**3GPP TSG-SA5 Meeting #141-e *S5-222xxx***

**e-meeting, 11 - 20 October 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **28.622** | **CR** | **xxx** | **rev** | - | **Current version:** | **17.0.0** |  |
|  |
| *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-17 28.622 enhance NRM to support access control |
|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** | MSAC |  | ***Date:*** | 2021-09-29 |
|  |  |  |  |  |
| ***Category:*** | B |  | ***Release:*** | Rel-17 |
|  | *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 canbe 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:*** | According to discussion paper (S5-215226) and requirements related to access control. |
|  |  |
| ***Summary of change:*** | Add NRM fragment to support authentication and authorization capability |
|  |  |
| ***Consequences if not approved:*** | No standardized way for access control on management service of 3GPP management system, that may cause interoperability issue once security feature is enabled. |
|  |  |
| ***Clauses affected:*** | 4.2, 4.3.x (new), 4.3.y (new), 4.3.z (new), 4.3.xx (new) |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | Information model to access ASP is similar to information to access other MnSP, which could be part of discovery WI.This is resubmission of S5-221297 |
|  |  |
| ***This CR's revision history:*** |  |

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| **Start of 1st modification** |

## 4.2 Class diagrams

### 4.2.1 Relationships

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

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



NOTE 1: ManagedElement may be contained either

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

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

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

ManagedElement may also have no parent instance at all.

NOTE 2: Void

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

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

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

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

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

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

Figure 4.2.1-1: NRM fragment

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

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



NOTE 8: Void

NOTE 9: Void

Figure 4.2.1-2: Vendor specific data container NRM fragment



Figure 4.2.1-3: PM control NRM fragment



Figure 4.2.1-4: Threshold monitoring control NRM fragment



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



Figure 4.2.1-6: FM control NRM fragment



Figure 4.2.1-7: Trace control NRM fragment



Figure 4.2.1-x: Access control NRM fragment - naming containment



Figure 4.2.1-y: Access control NRM fragment - association

### 4.2.2 Inheritance

This clause depicts the inheritance relationships.





Figure 4.2.2-1: NRM fragment



Figure 4.2.2-2: PM control NRM fragment



Figure 4.2.2-3: Threshold monitoring control NRM fragment



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



Figure 4.2.2-5: FM control NRM fragment



Figure 4.2.2-6: Trace control NRM fragment



Figure 4.2.2-x: Access control NRM fragment

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| **End of 1st modification** |

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| **Start of 2nd modification** |

### 4.3.x Identity4AC

#### 4.3.x.1 Definition

This IOC represents an identity, which is used to represent a management service consumer or producer. It can be name-contained by SubNetwork.

An identity is used for authentication and authorization. Authentication service producer provides identity management capabilities. Identity management of MnS consumers and producers includes creating, reading, updating and deleting identities.

Management and usage of identify in Access control is defined in TS 28.533 [32].

NOTE 1: Access Control NRM is solution set agnostic, e.g.: it supports both OAuth2.0 based access control of OpenAPI and Netconf Access Control Mobile (NACM)..

NOTE 2: OAuth2.0 is supported, 1.x is obsolete and not supported.

#### 4.3.x.2 Attributes

The Identity4AC IOC includes attributes inherited from Top IOC (defined in clause 4.3.29) and the following attributes:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | S | isReadable  | isWritable | isInvariant | isNotifyable |
|  |  |  |  |  |  |
| identifier | M | T | T | F | T |
| identifierType | O | T | T | F | T |
| identityType | M | T | F | T | F |
| identityStatus | O | T | T | F | T |
| identityOwner | O | T | T | F | T |
| identityDomain | O | T | T | F | T |
| authSessionList | O | T | F | F | T |
| credential | O | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
| groupOfIdentityRef | M | T | T | F | T |
| roleInfoRef | O | T | T | F | T |

NOTE: The credential should be well protected with relevant security control, e.g. stored the hash password in a credential vault or hardware security module (HSM).

#### 4.3.x.3 Attribute constraints

None.

#### 4.3.x.4 Notifications

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

### 4.3.y GroupOfIdentity

#### 4.3.y.1 Definition

This IOC represents a group of management service consumers or producers. It can be name-contained by SubNetwork.

Managing authentication policies, and authorization policies, according to the general of practice, is based on the group or based on the role.

As a MOI, or a MOI hierarchy may support multiple sNSSAIs and plmnIds,  the pre-condition/post-condition attribute defined in the PermInfo allows a group/role to access MOIs or part of a MOI for specific plmnIds and/or sNSSAIs based on plmnIds and/or sNSSAIs value of the GroupOfIdentity MOI.

#### 4.3.y.2 Attributes

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | S | isReadable  | isWritable | isInvariant | isNotifyable |
|  |  |  |  |  |  |
| groupName | M | T | T | F | T |
| groupType | M | T | F | T | F |
| groupOwner | O | T | T | F | T |
| groupDomain | O | T | T | F | T |
| plmnIds | O | T | T | F | T |
| sNSSAIs | O | T | T | F | T |
| noOfMembers | O | T | F | F | T |
| **Attribute related to role** |  |  |  |  |  |
| policy4AuthnRef | O | T | T | F | T |
| identity4ACRef | M | T | F | F | T |
| roleInfoRef | O | T | T | F | T |
| permInfoRef | O | T | T | F | T |

#### 4.3.y.3 Attribute constraints

None.

