**3GPP TSG- Meeting # *d1***

**e-meeting, 4 - 12 April 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network | **X** |

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|  | | | | | | | | | | |
| ***Title:*** | Rel-17 DraftCR 28.622 for MADCOL | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | SA5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | MADCOL | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Stage 2 for management data collection control and discovery need to be added. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Stage 2 for management data collection control and discovery are added. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The WI MADCOL cannot progress. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.2.1, 4.2.2, 4.3.33.1, 4.3.33.2, 4.3.33.3, 4.3.A (new), 4.3.A.1(new), 4.3.A.2 (new), 4.3.A.3 (new), 4.3.A.4 (new), 4.3.B (new), 4.3.B.1(new), 4.3.B.2 (new), 4.3.B.3 (new), 4.3.B.4 (new), 4.3.C (new), 4.3.C.1(new), 4.3.C.2 (new), 4.3.C.3 (new), 4.3.C.4 (new), | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | Baseline DraftCR: None  Considered inputs:   * S5-215364 Rel-17 Input to DraftCR 28.622 Add implicit subscriptions for notifyFileReady to PerfMetricJob (SA5#139) * S5-222633 Rel-17 Input to DraftCR 28.622 Management Data Collection (SA5#142) | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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| **First modification** |

## 4.2 Class diagrams

### 4.2.1 Relationships

This clause depicts the set of classes (e.g. IOCs) that encapsulates the information relevant for this IRP. This clause provides the overview of the relationships of relevant classes in UML. Subsequent clauses provide more detailed specification of various aspects of these classes.

The following figure shows the containment/naming hierarchy and the associations of the classes defined in the present document. See Annex A of a class diagram that combines this figure with Figure 1 of [2], the class diagram of UIM.



NOTE 1: ManagedElement may be contained either

- in a SubNetwork (since *SubNetwork* inherits from *Domain*\_ and *ManagedElement* inherits from *ManagedElement*\_ and *Domain*\_ name-contained *ManagedElement\_* as observed in the figure of Annex A) or

- in a MeContext instance as observed by the above figure or in the figure of Annex A.

This either-or relation cannot be shown by using an {xor} constraint in the above figure.

ManagedElement may also have no parent instance at all.

NOTE 2: Void

NOTE 3: If the configuration contains several instances of SubNetwork, exactly one SubNetwork instance shall directly or indirectly contain all the other SubNetwork instances.

NOTE 4: The SubNetwork instance not contained in any other instance of SubNetwork is referred to as "the root SubNetwork instance".

NOTE 5: ManagementNode shall be contained in the root SubNetwork instance.

NOTE 6: If contained in a SubNetwork instance, MnsAgent shall be contained in the root SubNetwork instance.

NOTE 7: For a clarification on the choice of containment of the IRPAgent (since it has three possible parents), see the definition of MnsAgent.

NOTE 8: The MnsAgent shall be replaced by the IRPAgent in deployments using the IRP framework as defined in TS 32.102 [2].

Figure 4.2.1-1: NRM fragment

Each Managed Object is identified with a Distinguished Name (DN) according to 3GPP TS 32.300 [13] that expresses its containment hierarchy. As an example, the DN of a ManagedElement instance could have a format like:

SubNetwork=Sweden,MeContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1.



NOTE 8: Void

NOTE 9: Void

Figure 4.2.1-2: Vendor specific data container NRM fragment



Figure 4.2.1-3: PM control NRM fragment



Figure 4.2.1-4: Threshold monitoring control NRM fragment



Figure 4.2.1-5: Notification subscription and heartbeat notification control NRM fragment



Figure 4.2.1-6: FM control NRM fragment



Figure 4.2.1-7: Trace control NRM fragment



Figure 4.2.1-8: MnS Registry NRM fragment



Figure 4.2.1-9: File retrieval NRM fragment



Figure 4.2.1-10: File download NRM fragment



Figure 4.2.1-11: ManagementDataCollection control NRM fragment

### 4.2.2 Inheritance

This clause depicts the inheritance relationships.





Figure 4.2.2-1: NRM fragment



Figure 4.2.2-2: PM control NRM fragment



Figure 4.2.2-3: Threshold monitoring control NRM fragment



Figure 4.2.2-4: Notification subscription and heartbeat notification control NRM fragment



Figure 4.2.2-5: FM control NRM fragment



Figure 4.2.2-6: Trace control NRM fragment



Figure 4.2.2-7: MnS Registry NRM fragment



Figure 4.2.2-8: File retrieval NRM fragment



Figure 4.2.1-9: File download NRM fragment



Figure 4.2.2-10: ManagementDataCollection control NRM fragment

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| **Next modification** |

### 4.3.33 ReportingCtrl <<choice>>

#### 4.3.33.1 Definition

This <<choice>> defines the method for reporting collected performance metrics to MnS consumers as well as the parameters for configuring the reporting function. It is a choice between the control parameter required for the reporting methods, whose presence selects the reporting method as follows:

When only the fileReportingPeriod attribute is present (CHOICE\_1), the MnS producer shall store files on the MnS producer at a location selected by the MnS producer and, on condition that an appropriate subscription is in place, inform the MnS consumer about the availability of new files and the file location using the notifyFileReady notification. In case the preparation of a file fails, "notifyFilePreparationError" shall be sent instead.

When the "fileReportingPeriod" and "notificationRecipientAddress" attributes are present (CHOICE\_2), then the MnS producer shall behave like described for the case that only the "fileReportingPeriod" is present. In addition, the MnS producer shall create on behalf of the MnS consumer a subscription, using "NtfSubscriptionControl", for the notification types "notifyMOICreation" and "notifyMOIDeletion" related to the "File" instances that will be produced later.In case an existing subscription does already include the "File" instances to be produced, no new subscription shall be created. The "notificationRecipientAddress" attribute in the created "NtfSubscriptionControl" instance shall be set to the value of the "notificationRecipientAddress" in the related "PerfMetricJob". This feature is called implicit notification subscription, as opposed to the case where the MnS consumer creates the subscription (explicit notification subscription). When the related "PerfMetricJob" is deleted, the "NtfSubscriptionControl" instance created due to the request for implicit subscription shall be deleted as well.

When only the fileReportingPeriod and fileLocation attributes are present (CHOICE\_3), the MnS producer shall store the files on a MnS consumer, that can be any entity such as a file server, at the location specified by fileLocation. No notification is emitted by the MnS producer.

When only the streamTarget attribute is present (CHOICE\_4), the MnS producer shall stream the data to the location specified by streamTarget.

