**3GPP TSG-SA5 Meeting #139-e *S5-215122***

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

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **28.622** | **CR** | **0119** | **rev** | **-** | **Current version:** | **16.9.0** |  |
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| *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:*** | Add additional condition information for threashold monitoring | | | | | | | | | |
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| ***Source to WG:*** | S5 | | | | | | | | | |
| ***Source to TSG:*** | Huawei | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | adNRM | | | | |  | ***Date:*** | | | 2021-04-22 |
|  |  | | | |  | |  | | |  |
| ***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 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)* | |
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| ***Reason for change:*** | | ThresholdMonitor<<IOC>> and ThresholdInfo<<dataType>> is defined in TS 28.622 to support the capability of threshold monitoring. Multiple thresholds can be defined for multiple performance metric sets in a single monitor using thresholdInfoList and A threshold is defined using the attributes thresholdValue, thresholdDirection and hysteresis. However, the current threshold monitoring solution cannot allow the MnS consumer configure the different thresholdValues for the same performance metrics for different scenarios/conditions. An example, the threshold value for the “Average DL UE throughput in gNB” in traffic busy time can be lower than non-traffic busy time because more users are accessed and shared the radio resources. Another example, the thresholdValues for the “Registration success rate of one single network slice” may depend on “Mean registered subscribers of network and network slice”. | | | | | | | | |
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| ***Summary of change:*** | | Update ThresholdMonitor<<IOC>> and ThresholdInfo<<dataType>> to support the capability to allow MnS consumer configure the different thresholdValues for the same performance metrics for different scenarios/conditions. | | | | | | | | |
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| ***Consequences if not approved:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.3.16, 4.3.34, 4.3.X(new),4.4.1 | | | | | | | | |
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|  | | **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** |

### 4.3.16 ThresholdMonitor

#### 4.3.16.1 Definition

This IOC represents a threshold monitor for performance metrics. It can be name-contained by SubNetwork, ManagedElement, or ManagedFunction. A threshold monitor checks for threshold crossings of performance metric values and generates a notification when that happens.

To activate threshold monitoring, a MnS consumer needs to create a ThresholdMonitor instance on the MnS producer. For ultimate deactivation of threshold monitoring, the MnS consumer should delete the monitor to free up resources on the MnS producer.

For temporary suspension of threshold monitoring, the MnS consumer can manipulate the value of the administrative state attribute. The MnS producer may disable threshold monitoring as well, for example in overload situations. This situation is indicated by the MnS producer with setting the operational state attribute to disabled. When monitoring is resumed the operational state is set again to enabled.

All object instances below and including the instance name-containing the ThresholdMonitor (base object instance) are scoped for performance metric production. Performance metrics are monitored only on those object instances whose object class matches the object class associated to the performance metrics to be monitored.

The optional attributes objectInstances and rootObjectInstances allow to restrict the scope. When the attribute objectInstances is present, only the object instances identified by this attribute are scoped. When the attribute rootObjectInstances is present, then the subtrees whose root objects are identified by this attribute are scoped. Both attributes may be present at the same time meaning the total scope is equal to the sum of both scopes. Object instances may be scoped by both the objectInstances and rootObjectInstances attributes. This shall not be considered as an error by the MnS producer.

Multiple thresholds can be defined for multiple performance metric sets in a single monitor using thresholdInfoList. Multiple thresholdInfos can be applied for the same performance metric sets, and each thresoldInfo represents a threshold for a specific condition which is identify by attribute “conditionInfo”. In this scenario, MnS consumer create a ThresholdMonitor which contains multiple thresholdInfos for different conditions (i.e., time, vsCondition). Based on this, MnS producer firstly needs to determine the current condition and corresponding threshold value based on the collocted performance metrics for the specific condition, then determine the threshold monitor result.

The attribute monitorGranularityPeriod defines the granularity period to be applied.

A threshold is defined using the attributes thresholdValue , thresholdDirection, hysteresis and condition.

When hysteresis is absent or carries no information, a threshold is triggered when the thresholdValue is reached or crossed. When hysteresis is present, two threshold values are specified for the threshold as follows: A high treshold value equal to the threshold value plus the hysteresis value, and a low threshold value equal to the threshold value minus the hysteresis value. When the monitored performance metric increases, the theshold is triggered when the high threshold value is reached or crossed. When the monitored performance metric decreases, the theshold is triggered when the low threshold value is reached or crossed. The hsyteresis ensures that the performance metric value can oscillate around a comparison value without triggering each time the threshold when the threshold value is crossed.

