": [

{

"name": "alarmId",

"in": "path",

"description": "Identifies the alarm to be patched.",

"required": true,

"schema": {

"$ref": "#/components/schemas/alarmId-PathType"

}

},

{

"name": "perceivedSeverity",

"description": "This parameter may be present when acknowledging an alarm. For other patch actions it shall be absent.",

"in": "query",

"required": false,

"schema": {

"$ref": "#/components/schemas/perceivedSeverity-QueryType"

}

}

],

"requestBody": {

"required": true,

"content": {

"application/merge-patch+json": {

"schema": {

"oneOf": [

{

"$ref": "#/components/schemas/patchAcknowledgeAlarms-RequestType"

},

{

"$ref": "#/components/schemas/patchUnacknowledgeAlarms-RequestType"

},

{

"$ref": "#/components/schemas/patchClearAlarms-RequestType"

}

]

}

}

}

},

"responses": {

"200": {

"description": "Response in case of success."

},

"default": {

"description": "Response in case of error. The error case needs rework.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/failedAlarms-ResponseType"

}

}

}

}

}

}

},

"/alarms/{alarmId}/comments": {

"post": {

"summary": "Add a comment to a single alarm",

"description": "Add a comment to an alarm identified by alarmId.",

"parameters": [

{

"name": "alarmId",

"in": "path",

"description": "Identifies the alarm to which the comment shall be added.",

"required": true,

"schema": {

"$ref": "#/components/schemas/alarmId-PathType"

}

}

],

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/comment-RequestType"

}

}

}

},

"responses": {

"201": {

"description": "Success case. The representation of the newly created comment resource shall be returned.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/comment-ResponseType"

}

}

}

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/failedAlarms-ResponseType"

}

}

}

}

}

}

},

"/subscriptions": {

"post": {

"summary": "Create a subscription",

"description": "To create a subscription the representation of the subscription is POSTed on the /subscriptions collection resource.",

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/subscription-RequestType"

}

}

}

},

"responses": {

"201": {

"description": "Success case (\"201 Created\"). The representation of the newly created subscription resource shall be returned.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/subscription-ResponseType"

}

}

}

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

},

"callbacks": {

"notifyNewAlarm": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyNewAlarm-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"notifyNewSecurityAlarm": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyNewSecurityAlarm-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"notifyAckStateChanged": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyAckStateChanged-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"notifyClearedAlarm": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyClearedAlarm-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"notifyAlarmListRebuilt": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyAlarmListRebuilt-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"notifyChangedAlarm": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyChangedAlarm-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"notifyComments": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyComments-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"notifyPotentialFaultyAlarmList": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyPotentialFaultyAlarmList-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"notifyCorrelatedNotificationChanged": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyCorrelatedNotificationChanged-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"notifyChangedAlarmGeneral": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyChangedAlarmGeneral-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

}

}

},

"delete": {

"summary": "Delete all subscriptions made with a specific consumerReferenceId",

"description": "The subscriptions are deleted by deleting the corresponding subscription resources. The resources to be deleted are identified with the path component of the URI pointing to the /subscription collection resource and filtering on the consumerReferenceId provided in the query part.",

"parameters": [

{

"name": "consumerReferenceId",

"in": "query",

"description": "Identifies the subscriptions to be deleted.",

"required": true,

"schema": {

"$ref": "#/components/schemas/consumerReferenceId-QueryType"

}

}

],

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The subscription resources have been deleted. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

},

"/subscriptions/{subscriptionId}": {

"delete": {

"summary": "Delete a single subscription",

"description": "The subscription is deleted by deleting the corresponding subscription resource. The resource to be deleted is identified with the path component of the URI.",

"parameters": [

{

"name": "subscriptionId",

"in": "path",

"description": "Identifies the subscription to be deleted.",

"required": true,

"schema": {

"$ref": "#/components/schemas/subscriptionId-PathType"

}

}

],

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The subscription resource has been deleted. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"components": {

"schemas": {

"attributeNameValuePair-Type": {

"type": "object",

"properties": {

"attributeName": {

"type": "string"

},

"attributeValue": {}

}

},

"dateTime-Type": {

"type": "string",

"format": "date-Time"

},

"float-Type": {

"type": "string",

"format": "float"

},

"long-Type": {

"type": "string",

"format": "long"

},

"uri-Type": {

"type": "string"

},

"header-Type": {

"description": "Header used in notifications as notification header and as header in the alarm resource",

"type": "object",

"properties": {

"uri": {

"$ref": "#/components/schemas/uri-Type"

},

"notificationId": {

"$ref": "#/components/schemas/notificationId-Type"

},

"notificationType": {

"$ref": "#/components/schemas/notificationType-Type"

},

"eventTime": {

"$ref": "#/components/schemas/dateTime-Type"

},

"systemDN": {

"$ref": "#/components/schemas/systemDN-Type"

}

}

},

"alarmId-PathType": {

"type": "string"

},

"subscriptionId-PathType": {

"type": "string"

},

"alarmAckState-QueryType": {

"type": "string",

"enum": [

"allAlarms",

"allActiveAlarms",

"allActiveAndAcknowledgedAlarms",

"allActiveAndUnacknowledgedAlarms",

"allClearedAndUnacknowledgedAlarms",

"allUnacknowledgedAlarms"

]

},

"consumerReferenceId-QueryType": {

"$ref": "#/components/schemas/uri-Type"

},

"filter-QueryType": {

"type": "string"

},

"href-QueryType": {

"type": "string"

},

"alarmIdList-QueryType": {

"type": "array",

"items": {

"$ref": "#/components/schemas/alarmId-Type"

}

},

"alarmIdAndPerceivedSeverityList-QueryType": {

"type": "array",

"items": {

"$ref": "#/components/schemas/alarmIdAndPerceivedSeverity-Type"

}

},

"perceivedSeverity-QueryType": {

"$ref": "#/components/schemas/perceivedSeverity-Type"

