**3GPP TSG-SA5 Meeting #158**

**Orlando, United States, 18th Nov 2024 - 22nd Nov 2024**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **28.622** | **CR** | **Input to draftCR** | **rev** | **1** | **Current version:** | **19.1.0** |  |
|  | | | | | | | | |
| *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-19 inputToDraftCR TS 28.622 Enhance the model for supported management data to support management data discovery | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, Deutsche Telekom | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | MADCOL\_ph2 | | | | |  | ***Date:*** | | | 2024-11-06 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-19 |
|  | *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:*** | | The solutions for discovery of management data was studied in TR 28.842 as Key Issue #7 and recommended for normative work. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add solution for discovery of management data based on solution documented in clause 4.7.3.1 in TR 28.842. | | | | | | | | |
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| ***Consequences if not approved:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.2.1, 4.2.2, 4.3.X(new), 4.3.42.2, 4.4.1, C.1, C.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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| **1st Change** |

## 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: Void

NOTE 8: Void

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: Void



Figure 4.2.1-7: Trace control NRM fragment

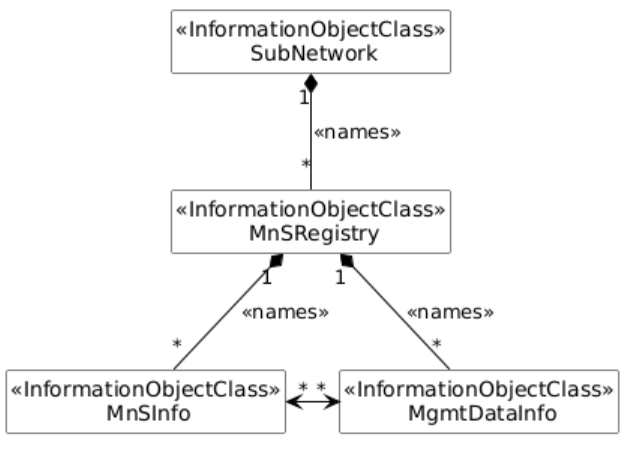


Figure 4.2.1-8: MnS Registry NRM fragment



Figure 4.2.1-9: File retrieval NRM fragment



Figure 4.2.1-10: File download NRM fragment



Figure 4.2.1-11: Management data collection NRM fragment



Figure 4.2.1-12: QoE Measurement Collection NRM fragment



Figure 4.2.1-13: SupportedNotifications NRM fragment

A diagram of a computer

Description automatically generated

Figure 4.2.1-14: Scheduler NRM fragment

A diagram of a computer program

Description automatically generated

Figure 4.2.1-15: Condition monitor 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: Void



Figure 4.2.2-6: Trace control NRM fragment

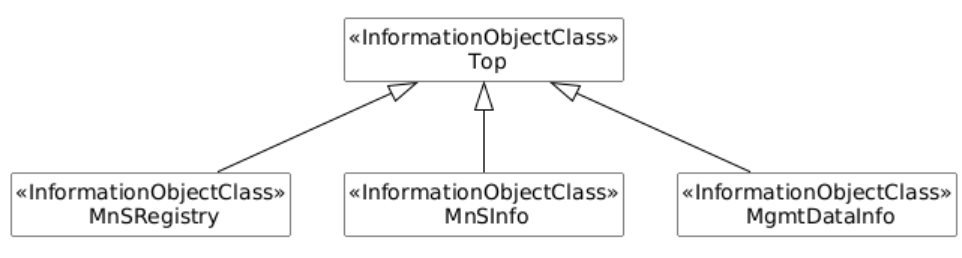


Figure 4.2.2-7: MnS Registry NRM fragment



Figure 4.2.2-8: File retrieval NRM fragment



Figure 4.2.2-9: File download NRM fragment



Figure 4.2.2-10: Management data collection NRM fragment



Figure 4.2.2-11: QoE Measurement Collection NRM fragment



Figure 4.2.2-12: SupportedNotifications NRM fragment

A diagram of a diagram

Description automatically generated

Figure 4.2.2-13: ConditionMonitor control NRM fragment

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| **2nd Change** |

### 4.3.X MgmtDataInfo

#### 4.3.X.1 Definition

This IOC describes the management capabilities for a set of management data, which can be used for management data discovery. The MgmtDataInfo <<IOC>> is name-contained by MnSRegistry <<IOC>> and associated to MnSInfo <<IOC>>.

Multiple MgmtDataInfo instances maybe created for different sets of management data, it is MnS producer’s decision.