#### 4.3.y.4 Notifications

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

### 4.3.z Policy4Authn

#### 4.3.z.1 Definition

The Policy4Authn represents authentication policy which can be assigned to a group of management service consumers.

Authentication service producer provides authentication policy management capabilities. Authentication policy management of MnS consumers and producers includes creating, reading, updating and deleting authentication policies.

#### 4.3.z.2 Attributes

The Policy4Authn IOC includes attributes inherited from Top IOC (defined in clause 4.3.29) and the following attributes:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | S | isReadable  | isWritable | isInvariant | isNotifyable |
| policies | M | T | T | F | T |

#### 4.3.z.3 Attribute constraints

None.

#### 4.3.z.4 Notifications

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

### 4.3.xx AuthSession <<dataType>>

#### 4.3.xx.1 Definition

This dataType defines state and other context of an authentication session of a management service consumer.

Authentication service producer provides capabilities for authentication of MnS consumer. Authentication service producer creates an authentication session for the MnS consumer after successfully authenticated the consumer.

#### 4.3.xx.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | S | isReadable  | isWritable | isInvariant | isNotifyable |
| sessionId | M | T | F | F | T |
| authState | M | T | F | F | T |
| context | O | T | F | F | T |
| assocClient | O | T | F | F | T |
| assertion | O | T | F | F | T |
| accessToken | CM | T | F | F | T |
| permInfoRef | O | T | F | F | T |

|  |  |
| --- | --- |
| Name | Definition |
| accessToken S | The condition is "explicit authentication". |

#### 4.3.xx.3 Attribute constraints

#### 4.3.xx.4 Notifications

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

### 4.3.a AccessRight

#### 4.3.a.1 Definition

An AccessRight instance represents access right defined for a managed object instance (MOI) to be protected with the access right , e.g. read, update or delete the MOI, read or update attribute of the MOI, read MIB tree (naming containment tree) of the MOI, create/delete child MOI (contained MOI) of the MOI, etc. The AccessRight MOI is associated to the MOI to be protected. If standardized access control feature is supported by a management system, the management system supports creating AccessRight MOIs once creates the containing MOI to be protected with the access rights.

#### 4.3.a.2 Attributes

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | S | isReadable  | isWritable | isInvariant | isNotifyable |
| operation | M | T | T | F | T |
| attribute | M | T | T | F | T |
| childObjectClass | O | T | T | F | T |
| childObjectInstance | O | T | T | F | T |

#### 4.3.a.3 Attribute constraints

None.

#### 4.3.a.4 Notifications

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

### 4.3.b ResourceProfile

#### 4.3.b.1 Definition

This IOC represents the properties of a managed object/entity as resource to be protected, e.g. owner, domain of the resource, PLMNs, S-NSSAIs supported by the resources, etc. It can be name-contained by SubNetwork.

4.3.b.2 Attributes

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | S | isReadable  | isWritable | isInvariant | isNotifyable |
| resourceOwner | O | T | F | F | T |
| resourceDomain | O | T | F | F | T |
| plmnIds | O | T | F | F | T |
| sNSSAIs | O | T | F | F | T |
|  |  |  |  |  |  |

#### 4.3.b.3 Attribute constraints

None.

#### 4.3.b.4 Notifications

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

### 4.3.d RoleInfo

#### 4.3.d.1 Definition

This IOC represents the role assigned to a MnS consumer or a group of MnS consumer. It can be name-contained by SubNetwork.

A RoleInfo instanstance is used to simplify permission management and enable role based access control

#### 4.3.d.2 Attributes

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | S | isReadable  | isWritable | isInvariant | isNotifyable |
|  |  |  |  |  |  |
| roleName | CM | T | F | T | F |
| **Attribute related to role** |  |  |  |  |  |
| permInfoRef | CM | T | T | F | T |

#### 4.3.d.3 Attribute constraints

None.

#### 4.3.d.4 Notifications

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

### 4.3.e PermInfo

#### 4.3.e.1 Definition

A PermInfo represents a permission assigned/configured to a role or group, or granted to an authenticated and authorized MnS consumer. It can be name-contained by SubNetwork.

A permission may or may not contain conditions. If there’s precondition, that means the accessRight is valid for the consumer only when the precondition is satisfied. E.g. when a consumer access a MnS, the MnS consumer first check if the AccessRight is assigned to the consumer based on the permission associated to the corresponding group, if so, the MnS will further check the pre-condition, e.g. if the consumer is in specific location (e.g. based on its IP address or other information), if it’s working time when the consumer access specific resource, etc.. Similarly, the precondition could be if the consumer (e.g. another MnF acting as MnS consumer) asking for a specific S-NSSAI’s/PLMN’s resources belong to the same PLMN or S-NSSAI, etc

#### 4.3.e.2 Attributes

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | S | isReadable  | isWritable | isInvariant | isNotifyable |
| preCondition | M | T | T | F | T |
| postCondition | M | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
| accessRightRef | M | T | T | F | T |
| identity4ACRef | M | T | T | F | T |

#### 4.3.e.3 Attribute constraints

None.

#### 4.3.e.4 Notifications

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

### 4.3.f AccessToken <<dataType>>

#### 4.3.f.1 Definition

An AccessToken dataType defines a list of permissions granted to the authenticated MnS consumer in specific context by the authorization service producer.

It represents the access or authorization token assigned to a MnS consumer in an authentication session after the MnS consumer being authenticated and authorized.

