**3GPP TSG-CT WG3 Meeting #130C3-234064**

**Xiamen, China, 9 - 13 October, 2023 (revision of C3-233abc)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **29.520** | **CR** | **0785** | **rev** |  | **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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Enhancements on the inference input data and training input data | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** | CT3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eNA\_Ph3 | | | | |  | ***Date:*** | | | 2023-09-25 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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 can be 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The Inference Input Data information that are expected to be used by AnLF during inferences are different from the training Input Data Information that have been used by MTLF during training, which are defined in clause 6.2A.2 of 23.288. This CR proposes to abstract the common information of these two kinds to data as InputDataInfo data structure and define independent data structure for training Input Data Information to include the time and other information.  The feature of "modelMetric" attribute needs to be removed. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * Rename the TrainInputInfo data structure to InputDataInfo. * Define TrainInputDataInfo data structure for training Input Data Information * Remove the feature of "modelMetric" attribute. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Misalignment between stage 2 and stage 3. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.4.6.1, 5.4.6.2.12, 5.4.6.2.13, 5.4.6.2.14, 5.4.6.2.16(new), A.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | The CR introduces backward compatible feature to the OpenAPI file for Nnwdaf\_MLModelProvision API. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**Additional discussion(if needed):**

**Proposed changes:**

\*\*\* 1st Change \*\*\*

#### 5.4.6.1 General

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

Table 5.4.6.1-1 specifies the data types defined for the Nnwdaf\_MLModelProvision service based interface protocol.

Table 5.4.6.1-1: Nnwdaf\_MLModelProvision specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| AdditionalMLModelInformation | 5.4.6.2.14 | Represnets the additional ML Model Information | ModelProvisionExt |
| DataStatisticsInfo | 5.4.6.2.17 | The statistics information of the data. | ModelProvisionExt |
| FailureEventInfoForMLModel | 5.4.6.2.7 |  |  |
| InputDataInfo | 5.4.6.2.12 | Represents the metrics of the input data. | ModelProvisionExt |
| MLEventNotif | 5.4.6.2.6 |  |  |
| MLEventSubscription | 5.4.6.2.3 |  |  |
| MLModelAddr | 5.4.6.2.8 |  |  |
| MLModelAdrf | 5.4.6.2.15 | Represents the ADRF (Set) information of ML Model. | ModelProvisionExt |
| MLModelMetric | 5.4.6.2.9 | Indicates the ML model metric. | FederatedLearning  ModelProvisionExt |
| MLModelStatus | 5.4.6.2.10 | Indicates the pre-determined status of the ML model or training. | FederatedLearning |
| MLRepEventCondition | 5.4.6.2.11 | Indicates the ML event reporting condition. | FederatedLearning  ModelProvisionExt |
| ModelProvisionParamsExt | 5.4.6.2.13 | Represents extended model provision parameters. | ModelProvisionExt |
| NwdafMLModelProvNotif | 5.4.6.2.5 |  |  |
| NwdafMLModelProvSubsc | 5.4.6.2.2 |  |  |
| TrainInputDataInfo | 5.4.6.2.16 | Represents training input data information. | ModelProvisionExt |

Table 5.4.6.1-2 specifies data types re-used by the Nnwdaf\_MLModelProvision service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Nnwdaf\_MLModelProvision service based interface.

Table 5.4.6.1-2: Nnwdaf\_MLModelProvision re-used Data Types

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Data type | Reference | | Comments | | Applicability | |
| Accuracy | | 5.1.6.3.5 | | Represents accuracy levels of interest for ML models | | ModelProvisionExt | |
| DateTime | | 3GPP TS 29.571 [8] | | Identifies the time. | |  | |
| DccfEvent | | 3GPP TS 29.574 [26] | | Identifies the input data event. | | ModelProvisionExt | |
| EventFilter | | 5.2.6.2.3 | | Identifies the filter for the subscribed event. | |  | |
| NetworkAreaInfo | | 3GPP TS 29.554 [18] | | Identifies the network area. | |  | |
| NwdafEvent | 5.1.6.3.4 | |  | |  | |
| NfInstanceId | 3GPP TS 29.571 [8] | | Identifies an NF instance. | | ModelProvisionExt | |
| NfSetId | 3GPP TS 29.571 [8] | | Identifies an NF Set. | | ModelProvisionExt | |
| RedirectResponse | 3GPP TS 29.571 [8] | |  | |  | |
| ReportingInformation | | 3GPP TS 29.523 [20] | | Represents the requirements of reporting the subscription. | |  | |
| SupportedFeatures | 3GPP TS 29.571 [8] | |  | |  | |
| TargetUeInformation | 5.1.6.2.8 | |  | |  | |
| TimeWindow | | 3GPP TS 29.122 [19] | |  | |  | |
| Uinteger | 3GPP TS 29.571 [8] | | Unsigned Integer, i.e. only value 0 and integers above 0 are permissible. | | ModelProvisionExt | |
| Uri | 3GPP TS 29.571 [8] | |  | |  | |
| VendorId | 3GPP TS 29.510 [12] | | Represents the Vendor ID. | | ModelSharing | |