},

"comment-RequestType": {

"type": "object",

"properties": {

"data": {

"$ref": "#/components/schemas/comment-ResourceType"

}

}

},

"patchAcknowledgeAlarms-RequestType": {

"description": "Used to patch alarm attributes to acknowledge one or multiple alarm",

"type": "object",

"properties": {

"ackUserId": {

"$ref": "#/components/schemas/ackUserId-Type"

},

"ackSystemId": {

"$ref": "#/components/schemas/ackSystemId-Type"

},

"ackState": {

"type": "string",

"enum": [

"acknowledged"

]

}

}

},

"patchUnacknowledgeAlarms-RequestType": {

"description": "Used to patch alarm attributes to unacknowledge one or multiple alarm",

"type": "object",

"properties": {

"ackUserId": {

"$ref": "#/components/schemas/ackUserId-Type"

},

"ackSystemId": {

"$ref": "#/components/schemas/ackSystemId-Type"

},

"ackState": {

"type": "string",

"enum": [

"unacknowledged"

]

}

}

},

"patchClearAlarms-RequestType": {

"description": "Used to patch the attributes related to clear",

"type": "object",

"properties": {

"clearUserId": {

"$ref": "#/components/schemas/clearUserId-Type"

},

"clearSystemId": {

"$ref": "#/components/schemas/clearSystemId-Type"

},

"perceivedSeverity": {

"type": "string",

"enum": [

"cleared"

]

}

}

},

"subscription-RequestType": {

"type": "object",

"properties": {

"data": {

"$ref": "#/components/schemas/subscription-ResourceType"

}

}

},

"alarms-ResponseType": {

"type": "object",

"properties": {

"data": {

"type": "array",

"items": {

"$ref": "#/components/schemas/alarm-ResourceType"

}

}

}

},

"alarmsCount-ResponseType": {

"type": "object",

"properties": {

"data": {

"$ref": "#/components/schemas/alarmsCount-Type"

}

}

},

"comment-ResponseType": {

"type": "object",

"properties": {

"data": {

"$ref": "#/components/schemas/comment-ResourceType"

}

}

},

"error-ResponseType": {

"type": "object",

"properties": {

"error": {

"type": "object",

"properties": {

"errorInfo": {

"type": "string"

}

}

}

}

},

"failedAlarms-ResponseType": {

"type": "object",

"properties": {

"error": {

"type": "array",

"items": {

"type": "object",

"properties": {

"alarmId": {

"$ref": "#/components/schemas/alarmId-Type"

},

"errorReason": {

"type": "string"

}

}

}

}

}

},

"subscription-ResponseType": {

"type": "object",

"properties": {

"data": {

"$ref": "#/components/schemas/subscription-ResourceType"

}

}

},

"notifyNewAlarm-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"alarmId": {

"$ref": "#/components/schemas/alarmId-Type"

},

"alarmType": {

"$ref": "#/components/schemas/alarmType-Type"

},

"probableCause": {

"$ref": "#/components/schemas/probableCause-Type"

},

"specificProblem": {

"$ref": "#/components/schemas/specificProblem-Type"

},

"perceivedSeverity": {

"$ref": "#/components/schemas/perceivedSeverity-Type"

},

"backedUpStatus": {

"$ref": "#/components/schemas/backedUpStatus-Type"

},

"backUpObject": {

"$ref": "#/components/schemas/backUpObject-Type"

},

"trendIndication": {

"$ref": "#/components/schemas/trendIndication-Type"

},

"thresholdInfo": {

"$ref": "#/components/schemas/thresholdInfo-Type"

},

"correlatedNotifications": {

"type": "array",

"items": {

"$ref": "#/components/schemas/correlatedNotification-Type"

}

},

"stateChangeDefinition": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeValueChange-Type"

}

},

"monitoredAttributes": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeNameValuePair-Type"

}

},

"proposedRepairActions": {

"$ref": "#/components/schemas/proposedRepairActions-Type"

},

"additionalText": {

"$ref": "#/components/schemas/additionalText-Type"

},

"additionalInformation": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeNameValuePair-Type"

}

},

"rootCauseIndicator": {

"$ref": "#/components/schemas/rootCauseIndicator-Type"

}

}

}

}

},

"notifyNewSecurityAlarm-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"alarmId": {

"$ref": "#/components/schemas/alarmId-Type"

},

"alarmType": {

"$ref": "#/components/schemas/alarmType-Type"

},

"probableCause": {

"$ref": "#/components/schemas/probableCause-Type"

},

"specificProblem": {

"$ref": "#/components/schemas/specificProblem-Type"

},

"perceivedSeverity": {

"$ref": "#/components/schemas/perceivedSeverity-Type"

},

"correlatedNotifications": {

"type": "array",

"items": {

"$ref": "#/components/schemas/correlatedNotification-Type"

}

},

"additionalText": {

"$ref": "#/components/schemas/additionalText-Type"

},

"additionalInformation": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeNameValuePair-Type"

}

},

"rootCauseIndicator": {

"$ref": "#/components/schemas/rootCauseIndicator-Type"

},

"serviceUser": {

"$ref": "#/components/schemas/serviceUser-Type"

},

"serviceProvider": {

"$ref": "#/components/schemas/serviceProvider-Type"

},

"securityAlarmDetector": {

"$ref": "#/components/schemas/securityAlarmDetector-Type"

}

}

}

}

},

"notifyAckStateChanged-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"alarmId": {

"$ref": "#/components/schemas/alarmId-Type"

},

"alarmType": {

"$ref": "#/components/schemas/alarmType-Type"

},

"probableCause": {

"$ref": "#/components/schemas/probableCause-Type"

},

"perceivedSeverity": {

"$ref": "#/components/schemas/perceivedSeverity-Type"

},

"ackState": {

"$ref": "#/components/schemas/ackState-Type"

},

"ackUserId": {

"$ref": "#/components/schemas/ackUserId-Type"

