**3GPP TSG- Meeting # *S5-247281***

**Orlando, United States, 18th Nov 2024 - 22nd Nov 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** | **0204** | **rev** | **1** | **Current version:** |  |  |
|  |
| *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 Fix trainingRequestSource attribute |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** | TEI17 |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** | A |  | ***Release:*** |  |
|  | *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:*** | The description of trainingRequestSource attribute needs improvement. 1. In MLTrainingRequest IOC, the attribute description (“may have”) does not match with the support qualifier (“M”). The description is also incomplete. Additionally, some examples (e.g., operator roles, functional differentiators) are misleading, as they refer to concepts that have not been defined anywhere.
2. In the big attribute, the description is wrong, since the attribute does not identify the model, but the source instead.
3. The link on how the examples match with the attribute type (i.e. <<choice>>) is missing.
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| ***Summary of change:*** | Fix trainingRequestSource attribute description in the IOC and big attribute table, while justifying why this attribute is of type choice. Fix attribute type in stage 3. |
| * ***a***
 |  |
| ***Consequences if not approved:*** | Attribute description is wrong.Stage-3 is misaligned with stage-2 |
|  |  |
| ***Clauses affected:*** | 7.3a.1.2.2, 7.5.1, Forge |
|  |  |
|  | **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/1479> at commit 9ec852acf70deca27c36a6c0aef9838b2162b54c |
|  |  |
| ***This CR's revision history:*** |  |

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| **1st 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.

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 MOI may represent the request for initial ML model training or re-training. For ML model re-training, the MLTrainingRequest is associated to one MLModel for re-training a single ML model, or associated to one MLModelCoordinationGroup.

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 prodcuer 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.

###### 7.3a.1.2.2.2 Attributes

Table 7.3a.1.2.2.1-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable  | isWritable | isInvariant | isNotifyable |
| aIMLInferenceName | CM | T | F | F | T |
| candidateTrainingDataSource | O | T | T | F | T |
| trainingDataQualityScore | O | T | T | F | T |
| trainingRequestSource | M | T | T | F | T |
| requestStatus | M | T | F | F | T |
| expectedRuntimeContext | M | T | T | F | T |
| performanceRequirements | M | T | T | F | T |
| cancelRequest | O | T | T | F | T |
| suspendRequest | O | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
| mLModelRef | CM | T | F | F | T |
| mLModelCoordinationGroupRef | CM | T | F | F | T |

###### 7.3a.1.2.2.3 Attribute constraints

Table 7.3a.1.2.2.3-1

|  |  |
| --- | --- |
| Name | Definition |
| aIMLInferenceName | Condition: MLTrainingRequest MOI represents the request for initial ML model training.  |
| mLModelRef | Condition: MLTrainingRequest MOI represents the request for ML model re-training. |
| mLModelCoordinationGroupRef | Condition: MLTrainingRequest MOI represents the request for joint training of a group of ML models. |