\*\*\* Next Change \*\*\*

##### 5.4.6.2.12 Type InputDataInfo

**Table 5.4.6.2.12-1: Definition of type InputDataInfo**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **Data type** | **P** | **Cardinality** | **Description** | **Applicability** |
| inpEvent | DccfEvent | M | 1 | Identifies the input data event to which the information applies. |  |
| maxNumSamples | Uinteger | O | 0..1 | Maximum number of samples that have been taken to train an ML model. |  |
| maxTimeInterval | Uinteger | O | 0..1 | Maximum time interval between samples that are used to train an ML model. |  |
| nfInstanceIds | array(NfInstanceId) | O | 1..N | NF instance identifiers of the used data sources. |  |
| nfSetIds | array(NfSetId) | O | 1..N | NF set identifiers of the used data sources. |  |
| ratio | Uinteger | O | 0..1 | Sampling ratio, indicates the percentage of the available data values that are used by this ML model (for training or inference).  Minimum = 0. Maximum = 100. |  |

\*\*\* Next Change \*\*\*

##### 5.4.6.2.13 Type ModelProvisionParamsExt

Table 5.4.6.2.13-1: Definition of type ModelProvisionParamsExt

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **Data type** | **P** | **Cardinality** | **Description** | **Applicability** |
| modelInterInfo | string | O | 0..1 | Represents the ML Model Interoperability Information. This is vendor-specific information and is agreed between vendors, if necessary for sharing purposes.  The format of value is out of 3GPP. |  |
| reqRepRatio | Uinteger | O | 0..1 | Minimum percentage of UEs whose data is used for training an ML model when the target of ML model reporting is a group of UEs.  Minimum = 0. Maximum = 100. |  |
| inferInpDataInfos | array(InputDataInfo) | O | 1..N | The metrics of input data that are expected to be used by NWDAF containing AnLF during inference. |  |
| multModelsInd | boolean | O | 0..1 | If provided and set to "true", it indicates that the NF service consumer supports receiving multiple ML models. If omitted or set to "false" the NF service consumer does not support multiple ML models. The default value is false. |  |
| numModels | Uinteger | O | 0..1 | Maximum number of ML models that the consumer supports to receive for a specific analytics ID. It may only be provided if the "multModelInd" attribute is provided and set to "true". |  |
| accuLevels | array(Accuracy) | O | 1..N | Provided accuracy levels of interest for ML models. |  |

\*\*\* Next Change \*\*\*

##### 5.4.6.2.14 Type AdditionalMLModelInformation

Table 5.4.6.2.14-1: Definition of type AdditionalMLModelInformation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| mLFileAddr | MLModelAddr | M | 1 | Indicates the address (e.g. a URL or an FQDN) of the ML model file. |  |
| validityPeriod | TimeWindow | O | 0..1 | Indicates the time period when the provided ML model applies. |  |
| spatialValidity | NetworkAreaInfo | O | 0..1 | Indicates the area where the provided ML model applies. |  |
| modelUniqueId | Uinteger | O | 0..1 | Unique identifier for an ML model. The identified shall be unique within 5GC scope. |  |
| modelRepRatio | Uinteger | O | 0..1 | Indicating the percentage of UEs in the group that is used to train an ML model when target of ML model reporting is a group of UEs. |  |
| mlDegradInd | boolean | O | 0..1 | Set to "true" to indicate support degration of an ML model.  Set to "false" to indicate not support degration of an ML model.  Default value is "false" if omitted. |  |
| trainInpInfos | array(TrainInputDataInfo) | O | 1..N | Training input data information that is used by NWDAF containing MTLF during training. |  |
| modelMetric | MLModelMetric | O | 0..1 | Indicates the ML model metric. |  |
| accMLModel | Accuracy | O | 0..1 | Represents the accuracy level of ML model. |  |