#### 4.3.X.2 Attributes

The MgmtDataInfo IOC includes attributes inherited from Top IOC (defined in clause 4.3.29) and the following attributes:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | S | isReadable | isWritable | isInvariant | isNotifyable |
| supportedManagementData | M | T | F | F | T |
| supportedGranularityPeriods | CM | T | F | F | T |
| supportedReportingPeriods | CM | T | F | F | T |
| historicalDataPeriod | M | T | F | F | T |
| supportedReportingMethod | M | T | F | F | T |
| supportedDataScope | M | T | F | F | T |
| **Atttibutes related to roles** | | | | | |
| supportedDataRequestMnSRef | M | T | F | F | T |
| supportedDataReportingMnSRef | M | T | F | F | T |

#### 4.3.X.3 Attribute constraints

|  |  |
| --- | --- |
| Name | Definition |
| supportedGranularityPeriods | This attribute shall be supported, when the supported management data is performance metric (including performance measurement and KPI) |
| supportedReportingPeriods | This attribute shall be supported, when the supported management data is performance metric (including performance measurement and KPI) |

#### 4.3.X.4 Notifications

The common notifications defined in clause 4.5 are valid for this IOC, without exceptions or additions

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| **3rd Change** |

### 4.3.42 MnsInfo

#### 4.3.42.1 Definition

This IOC represents an available Management Service (MnS) and provides the data required to support its discovery. It is name-contained by MnsRegistry.

The present document does not specify how “MnsInfo” objects are created and maintained.

This information is used by the consumer to discover the producers of specific Management Services and to derive the addresses of the Management Service.

Attributes mnsLabel, mnsType, and mnsVersion are used to describe the Management Service.

Attribute mnsAddress is used to provide addressing information for the Management Service operations.

Attribute mnsScope is used to provide information about the management scope of the Management Service. The management scope is defined as the set of managed object instances that can be accessed using the Management Service.

#### 4.3.42.2 Attributes

The MnsInfo IOC includes the attributes inherited from Top IOC (defined in clause 4.3.29) and the following attributes:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | S | isReadable | isWritable | isInvariant | isNotifyable |
| mnsLabel | M | T | F | F | T |
| mnsType | M | T | F | F | T |
| mnsVersion | M | T | F | F | T |
| mnsAddress | M | T | F | F | T |
| mnsScope | M | T | F | F | T |
| **Atttibutes related to roles** | | | | | |
| mgmtDataInfoRef | M | T | F | F | T |