},

"ackSystemId": {

"$ref": "#/components/schemas/ackSystemId-Type"

}

}

}

}

},

"notifyClearedAlarm-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"alarmId": {

"$ref": "#/components/schemas/alarmId-Type"

},

"alarmType": {

"$ref": "#/components/schemas/alarmType-Type"

},

"probableCause": {

"$ref": "#/components/schemas/probableCause-Type"

},

"perceivedSeverity": {

"$ref": "#/components/schemas/perceivedSeverity-Type"

},

"correlatedNotifications": {

"type": "array",

"items": {

"$ref": "#/components/schemas/correlatedNotification-Type"

}

},

"clearUserId": {

"$ref": "#/components/schemas/clearUserId-Type"

},

"clearSystemId": {

"$ref": "#/components/schemas/clearSystemId-Type"

}

}

}

}

},

"notifyAlarmListRebuilt-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"probableCause": {

"$ref": "#/components/schemas/probableCause-Type"

},

"reason": {

"$ref": "#/components/schemas/reason-Type"

},

"alarmListAlignmentRequirement": {

"$ref": "#/components/schemas/alarmListAlignmentRequirement-Type"

}

}

}

}

},

"notifyChangedAlarm-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"alarmId": {

"$ref": "#/components/schemas/alarmId-Type"

},

"alarmType": {

"$ref": "#/components/schemas/alarmType-Type"

},

"probableCause": {

"$ref": "#/components/schemas/probableCause-Type"

},

"perceivedSeverity": {

"$ref": "#/components/schemas/perceivedSeverity-Type"

}

}

}

}

},

"notifyComments-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"alarmId": {

"$ref": "#/components/schemas/alarmId-Type"

},

"alarmType": {

"$ref": "#/components/schemas/alarmType-Type"

},

"probableCause": {

"$ref": "#/components/schemas/probableCause-Type"

},

"perceivedSeverity": {

"$ref": "#/components/schemas/perceivedSeverity-Type"

},

"comments": {

"type": "array",

"items": {

"$ref": "#/components/schemas/comment-ResourceType"

}

}

}

}

}

},

"notifyPotentialFaultyAlarmList-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"reason": {

"$ref": "#/components/schemas/reason-Type"

}

}

}

}

},

"notifyCorrelatedNotificationChanged-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"rootCauseIndicator": {

"$ref": "#/components/schemas/rootCauseIndicator-Type"

},

"correlatedNotifications": {

"type": "array",

"items": {

"$ref": "#/components/schemas/correlatedNotification-Type"

}

},

"alarmId": {

"$ref": "#/components/schemas/alarmId-Type"

}

}

}

}

},

"notifyChangedAlarmGeneral-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"alarmType": {

"$ref": "#/components/schemas/alarmType-Type"

},

"alarmId": {

"$ref": "#/components/schemas/alarmId-Type"

},

"probableCause": {

"$ref": "#/components/schemas/probableCause-Type"

},

"perceivedSeverity": {

"$ref": "#/components/schemas/perceivedSeverity-Type"

},

"rootCauseIndicator": {

"$ref": "#/components/schemas/rootCauseIndicator-Type"

},

"specificProblem": {

"$ref": "#/components/schemas/specificProblem-Type"

},

"correlatedNotifications": {

"type": "array",

"items": {

"$ref": "#/components/schemas/correlatedNotification-Type"

}

},

"backedUpStatus": {

"$ref": "#/components/schemas/backedUpStatus-Type"

},

"trendIndication": {

"$ref": "#/components/schemas/trendIndication-Type"

},

"thresholdInfo": {

"$ref": "#/components/schemas/thresholdInfo-Type"

},

"stateChangeDefinition": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeValueChange-Type"

}

},

"monitoredAttributes": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeNameValuePair-Type"

}

},

"proposedRepairActions": {

"$ref": "#/components/schemas/proposedRepairActions-Type"

},

"additionalText": {

"$ref": "#/components/schemas/additionalText-Type"

},

"additionalInformation": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeNameValuePair-Type"

}

},

"changedAlarmAttributes": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeNameValuePair-Type"

}

},

"backUpObject": {

"$ref": "#/components/schemas/backUpObject-Type"

}

}

}

}

},

"alarm-ResourceType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"alarmType": {

"$ref": "#/components/schemas/alarmType-Type"

},

"alarmId": {

"$ref": "#/components/schemas/alarmId-Type"

},

"alarmRaisedTime": {

"$ref": "#/components/schemas/dateTime-Type"

},

"alarmChangedTime": {

"$ref": "#/components/schemas/dateTime-Type"

},

"alarmClearedTime": {

"$ref": "#/components/schemas/dateTime-Type"

},

"probableCause": {

"$ref": "#/components/schemas/probableCause-Type"

},

"perceivedSeverity": {

"$ref": "#/components/schemas/perceivedSeverity-Type"

},

"rootCauseIndicator": {

"$ref": "#/components/schemas/rootCauseIndicator-Type"

},

"specificProblem": {

"$ref": "#/components/schemas/specificProblem-Type"

},

"backedUpStatus": {

"$ref": "#/components/schemas/backedUpStatus-Type"

},

"trendIndication": {

"$ref": "#/components/schemas/trendIndication-Type"

},

"thresholdinfo": {

"$ref": "#/components/schemas/thresholdInfo-Type"

},

"stateChangeDefinition": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeValueChange-Type"

}

},

"monitoredAttributes": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeNameValuePair-Type"

}

},

"proposedRepairActions": {

"$ref": "#/components/schemas/proposedRepairActions-Type"

},

"additionalText": {

"$ref": "#/components/schemas/additionalText-Type"

},

"additionalInformation": {

"type": "array",

"items": {

"$ref": "#/components/schemas/attributeNameValuePair-Type"

}

},

"ackTime": {

"$ref": "#/components/schemas/dateTime-Type"

},

"ackUserId": {

"$ref": "#/components/schemas/ackUserId-Type"