\*\*\* Next Change \*\*\*

##### 5.4.6.2.16 Type TrainInputDataInfo

**Table 5.4.6.2.16-1: Definition of type TrainInputDataInfo**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **Data type** | **P** | **Cardinality** | **Description** | **Applicability** |
| dataInfo | InputDataInfo | O | 0..1 | The metrics of input data that has been used by NWDAF containing MTLF during training. |  |
| time | TimeWindow | O | 0..1 | Indicates the time interval during which the data was obtained from the data source NFs. |  |
| dataStatisticsInfos | array(DataStatisticsInfo) | O | 1..N | Indicates the statistics information of the data identified by "dataInfo" attribute, e.g. data range including maximum and minimum values, mean and standard deviation and data distribution when applicable. |  |

\*\*\* Next Change \*\*\*

##### 5.4.6.2.17 Type DataStatisticsInfo

**Table 5.4.6.2.17-1: Definition of type DataStatisticsInfo**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **Data type** | **P** | **Cardinality** | **Description** | **Applicability** |
| name | string | M | 1 | This attribute contains the information of the statistical items, e.g., the UE number, the data rate of the traffic or the time period etc. |  |
| values | array(Any type) | M | 1 | The values for the attribute identified by the "name" attribute. |  |

\*\*\* Next Change \*\*\*

# A.5 Nnwdaf\_MLModelProvision API

openapi: 3.0.0

info:

title: Nnwdaf\_MLModelProvision

version: 1.1.0-alpha.4

description: |

Nnwdaf\_MLModelProvision API Service.

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externalDocs:

description: 3GPP TS 29.520 V18.3.0; 5G System; Network Data Analytics Services.

url: https://www.3gpp.org/ftp/Specs/archive/29\_series/29.520/

servers:

- url: '{apiRoot}/nnwdaf-mlmodelprovision/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501

security:

- {}

- oAuth2ClientCredentials:

- nnwdaf-mlmodelprovision

paths:

/subscriptions:

post:

summary: Create a new Individual NWDAF ML Model Provision Subscription resource.

operationId: CreateNWDAFMLModelProvisionSubcription

tags:

- Subscriptions (Collection)

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'201':

description: Create a new Individual NWDAF ML Model Provision Subscription resource.

content:

application/json:

schema:

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

headers:

Location:

description: >

Contains the URI of the newly created resource, according to the structure

{apiRoot}/nnwdaf-mlmodelprovision/v1/subscriptions/{subscriptionId}.

required: true

schema:

type: string

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29571\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29571\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29571\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'502':

$ref: 'TS29571\_CommonData.yaml#/components/responses/502'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

callbacks:

myNotification:

'{$request.body#/notifUri}':

post:

requestBody:

required: true

content:

application/json:

schema:

type: array

items:

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

minItems: 1

responses:

'204':

description: No Content, Notification was succesfull

'307':

$ref: 'TS29571\_CommonData.yaml#/components/responses/307'

'308':

$ref: 'TS29571\_CommonData.yaml#/components/responses/308'

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29571\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29571\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29571\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'502':

$ref: 'TS29571\_CommonData.yaml#/components/responses/502'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

/subscriptions/{subscriptionId}:

put:

summary: update an existing Individual NWDAF ML Model Provision Subscription

operationId: UpdateNWDAFMLModelProvisionSubcription

tags:

- Individual NWDAF ML Model Provision Subscription (Document)

requestBody:

required: true

content:

application/json:

schema:

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

parameters:

- name: subscriptionId

in: path

description: String identifying a subscription to the Nnwdaf\_MLModelProvision Service.

required: true

schema:

type: string

responses:

'200':

description: >

The Individual NWDAF ML Model Provision Subscription resource was modified successfully

and a representation of that resource is returned.

content:

application/json:

schema:

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

'204':

description: >

The Individual NWDAF ML Model Provision Subscription resource was modified successfully.