#### 4.3.f.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | S | isReadable  | isWritable | isInvariant | isNotifyable |
| tokenId | M | T | F | T | F |
| context | O | T | F | T | T |
| tokenType | M | T | F | T | F |
| issuer | M | T | F | T | F |
| permInfoRef | M | T | F | F | T |

#### 4.3.f.3 Attribute constraints

None.

#### 4.3.f.4 Notifications

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

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| **End of 2nd modification** |

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| **Start of 3rd modification** |

### 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 |
| --- | --- | --- |
| 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: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: 0isNullable: 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: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FALSE isNullable: False |
| notificationRecipientAddress | Address of the notification recipient.allowedValues: N/A | type: String multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| notificationTypes | Notification types of notifications that are candidates for being forwarding to the notification recipient. If this attribute is absent, notifications of all types are candidates for being forwarding to the notification recipient.If the notificationFilter attribute is absent, all candidate notifications are forwarded to the notification recipient, otherwise the candidate notifications are discriminated by the filter specified by the notificationFilter attribute.AllowedValues: - notifyMOICreation- notifyMOIDeletion- notifyMOIAttributeValueChanges- notifyMOIChanges- notifyEvent- notifyNewAlarm- notifyChangedAlarm- notifyAckStateChanged- notifyComments- notifyCorrelatedNotificationChanged- notifyChangedAlarmGeneral- notifyClearedAlarm- notifyAlarmListRebuilt- notifyPotentialFaultyAlarmList- notifyFileReady- notifyFilePreparationError- notifyThresholdCrossing | type: ENUMmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: 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..1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| scope | Scopes the managed object instances included in the notification subscription. If this attribute is absent, all objects below and including the base object are scoped.allowedValues: N/A | type: Scopemultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: 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: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| scopeLevel | See definition of scopeType attribute.allowedValues: N/A | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: 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: DNmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: 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: Stringmultiplicity: 0..\*isOrdered: FalseisUnique: TruedefaultValue: No isNullable: False |
| locationName | The physical location of this entity (e.g. an address). allowedValues: N/A | type: Stringmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| monitorGranularityPeriod | Granularity period used to monitor measurements for threshold crossings. The period is defined in seconds.See Note 5allowedValues: Integer with a minimum value of 1 | type: Integermultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: None isNullable: False |
| monitorGranularityPeriods | Granularity periods supported for the monitoring of associated measurement types for thresholds. The period is defined in seconds.allowedValues: Integer with a minimum value of 1 | type: Integermultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| thresholdInfoList | List of threshold infos. | type: ThresholdInfomultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: 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: Unionmultiplicity: 1isOrdered: NAisUnique: NAdefaultValue: NoneisNullable: 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 byhighThresholdValue- = thresholdValue + hysteresislowThresholdValue = thresholdValue - hysteresisWhen 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: Unionmultiplicity: 0..1isOrdered: NAisUnique: NAdefaultValue: NoneisNullable: False |
| thresholdDirection | Direction of a threshold indicating the direction for which a threshold crossing triggers a threshold.When the threshold direction is configured to "UP", the associated treshold is triggered only when the performance metric value is going up upon reaching or crossing the threshold value. The treshold is not triggered, when the performance metric is going down upon reaching or crossing the threshold value.Vice versa, when the threshold direction is configured to "DOWN", the associated treshold is triggered only when the performance metric is going down upon reaching or crossing the threshold value. The treshold is not triggered, when the performance metric is going up upon reaching or crossing the threshold value.When the threshold direction is set to "UP\_AND\_DOWN" the treshold is active in both direcions.In case a threshold with hysteresis is configured, the threshold direction attribute shall be set to "UP\_AND\_DOWN".allowedValues:- UP- DOWN- UP\_AND\_DOWN | type: ENUMmultiplicity: 1isOrdered: NAisUnique: NAdefaultValue: NoneisNullable: False |
| objectClass | Class of a managed object instance.allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| objectInstance | Managed object instance identified by its DN.allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| objectInstances | List of managed object instances. Each object instance is identified by its DN.allowedValues: N/A | type: Dnmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: 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)- siteDescription - equipmentType- environmentType- powerInterface siteIdentification: The identification of the site where the ManagedFunction resides.allowedValues: N/AsiteLatitude: 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 in case of BTSFunction and RNCFunction instance(s).allowedValues: -90.0000 to +90.0000siteLongitude: 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 in case of BTSFunction and RNCFunction instance(s).allowedValues: -180.0000 to +180.0000siteDescription: 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: Stringmultiplicity: 0..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: True |
| priorityLabel | This is a label that consumer would assign a value on a concrete instance of the managed object. The management system takes the value of this attribute into account. The effect of this attribute value to the subject managed entity is not standardized | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: 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: Stringmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: 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: Integermultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: No default valueisNullable: 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: Stringmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| systemDN | Distinguished Name (DN) of a IRPAgent or a MnSAgent.allowedValues: N/A | type: DNmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| userDefinedState | An operator defined state for operator specific usage.allowedValues: N/A | type: Stringmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| userLabel | A user-friendly (and user assignable) name of this object.allowedValues: N/A | type: Stringmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| vendorName | The name of the vendor.allowedValues: N/A | type: Stringmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: 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/AA 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: Stringmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: True |
