**3GPP TSG-SA5 Meeting #155 *S5-243334***

**Jeju, South Korea, 27 - 31 May 2024 revision of S5-242534**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **28.105** | **CR** | **Input to draftCR** | **rev** | **1** | **Current version:** | **18.3.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network | **X** |

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|  |
| ***Title:***  | Rel-18 Input to draftCR TS 28.105 Update AIMLInferenceEmulationFunction IOC |
|  |  |
| ***Source to WG:*** | Huawei |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** | AIML\_MGT |  | ***Date:*** | 2024-04-29 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-18 |
|  | *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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | * There is no definition of attribute “aIMLInferenceEmulationFunctionId” in clause 7.5.1. Because the AIMLInferenceEmulationFunction IOC includes the attribute objectClass and objectInstance from the TOP IOC. The value of attribute objectClass is " AIMLInferenceEmulationFunction " and the value of attribute objectInstance is the DN of the instance of AIMLInferenceEmulationFunction IOC. this IOC can be identified by DN, no need to define Id. So we propose to remove the attribute “aIMLInferenceEmulationFunctionId”
* Change the “AIMLInferenceEmulationReport” to “AIMLInferenceReport” in Figure 7.3a.2.1.1-1 and Figure 7.3a.2.1.2-1, because the Emulation report is reuse the inference report according to the current definition, so the attribute of “aIMLInferenceEmulationReportRefList” should remove.
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|  |  |
| ***Summary of change:*** | * Remove the attribute “aIMLInferenceEmulationFunctionId”.
* Change the “AIMLInferenceEmulationReport” to “AIMLInferenceReport” in Figure 7.3a.2.1.1-1 and Figure 7.3a.2.1.2-1.
* Remove “aIMLInferenceEmulationReportRefList” in clause 7.5.1
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| ***Consequences if not approved:*** | It is unclear of management of ML emulation. |
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| ***Clauses affected:*** | 7.3a.2.1.1, 7.3a.2.1.2, 7.3a.2.2.1.2, 7.5.1, A.14, A.15 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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| **1st change** |

### 7.3a.2 Information model definitions for ML emulation Phase

#### 7.3a.2.1 Class diagram

##### 7.3a.2.1.1 Relationships



Figure 7.3a.2.1.1-1: NRM fragment for AI/ML inference emulation Control

##### 7.3a.2.1.2 Inheritance



Figure 7.3a.2.1.2-1: AI/ML inference emulation Inheritance Relations

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| **Next change** |

#### 7.3a.2.2 Class definitions

##### 7.3a.2.2.1 AIMLInferenceEmulationFunction

###### 7.3a.2.2.1.1 Definition

This IOC represents the properties of a function that undertakes AI/ML Inference Emulation.

This AIMLInferenceEmulationFunction instance can be created by the system (AI/ML inference emulation MnS producer) or pre-installed.

An AIMLInferenceEmulationFunction may be associated with one or more MLEntity(s). AIMLInferenceEmulationFunction is name contained with AIMLInferenceEmulationReport(s) that delivers the outcomes of the emulation processes.

NOTE: The way of triggering of an AI/ML inference emulation and the instantiation of the related AI/ML inference emulation process is not in the scope of the present document.

###### 7.3a.2.2.1.2 Attributes

The AIMLInferenceEmulationFunction IOC includes attributes inherited from ManagedFunction IOC (defined in TS 28.622[30]) and the following attributes:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
|  |  |  |  |  |  |
| **Attributes related to Role** |  |  |  |  |  |
|  |  |  |  |  |  |

###### 7.3a.2.2.1.3 Attribute constraints

None.