},

"ackSystemId": {

"$ref": "#/components/schemas/ackSystemId-Type"

},

"ackState": {

"$ref": "#/components/schemas/ackState-Type"

},

"clearUserId": {

"$ref": "#/components/schemas/clearUserId-Type"

},

"clearSystemId": {

"$ref": "#/components/schemas/clearSystemId-Type"

},

"backUpObject": {

"$ref": "#/components/schemas/backUpObject-Type"

},

"correlatedNotifications": {

"type": "array",

"items": {

"$ref": "#/components/schemas/correlatedNotification-Type"

}

},

"comments": {

"type": "array",

"items": {

"$ref": "#/components/schemas/comment-ResourceType"

}

},

"serviceUser": {

"$ref": "#/components/schemas/serviceUser-Type"

},

"serviceProvider": {

"$ref": "#/components/schemas/serviceProvider-Type"

},

"securityAlarmDetector": {

"$ref": "#/components/schemas/securityAlarmDetector-Type"

}

}

}

}

},

"comment-ResourceType": {

"type": "object",

"properties": {

"commentTime": {

"$ref": "#/components/schemas/dateTime-Type"

},

"commentText": {

"$ref": "#/components/schemas/commentText-Type"

},

"commentUserId": {

"$ref": "#/components/schemas/commentUserId-Type"

},

"commentSystemId": {

"$ref": "#/components/schemas/commentSystemId-Type"

}

}

},

"subscription-ResourceType": {

"type": "object",

"properties": {

"consumerReference": {

"$ref": "#/components/schemas/uri-Type"

},

"timeTick": {

"$ref": "#/components/schemas/long-Type"

},

"filter": {

"$ref": "#/components/schemas/filter-Type"

}

}

},

"ackState-Type": {

"type": "string",

"enum": [

"acknowledged",

"unacknowledged"

]

},

"ackSystemId-Type": {

"type": "string"

},

"ackUserId-Type": {

"type": "string"

},

"additionalText-Type": {

"type": "string"

},

"alarmId-Type": {

"type": "string"

},

"alarmIdAndPerceivedSeverity-Type": {

"type": "object",

"properties": {

"alarmId": {

"$ref": "#/components/schemas/alarmId-Type"

},

"perceivedSeverity": {

"$ref": "#/components/schemas/perceivedSeverity-Type"

}

}

},

"alarmListAlignmentRequirement-Type": {

"type": "string",

"enum": [

"Alignment Required",

"Alignment Not Required"

]

},

"alarmsCount-Type": {

"type": "object",

"properties": {

"criticalCount": {

"type": "integer"

},

"majorCount": {

"type": "integer"

},

"minorCount": {

"type": "integer"

},

"warningCount": {

"type": "integer"

},

"indeterminateCount": {

"type": "integer"

},

"clearedCount": {

"type": "integer"

}

}

},

"alarmType-Type": {

"type": "string",

"enum": [

"Communications Alarm",

"Processing Error Alarm",

"Environmental Alarm",

"Quality Of Service Alarm",

"Equipment Alarm",

"Integrity Violation",

"Operational Violation",

"Physical Violation",

"Security Service or Mechanism Violation",

"Time Domain Violation"

]

},

"attributeValueChange-Type": {

"type": "object",

"properties": {

"attributeName": {

"type": "string"

},

"oldAttributeValue": {},

"newAttributeValue": {}

}

},

"backedUpStatus-Type": {

"type": "boolean"

},

"backUpObject-Type": {

"$ref": "#/components/schemas/uri-Type"

},

"clearSystemId-Type": {

"type": "string"

},

"clearUserId-Type": {

"type": "string"

},

"commentText-Type": {

"type": "string"

},

"commentUserId-Type": {

"type": "string"

},

"commentSystemId-Type": {

"type": "string"

},

"correlatedNotification-Type": {

"type": "object",

"properties": {

"source": {

"$ref": "#/components/schemas/uri-Type"

},

"notificationIds": {

"type": "array",

"items": {

"$ref": "#/components/schemas/notificationId-Type"

}

}

}

},

"filter-Type": {

"type": "string"

},

"indication-Type": {

"type": "string",

"enum": [

"Up",

"Down"

]

},

"notificationId-Type": {

"$ref": "#/components/schemas/long-Type"

},

"notificationType-Type": {

"type": "string",

"enum": [

"notifyNewAlarm",

"notifyAckStateChanged",

"notifyClearedAlarm",

"notifyAlarmListRebuiltAlarm",

"notifyChangedAlarm",

"notifyComments",

"notifyPotentialFaultyAlarmList",

"notifyCorrelatedNotificationChanged",

"notifyChangedAlarmGeneral"

]

},

"perceivedSeverity-Type": {

"type": "string",

"enum": [

"Critical",

"Major",

"Minor",

"Warning",

"Indeterminate",

"Cleared"

]

},

"probableCause-Type": {

"type": "string"

},

"proposedRepairActions-Type": {

"type": "string"

},

"reason-Type": {

"type": "string"

},

"rootCauseIndicator-Type": {

"type": "boolean"

},

"securityAlarmDetector-Type": {

"type": "string"

},

"serviceProvider-Type": {

"type": "string"

},

"serviceUser-Type": {

"type": "string"

},

"specificProblem-Type": {

"type": "string"

},

"systemDN-Type": {

"type": "string"

},

"thresholdInfo-Type": {

"type": "object",

"properties": {

"attributeName": {

"type": "string"

},

"observedValue": {

"$ref": "#/components/schemas/float-Type"

},

"thresholdLevel": {

"$ref": "#/components/schemas/thresholdLevel-Type"

},

"armTime": {

"$ref": "#/components/schemas/dateTime-Type"

}

}

},

"thresholdLevel-Type": {

"type": "object",

"properties": {

"indication": {

"$ref": "#/components/schemas/indication-Type"

},

"low": {

"$ref": "#/components/schemas/float-Type"