Using the thresholdDirection attribute a threshold can be configured in such a manner that it is triggered only when the monitored performance metric is going up or down upon reaching or crossing the threshold.

A ThresholdMonitor creation request shall be rejected, if the performance metrics requested to be monitored, the requested granularity period, or the requested combination thereof is not supported by the MnS producer. A creation request may fail, when the performance metrics requested to be monitored are not produced by a PerfMetricJob.

Creation and deletion of ThresholdMonitor instances by MnS consumers is optional; when not supported, ThresholdMonitor instances may be created and deleted by the system or be pre-installed.

#### 4.3.16.2 Attributes

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | SQ | isReadable | isWritable | isInvariant | isNotifyable |
| administrativeState | M | T | T | F | T |
| operationalState | M | T | F | F | T |
| thresholdInfoList | M | T | T | F | T |
| monitorGranularityPeriod | M | T | T | F | T |
| objectInstances | O | T | T | F | F |
| rootObjectInstances | O | T | T | F | F |

#### 4.3.16.3 Attribute constraints

None.

#### 4.3.16.4 Notifications

The common notifications defined in clause 4.5 are valid for this IOC.

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| **2nd Change** |

### 4.3.34 ThresholdInfo <<dataType>>

#### 4.3.34.1 Definition

This data type defines a single threshold level. If the attribute”condition” present, this data type defines a single threshold level for a specific condition which can represented by specific conditionInfo.

#### 4.3.34.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | S | isReadable | isWritable | isInvariant | isNotifyable |
| performanceMetrics | M | T | T | F | T |
| thresholdDirection | M | T | T | F | T |
| thresholdValue | M | T | T | F | T |
| hysteresis | O | T | T | F | T |
| conditionInfo | O | T | T | F | T |

#### 4.3.34.3 Attribute constraints

None

#### 4.3.34.4 Notifications

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

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| **3rd Change** |

### 4.3.X ConditionInfo <<dataType>>

#### 4.3.X.1 Definition

This data type specifies which specific condition the thredshould level can be applied.The condition can be represented by time, load status.

#### 4.3.X.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | S | isReadable | isWritable | isInvariant | isNotifyable |
| appliedTimePeriods | M | T | T | F | T |
| vSConditions | M | T | T | F | T |

#### 4.3.X.3 Attribute constraints

None

#### 4.3.X.4 Notifications

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

### 4.3.Y TimePeriod <<dataType>>

#### 4.3.Y.1 Definition

This data type specifies a time period.

