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Contents

Foreword

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

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- 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.

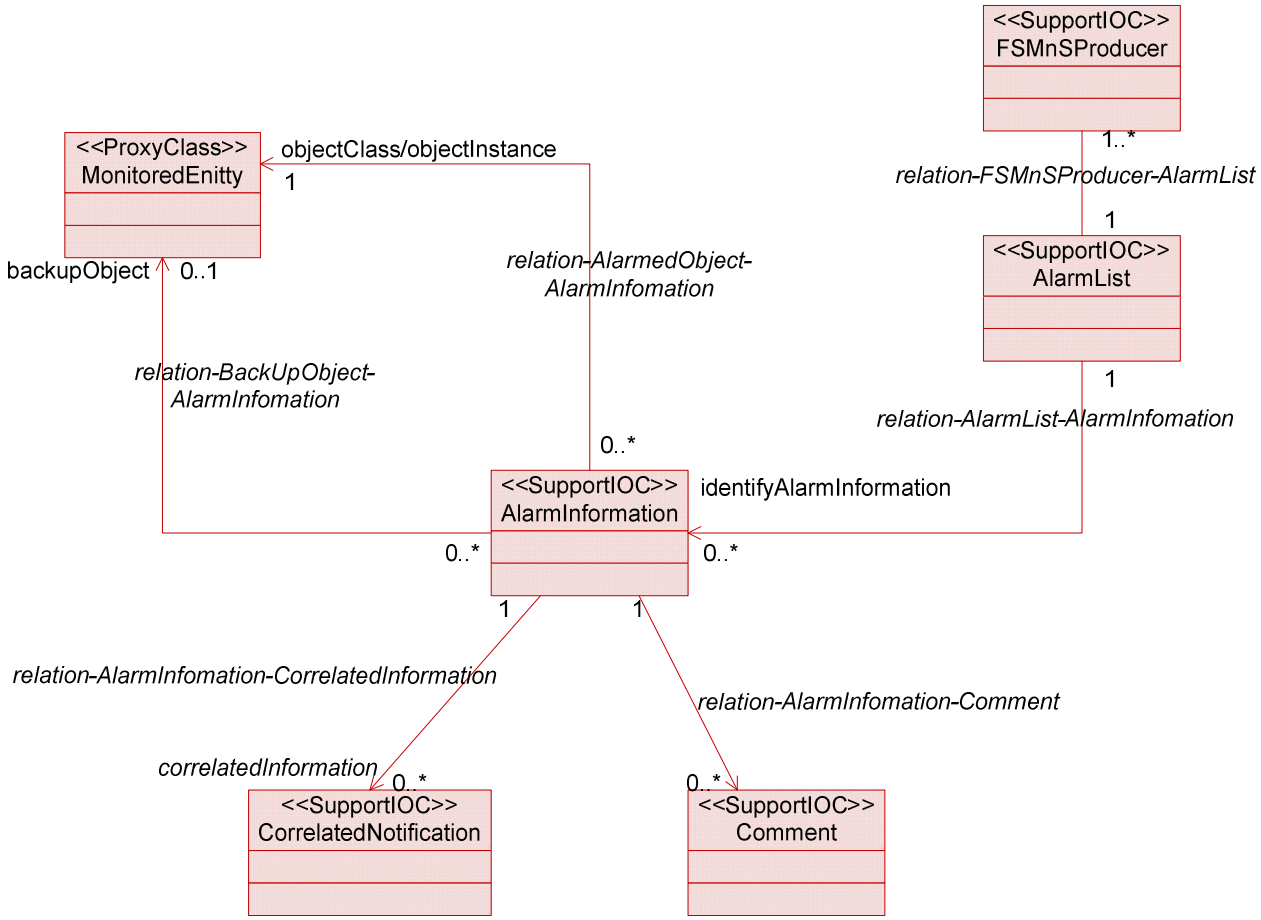
10.2.2.1.2 Class diagram

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.