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| **4th Change** |

## 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 4.3.46.1.  allowedValues: N/A | Type: ProcessMonitor  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: Boolean  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: Boolean  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 | List of notification types.  Below is a list of notificationType values that are defined in 3GPP specifications.. Other notificationTypes defined by SDOs or enterprises may also be supported.  allowedValues:  - NOTIFY\_MOI\_CREATION  - NOTIFY\_MOI\_DELETION  - NOTIFY\_MOI\_ATTRIBUTE\_VALUE\_CHANGES  - NOTIFY\_MOI\_CHANGES  - NOTIFY\_EVENT  - NOTIFY\_NEW\_ALARM  - NOTIFY\_CHANGED\_ALARM  - NOTIFY\_ACKSTATE\_CHANGED  - NOTIFY\_COMMENTS  - NOTIFY\_CORRELATED\_NOTIFICATION\_CHANGED  - NOTIFY\_CHANGED\_ALARM\_GENERAL  - NOTIFY\_CLEARED\_ALARM  - NOTIFY\_ALARMLIST\_REBUILT  - NOTIFY\_POTENTIAL\_FAULTY\_ALARMLIST  - NOTIFY\_FILEREADY  - NOTIFY\_FILE\_PREPARATION\_ERROR  - NOTIFY\_THRESHOLD\_CROSSING | 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 |
| notificationProtocols | List of protocols supported for notifications.  TS 28.532 [27] defines options  Restful HTTP and Restful HTTP aligned with VES  Other values defined by SDOs or enterprises may also be supported.  allowedValues:  - HTTP  - HTTP\_VES\_ENCAPS | type: ENUM  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| scope | Scopes (selects) data nodes in an object tree.  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 |
| dataNodeSelector | The "dataNodeSelector" attribute allows to select one or more managed object instances, attributes, attribute fields or attribute elements. Its value contains a solution set specific expression for selecting the nodes.  allowedValues: N/A | type: String  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: None  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 performance metrics for threshold crossings. The period is defined in seconds.  See Note 5  allowedValues: a multiple of a supported GP of the associated performance metrics | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| reportingPeriods | Reporting periods supported for the associated performance metrics. 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: Float or Integer  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: Float or Integer  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 threshold is triggered only when the performance metric value is going up upon reaching or crossing the threshold value. The threshold 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 threshold is triggered only when the performance metric is going down upon reaching or crossing the threshold value. The threshold 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 threshold is active in both directions.  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: N/A  isUnique: N/A  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: False |
| 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: None  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 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: False |
| 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  isNullable: False |
| performanceMetrics | List of performance metrics identified by name  allowedValues:.  Performance metrics include measurements defined in TS 28.552 [20] and KPIs defined in TS 28.554 [28].  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  The individual components of the name are defined in the measurement definition template, see clause 3.3 in TS 32.404 [59], as the component designated with e).  For KPIs defined in TS 28.554 [28] the name is defined in the KPI definitions template, see chapter 5 in TS 28.554 [28], as the component designated with a).  For non-3GPP specified measurements the name is defined elsewhere. | type: String  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| supportedTraceMetrics | List of trace metrics. When this attribute is contained in a managed object it defines the trace metrics supported for this object and all descendant objects.  Trace metrics include trace messages, MDT measurements (Immediate MDT, Logged MDT, Logged MBSFN MDT), RLF and RCEF reports, see TS 32.422 [30]. Trace metrics are identified with their metric identifier. The metric identifier is constructed as defined in clause 10 of TS 32.422 [30].  For non-3GPP specified trace metrics the name is defined elsewhere.  allowedValues: N/A | type: String  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| listOfTraceMetrics | List of trace metrics identified by name.  Includes trace messages, MDT measurements (Immediate MDT, Logged MDT, Logged MBSFN MDT), RLF and RCEF reports, see TS 32.422 [30]. Trace messages are identified with their message identifier. Trace metric identifier is constructed as defined in clause 10 of TS 32.422 [30].  For non-3GPP specified trace metrics the name is defined elsewhere.  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 |
| jobRef | Object instance of the "PerfMetricJob" or "TraceJob" that produced the file.  allowedValues: NA | Type: DN  multiplicity: 0..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| jobId | Identifier of a PerfMetricJob, a TraceJob or a QMCJob. | type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| granularityPeriod | Granularity period used to produce performance metrics. 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 performance metrics. 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 |
| 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 |
| \_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 administrative 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 |
| jobType | 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, 5GC UE level measurements job or RRC reporting. The attribute is applicable for Trace, MDT, RCEF, RLF and RRC reporting, and 5GC UE level measurements collection.  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 |
| rrcReportType | Specifies the RRC reports requested.  Allowed values: RLF\_REPORT, RCEF\_REPORT, SHR, SPR, MHI, RA\_REPORT, or UHI\_REPORT. See 3GPP TS 38.331 [38]. | type: ENUM  multiplicity: 0..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| traceConfig | The set of parameters specific for trace configuration. | type: TraceConfig  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| mdtConfig | The set of parameters specific for MDT configuration. | type: MdtConfig  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| immediateMdtConfig | The set of parameters specific for Immediate MDT configuration. | type: ImmediateMdtConfig  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| loggedMdtConfig | The set of parameters specific for Logged MDT and Logged MBSFN MDT configuration. | type: LoggedMdtConfig  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| listOfInterfaces | 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: False  isUnique: True  defaultValue: None  isNullable: True |
| listOfNETypes | 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: False  isUnique: True  defaultValue: None  isNullable: True |
| pLMNTarget | It specifies which PLMN that the subscriber of the session to be recorded uses as selected PLMN. | type: PLMNId  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| traceReportingConsumerUri | 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: None  isNullable: True |
| traceCollectionEntityIPAddress | It specifies the address of the Trace Collection Entity when the attribute traceReportingFormat 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: IpAddr  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| traceDepth | 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 |
| traceReference | 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: N/A  defaultValue: None  isNullable: False |
| traceRecordingSessionReference | 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: N/A  defaultValue: None  isNullable: False |