},

"high": {

"$ref": "#/components/schemas/float-Type"

}

}

},

"trendIndication-Type": {

"type": "string",

"enum": [

"More severe",

"No change",

"Less severe"

]

}

}

}

}

# A.3 Generic performance assurance management service

## A.3.1 Performance data file reporting service

{

"openapi": "3.0.1",

"info": {

"title": "TS 28.532 Performance data file reporting Service",

"version": "15.3.0",

"description": "OAS 3.0.1 specification of the Performance Data File Reporting Service"

},

"servers": [

{

"url": "http://{DN\_prefix\_authority\_part}/{DN\_prefix\_remainder}/PerfDataFileReportMnS/v1530",

"variables": {

"DN\_prefix\_authority\_part": {

"description": "See clause 4.4 of TS 32.158",

"default": "example.com"

},

"DN\_prefix\_remainder": {

"description": "See clause 4.4 of TS 32.158",

"default": ""

}

}

}

],

"paths": {

"/Files": {

"get": {

"summary": "Read resources of information of available files",

"description": "With HTTP GET, resources of information of available files are read. The resources to be read are identified with the path component (base resource) and the query component (managementDataType, beginTime and endTime) of the URI. The fields query component allows to select the resource properties to be returned.",

"parameters": [

{

"name": "managementDataType",

"in": "query",

"description": "This parameter identifies the type of management data that the file contains to select the resources from the collection resources identified with the path component of the URI.",

"required": true,

"$ref": "#/components/schemas/managementDataType-Type"

},

{

"name": "beginTime",

"in": "query",

"description": "This parameter identifies the time stamp no later than which the file became available to select the resources from the collection resources identified with the path component of the URI.",

"required": true,

"$ref": "#/components/schemas/dateTime-Type"

},

{

"name": "endTime",

"in": "query",

"description": "This parameter identifies the time stamp no earlier than which the file became available to select the resources from the collection resources identified with the path component of the URI.",

"required": true,

"$ref": "#/components/schemas/dateTime-Type"

}

],

"responses": {

"200": {

"description": "Success case (\"200 OK\"). The resources identified in the request for retrieval are returned in the response message body. In case the fields query parameter is used, the selected resources are returned.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/fileInfoRetrieval-ResponseType"

}

}

}

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

},

"/subscriptions": {

"post": {

"summary": "Create a subscription",

"description": "To create a subscription the representation of the subscription is POSTed on the /subscriptions collection resource.",

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/subscription-RequestType"

}

}

}

},

"responses": {

"201": {

"description": "Success case (\"201 Created\"). The representation of the newly created subscription resource shall be returned.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/subscription-ResponseType"

}

}

}

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

},

"callbacks": {

"notifyFileReady": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyFileReady-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"notifyFilePreparationError": {

"{request.body#/consumerReference}": {

"post": {

"requestBody": {

"required": true,

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/notifyFilePreparationError-NotifType"

}

}

}

},

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The notification is successfully delivered. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

}

}

},

"delete": {

"summary": "Delete all subscriptions made with a specific consumerReferenceId",

"description": "The subscriptions are deleted by deleting the corresponding subscription resources. The resources to be deleted are identified with the path component of the URI pointing to the /subscription collection resource and filtering on the consumerReferenceId provided in the query part.",

"parameters": [

{

"name": "consumerReferenceId",

"in": "query",

"description": "Identifies the subscriptions to be deleted.",

"required": true,

"schema": {

"$ref": "#/components/schemas/consumerReferenceId-QueryType"

}

}

],

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The subscription resources have been deleted. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

},

"/subscriptions/{subscriptionId}": {

"delete": {

"summary": "Delete a single subscription",

"description": "The subscription is deleted by deleting the corresponding subscription resource. The resource to be deleted is identified with the path component of the URI.",

"parameters": [

{

"name": "subscriptionId",

"in": "path",

"description": "Identifies the subscription to be deleted.",

"required": true,

"schema": {

"$ref": "#/components/schemas/subscriptionId-PathType"

}

}

],

"responses": {

"204": {

"description": "Success case (\"204 No Content\"). The subscription resource has been deleted. The response message body is absent."

},

"default": {

"description": "Error case.",

"content": {

"application/json": {

"schema": {

"$ref": "#/components/schemas/error-ResponseType"

}

}

}

}

}

}

}

},

"components": {

"schemas": {

"dateTime-Type": {

"type": "string",

"format": "date-Time"

},

"uri-Type": {

"type": "string"

},

"long-Type": {

"type": "string",

"format": "long"

},

"additionalText-Type": {

"type": "string"

},

"reason-Type": {

"type": "string"

},

"fileInfoRetrieval-ResponseType": {

"type": "object",

"properties": {

"data": {

"type": "array",

"items": {

"$ref": "#/components/schemas/fileInfo-Type"

}

}

}

},

"fileInfo-Type": {

"type": "object",

"properties": {

"fileLocation": {

"$ref": "#/components/schemas/uri-Type"

},

"fileSize": {

"$ref": "#/components/schemas/long-Type"

},

"fileReadyTime": {

"$ref": "#/components/schemas/dateTime-Type"

},

"fileExpirationTime": {

"$ref": "#/components/schemas/dateTime-Type"

},

"fileCompression": {

"type": "string"

},

"fileFormat": {

"type": "string"

}

}

},

"error-ResponseType": {

"type": "object",

"properties": {

"error": {

"type": "object",

"properties": {

"errorInfo": {

"type": "string"

}

}

}

}

},

"managementDataType-Type": {

"type": "string",

"enum": [

"PM"

]

},

"header-Type": {

"description": "Header used in notifications as notification header",

"type": "object",

"properties": {

"uri": {

"$ref": "#/components/schemas/uri-Type"

},

"notificationId": {

"$ref": "#/components/schemas/notificationId-Type"

},

"notificationType": {

"$ref": "#/components/schemas/notificationType-Type"