#### 4.3.Y.2 Attributes

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

#### 4.3.Y.3 Attribute constraints

None

#### 4.3.Y.4 Notifications

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

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| **4th Change** |

### 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: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: 0  isNullable: False | |
| triggerHeartbeatNtf | | Setting this attribute to TRUE triggers an immediate additional heartbeat notification emission. Setting the value to FALSE has no observable result.  The periodicity of notifyHeartbeat emission is not changed.  AllowedValues: TRUE, FALSE | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: FALSE  isNullable: False | |
| notificationRecipientAddress | | Address of the notification recipient.  allowedValues: N/A | | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| notificationTypes | | Notification types of notifications that are candidates for being forwarding to the notification recipient. If this attribute is absent, notifications of all types are candidates for being forwarding to the notification recipient.  If the notificationFilter attribute is absent, all candidate notifications are forwarded to the notification recipient, otherwise the candidate notifications are discriminated by the filter specified by the notificationFilter attribute.  AllowedValues:  - notifyMOICreation  - notifyMOIDeletion  - notifyMOIAttributeValueChanges  - notifyMOIChanges  - notifyEvent  - notifyNewAlarm  - notifyChangedAlarm  - notifyAckStateChanged  - notifyComments  - notifyCorrelatedNotificationChanged  - notifyChangedAlarmGeneral  - notifyAlarmListRebuilt  - notifyPotentialFaultyAlarmList  - notifyFileReady  - notifyFilePreparationError  - notifyThresholdCrossing | | type: ENUM  multiplicity: \*  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| notificationFilter | | Filter to be applied to candidate notifications identified by the notificationTypes attribute. Only notifications that pass the filter criteria are forwarded to the notification recipient. All other notifications are discarded.  The filter can be applied to any field of a notification.  allowedValues: N/A | | type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| scope | | Scopes the managed object instances included in the notification subscription. If this attribute is absent, all objects below and including the base object are scoped.  allowedValues: N/A | | type: Scope  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| scopeType | | If the optional scopeLevel attribute is not supported or absent, allowed values of scopeType are BASE\_ONLY and BASE\_ALL.  The value BASE\_ONLY indicates only the base object is selected.  The value BASE\_ALL indicates the base object and all of its subordinate objects (incl. the leaf objects) are selected.  If the scopeLevel attribute is supported and present, allowed values of scopeType are BASE\_NTH\_LEVEL and BASE\_SUBTREE.  The value BASE\_NTH\_LEVEL indicates all objects on the level, which is specified by the scopeLevel attribute, below the base object are selected. The base object is at scopeLevel zero.  The value BASE\_SUBTREE indicates the base object and all subordinate objects down to and including the objects on the level, which is specified by the scopeLevel attribute, are selected. The base object is at scopeLevel zero.  allowedValues: N/A | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| scopeLevel | | See definition of scopeType attribute.  allowedValues: N/A | | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| farEndEntity | | The value of this attribute shall be the Distinguished Name of the far end network entity to which the reference point is related.  As an example, with EP\_Iucs, if the instance of EP\_Iucs is contained by one RncFunction instance, the farEndEntity is the Distinguished Name of the MscServerFunction instance to which this Iucs reference point is related.  allowedValues: N/A | | type: DN  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| linkType | | This attribute defines the type of the link.  allowedValues: Signalling, Bearer, OAM&P, Other or multiple combinations of this type. | | type: String  multiplicity: 0..\*  isOrdered: False  isUnique: True  defaultValue: No  isNullable: False | |
| locationName | | The physical location of this entity (e.g. an address).  allowedValues: N/A | | type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| monitorGranularityPeriod | | Granularity period used to monitor measurements for threshold crossings. The period is defined in seconds.  See Note 5  allowedValues: Integer with a minimum value of 1 | | type: Integer  multiplicity: 1  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False | |
| monitorGranularityPeriods | | Granularity periods supported for the monitoring of associated measurement types for thresholds. The period is defined in seconds.  allowedValues: Integer with a minimum value of 1 | | type: Integer  multiplicity: \*  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| thresholdInfoList | | List of threshold infos. | | type: ThresholdInfo  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False | |
| thresholdValue | | Value against which the monitored performance metric is compared at a threshold level in case the hysteresis is zero.  allowedValues: float or integer | | type: Union  multiplicity: 1  isOrdered: NA  isUnique: NA  defaultValue: None  isNullable: False | |
| hysteresis | | Hysteresis of a threshold. If this attribute is present the monitored performance metric is not compared against the threshold value as specified by the thresholdValue attribute but against a high and low threshold value given by  highThresholdValue- = thresholdValue + hysteresis  lowThresholdValue = thresholdValue - hysteresis  When going up, the threshold is triggered when the performance metric reaches or crosses the high threshold value. When going down, the threshold is triggered when the performance metric reaches or crosses the low threshold value.  A hysteresis may be present only when the monitored performance metric is not of type counter that can go up only. If present for a performance metric of type counter, it shall be ignored.  allowedValues: non-negative float or integer | | type: Union  multiplicity: 0..1  isOrdered: NA  isUnique: NA  defaultValue: None  isNullable: False | |
