**TSG-SA5 Meeting #162 *S5-253930d1***

**, , 5 – Revision of S5-253477**

|  |
| --- |
| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** | **0292** | **rev** | **1** | **Current version:** | **19.2.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: compr**ehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network | **X** |

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|  |
| ***Title:***  | Rel-19 CR TS 28.105 Correct associations on Training NRM fragment |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** | SA5 |
|  |  |
| ***Work item code:*** | TEI19 |  | ***Date:*** | 2025-08-14 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-19 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories 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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | Training NRM fragment figureThere are several issues in the figure:* Association between MLTrainingRequest and MLTrainingProcess shows navigation in the wrong direction (<-). In addition, the cardinality is wrong, since each MLTrainingRequest is always assocaited to only one MLTrainingProcess, and MLTrainingProcess can be associated to zero or one MLTrainingRequest
* Association between MLTrainingProcess and MLTrainingReport is one-way; it should be two-way.
* Self-association on MLTrainingReport has an incorrect cardinality.
* Association between MLTrainingRequest and MLModel is wrong, since it prevents from two or more MLTrainingRequest instances pointing out to the same MLModel instance.

MLTrainingRequest IOCSome existing sentences are unclear. Associations are missing. MLTrainingProcess IOCThe attribute mlModelGeneratedRef is not needed. The IOC should specify only the ML model which is being trained. The ML model generated after a successful training process needs to be specified not here, but in the MLTrainingReport IOC. Some existing sentences are unclear. Associations are missing. MLTrainingReport IOCThere are two contradictory quotes in the specification, defining different conditions for creating an MLTrainingReportMOI*.** *“The MLTrainingReport instance is created by the training MnS producer automatically when creating an MLTrainingRequest instance*” (see clause 7.3a.1.2.3.1). This quote is wrong, as there does not exist an association between MLTrainingReport and MLTrainingRequest (see Figure 7.3a.1.1.1-1). Actually, a MLTrainingReport MOI can exist without an MLTrainingRequest,for example when producer-initiated training, i.e. when there’s no MLTrainingRequest triggering MLTrainingProcess.
* “*When the training is completed with "status" equal to "FINISHED", the MLT MnS producer provides the training report, by creating an MLTrainingReport MOI, to the MLT MnS consumer*” (see clause 7.3a.1.2.3.4). This quote is correct, as the MLTrainingReport MOI creation is always associated to a MLTrainingProcess.

In addition, some of the attributes in the IOC are no longer needed:* trainingRequestRef. There is no association between MLTrainingRequest and MLTrainingRequest, see Figure 7.3a.1.1.1-1. Note also that the association between request and report can be done through MLTrainingProcess.
* mlModelRef. This is not needed, since it is already specified in the MLTrainingProcess. The report shall contain information on the ML model generated after successful training process (mlModelGeneratedRef).
 |
|  |  |
| ***Summary of change:*** | Correct issues identified for the figure and three IOCs.Correct wrong conditions for CM attributes.Clarify associations between Training NRM fragment IOCs, when describing individual IOCs. |
|  |  |
| ***Consequences if not approved:*** | Wrong implementation of Training NRM fragment.  |
|  |  |
| ***Clauses affected:*** | 7.3a.1.1.1, 7.3a.1.2.2.1, 7.3a.1.2.3.1, 7.3a.1.2.3.2, 7.3a.1.2.3.3, 7.3a.1.2.4.1, 7.3a.1.2.4.2, 7.3a.1.2.4.3, A.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ... |
|  |  |
| ***Other comments:*** | Forge MR link: <https://forge.3gpp.org/rep/sa5/MnS/-/merge_requests/1867> at commit d7e81bb8e81c7e8bbb7ecaf4376c0c5fc4d4beef |
|  |  |
| ***This CR's revision history:*** |  |

|  |
| --- |
| **1st Change** |

#### 7.3a.1.1 Class diagram

##### 7.3a.1.1.1 Relationships

This clause depicts the set of classes (e.g. IOCs) that encapsulates the information relevant to ML model training. For the UML semantics, see TS 32.156 [13].