},

"eventTime": {

"$ref": "#/components/schemas/dateTime-Type"

}

}

},

"subscriptionId-PathType": {

"type": "string"

},

"filter-Type": {

"type": "string"

},

"notificationId-Type": {

"$ref": "#/components/schemas/long-Type"

},

"notificationType-Type": {

"type": "string",

"enum": [

"notifyFileReady",

"notifyFilePreparationError"

]

},

"subscription-ResourceType": {

"type": "object",

"properties": {

"consumerReference": {

"$ref": "#/components/schemas/uri-Type"

},

"timeTick": {

"$ref": "#/components/schemas/long-Type"

},

"filter": {

"$ref": "#/components/schemas/filter-Type"

}

}

},

"subscription-RequestType": {

"type": "object",

"properties": {

"data": {

"$ref": "#/components/schemas/subscription-ResourceType"

}

}

},

"subscription-ResponseType": {

"type": "object",

"properties": {

"data": {

"$ref": "#/components/schemas/subscription-ResourceType"

}

}

},

"consumerReferenceId-QueryType": {

"$ref": "#/components/schemas/uri-Type"

},

"notifyFileReady-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"fileInfoList": {

"type": "array",

"items": {

"$ref": "#/components/schemas/fileInfo-Type"

}

},

"additionalText": {

"$ref": "#/components/schemas/additionalText-Type"

}

}

}

}

},

"notifyFilePreparationError-NotifType": {

"type": "object",

"properties": {

"header": {

"$ref": "#/components/schemas/header-Type"

},

"body": {

"type": "object",

"properties": {

"fileInfoList": {

"type": "array",

"items": {

"$ref": "#/components/schemas/fileInfo-Type"

}

},

"reason": {

"$ref": "#/components/schemas/reason-Type"

},

"additionalText": {

"$ref": "#/components/schemas/additionalText-Type"

}

}

}

}

}

}

}

}

# A.4 Streaming data reporting management service

## A.4.1 Introduction

Clause A.4.2 contains the OpenAPI specification of the Streaming data reporting MnS.

## A.4.2 OpenAPI document "streamingDataMnS.yaml"

openapi: 3.0.1

info:

title: TS 28.532 Streaming data reporting service

version: 15.7.0

description: OAS 3.0.1 specification for the Streaming data reporting service (Streaming MnS)

servers:

- url: '{protocol}://{root}/StreamingDataReportingMnS/{version}'

variables:

protocol:

description: Protocol used

enum:

- http

- https

- wss

default: https

root:

description: Indicates the host name and optional port, and an optional sequence of path segments that together represent a prefix path.

default: example.com

version:

description: Indicates the current version of the specification

default: 15.7.0

paths:

'/connections':

post:

summary: Inform consumer about reporting streams to be carried by the new connection and receive a new connection id.

description: Exchange of meta-data (producer informs consumer about its own identity and the nature of the data to be reported via streaming) phase of the connection establishement by streaming data reporting producer to the streaming data reporting consumer (i.e. streaming target).

requestBody:

required: true

content:

application/json:

schema:

$ref: '#/components/schemas/connectionRequest-Type'

responses:

'201':

description: Success case (201 Created).

headers:

Location:

description: Location of the created connection resource.

schema:

$ref: '#/components/schemas/connectionId-Type'

default:

description: Error case.

content:

application/json:

schema:

$ref: '#/components/schemas/failedConnectionResponse-Type'

get:

summary: Obtain information about connections.

description: Enables the streaming data reporting service producer to obtain information about one or more streaming connections.

parameters:

- name: connectionIdList

in: query

description: The list of connectionId for which the connection information is to be returned.

required: false

schema:

type: array

items:

$ref: '#/components/schemas/connectionId-Type'

responses:

'200':

description: Success case (200 OK). The resources identified in the request for retrieval are returned in the response message body. In case the fields query parameter is used, the selected resources are returned.

content:

application/json:

schema:

type: array

items:

$ref: '#/components/schemas/connectionInfo-Type'

'202':

description: Partial success case (202 Partially retrieved). Subset of the resources identified in the request for retrieval are returned in the response message body.

content:

application/json:

schema:

type: array

items:

$ref: '#/components/schemas/connectionInfo-Type'

default:

description: Error case.

content:

application/json:

schema:

$ref: '#/components/schemas/errorResponse-Type'

'/connections/{connectionId}':

get:

summary: Obtain information about a connection.

description: Enables the streaming data reporting service producer to obtain information about one streaming connection.

parameters:

- name: connectionId

in: path

description: Indicate the ID (URI) of the connection for which the information is being retrieved

required: true

schema:

$ref: '#/components/schemas/connectionId-Type'

- name: Connection

in: header

schema:

$ref: '#/components/schemas/websocketHeaderConnection-Type'

- name: Sec-WebSocket-Extensions

in: header

schema:

$ref: '#/components/schemas/websocketHeader-Sec-WebSocket-Extensions-Type'

- name: Sec-WebSocket-Key

in: header

schema:

$ref: '#/components/schemas/websocketHeader-Sec-WebSocket-Key-Type'

- name: Sec-WebSocket-Protocol

in: header

schema:

$ref: '#/components/schemas/websocketHeader-Sec-WebSocket-Protocol-Type'

- name: Sec-WebSocket-Version

in: header

schema:

$ref: '#/components/schemas/websocketHeader-Sec-WebSocket-Version-Type'

responses:

'101':

description: Success case (101 Switching Protocols). The connection has been successfully switched to WebSocket. The response message body is absent.

headers:

Upgrade:

schema:

$ref: '#/components/schemas/websocketHeaderUpgrade-Type'

Connection:

schema:

$ref: '#/components/schemas/websocketHeaderConnection-Type'

Sec-WebSocket-Accept:

schema:

$ref: '#/components/schemas/websocketHeader-Sec-WebSocket-Accept-Type'