For the file-based reporting methods the fileReportingPeriod attribute specifies the time window during which collected measurements are stored into the same file before the file is closed and a new file is opened.

#### 4.3.33.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | S | isReadable | isWritable | isInvariant | isNotifyable |
| CHOICE\_1.1 fileReportingPeriod | CM | T | T | F | T |
| CHOICE\_2.1 fileReportingPeriod | CM | T | T | F | T |
| CHOICE\_2.2 notificationRecipientAddress | CM | T | T | F | T |
| CHOICE\_3.1 fileReportingPeriod | CM | T | T | F | T |
| CHOICE\_3.2 fileLocation | CM | T | T | F | T |
| CHOICE\_4.1 streamTarget | CM | T | T | F | T |

#### 4.3.33.3 Attribute constraints

|  |  |
| --- | --- |
| Name | Definition |
| CHOICE\_1.1 fileReportingPeriod | This attribute shall be supported, when the MnS producer supports file based reporting and storing files on the MnS producer. |
| CHOICE\_2.1 fileReportingPeriod  CHOICE\_2.2 notificationRecipientAddress | These attributes shall be supported, when the MnS producer supports file based reporting, storing files on the MnS producer and implicit notification subscription. |
| CHOICE\_3.1 fileReportingPeriod  CHOICE\_3.2 fileLocation | These attributes shall be supported, when MnS producer supports file based reporting and storing files on a MnS consumer. |
| CHOICE\_4.1 streamTarget | This attribute shall be supported, when the MnS producer supports stream-based reporting. |

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| **Next modification** |

4.3.A ManagementDataCollection

4.3.A.1 Definition

This IOC represents a management data collection request. The attribute "managementDataType" defines the category of data which shall be reported. This may include coverage, capacity, service experience, trace, mobility, energy efficiency, accessibilityetc. The mapping of exact measurement with the requested category will be done at the producer and is implementation specific.

The "targetNodeFilter" attribute can be used to target object instance(s) producing the required management data. It is assumed that the consumer may not have detail knowledge of the network and hence may not identify the exact object instance producing the required management data. In this case consumer can request management data, specified by 3GPP, produced by certain network function(s) based on a particular location, the domain (CN or RAN) of the network function, and the handled traffic (CP or UP) of the network function.

The MnS producer will derive multiple jobs (PrefMetricJob, Tracejob) from a single ManagementDataCollection job for collecting the required management data. Once it receives the measurement from multiple sources, it consolidate the data into a set of management data for reporting.

The attribute "collectionTimePeriod" specifies the duration for which the management data should be reported.

The attribute "reportingCtrl" specifies the method and associated control parameters for reporting the produced management data to MnS consumers. Three methods are available: file-based reporting with selection of the file location by the MnS producer, file-based reporting with selection of the file location by the MnS consumer and stream-based reporting.

The attribute "dataScope" configures, whether the management data should be reported per S-NSSAI or per 5QI, if applicable.

4.3.A.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute Name** | **S** | **isReadable** | **isWritable** | **isInvariant** | **isNotifyable** |
| managementDataType | M | T | T | T | N/A |
| targetNodeFilter | M | T | T | T | N/A |
| collectionTimePeriod | M | T | T | T | N/A |
| reportingCtrl | M | T | T | T | N/A |
| dataScope | O | T | T | T | N/A |

4.3.A.3 Attribute constraints

None.

4.3.A.4 Notifications

The common notifications defined in clause 4.5 are valid for this IOC. In addition, the following set of notifications is also valid.

| **Name** | **S** | **Notes** |
| --- | --- | --- |
| notifyFileReady | M | -- |
| notifyFilePreparationError | M | -- |

4.3.B CollectionDuration <<dataType>>

4.3.B.1 Definition

This data type defines a collection time duration for which the management data should be reported.

*Editor’s Note: Whether to move the definition of this datatype to common definitions if FFS.*

4.3.B.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **S** | **isReadable** | **isWritable** | **isInvariant** | **isNotifyable** |
| startTime | M | T | T | T | T |
| endTime | M | T | T | T | T |

4.3.B.3 Attribute constraints

None.

4.3.B.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

4.3.C NodeFilter <<dataType>>

4.3.C.1 Definition

This data type defines several selection criteria for the target node i.e the node producing the requested management data.

The attribute "networkDomain" is used to select target object based in domain. Managed objects from a particular domain (e.g RAN, CN) will be considered as target managed objects. Meaning objects which name contain or are associated to a managed object of that domain, shall be considered as target managed object as well.

The attribute "cpUpType" is used to select the target object based on traffic type. Managed objects catering particular traffic type (CP, UP) will be considered as target managed objects. Meaning objects which name contain or are associated to a managed object of that traffic type, shall be considered as target managed object as well.

The attribute "sst" is used to select the target object based on SST (Slice/Service Type)[22]. Managed objects related to particular SST will be considered as target managed objects.

Note: If it is not possible to select the target node(s) (based on a particular selection criteria) deterministically, the selection criteria should not be used.

4.3.C.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **S** | **isReadable** | **isWritable** | **isInvariant** | **isNotifyable** |
| areaOfInterest | O | T | T | T | N/A |
| networkDomain | O | T | T | T | N/A |
| cpUpType | O | T | T | T | N/A |
| sst | O | T | T | T | N/A |

4.3.C.3 Attribute constraints

None.

4.3.C.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

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| **Next modification** |

## 4.4 Attribute definitions

### 4.4.1 Attribute properties

The following table defines the properties of attributes specified in the present document.