| vsData | Vendor specific attributes of the type vsDataType. The attribute definitions including constraints (value ranges, data types, etc.) are specified in a vendor specific data format file. allowedValues: -- | type: --multiplicity: --isOrdered: --isUnique: --defaultValue: --isNullable: False |
| vsDataFormatVersion | Name of the data format file, including version.allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: 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: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: 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: SupportedPerfMetricGroupmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneallowedValues: N/AisNullable: False |
| performanceMetrics | List of performance metrics.Performance metrics include measurements defined in TS 28.552 [20] and KPIs defined in TS 28.554 [28]. Performance metrics can also be specified by other SDOs, or be vendor specific. Performance metrics are identified with their names.For measurements defined in TS 28.552 [20] the name is constructed as follows:- "family.measurementName.subcounter" for measurement types with subcounters- "family.measurementName" for measurement types without subcounters- "family" for measurement familiesFor KPIs defined in TS 28.554 [28] the name is defined in the KPI definitions template as the component designated with e).A name can also identify a vendor specific performance metric or a group of vendor specific performance metrics.allowedValues: N/A | type: Stringmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: 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: Dnmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| reportingMethods | List of reporting methods for performance metricsallowedValues:  - "FILE\_BASED\_LOC\_SET\_BY\_PRODUCER", - "FILE\_BASED\_LOC\_SET\_BY\_CONSUMER", - "STREAM\_BASED" | type: ENUMmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| nFServiceType | The parameter defines the type of the managed NF service instanceallowedValues: See clause 7.2 of TS 23.501[22] | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: NoneisNullable: False |
| operations | This parameter defines set of operations supported by the managed NF service instance.allowedValues: See TS 23.502[23] for supporting operations | type: Operationmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: No default valueisNullable: False |
| Operation.name | This parameter defines the name of the operation of the managed NF service instance.allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: FalseisUnique: FalsedefaultValue: NoneisNullable: True |
| allowedNFTypes | This parameter identifies the type of network functions allowed to access the operation of the managed NF service instance.allowedValues: See TS 23.501[22] for NF types | type: ENUMmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| operationSemantics | This paramerter identifies the semantics type of the operation. See TS 23.502[23]allowedValues: “Request/Response”, “Subscribe/Notify”.  | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| sAP | This parameter specifies the service access point of the managed NF service instance.allowedValues: N/A | type: SAPmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| host | This parameter specifies the host address of the managed NF service instance. It can be FQDN (See TS 23.003 [5]) or an IPv4 address (See RFC 791 [24]) or an IPv6 address (See RFC 2373 [25]).allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: FalseisUnique: N/AdefaultValue: NoneisNullable: False |
| port | This parameter specifies the transport port of the managed NF service instance.allowedValues: 1 - 65535 | type: Integermultiplicity: 1isOrdered: FalseisUnique: FalsedefaultValue: NoneisNullable: False |
| usageState | Usage state of a managed object instance. It describes whether the resource is actively in use at a specific instant, and if so, whether or not it has spare capacity for additional users at that instant. allowedValues: "IDLE", "ACTIVE", "BUSY".The meaning of these values is as defined in 3GPP TS 28.625 [21] and ITU-T X.731 [19]. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| registrationState | This parameter defines the registration status of the managed NF service instance.allowedValues: "Registered", "Deregistered". | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: DeregisteredisNullable: False |
| jobId | Identifier of a PerfMetricJob job. | type: Stringmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| granularityPeriod | Granularity period used to produce measurements. The period is defined in seconds.See Note 4.allowedValues: Integer with a minimum value of 1 | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| granularityPeriods | Granularity periods supported for the production of associated measurement types. The period is defined in seconds.allowedValues: Integer with a minimum value of 1 | type: Integermultiplicity: \*isOrdered: False isUnique: defaultValue: NoneisNullable: False |
| reportingCtrl | Selecting the reporting method and defining associated control parameters. | type: ReportingCtrlmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: 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: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| fileLocation | File location allowedValues: Not applicable. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| streamTarget | The stream target for the stream-based reporting method.allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| administrativeState | Administrative state of a managed object instance. The administrative state describes the permission to use or prohibition against using the object instance. The adminstrative state is set by the MnS consumer.allowedValues: LOCKED, UNLOCKED.  | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: LOCKEDisNullable: 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: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: DISABLEDisNullable: False |
| alarmRecords | List of alarm recordsallowedValues: N/A | type: AlarmRecordmultiplicity: \*isOrdered: N/AisUnique: Truedefault value: NoneisNullable: True |
| numOfAlarmRecords | Number of alarm records in the AlarmList.allowedValues: 0 to x where x is vendor specific. | type: integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| lastModification | Time an alarm record was modified the last timeallowedValues: N/A | type: DateTimemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| tjJobType | It specifies the MDT mode and it specifies also whether the TraceJob represents only MDT, Logged MBSFN MDT, Trace or a combined Trace and MDT job. The attribute is applicable for Trace, MDT, RCEF and RLF reporting.See the clause 5.9a of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: TRACE\_ONLYisNullable: False |