###### 7.3a.1.2.2.4 Notifications

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

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| **2nd Change** |

## 7.5 Attribute definitions

### 7.5.1 Attribute properties

Table 7.5.1-1

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| mLModelId | It identifies the ML model.It is unique in each MnS producer.allowedValues: N/A. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| candidateTrainingDataSource | It provides the address(es) of the candidate training data source provided by MnS consumer. The detailed training data format is vendor specific.allowedValues: N/A. | type: Stringmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| aIMLInferenceName | It indicates the type of inference that the ML model supports. allowedValues: the values of the MDA type (see 3GPP TS 28.104 [2]), Analytics ID(s) of NWDAF (see 3GPP TS 23.288 [3]), types of inference for NG-RAN (see TS 38.300 [16] and TS 38.401 [17]), and vendor's specific extensions. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| areConsumerTrainingDataUsed | It indicates whether the consumer provided training data have been used for the ML model training.allowedValues: ALL, PARTIALLY, NONE. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| usedConsumerTrainingData | It provides the address(es) where lists of the consumer-provided training data are located, which have been used for the ML model training.allowedValues: N/A. | type: Stringmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| trainingRequestRef | It is the DN(s) of the related MLTrainingRequest MOI(s).allowedValues: DN. | type: DN multiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| trainingProcessRef | It is the DN(s) of the related MLTrainingProcess MOI(s) that produced the MLTrainingReport.allowedValues: DN. | type: DN multiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| trainingReportRef | It is the DN of the MLTrainingReport MOI that represents the reports of the ML model training.allowedValues: DN. | type: DN multiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| lastTrainingRef | It is the DN of the MLTrainingReport MOI that represents the reports for the last training of the ML model.allowedValues: DN. | type: DN multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| modelConfidenceIndication | It indicates the average confidence value (in unit of percentage) that the ML model would perform for inference on the data with the same distribution as training data.Essentially, this is a measure of degree of the convergence of the trained ML model.allowedValues: { 0..100 }. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| trainingRequestSource | It identifies the entity that requested to instantiate the MLTrainingRequest MOI.This attribute is the DN of a managed entity, otherwise, it is a String. | type: <<Choice>>multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| MLTrainingRequest.requestStatus | It describes the status of a particular ML model training request.allowedValues: NOT\_STARTED, IN\_PROGRESS, CANCELLING, SUSPENDED, FINISHED, and CANCELLED. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| mLTrainingProcessId | It identifies the training process.It is unique in each instantiated process in the MnS producer.allowedValues: N/A. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| priority | It indicates the priority of the training process.The priority may be used by the ML model training to schedule the training processes. Lower value indicates a higher priority.allowedValues: { 0..65535 }. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: 0 isNullable: False |
| terminationConditions | It indicates the conditions to be considered by the ML training MnS producer to terminate a specific training process.allowedValues: N/A. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| progressStatus | It indicates the status of the process.allowedValues: N/A. | type: ProcessMonitor multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| MLUpdateProcess.cancelProcess | It allows the ML update MnS consumer to cancel the ML update process.Setting this attribute to "TRUE" cancels the ML update process. Setting the attribute to "FALSE" has no observable result. allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLUpdateProcess.suspendProcess | It allows the ML update MnS consumer to suspend the ML update process.Setting this attribute to "TRUE" suspends the ML update process. The process can be resumed by setting this attribute to “FALSE” when it is suspended. Setting the attribute to "FALSE" has no observable result.allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| mLModelVersion | It indicates the version number of the ML model.allowedValues: N/A. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| performanceRequirements | It indicates the expected performance for a trained ML model when performing on the training data.allowedValues: N/A. | type: ModelPerformancemultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| modelPerformanceTraining | It indicates the performance score of the ML model when performing on the training data.allowedValues: N/A. | type: ModelPerformancemultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| MLTrainingProcess.progressStatus.progressStateInfo | It provides the following specialization for the “progressStateInfo“ attribute of the “ProcessMonitor“ data type for the “MLTrainingProcess.progressStatus“.When the ML model training is in progress, and the " mLTrainingProcess.progressStatus.status " is equal to "RUNNING", it provides the more detailed progress information.allowedValues for " mLTrainingProcess.progressStatus.status " = "RUNNING":- “COLLECTING\_DATA”- “PREPARING\_TRAINING\_DATA”- “TRAINING” + DN of the MLModel being trainedThe allowed values for " mLTrainingProcess.progressStatus.status " = "CANCELLING" are vendor specific.The allowed values for " mLTrainingProcess.progressStatus.status " = "NOT\_STARTED" are vendor specific. | type: Stringmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| inferenceOutputName | It indicates the name of an inference output of an ML model.allowedValues: the name of the MDA output IEs (see 3GPP TS 28.104 [2]), name of analytics output IEs of NWDAF (see TS 23.288 [3]), RAN inference output IE name(s), and vendor's specific extensions. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| performanceMetric | It indicates the performance metric used to evaluate the performance of an ML model, e.g. "accuracy", "precision", "F1 score", etc.allowedValues: N/A. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| performanceScore | It indicates the performance score (in unit of percentage) of an ML model when performing inference on a specific data set (Note).The performance metrics may be different for different kinds of ML models depending on the nature of the model. For instance, for numeric prediction, the metric may be accuracy; for classification, the metric may be a combination of precision and recall, like the "F1 score".allowedValues: { 0..100 }. | type: Realmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| MLTrainingRequest.cancelRequest | It allows the ML training MnS consumer to cancel the ML model training request.Setting this attribute to "TRUE" cancels the ML model training request. The request can be resumed by setting this attribute to "FALSE" when it is suspended. Cancellation is possible when the requestStatus is the "NOT\_STARTED", " IN\_PROGRESS", and "SUSPENDED" state. Setting the attribute to "FALSE" has no observable result.allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLTrainingRequest.suspendRequest | It allows the ML training MnS consumer to suspend the ML model training request.Setting this attribute to "TRUE" suspends the ML model training process. Suspension is possible when the requestStatus is not the "FINISHED" state. Setting the attribute to "FALSE" has no observable result. allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLTrainingProcess.cancelProcess | It allows the ML training MnS consumer to cancel the ML model training process.Setting this attribute to “TRUE“ cancels the ML model training process. Cancellation is possible when the “mLTrainingProcess.progressStatus.status“ is not the “FINISHED“ state. Setting the attribute to “FALSE“ has no observable result.allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLTrainingProcess.suspendProcess | It allows the ML training MnS consumer to suspend the ML model training process.Setting this attribute to "TRUE" suspends the ML model training process. The process can be resumed by setting this attribute to “FALSE” when it is suspended. Suspension is possible when the " mLTrainingProcess.progressStatus.status" is not the "FINISHED", "CANCELLING" or "CANCELLED" state. Setting the attribute to "FALSE" has no observable result. allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| inferenceModelRef | It describes the target entities that will use the ML model for inference. | type: DN multiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| dataProviderRef | It describes the entities that have provided or should provide data needed by the ML model e.g. for training or inference | type: DN multiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| areNewTrainingDataUsed | It indicates whether the other new training data have been used for the ML model training.allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| trainingDataQualityScore | It indicates numerical value that represents the dependability/quality of a given observation and measurement type. The lowest value indicates the lowest level of dependability of the data, i.e. that the data is not usable at all. allowedValues: { 0..100 }. | type: Realmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| decisionConfidenceScore | It is the numerical value that represents the dependability/quality of a given decision generated by the AI/ML inference function. The lowest value indicates the lowest level of dependability of the decisions, i.e. that the data is not usable at all.allowedValues: { 0..100 }. | type: Realmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| expectedRuntimeContext | This describes the context where an MLModel is expected to be applied.allowedValues: N/A | type: MLContextmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| trainingContext | This specifies the context under which the MLModel has been trained.allowedValues: N/A | type: MLContextmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| runTimeContext | This specifies the context where the MLmodel or model is being applied.allowedValues: N/A | type: MLContextmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| MLTrainingRequest.mLModelRef | It identifies the DN of the MLModel requested to be trained.allowedValues: DN | type: DNmultiplicity: 0..1isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| MLTrainingReport.mLModelGeneratedRef | It identifies the DN of the MLModel generated by the ML training.allowedValues: DN | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| mLModelRepositoryRef | It identifies the DN of the MLModelRepository. | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| mLRepositoryId | It indicates the unique ID of the ML repository. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| modelPerformanceValidation | It indicates the performance score of the ML model when performing on the validation data.allowedValues: N/A | type: ModelPerformancemultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| dataRatioTrainingAndValidation | It indicates the ratio (in terms of quantity of data samples) of the training data and validation data used during the training and validation process. It is represented by the percentage of the validation data samples in the total training data set (including both training data samples and validation data samples). The value is an integer reflecting the rounded number of percent \* 100. allowedValues: { 0 .. 100 }. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| MLTestingRequest.requestStatus | It describes the status of a particular ML testing request.allowedValues: NOT\_STARTED, IN\_PROGRESS, CANCELLING, SUSPENDED, FINISHED, and CANCELLED. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| MLTestingRequest.cancelRequest | It allows the ML testing MnS consumer to cancel the ML testing request.Setting this attribute to "TRUE" cancels the ML testing request. Cancellation is possible when the requestStatus is the "NOT\_STARTED", " IN\_PROGRESS", and "SUSPENDED" state. Setting the attribute to "FALSE" has no observable result.allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLTestingRequest.suspendRequest | It allows the ML testing MnS consumer to suspend the ML testing request.Setting this attribute to "TRUE" suspends the ML testing request. The request can be resumed by setting this attribute to “FALSE” when it is suspended. Suspension is possible when the requestStatus is not the "FINISHED" state. Setting the attribute to "FALSE" has no observable result. allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLTestingRequest.mLModelRef | It identifies the DN of the MLModel requested to be tested.AllowedValues: DN | type: DNMultiplicity: 0..1isOrdered: FalsoisUnique: TruedefaultValue: NoneisNullable: True |
