**3GPP TSG CT WG3 Meeting #134 *C3-242177r1***

**Changsha, China, 15-19 April 2024**

|  |
| --- |
| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **29.520** | **CR** | **0883** | **rev** | **1** | **Current version:** | **18.5.0** |  |
|  |
| *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:***  | Support of model level use case context |
|  |  |
| ***Source to WG:*** | ZTE, Nokia |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | eNA\_Ph3 |  | ***Date:*** | 2024-04-08 |
|  |  |  |  |  |
| ***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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | As per text below from 23.288, the "Use case context" defined in Nnwdaf\_MLModelProvision Service is per Analytics event/model.*NWDAF containing AnLF can additionally provide the parameter "Use case context" when requesting an ML model from an NWDAF containing MTLF. The values of this parameter are not standardized. For example, the AMF can use a given value of "Use case context" when requesting UE Mobility analytics for optimizing the definition of a Registration Area, and a different value of "Use case context" when requesting UE Mobility analytics for determines a paging strategy.*Similarly, the "Use case context" defined in Nnwdaf\_MLModelTraining Service should also be per Analytics event/model instead of per subscription request. |
|  |  |
| ***Summary of change:*** | For model training subscription, as the reused data type MLEventSubscription already includes the "Use case context" as the "useCaseCxt" attribute, remove the "uCaseCont" attribute directly from NwdafMLModelTrainSubsc/ NwdafMLModelTrainSubscPatch data type.For model training notification, add "useCaseCxt" attribute to the reused data type MLEventNotif. |
|  |  |
| ***Consequences if not approved:*** | Use case context is not supported at model level. |
|  |  |
| ***Clauses affected:*** | 4.6.2.2.2, 4.6.2.4.2, 5.4.6.2.6, 5.5.6.2.2, 5.5.6.2.3, 5.5.6.2.8, A.5, A.6 |
|  |  |
|  | **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 introduces a backwards compatible correction to the OpenAPI file of the Nnwdaf\_MLModelProvision API.This CR introduces a backwards compatible correction to the OpenAPI file of the Nnwdaf\_MLModelTraining API. |
|  |  |
| ***This CR's revision history:*** |  |

**Additional discussion(if needed):**

**Proposed changes:**

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

##### 4.6.2.2.2 Subscription for event notifications

Figure 4.6.2.2.2-1 shows a scenario where the NF service consumer sends a request to the NWDAF to subscribe for event notification(s) (as shown in 3GPP TS 23.288 [17]).



Figure 4.6.2.2.2-1: NF service consumer subscribes to notifications

The NF service consumer shall invoke the Nnwdaf\_MLModelTraining\_Subscribe service operation to subscribe to event notification(s). The NF service consumer shall send an HTTP POST request with "{apiRoot}/nnwdaf-mlmodeltraining/<apiVersion>/subscriptions" as Resource URI representing the "NWDAF ML Model Training Subscriptions", as shown in figure 4.6.2.2.2-1, step 1, to create a subscription for an "Individual NWDAF ML Model Training Subscription" according to the information in message body.

The NwdafMLModelTrainSubsc data structure provided in the request body shall include:

- an URI where to receive the requested notifications as the "notifUri" attribute;

- a description of the subscribed events as the "mLEventSubscs" attribute that, for each event, the MLEventSubscription data type shall include:

1) an event identifier as the "mLEvent" attribute;

2) event filter information as the "mLEventFilter" attribute; and

3) the ML Model Interoperability Information as the "modelInterInfo" attribute;

- a notification correlation identifier assigned by the NF service consumer for the requested notifications as "notifCorreId" attribute;

and may include:

- an identification of UE information for which data for ML model training is requested as the "tgtRepUe" attribute;

- the ML model information as the "mLModelInfos" attribute;

- the ML model training information as the "mLModelTrainInfos" attribute;

- identification of the ML procesure for training the ML model as the "mlCorreId" attribute;

- an indication of preparation request for ML model training as the "mLPreFlag" attribute;

- an indication of request using the local training data as the testing dataset to calculate the Model Accuracy of the global ML model provided by the consumer as the "mLAccChkFlg" attribute;

- the ML model training reporting information as the "mLTrainRepInfo" attribute;

- the round number of the training in a multi-round training process as the "roundInd" attribute; and

- the reporting requirement information of the subscription as the "eventReq" attribute.

