3GPP TSG SA WG5 Meeting 143-e S5-223346

**e-meeting, 9 -17 May 2022**

**Source: Nokia**

**Title: Adding MDA output IOC**

**Document for: Approval**

**Agenda Item: 6.6.5**

# 1 Decision/action requested

This contribution is for approval.

# 2 References

[x] TR 28.809 Study on enhancement of management data analytics

# 3 Rationale

This contribution introduces the MDA output IOC in order to enable the MDA MnS producer to provide MDA output towards a managed entity that is responsible for holding data, allowing the MDA MnS consumer to obtain it at any point in time. This contribution also introduces a unified way to represent MDA output, which can be used across all use cases in [x] and can be further populated with use case specific MDA output (so this proposal shall not be perceived as completed – it is a draft). The idea is to introduce a way to represent numeric analytics and root cause analysis that would be the same across all use cases, since currently we are facing the problem that many use cases introduce different parameters to represent statistics or predictions, i.e., some of them include duration other not, while none use case introduce confidence degree related to statistics or prediction.

# 4 Detailed proposal

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| **1st Modified Section** |

# 9.2 Class diagram

### 9.2.1 Relationships

This clause provides the relationships of relevant classes in UML.



**Figure 9.2.1-1: NRM fragment for MDA request and MDA output (Update)**

### 9.2.2 Inheritance





**Figure 9.2.2-1: Inheritance Hierarchy**

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| **2nd Modified Section** |

## 9.3 Class definitions

### 9.3.1 MDARequest

#### 9.3.1.1 Definition

The IOC MDARequest represents the MDA output request created by an MnS consumer.

The attribute requestedMDAOutputs contains one or multiple RequestedMDAOutputPerMDAType elements, and each RequestedMDAOutputPerMDAType element supports filtering of MDA output for a certain MDA type.

#### 9.3.1.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable  | isWritable | isInvariant | isNotifyable |
| requestedMDAOutputs | M | T | T | F | T |
| reportingMethod | M | T | T | F | T |
| analyticsScope | M | T | T | F | T |
| startTime | M | T | T | F | T |
| stopTime | M | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
|  |  |  |  |  |  |

#### 9.3.1.3 Attribute constraints

None.

#### 9.3.1.4 Notifications

The common notifications defined in clause 9.6 are valid for this IOC, without exceptions or additions.

### 9.3.x MDAReport

#### 9.3.x1 Definition

The IOC MDAReport represents the report containing the outputs for one or more MDA types delivered to the MDA consumer.

#### 9.3.x.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | S | isReadable  | isWritable | isInvariant | isNotifyable |
| MDAReportID | M | T | F | T | T |
| mDAOutputs | M | T | F | F | T |
| **Attribute related to role** |  |  |  |  |  |
|  |  |  |  |  |  |

Note: The content represented by this IOC can be reported by notification, file and streaming.”

#### 9.3.x.3 Attribute constraints

None.

#### 9.3.x.4 Notifications

None.

## 9.4 Data type definitions

### 9.4.1 RequestedMDAOutputPerMDAType <<dataType>>

#### 9.4.1.1 Definition

The <<dataType>> represents the analytics output filters for each MDA type for an MDA request.

If only mDAType element is present (i.e., mDAOutputIEFilters element is not present), then all of the MDA output information elements for this mDAType (see analytics output definitions per MDA capability in clause 8) are requested.

if mDAOutputIEFilters element is present, then only the listed analytics output information elements are requested and shall be reported according to the corresponding threshold.

#### 9.4.1.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable  | isWritable | isInvariant | isNotifyable |
| mDAType | M | T | T | F | T |
| mDAOutputIEFilters | O | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
|  |  |  |  |  |  |

#### 9.4.1.3 Attribute constraints

None.

#### 9.4.1.4 Notifications

The <<IOC>> using this <<dataType>> for one of its attributes, shall be applicable.