| traceReportingFormat | It specifies the trace reporting format - streaming trace reporting or file-based trace reporting.  allowedValues: FILE-BASED, STREAMING | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: FILE-BASED  isNullable: False |
| traceTarget | It specifies the target object of the Trace, MDT and 5GC UE level measurements collection. The attribute is applicable for Trace, MDT, and 5GC UE level measurements collection. This attribute includes the ID type of the target as an enumeration and the ID value(s).  The traceTarget 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 traceTarget shall be "UTRAN\_CELL" only in case of the UTRAN cell traffic trace function.  The traceTarget shall be "E-UTRAN\_CELL" only in case of E-UTRAN cell traffic trace function.  The traceTarget shall be "NG-RAN\_CELL" only in case of NR cell traffic trace function.  The traceTarget 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 traceTarget 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 traceTarget attribute shall be able to carry "PUBLIC\_ID", "IMSI", "IMEI", "IMEISV)" or "SUPI".  In case of management based Immediate MDT, the traceTarget attribute shall be null value.  In case of management based Logged MDT, the traceTarget attribute shall carry an "eNB" or a "gNB" or an "RNC". The Logged MDT should be initiated on the specified eNB/gNB/RNC in traceTarget.  In case of RLF reporting, or RCEF reporting, the traceTarget attribute shall be null value.  In case of signalling based 5GC UE level measurements collection, the traceTarget attribute shall be able to carry "IMEISV" or "SUPI".  In case of management based 5GC UE level measurements collection, the traceTarget attribute shall be able to carry the corresponding Measured UE Identifier as defined by the bullet g) of the 5GC UE level measurements (see TS 28.558 [57]) when the TraceJob is created at the subject ManagedEntity. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True |
| triggeringEvents | 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: None  isNullable: True |
| anonymizationOfMDTData | It specifies the level of anonymization of MDT data. This attribute is only applicable for management based activation.  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 |
| areaConfigurationForNeighCells | 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..32  isOrdered: False  isUnique: True  defaultValue: None  isNullable: True |
| areaScope | It specifies the area where data shall be collected..  List of eNB/list of gNB/eNB/gNB for RLF or RCEF.  List of cells/TA/LA/RA for signalling based or management based Logged MDT.  List of cells for management based Immediate MDT.  List of cells or Tracking Area for QMC.  List of NPN Identifies in NR for management based MDT.  Cell, TA, LA, RA are mutually exclusive. | type: AreaScope  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: True |
| collectionPeriodRRMLTE | 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: None  isNullable: True |
| collectionPeriodRRMUMTS | 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: None  isNullable: True |
| eventListForEventTriggeredMeasurement | 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: None  isNullable: True |
| eventThreshold | 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 reportingTrigger 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: None  isNullable: True |
| listOfMeasurements | 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: None  isNullable: True |
| loggingDuration | 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: None  isNullable: True |
| loggingInterval | It specifies the periodicity for 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 5.10.8 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| eventThresholdL1 | 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 reportType is configured for event triggered reporting and when eventListEventForTriggeredMeasurement 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: None  isNullable: True |
| hysteresisL1 | 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 reportType is configured for event triggered reporting and when eventListForEventTriggeredMeasurement 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: None  isNullable: True |
| timeToTriggerL1 | 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 reportType is configured for event triggered reporting and when eventListForEventTriggeredMeasurement 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: None  isNullable: True |
| mbsfnAreaList | 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: False  isUnique: True  defaultValue: None  isNullable: True |
| measurementPeriodLTE | 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: None  isNullable: True |
| collectionPeriodM6LTE | 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: None  isNullable: True |
| collectionPeriodM7LTE | 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: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| measurementPeriodUMTS | 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: None  isNullable: True |
| collectionPeriodRRMNR | 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: None  isNullable: True |
| collectionPeriodM6NR | 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: None  isNullable: True |
| collectionPeriodM7NR | 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: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| beamLevelMeasurement | 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 |
| eventThresholdUphUMTS | 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: None  isNullable: True |
| measurementQuantity | 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: None  isNullable: True |
| pLMNList | 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: False  isUnique: True  defaultValue: None  isNullable: True |
| positioningMethod | 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: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| reportAmount | It specifies the number of measurement reports that shall be taken for periodic reporting while the UE is in connected mode. The attribute is applicable only for Immediate MDT and when reportingTrigger is configured for periodical measurements and applicable only for UMTS. 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: None  isNullable: True |
| reportAmountM1LTE | It specifies the number of measurement reports that shall be taken for periodic reporting while the UE is in connected mode. The attribute is applicable only for Immediate MDT and combined Trace and Immediate MDT and when reportingTrigger is configured for periodical measurements and applicable only for LTE. 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: None  isNullable: True |
| reportAmountM4LTE | It specifies the number of measurement reports that shall be taken for periodic reporting while the UE is in connected mode. The attribute is applicable only for Immediate MDT and combined Trace and Immediate MDT and when reportingTrigger is configured for periodical measurements and applicable only for LTE. 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: None  isNullable: True |
| reportAmountM5LTE | It specifies the number of measurement reports that shall be taken for periodic reporting while the UE is in connected mode. The attribute is applicable only for Immediate MDT and combined Trace and Immediate MDT and when reportingTrigger is configured for periodical measurements and applicable only for LTE. 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: None  isNullable: True |
| reportAmountM6LTE | It specifies the number of measurement reports that shall be taken for periodic reporting while the UE is in connected mode. The attribute is applicable only for Immediate MDT and combined Trace and Immediate MDT and when reportingTrigger is configured for periodical measurements and applicable only for LTE. 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: None  isNullable: True |
| reportAmountM7LTE | It specifies the number of measurement reports that shall be taken for periodic reporting while the UE is in connected mode. The attribute is applicable only for Immediate MDT and combined Trace and Immediate MDT and when reportingTrigger is configured for periodical measurements and applicable only for LTE. 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: None  isNullable: True |
