**3GPP TSG-CT WG3 Meeting #142C3-253293**

**Gothenburg, SE, 25 - 29 August 2025**

**Source: Samsung**

**Title: Pseudo-CR on data model definition for AIMLES\_MLModelTraining API.**

**Spec: 3GPP TS 29.482**

**Agenda item: 19.41**

**Document for: Decision**

**1. Introduction**

The pseudo CR defines the data model for AIMLES\_MLModelTraining API.

**2. Reason for Change**

The data model for AIMLES\_MLModelTraining API is FFS. This CR defines the data model for the API.

**3. Conclusions**

N/A

**4. Proposal**

It is proposed to agree the following changes to 3GPP TS 29.482 v1.0.0.

\* \* \* First Change \* \* \* \*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 29.122: "T8 reference point for Northbound Application Programming Interfaces (APIs)".

[3] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[4] OpenAPI: "OpenAPI Specification Version 3.0.0", <https://spec.openapis.org/oas/v3.0.0>.

[5] 3GPP TR 21.900: "Technical Specification Group working methods".

[6] 3GPP TS 23.222: "Common API Framework for 3GPP Northbound APIs; Stage 2".

[7] 3GPP TS 29.222: "Common API Framework for 3GPP Northbound APIs; Stage 3".

[8] 3GPP TS 33.122: "Security aspects of Common API Framework (CAPIF) for 3GPP northbound APIs".

[9] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

[10] IETF RFC 9113: "HTTP/2".

[11] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".

[12] IETF RFC 9457: "Problem Details for HTTP APIs".

[13] 3GPP TS 23.482: "Functional architecture and information flows for AIML Enablement Service".

[14] 3GPP TS 29.549: "Service Enabler Architecture Layer for Verticals (SEAL); Application Programming Interface (API) specification; Stage 3".

[15] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[16] 3GPP TS 24.560: "Artificial Intelligence Machine Learning (AIML) Services - Service Enabler Architecture Layer for Verticals (SEAL); Protocol Specification; Stage 3".

[17] 3GPP TS 23.434: "Service Enabler Architecture Layer for Verticals (SEAL); Functional architecture and information flows".

[18] 3GPP TS 29.572: "5G System; Location Management Services; Stage 3".

[19] 3GPP TS 29.558: "5G System; Enabling Edge Applications; Application Programming Interface (API) specification; Stage 3".

\* \* \* Second Change \* \* \* \*

#### 6.1.8.6 Data Model

##### 6.1.8.6.1 General

This clause specifies the application data model supported by the API.

Table 6.1.8.6.1-1 specifies the data types defined for the AIMLES\_MLModelTraining API.

Table 6.1.8.6.1-1: AIMLES\_MLModelTraining API specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Clause defined | Description | Applicability |
| AccessType | 6.1.8.6.3.7 | Represents the access type for ML model. |  |
| AccessReqInfo | 6.1.8.6.2.11 | Represents the information for accessing the ML model. |  |
| MemberInfo | 6.1.8.6.2.7 | Represents the list of AIMLE clients selected or de-selected for the ML model training. |  |
| MemberSelCriteria | 6.1.8.6.2.4 | Represents the criteria to be continuously monitored for selecting the member clients. |  |
| MlModelInfo | 6.1.8.6.2.5 | Represents the ML model that has to be distributed to the selected member clients for training |  |
| MlModelReqInfo | 6.1.8.6.2.6 | Represents the requirement for selecting a model to be trained and this information contains the filtering criteria for selecting the model. |  |
| MlModelTrainNotif | 6.1.8.6.2.3 | Represents the ML Model training notification |  |
| ModelDomain | 6.1.8.6.3.6 | Represents the domain for which the model can be used. |  |
| ModelPhase | 6.1.8.6.3.4 | Represents the ML model phase, e.g., in training, trained, re-training, deployed. |  |
| ModelPhaseInfo | 6.1.8.6.2.9 | Represents the information regarding ML model phase, e.g., observed performance, training information. |  |
| ModelStorageReq | 6.1.8.6.2.10 | Represents the requirements for the ML repository for the ML model storage and discovery. |  |
| TrainingOutput | 6.1.8.6.2.8 | Represents the output of training, e.g., ML model parameters for the training. |  |
| TrainRequest | 6.1.8.6.2.2 | Represents the ML Model training request |  |
| TrainingType | 6.1.8.6.3.3 | Represents whether the VFL or HFL training to be performed. |  |
| TrainingErr | 6.1.8.6.3.5 | Represents the errors, if any, encountered during training process. |  |

Table 6.1.8.6.1-2 specifies data types re-used by the AIMLES\_MLModelTraining API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the AIMLES\_MLModelTraining API.