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| numberOfFiles | Number of files in a file collection.  allowedValues: NA | Type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| fileLocation | Location of the file incl. the file transfer protocol, and the file name for the case the file content cannot be retrieved by reading the "fileContent" attribute.  The allowed file transfer protocols are:  - sftp  - ftpes  - https  Examples:  "sftp://companyA.com/datastore/fileName.xml",  "https://companyA.com/ManagedElement=1/Files=1/File=1  allowedValues: NA | Type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| fileCompression | Name of the algorithm used for compressing the file. An empty or absent "fileCompression" parameter indicates the file is not compressed. The MnS producer selects the compression algorithm. It is encouraged to use popular algorithms such as GZIP.  allowedValues: N/A | Type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| fileSize | Size of the file.  Unit is byte.  allowedValues: non-negative integers | Type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| fileDataType | Type of the management data stored in the file.  AllowedValues:  - "PERFORMANCE"  - "TRACE"  - "ANALYTICS"  - "PROPRIETARY"  The value "PERFORMANCE" refers to measurements and KPIs. | Type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| fileFormat | Identifier of the XML or ASN.1 schema (incl. its version) used to produce the file content.  allowedValues: N/A | Type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| fileReadyTime | Date and time, when the file was closed (the last time) and made available on the MnS producer. The file content will not be changed anymore.  allowedValues: N/A | Type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| fileExpirationTime | Date and time after which the file may be deleted.  allowedValues: N/A | Type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| fileContent | File content.  allowedValues: N/A | Type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| jobMonitor | Provides monitoring for the file download job. The data type of this attribute is the "ProcessMonitor" as defined in clause 4.3.43 with the specialisations defined in clause 4.3.44.1.  allowedValues: N/A | Type: JobMonitor  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| cancelJob | Setting this attribute to "TRUE" cancels the file download job. As specified in the definition of "ProcessMonitor", cancellation is possible in the "NOT\_STARTED" and "RUNNING" state. Setting the attribute to "FALSE" has no observable result.  allowedValues: TRUE, FALSE | Type: ENUM  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: FALSE  isNullable: False |
| FileDownloadJob.jobMonitor.resultStateInfo | Provides the following specialisation for the "resultStateInfo" attribute of the "ProcessMonitor" data type for the "FileDownloadJob".  In the event the file download fails, and the "status" is equal to "FAILED", it provides the reason for the failure.  allowedValues for "status" = "FAILED":  - NULL  - UNKNOWN  - NO\_STORAGE  - LOW\_MEMORY  - NO\_CONNECTION\_TO\_REMOTE\_SERVER  - FILE\_NOT\_AVAILABLE  - DNS\_CANNOT\_BE\_RESOLVED  - TIMER\_EXPIRED  - OTHER  The allowed values for "FINISHED" or "CANCELLED" are vendor specific. | Type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| heartbeatNtfPeriod | Periodicity of the heartbeat notification emission. The value of zero has the special meaning of stopping the heartbeat notification emission.  Unit is in seconds.  AllowedValues: non-negative integers | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: 0  isNullable: False |
| triggerHeartbeatNtf | Setting this attribute to TRUE triggers an immediate additional heartbeat notification emission. Setting the value to FALSE has no observable result.  The periodicity of notifyHeartbeat emission is not changed.  AllowedValues: TRUE, FALSE | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: FALSE  isNullable: False |
| notificationRecipientAddress | Address of the notification recipient.  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| notificationTypes | Notification types of notifications that are candidates for being forwarding to the notification recipient. If this attribute is absent, notifications of all types are candidates for being forwarding to the notification recipient.  If the notificationFilter attribute is absent, all candidate notifications are forwarded to the notification recipient, otherwise the candidate notifications are discriminated by the filter specified by the notificationFilter attribute.  Below is a list of notificationType values that are defined in 3GPP specifications. If the notificationType itself is supported by the system, it shall be supported in the NtfSubscriptionControl.notificationTypes attribute as well. Other notificationTypes defined by SDOs or enterprises may also be supported.  AllowedValues:  - notifyMOICreation  - notifyMOIDeletion  - notifyMOIAttributeValueChanges  - notifyMOIChanges  - notifyEvent  - notifyNewAlarm  - notifyChangedAlarm  - notifyAckStateChanged  - notifyComments  - notifyCorrelatedNotificationChanged  - notifyChangedAlarmGeneral  - notifyClearedAlarm  - notifyAlarmListRebuilt  - notifyPotentialFaultyAlarmList  - notifyFileReady  - notifyFilePreparationError  - notifyThresholdCrossing | type: ENUM  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| notificationFilter | Filter to be applied to candidate notifications identified by the notificationTypes attribute. Only notifications that pass the filter criteria are forwarded to the notification recipient. All other notifications are discarded.  The filter can be applied to any field of a notification.  allowedValues: N/A | type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| scope | Scopes the managed object instances included in the notification subscription. If this attribute is absent, all objects below and including the base object are scoped.  allowedValues: N/A | type: Scope  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| scopeType | If the optional scopeLevel attribute is not supported or absent, allowed values of scopeType are BASE\_ONLY and BASE\_ALL.  The value BASE\_ONLY indicates only the base object is selected.  The value BASE\_ALL indicates the base object and all of its subordinate objects (incl. the leaf objects) are selected.  If the scopeLevel attribute is supported and present, allowed values of scopeType are BASE\_NTH\_LEVEL and BASE\_SUBTREE.  The value BASE\_NTH\_LEVEL indicates all objects on the level, which is specified by the scopeLevel attribute, below the base object are selected. The base object is at scopeLevel zero.  The value BASE\_SUBTREE indicates the base object and all subordinate objects down to and including the objects on the level, which is specified by the scopeLevel attribute, are selected. The base object is at scopeLevel zero.  allowedValues: N/A | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| scopeLevel | See definition of scopeType attribute.  allowedValues: N/A | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| farEndEntity | The value of this attribute shall be the Distinguished Name of the far end network entity to which the reference point is related.  As an example, with EP\_Iucs, if the instance of EP\_Iucs is contained by one RncFunction instance, the farEndEntity is the Distinguished Name of the MscServerFunction instance to which this Iucs reference point is related.  allowedValues: N/A | type: DN  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| linkType | This attribute defines the type of the link.  allowedValues: Signalling, Bearer, OAM&P, Other or multiple combinations of this type. | type: String  multiplicity: 0..\*  isOrdered: False  isUnique: True  defaultValue: No  isNullable: False |
| locationName | The physical location of this entity (e.g. an address).  allowedValues: N/A | type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| monitorGranularityPeriod | Granularity period used to monitor measurements for threshold crossings. The period is defined in seconds.  See Note 5  allowedValues: Integer with a minimum value of 1 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| monitorGranularityPeriods | Granularity periods supported for the monitoring of associated measurement types for thresholds. The period is defined in seconds.  allowedValues: Integer with a minimum value of 1 | type: Integer  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| thresholdInfoList | List of threshold infos. | type: ThresholdInfo  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| thresholdValue | Value against which the monitored performance metric is compared at a threshold level in case the hysteresis is zero.  allowedValues: float or integer | type: Union  multiplicity: 1  isOrdered: NA  isUnique: NA  defaultValue: None  isNullable: False |