| reportAmountM1NR | It specifies the number of measurement reports that shall be taken for periodic reporting while the UE is in connected mode. The attribute is applicable only for Immediate MDT and combined Trace and Immediate MDT and when reportingTrigger is configured for periodical measurements and applicable only for NR. 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: None  isNullable: True |
| reportAmountM4NR | It specifies the number of measurement reports that shall be taken for periodic reporting while the UE is in connected mode. The attribute is applicable only for Immediate MDT and combined Trace and Immediate MDT and when reportingTrigger is configured for periodical measurements and applicable only for NR. 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: None  isNullable: True |
| reportAmountM5NR | It specifies the number of measurement reports that shall be taken for periodic reporting while the UE is in connected mode. The attribute is applicable only for Immediate MDT and combined Trace and Immediate MDT and when reportingTrigger is configured for periodical measurements and applicable only for NR. 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: None  isNullable: True |
| reportAmountM6NR | It specifies the number of measurement reports that shall be taken for periodic reporting while the UE is in connected mode. The attribute is applicable only for Immediate MDT and combined Trace and Immediate MDT and when reportingTrigger is configured for periodical measurements and applicable only for NR. 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: None  isNullable: True |
| reportAmountM7NR | It specifies the number of measurement reports that shall be taken for periodic reporting while the UE is in connected mode. The attribute is applicable only for Immediate MDT and combined Trace and Immediate MDT and when reportingTrigger is configured for periodical measurements and applicable only for NR. 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: None  isNullable: True |
| reportingTrigger | It specifies whether periodic or event based measurements should be collected. The attribute is applicable only for Immediate MDT and when the listOfMeasurements 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: None  isNullable: True |
| reportInterval | 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 reportingTrigger 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: None  isNullable: True |
| reportType | 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: None  isNullable: True |
| sensorInformation | 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. | type: ENUM  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: True |
| traceCollectionEntityId | 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: None  isNullable: True |
| mcc | Mobile Country Code  allowedValues: As defined by the data type | type: Mcc  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| mnc | Mobile Network  allowedValues: As defined by the data type | type: Mnc  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  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: None  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: None  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: None  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: False  isUnique: True  defaultValue: None  isNullable: False |
| pciList | List of neighbour cells subject for MDT scope.  allowedValues: 0, 1, …,1007 | type: Integer  multiplicity: 1..32  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| tac | Tracking Area Code  allowedValues: As defined by the data type | type: Tac  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| utraCellIdList | List of UTRAN cells identified by UTRAN CGI  allowedValues: As defined by the data type | type: UtraCellId  multiplicity: 1..32  isOrdered: False  isUnique: True  defaultValue: None  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: None  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: None  isNullable: False |
| tacList | Tracking Area Code list  allowedValues: As defined by the data type | type: Tac  multiplicity: 1..8  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| taiList | Tracking Area Identity list  allowedValues: As defined by the data type | type: Tai  multiplicity: 1..8  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| mbsfnAreaId | MBSFN Area Identifier  allowedValues: 1, 2, … | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| earfcn | Carrier Frequency  allowedValues: 1, 2, … | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  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: PROV\_MNS, FAULT\_SUPERVISION\_MNS, STREAMING\_DATA\_REPORTING\_MNS, FILE\_DATA\_REPORTING\_MNS | 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: N/A  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.  allowedValues: 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.  If a complete ManagedElement can be accessed using the Management Service, this attribute may contain the DN of the ManagedElement instead of the DNs of the individual managed entities within the ManagedElement. | type: DN  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| managementData | This attribute defines the list of management data that are requested. | Type: ManagementData  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| mgtDataCategory | This attributes defines the type of management data that are requested.  Allowed values for data category are COVERAGE, CAPACITY, ENERGY\_EFFICIENCY, MOBILITY, ACCESSIBILITY. The data categories will map to certain measurement families defined in TS 28.552 [2], see below. In addition to the below mappings, MnS producer may map the provided categories to any additional proprietary management data, as appropriate.  The COVERAGE category will map to measurement families of MR (measurements related to Measurement Report) and L1M (measurements related to Layer 1 Measurement).  The CAPACITY category will map to measurement family RRU (measurements related to Radio Resource Utilization).  The ENERGY\_EFFICIENCY category will map to measurement family PEE (measurements related to Power, Energy and Environment).  The MOBILITY category will map to measurement family MM (measurements related to Mobility Management).  The ACCESSIBILITY category will map to measurement family CE (measurements related to Connection Establishment).  allowedValues: COVERAGE, CAPACITY, SERVICE EXPERIENCE, TRACE, ENERGY EFFICIENCY, MOBILITY, ACCESSIBILITY  See NOTE 7. | type: ENUM  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: True |
| mgtDataName | A list of management data identified by name.  allowedValues:  The list may include metrics or set of metrics defined in TS 28.552 [20], TS 28.554 [28] and TS 32.422 [30].  For performance 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 according to the KPI definitions template as the component designated with a).  For trace metrics (including trace messages, MDT measurements (Immediate MDT, Logged MDT, Logged MBSFN MDT), RLF and RCEF reports) defined in TS 32.422 [30], the name (metric identifier) is defined in clause 10 of TS 32.422 [30].  For non-3GPP specified management data the name is defined elsewhere. | type: String  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: True |
| consolidateOutput | Indicates whether the management data collection output will be consolidated into a single file per reporting period. | type: Boolean  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| targetNodeFilter | Set of information to target the Object Instance to collect the management data from. | type: NodeFilter  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: No  isNullable: True |
| areaOfInterest | It specifies a location(s) from where the management data shall be collected. | type: AreaOfInterest  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: No  isNullable: True |
