**3GPP TSG-SA5 Meeting #143eS5-223410**

**09 - 17 May 2022, E-meeting**

**Source: Nokia**

**Title: pCR 28.104 enhance MDA information model**

**Document for: Approval**

**Agenda Item: 6.6.5**

# 1 Decision/action requested

***The group is asked to discuss and agree on the proposal.***

# 2 References

[1] 3GPP TS 28.104-100 “Management and orchestration; [Management Data Analytics](https://portal.3gpp.org/ngppapp/CreateTDoc.aspx?mode=view&contributionId=1330366)”.

# 3 Rationale

TR 28.104 includes a stage 2 model that only captures the request for analytics and that show what happens after the analytics is requested. Since we know that a process needs to be instantiated to serve the analytics, we need to model this job that is instantiated. Moreover, the analytics output needs to indicate to the consumer meta information (e.g. name/identifier and version) of the computational model that was used to generate the analytics. This contribution extends the stage 2 model to include these features.

# 4 Detailed proposal

|  |
| --- |
| **Start of modifications** |

## 9.2 Class diagram

### 9.2.1 Relationships

This clause provides the relationships of relevant classes in UML.

@startuml

skinparam ClassStereotypeFontStyle normal

skinparam ClassBackgroundColor White

skinparam shadowing false

skinparam monochrome true

hide members

hide circle

'skinparam maxMessageSize 250

class MDAEntity <<ProxyClass>>

class SupportedAnalytics<<InformationObjectClass>>

class MDAFunction <<InformationObjectClass>>

class MDARequest <<InformationObjectClass>>

class MDAReport <<InformationObjectClass>>

class MDAJob <<InformationObjectClass>>

MDAEntity "1" \*-- "\*" MDAFunction: <<names>>

MDAFunction "1" -d-> "\*" SupportedAnalytics: <<names>>

MDAFunction "1" \*-- "\*" MDAJob: <<names>>

MDAFunction "1" \*-- "\*" MDARequest: <<names>>

MDAFunction "1" \*-- "\*" MDAReport: <<names>>

MDAJob "1" <-r-> "\*" MDAReport

MDARequest "\*" -l-> "1" SupportedAnalytics

MDARequest "\*" -r-> "\*" MDAJob

note left of MDAEntity

 Represents the following IOCs:

 Subnetwork or

 ManagedElement or

 ManagedFunction (Note 1)

 end note

@enduml



NOTE 1: When the MDAEntity represents the ManagedElement or ManagedFunction, it means the MDAF is located in the NE/NF that the ManagedElement or ManagedFunction represents, but it does not mean the MDA is the feature of the NE/NF.

**Figure 9.2.1-1: NRM fragment for MDA request**

### 9.2.2 Inheritance

@startuml TS 28.541 figure 6.2.1-2 (as of MArch 2021)

' UML diagram for 3GPP TS 28.541 clause 6

skinparam ClassStereotypeFontStyle normal

skinparam ClassBackgroundColor White

skinparam shadowing false

skinparam monochrome true

hide members

hide circle

'skinparam maxMessageSize 250

class Top <<InformationObjectClass>>

class MDAFunction <<InformationObjectClass>>

class MDARequest <<InformationObjectClass>>

class MDAJob <<InformationObjectClass>>

class MDAReport <<InformationObjectClass>>

Top <|-- MDAFunction

Top <|-- MDARequest

Top <|-- MDAJob

Top <|-- MDAReport

@enduml



**Figure 9.2.2-1: Inheritance Hierarchy**

## 9.3 Class definitions

### 9.3.1 MDAFunction

#### 9.3.1.1 Definition

The IOC MDAFunction represents the MDA function which supports one or more MDA capabilities.

#### 9.3.1.2 Attributes

None.

#### 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.

### 9.3.2 MDARequest

#### 9.3.2.1 Definition

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

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

#### 9.3.2.2 Attributes

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

#### 9.3.2.3 Attribute constraints

None.

#### 9.3.2.4 Notifications

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

### 9.3.3 SupportedAnalytics

#### 9.3.3.1 Definition

The IOC SupportedAnalyticsrepresents a specific MDA capability identified by a specific MDAType as described in clause 8.1.1.

The SupportedAnalytics may be identified by a supportedAnalyticsVersion and may apply one or more analyticsComputationModels. An example of the analyticsComputationModel for SupportedAnalytics that rely apply AI/ML is the AIMLEntity defined in 28.105

#### 9.3.3.2 Attributes

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

#### 9.3.2.3 Attribute constraints

None.

#### 9.3.2.4 Notifications

None.

### 9.3.4 MDAJob

#### 9.3.4.1 Definition

The IOC MDAJob represents the process instantiated to service a given MDARequest.

For a given request, 1 or more jobs may be instantiated. Alternatively, if the analytics already exists and no computation is necessary, a reporting may instead be instantiated.

MDAJob also

The MDAJob may be associated to one or more SupportedMDARequests

#### 9.3.4.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | S | isReadable  | isWritable | isInvariant | isNotifyable |
| administrativeState | M | T | T | F | T |
| operationalState | M | T | F | F | T |
| mDAJobID | M | T | T | F | T |
| supportedMDARequests | M | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
|  |  |  |  |  |  |

Edtirs's note: Other MDAJob attributes are FFS

#### 9.3.4.3 Attribute constraints

None.

#### 9.3.4.4 Notifications

None.

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### 9.3.6 MDAreport

#### 9.3.6.1 Definition

The IOC MDAReport represents the output of the MDA delivered to the MDA consumer. An instantiated MDAJob may result into one or more MDAReports.

#### 9.3.6.2 Attributes

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

Edtirs's note: Other MDAReport attributes are FFS

#### 9.3.6.3 Attribute constraints

None.

#### 9.3.6.4 Notifications

None.

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| **Next modifications** |

### 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: MDAOutputPerMDAType 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 |
| filterValue | 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 |
| threshold | 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. |
| analyticsPeriod | It indicates a list of times, which may determine a time-period related to a time schedule for analytics period.  | type: DateTimemultiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| timeOut | It indicates a time until which an MDA MnS consumer needs to obtain an MDA output. Beyond this time the MDA output is no loner needed by the MDA MnS consumer.  | type: DateTimemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| 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 |
| analyticsWindow | It indicates the time duration related with the analytics output towards the MDA MnS consumer.  | type: TimeWindowmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| supportedAnalyticsVersion | It indicates the version of the supportedAnalytics e.g. a time stamp of the time when the respective analyticsComputationModel was trained or put into service | type: stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| analyticsComputationModel | It indicates the (kind of mathematical) model or function used to derive the analytics provided by the MDAType. Examples could include a convolutional neural network, a mathematical/statistical function, a time-series prediction model. | type: stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| mDAJobID | It indicates the identifier for the MDAJob | type: stringmultiplicity: 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 |
| mDAOutput | Refer to S5-223346 | type: mDAOutputmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| MDARequestId | It indicates an identifier for a specific MDARequest | 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 |
| supportedMDARequests | It indicates the list of MDARequests that are supported or served by a specific MDAJob | type: listmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |

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| **End of modifications** |