| thresholdDirection | | Direction of a threshold indicating the direction for which a threshold crossing triggers a threshold.  When the threshold direction is configured to "UP", the associated treshold is triggered only when the performance metric value is going up upon reaching or crossing the threshold value. The treshold is not triggered, when the performance metric is going down upon reaching or crossing the threshold value.  Vice versa, when the threshold direction is configured to "DOWN", the associated treshold is triggered only when the performance metric is going down upon reaching or crossing the threshold value. The treshold is not triggered, when the performance metric is going up upon reaching or crossing the threshold value.  When the threshold direction is set to "UP\_AND\_DOWN" the treshold is active in both direcions.  In case a threshold with hysteresis is configured, the threshold direction attribute shall be set to "UP\_AND\_DOWN".  allowedValues:  - UP  - DOWN  - UP\_AND\_DOWN | | type: ENUM  multiplicity: 1  isOrdered: NA  isUnique: NA  defaultValue: None  isNullable: False | |
| appliedTimePeriods | | It specify the list of specific time period(s) the thredshold level can be applied.  Each TimePeriod specified by startTime and endTime.  allowedValues: N/A | | type: TimePeriod  multiplicity: 1  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False | |
| vSConditions | | It specify the vendor specific conditions (e.g. resource usage level) the threshold level can be applied.  The concrete vSCondition is implementation depends.  allowedValues: N/A | | type: String  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False | |
| startTime | | It specifies the UTC time for the start of a time period  allowedValues: containing the information same with xsd: dateTime. | | type: String  multiplicity: 1  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False | |
| endTime | | It specifies the UTC time for a end of a time period  allowedValues: containing the information same with xsd: dateTime. | | type: String  multiplicity: 1  isOrdered: False  isUnique: True  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: N/A  isUnique: N/A  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)  - 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 in case of BTSFunction and RNCFunction 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 in case of BTSFunction and RNCFunction instance(s).  allowedValues: -180.0000 to +180.0000  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: N/A  isUnique: True  defaultValue: None  isNullable: True | |
| priorityLabel | | This is a label that consumer would assign a value on a concrete instance of the managed object. The management system takes the value of this attribute into account. The effect of this attribute value to the subject managed entity is not standardized | | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| protocolVersion | | Versions(s) and additional descriptive information for the protocol(s) used for the associated communication link. Syntax and semantic is not specified.  allowedValues: N/A | | type: String  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False | |
| setOfMcc | | Set of Mobile Country Code (MCC). The MCC uniquely identifies the country of domicile of the mobile subscriber. MCC is part of the IMSI (TS 23.003 [5])  This list contains all the MCC values in subordinate object instances to this SubNetwork instance.  allowedValues: See clause 2.3 of TS 23.003 [5] for MCC allocation principles. | | type: Integer  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: No default value  isNullable: False | |
| swVersion | | The software version of the ManagementNode or ManagedElement (this is used for determining which version of the vendor specific information is valid for the ManagementNode or ManagedElement).  allowedValues: N/A | | type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| systemDN | | The Distinguished Name (DN) of IRPAgent (or consumer). Defined in 3GPP TS 32.300.  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  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.  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: N/A  isUnique: True  defaultValue: None  isNullable: True | |
| vsData | | Vendor specific attributes of the type vsDataType. The attribute definitions including constraints (value ranges, data types, etc.) are specified in a vendor specific data format file.  allowedValues: -- | | type: --  multiplicity: --  isOrdered: --  isUnique: --  defaultValue: --  isNullable: False | |
| vsDataFormatVersion | | Name of the data format file, including version.  allowedValues: N/A | | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| vsDataType | | Type of vendor specific data contained by this instance, e.g. relation specific algorithm parameters, cell specific parameters for power control or re-selection or a timer. The type itself is also vendor specific.  allowedValues: N/A | | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| supportedPerfMetricGroups | | A set of performance metric groups. When this attribute is contained in a managed object it may define performance metrics for this object and all descendant objects.  allowedValues: N/A | | type: SupportedPerfMetricGroup  multiplicity: \*  isOrdered: N/A  isUnique: N/A  defaultValue: None  allowedValues: N/A  isNullable: False | |
| performanceMetrics | | List of performance metrics.  Performance metrics include measurements defined in TS 28.552 [20] and KPIs defined in TS 28.554 [28]. Performance metrics can also be those specified by other SDOs or vendor specific metrics. Performance metrics are identified with their names. A name can als identify a vendor specific group of performance metrics.  For measurements defined in TS 28.552 [20] the name is constructed as follows:  - "family.measurementName.subcounter" for measurement types with subcounters  - "family.measurementName" for measurement types without subcounters  - "family" for measurement families  For KPIs defined in TS 28.554 [28] the name is defined in the KPI definitions template as the component designated with e).  allowedValues: N/A | | type: String  multiplicity: \*  isOrdered: N/A  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: N/A  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: N/A  isUnique: True  defaultValue: None  isNullable: False | |
| nFServiceType | | The parameter defines the type of the managed NF service instance  allowedValues: See clause 7.2 of TS 23.501[22] | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False | |