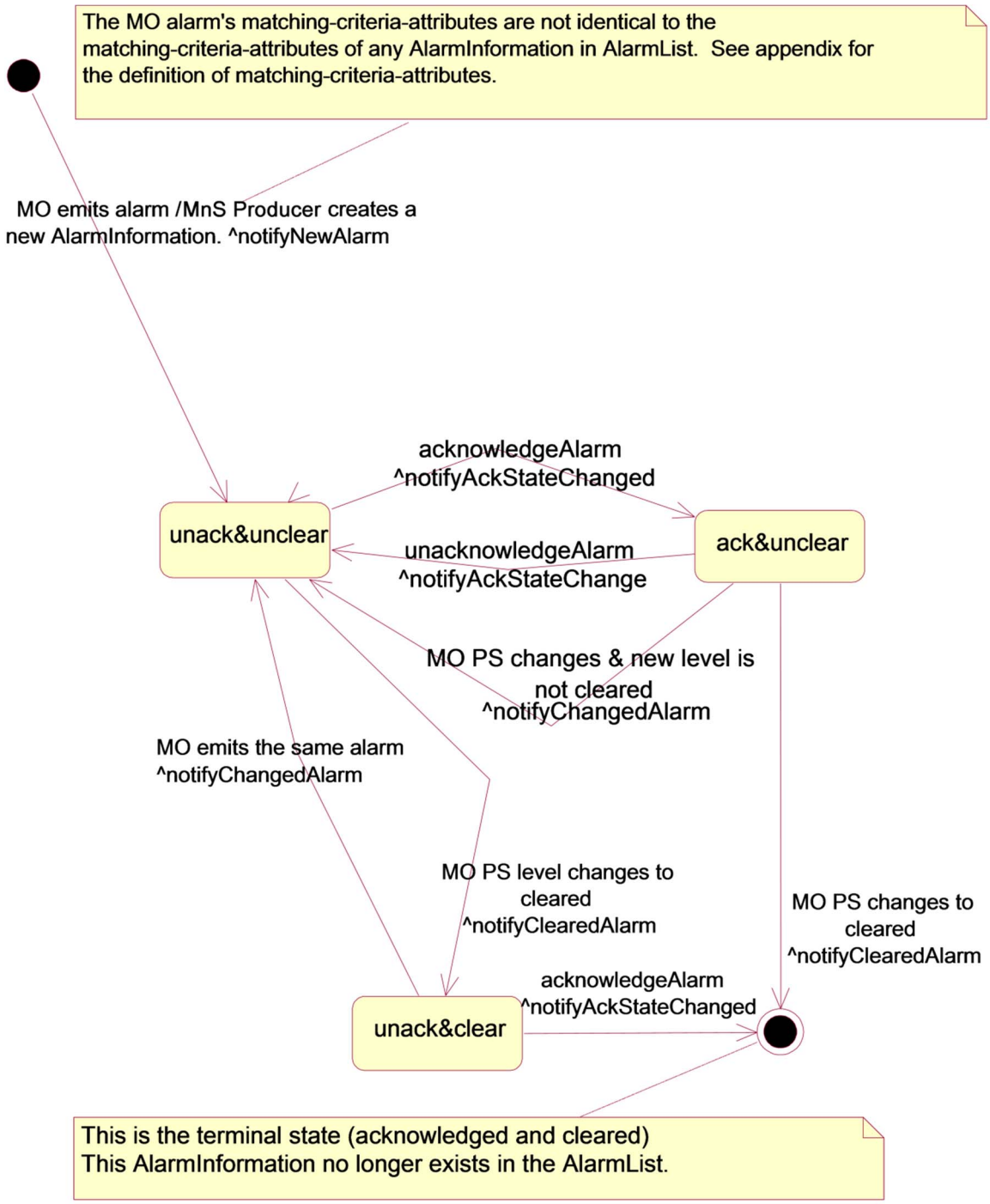


Figure 10.2.2.1.3.1.3-1 notifyChangedAlarm supported

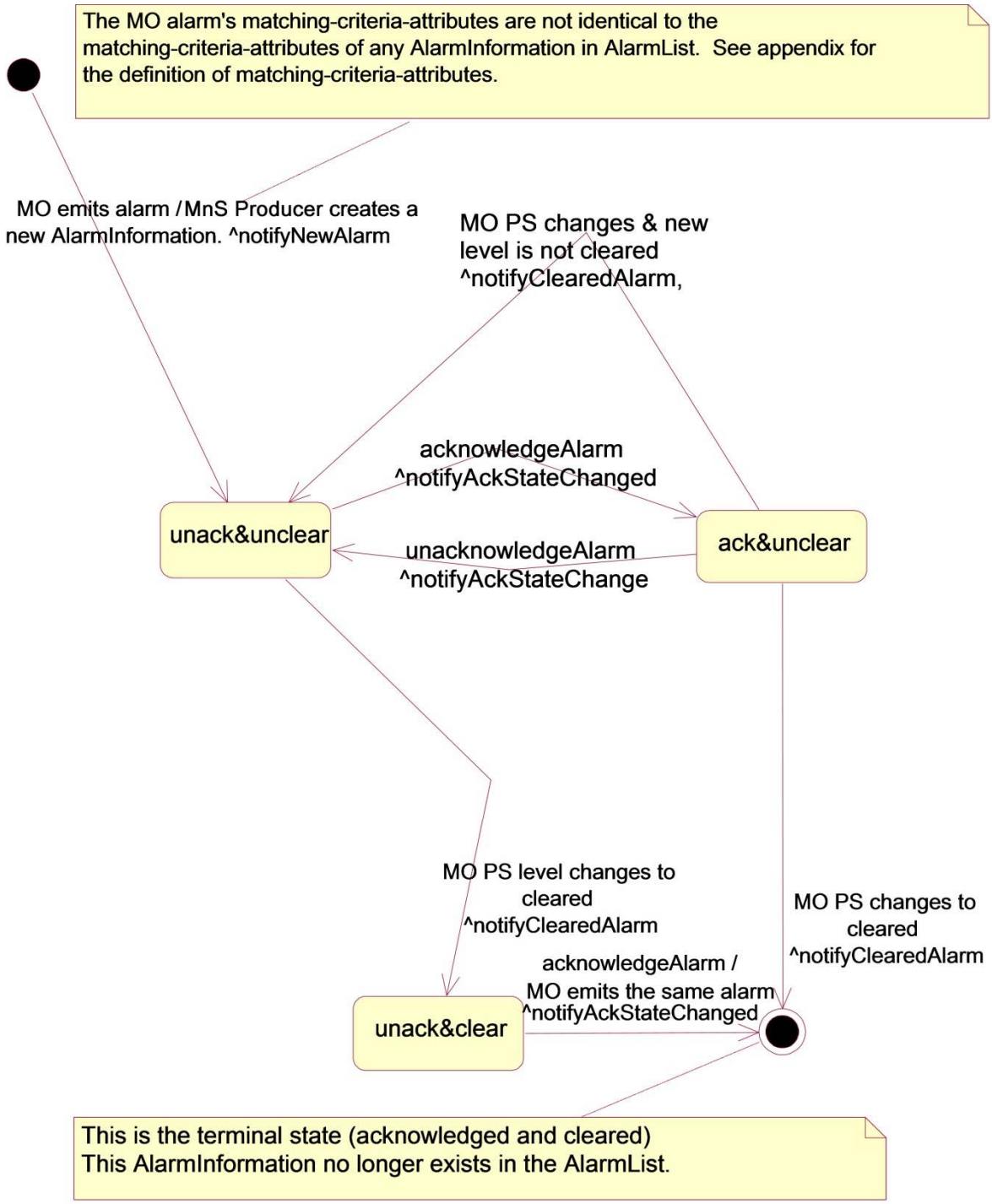


Figure 10.2.2.1.3.1.3-2 notifyChangedAlarm not supported

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

Name	Definition	Legal Values
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 "".