Figure 7.3a.1.1.1-1: NRM fragment for ML model training

##### 7.3a.1.1.2 Inheritance



Figure 7.3a.1.1.2-1: Inheritance Hierarchy for ML model training related NRMs

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| **Next Change** |

##### 7.3a.1.2.2 MLTrainingRequest

###### 7.3a.1.2.2.1 Definition

The IOC MLTrainingRequest represents the ML model training request that is trigered by the ML training MnS consumer. This MLTrainingRequest can be associated to one MLModel (if the request is for a single ML model) or one MLModelCoordinationGroup (if the request is for joint training).

To trigger the ML model training process, ML training MnS consumer needs create MLTrainingRequest object instances on the ML training MnS producer. The MLTrainingRequest MOI is contained under one MLTrainingFunction MOI.

The MLTrainingRequest has a source to identify where it is coming from, which is represented with trainingRequestSource attribute. This attribute may be used by a ML Training MnS producer to prioritize the training resources for different sources.

Each MLTrainingRequest indicates the expectedRunTimeContext that describes the specific conditions for which the MLModel should be trained.

In case the request is accepted, the ML training MnS producer decides when to start the ML model training based on consumer requirements. Once the MnS producer decides to start the training based on the request, the ML training MnS producer instantiates one or more MLTrainingProcess MOI(s) that are responsible to perform the followings:

- collects (more) data for training, if the training data are not available or the data are available but not sufficient for the training;

- prepares and selects the required training data, with consideration of the consumer’s request provided candidate training data if any. The ML training MnS producer may examine the consumer's provided candidate training data and select none, some or all of them for training. In addition, the ML training MnS producer may select some other training data that are available in order to meet the consumer’s requirements for the ML model training;

- trains the MLModel using the selected and prepared training data.

The MLTrainingRequest may have a requestStatus field to represent the status of the specific MLTrainingRequest:

- The attribute values are "NOT\_STARTED", " IN\_PROGRESS", "SUSPENDED", "FINISHED", and "CANCELLED".

- When value turns to " IN\_PROGRESS", the ML training MnS producer instantiates one or more MLTrainingProcess MOI(s) representing the training process(es) being performed per the request and notifies the MLT MnS consumer(s) who subscribed to the notification.

When all of the training process associated to this request are completed, the value turns to "FINISHED".

The ML training MnS producer shall delete the corresponding MLTrainingRequest instance in case of the status value turns to "FINISHED" or "CANCELLED". The MnS producer may notify the status of the request to MnS consumer after deleting MLTrainingRequest instance.

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| **Next Change** |

###### 7.3a.1.2.2.4 Notifications

The common notifications defined in clause 7.6 are valid for this IOC, without exceptions or additions.

##### 7.3a.1.2.3 MLTrainingReport

###### 7.3a.1.2.3.1 Definition

The IOC MLTrainingReport represents the ML model training report that is provided by the training MnS producer. An MLTrainingReport instance is associated with one MLModel instance or one MLModelCoordinationGroup instance. An MLTrainingReport instance is associated to one MLTrainingProcess instance.

The MLTrainingReport instance is created by the training MnS producer when the training process gets completed (when the associated MLTrainingProcess instance has “status” attribute equal to “FINISHED”).

The MLTrainingReport MOI is contained under one MLTrainingFunction MOI.

###### 7.3a.1.2.3.2 Attributes

Table 7.3a.1.2.3.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable  | isWritable | isInvariant | isNotifyable |
| usedConsumerTrainingData | CM | T | F | F | T |
| modelConfidenceIndication | O | T | F | F | T |
| modelPerformanceTraining | M | T | F | F | T |
| areNewTrainingDataUsed | M | T | F | F | T |
| modelPerformanceValidation | O | T | F | F | T |
| **Attribute related to role** |  |  |  |  |  |
|  |  |  |  |  |  |
| trainingProcessRef | M | T | F | F | T |
| lastTrainingRef | CM | T | F | F | T |
| mLModelGeneratedRef | M | T | F | F | T |
| mLModelCoordinationGroupGeneratedRef | CM | T | F | F | T |
|  |  |  |  |  |  |