| hysteresis | Hysteresis of a threshold. If this attribute is present the monitored performance metric is not compared against the threshold value as specified by the thresholdValue attribute but against a high and low threshold value given by  highThresholdValue- = thresholdValue + hysteresis  lowThresholdValue = thresholdValue - hysteresis  When going up, the threshold is triggered when the performance metric reaches or crosses the high threshold value. When going down, the threshold is triggered when the performance metric reaches or crosses the low threshold value.  A hysteresis may be present only when the monitored performance metric is not of type counter that can go up only. If present for a performance metric of type counter, it shall be ignored.  allowedValues: non-negative float or integer | type: Union  multiplicity: 0..1  isOrdered: NA  isUnique: NA  defaultValue: None  isNullable: False |
| thresholdDirection | Direction of a threshold indicating the direction for which a threshold crossing triggers a threshold.  When the threshold direction is configured to "UP", the associated treshold is triggered only when the performance metric value is going up upon reaching or crossing the threshold value. The treshold is not triggered, when the performance metric is going down upon reaching or crossing the threshold value.  Vice versa, when the threshold direction is configured to "DOWN", the associated treshold is triggered only when the performance metric is going down upon reaching or crossing the threshold value. The treshold is not triggered, when the performance metric is going up upon reaching or crossing the threshold value.  When the threshold direction is set to "UP\_AND\_DOWN" the treshold is active in both direcions.  In case a threshold with hysteresis is configured, the threshold direction attribute shall be set to "UP\_AND\_DOWN".  allowedValues:  - UP  - DOWN  - UP\_AND\_DOWN | type: ENUM  multiplicity: 1  isOrdered: NA  isUnique: NA  defaultValue: None  isNullable: False |
| objectClass | Class of a managed object instance.  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| objectInstance | Managed object instance identified by its DN.  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| objectInstances | List of managed object instances. Each object instance is identified by its DN.  allowedValues: N/A | type: Dn  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| peeParametersList | This attribute contains the parameter list for the control and monitoring of power, energy and environmental parameters of ManagedFunction instance(s). This list contains the following parameters:  - siteIdentification  - siteLatitude (optional)  - siteLongitude (optional)  - siteAltitude (optional)  - siteDescription  - equipmentType  - environmentType  - powerInterface  siteIdentification: The identification of the site where the ManagedFunction resides.  allowedValues: N/A  siteLatitude: The latitude of the site where the ManagedFunction instance resides, based on World Geodetic System (1984 version) global reference frame (WGS 84). Positive values correspond to the northern hemisphere. This attribute is optional for BTSFunction, RNCFunction , GNBDUFunction and NRSectorCarrier instance(s).  allowedValues: -90.0000 to +90.0000  siteLongitude: The longitude of the site where the ManagedFunction instance resides, based on World Geodetic System (1984 version) global reference frame (WGS 84). Positive values correspond to degrees east of 0 degrees longitude. This attribute is optional for BTSFunction, RNCFunction, GNBDUFunction and NRSectorCarrier instance(s).  allowedValues: -180.0000 to +180.0000  siteAltitude: The altitude of the site where the ManagedFunction instance resides, in unit of meter. This attribute is optional for BTSFunction, RNCFunction, GNBDUFunction and NRSectorCarrier instance(s).  siteDescription: An operator defined description of the site where the ManagedFunction instance resides.  allowedValues: N/A  equipmentType: The type of equipment where the managedFunction instance resides.  allowedValues: see clause 4.4.1 of ETSI ES 202 336-12 [18].  environmentType: The type of environment where the managedFunction instance resides.  allowedValues: see clause 4.4.1 of ETSI ES 202 336-12 [18].  powerInterface: The type of power.  allowedValues: see clause 4.4.1 of ETSI ES 202 336-12 [18]. | type: String  multiplicity: 0..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: True |
| priorityLabel | This is a label that consumer would assign a value on a concrete instance of the managed object. The management system takes the value of this attribute into account. The effect of this attribute value to the subject managed entity is not standardized | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| protocolVersion | Versions(s) and additional descriptive information for the protocol(s) used for the associated communication link. Syntax and semantic is not specified.  allowedValues: N/A | type: String  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| setOfMcc | Set of Mobile Country Code (MCC). The MCC uniquely identifies the country of domicile of the mobile subscriber. MCC is part of the IMSI (TS 23.003 [5])  This list contains all the MCC values in subordinate object instances to this SubNetwork instance.  allowedValues: See clause 2.3 of TS 23.003 [5] for MCC allocation principles. | type: Integer  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: No default value  isNullable: False |
| swVersion | The software version of the ManagementNode or ManagedElement (this is used for determining which version of the vendor specific information is valid for the ManagementNode or ManagedElement).  allowedValues: N/A | type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| systemDN | Distinguished Name (DN) of a IRPAgent or a MnSAgent.  allowedValues: N/A | type: DN  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| userDefinedState | An operator defined state for operator specific usage.  allowedValues: N/A | type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| userLabel | A user-friendly (and user assignable) name of this object.  allowedValues: N/A | type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| vendorName | The name of the vendor.  allowedValues: N/A | type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| vnfParametersList | This attribute contains the parameter set of the VNF instance(s) corresponding to an NE. Each entry in the list contains:  - vnfInstanceId  - vnfdId (optional)  - flavourId (optional)  - autoScalable (optional)  vnfInstanceId: VNF instance identifier (vnfInstanceId, see section 9.4.2 of [16] and section B2.4.2.1.2.3 of [17]).  See Note 1.  vnfdId: Identifier of the VNFD on which the VNF instance is based, see section 9.4.2 of [16]. This attribute is optional.  Note: the value of this attribute is identical to that of the same attribute in clause 9.4.2 of ETSI GS NFV-IFA 008 [16].  flavourId: Identifier of the VNF Deployment Flavour applied to this VNF instance, see section 9.4.3 of [16]. This attribute is optional.  Note: the value of this attribute is identical to that of the same attribute in clause 9.4.3 of ETSI GS NFV-IFA 008 [16].  autoScalable: Indicator of whether the auto-scaling of this VNF instance is enabled or disabled. The type is Boolean.  This attribute is optional.  See Note2.  The presence of this attribute indicates that the ManagedFunction represented by the MOI is a virtualized function.  See Note 3.  allowedValues: N/A  A string length of zero for vnfInstanceId means the VNF instance(s) corresponding to the MOI does not exist (e.g. has not been instantiated yet, has already been terminated). | type: String  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: True |
| vsData | Vendor specific attributes of the type vsDataType. The attribute definitions including constraints (value ranges, data types, etc.) are specified in a vendor specific data format file.  allowedValues: -- | type: --  multiplicity: --  isOrdered: --  isUnique: --  defaultValue: --  isNullable: False |