'200':

description: Success case (200 OK). The resource identified in the request for retrieval returned in the response message body.

content:

application/json:

schema:

$ref: '#/components/schemas/connectionInfo-Type'

default:

description: Error case.

content:

application/json:

schema:

$ref: '#/components/schemas/errorResponse-Type'

'/connections/{connectionId}/streams':

post:

summary: Inform consumer about new reporting streams on an existing connection.

description: Allows the producer to add one or more reporting streams to an already established streaming connection.

parameters:

- name: connectionId

in: path

description: Indicate the ID (URI) of the connection for which the reporting stream information is being added.

required: true

schema:

$ref: '#/components/schemas/connectionId-Type'

requestBody:

required: true

content:

application/json:

schema:

type: array

items:

$ref: '#/components/schemas/streamInfo-Type'

responses:

'201':

description: Success case (201 Posted).

content:

application/json:

schema:

type: array

items:

$ref: '#/components/schemas/streamInfo-Type'

'202':

description: Partial success case (202 Posted).

content:

application/json:

schema:

type: array

items:

$ref: '#/components/schemas/streamInfo-Type'

default:

description: Error case.

content:

application/json:

schema:

$ref: '#/components/schemas/errorResponse-Type'

delete:

summary: Remove reporting streams from an existing connection

description: Allows the producer to remove one or more reporting streams from an already established streaming connection.

parameters:

- name: connectionId

in: path

description: Indicate the ID (URI) of the connection for which the reporting stream information is being removed.

required: true

schema:

$ref: '#/components/schemas/connectionId-Type'

- name: streamIds

in: query

description: The list of streamId for the stream(s) to be deleted.

required: true

schema:

type: array

items:

$ref: '#/components/schemas/streamId-Type'

responses:

'204':

description: Success case (204 No Content). The stream information resource has been deleted. The response message body is absent.

default:

description: Error case.

content:

application/json:

schema:

$ref: '#/components/schemas/errorResponse-Type'

get:

summary: Obtain information about streams.

description: Enables the streaming data reporting service producer to obtain information about one or more reporting streams.

parameters:

- name: connectionId

in: path

description: Indicate the ID (URI) of the connection for which the information is being retrieved

required: true

schema:

$ref: '#/components/schemas/connectionId-Type'

- name: streamIds

in: query

description: The list of streamId for which the stream information is to be retrieved.

required: true

schema:

type: array

items:

$ref: '#/components/schemas/streamId-Type'

responses:

'200':

description: Success case (200 OK).

content:

application/json:

schema:

type: array

items:

$ref: '#/components/schemas/streamInfoWithReporters-Type'

'202':

description: Partial success case (202 Partially retrieved).

content:

application/json:

schema:

type: array

items:

$ref: '#/components/schemas/streamInfoWithReporters-Type'

default:

description: Error case.

content:

application/json:

schema:

$ref: '#/components/schemas/errorResponse-Type'

'/connections/{connectionId}/streams/{streamId}':

get:

summary: Obtain information about stream

description: Enables the streaming data reporting service producer to obtain information about a reporting stream.

parameters:

- name: connectionId

in: path

description: Indicate the ID (URI) of the connection for which the information is being retrieved

required: true

schema:

$ref: '#/components/schemas/connectionId-Type'

- name: streamId

in: path

description: Indicate the ID of the reporting stream for which the information is being retrieved

required: true

schema:

$ref: '#/components/schemas/streamId-Type'

responses:

'200':

description: Success case (200 OK).

content:

application/json:

schema:

$ref: '#/components/schemas/streamInfoWithReporters-Type'

default:

description: Error case.

content:

application/json:

schema:

$ref: '#/components/schemas/errorResponse-Type'

components:

schemas:

connectionId-Type:

$ref: '#/components/schemas/uri-Type'

connectionInfo-Type:

type: object

properties:

connection:

$ref: '#/components/schemas/connectionId-Type'

producer:

$ref: '#/components/schemas/producerId-Type'

streams:

type: array

items:

$ref: '#/components/schemas/streamId-Type'

connectionRequest-Type:

type: object

properties:

producer:

$ref: '#/components/schemas/producerId-Type'

streams:

type: array

items:

$ref: '#/components/schemas/streamInfo-Type'

errorResponse-Type:

type: object

properties:

error:

type: object

properties:

errorInfo:

type: string

failedConnectionResponse-Type:

type: object

properties:

error:

type: array

items:

type: object

properties:

streamId:

$ref: '#/components/schemas/streamId-Type'

errorReason:

type: string

measObjDn-Type:

description: DN of the measured object instance (see 3GPP TS 28.550)

allOf:

- $ref: '#/components/schemas/systemDN-Type'

measTypes-Type:

description: an ordered list of measurement type or KPI whose measurement values or KPI result values are to be reported by the Performance Data Stream Units (see Annex C of TS 28.550) via this stream

type: array

items:

type: string

performanceInfo-Type:

description: Information specific to performance data reporting

type: object

properties:

measObjDn:

$ref: '#/components/schemas/measObjDn-Type'

measTypes:

$ref: '#/components/schemas/measTypes-Type'

measurementReaderId:

$ref: '#/components/schemas/systemDN-Type'

jobId:

type: string

required:

- measObjDn

- measTypes

producerId-Type:

description: DN of the streaming data reporting MnS producer.

allOf:

- $ref: '#/components/schemas/systemDN-Type'

serializationFormat-Type:

type: string

enum:

- GPB

- ASN1

streamId-Type:

description: globally unique stream identifier

type: string

example: '26F452550021'

streamInfo-Type:

description: Reporting stream meta-data.

type: object

properties:

streamType:

$ref: '#/components/schemas/streamType-Type'

serializationFormat:

$ref: '#/components/schemas/serializationFormat-Type'

streamId:

oneOf:

- $ref: '#/components/schemas/streamId-Type'

additionalInfo:

oneOf:

- $ref: '#/components/schemas/performanceInfo-Type'