Table 6.1.8.6.1-2: AIMLES\_MLModelTraining API re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| LocationArea5G | 3GPP TS 29.122 [5] | Used to indicate a location area represented as list of geographic areas, civic addresses and network area. |  |
| Uri | 3GPP TS 29.122 [2] | Represent an URI, used to indicate the notification URI. |  |
| ClientCapability | 3GPP TS 29.560 [16] | Represents the client capability information. |  |
| TimeWindow | 3GPP TS 29.122 [3] | Indicates the time window. |  |
| Endpoint | 3GPP TS 29.558 [19] | Represents the endpoint information. |  |
| Float | 3GPP TS 29.571 [15] | Used to represent the fractional part of the proximity range in the reference UE details. |  |
| VendorId | 3GPP TS 29.510 [12] | Represents the Vendor ID. |  |

##### 6.1.8.6.2 Structured data types

6.1.8.6.2.1 Introduction

This clause defines the structures to be used in resource representations.

###### 6.1.8.6.2.2 Type: TrainRequest

Table 6.1.8.6.2.2-1: Definition of type TrainRequest

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| trnType | TrainingType | M | 1 | Contains the type of training to be performed. |  |
| members | array(AimleClientId) | C | 1..N | Contains the list of member clients to be utilized for training the ML model.  (NOTE 1) |  |
| memSelCrit | MemberSelCriteria | C | 0..1 | Contains the criteria that needs to be continuously monitored for selecting the member clients.  (NOTE 1) |  |
| modelInf | MlModelInfo | C | 0..1 | Contains the ML model that has to be distributed to the selected member clients for training.  (NOTE 2) |  |
| modelReq | MlmodelReqInfo | C | 0..1 | Contains the requirement for selecting a model to be trained and the filtering criteria for selecting the model.  (NOTE 2) |  |
| memUpdNotif | Boolean | O | 0..1 | Indicates whether the requestor needs to be notified whenever there is update related to new member clients selected or de-selected.  Set to "true" to indicate that requestor needs to be notified whenever there is update related to new member clients selected or de-selected. Default value is "false" if omitted. |  |
| notifUri | Uri | C | 0..1 | Contains the notification URI where notifications should be sent.  This attribute shall be present when the attribute "memUpdNotif" is set to "true". |  |
| NOTE 1: At least one of these attributes shall be present.  NOTE 2: At least one of these attributes shall be present. | | | | | |

Editor's note: It is FFS, if reporting requirements are applicable to this data type.

###### 6.1.8.6.2.3 Type: MlModelTrainNotif

Table 6.1.8.6.2.3-1: Definition of type MlModelTrainNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| members | array(MemberInfo) | C | 1..N | Contains the list of AIMLE clients selected or de-selected for the ML model training.  (NOTE) |  |
| trainOut | PerfParams | C | 0..1 | Contains the output of training, e.g., ML model parameters for the training.  (NOTE) |  |
| trainErr | TrainingErr | C | 0..1 | Contains the list of errors, if any, encountered during training process.  (NOTE) |  |
| NOTE: At least one of these attributes shall be present. | | | | | |

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###### 6.1.8.6.2.4 Type: MemberSelCriteria

Table 6.1.8.6.2.4-1: Definition of type MemberSelCriteria

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| clientLoc | LocationArea5G | C | 0..1 | Contains the location of the AIMLE client for the AIML service that needs to be monitored. |  |
| clientAvailability | TimeWindow | C | 0..1 | Contains the required availability duration of the AIMLE client. |  |
| clientCapability | ClientCapability | C | 0..1 | Contains the required client capability information. |  |
| NOTE: At least one of these attributes shall be present. | | | | | |

###### 6.1.8.6.2.5 Type: MlModelInfo

Table 6.1.8.6.2.5-1: Definition of type MlModelInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| mlModelId | string | C | 0..1 | Contains the identifier for ML model. |  |
| mlModelLoc | Endpoint | C | 0..1 | Contains the URI, fqdn or address that maps to the resource where ML model is stored. |  |
| NOTE: At least one of these attributes shall be present. | | | | | |