| geoAreaToCellMapping | It specifies the geographical area from where the management data shall be collected and the mapping to cells.  allowedValues: N/A | type: GeoAreaToCellMapping  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: True |
| convexGeoPolygon | It specifies the geographical area with a convex polygon. The convex polygon is specified by its corners.  allowedValues: N/A | type: GeoCoordinate  multiplicity: 3..\*  isOrdered: True  isUnique: True  defaultValue: None  isNullable: True |
| geoArea | It specifies the geographical area using the coordinates of the corners of a convex polygon.  allowedValues: N/A | type: GeoArea  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| latitude | Latitude based on World Geodetic System (1984 version) global reference frame (WGS 84). Positive values correspond to the northern hemisphere.  allowedValues: -90.0000, …+90.0000 | type: Float  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| longitude | Longitude based on World Geodetic System (1984 version) global reference frame (WGS 84). Positive values correspond to degrees east of 0 degrees longitude.  allowedValues: -180.0000, … +180.0000 | type: Float  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| altitude | It is the vertical distance between the point of interest from the mean sea level measured in metres. | type: Float  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| associationThreshold | It specifies the threshold of coverage area in percentage whether a cell belongs to the geographical area or not.  If this attribute is absent, the location of the base station antenna determines whether a cell belongs to the geographical area or not.  allowedValues: 1,…,100 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  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.  allowedValues: CN, RAN | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  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).  allowedValues: CP, UP | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| sst | It specifies the slice service type (SST) of which the slice subnet should be targeted. Please refer to TS 23.501 [22]. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| collectionTimeWindow | Collection time window for which the management data should be reported. | type: TimeWindow  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| startTime | It indicates the time (in "date-time" format) when the management activity shall be started.  allowedValues: N/A. | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| endTime | It indicates the time (in "date-time" format) when the management activity shall be stopped.  allowedValues: N/A. | type: DateTime  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| timeWindow | Time window for which the configured management activity shall be active. | type: TimeWindow  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| timeIntervals | List of intervals within one day for which the service shall be active. | type: TimeInterval  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| intervalStart | It indicates the time (in "full-time" format) when the service shall be started.  Data type "FullTime" defines the time as specified by "full-time" in RFC3339 [54].  allowedValues: N/A. | type: FullTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| intervalEnd | It indicates the time (in "full-time" format) when the service shall be stopped.  "FullTime" defines the time as specified by "full-time" in RFC3339 [54].  allowedValues: N/A. | type: FullTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| daysOfWeek | It indicates the days on which the service shall be scheduled in case of weekly repetition. The intervals per day are configured by attribute timeIntervals.  allowedValues:  - MONDAY  - TUESDAY  - WEDNESDAY  - THURSDAY  - FRIDAY  - SATURDAY  - SUNDAY | type: ENUM  multiplicity: 1..7  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| daysOfMonth | It indicates the days in a month on which the service shall be scheduled in case of monthly repetition. Value 0 presents the last day of the month. The intervals per day are configured by attribute timeIntervals.  allowedValues: 0, 1, …31 | type: Integer  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| schedulingTimes | It defines the active scheduling times. | type: SchedulingTime  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| schedulerStatus | Switches between TRUE and FALSE depending upon whether the configured time constraints are fulfilled or not. | type: Boolean  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| conditionStatus | Switches between TRUE and FALSE depending upon whether the configured constraints are fulfilled or not. | type: Boolean  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| schedulerRef | Pointer to a Scheduler object. | type: DN  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| conditionMonitorRef | Pointer to a ConditionMonitor object. | type: DN  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| condition | Logical expression of one or several condition(s).  The actual syntax and capabilities of condition is SS specific. However, each SS should support condition consisting of one or several assertions that may be grouped using the logical operators AND, OR and NOT. Only if the whole expression of condition evaluates TRUE, the attribute conditionStatus will be TRUE.  Each assertion is a pointer to a Boolean parameter or a logical expression of attribute existence or attribute value comparison ("equal to X, less than Y" etc.).  An empty string is not allowed.  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| dataScope | It specifies whether the required data is reported per S-NSSAI or per 5QI or per PLMN.  allowedValues: SNSSAI, 5QI, PLMN | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| serviceType | Specifies an end user service type for QoE measurements.  allowedValues: DASH, MTSI, VR | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| qoECollectionEntityAddress | Specifies the address to which the QMC records shall be transferred. Ipv4 or Ipv6 address(es) may be used. | type: IpAddr  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| qoETarget | Specifies the target object of the QMC in case of signalling based QMC. The qoETarget attribute shall be able to carry "IMSI” or "SUPI". | type: String  multiplicity: 1  isOrdered:N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| qoEReference | Identifies the QoE measurement collection job in the Managed Elements and in the measurement collection entity.  The QoE reference shall be globally unique therefore it is composed as follows:  MCC+MNC+QMC ID, where the MCC and MNC are coming with the QMC activation request from the management system to identify one PLMN containing the management system, and QMC ID is a 3 byte Octet String.  The QMC ID is generated by the management system or the operator. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| sliceScope | Contains a list of S-NSSAIs (Single Network Slice Selection Assistance Information). A Network Slice is identified by S-NSSAI. | type: S-NSSAI  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| qMCConfigFile | Provides a reference to a file including the parameters for configuration of application layer measurements, known as Container for Application Layer Measurement Configuration | Type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| excessPacketDelayThresholds | Excess packet delay thresholds info for M6 UL measurement. | type: ExcessPacketDelayThresholds  multiplicity: 0..255  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| fiveQIValue | It indicates 5QI value.  allowedValues: 0 - 255 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| excessPacketDelayThresholdValue | Value of excess packet delay threshold for M6 UL measurement.  