###### 7.3a.1.2.3.3 Attribute constraints

Table 7.3a.1.2.3.3-1

|  |  |
| --- | --- |
| Name | Definition |
|  |  |
| lastTrainingRef Support Qualifier | Condition: This attribute is present in case of ML model re-training. |
| mLModelCoordinationGroupGeneratedRef Support Qualifier | Condition: ML model joint training is supported. |

###### 7.3a.1.2.3.4 Notifications

The common notifications defined in clause 7.6 are valid for this IOC, without exceptions or additions.

##### 7.3a.1.2.4 MLTrainingProcess

###### 7.3a.1.2.4.1 Definition

The IOC MLTrainingProcess represents the ML model training process. When a ML model training process starts, an instance of the MLTrainingProcess is created by the MnS Producer and notification is sent to MnS consumer who has subscribed to it.The MnS producer can delete the MLTrainingProcess instance whose attribute status equals to "FINISHED" or "CANCELLED".

A training request triggers the start of a ML training process, and thus the creation of one MLTrainingProcess instance. One MLTrainingProcess instance may be associated to only one MLModel instance.

Each MLTrainingProcess has a priority that may be used to prioritize the execution of different MLTrainingProcess instances.

Each MLTrainingProcess may have one or more termination conditions used to define the points at which the MLTrainingProcess may terminate.

The "progressStatus" attribute represents the status of the ML model training and includes information the ML training MnS consumer can use to monitor the progress and results. The data type of this attribute is "ProcessMonitor" (see 3GPP TS 28.622 [12]). The following specializations are provided for this data type for the ML model training process:

- The "status" attribute values are "RUNNING", "CANCELLING", "SUSPENDED", "FINISHED", and "CANCELLED". The other values are not used.

- The "timer" attribute is not used.

- When the "status" is equal to "RUNNING" the "progressStateInfo" attribute shall indicate one of the following states: "COLLECTING\_DATA", "PREPARING\_TRAINING\_DATA", "TRAINING".

- No specifications are provided for the "resultStateInfo" attribute. Vendor specific information may be provided though.

When the training is completed with "status" equal to "FINISHED", the MLT MnS producer creates an MLTrainingReport instance. The consumer can access to the MLTrainingReport MOI by reading the attribute “trainingReportRef” in the MLTrainingProcess instance.

###### 7.3a.1.2.4.2 Attributes

Table 7.3a.1.2.4.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable  | isWritable | isInvariant | isNotifyable |
| priority | M | T | T | F | T |
| terminationConditions | M | T | T | F | T |
| progressStatus | M | T | F | F | T |
| cancelProcess | O | T | T | F | T |
| suspendProcess | O | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
| trainingRequestRef | CM | T | F | F | T |
| trainingReportRef | M | T | F | F | T |
|  |  |  |  |  |  |
| mLModelRef | M | T | F | F | T |

###### 7.3a.1.2.4.3 Attribute constraints

Table 7.3a.1.2.4.3-1

|  |  |
| --- | --- |
| Name | Definition |
| trainingRequestRef | Condition: Consumer-initiated training is supported.  |
|  |  |
|  |  |

###### 7.3a.1.2.4.4 Notifications

The common notifications defined in clause 7.6 are valid for this IOC, without exceptions or additions.