### 9.4.2 MDAOutputIEFilter <<dataType>>

#### 9.4.2.1 Definition

The <<dataType>> represents the filter for an MDA output information element for an MDA request.

If only mDAOutputIEName element is present (i.e., mDAOutputIEFilterValue and mDAOutputIEThreshold elements are not present), then the MDA output information element indicated by the mDAOutputIEName is requested and reported without filter or threshold.

If mDAOutputIEFilterValue element is present (only applicable when the MDA output information element indicated by mDAOutputIEName is non-numeric type (e.g., enum, string)), then the MDA output information element indicated by the mDAOutputIEName is only requested and reported when its value equals to the value of mDAOutputIEFilterValue.

If mDAOutputIEThreshold element is present (only applicable when the MDA output information element indicated by mDAOutputIEName is numeric type (e.g., integer, real)), then the MDA output information element indicated by the mDAOutputIEName is only requested and reported when its value reaches or crosses the threshold.

#### 9.4.2.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable  | isWritable | isInvariant | isNotifyable |
| mDAOutputIEName | M | T | T | F | T |
| mDAOutputIEFilterValue | CO | T | T | F | T |
| mDAOutputIEThreshold | CO | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
|  |  |  |  |  |  |

#### 9.4.2.3 Attribute constraints

|  |  |
| --- | --- |
| Name | Definition |
| mDAOutputIEFilterValue Support Qualifier | Condition: the MDA output information element indicated by the mDAOutputIEName element is non-numeric type (e.g., enum, string). |
| mDAOutputIEThreshold Support Qualifier | Condition: the MDA output information element indicated by the mDAOutputIEName element is numeric type (e.g., integer, real). |

#### 9.4.2.4 Notifications

The <<IOC>> using this <<dataType>> for one of its attributes, shall be applicable.

### 9.4.3 AnalyticsScopeType <<choice>>

#### 9.4.3.1 Definition

The <<choice>> represents the scope of analytics.

When the managedEntitiesScope attribute is present, the MnS producer identify the analytics scope by the DNs of the managed entities.

When the areaScope attribute is present, the MnS producer identify the analytics scope by the geographical area information.

The managedEntitiesScope attribute and areaScope attribute shall not be present at the same time.

#### 9.4.3.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable  | isWritable | isInvariant | isNotifyable |
| Choice\_1 managedEntitiesScope | CM | T | T | F | T |
| Choice\_2 areaScope | CM | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
|  |  |  |  |  |  |

#### 9.4.3.3 Attribute constraints

|  |  |
| --- | --- |
| Name | Definition |
| Choice\_1 managedEntitiesScope | Condition: the MDA MnS producer supports to identify the scope by managed entities. |
| Choice\_2 areaScope | Condition: MDA MnS producer supports to identify the scope by geographical area information. |

#### 9.4.3.4 Notifications

The <<IOC>> using this <<dataType>> for one of its attributes, shall be applicable.

### 9.4.y MDAOutputs <<dataType>>

#### 9.4.y.1 Definition

The IOC MDAOutputs represents the MDA outputs created by an MDA MnS producer for a specific MDA type.

#### 9.4.y.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | S | isReadable  | isWritable | isInvariant | isNotifyable |
| mDAType | M | T | T | F | T |
| mdaOutputList | M | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
| mDARequestRef |  |  |  |  |  |

#### 9.4.y.3 Notifications

The common notifications defined in clause 9.6 are valid for this IOC, without exceptions or additions.

### 9.4.x mdaOutputEntry <<dataType>>

#### 9.4.x.1 Definition

This data type specifies MDA output related to numeric analytics, i.e., statistics or predictions.

#### 9.4.x.1 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | S | isReadable  | isWritable | isInvariant | isNotifyable |
| mdaOutputIEName | M | T | T | F | T |
| mdaOutputIEValue | M | T | T | F | T |
| analyticsWindow | M | T | T | F | T |
| confidenceDegree | M | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
|  |  |  |  |  |  |

Editor note: mdaOutputResult type “string” needs to be discussed further in order to explore potential output categories.