Name	Definition	Legal Values
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

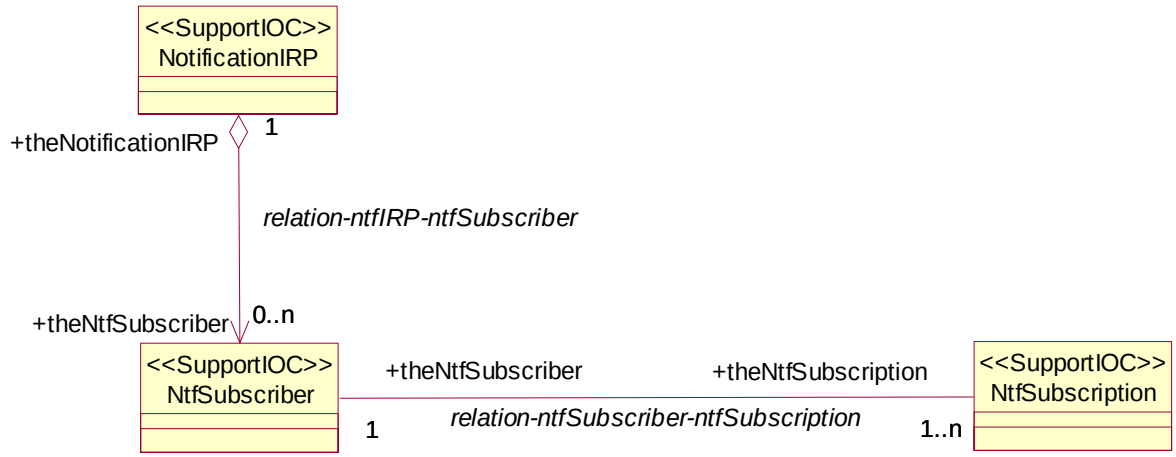
10.2.2.2.1 Imported information entities and local labels

None.

10.2.2.2.2 Class Diagram

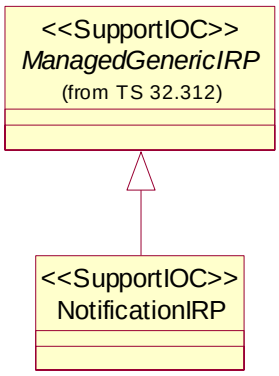
10.2.2.2.2.1 Attributes and relationships

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 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>, 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.

Parameter Name	Qualifier	Information Type	Comment
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.

File Content Item	Description
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.

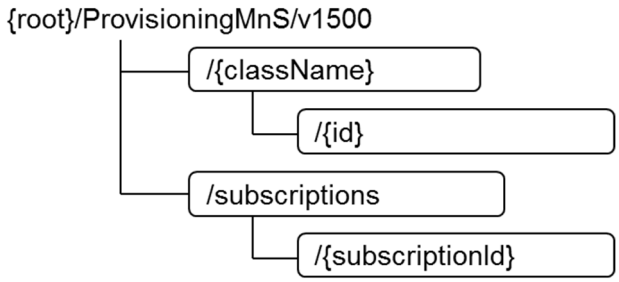


Figure 11.1.1.3.1-1: Resource URI structure of the Provisioning MnS

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.

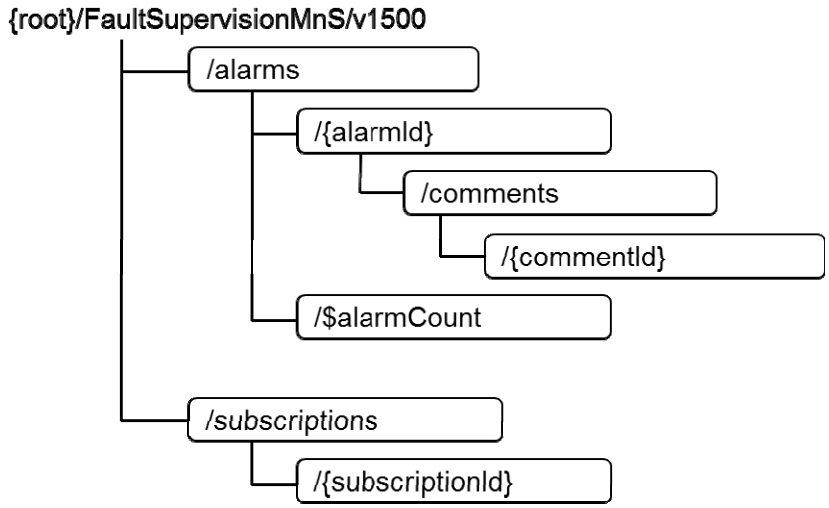


Figure 11.2.1.3.1-1: Resource URI structure of the Fault MnS

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.