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| **Next Change** |

# A.2 PlantUML code for Figure 7.3a.1.1.1-1: NRM fragment for ML model training

@startuml

skinparam ClassStereotypeFontStyle normal

skinparam ClassBackgroundColor White

skinparam shadowing false

skinparam monochrome true

hide members

hide circle

'skinparam maxMessageSize 250

skinparam nodesep 60

class ManagedEntity <<ProxyClass>>

class MLModel <<InformationObjectClass>>

class MLModelCoordinationGroup <<InformationObjectClass>>

class MLTrainingFunction <<InformationObjectClass>>

class MLTrainingRequest <<InformationObjectClass>>

class MLTrainingReport <<InformationObjectClass>>

class MLTrainingProcess <<InformationObjectClass>>

class MLModelRepository <<InformationObjectClass>>

ManagedEntity "1" \*-- "\*" MLTrainingFunction: <<names>>

MLTrainingFunction "1" \*-- "\*" MLTrainingProcess: <<names>>

MLTrainingFunction "1" \*-- "\*" MLTrainingRequest: <<names>>

MLTrainingFunction "1" \*-- "\*" MLTrainingReport: <<names>>

MLTrainingFunction "1" \*-- "\*" ThresholdMonitor : <<names>>

MLTrainingFunction "\*" --> "1" MLModelRepository

MLTrainingProcess "1" <-r-> "1" MLTrainingReport

MLTrainingProcess "1" -l-> "0..1" MLTrainingRequest

MLTrainingRequest "\*" --> "0..1" MLModel

MLTrainingRequest "1" -r-> "0..1" MLModelCoordinationGroup

MLTrainingReport "1" --> "0..1" MLModel

MLTrainingReport "1" --> "0..1" MLModelCoordinationGroup

MLTrainingProcess "1" --> "0..1" MLModel

MLTrainingProcess "1" --> "0..1" MLModelCoordinationGroup

MLModel"\*" -l-> "1" ThresholdMonitor

MLTrainingReport "1" -r> "0..1" MLTrainingReport

note left of ManagedEntity

  This represents the following IOCs:

    SubNetwork or

    ManagedFunction or

    ManagedElement

  end note

@enduml

|  |
| --- |
| **Next Change** |

\*\*\* START OF CHANGE 1 \*\*\*

\*\*\* OpenAPI/TS28105\_AiMlNrm.yaml \*\*\*

<CODE BEGINS>

openapi: 3.0.1

info:

 title: AI/ML NRM

 version: 19.2.0

 description: >-

 OAS 3.0.1 specification of the AI/ML NRM

 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

 All rights reserved.

externalDocs:

 description: 3GPP TS 28.105; AI/ML Management

 url: http://www.3gpp.org/ftp/Specs/archive/28\_series/28.105/

paths: {}

components:

 schemas:

#-------- Definition of types-----------------------------------------------------

 MLContext:

 type: object

 properties:

 inferenceEntityRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 dataProviderRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 RequestStatus:

 type: string

 readOnly: true

 enum:

 - NOT\_STARTED

 - IN\_PROGRESS

 - SUSPENDED

 - FINISHED

 - CANCELLED

 - CANCELLING

 ModelPerformance:

 type: object

 properties:

 inferenceOutputName:

 type: string

 performanceMetric:

 type: string

 performanceScore:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/Float'

 decisionConfidenceScore:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/Float'

 ProcessMonitor:

 description: >-

 This data type is the "ProcessMonitor" data type defined in “genericNrm.yaml”

 with specialisations for usage in TS 28.105.

 type: object

 properties:

 status:

 type: string

 progressPercentage:

 type: integer

 minimum: 0

 maximum: 100

 progressStateInfo:

 type: string

 resultStateInfo:

 type: string

 AIMLManagementPolicy:

 description: >-

 This data type represents the properties of a policy for AI/ML management.

 type: object

 properties:

 thresholdList:

 type: array

 uniqueItems: true

 items:

 $ref: 'TS28623\_ThresholdMonitorNrm.yaml#/components/schemas/ThresholdInfo'

 managedActivationScope:

 $ref: '#/components/schemas/ManagedActivationScope'

 SupportedPerfIndicator:

 type: object

 properties:

 performanceIndicatorName:

 type: string

 readOnly: true

 isSupportedForTraining:

 type: boolean

 readOnly: true

 default: FALSE

 isSupportedForTesting:

 type: boolean

 readOnly: true

 default: FALSE

 ManagedActivationScope:

 oneOf:

 - type: object

 properties:

 dNList:

 type: array

 uniqueItems: true

 items:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

 - type: object

 properties:

 timeWindow:

 type: array

 uniqueItems: true

 items:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/TimeWindow'