| modelPerformanceTesting | It indicates the performance score of the ML model when performing on the testing data.allowedValues: N/A. | type: ModelPerformancemultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| mLTestingResult | It provides the address where the testing result (including the inference result for each testing data example) is provided.The detailed testing result format is vendor specific.allowedValues: N/A. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| testingRequestRef | It identifies the DN of the MLTestingRequest MOI. | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| supportedPerformanceIndicators | This parameter lists specific PerformanceIndicator(s) of an ML model.allowedValues: N/A. | type: SupportedPerfIndicator multiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| performanceIndicatorName | It indicates the identifier of the specific performance indicator.allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| isSupportedForTraining | It indicates whether the specific performance indicator is supported a performance metric of ML model training for the ML model. allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| isSupportedForTesting | It indicates whether the specific performance indicator is supported a performance metric of ML model testing for the ML model. allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| mLUpdateProcessRef | It is the DN of the mLUpdateProcess MOI that represents the process of updating an ML model.allowedValues: DN. | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| mLUpdateRequestRefList | It is the list of DN of the MLUpdateRequest MOI that represents an ML update request.allowedValues: DN. | type: DNmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| mLUpdateReportRef | It is the DN of the MLUpdateReport MOI that represents an ML update report.allowedValues: DN. | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| mLUpdateReportingPeriod | It specifies the time duration upon which the MnS consumer expects the ML update is reported. | type: TimeWindowmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| availMLCapabilityReport | It represents the available ML capabilities.allowedValues: N/A. | type: AvailMLCapabilityReport multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| updatedMLCapability | It represents the updated ML capabilities.allowedValues: N/A. | type: AvailMLCapabilityReport multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| availMLCapabilityReportID | It identifies the available ML capability report.allowedValues: N/A. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| newCapabilityVersionId | It indicates the specific version of AI/ML capabilities to be applied for the update. It is typically the one indicated by the MLCapabilityVersionID in a newCapabilityVersion | type: Stringmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| mlCapabilityVersionId | It indicates the version of ML capabilities that is available for the update.  | type: Stringmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| performanceGainThreshold | It defines the minimum performance gain as a percentage that shall be achieved with the capability update, i.e., the difference in the performances between the existing capabilities and the new capabilities should be at least performanceGainThreshold otherwise the new capabilities should not be applied.Allowed value: float between 0.0 and 100.0 | type: ModelPerformancemultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| expectedPerformanceGains | It indicates the expected performance gain if/when the AI/ML capabilities of the respective network function are updated with/to the specific set of newly available AI/ML capabilities. | type: ModelPerformancemultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| updateTimeDeadline | It indicates the maximum as stated in the MLUpdate request that should be taken to complete the update | type: TimeWindowmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| MLUpdateReport.mLModelModelRef | It indicates the DN of MLModel instances that can be updated. | type: DNmultiplicity: 1 .. \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| MLUpdateRequest.requestStatus | It describes the status of a particular ML update request.allowedValues: NOT\_STARTED, IN\_PROGRESS, CANCELLING, SUSPENDED, FINISHED, and CANCELLED. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| MLUpdateRequest.cancelRequest | It allows the MnS consumer to cancel the ML update request.Setting this attribute to "TRUE" cancels the ML update request. Cancellation is possible when the requestStatus is the "NOT\_STARTED", " IN\_PROGRESS", and "SUSPENDED" state. Setting the attribute to "FALSE" has no observable result.allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLUpdateRequest.suspendRequest | It allows the MnS consumer to suspend the ML update request.Setting this attribute to "TRUE" suspends the ML update request. The request can be resumed by setting this attribute to “FALSE” when it is suspended. Suspension is possible when the requestStatus is not the "FINISHED" state. Setting the attribute to "FALSE" has no observable result. allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| memberMLModelRefList | It identifies the list of member ML models within a level of an ML model coordination group.allowedValues: DN list | type: DNmultiplicity: 2..\*isOrdered: TrueisUnique: TruedefaultValue: None isNullable: False |
| MLTrainingRequest.mLModelCoordinationGroupRef | It identifies the DN of the MLModelCoordinationGroup requested to be trained.allowedValues: DN | type: DNmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| MLTrainingReport.mLModelCoordinationGroupGeneratedRef | It identifies the DN of the MLModelCoordinationGroup generated by ML training.AllowedValues: DN | type: DNmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| MLTestingRequest.mLModelCoordinationGroupRef | It identifies the DN of the MLEntityCoordinationGroup requested to be tested.AllowedValues: DN | type: DNmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| retrainingEventsMonitorRef | It indicates the DN of the ThresholdMonitor MOI that indicates the performance measurements and its corresponding thresholds to be used by MnS producer to initiate the re-training of the MLModel. | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| sourceTrainedMLModelRef | It identifies the DN of the source trained MLModel whose copy has been loaded from the ML model repository to the inference function. allowedValues: DN | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| MLModelLoadingRequest.requestStatus | It describes the status of a particular ML model loading request.allowedValues: NOT\_STARTED, IN\_PROGRESS, CANCELLING, SUSPENDED, FINISHED, and CANCELLED. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| MLModelLoadingRequest.cancelRequest | It allows the MnS consumer to cancel the ML model loading request.Setting this attribute to "TRUE" cancels the ML model loading. Cancellation is possible when the requestStatus is the "NOT\_STARTED", " IN\_PROGRESS", and "SUSPENDED" state. Setting the attribute to "FALSE" has no observable result.allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLModelLoadingRequest.suspendRequest | It allows the MnS consumer to suspend the ML model loading request.Setting this attribute to "TRUE" suspends the ML model loading request. The request can be resumed by setting this attribute to “FALSE” when it is suspended. Suspension is possible when the requestStatus is not the "FINISHED" state. Setting the attribute to "FALSE" has no observable result. allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| mLModelToLoadRef | It identifies the DN of a trained MLModel requested to be loaded to the target inference function(s). | type: DNmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| policyForLoading | It provides the policy for controlling ML model loading triggered by the MnS producer.This policy contains two thresholds in the thresholdList attribute. The first threshold is related to the ML model to be loaded, and the second threshold is related to the existing ML model being used for inference. | type: AIMLManagementPolicymultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| thresholdList | It provides the list of threshold.  | type: ThresholdInfomultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| MLModelLoadingProcess.progressStatus.progressStateInfo | It provides the following specialization for the "progressStateInfo" attribute of the "ProcessMonitor" data type for the "MLModelLoadingProcess.progressStatus".When the ML model loading is in progress, and the " MLModelLoadingProcess.progressStatus.status " is equal to "RUNNING", it provides the more detailed progress information.allowedValues for " MLModelLoadingProcess.progressStatus.status " = "RUNNING":The allowed values for " MLModelLoadingProcess.progressStatus.status " = "CANCELLING" are vendor specific.The allowed values for " MLModelLoadingProcess.progressStatus.status " = "NOT\_STARTED" are vendor specific. | type: Stringmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| MLModelLoadingProcess.cancelProcess | It allows the MnS consumer to cancel the ML model loading process.Setting this attribute to "TRUE" cancels the process. Cancellation is possible when the "MLModelLoadingProcess.progressStatus.status" is not the "FINISHED" state. Setting the attribute to "FALSE" has no observable result. allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLModelLoadingProcess.suspendProcess | It allows the MnS consumer to suspend the ML model loading process.Setting this attribute to "TRUE" suspends the process. The process can be resumed by setting this attribute to "FALSE" when it is suspended. Suspension is possible when the "MLModelLoadingProcess.progressStatus.status" is not the "FINISHED", "CANCELLING" or "CANCELLED" state. Setting the attribute to "FALSE" has no observable result. allowedValues: TRUE, FALSE. | type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| mLModelLoadingRequestRef | It identifies the DN of the associated MLModelLoadingRequest.allowedValues: DN. | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| mLModelLoadingPolicyRef | It identifies the DN of the associated MLModelLoadingPolicyRef.allowedValues: DN. | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| loadedMLModelRef | It identifies the DN of the MLModel that has been loaded to the inference function. allowedValues: DN | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| activationStatus | It describes the activation status.allowedValues: ACTIVATED, DEACTIVATED. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| AIMLManagementPolicy.managedActivationScope | It provides a list of sub scopes for which ML inference is activated as triggered by a policy on the MnS producer. For example, the sub scopes may be a list of cells or of geographical areas. The list is an ordered list indicating the inference is activated for the first sub scope and gradually extended to the next sub scope if the policy evaluates to true.allowedValues: N/A | type: ManagedActivationScopemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| AIMLInferenceFunction.managedActivationScope | It provides a list of sub scopes for which ML inference is activated as triggered by a policy on the MnS producer. For example, the sub scopes may be a list of cells or of geographical areas. The list is an ordered list indicating the inference is activated for the first sub scope and gradually extended to the next sub scope if the policy evaluates to true.allowedValues: N/A | type: AIMLManagementPolicymultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| ManagedActivationScope.dNList | It indicates the list of DN, the list is an ordered list indicating the inference is activated for the first sub scope and gradually extended to the next sub scope.allowedValues: N/A | type: DNmultiplicity: \*isOrdered: TrueisUnique: TruedefaultValue: None isNullable: False |
| ManagedActivationScope.timeWindow | It indicates the list of time window; the list is an ordered list indicating the inference is activated for the first sub scope and gradually extended to the next sub scope.allowedValues: N/A | type: TimeWindowmultiplicity: \*isOrdered: TrueisUnique: TruedefaultValue: None isNullable: False |
| ManagedActivationScope.geoPolygon | It indicates the list of GeoArea, the list is an ordered list indicating the inference is activated for the first sub scope and gradually extended to the next sub scope.allowedValues: N/A | type: GeoAreamultiplicity: \*isOrdered: TrueisUnique: TruedefaultValue: None isNullable: False |
| usedByFunctionRefList | It provides the DNs of the functions supported by the AIMLInferenceFunction.allowedValues: N/A | type: DNmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| inferenceOutputId  | It identifies an inference output within an AIMLinferenceReport. | type: Stringmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| inferenceOutputs | It indicates the Outputs that have been derived by the AIMLInferenceFunction instance from a specific ML model.Each ML model, inferenceOutputs may be a set of values.allowedValues: N/A. | type: InferenceOutputmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| inferencePerformance | It indicates the performance score of the ML model during Inference.allowedValues: N/A. | type: ModelPerformancemultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| inferenceOutputTime | It indicates the time at which the inference output is generated.allowedValues: N/A | type: DateTimemultiplicity: \*isOrdered: TrueisUnique: TruedefaultValue: None isNullable: False |
| outputResult | It indicates the result of an inference. | type: AttributeValuePairmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NullisNullable: False |
| mLCapabilitiesInfoList | It indicates information about what an ML model can generate inference for. allowedValues: N/A. | type: MLCapabilityInfomultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| capabilityName | It indicates the name of a capability for which an ML model can generate inference. The capability is defined by Mns producer which can be traffic analysis capability, coverage analysis capability, mobility analysis capability or vendor specific extensions.allowedValues: N/A. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| mLCapabilityParameters | It indicates a set of optional parameters that apply for an aIMLInferenceName and capabilityName. allowedValues: N/A | type: AttributeValuePair multiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| aIMLInferenceReportRefList | It indicates a list of DN of the MLInferenceReport MOI that represents an ML inference report.allowedValues: DN. | type: DNmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| mLModelRefList | It identifies the list of MLModel DN.allowedValues: DN list | type: DNmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| NOTE: When the performanceScore is to indicate the performance score for ML model training, the data set is the training data set. When the performanceScore is to indicate the performance score for ML validation, the data set is the validation data set. When the performanceScore is to indicate the performance score for ML model testing, the data set is the testing data set. |