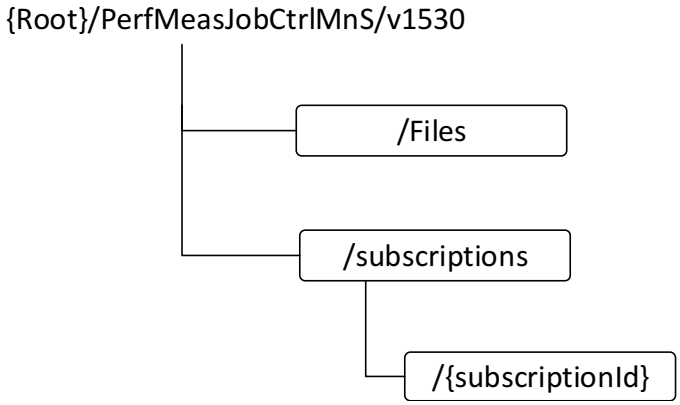


Figure 11.3.1.1.3.1-1: Resource URI structure of the performance data file reporting service

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	

File Content Item	XML schema based XML tag	Description
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.				

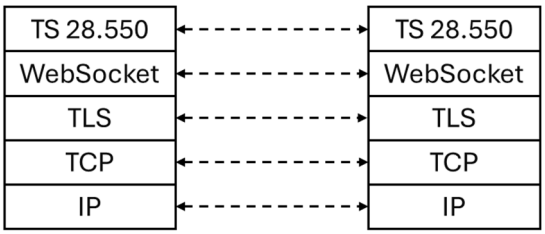


Figure 11.4.1.1.4-1: Protocol stack for streaming performance data reporting

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.

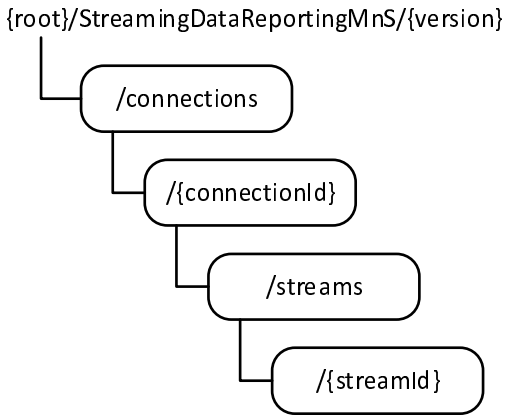


Figure 11.4.1.3.1-1: Resource URI structure of the Streaming data reporting service

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": {
```

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              "$ref": "#/components/schemas/href-QueryType"
            }
          },
          {
            "name": "filter",
            "in": "query",
            "required": false,
            "schema": {
              "$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",
```

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            "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": {
```

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              "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": {
```

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            "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.",
```

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                    "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": {
                          "$ref": "#/components/schemas/error-ResponseType"
                        }
                      }
                    }
                  }
                }
              }
            }
          },
          "notifyChangedAlarmGeneral": {
            "{request.body#/consumerReference}": {
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              "post": {
                "requestBody": {
                  "required": true,
                  "content": {
                    "application/json": {
                      "schema": {
                        "$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": {
            "$ref": "#/components/schemas/systemDN-Type"
          }
        }
      },
      "alarmId-PathType": {
        "type": "string"
      },
      "subscriptionId-PathType": {
        "type": "string"
      },
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"alarmAckState-QueryType": {
  "type": "string",
  "enum": [
    "allAlarms",
    "allActiveAlarms",
    "allActiveAndAcknowledgedAlarms",
    "allActiveAndUnacknowledgedAlarms",
    "allClearedAndUnacknowledgedAlarms",
    "allUnacknowledgedAlarms"
  ]
},
"consumerReferenceId-QueryType": {
  "$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"
      ]
    }
  }
```