 - type: object

 properties:

 geoPolygon:

 type: array

 uniqueItems: true

 items:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/GeoArea'

 MLCapabilityInfo:

 type: object

 properties:

 aIMLInferenceName:

 $ref: '#/components/schemas/AIMLInferenceName'

 capabilityName:

 type: string

 readOnly: true

 mLCapabilityParameters:

 description: A map (list of key-value pairs) for an aIMLInferenceName and capabilityName

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/AttributeNameValuePairSet'

 AvailMLCapabilityReport:

 type: object

 properties:

 availMLCapabilityReportID:

 type: string

 readOnly: true

 mLCapabilityVersionId:

 type: array

 uniqueItems: true

 items:

 type: string

 readOnly: true

 expectedPerformanceGains:

 type: array

 uniqueItems: true

 items:

 $ref: '#/components/schemas/ModelPerformance'

 mLModelRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 InferenceOutput:

 type: object

 properties:

 inferenceOutputId:

 type: array

 uniqueItems: true

 items:

 type: string

 readOnly: true

 aIMLInferenceName:

 $ref: '#/components/schemas/AIMLInferenceName'

 readOnly: true

 inferenceOutputTime:

 type: array

 uniqueItems: true

 items:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DateTimeRo'

 # FIXME, isOrder/isUnique both as True

 inferencePerformance:

 $ref: '#/components/schemas/ModelPerformance'

 outputResult:

 description: A map (list of key-value pairs) for Inference result name and it's value

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/AttributeNameValuePairSet'

 AIMLInferenceName:

 oneOf:

 - $ref: 'TS28104\_MdaNrm.yaml#/components/schemas/MDAType'

 - $ref: '#/components/schemas/NwdafAnalyticsType'

 - $ref: '#/components/schemas/NgRanInferenceType'

 - $ref: '#/components/schemas/VSExtensionType'

 NwdafAnalyticsType:

 $ref: 'TS29520\_Nnwdaf\_EventsSubscription.yaml#/components/schemas/NwdafEvent'

 NgRanInferenceType:

 type: string

 enum:

 - NG\_RAN\_NETWORK\_ENERGY\_SAVING

 - NG\_RAN\_LOAD\_BALANCING

 - NG\_RAN\_MOBILITY\_OPTIMIZATION

 VSExtensionType:

 type: string

#-------- Definition of types for name-containments ------

 SubNetwork-ncO-AiMlNrm:

 type: object

 properties:

 MLTrainingFunction:

 $ref: '#/components/schemas/MLTrainingFunction-Multiple'

 MLTestingFunction:

 $ref: '#/components/schemas/MLTestingFunction-Multiple'

 MLModelRepository:

 $ref: '#/components/schemas/MLModelRepository-Multiple'

 MLUpdateFunction:

 $ref: '#/components/schemas/MLUpdateFunction-Multiple'

 AIMLInferenceFunction:

 $ref: '#/components/schemas/AIMLInferenceFunction-Multiple'

 AIMLInferenceEmulationFunction:

 $ref: '#/components/schemas/AIMLInferenceEmulationFunction-Multiple'

 ManagedElement-ncO-AiMlNrm:

 type: object

 properties:

 MLTrainingFunction:

 $ref: '#/components/schemas/MLTrainingFunction-Multiple'

 MLTestingFunction:

 $ref: '#/components/schemas/MLTestingFunction-Multiple'

 MLModelRepository:

 $ref: '#/components/schemas/MLModelRepository-Multiple'

 MLUpdateFunction:

 $ref: '#/components/schemas/MLUpdateFunction-Multiple'

 AIMLInferenceFunction:

 $ref: '#/components/schemas/AIMLInferenceFunction-Multiple'

 AIMLInferenceEmulationFunction:

 $ref: '#/components/schemas/AIMLInferenceEmulationFunction-Multiple'

#-------- Definition of concrete IOCs --------------------------------------------

 MLTrainingFunction-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

 - type: object

 properties:

 mLModelRepositoryRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

 - type: object

 properties:

 MLTrainingRequest:

 $ref: '#/components/schemas/MLTrainingRequest-Multiple'

 MLTrainingProcess:

 $ref: '#/components/schemas/MLTrainingProcess-Multiple'

 MLTrainingReport:

 $ref: '#/components/schemas/MLTrainingReport-Multiple'

 ThresholdMonitors:

 $ref: 'TS28623\_ThresholdMonitorNrm.yaml#/components/schemas/ThresholdMonitor-Multiple'

 MLTestingRequest:

 $ref: '#/components/schemas/MLTestingRequest-Multiple'

 MLTestingReport:

 $ref: '#/components/schemas/MLTestingReport-Multiple'

 MLTrainingRequest-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - type: object

 properties:

 aIMLInferenceName:

 $ref: '#/components/schemas/AIMLInferenceName'

 candidateTrainingDataSource:

 type: array

 uniqueItems: true

 items:

 type: string

 trainingDataQualityScore:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/Float'

 trainingRequestSource:

 oneOf:

 - type: string

 - $ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

 requestStatus:

 $ref: '#/components/schemas/RequestStatus'

 expectedRuntimeContext:

 $ref: '#/components/schemas/MLContext'

 performanceRequirements:

 type: array

 uniqueItems: true

 items:

 $ref: '#/components/schemas/ModelPerformance'

 cancelRequest:

 type: boolean

 suspendRequest:

 type: boolean

 mLModelRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 mLModelCoordinationGroupRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 MLTrainingProcess-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - type: object

 properties:

 priority:

 type: integer

 default: 0

 terminationConditions:

 type: string

 progressStatus:

 $ref: '#/components/schemas/ProcessMonitor'

 cancelProcess:

 type: boolean

 default: FALSE

 suspendProcess:

 type: boolean

 default: FALSE

 trainingRequestRef: ## Figure 7.3a.1.1.1-1 has no such pointer

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 trainingReportRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 mLModelRef: ## Figure 7.3a.1.1.1-1 is 1-0..1 mapping, hence should be single

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 MLTrainingReport-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - type: object

 properties:

 usedConsumerTrainingData:

 type: array

 uniqueItems: true

 items:

 type: string

 readOnly: true

 modelConfidenceIndication:

 type: integer

 readOnly: true

 modelPerformanceTraining:

 type: array

 uniqueItems: true

 items:

 $ref: '#/components/schemas/ModelPerformance'

 modelPerformanceValidation:

 type: array

 uniqueItems: true

 items:

 $ref: '#/components/schemas/ModelPerformance'

 dataRatioTrainingAndValidation:

 type: integer

 areNewTrainingDataUsed:

 type: boolean

 readOnly: true

 trainingProcessRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 lastTrainingRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 mLModelGeneratedRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 mLModelCoordinationGroupGeneratedRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 MLTestingFunction-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

 - type: object

 properties: ##FIXME pointer to MLModelCoordinationGroup missing

 mLModelRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

 - type: object

 properties:

 MLTestingRequest:

 $ref: '#/components/schemas/MLTestingRequest-Multiple'

 MLTestingReport:

 $ref: '#/components/schemas/MLTestingReport-Multiple'

 MLTestingRequest-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - type: object

 properties:

 requestStatus:

 $ref: '#/components/schemas/RequestStatus'

 cancelRequest:

 type: boolean

 default: FALSE

 suspendRequest:

 type: boolean

 default: FALSE

 mLModelRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 mLModelCoordinationGroupRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 MLTestingReport-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - type: object

 properties:

 modelPerformanceTesting:

 type: array

 uniqueItems: true

 items:

 $ref: '#/components/schemas/ModelPerformance'

 mLTestingResult:

 type: string

 readOnly: true

 testingRequestRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 MLModelLoadingRequest-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - type: object

 properties:

 requestStatus:

 $ref: '#/components/schemas/RequestStatus'

 cancelRequest:

 type: boolean

 default: FALSE

 suspendRequest:

 type: boolean

 default: FALSE

 mLModelToLoadRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 MLModelLoadingPolicy-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - type: object

 properties:

 aIMLInferenceName:

 $ref: '#/components/schemas/AIMLInferenceName'

 policyForLoading:

 $ref: '#/components/schemas/AIMLManagementPolicy'

 mLModelRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 MLModelLoadingProcess-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - type: object

 properties:

 progressStatus:

 $ref: '#/components/schemas/ProcessMonitor'

 cancelProcess:

 type: boolean

 default: FALSE

 suspendProcess:

 type: boolean

 default: FALSE

 mLModelLoadingRequestRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 mLModelLoadingPolicyRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 loadedMLModelRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 MLModel-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 type: object

 properties:

 mLModelId:

 type: string

 readOnly: true

 aIMLInferenceName:

 $ref: '#/components/schemas/AIMLInferenceName'

 mLModelVersion:

 type: string

 readOnly: true

 expectedRunTimeContext:

 $ref: '#/components/schemas/MLContext'

 trainingContext:

 $ref: '#/components/schemas/MLContext'

 runTimeContext:

 $ref: '#/components/schemas/MLContext'

 supportedPerformanceIndicators:

 type: array

 uniqueItems: true

 items:

 $ref: '#/components/schemas/SupportedPerfIndicator'

 minItems: 1

 mLCapabilitiesInfoList:

 type: array

 uniqueItems: true

 items:

 $ref: '#/components/schemas/MLCapabilityInfo'

 minItems: 1

 retrainingEventsMonitorRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

 sourceTrainedMLModelRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 aIMLInferenceReportRefList:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 usedByFunctionRefList:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 MLModelRepository-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 MLModel:

 $ref: '#/components/schemas/MLModel-Multiple'

 MLModelCoordinationGroup:

 $ref: '#/components/schemas/MLModelCoordinationGroup-Multiple'

 MLModelCoordinationGroup-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 type: object

 properties:

 memberMLModelRefList:

 type: array

 uniqueItems: true

 items:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 minItems: 2

 ## 7.3a.4.1 IOC

 MLUpdateFunction-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

 - type: object

 properties:

 availMLCapabilityReport:

 $ref: '#/components/schemas/AvailMLCapabilityReport'

 mLModelRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

 - type: object

 properties:

 MLUpdateRequest:

 $ref: '#/components/schemas/MLUpdateRequest-Multiple'

 MLUpdateProcess:

 $ref: '#/components/schemas/MLUpdateProcess-Multiple'

 MLUpdateReport:

 $ref: '#/components/schemas/MLUpdateReport-Multiple'

 MLUpdateRequest-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 type: object

 properties:

 performanceGainThreshold:

 type: array

 uniqueItems: true

 items:

 $ref: '#/components/schemas/ModelPerformance'

 newCapabilityVersionId:

 type: array

 uniqueItems: true

 items:

 type: string

 updateTimeDeadline:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/TimeWindow'

 requestStatus:

 $ref: '#/components/schemas/RequestStatus'

 mLUpdateReportingPeriod:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/TimeWindow'

 cancelRequest:

 type: boolean

 default: FALSE

 suspendRequest:

 type: boolean

 default: FALSE

 mLUpdateProcessRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 mLModelRefList:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 MLUpdateProcess-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 type: object

 properties:

 progressStatus:

 $ref: '#/components/schemas/ProcessMonitor'

 cancelProcess:

 type: boolean

 default: FALSE

 suspendProcess:

 type: boolean

 default: FALSE

 mLModelRefList:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 mLUpdateRequestRefList:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 mLUpdateReportRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 MLUpdateReport-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 type: object

 properties:

 updatedMLCapability:

 $ref: '#/components/schemas/AvailMLCapabilityReport'

 mLModelRefList:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 mLUpdateProcessRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

 AIMLInferenceFunction-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

 - type: object

 properties:

 activationStatus:

 type: string

 enum:

 - ACTIVATED

 - DEACTIVATED

 managedActivationScope:

 $ref: '#/components/schemas/AIMLManagementPolicy'

 usedByFunctionRefList:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 mLModelRefList:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

 - type: object

 properties:

 AIMLInferenceReport:

 $ref: '#/components/schemas/AIMLInferenceReport-Multiple'

 MLModelLoadingRequest:

 $ref: '#/components/schemas/MLModelLoadingRequest-Multiple'

 MLModelLoadingProcess:

 $ref: '#/components/schemas/MLModelLoadingProcess-Multiple'

 MLModelLoadingPolicy:

 $ref: '#/components/schemas/MLModelLoadingPolicy-Multiple'

 MLModel:

 $ref: '#/components/schemas/MLModel-Multiple'

 AIMLInferenceReport-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - type: object

 properties:

 inferenceOutputs:

 type: array

 uniqueItems: true

 items:

 $ref: '#/components/schemas/InferenceOutput'

 minItems: 1

 mLModelRefList:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnListRo'

 AIMLInferenceEmulationFunction-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

 - type: object

 properties:

 AIMLInferenceReport:

 $ref: '#/components/schemas/AIMLInferenceReport-Multiple'

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

#-------- Definition of JSON arrays for name-contained IOCs ----------------------

 MLTrainingFunction-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLTrainingFunction-Single'

 MLTrainingRequest-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLTrainingRequest-Single'

 MLTrainingProcess-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLTrainingProcess-Single'

 MLTrainingReport-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLTrainingReport-Single'

 MLModel-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLModel-Single'

 MLModelRepository-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLModelRepository-Single'

 MLModelCoordinationGroup-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLModelCoordinationGroup-Single'

 MLTestingFunction-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLTestingFunction-Single'

 MLTestingRequest-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLTestingRequest-Single'

 MLTestingReport-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLTestingRequest-Single'

 MLModelLoadingRequest-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLModelLoadingRequest-Single'

 MLModelLoadingProcess-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLModelLoadingProcess-Single'

 MLModelLoadingPolicy-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLModelLoadingPolicy-Single'

 MLUpdateFunction-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLUpdateFunction-Single'

 MLUpdateRequest-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLUpdateRequest-Single'

 MLUpdateProcess-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLUpdateProcess-Single'

 MLUpdateReport-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/MLUpdateReport-Single'

 AIMLInferenceFunction-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/AIMLInferenceFunction-Single'

 AIMLInferenceReport-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/AIMLInferenceReport-Single'

 AIMLInferenceEmulationFunction-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/AIMLInferenceEmulationFunction-Single'

#-------- Definitions in TS 28.104 for TS 28.532 ---------------------------------

 resources-AiMlNrm:

 oneOf:

 - $ref: '#/components/schemas/MLTrainingFunction-Single'

 - $ref: '#/components/schemas/MLTrainingRequest-Single'

 - $ref: '#/components/schemas/MLTrainingProcess-Single'

 - $ref: '#/components/schemas/MLTrainingReport-Single'

 - $ref: '#/components/schemas/MLModel-Single'

 - $ref: '#/components/schemas/MLModelRepository-Single'

 - $ref: '#/components/schemas/MLModelCoordinationGroup-Single'

 - $ref: '#/components/schemas/MLTestingFunction-Single'

 - $ref: '#/components/schemas/MLTestingRequest-Single'

 - $ref: '#/components/schemas/MLTestingReport-Single'

 - $ref: '#/components/schemas/MLModelLoadingRequest-Single'

 - $ref: '#/components/schemas/MLModelLoadingProcess-Single'

 - $ref: '#/components/schemas/MLModelLoadingPolicy-Single'

 - $ref: '#/components/schemas/MLUpdateFunction-Single'

 - $ref: '#/components/schemas/MLUpdateRequest-Single'

 - $ref: '#/components/schemas/MLUpdateProcess-Single'

 - $ref: '#/components/schemas/MLUpdateReport-Single'

 - $ref: '#/components/schemas/AIMLInferenceFunction-Single'

 - $ref: '#/components/schemas/AIMLInferenceReport-Single'

 - $ref: '#/components/schemas/AIMLInferenceEmulationFunction-Single'

<CODE ENDS>

\*\*\* END OF CHANGE 1 \*\*\*

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