allowedValues: 0.25ms, 0.5ms, 1ms, 2ms, 4ms, 5ms, 10ms, 20ms, 30ms, 40ms, 50ms, 60ms, 70ms, 80ms, 90ms, 100ms, 150ms, 300ms, 500ms, … | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| mDTAlignmentInformation | This parameter indicates the MDT measurements with which alignment of QoE measurement is required. This parameter is optional and is valid for NR only. | Type: TraceReference  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| availableRANqoEMetrics | This parameter indicates available RAN visible QoE metrics to the gNB. This parameter is optional and is valid for NR only.  allowedValues: APPLAYER\_BUFFER\_LEVEL\_LIST, PLAYOUT\_DELAY\_FORMEDIA\_ STARTUP | Type: ENUM  multiplicity: 0..2  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| dnPrefix | It carries the DN Prefix information or no information. See Annex C of TS 32.300 [13] for one usage of this attribute.  allowedValues: N/A | type: DN  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| nPNIdentityList | It defines which NPNs that can be served by the NR cell, and which CAG IDs or NIDs can be supported by the NR cell for corresponding PNI-NPN or SNPN in case of the cell is NPN-only cell.  (NPN-Identity referring to TS 38.331 [38])  allowedValues: N/A | type: NpnId  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| cAGIdList | It identifies a CAG list containing up to 256 CAG-identifiers per UE or up to 12 CAG-identifiers per cell, see TS 38.331 [38].  CAG ID is used to combine with PLMN ID to identify a PNI-NPN.  CAG ID is a hexadecimal range with size 32 bit.  allowedValues: N/A | type: String  multiplicity: 0..256  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| nIDList | It identifies a list of NIDs containing up to 16 NIDs, see TS 38.331 [38]. NID is used to combine with PLMN ID to identify an SNPN.  NID is a hexadecimal range with size 44 bit. | type: String  multiplicity: 0..16  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| nPNTarget | It defines which NPN that the subscriber of the session to be recorded uses as selected NPN.  There is maximum one CAG ID present in cAGIdList in case of PNI-NPN or maximum one NID present in nIDList in case of SNPN | type: NpnId  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| ueCoreMeasConfig | The set of parameters specific for 5GC UE level measurements configuration. | type: UECoreMeasConfig  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| ueCoreMeasurements | List of 5GC UE level measurements identified by name.  allowedValues:  The list may include 5GC UE level measurements defined in TS 28.558 [57], or vendor specific measurements.  For 5GC UE level measurements defined in TS 28.558 [57], the name is constructed as follows:  - "family.measurementName.subcounter" for measurement type with specified subcounter  - "family.measurementName.ALL" for measurement type with all supported subcounters  - "family.measurementName" for measurement type without subcounters  - "family" for measurement family, including all measurement types and the associated subcounters under this family.  For non-3GPP specified 5GC UE level measurements the name is defined elsewhere. | type: String  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| ueCoreMeasGranularityPeriod | Granularity period used to produce 5GC UE level measurements. The period is defined in milliseconds (ms).  See Note 8.  allowedValues: Integer with a minimum value of 10 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| nfTypeToMeasure | It indicates the type of NE to produce the 5GC UE level measurements.  allowedValues: The NF types represented by the measured object classes as defined by f) of the 5GC UE level measurements specified in TS 28.558 [57]. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| processMonitor | This IE indicates the process of the ManagementDataCollection MOI. | Type: ProcessMonitor  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| mBSCommunicationServiceType | This IE indicates for which type of MBS communication service the QoE measurement configuration pertains to. See the clause 4.5.1 of TS 28.405 [50] for additional details.  allowedValue: BROADCAST, MULTICAST | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: False  isNullable: False |
| month | It indicates the month in a year.  allowedValues: 1, …, 12 | type: DateMonth  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| monthDay | It indicates the day in a month.  allowedValues: 1, …, 31 | type: DateMonthDay  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| mNOnly | This indicates whether the MDT configuration is for MN only or not.  The default value is "FALSE" which means the MDT configuration is for both MN and SN.  The value “TRUE” means the MDT configuration is for MN only. | type: Boolean  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: FALSE  isNullable: False |
| supportedExternalDataTypes | This attribute defines a list of types of supported external management data can be supporte by MnS producer.  *Editor's note: It is ffs in which IOC this attribute should be placed.* | Type: SupportedExternalDataType  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| externalDataTypeName | Name of the external management data supported by MnS producer.  Possible examples of allowed values can be “Electronic Map”, “Camara Data”, “UE path”, etc. | Type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| externalDataTypeSchema | Location and name of the schema for external management data definition.  The detailed schema definition for the external management data of different types is out of scope of this specification | Type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| externalDataReportingMethods | Supported reporting methods or mechanism for external management data.  allowedValues: “FILE\_BASED”  *Editor’s Note: the reporting methods or mechanism for external management data is FFS.* | type: ENUM  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| supportedManagementData | This attribute defines the list of management data that can be supported.  The management data is a choice between:   * a list of data categories (attribute mgtDataCategory) * a list of management data identified with their name (attribute "mgtDataName"). | Type: ManagementData  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| supportedGranularityPeriods | Granularity periods supported for the production of associated management data. The period is defined in seconds. | Type: Integer  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| supportedReportingPeriods | Reporting periods supported for the associated management data. The period is defined in seconds. | Type: Integer  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| historicalDataPeriod | This attribute describes the maximum period of the requested historical data. The period is defined in seconds.  When the value of this attribute is NULL, which means the capability of querying historical data is not supported. | Type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: TRUE |
| supportedReportingMethod | List of supported reporting methods for the associated management data.  AllowedValues:  - FILE - STREAM | type: ENUM  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| supportedDataScope | List of supported sub counter capabilities for the associated management data  Allowed Values:   * SNSSAI * 5QI   PLMN | type: ENUM  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| supportedDataRequestMnSRef | List of DN of MnSInfo for the MnS instance(s) which can be used to request the associated management data | type: DN  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| supportedDataReportingMnSRef | List of DN of MnSInfo for the MnS instance(s) which can be used to report the associated management data | type: DN  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| MgmtDataInfoRef | List of DN of MgmtDataInfo instance(s) which are associated the MnSInfo which represent a management service instance | type: DN  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| 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.  NOTE 7: The above values can be further extended by the implementations, as appropriate.  NOTE 8: The ueCoreMeasGranularityPeriod 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 Granularity periods reflects the agreement between producer and the consumer involved. | | |