| tjListOfInterfaces | It specifies the interfaces that need to be traced.The attribute is applicable only for Trace. In case this attribute is not used, it carries a null semantic.See the clause 5.5 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: NoisNullable: True |
| tjListOfNeTypes | It specifies the network element types where the trace should be activated. The attribute is applicable only for Trace with Signalling Based Trace activation. In case this attribute is not used, it carries a null semantic.See the clause 5.4 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: NoisNullable: True |
| tjPLMNTarget | It specifies which PLMN that the subscriber of the session to be recorded uses as selected PLMN. PLMN Target might differ from the PLMN specified in the Trace Reference.See the clause 5.9b of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: PlmnIdmultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: No isNullable: True |
| tjStreamingTraceConsumerURI | It specifies the Uniform Resource Identifier (URI) of the Streaming Trace data reporting MnS consumer (a.k.a. streaming target).See the clause 5.9 c of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjTraceCollectionEntityAddress | It specifies the address of the Trace Collection Entity when the attribute tjTraceReportingFormat is configured for the file-based reporting. The attribute is applicable for both Trace and MDT.See the clause 5.9 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: IpAddressmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjTraceDepth | It specifies the trace depth. The attribute is applicable only for Trace. In case this attribute is not used, it carries a null semantic.See the clause 5.3 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: MAXIMUM isNullable: True |
| tjTraceReference | A globally unique identifier, which uniquely identifies the Trace Session that is created by the TraceJob. In case of shared network, it is the MCC and MNC of the Participating Operator that request the trace session that shall be provided.The attribute is applicable for both Trace and MDT.See the clause 5.6 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: TraceReferencemultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: None isNullable: False |
| tjTraceRecordSessionReference | An identifier, which identifies the Trace Recording Session. The attribute is applicable for both Trace and MDT.See the clause 5.7 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: None isNullable: False |
| tjTraceReportingFormat | It specifies the trace reporting format - streaming trace reporting or file-based trace reporting.See the clause 5.11 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FILE isNullable: False |
| tjTraceTarget | It specifies the target object of the Trace and MDT. The attribute is applicable for both Trace and MDT. This attribute includes the ID type of the target as an enumeration and the ID value(s).The tjTraceTarget shall be "PUBLIC\_ID" in case of a Management Based Activation is done to an SCSCFFunction (Serving Call Session Control Function) or PCSCFFunction (Proxy Call Session Control Function) [TS 28.705[x]]. The tjTraceTarget shall be "UTRAN\_CELL" only in case of the UTRAN cell traffic trace function. The tjTraceTarget shall be "E-UTRAN\_CELL" only in case of E-UTRAN cell traffic trace function.The tjTraceTarget shall be "NG-RAN\_CELL" only in case of NR cell traffic trace function.The tjTraceTarget shall be either "IMSI", "IMEI" or "IMEISV" if the Trace Session is activated to any of the following ManagedEntity(ies):- HSSFunction (Home Subscriber Server) (TS 28.705 [x])- MscServerFunction (Mobile Switching Centre Server) (TS 28.702 [y])- SgsnFunction (Serving GPRS Support Node) (TS 28.702[z])- GgsnFunction (Gateway GPRS Support Node) (TS 28.702[z])- BmscFunction (Broadcast Multicast Service Centre) (TS 28.702z])- RncFunction (Radio Network Controller) (TS 28.652[a])- MmeFunction (Mobility Management Entity) (TS 28.708[b])- ServingGWFunction (Serving Gateway) (TS 28.708[b])- PGWFunction (PDN Gateway) (TS 28.708[b]).The tjTraceTarget shall be either “SUPI” or “IMEISV” if the Trace Session is activated to any of the following ManagedEntity(ies) (TS 28.541[c]):- AFFunction- AMFFunction- AUSFunction- NEFFunction- NRFFunction- NSSFFunction- PCFFunction- SMFFunction- UPFFunction- UDMFunctionIn case of signalling based MDT, the tjTraceTarget attribute shall be able to carry "PUBLIC\_ID", "IMSI", "IMEI", "IMEISV)" or "SUPI".In case of management based Immediate MDT, the tjTraceTarget attribute shall be null value.In case of management based Logged MDT, the tjTraceTarget attribute shall carry an "eNB" or a "gNB" or an "RNC". The Logged MDT should be initiated on the specified eNB/gNB/RNC in tjTraceTarget. In case of RLF reporting, or RCEF reporting, the tjTraceTarget attribute shall be null value. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjTriggeringEvent | It specifies the triggering event parameter of the trace session. The attribute is applicable only for Trace. In case this attribute is not used, it carries a null semantic.See the clause 5.1 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTAnonymizationOfData | It specifies the level of anonymization for management based MDT.See the clause 5.10.12 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NO\_IDENTITY isNullable: True |
| tjMDTAreaConfigurationForNeighCell | It specifies the area for which UE is requested to perform measurement logging for neighbour cells which have list of frequencies. If it is not configured, the UE shall perform measurement logging for all the neighbour cells.Applicable only to NR Logged MDT.See the clause 5.10.26 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: AreaConfigmultiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTAreaScope | It specifies MDT area scope when activates an MDT job. For RLF and RCEF reporting it specifies the eNB/gNB or list of eNBs/gNBs where the RLF or RCEF reports should be collected.List of cells/TA/LA/RA for signalling based MDT or management based Logged MDT.List of cells for management based Immediate MDT.Cell, TA, LA, RA are mutually exclusive.One or list of eNBs/gNBs for RLF and RCEF reportingSee the clause 5.10.2 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: AreaScopemultiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTCollectionPeriodRrmLte | It specifies the collection period for collecting RRM configured measurement samples for M3 in LTE. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.See the clause 5.10.20 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTCollectionPeriodRrmUmts | It specifies the collection period for collecting RRM configured measurement samples for M3, M4, M5 in UMTS. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.See the clause 5.10.21 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTEventListForTriggeredMeasurement | It specifies event types for event triggered measurement in the case of logged NR MDT. Each trace session may configure at most one event. The UE shall perform logging of measurements only upon certain condition being fulfilled:- Out of coverage.