| operations | | This parameter defines set of operations supported by the managed NF service instance.  allowedValues: See TS 23.502[23] for supporting operations | | type: Operation  multiplicity: 1..\*  isOrdered: False  isUnique: False  defaultValue: No default value  isNullable: False | |
| Operation.name | | This parameter defines the name of the operation of the managed NF service instance.  allowedValues: N/A | | type: String  multiplicity: 1  isOrdered: False  isUnique: False  defaultValue: None  isNullable: True | |
| allowedNFTypes | | This parameter identifies the type of network functions allowed to access the operation of the managed NF service instance.  allowedValues: See TS 23.501[22] for NF types | | type: ENUM  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| operationSemantics | | This paramerter identifies the semantics type of the operation. See TS 23.502[23]  allowedValues: “Request/Response”, “Subscribe/Notify”. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| sAP | | This parameter specifies the service access point of the managed NF service instance.  allowedValues: N/A | | type: SAP  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| host | | This parameter specifies the host address of the managed NF service instance. It can be FQDN (See TS 23.003 [5]) or an IPv4 address (See RFC 791 [24]) or an IPv6 address (See RFC 2373 [25]).  allowedValues: N/A | | type: String  multiplicity: 1  isOrdered: False  isUnique: N/A  defaultValue: None  isNullable: False | |
| port | | This parameter specifies the transport port of the managed NF service instance.  allowedValues: 1 - 65535 | | type: Integer  multiplicity: 1  isOrdered: False  isUnique: False  defaultValue: None  isNullable: False | |
| usageStae | | Usage state of a managed object instance. It describes whether the resource is actively in use at a specific instant, and if so, whether or not it has spare capacity for additional users at that instant.  allowedValues: "IDLE", "ACTIVE", "BUSY".  The meaning of these values is as defined in 3GPP TS 28.625 [21] and ITU-T X.731 [19]. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| registrationState | | This parameter defines the registration status of the managed NF service instance.  allowedValues: "Registered", "Deregistered". | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: Deregistered  isNullable: False | |
| jobId | | Id for a PerfMetricJob job. | | type: String  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| granularityPeriod | | Granularity period used to produce measurements. The period is defined in seconds.  See Note 4.  allowedValues: Integer with a minimum value of 1 | | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| granularityPeriods | | Granularity periods supported for the production of associated measurement types. The period is defined in seconds.  allowedValues: Integer with a minimum value of 1 | | type: Integer  multiplicity: \*  isOrdered: N/A  isUnique: N/A  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 | |
| fileLocation | | File location  allowedValues: Not applicable. | | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True | |
| streamTarget | | The stream target for the stream-based reporting method.  allowedValues: N/A | | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True | |
| administrativeState | | Administrative state of a managed object instance. The administrative state describes the permission to use or prohibition against using the object instance. The adminstrative state is set by the MnS consumer.  allowedValues: LOCKED, UNLOCKED. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: LOCKED  isNullable: False | |
| operationalState | | Operational state of manged object instance. The operational state describes if an object instance is operable ("ENABLED") or inoperable ("DISABLED"). This state is set by the object instance or the MnS producer and is hence READ-ONLY.  allowedValues: ENABLED, DISABLED. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: DISABLED  isNullable: False | |
| alarmRecords | | List of alarm records  allowedValues: N/A | | type: AlarmRecord  multiplicity: \*  isOrdered: N/A  isUnique: True  default value: None  isNullable: True | |
| numOfAlarmRecords | | Number of alarm records in the AlarmList.  allowedValues: 0 to x where x is vendor specific. | | type: integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| lastModification | | Time an alarm record was modified the last time  allowedValues: N/A | | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False | |
| tjJobType | | It specifies the MDT mode and it specifies also whether the TraceJob represents only MDT, Logged MBSFN MDT, Trace or a combined Trace and MDT job. The attribute is applicable for Trace, MDT, RCEF and RLF reporting.  See the clause 5.9a of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: TRACE\_ONLY  isNullable: False | |
| tjListOfInterfaces | | It specifies the interfaces that need to be traced in the given ManagedEntityFunction.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: ENUM  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjListOfNeTypes | | It specifies in which type of ManagedFunction 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: ENUM  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjPLMNTarget | | It specifies which PLMN that the subscriber of the session to be recorded uses as selected PLMN. PLMN Target might differ from the PLMN specified in the Trace Reference.  See the clause 5.9b of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: String  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: No  isNullable: True | |
| tjStreamingTraceConsumerURI | | It specifies the URI of the Streaming Trace data reporting MnS consumer (a.k.a. streaming target).  See the clause 5.9 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjTraceDepth | | It specifies the trace depth. The attribute is applicable only for Trace. In case this attribute is not used, it carries a null semantic.  See the clause 5.3 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: MAXIMUM  isNullable: True | |
| tjTraceReference | | A globally unique identifier, which uniquely identifies the Trace Session that is created by the TraceJob.  In case of shared network, it is the MCC and  MNC of the Participating Operator that request the trace session that shall be provided.  The attribute is applicable for both Trace and MDT.  See the clause 5.6 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False | |