### 7.5.2 Constraints

None.

|  |
| --- |
| **3rd Change** |

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

<CODE BEGINS>

openapi: 3.0.1

info:

 title: AI/ML NRM

 version: 18.5.0

 description: >-

 OAS 3.0.1 specification of the AI/ML NRM

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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:

 inferenceModelRef:

 $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

 isSupportedForTesting:

 type: boolean

 readOnly: true

 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:

 type: string

 readOnly: true

 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:

 type: string

 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'

#-------- 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:

 type: string

 readOnly: true

 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

 terminationConditions:

 type: string

 progressStatus:

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

 cancelProcess:

 type: boolean

 suspendProcess:

 type: boolean

 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'

 mLModelGeneratedRef:

 $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

 trainingRequestRef:

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

 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'

 mLModelRef:

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

 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

 suspendRequest:

 type: boolean

 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

 suspendRequest:

 type: boolean

 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:

 type: string

 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

 suspendProcess:

 type: boolean

 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:

 type: string

 readOnly: true

 mLModelVersion:

 type: string

 readOnly: true

 expectedRunTimeContext:

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

 trainingContext:

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

 runTimeContext:

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

 supportedPerformanceIndicators:

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

 mLCapabilitiesInfoList:

 type: array

 uniqueItems: true

 items:

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

 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:

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

 ## 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

 suspendRequest:

 type: boolean

 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

 suspendProcess:

 type: boolean

 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 Changes** |