###### 7.3a.2.2.1.4 Notifications

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

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| **Next change** |

## 7.5 Attribute definitions

### 7.5.1 Attribute properties

Table 7.5.1-1

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| mLEntityId | It identifies the ML entity.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 RAN, 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 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 describes the entity that requested to instantiate the MLTrainingRequest MOI.This attribute can be of type String or DN. | type: <<CHOICE>>multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| MLTrainingRequest.requestStatus | It describes the status of a particular ML 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 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 MLtraining MnS producer to terminate a specific training process.allowedValues: MODEL UPDATED\_IN\_INFERENCE\_FUNCTION, INFERENCE FUNCTION\_TERMINATED, INFERENCE FUNCTION\_UPGRADED, INFERENCE\_CONTEXT\_CHANGED. | type: Enummultiplicity: 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 indicates whether the ML update MnS consumer cancels the ML update process.Setting this attribute to "TRUE" cancels the ML update process. Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| mLupdateProcess.suspendProcess | It indicates whether the ML update MnS consumer suspends 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. Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| mLEntityVersion | It indicates the version number of the ML entity.allowedValues: N/A. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| performanceRequirements | It indicates the expected performance for a trained ML entity 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 entity 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 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 MLEntity 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 entity.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 entity, 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 entity 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 indicates whether the ML training MnS consumer cancels the ML training request.Setting this attribute to "TRUE" cancels the ML 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.Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLTrainingRequest.suspendRequest | It indicates whether the ML training MnS consumer suspends the /ML training request.Setting this attribute to "TRUE" suspends the ML training process. Suspension is possible when the requestStatus is not the "FINISHED" state. Setting the attribute to "FALSE" has no observable result. Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLTrainingProcess.cancelProcess | It indicates whether the ML training MnS consumer cancels the ML training process.Setting this attribute to "TRUE" cancels the ML training process. Cancellation is possible when the " mLTrainingProcess.progressStatus.status" is not the "FINISHED" state. Setting the attribute to "FALSE" has no observable result. Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLTrainingProcess.suspendProcess | It indicates whether the ML training MnS consumer suspends the ML training process.Setting this attribute to "TRUE" suspends the ML 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. Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| inferenceEntityRef | It describes the target entities that will use the ML entity 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 entity 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 MLEntity is expected to be applied.allowedValues: N/A | Type: MLContextmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| trainingContext | This specify the context under which the MLEntity has been trained.allowedValues: N/A | Type: MLContextmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| runTimeContext | This specifies the context where the MLmodel or entity is being applied.allowedValues: N/A | Type: MLContextmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| mLEntityRepositoryRef | It identifies the DN of the MLEntityRepository. | 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 entity 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 indicates whether the ML testing MnS consumer cancels 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.Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLTestingRequest.suspendRequest | It indicates whether the ML testing MnS consumer suspends 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. Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| modelPerformanceTesting | It indicates the performance score of the ML entity 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.allowedValues: DN | Type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| supportedPerformanceIndicators | This parameter lists specific PerformanceIndicator(s) of an ML entity.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 training for the ML entity Default value is set to "FALSE". 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 testing for the ML entity. Default value is set to "FALSE". 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 entity.allowedValues: DN. | Type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| mLUpdateRequestRef | It is the DN of the MLUpdateRequest MOI that represents an ML update request.allowedValues: DN. | Type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: 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 |
| 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 |
| mLEntityRef | It indicates the DN of MLEntity  | 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 indicates whether the MnS consumer cancels 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.Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLUpdateRequest.suspendRequest | It indicates whether the MnS consumer suspends 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. Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| memberMLEntityRefList | It identifies the list of member ML entities within a level of an ML entity coordination group.allowedValues: DN list | Type: DNmultiplicity: 2..\*isOrdered: TrueisUnique: TruedefaultValue: None isNullable: False |
| mLEntityCoordinationGroupRef | It identifies the DN of the MLEntityCoordinationGroup.allowedValues: DN | Type: DNmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: 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 MLEntity. | Type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| sourceTrainedMLEntityRef | It identifies the DN of the source trained MLEntity whose copy has been loaded from the ML entity repository to the inference function. allowedValues: DN | Type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| MLEntityLoadingRequest.requestStatus | It describes the status of a particular ML entity loading request.allowedValues: NOT\_STARTED, IN\_PROGRESS, CANCELLING, SUSPENDED, FINISHED, and CANCELLED. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| MLEntityLoadingRequest.cancelRequest | It indicates whether the MnS consumer cancels the ML entity loading request.Setting this attribute to "TRUE" cancels the ML entity 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.Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLEntityLoadingRequest.suspendRequest | It indicates whether the MnS consumer suspends the ML entity loading request.Setting this attribute to "TRUE" suspends the ML entity 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. Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| mLEntityToLoadRef | It identifies the DN of a trained MLEntity 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 entity loading triggered by the MnS producer.This policy contains two thresholds in the thresholdList attribute. The first threshold is related to the ML entity to be loaded, and the second threshold is related to the existing ML entity 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 |
| MLEntityLoadingProcess.progressStatus.progressStateInfo | It provides the following specialization for the "progressStateInfo" attribute of the "ProcessMonitor" data type for the "MLEntityLoadingProcess.progressStatus".When the ML loading is in progress, and the " MLEntityLoadingProcess.progressStatus.status " is equal to "RUNNING", it provides the more detailed progress information.allowedValues for " MLEntityLoadingProcess.progressStatus.status " = "RUNNING":The allowed values for " MLEntityLoadingProcess.progressStatus.status " = "CANCELLING" are vendor specific.The allowed values for " MLEntityLoadingProcess.progressStatus.status " = "NOT\_STARTED" are vendor specific. | Type: Stringmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| MLEntityLoadingProcess.cancelProcess | It indicates whether the MnS consumer cancels the ML entity loading process.Setting this attribute to "TRUE" cancels the process. Cancellation is possible when the "MLEntityLoadingProcess.progressStatus.status" is not the "FINISHED" state. Setting the attribute to "FALSE" has no observable result. Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLEntityLoadingProcess.suspendProcess | It indicates whether the MnS consumer suspends the ML entity 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 "MLEntityLoadingProcess.progressStatus.status" is not the "FINISHED", "CANCELLING" or "CANCELLED" state. Setting the attribute to "FALSE" has no observable result. Default value is set to "FALSE". allowedValues: TRUE, FALSE. | Type: Booleanmultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| MLEntityLoadingRequestRef | It identifies the DN of the associated MLEntityLoadingRequest.allowedValues: DN. | Type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| MLEntityLoadingPolicyRef | It identifies the DN of the associated MLEntityLoadingPolicy.allowedValues: DN. | Type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| LoadedMLEntityRef | It identifies the DN of the MLEntity 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 entity.Each ML entity, 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 entity 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 entity 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 entity can generate inference.The capability is defined by Mns producer which can be of traffic analysis capability, coverage analises capability,mobility analises 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 |
| NOTE: When the performanceScore is to indicate the performance score for ML 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 testing, the data set is the testing data set. |