| tjTraceReportingFormat | | It specifies the trace reporting format - streaming trace reporting or file-based trace reporting.  See the clause 5.11 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: FILE  isNullable: False | |
| tjTraceTarget | | It specifies the target object of the Trace and MDT. The attribute is applicable for both Trace and MDT. This attribute includes the ID type of the target as an enumeration and the ID value.  See the 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTAnonymizationOfData | | It specifies the level of anonymization for management based MDT.  See the clause 5.10.12 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: NO\_IDENTITY  isNullable: True | |
| tjMDTAreaConfigurationForNeighCell | | It specifies the area for which UE is requested to perform measurement logging for neighbour cells which have list of frequencies. If it is not configured, the UE shall perform measurement logging for all the neighbour cells.  Applicable only to NR Logged MDT.  See the clause 5.10.26 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: String  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTAreaScope | | It specifies MDT area scope when activates an MDT job.  For RLF and RCEF reporting it specifies the eNB or list of eNBs where the RLF or RCEF reports should be collected.  List of cells/TA/LA/RA for signaling 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 for RLF and RCEFreporting  See the clause 5.10.2 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: String  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTCollectionPeriodRrmLte | | It specifies the collection period for collecting RRM configured measurement samples for M2, M3 in LTE. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.20 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTCollectionPeriodRrmUmts | | It specifies the collection period for collecting RRM configured measurement samples for M3, M4, M5 in UMTS. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.21 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTEventListForTriggeredMeasurement | | It specifies event types for event triggered measurement in the case of logged NR MDT. Each trace session may configure at most one event. The UE shall perform logging of measurements only upon certain condition being fulfilled:  - Out of coverage.  - A2 event.  See the clause 5.10.28 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTEventThreshold | | It specifies the threshold which should trigger  the reporting in case A2 event reporting in LTE or 1F/1l event in UMTS. The attribute is applicable only for Immediate MDT and when reportingTrigger is configured for A2 event in LTE or 1F event or 1l event in UMTS. In case this attribute is not used, it carries a null semantic.  See the clauses 5.10.7 and 5.10.7a of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTListOfMeasurements | | It specifies the UE measurements that shall be collected in an Immediate MDT job. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.3 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTLoggingDuration | | It specifies how long the MDT configuration is valid at the UE in case of Logged MDT. The attribute is applicable only for Logged MDT and Logged MBSFN MDT. In case this attribute is not used, it carries a null semantic.  See the clause 5.10.9 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTLoggingInterval | | It specifies the periodicty for Logged MDT. The attribute is applicable only for Logged MDT and Logged MBSFN MDT. In case this attribute is not 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: 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 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: String  multiplicity: 1..8  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTMeasurementPeriodLTE | | It specifies the measurement period for the Data Volume and Scheduled IP throughput measurements 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 5.10.23 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTMeasurementPeriodUMTS | | It specifies the measurement period for the Data Volume and Throughput measurements for 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 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| 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 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| 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 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTPLMList | | It indicates the PLMNs where measurement collection, status indication and log reporting is allowed.  See the clause 5.10.24 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: PLMN  multiplicity: 1..16  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTPositioningMethod | | It specifies what positioning method should be used in the MDT job.  See the clause 5.10.19 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| 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 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| 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 both UMTS and LTE) or M2 (only for UMTS). In case this attribute is not used, it carries a null semantic.  See the clause 5.10.4 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| 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: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTReportType | | It specifies report type for logged NR MDT as:  - periodical.  - event triggered.  See the clause 5.10.27 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTSensorInformation | | It specifies which sensor information shall be included in logged NR MDT and immediate NR MDT measurement if they are available. The following sensor measurement can be included or excluded for the UE:  - Barometric pressure.  - UE speed.  - UE orientation.  See the clause 5.10.29 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: ENUM  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| tjMDTTraceCollectionEntityID | | It specifies the TCE Id which is sent to the UE in Logged MDT.  See the clause 5.10.11 of 3GPP TS 32.422 [30] for additional details on the allowed values. | | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: No  isNullable: True | |
| 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 same attribute 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. | | | | | |

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| **End of Change** |