| vsDataFormatVersion | Name of the data format file, including version.  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| vsDataType | Type of vendor specific data contained by this instance, e.g. relation specific algorithm parameters, cell specific parameters for power control or re-selection or a timer. The type itself is also vendor specific.  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| supportedPerfMetricGroups | A set of performance metric groups. When this attribute is contained in a managed object it may define performance metrics for this object and all descendant objects.  allowedValues: N/A | type: SupportedPerfMetricGroup  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  allowedValues: N/A  isNullable: False |
| performanceMetrics | List of performance metrics.  Performance metrics include measurements defined in TS 28.552 [20] and KPIs defined in TS 28.554 [28]. Performance metrics can also be specified by other SDOs, or be vendor specific. Performance metrics are identified with their names.  For measurements defined in TS 28.552 [20] the name is constructed as follows:  - "family.measurementName.subcounter" for measurement types with subcounters  - "family.measurementName" for measurement types without subcounters  - "family" for measurement families  For KPIs defined in TS 28.554 [28] the name is defined in the KPI definitions template as the component designated with e).  A name can also identify a vendor specific performance metric or a group of vendor specific performance metrics.  allowedValues: N/A | type: String  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| rootObjectInstances | List of object instances. Each object instance is identified by its DN and designates the root of a subtree that contains the root object and all descendant objects. | type: Dn  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| reportingMethods | List of reporting methods for performance metrics  allowedValues:  - "FILE\_BASED\_LOC\_SET\_BY\_PRODUCER",  - "FILE\_BASED\_LOC\_SET\_BY\_CONSUMER",  - "STREAM\_BASED" | type: ENUM  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| nFServiceType | The parameter defines the type of the managed NF service instance  allowedValues: See clause 7.2 of TS 23.501[22] | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| operations | This parameter defines set of operations supported by the managed NF service instance.  allowedValues: See TS 23.502[23] for supporting operations | type: Operation  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: No default value  isNullable: False |
| Operation.name | This parameter defines the name of the operation of the managed NF service instance.  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: False  isUnique: False  defaultValue: None  isNullable: True |
| allowedNFTypes | This parameter identifies the type of network functions allowed to access the operation of the managed NF service instance.  allowedValues: See TS 23.501[22] for NF types | type: ENUM  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| operationSemantics | This paramerter identifies the semantics type of the operation. See TS 23.502[23]  allowedValues: “Request/Response”, “Subscribe/Notify”. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| sAP | This parameter specifies the service access point of the managed NF service instance.  allowedValues: N/A | type: SAP  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| host | This parameter specifies the host address of the managed NF service instance. It can be FQDN (See TS 23.003 [5]) or an IPv4 address (See RFC 791 [24]) or an IPv6 address (See RFC 2373 [25]).  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: False  isUnique: N/A  defaultValue: None  isNullable: False |
| port | This parameter specifies the transport port of the managed NF service instance.  allowedValues: 1 - 65535 | type: Integer  multiplicity: 1  isOrdered: False  isUnique: False  defaultValue: None  isNullable: False |
| usageState | Usage state of a managed object instance. It describes whether the resource is actively in use at a specific instant, and if so, whether or not it has spare capacity for additional users at that instant.  allowedValues: "IDLE", "ACTIVE", "BUSY".  The meaning of these values is as defined in 3GPP TS 28.625 [21] and ITU-T X.731 [19]. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| registrationState | This parameter defines the registration status of the managed NF service instance.  allowedValues: "Registered", "Deregistered". | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: Deregistered  isNullable: False |
| jobRef | Object instance of the "PerfMetricJob" or "TraceJob" that produced the file.  allowedValues: NA | Type: Dn  multiplicity: 0..\*  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| jobId | Identifier of a PerfMetricJob job or a TraceJob. | type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| granularityPeriod | Granularity period used to produce measurements. The period is defined in seconds.  See Note 4.  allowedValues: Integer with a minimum value of 1 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| granularityPeriods | Granularity periods supported for the production of associated measurement types. The period is defined in seconds.  allowedValues: Integer with a minimum value of 1 | type: Integer  multiplicity: \*  isOrdered: False  isUnique:  defaultValue: None  isNullable: False |
| reportingCtrl | Selecting the reporting method and defining associated control parameters. | type: ReportingCtrl  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| fileReportingPeriod | For the file-based reporting method this is the time window during which collected measurements are stored into the same file before the file is closed and a new file is opened. The period is defined in minutes.  allowedValues: Multiples of granularityPeriod | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| linkToCreatsSubscriptions | Link to the parent object below which "NtfSubscriptionControl" instances can be created. | type: Link  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| \_linkToFiles | Link to a "Files" object.  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| fileLocation | The location of a file.  allowedValues: File URI [See RFC 8089 [49]). | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| streamTarget | The stream target for the stream-based reporting method.  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| administrativeState | Administrative state of a managed object instance. The administrative state describes the permission to use or prohibition against using the object instance. The adminstrative state is set by the MnS consumer.  allowedValues: LOCKED, UNLOCKED. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: LOCKED  isNullable: False |
| operationalState | Operational state of manged object instance. The operational state describes if an object instance is operable ("ENABLED") or inoperable ("DISABLED"). This state is set by the object instance or the MnS producer and is hence READ-ONLY.  allowedValues: ENABLED, DISABLED. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: DISABLED  isNullable: False |
| alarmRecords | List of alarm records  allowedValues: N/A | type: AlarmRecord  multiplicity: \*  isOrdered: N/A  isUnique: True  default value: None  isNullable: True |
| numOfAlarmRecords | Number of alarm records in the AlarmList.  allowedValues: 0 to x where x is vendor specific. | type: integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| lastModification | Time an alarm record was modified the last time  allowedValues: N/A | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| tjJobType | It specifies the MDT mode and it specifies also whether the TraceJob represents only MDT, Logged MBSFN MDT, Trace or a combined Trace and MDT job. The attribute is applicable for Trace, MDT, RCEF and RLF reporting.  See the clause 5.9a of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: TRACE\_ONLY  isNullable: False |
| tjListOfInterfaces | It specifies the interfaces that need to be traced.The attribute is applicable only for Trace. In case this attribute is not used, it carries a null semantic.  See the clause 5.5 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjListOfNeTypes | It specifies the network element types where the trace should be activated. The attribute is applicable only for Trace with Signalling Based Trace activation. In case this attribute is not used, it carries a null semantic.  See the clause 5.4 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjPLMNTarget | It specifies which PLMN that the subscriber of the session to be recorded uses as selected PLMN. PLMN Target might differ from the PLMN specified in the Trace Reference.  See the clause 5.9b of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: PlmnId  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: No  isNullable: True |