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},
"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": {
            "$ref": "#/components/schemas/alarmId-Type"
          },
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          "errorReason": {
            "type": "string"
          }
        }
      }
    }
  }
},
"subscription-ResponseType": {
  "type": "object",
  "properties": {
    "data": {
      "$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": {
          "$ref": "#/components/schemas/trendIndication-Type"
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        "thresholdInfo": {
          "$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": {
          "$ref": "#/components/schemas/additionalText-Type"
        },
        "additionalInformation": {
          "type": "array",
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            "items": {
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            }
          },
          "rootCauseIndicator": {
            "$ref": "#/components/schemas/rootCauseIndicator-Type"
          }
        }
      }
    }
  },
  "notifyNewSecurityAlarm-NotifType": {
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    "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": {
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            }
          },
          "additionalText": {
            "$ref": "#/components/schemas/additionalText-Type"
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          "additionalInformation": {
            "type": "array",
            "items": {
              "$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"
          },
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          "alarmType": {
            "$ref": "#/components/schemas/alarmType-Type"
          },
          "probableCause": {
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          },
          "perceivedSeverity": {
            "$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"
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          "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": {
            "$ref": "#/components/schemas/alarmListAlignmentRequirement-Type"
          }
        }
      }
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      }
    }
  },
  "notifyChangedAlarm-NotifType": {
    "type": "object",
    "properties": {
      "header": {
        "$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": {
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      "header": {
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        "type": "object",
        "properties": {
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          "correlatedNotifications": {
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            "items": {
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            }
          },
          "alarmId": {
            "$ref": "#/components/schemas/alarmId-Type"
          }
        }
      }
    }
  },
  "notifyChangedAlarmGeneral-NotifType": {
    "type": "object",
    "properties": {
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        "$ref": "#/components/schemas/header-Type"
      },
      "body": {
        "type": "object",
        "properties": {
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            "$ref": "#/components/schemas/alarmType-Type"
          },
          "alarmId": {
            "$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": {
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            "items": {
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            }
          },
          "backedUpStatus": {
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          },
          "trendIndication": {
            "$ref": "#/components/schemas/trendIndication-Type"
          },
          "thresholdInfo": {
            "$ref": "#/components/schemas/thresholdInfo-Type"
          },
          "stateChangeDefinition": {
            "type": "array",
            "items": {
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            }
          },
          "monitoredAttributes": {
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            "items": {
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            }
          },
          "proposedRepairActions": {
            "$ref": "#/components/schemas/proposedRepairActions-Type"
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          },
          "additionalText": {
            "$ref": "#/components/schemas/additionalText-Type"
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          "additionalInformation": {
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            "items": {
              "$ref": "#/components/schemas/attributeNameValuePair-Type"
            }
          },
          "changedAlarmAttributes": {
            "type": "array",
            "items": {
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            }
          },
          "backUpObject": {
            "$ref": "#/components/schemas/backUpObject-Type"
          }
        }
      }
    }
  },
  "alarm-ResourceType": {
    "type": "object",
    "properties": {
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        "$ref": "#/components/schemas/header-Type"
      },
      "body": {
        "type": "object",
        "properties": {
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          },
          "alarmId": {
            "$ref": "#/components/schemas/alarmId-Type"
          },
          "alarmRaisedTime": {
            "$ref": "#/components/schemas/dateTime-Type"
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          "alarmChangedTime": {
            "$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"
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            }
          },
          "proposedRepairActions": {
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          "additionalText": {
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          },
          "additionalInformation": {
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            "items": {
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            }
          },
          "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": {
```

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    "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",
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```
      "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

History

Document history		
V15.0.1	October 2018	Publication
V15.1.0	April 2019	Publication
V15.2.0	May 2019	Publication
V15.3.0	October 2019	Publication
V15.4.0	January 2020	Publication
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