### 4.4.2 Constraints

None

|  |
| --- |
| **5th Change** |

Annex C (informative):  
PlantUML source code

# C.1 Relationships

@startuml Figure 4.2.1-1: NRM fragment

hide empty members

skinparam ClassStereotypeFontStyle normal

hide circle

skinparam class {

BackgroundColor White

ArrowColor Black

BorderColor Black

}

skinparam linetype ortho

'skinparam BoxPadding 40

skinparam nodesep 2

class ManagedFunction <<InformationObjectClass>>

class EP\_RP <<InformationObjectClass>>

ManagedFunction "1" \*-- "\*" EP\_RP: <<names>>

@enduml

@startuml Figure 4.2.1-8: MnS Registry NRM fragment

hide circle

hide methods

hide members

skinparam class {

AttributeIconSize 0

BackgroundColor white

BorderColor black

ArrowColor black

}

skinparam Shadowing false

skinparam Monochrome true

skinparam ClassBackgroundColor White

skinparam NoteBackgroundColor White

class "<<InformationObjectClass>>\n SubNetwork" as SubNetwork{}

class "<<InformationObjectClass>>\n MnSRegistry" as MnSRegistry{}

class "<<InformationObjectClass>>\n MnSInfo" as MnSInfo{}

class "<<InformationObjectClass>>\n MgmtDataInfo" as MgmtDataInfo{}

SubNetwork "1" \*-- "\*" MnSRegistry : <<names>>

MnSRegistry "1" \*-- "\*" MnSInfo : <<names>>

MnSRegistry "1" \*-- "\*" MgmtDataInfo : <<names>>

MnSInfo "\*" <-right-> "\*" MgmtDataInfo

@enduml

# C.2 Inheritance

@startuml Rel19 Figure 4.2.2-1: NRM fragment

hide empty members

skinparam ClassStereotypeFontStyle normal

hide circle

skinparam class {

BackgroundColor White

ArrowColor Black

BorderColor Black

}

skinparam linetype ortho

'skinparam BoxPadding 40

skinparam nodesep 2

class TopX <<InformationObjectClass>>

class Top\_ <<InformationObjectClass>>

class Top <<InformationObjectClass>>

class MnsAgent <<InformationObjectClass>>

class MeContext <<InformationObjectClass>>

class VsDataContainer <<InformationObjectClass>>

class EP\_RP <<InformationObjectClass>>

TopX <|-- Top

Top\_ <|-- Top

Top <|-- MnsAgent

Top <|-- MeContext

Top <|-- VsDataContainer

Top <|-- EP\_RP

@enduml

@startuml Figure Figure 4.2.2-7: MnS Registry NRM fragment

hide circle

hide methods

hide members

skinparam class {

AttributeIconSize 0

BackgroundColor white

BorderColor black

ArrowColor black

}

skinparam Shadowing false

skinparam Monochrome true

skinparam ClassBackgroundColor White

skinparam NoteBackgroundColor White

class "<<InformationObjectClass>>\n Top" as Top{}

class "<<InformationObjectClass>>\n MnSRegistry" as MnSRegistry{}

class "<<InformationObjectClass>>\n MnSInfo" as MnSInfo{}

class "<<InformationObjectClass>>\n MgmtDataInfo" as MgmtDataInfo{}

Top <|-- MnSRegistry

Top <|-- MnSInfo

Top <|-- MgmtDataInfo

@enduml

|  |
| --- |
| **End of Changes** |