- A2 event.See the clause 5.10.28 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTEventThreshold | It specifies the threshold which should trigger the reporting in case A2 event reporting in LTE and NR or 1F/1l event in UMTS. The attribute is applicable only for Immediate MDT and when tjMDTReportingTrigger is configured for A2 event in LTE and NR or 1F event or 1l event in UMTS. In case this attribute is not used, it carries a null semantic.See the clauses 5.10.7 and 5.10.7a of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTListOfMeasurements | It specifies the UE measurements that shall be collected in an Immediate MDT job. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.See the clause 5.10.3 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTLoggingDuration | It specifies how long the MDT configuration is valid at the UE in case of Logged MDT. The attribute is applicable only for Logged MDT and Logged MBSFN MDT. In case this attribute is not used, it carries a null semantic.See the clause 5.10.9 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTLoggingInterval | It specifies the periodicty for Logged MDT. The attribute is applicable only for Logged MDT and Logged MBSFN MDT. In case this attribute is not Sused, it carries a null semantic.See the clause 5.10.8 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTLoggingEventThreshold | It specifies the threshold which should trigger the reporting in case of event based reporting of logged NR MDT. The attribute is applicable only for Logged MDT and when tjMDTReportType is configured for event triggered reporting and when tjMDTEventListForTriggeredMeasurement is configured for L1 event. In case this attribute is not used, it carries a null semantic.See the clause 5.10.36 of TS 32.422 [30] for additional details on the allowed values. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTLoggedHysteresis | It specifies the hysteresis used within the entry and leave condition of the L1 event based reporting of logged NR MDT. The attribute is applicable only for Logged MDT, when tjMDTReportType is configured for event triggered reporting and when tjMDTEventListForTriggeredMeasurement is configured for L1 event. In case this attribute is not used, it carries a null semantic.See the clause 5.10.37 of TS 32.422 [30] for additional details on the allowed values. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTLoggedTimeToTrigger | It specifies the threshold which should trigger the reporting in case of event based reporting of logged NR MDT. The attribute is applicable only for Logged MDT, when tjMDTReportType is configured for event triggered reporting and when tjMDTEventListForTriggeredMeasurement is configured for L1 event. In case this attribute is not used, it carries a null semantic.See the clauses 5.10.38 of TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTMBSFNAreaList | The MBSFN Area consists of a MBSFN Area ID and Carrier Frequency (EARFCN). The target MBSFN area List can have up to 8 entries. This parameter is applicable only if the job type is Logged MBSFN MDT.See the clause 5.10.25 of TS 32.422 [30] for additional details on the allowed values. | type: MbsfnAreamultiplicity: 1..8isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTMeasurementPeriodLTE | It specifies the collection period for the Data Volume (M4) and Scheduled IP throughput measurements (M5) for LTE MDT taken by the eNB. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.See the clause 5.10.23 of TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTCollectionPeriodM6Lte | It specifies the collection period for the Packet Delay measurement (M6) for MDT taken by the eNB. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.See the clause 5.10.32 of TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTCollectionPeriodM7Lte | It specifies the collection period for the Packet Loss Rate measurement (M7) for LTE MDT taken by the eNB. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.See the clause 5.10.33 of TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTMeasurementPeriodUMTS | It specifies the collection period for the Data Volume (M6) and Throughput measurements (M7) for UMTS MDT taken by RNC. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.See the clause 5.10.22 of TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTCollectionPeriodRrmNR | It specifies the collection period for collecting RRM configured measurement samples for M4, M5 in NR. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.See the clause 5.10.30 of TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTCollectionPeriodM6NR | It specifies the collection period for the Packet Delay measurement (M6) for NR MDT taken by the gNB. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.See the clause 5.10.34 of TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTCollectionPeriodM7NR | It specifies the collection period for the Packet Loss Rate measurement (M7) for NR MDT taken by the gNB. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.See the clause 5.10.35 of TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTM4ThresholdUmts | It specifies the threshold which should trigger the reporting in case of event-triggered periodic reporting for M4 (UE power headroom measurement) in UMTS. In case this attribute is not used, it carries a null semantic.See the clause 5.10.39 of TS 32.422 [30] for additional details on the allowed values. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTMeasurementQuantity | It specifies the measurements that are collected in an MDT job for a UMTS MDT configured for event triggered reporting.See the clause 5.10.15 of TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTPLMNList | It indicates the PLMNs where measurement collection, status indication and log reporting are allowed.See the clause 5.10.24 of TS 32.422 [30] for additional details on the allowed values. | type: PlmnIdmultiplicity: 1..16isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTPositioningMethod | It specifies what positioning method should be used in the MDT job.See the clause 5.10.19 of TS 32.422 [30] for additional details on the allowed values. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTReportAmount | It specifies the number of measurement reports that shall be taken for periodic reporting while the UE is in connected. The attribute is applicable only for Immediate MDT and when tjMDTReportingTrigger is configured for periodical measurements. In case this attribute is not used, it carries a null semantic.See the clause 5.10.6 of TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTReportingTrigger | It specifies whether periodic or event based measurements should be collected. The attribute is applicable only for Immediate MDT and when the tjMDTListOfMeasurements is configured for M1 (for UMTS, LTE and NR) or M2 (only for UMTS). In case this attribute is not used, it carries a null semantic.See the clause 5.10.4 of TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTReportInterval | It specifies the interval between the periodical measurements that shall be taken when the UE is in connected mode. The attribute is applicable only for Immediate MDT and when tjMDTReportingTrigger is configured for periodical measurements. In case this attribute is not used, it carries a null semantic.See the clause 5.10.5 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTReportType | It specifies report type for logged NR MDT as:- periodical.- event triggered.See the clause 5.10.27 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTSensorInformation | It specifies which sensor information shall be included in logged NR MDT and immediate NR MDT measurement if they are available. The following sensor measurement can be included or excluded for the UE: - Barometric pressure.- UE speed.- UE orientation.See the clause 5.10.29 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: ENUMmultiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| tjMDTTraceCollectionEntityID | It specifies the TCE Id which is sent to the UE in Logged MDT.See the clause 5.10.11 of 3GPP TS 32.422 [30] for additional details on the allowed values. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No isNullable: True |