| tjStreamingTraceConsumerURI | It specifies the Uniform Resource Identifier (URI) of the Streaming Trace data reporting MnS consumer (a.k.a. streaming target).  See the clause 5.9 c of TS 32.422 [30] for additional details on the allowed values. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjTraceCollectionEntityAddress | It specifies the address of the Trace Collection Entity when the attribute tjTraceReportingFormat is configured for the file-based reporting. The attribute is applicable for both Trace and MDT.  See the clause 5.9 of TS 32.422 [30] for additional details on the allowed values. | type: IpAddress  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjTraceDepth | It specifies the trace depth. The attribute is applicable only for Trace. In case this attribute is not used, it carries a null semantic.  See the clause 5.3 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: MAXIMUM  isNullable: True |
| tjTraceReference | A globally unique identifier, which uniquely identifies the Trace Session that is created by the TraceJob.  In case of shared network, it is the MCC and  MNC of the Participating Operator that request the trace session that shall be provided.  The attribute is applicable for both Trace and MDT.  See the clause 5.6 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: TraceReference  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| tjTraceRecordSessionReference | An identifier, which identifies the Trace Recording Session.  The attribute is applicable for both Trace and MDT.  See the clause 5.7 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| tjTraceReportingFormat | It specifies the trace reporting format - streaming trace reporting or file-based trace reporting.  See the clause 5.11 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: FILE  isNullable: False |
| tjTraceTarget | It specifies the target object of the Trace and MDT. The attribute is applicable for both Trace and MDT. This attribute includes the ID type of the target as an enumeration and the ID value(s).  The tjTraceTarget shall be "PUBLIC\_ID" in case of a Management Based Activation is done to an SCSCFFunction (Serving Call Session Control Function) or PCSCFFunction (Proxy Call Session Control Function) (TS 28.705[44]). The tjTraceTarget shall be "UTRAN\_CELL" only in case of the UTRAN cell traffic trace function.  The tjTraceTarget shall be "E-UTRAN\_CELL" only in case of E-UTRAN cell traffic trace function.  The tjTraceTarget shall be "NG-RAN\_CELL" only in case of NR cell traffic trace function.  The tjTraceTarget shall be either "IMSI", "IMEI" or "IMEISV" if the Trace Session is activated to any of the following ManagedEntity(ies):  - HSSFunction (Home Subscriber Server) (TS 28.705 [44])  - MscServerFunction (Mobile Switching Centre Server) (TS 28.702 [45])  - SgsnFunction (Serving GPRS Support Node) (TS 28.702[45])  - GgsnFunction (Gateway GPRS Support Node) (TS 28.702[45])  - BmscFunction (Broadcast Multicast Service Centre) (TS 28.702[45])  - RncFunction (Radio Network Controller) (TS 28.652[46])  - MmeFunction (Mobility Management Entity) (TS 28.708[47])  - ServingGWFunction (Serving Gateway) (TS 28.708[47])  - PGWFunction (PDN Gateway) (TS 28.708[47]).  The tjTraceTarget shall be either “SUPI” or “IMEISV” if the Trace Session is activated to any of the following ManagedEntity(ies) (TS 28.541[48]):  - AFFunction  - AMFFunction  - AUSFunction  - NEFFunction  - NRFFunction  - NSSFFunction  - PCFFunction  - SMFFunction  - UPFFunction  - UDMFunction  In case of signalling based MDT, the tjTraceTarget attribute shall be able to carry "PUBLIC\_ID", "IMSI", "IMEI", "IMEISV)" or "SUPI".  In case of management based Immediate MDT, the tjTraceTarget attribute shall be null value.  In case of management based Logged MDT, the tjTraceTarget attribute shall carry an "eNB" or a "gNB" or an "RNC". The Logged MDT should be initiated on the specified eNB/gNB/RNC in tjTraceTarget.  In case of RLF reporting, or RCEF reporting, the tjTraceTarget attribute shall be null value. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjTriggeringEvent | It specifies the triggering event parameter of the trace session. The attribute is applicable only for Trace. In case this attribute is not used, it carries a null semantic.  See the clause 5.1 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTAnonymizationOfData | It specifies the level of anonymization for management based MDT.  See the clause 5.10.12 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: NO\_IDENTITY  isNullable: True |
| tjMDTAreaConfigurationForNeighCell | It specifies the area for which UE is requested to perform measurement logging for neighbour cells which have list of frequencies. If it is not configured, the UE shall perform measurement logging for all the neighbour cells.  Applicable only to NR Logged MDT.  See the clause 5.10.26 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: AreaConfig  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTAreaScope | It specifies MDT area scope when activates an MDT job.  For RLF and RCEF reporting it specifies the eNB/gNB or list of eNBs/gNBs where the RLF or RCEF reports should be collected.  List of cells/TA/LA/RA for signalling based MDT or management based Logged MDT.  List of cells for management based Immediate MDT.  Cell, TA, LA, RA are mutually exclusive.  One or list of eNBs/gNBs for RLF and RCEF reporting  See the clause 5.10.2 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: AreaScope  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTCollectionPeriodRrmLte | It specifies the collection period for collecting RRM configured measurement samples for M3 in LTE. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.20 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTCollectionPeriodRrmUmts | It specifies the collection period for collecting RRM configured measurement samples for M3, M4, M5 in UMTS. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.21 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTEventListForTriggeredMeasurement | It specifies event types for event triggered measurement in the case of logged NR MDT. Each trace session may configure at most one event. The UE shall perform logging of measurements only upon certain condition being fulfilled:  - Out of coverage.  - A2 event.  See the clause 5.10.28 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTEventThreshold | It specifies the threshold which should trigger  the reporting in case A2 event reporting in LTE and NR or 1F/1l event in UMTS. The attribute is applicable only for Immediate MDT and when tjMDTReportingTrigger is configured for A2 event in LTE and NR or 1F event or 1l event in UMTS. In case this attribute is not used, it carries a null semantic.  See the clauses 5.10.7 and 5.10.7a of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTListOfMeasurements | It specifies the UE measurements that shall be collected in an Immediate MDT job. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.3 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTLoggingDuration | It specifies how long the MDT configuration is valid at the UE in case of Logged MDT. The attribute is applicable only for Logged MDT and Logged MBSFN MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.9 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTLoggingInterval | It specifies the periodicty for Logged MDT. The attribute is applicable only for Logged MDT and Logged MBSFN MDT. In case this attribute is not Sused, it carries a null semantic.  See the clause 5.10.8 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTLoggingEventThreshold | It specifies the threshold which should trigger  the reporting in case of event based reporting of logged NR MDT. The attribute is applicable only for Logged MDT and when tjMDTReportType is configured for event triggered reporting and when tjMDTEventListForTriggeredMeasurement is configured for L1 event. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.36 of TS 32.422 [30] for additional details on the allowed values. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTLoggedHysteresis | It specifies the hysteresis used within the entry and leave condition of the L1 event based reporting of logged NR MDT. The attribute is applicable only for Logged MDT, when tjMDTReportType is configured for event triggered reporting and when tjMDTEventListForTriggeredMeasurement is configured for L1 event. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.37 of TS 32.422 [30] for additional details on the allowed values. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTLoggedTimeToTrigger | It specifies the threshold which should trigger  the reporting in case of event based reporting of logged NR MDT. The attribute is applicable only for Logged MDT, when tjMDTReportType is configured for event triggered reporting and when tjMDTEventListForTriggeredMeasurement is configured for L1 event. In case this attribute is not used, it carries a null semantic.  See the clauses 5.10.38 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTMBSFNAreaList | The MBSFN Area consists of a MBSFN Area ID and Carrier Frequency (EARFCN). The target MBSFN area List can have up to 8 entries. This parameter is applicable only if the job type is Logged MBSFN MDT.  See the clause 5.10.25 of TS 32.422 [30] for additional details on the allowed values. | type: MbsfnArea  multiplicity: 1..8  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTMeasurementPeriodLTE | It specifies the collection period for the Data Volume (M4) and Scheduled IP throughput measurements (M5) for LTE MDT taken by the eNB. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.23 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTCollectionPeriodM6Lte | It specifies the collection period for the Packet Delay measurement (M6) for MDT taken by the eNB. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.32 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTCollectionPeriodM7Lte | It specifies the collection period for the Packet Loss Rate measurement (M7) for LTE MDT taken by the eNB. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.33 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTMeasurementPeriodUMTS | It specifies the collection period for the Data Volume (M6) and Throughput measurements (M7) for UMTS MDT taken by RNC. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.22 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTCollectionPeriodRrmNR | It specifies the collection period for collecting RRM configured measurement samples for M4, M5 in NR. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.30 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTCollectionPeriodM6NR | It specifies the collection period for the Packet Delay measurement (M6) for NR MDT taken by the gNB. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.34 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTCollectionPeriodM7NR | It specifies the collection period for the Packet Loss Rate measurement (M7) for NR MDT taken by the gNB. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.35 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTBeamLevelMeasurement | This indicates whether the NR M1 beam level measurements shall be included or not.  See the clause 5.10.40 of TS 32.422 [30] for additional details.  The default value is "FALSE".  allowedValues: TRUE, FALSE | type: Boolean  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: FALSE  isNullable: False |
| tjMDTM4ThresholdUmts | It specifies the threshold which should trigger  the reporting in case of event-triggered periodic reporting for M4 (UE power headroom measurement) in UMTS. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.39 of TS 32.422 [30] for additional details on the allowed values. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTMeasurementQuantity | It specifies the measurements that are collected in an MDT job for a UMTS MDT configured for event triggered reporting.  See the clause 5.10.15 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTPLMNList | It indicates the PLMNs where measurement collection, status indication and log reporting are allowed.  See the clause 5.10.24 of TS 32.422 [30] for additional details on the allowed values. | type: PlmnId  multiplicity: 1..16  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTPositioningMethod | It specifies what positioning method should be used in the MDT job.  See the clause 5.10.19 of TS 32.422 [30] for additional details on the allowed values. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTReportAmount | It specifies the number of measurement reports that shall be taken for periodic reporting while the UE is in connected. The attribute is applicable only for Immediate MDT and when tjMDTReportingTrigger is configured for periodical measurements. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.6 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTReportingTrigger | It specifies whether periodic or event based measurements should be collected. The attribute is applicable only for Immediate MDT and when the tjMDTListOfMeasurements is configured for M1 (for UMTS, LTE and NR) or M2 (only for UMTS). In case this attribute is not used, it carries a null semantic.  See the clause 5.10.4 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTReportInterval | It specifies the interval between the periodical measurements that shall be taken when the UE is in connected mode. The attribute is applicable only for Immediate MDT and when tjMDTReportingTrigger is configured for periodical measurements. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.5 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTReportType | It specifies report type for logged NR MDT as:  - periodical.  - event triggered.  See the clause 5.10.27 of TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTSensorInformation | It specifies which sensor information shall be included in logged NR MDT and immediate NR MDT measurement if they are available. The following sensor measurement can be included or excluded for the UE:  - Barometric pressure.  - UE speed.  - UE orientation.  See the clause 5.10.29 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| tjMDTTraceCollectionEntityID | It specifies the TCE Id which is sent to the UE in Logged MDT.  See the clause 5.10.11 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| mcc | Mobile Country Code  allowedValues: As defined by the data type | type: Mcc  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No value  isNullable: False |
| mnc | Mobile Network  allowedValues: As defined by the data type | type: Mnc  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No value  isNullable: False |
| traceId | An identifier, which identifies the Trace (together with MCC and MNC). This is a 3 byte Octet String.  See the clause 5.6 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No value  isNullable: False |
| freqInfo | It specifies the carrier frequency and bands used in a cell. | type: FreqInfo  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No value  isNullable: False |
| arfcn | RF Reference Frequency as defined in TS 38.104 [35], clause 5.4.2.1. The frequency provided identifies the absolute frequency position of the reference resource block (Common RB 0) of the carrier. Its lowest subcarrier is also known as Point A.  allowedValues: 0, 1, …,3279165 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No value  isNullable: False |
| freqBands | List of NR frequency operating bands. Primary NR Operating Band as defined in TS 38.104 [35], clause 5.4.2.3.  The value 1 corresponds to n1, value 2 corresponds to NR operating band n2, etc.  allowedValues: 1, 2, …,1024 | type: Integer  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No value  isNullable: False |
| pciList | List of neighbour cells subject for MDT scope.  allowedValues: 0, 1, …,1007 | type: Integer  multiplicity: 1..32  isOrdered: N/A  isUnique: N/A  defaultValue: No value  isNullable: False |
| tac | Tracking Area Code  allowedValues: As defined by the data type | type: Tac  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No value  isNullable: False |
| eutraCellIdList | List of E-UTRAN cells identified by E-UTRAN-CGI  allowedValues: As defined by the data type | type: EutraCellId  multiplicity: 1..32  isOrdered: False  isUnique: True  defaultValue: No value  isNullable: False |
| nrCellIdList | List of NR cells identified by NG-RAN CGI  allowedValues: As defined by the data type | type: NrCellId  multiplicity: 1..32  isOrdered: False  isUnique: True  defaultValue: No value  isNullable: False |