###### 6.1.8.6.2.6 Type: MlModelReqInfo

Table 6.1.8.6.2.6-1: Definition of type MlModelReqInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| mlModelId | string | M | 1 | Contains the identifier for the ML model. |  |
| adaeAnalyticsId | string | C | 0..1 | Contains the ADAE analytics ID for which the model can be used.  (NOTE) |  |
| mlModelSize | Uinteger | C | 0..1 | Represents the model size in bytes.  (NOTE) |  |
| mlModelSource | nodeId | C | 0..1 | Contains the node ID which is the source that stored the ML model in the ML repository.  (NOTE) |  |
| valServiceId | string | C | 0..1 | Contains the identifier for the VAL service.  (NOTE) |  |
| modelDomain | ModelDomain | C | 0..1 | Contains the domain for which the model can be used.  (NOTE) |  |
| vendorList | Array(VendorId) | C | 0..N | Contains the list of vendors that are allowed to use the ML model.  (NOTE) |  |
| modelPhaseInfo | ModelPhaseInfo | C | 0..1 | Contains the ML model phase information.  (NOTE) |  |
| mlModelReq | ModelStorageReq | C | 0..1 | Contains the requirements for ML repository for ML model storage and discovery.  (NOTE) |  |
| mlModelUsageReq | AimleOperation | C | 0..1 | Contains the requirements for using the ML model.  (NOTE) |  |
| NOTE: At least one of these attributes shall be present. | | | | | |

###### 6.1.8.6.2.7 Type: MemberInfo

Table 6.1.8.6.2.7-1: Definition of type MemberInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| clientSel | boolean | C | 0..1 | Indicates whether the AIMLE client is selected or not.  0 represents the client is not selected. 1 represents the client is selected. |  |
| clientUri | Uri | C | 0..1 | Contains the URI information of the AIMLE clients. |  |
| NOTE: At least one of these attributes shall be present. | | | | | |

###### 6.1.8.6.2.8 Type: PerfParam

Table 6.1.8.6.2.8-1: Definition of type PerfParam

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| modelAccuracy | integer | C | 0..1 | Indicates the achieved ML model accuracy, expressed as a percentage.  Minimum: 0, maximum: 100. |  |
| modelPrecision | Float | C | 0..1 | Represents the accuracy for the positive predictions made by the model.  Minimum: 0, maximum: 1. |  |
| modelRecall | Float | C | 0..1 | Represents model's ability to identify all the actual positive instances within a dataset.  Minimum: 0, maximum: 1. |  |
| modelF1Score | Float | C | 0..1 | Represents the combined metric for precision and recall.  Minimum: 0, maximum: 1. |  |
| errorMeanSquare | Float | C | 0..1 | Represents the mean squared error between predicted values and actual values. |  |
| errorMeanAbs | Float | C | 0..1 | Represents the mean absolute error between predicted values and actual values. |  |
| NOTE: At least one of these attributes shall be present. | | | | | |

###### 6.1.8.6.2.9 Type: ModelPhaseInfo

Table 6.1.8.6.2.9-1: Definition of type ModelPhaseInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| modelPhase | ModelPhase | C | 0..1 | Contains the ML model phase. |  |
| obsPerf | PerfParam | C | 0..1 | Contains information on model performance.  This attribute shall be present if ModelPhase is “TRAINED” or “DEPLOYED”. |  |
| trainingInfo | TrainingInfo | C | 0..1 | Contains information on the data that has been used to train the model.  This attribute shall be present if ModelPhase is “TRAINED” or “DEPLOYED”. |  |
| indContModel | boolean | C | 0..1 | Indicates whether model can be continuously trained or not.  0 indicates model cannot be continuously trained.  1 indicates model can be continuously trained.  This attribute shall be present if ModelPhase is “TRAINING” or “RETRAINING”. |  |
| paramContModel | ParamContModel | C | 0..1 | Contains the information regarding parameters for continuous model training.  This attribute shall be present if ModelPhase is “TRAINING” or “RETRAINING”. |  |
| NOTE: At least one of these attributes shall be present. | | | | | |

###### 6.1.8.6.2.10 Type: ModelStorageReq

Table 6.1.8.6.2.10-1: Definition of type ModelStorageReq

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| storageDuration | TimeWindow | C | 0..1 | Contains the ML model storage duration time. |  |
| secuReq | string | C | 0..1 | Contains the security requirement for ML model information. |  |
| accessReq | AccessReqInfo | C | 0..1 | Contains the ML model access requirements. |  |
| NOTE: At least one of these attributes shall be present. | | | | | |

###### 6.1.8.6.2.11 Type: AccessReqInfo

Table 6.1.8.6.2.10-1: Definition of type AccessReqInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| accessType | AccessType | C | 0..1 | Contains the access type for ML model. |  |
| valServIds | array(string) | C | 0..1 | Contains the VAL server IDs that can access the ML model.  This shall be present when the access type is CONDITIONAL. |  |
| valClientIds | array(string) | C | 0..1 | Contains the VAL client IDs that can access the ML model.  This shall be present when the access type is CONDITIONAL. |  |
| timePeriod | TimeWindow | C | 0..1 | Contains the time period for accessing the ML model.  This shall be present when the access type is CONDITIONAL. |  |
| locAccess | LocationArea5G | C | 0..1 | Contains the location area for accessing the ML model.  This shall be present when the access type is CONDITIONAL. |  |
| NOTE: At least one of these attributes shall be present. | | | | | |