#### 9.4.x.3 Notifications

The <<IOC>> using this <<dataType>> all of its attributes, shall be applicable.

### 9.4.z TimeWindow <<dataType>>

#### 9.4.z.1 Definition

The <<dataType>> represents the time duration related to the MDA output towards the MDA MnS consumer.

#### 9.4.z.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | S | isReadable  | isWritable | isInvariant | isNotifyable |
| startTime | M | T | T | F | T |
| endTime | M | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
|  |  |  |  |  |  |

#### 9.4.z.3 Notifications

The <<IOC>> using this <<dataType>> both of its attributes, shall be applicable.

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| **3rd Modified Section** |

## 9.5 Attribute definitions

### 9.5.1 Attribute properties

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| mDAType | It indicates the type of MDA type (corresponding to the MDA capability).AllowedValues: the value of MDA type defined for each MDA capability in clause 8. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| requestedMDAOutputs  | It indicates the requested analytics outputs for an MDA request | type: RequestedMDAOutputPerMDAType multiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| mDAOutputIEFilters | It provides the filters for the analytics output information elements of an MDA type for an MDA request. | type: MDAOutputIEFiltermultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| mDAOutputIEName | It indicates the analytics output information element name of an MDA type for an MDA request.AllowedValues: the analytics output information element names for each MDA type as specified in clause 8. | type: stringmultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| mDAOutputIEFilterValue | It indicates the filter value for analytics output information element for an MDA request.The MDA output information element is only requested and reported when its value equals to the value of this attribute.allowedValues: depends on the definitions of the analytics output information element (see clause 8) indicated by mDAOutputIEName attribute. | type: stringmultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| mDAOutputIEThreshold | It indicates the threshold for analytics output information element for an MDA request. | type: TBDmultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: TrueEditor’s note: it is TBD to whether reuse the ThresholdInfo data type defined in 28.622. |
| reportingMethod | It indicates the reporting method of the analytics output selected by the MnS consumer.allowedValues: File, Streaming, Notification.Editor’s note: the detailed solution for Notification based solution is FFS. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| analyticsScope | It indicates the scope of the analytics requested by the MnS consumer. | type: AnalyticsScopeTypemultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| managedEntitiesScope | It indicates the scope of the analytics by the DNs of the managed entities.It carries the DN(s) of SubNetwork MOI(s), ManagedElement MOI(s), and/or the MOI(s) of the derivative IOCs of ManagedFunction (see TS 28.622 [19]).For each MOI provided by this attribute, the MOI itself and all of its subordinated MOIs are in the scope of analytics. | type: DNmultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| areaScope | It indicates the scope of the analytics by the geographical area information. | type: GeoArea (see TS 28.622)multiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| startTime | It indicates the start time of the analytics requested by the MnS consumer. | type: DateTime (see TS 32.156 [18])multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| stopTime | It indicates the stop time of the analytics requested by the MnS consumer. | type: DateTime (see TS 32.156 [18])multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| MDAReportID | It indicates the identifier for the MDAReport | type: stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| mdaOutputList | It indicates a list of output results related to particular MDA type.  | type: mdaOutputEntrymultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| analyticsWindow | It indicates the time duration related to MDA output. It can be in the past, when the analytics is statistics, or in the future for a prediction. | type: TimeWindowmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| analyticsType | Characterizes the type of the requested MDA report output data.allowedValues: statistics, predictions  | type:ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| mdaResultName | It indicates the MDA output result name related to mdaOutputResult.  | type: stringmultiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| mdaOutputIEValue | It indicates the MDA output result that can be numeric or non-numeric | type: The type for the corresponding mdaOutputIEName as defined in clause 8multiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| confidenceDegree | A probability range that contains the degree of accuracy of the analytics output statistics or prediction. | type:Realmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |

### 9.5.2 Constraints

|  |  |  |
| --- | --- | --- |
| Name | Affected attribute(s) | Definition |
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| **End of Modified Section** |