| tacList | Tracking Area Code list  allowedValues: As defined by the data type | type: Tac  multiplicity: 1..8  isOrdered: False  isUnique: True  defaultValue: No value  isNullable: False |
| taiList | Tracking Area Identity list  allowedValues: As defined by the data type | type: Tai  multiplicity: 1..8  isOrdered: False  isUnique: True  defaultValue: No value  isNullable: False |
| mbsfnAreaId | MBSFN Area Identifier  AllowedValues: 1, 2, … | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No value  isNullable: False |
| earfcn | Carrier Frequency  AllowedValues: 1, 2, … | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No value  isNullable: False |
| mnsLabel | Human-readable name of management service. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| mnsType | Type of management service.  allowedValues: ProvMnS, FaultSupervisionMnS, StreamingDataReportingMnS, FileDataReportingMnS | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| mnsVersion | Version of management service. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| mnsAddress | Addressing information for Management Service operations. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| ProcessMonitor.id | Id of the process. It is unique within a single multivalue attribute of type ProcessMonitor. | Type: String  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| ProcessMonitor.status | This attribute represents the status of the associated process, whether it fails, succeeds etc. It does not represent the returned values of a successfully finished process.  allowedValues:  - NOT\_STARTED  - RUNNING  - CANCELLING  - FINISHED  - FAILED  - PARTIALLY\_FAILED  - CANCELLED | Type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| ProcessMonitor.progressPercentage | Progress of the process as percentage.  Allowed values: integer between 0 and 100 | Type: Integer  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| ProcessMonitor.progressStateInfo | Additional textual qualification of the states "NOT\_STARTED", "CANCELLING" and "RUNNING".  For specific processes, specific well-defined strings (e.g. string patterns or enums) may be defined as a specialisation.  allowedValues: N/A | Type: String  multiplicity: 0..\*  isOrdered: True  isUnique: False  defaultValue: None  isNullable: False |
| ProcessMonitor.resultStateInfo | Additional textual qualification of the states "FINISHED", "FAILED", "PARTIALLY\_FAILED and "CANCELLED". For example, in the "FAILED" or "PARTIALLY\_FAILED" state this attribute may be used to provide error reasons.  This attribute shall not be used to make the outcome of the process available for retrieval, if any. For this purpose, dedicated attributes shall be specified when specifying the representation of a specific process.  For specific processes, specific well-defined strings (e.g. string patterns or enums) may be defined as a specialisation.  allowedValues: N/A | Type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| ProcessMonitor.startTime | Start time of the associated process, i.e. the time when the status changed from "NOT\_STARTED" to "RUNNING".  allowedValues: N/A | Type: DateTime  multiplicity: 0.. 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| ProcessMonitor.endTime | Date and time when status changed to SUCCESS, CANCELLED, FAILED or PARTIALLY\_FAILED. If the time is in the future, it is the estimated time the process will end.  allowedValues: N/A | Type: DateTime  multiplicity: 0.. 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| ProcessMonitor.timer | Time until the associated process is automatically cancelled.  If set, the system decreases the timer with time. When it reaches zero the cancellation of the associated process is initiated by the MnS\_Producer.  If not set, there is no time limit for the process.  Once the timer is set, the consumer can not change it anymore.  If the consumer has not set the timer the MnS Producer may set it.  Unit is minutes.  allowedValues: Positive integers | Type: Integer  multiplicity: 0.. 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| mnsScope | This attribute list contains the DNs of the managed object instances that can be accessed using the Management Service. If a complete SubNetwork can be accessed using the Management Service, this attribute may contain the DN of the SubNetwork instead of the DNs of the individual managed entities within the SubNetwork. | type: DN  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| managementDataType | This attributes defines the type of management data that are requested.  Allowed values: COVERAGE, CAPACITY, SERVICE EXPERIENCE, TRACE, ENERGY EFFICIENCY, MOBILITY, ACCESSIBILITY  Note: The above values can be further extended by the implementations, as appropriate | type: ENUM  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| targetNodeFilter | Set of information to target the Object Instance to collect the measurements from. | type: NodeFilter  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| areaOfInterest | It specifies a location(s) from where the management data shall be collected. It is defined in terms of TAI(s). | type: Tai  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| networkDomain | It specifies the network domain of the target node. This will also result in collecting appropriate management data from the nodes belonging to the specified domain.  Allowed Values: CN, RAN | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: N/A  isNullable: True | |
| cpUpType | It specifies the traffic type of the target node. This will also result in collecting appropriate management data from the nodes handling the specified traffic (e.g AMF for CP and UPF for UP).  Allowed Values: CP, UP | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: N/A  isNullable: True | |
| sst | It specifies the slice service type (SST) of which the slice subnet should be targeted. Please refer to [22]. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: N/A  isNullable: True | |
| collectionTimePeriod | Collection time duration for which the management data should be reported. | type: CollectionDuration  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: N/A  isNullable: True | |
| startTime | It specifies the start of collection period | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: N/A  isNullable: True | |
| endTime | It specifies the end of collection period | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: N/A  isNullable: True | |
| dataScope | It specifies whether the required data is reported per S-NSSAI or per 5QI.  Allowed Value: SNSSAI, 5QI | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: N/A  isNullable: True | |
| NOTE 1: The value of this attribute is identical to that of the same attribute in clause 9.4.2 of ETSI GS NFV-IFA 008 [16].  NOTE 2: The value of this attribute is identical to that of the attribute isAutoscaleEnabled included in vnfConfigurableProperty in clause 9.4.2 of ETSI GS NFV-IFA 008 [16].  NOTE 3: The presence of the attribute vnfParametersList, whose vnfInstanceId with a string length of zero, in createMO operation can trigger the instantiation of the related VNF/VNFC instances.  NOTE 4: The GP defines the measurement data production rate. The supported rates are dependent on the capacity of the producer involved (e.g. the processing power of the producer, the complexity of the measurement type involved etc) and therefore, it cannot be standardized for all producers involved. The supported GPs reflects the agreement between producer and the consumer involved.  NOTE 5: The monitoring granularity period defines the measurements monitoring period. The supported monitoring periods are dependent on the capacity of the producer involved (e.g. the processing power of the producer, the complexity of the measurement type involved etc) and therefore, it cannot be standardized for all producers involved. The supported monitoring GPs reflect the agreement between producer and the consumer involved.  NOTE 6: The supported threshold levels are dependent on the capacity of the producer involved (e.g. the processing power of the producer, number of measurements being measured by the producer at the time, the complexity of the measurement type involved etc) and therefore, it cannot be standardized for all producers involved. The supported levels can only reflect the negotiated agreement between producer and the consumer involved. | | |

### 4.4.2 Constraints

None

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| **End of modification** |