###### 6.1.8.6.2.12 Type: TrainingInfo

Table 6.1.8.6.2.12-1: Definition of type TrainingInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| dataSource | Endpoint | C | 0..1 | Contains the end point information for the data source.  (NOTE 1) |  |
| dataSize | Uinteger | C | 0..1 | Contains the size of the data in bytes.  (NOTE 1) |  |
| dataRecency | DateTime | C | 0..1 | Contains the date and time on which the data was last updated.  (NOTE 1) |  |
| baseModelId | string | C | 0..1 | Contains the base model ID.  (NOTE 2) |  |
| NOTE 1: At least one of these attributes shall be present.  NOTE 2: This attribute shall be present in case of Transfer Learning. | | | | | |

###### 6.1.8.6.2.13 Type: ParamContModel

Table 6.1.8.6.2.13-1: Definition of type ParamContModel

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| retrainParam | string | C | 0..1 | The performance parameter used for monitoring continuous model training. The parameter can be F1 score, accuracy, data drift, etc. |  |
| retrainThres | Uinteger | C | 0..1 | The threshold value below which the model needs to be retrained. |  |
| NOTE: At least one of these attributes shall be present. | | | | | |

##### 6.1.8.6.3 Simple data types and enumerations

###### 6.1.8.6.3.1 Introduction

This clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

###### 6.1.8.6.3.2 Simple data types

The simple data types defined in table 6.1.8.6.3.2-1 shall be supported.

Table 6.1.8.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
| AimleModelId | string | Represents the ML model identifier. |  |

###### 6.1.8.6.3.3 Enumeration: TrainingType

The enumeration TrainingType represents the type training requested. It shall comply with the provisions defined in table 6.1.8.6.3.3-1.

Table 6.1.8.6.3.3-1: Enumeration TrainingType

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| TRAIN\_VFL | Indicates that the training type is horizontal federated learning |  |
| TRAIN\_HFL | Indicates that the training type is vertical federated learning |  |

###### 6.1.8.6.3.4 Enumeration: ModelPhase

The enumeration ModelPhase represents the ML model training phase. It shall comply with the provisions defined in table 6.1.8.6.3.4-1.Table 6.1.8.6.3.4-1: Enumeration ModelPhase

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| TRAINING | Indicates that the model is in training phase. |  |
| TRAINED | Indicates that the model is trained. |  |
| RETRAINING | Indicates that the model is in retraining phase. |  |
| DEPLOYED | Indicates that the model is deployed. |  |

###### 6.1.8.6.3.5 Enumeration: TrainingErr

The enumeration TrainingErr represents the training error encountered during ML model training. It shall comply with the provisions defined in table 6.1.8.6.3.5-1.

Table 6.1.8.6.3.5-1: Enumeration TrainingErr

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| UNDERFITTING | Indicates that the trained model is underfitting the training data. |  |
| OVERFITTING | Indicates that the trained mode is overfitting the training data. |  |
| PERFORMANCE\_ERRORS | Indicates that the trained model is unable to meet the desired performance. |  |
| DATA\_LEAKAGE | Indicates that there is data leakage from evaluation data set to the training data. |  |

###### 6.1.8.6.3.6 Enumeration: ModelDomain

The enumeration ModelDomain represents the domain for which the model can be used. It shall comply with the provisions defined in table 6.1.8.6.3.6-1.

Table 6.1.8.6.3.6-1: Enumeration ModelDomain

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| SPEECH\_RECOGNITION | Indicates that the model can be used for speech recognition related applications. |  |
| IMAGE\_RECOGNITION | Indicates that the model can be used for image recognition related applications. |  |
| VIDEO\_PROCESSING | Indicates that the model can be used for video processing. |  |
| LOCATION\_PREDICTION | Indicates that the model can be used for location prediction. |  |

###### 6.1.8.6.3.7 Enumeration: AccessType

The enumeration AccessType represents the domain for which the model can be used. It shall comply with the provisions defined in table 6.1.8.6.3.7-1.

Table 6.1.8.6.3.7-1: Enumeration AccessType

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| PUBLIC | Indicates that ML model is publicly available. |  |
| PRIVATE | Indicates that ML model is private. |  |
| CONDITIONAL | Indicates that ML model is available for the list of VAL server or VAL client IDs. |  |

\* \* \* End of Changes \* \* \* \*