- $ref: '#/components/schemas/vsDataContainer-Type'

required:

- streamType

- serializationFormat

- streamId

streamInfoWithReporters-Type:

description: Reporting stream meta-data with added information about reporters.

type: object

properties:

streamInfo:

$ref: '#/components/schemas/streamInfo-Type'

reporters:

type: array

items:

$ref: '#/components/schemas/producerId-Type'

systemDN-Type:

description: See 3GPP TS 32.300 for details

type: string

example: 'SubNetwork=ABCNetwork,SubNetwork=MUC01,GNBDUFunction=XYZ0100'

streamType-Type:

type: string

enum:

- PERFORMANCE

- PROPRIETARY

uri-Type:

description: Resource URI

type: string

vsDataContainer-Type:

description: container for vendor specific data (see 3GPP TS 28.622)

type: object

properties:

vsDataType:

type: string

vsData:

type: string

vsDataFormatVersion:

type: string

websocketHeaderConnection-Type:

description: Header value for the upgrade request and response.

type: string

enum:

- Upgrade

websocketHeaderUpgrade-Type:

description: Header value for the upgrade to WebSocket request and response.

type: string

enum:

- websocket

websocketHeader-Sec-WebSocket-Accept-Type:

description: Header value for secure WebSocket response. Carries hash.

type: string

websocketHeader-Sec-WebSocket-Extensions-Type:

description: Header value for secure WebSocket request. Carries protocol extensions.

type: string

websocketHeader-Sec-WebSocket-Key-Type:

description: Header value for secure WebSocket request. Provides information to the server which is needed in order to confirm that the client is entitled to request an upgrade to WebSocket.

type: string

websocketHeader-Sec-WebSocket-Protocol-Type:

description: Header value for secure WebSocket request. Carries a comma-separated list of subprotocol names, in the order of preference.

type: string

websocketHeader-Sec-WebSocket-Version-Type:

description: Header value for secure WebSocket request and response. Carries the WebSocket protocol version to be used.

type: string

Annex B (informative):  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2018-09 | SA#81 |  |  |  |  | Upgrade to change control version | 15.0.0 |
| 2018-09 | SA#81 |  |  |  |  | EditHelp editorial fix | 15.0.1 |
| 2018-12 | SA#82 | SP-181042 | 0002 | 1 | F | Correction of references | 15.1.0 |
| 2018-12 | SA#82 | SP-181042 | 0003 | 1 | F | Align with 3GPP draft rules of the usage of must | 15.1.0 |
| 2018-12 | SA#82 | SP-181042 | 0004 | 1 | F | Correction of the numbering and title of figures and tables | 15.1.0 |
| 2018-12 | SA#82 | SP-181042 | 0005 | 1 | F | Remove unnecessary Editor’s Note and figure | 15.1.0 |
| 2018-12 | SA#82 | SP-181045 | 0006 | 1 | F | Update Resource URI of alarmCount | 15.1.0 |
| 2018-12 | SA#82 | SP-181045 | 0009 | 1 | F | Change the name of IRPAgent and IRPManager | 15.1.0 |
| 2018-12 | SA#82 | SP-181045 | 0010 | 1 | F | Remove unnecessary import table and state diagram | 15.1.0 |
| 2018-12 | SA#82 | SP-181045 | 0012 | - | F | Correct the subscription resource related errors | 15.1.0 |
| 2018-12 | SA#82 | SP-181043 | 0018 | - | F | Add notifyNewSecurityAlarm to notification type | 15.1.0 |
| 2018-12 | SA#82 | SP-181045 | 0020 | 1 | F | Change alarmIRP to FaultSupervision MnS producer | 15.1.0 |
| 2018-12 | SA#82 | SP-181042 | 0021 | 1 | F | Add stage 2 definition for provisioning management service related notifications | 15.1.0 |
| 2018-12 | SA#82 | SP-181042 | 0022 | 1 | F | Correct stage 3 description of the Provisioning Management Service | 15.1.0 |
| 2018-12 | SA#82 | SP-181045 | 0025 | - | F | Correct erroneous reference to notification header | 15.1.0 |
| 2019-03 | SA#83 | SP-190120 | 0029 | 1 | F | Correction of references | 15.2.0 |
| 2019-09 | SA#85 | SP-190742 | 0037 | 3 | F | Global reorganization, correcting operation names, notification parameter and wrong references | 15.3.0 |
| 2019-12 | SA#86 | SP-191219 | 0058 | 1 | F | Corrections to provisioning MnS notification definitions (Stage 2) | 15.4.0 |
| 2019-12 | SA#86 | SP-191219 | 0060 | 2 | F | Correct fault supervision management service | 15.4.0 |
| 2019-12 | SA#86 | SP-191173 | 0074 | - | F | Correct event time defn | 15.4.0 |
| 2020-03 | SA#87E | SP-200174 | 0099 | 1 | F | Correct ackState name | 15.5.0 |
| 2020-03 | SA#87E | SP-200174 | 0106 | - | F | Add missing definition for matching-criteria-attributes | 15.5.0 |
| 2020-06 | SA#88-e | SP-200499 | 0122 | - | F | Move XML file format from stage2 to stage3 | 15.6.0 |
| 2020-09 | SA#89-e | SP-200736 | 0140 | 1 | F | Correct the description for generic provisioning MnS | 15.7.0 |
| 2020-09 | SA#89-e | SP-200731 | 0142 | - | F | Correct and move the streaming solution from 28.550 to TS 28.532 | 15.7.0 |
| 2023-03 | SA#99 | SP-230200 | 0247 | - | F | Updates for generic management services | 15.8.0 |
| 2023-06 | SA#100 | SP-230647 | 0261 | - | F | Correction of reference and alarm information | 15.9.0 |
| 2024-09 | SA#105 | SP-241171 | 0336 | 1 | F | Rel-15 CR TS 28.532 Correcting the TLS component in the protocol stack diagram | 15.10.0 |