| mcc | Mobile Country CodeallowedValues: As defined by the data type | type: Mccmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| mnc | Mobile NetworkallowedValues: As defined by the data type | type: Mncmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: 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: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| freqInfo | It specifies the carrier frequency and bands used in a cell. | type: FreqInfomultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: 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: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: 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: Integermultiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| pciList | List of neighbour cells subject for MDT scope.allowedValues: 0, 1, …,1007 | type: Integermultiplicity: 1..32isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| tac | Tracking Area CodeallowedValues: As defined by the data type | type: Tacmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| eutraCellIdList | List of E-UTRAN cells identified by E-UTRAN-CGIallowedValues: As defined by the data type | type: EutraCellIdmultiplicity: 1..32isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: False |
| nrCellIdList | List of NR cells identified by NG-RAN CGIallowedValues: As defined by the data type | type: NrCellIdmultiplicity: 1..32isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: False |
| tacList | Tracking Area Code listallowedValues: As defined by the data type | type: Tacmultiplicity: 1..8isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: False |
| taiList | Tracking Area Identity listallowedValues: As defined by the data type | type: Taimultiplicity: 1..8isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: False |
| mbsfnAreaId | MBSFN Area IdentifierAllowedValues: 1, 2, … | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| earfcn | Carrier Frequency AllowedValues: 1, 2, … | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| identifier | A readable string to uniquely represent an identity, e.g. an email address, a username, a phone number, etc.AllowedValues: NA | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| identifierType | Type of identifier, e.g. email address, ip address, username, phone number,etc.AllowedValues: USER NAME, EMAIL ADDRESS, IP ADDRESS, PHONE NUMBER, FQDN | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| identityType | The type of an identity, e.g. it could be human consumers, machine consumer, MnS producer. etc.AllowedValues: HUMAN MNS CONSUMER, MNS CONSUMER MNF, MNS CONSUMER PORTAL, MNS PRODUCER, AUTHN\_SERVICE\_PRODUCER, AUTHR\_SERVICE\_PRODUCER | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| identityStatus | The security status of a MnS consumer/producer, e.g. secure, unsecure, unknown, etc.AllowedValues: SECURE, UNSECURE, UNKNOWN | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| identityOwner | The owner of an identity, e.g. it could be an operator, organization of an operator, vertical customer/tenant.AllowedValues: NA | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: True |
| identityDomain | The domain of a management functions as MnS producer/consumer, e.g. e2e domain, core domain, ran domain, etc. AllowedValues: NA | type: Stringmultiplicity: 1isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: True |
| authSessionList | The list of authentication sessions established for a MnS consumer.The authSessionList only contains the active sessions.AllowedValues: As defined by the data type | type: AuthSessionmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: True |
| credential | The credential of an management service consumer or producer used for authentication with authentication service producer. It could be password, certificate, key, pass phrase, etc., based on authentication protocol and factor.AllowedValues: NA | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| groupOfIdentityRef | Group(s) to which a management service consumer or producer is assigned, or group(s) assoicated with a role. A management service consumer should be assigned to at least on identity group.AllowedValues: NA | type: DNmultiplicity: 0..\*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: False |
| roleInfoRef | Role(s) to which a management service consumer or a group of MnS consumer is assigned.AllowedValues: NA | type: DNmultiplicity: 0..\*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: False |
| groupName | A readable name of a group.AllowedValues: NA | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| groupType | The type of the group, e.g. it could be group of human consumers, group of machine consumers, group of MnS producers.AllowedValues: HUMAN MNS CONSUMER, MNS CONSUMER MNF, MNS CONSUMER PORTAL, MNS PRODUCER | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| groupOwner | The owner of the group, e.g. it could be an operator, a department of an operator, vertical customer/tenant.AllowedValues: NA | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: True |
| groupDomain | The domain of a group of management functions as MnS producer/consumer, e.g. e2e domain, core domain, ran domain, etc. AllowedValues: NA | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: True |
| plmnIds | The plmns supported by a group of management functions as MnS producer/consumer, or by a managed object/entity.AllowedValues: As defined by the data type | type: PLMNIdmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: True |
| sNSSAIs | The S-NSSAI list supported by a group of MnS producer/consumer, or by a managed object/entityAllowedValues: As defined by the data type | type: S-NSSAImultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: True |
| noOfMembers | The total number of identities assigned to the group.AllowedValues: 1, 2, … | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| policy4AuthnRef | The authentication policies assigned/configured to a group.AllowedValues: NA | type: DNmultiplicity: 0..\*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: False |
| Identity4ACRef | Management service consumer or producer associated to the groupAllowedValues: NA | type: DNmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: False |