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| **Next change** |

# A.14 PlantUML code for Figure 7.3a.2.1.1-1: NRM fragment for AI/ML inference emulation Control

@startuml

scale max 350 height

skinparam ClassStereotypeFontStyle normal

skinparam ClassBackgroundColor White

skinparam shadowing false

skinparam monochrome true

hide members

hide circle

'skinparam maxMessageSize 250

class ManagedEntity <<ProxyClass>>

class AIMLInferenceEmulationFunction <<InformationObjectClass>>

class AIMLInferenceReport << InformationObjectClass >>

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

AIMLInferenceEmulationFunction "1" \*-- "\*" AIMLInferenceReport : <<names>>

note left of ManagedEntity

 Represents the following IOCs:

 SubNetwork or

 ManagedFunction or

 Managed Element

 end note

# @endumlA.15 PlantUML code for Figure 7.3a.2.1.2-1: AI/ML inference emulation Inheritance Relations

@startuml

skinparam ClassStereotypeFontStyle normal

skinparam ClassBackgroundColor White

skinparam shadowing false

skinparam monochrome true

hide members

hide circle

'skinparam maxMessageSize 250

class ManagedFunction <<InformationObjectClass>>

class AIMLInferenceEmulationFunction << InformationObjectClass >>

ManagedFunction <|-- AIMLInferenceEmulationFunction

@enduml

|  |
| --- |
| **End of change** |