'307':

$ref: 'TS29571\_CommonData.yaml#/components/responses/307'

'308':

$ref: 'TS29571\_CommonData.yaml#/components/responses/308'

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29571\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29571\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29571\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'502':

$ref: 'TS29571\_CommonData.yaml#/components/responses/502'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

delete:

summary: Delete an existing Individual NWDAF ML Model Provision Subscription.

operationId: DeleteNWDAFMLModelProvisionSubcription

tags:

- Individual NWDAF ML Model Provision Subscription (Document)

parameters:

- name: subscriptionId

in: path

description: String identifying a subscription to the Nnwdaf\_MLModelProvision Service.

required: true

schema:

type: string

responses:

'204':

description: >

No Content. The Individual NWDAF ML Model Provision Subscription matching the

subscriptionId was deleted.

'307':

$ref: 'TS29571\_CommonData.yaml#/components/responses/307'

'308':

$ref: 'TS29571\_CommonData.yaml#/components/responses/308'

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'502':

$ref: 'TS29571\_CommonData.yaml#/components/responses/502'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{nrfApiRoot}/oauth2/token'

scopes:

nnwdaf-mlmodelprovision: Access to the Nnwdaf\_MLModelProvision API

schemas:

NwdafMLModelProvSubsc:

description: Represents NWDAF Event Subscription resources.

type: object

properties:

mLEventSubscs:

type: array

items:

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

minItems: 1

description: Subscribed events

notifUri:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'

mLEventNotifs:

type: array

items:

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

minItems: 1

description: >

Notifications about Individual Events.Shall only be present if the immediate reporting

indication in the "immRep" attribute within the "eventReq" attribute sets to true in the

event subscription, and the reports are available.

suppFeats:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/SupportedFeatures'

notifCorreId:

type: string

eventReq:

$ref: 'TS29523\_Npcf\_EventExposure.yaml#/components/schemas/ReportingInformation'

failEventReports:

type: array

items:

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

minItems: 1

description: >

Supplied by the NWDAF containing MTLF when available, shall contain the event(s) that

the subscription is not successful including the failure reason(s).

required:

- mLEventSubscs

- notifUri

ModelProvisionParamsExt:

description: >

Extended parameters for ML model provisioning which can optionally be set by a service

consuumer NF.

type: object

properties:

modelInterInfo:

type: string

description: >

Vendor-specific information about the ML models.

reqRepRatio:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

inferInpDataInfos:

type: array

items:

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

minItems: 1

description: >

Inference information that is used by NWDAF containing AnLF during inference.

multModelsInd:

type: boolean

description: Indicates if the NF service consumer supports multiple models.

numModels:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

accuLevels:

type: array

items:

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

minItems: 1

description: >

Provided accuracy levels of interest for ML models.

InputDataInfo:

description: Contains information about inference that is used by NWDAF containing AnLF.

type: object

properties:

ratio:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

maxNumSamples:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

maxTimeInterval:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

inpEvent:

$ref: 'TS29574\_Ndccf\_DataManagement.yaml#/components/schemas/DccfEvent'

nfInstanceIds:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/NfInstanceId'

minItems: 1

nfSetIds:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/NfSetId'

minItems: 1

required:

- inpEvent

MLEventSubscription:

description: Represents a subscription to a single event.

type: object

properties:

mLEvent:

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

mLEventFilter:

$ref: 'TS29520\_Nnwdaf\_AnalyticsInfo.yaml#/components/schemas/EventFilter'

tgtUe:

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

mLTargetPeriod:

$ref: 'TS29122\_CommonData.yaml#/components/schemas/TimeWindow'

expiryTime:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/DateTime'

modelMetric:

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

mlEvRepCon:

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

preDetStatus:

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

modelInterInfo:

type: string

description: String representing the ML Model Interoperability Information.

nfConsumerInfo:

$ref: 'TS29510\_Nnrf\_NFManagement.yaml#/components/schemas/VendorId'

modelProvExt:

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

description: >

Extended ML model parameters that a service consumer optionally sets when subscribing to

an ML model to be provisioned.

useCaseCxt:

type: string

description: >

Indicates the context of usage of the analytics. The value and format of this parameter

are not standardized.

required:

- mLEvent

- mLEventFilter

NwdafMLModelProvNotif:

description: Represents notifications on events that occurred.

type: object

properties:

eventNotifs:

type: array

items:

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

minItems: 1

description: Notifications about Individual Events.

subscriptionId:

type: string

description: String identifying a subscription to the Nnwdaf\_MLModelProvision Service.

required:

- eventNotifs

- subscriptionId

MLEventNotif:

description: Represents a notification related to a single event that occurred.

type: object

properties:

event:

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

notifCorreId:

type: string

mLFileAddr:

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

mLModelAdrf:

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

validityPeriod:

$ref: 'TS29122\_CommonData.yaml#/components/schemas/TimeWindow'

spatialValidity:

$ref: 'TS29554\_Npcf\_BDTPolicyControl.yaml#/components/schemas/NetworkAreaInfo'

addModelInfo:

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

required:

- event

- mLFileAddr

FailureEventInfoForMLModel:

description: >

Represents the event(s) that the subscription is not successful including the failure

reason(s).

type: object

properties:

event:

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

failureCode:

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

required:

- event

- failureCode

MLModelAddr:

description: Addresses of ML model files.

type: object

properties:

mLModelUrl:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'

mlFileFqdn:

type: string

description: The FQDN of the ML Model file.

oneOf:

- required: [mLModelUrl]

- required: [mlFileFqdn]

MLModelMetric:

description: Indicates the ML model metric.

type: object

properties:

mlModelAcc:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

mlModelPre:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

mlModelRec:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

MLModelStatus:

description: Indicates the pre-determined status of the ML model or training.

type: object

properties:

mlReqAcc:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

mlTrainTime:

$ref: 'TS29122\_CommonData.yaml#/components/schemas/TimeWindow'

MLRepEventCondition:

description: Indicates the ML event reporting condition.

type: object

properties:

mlTrainRound:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

mlTrainRepTime:

$ref: 'TS29122\_CommonData.yaml#/components/schemas/TimeWindow'

mlAccuracyThreshold:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

AdditionalMLModelInformation:

description: Represents the additional ML Model Information.

type: object

properties:

mLFileAddr:

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

validityPeriod:

$ref: 'TS29122\_CommonData.yaml#/components/schemas/TimeWindow'

spatialValidity:

$ref: 'TS29554\_Npcf\_BDTPolicyControl.yaml#/components/schemas/NetworkAreaInfo'

modelUniqueId:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

description: Unique identifier for an ML model.

modelRepRatio:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

description: >

Minimum percentage of UEs whose data is used for training an ML model.

mlDegradInd:

type: boolean

description: >

Set to "true" to indicate support degration of an ML model. Set to "false" to indicate

not support degration of an ML model. Default value is "false" if omitted.

trainInpInfos:

type: array

items:

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

minItems: 1

description: >

Training information that is used by NWDAF containing MTLF during training.

modelMetric:

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

accMLModel:

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

required:

- mLFileAddr

MLModelAdrf:

description: ADRF (Set) information of the ML Model.

type: object

properties:

adrfId:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/NfInstanceId'

adrfSetId:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/NfSetId'

storTransId:

type: string

description: String identifying a Storage Transaction ID.

oneOf:

- required: [adrfId]

- required: [adrfSetId]

TrainInputDataInfo:

description: Contains Training input data information that is used by NWDAF containing MTLF.

type: object

properties:

dataInfo:

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

time:

$ref: 'TS29122\_CommonData.yaml#/components/schemas/TimeWindow'

dataStatisticsInfos:

type: array

items:

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

minItems: 1

description: >

Indicates the statistics information of the data identified by "dataInfo" attribute.

DataStatisticsInfo:

description: Indicates the statistics information of the data.

type: object

properties:

name:

type: string

description: >

This attribute contains the information of the statistical items, e.g., the UE number,

the data rate of the traffic or the time period etc.

values:

type: array

items: {}

minItems: 1

description: The values for the attribute identified by the "name" attribute.

required:

- name

- values

#

# ENUMERATIONS DATA TYPES

#

FailureCode:

anyOf:

- type: string

enum:

- UNAVAILABLE\_ML\_MODEL

- type: string

description: >

This string provides forward-compatibility with future extensions to the enumeration but

is not used to encode content defined in the present version of this API.

description: |

Represents the failure code.

Possible values are:

- UNAVAILABLE\_ML\_MODEL: Indicates the requested ML model for the event is unavailable.

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