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| Policy4Authn.policies | A list of authentication policies which could be, e.g. authentication factor, authentication protocol, credential policy, authentication context (e.g. time, location, identity status, etc.)AllowedValues: NA | type: Stringmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: False |
| sessionId | The id to identify an authentication session for a management service consumer. It's unique per management service consumer.AllowedValues: NA | type: Stringmultiplicity: 1isOrdered: N/AisUnique: YesdefaultValue: No valueisNullable: False |
| authState | The authentication state of an authentication session. The authentication session should be deleted if authentication is failed.The authSessionList only contains the current active sessions.AllowedValues: AUTHENTICATED, AUTHENTICATING | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: AUTHENTICATINGisNullable: False |
| AuthSession.context | The context of an authentication session for a MnS consumer, e.g. location of the MnS consumer, time of authenticating, etc.AllowedValues: NA | type: Stringmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: True |
| assocClient | The associated (machine) client/application which acting on behalf of a human MnS consumer when the MnS consumer authenticates to the authentication service producer. e.g. it could be a digital portal, a mediated management function, etc. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: True |
| assertion | The authentication assertion created and responded to MnS consumer after a successful authentication. It is a digital signed certifiation which issued by an authentication service producer. With the assertion, the MnS consumer could prove its authenticity to other management service producers, including authorization service producer. The attribute is only applicable to Explicit authentication. AllowedValues: NA | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: True |
| permInfoRef  | The permissions granted to a MnS consumer according to groups/roles assigned to the MnS consumer after the MnS consumer being authenticated and authorized. If access token is supported by protocol, permissions granted to a MnS consumer in an authentication session are included in the access token.AllowedValues: NA | type: DNmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: True |
| AccessRight.operation | The operation on the MOI protected with access rights or on its attributes or on its child/contained MOIs. It includes create, delete, read and update.AllowedValues: CREATE, DELETE, READ, UPDATE | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| AccessRight.attribute | The name of an attribute of the MOI protected with access rights. The attribute is only applicable to read and update operation. If operation is read and the attribute is not existed, it allows authorized consumer to read MOI tree of the protected MOI. If the attribute is existed but value is null, it allows authorized consumer to read/update all readable/writable attributes of the protected MOI.AllowedValues: NA | type: Stringmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: True |
| AccessRight.childObjectClass | The class name of child/contained MOIs of the MOI protected with access rights. It allows authorized consumer to create child MOIs.If the attribute is existed but value is null, it allows authorized consumer to create MOIs of all IOCs naming contained by the IOC of the protected MOI.AllowedValues: NA | type: Stringmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: True |
| AccessRight.childObjectInstance | It represents child/contained MOIs of the the MOI protected with access rights. It allows authorized consumer to delete child/contained MOIs of the protected MOI. If the attribute is existed but value is null, it allows authorized consumer to delete all child/contained MOIs of the protected MOI.AllowedValues: NA | type: DNmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: True |
| resourceOwner | The owner of the managed object/entity, e.g. it could be an operator, a department of an operator, vertical customer/tenant. The resource owner shall have the full permission of the resource.AllowedValues: NA | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: True |
| resourceDomain | The domain of the managed object/entity, e.g. e2e domain, core domain, ran domain, etc. AllowedValues: NA | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: True |
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| roleName | A readable name of a role.AllowedValues: NA | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| PermInfo.identity4ACRef | It represents the subject of permission which may be a MnS consumer, or a role/group of MnS consumers.AllowedValues: NA | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| PermInfo.accessRightRef | It points to an access right assigned/configured to a role/group of MnS consumers.AllowedValues: NA | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |
| preCondition | It defines condition to allow the consumer with access right to access the MnS. e.g. when the consumer is in specific location, during specific time, etc. AllowedValues: NA | type: AttributeValuePairmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: True |
| postCondition | It defines condition to restrict the specific resource which could be accessed by the consumer with access right, e.g. resource of specific S-NSSAI, event type, report data type, etc. The post-condition could be represented as list of key-value pair (referred to TS 32.158 clause 5.3.4.1) in ..e.g. key = NtfSubscriptionControl.notificationTypes, value = list of allowed values for notificationTypes; key = NtfSubscriptionControl.notificationRecipientAddress, value = list of target address (or maybe list of identities if the receiving entity is also managed by the system);key = PerfMetricJob.streamTarget, value = list of target address;key = NSACFFunction.numberOfRegisteredUE, value = list of NSSAIsAllowedValues: NA | type: AttributeValuePairmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: True |
| accessToken | The access or authorization token assigned to a MnS consumer in an authentication session after the MnS consumer being authenticated and authorized. The attribute is only applicable to Explicit authentication. AllowedValues: NA | type: AccessTokenmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: True |
| tokenId | It's id of an access token. It's unique per MnS consumerAllowedValues: NA | type: Stringmultiplicity: 1isOrdered: N/AisUnique: YesdefaultValue: No valueisNullable: False |
| AccessToken.context | The context of validity of the token, e.g. expire time, applicable region, etc. AllowedValues: NA | type: Stringmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: No valueisNullable: True |
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| issuer | It represents the id of the entity which issues the token, e.g. the id of authorization service producer.AllowedValues: NA | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: No valueisNullable: False |

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| **End of 3rd modification** |