Upon the reception of an HTTP POST request with: "{apiRoot}/nnwdaf-mlmodeltraining/<apiVersion>/subscriptions" as Resource URI and NwdafMLModelTrainSubsc data structure as request body, the NWDAF shall create a new subscription and store the subscription.

If the NWDAF created an "Individual NWDAF ML Model Training Subscription" resource, the NWDAF shall respond with "201 Created" with the message body containing a representation of the created subscription, as shown in figure 4.6.2.2.2-1, step 2. The NWDAF shall include a Location HTTP header field. The Location header field shall contain the URI of the created subscription i.e. "{apiRoot}/nnwdaf-mlmodeltraining/<apiVersion>/subscriptions/{subscriptionId}".

If the immediate reporting indication in the "immRep" attribute within the "eventReq" attribute sets to "true" during the event subscription, the NWDAF shall include the reports of the subscribed events, if available, as the "immReports" attribute in the HTTP POST response.

\*\*\* 2nd Change \*\*\*

##### 4.6.2.4.2 Notification about subscribed event

Figure 4.6.2.4.2-1 shows a scenario where the NWDAF sends a request to the NF Service Consumer to notify for event notifications (see also 3GPP TS 23.288 [17]).



Figure 4.6.2.4.2-1: NWDAF notifies the subscribed event

The NWDAF shall invoke the Nnwdaf\_MLModelTraining\_Notify service operation to notify the subscribed event. The NWDAF shall send an HTTP POST request with "{notifUri}" received in the Nnwdaf\_MLModelTraining\_Subscribe service operation as Resource URI, as shown in figure 4.6.2.4.2-1, step 1. The NwdafMLModelTrainNotif data structure provided in the request body that shall include:

- a notification correlation identifier as "notifCorreId" attribute;

- at least one of the notification detailed information:

- description of the notified event as "mLModelInfos" attribute;

- a delay event notification for training the ML model as "delayEventNotif" attribute when the service is for Federated Learning;

- an indication that the subscription is requested to be terminated, i.e. no further notifications related to this subscription will be provided, as "termTrainReq";

and may include:

- an identification of the Machine Learning procedure for training the ML model as "mlCorreId" attribute when the service is for Federated Learning;

- an identification of the round number of the training in a multi-round training process as "roundInd" attribute; and/or

- the status report for the ML model training as "statusReport" attribute when the service is for Federated Learning.

Upon the reception of an HTTP POST request, if the NF service consumer successfully processed and accepted the received HTTP POST request, the NF Service Consumer shall store the notification and respond with HTTP "204 No Content" status code.

If the NF service consumer determines the received HTTP POST request needs to be redirected, the NF service consumer shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [6].

If errors occur when processing the HTTP POST request, the NWDAF shall send an HTTP error response as specified in clause 5.5.7.

\*\*\* 3rd Change \*\*\*

##### 5.4.6.2.6 Type MLEventNotif

Table 5.4.6.2.6-1: Definition of type MLEventNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| event | NwdafEvent | M | 1 | Identifies the subscribed event. |  |
| notifCorreId | string | O | 0..1 | Notification correlation ID used to identify the subscription to which the notification relates. It shall be set to the same value as the "notifCorreId" attribute of NwdafMLModelProvSubsc data type. |  |
| mlFile | string | O | 0..1 | Indicates the ML model file. The format of value is out of 3GPP.This attribute is not applicable in the Nnwdaf\_MLModelProvision API. |  |
| mLFileAddr | MLModelAddr | C | 0..1 | Indicates the address (e.g. a URL or an FQDN) of the ML model file. (NOTE 1, NOTE 2) |  |
| mLModelAdrf | MLModelAdrf | C | 0..1 | Indicates the ADRF (Set) information of the ML Model. (NOTE 2) | ModelProvisionExt |
| modelUniqueId | Uinteger | C | 0..1 | Unique identifier for an ML model. The identifier shall be unique within 5GC scope.It shall be provided only if the ModelProvisionExt feature is supported. | ModelProvisionExt |
| validityPeriod | TimeWindow | O | 0..1 | Indicates the time period when the provided ML model applies. (NOTE 1) |  |
| spatialValidity | NetworkAreaInfo | O | 0..1 | Indicates the area where the provided ML model applies. (NOTE 1) |  |
| addModelInfo | array(AdditionalMLModelInformation) | O | 1..N | Indicates the additional ML Model Information. (NOTE 1) | ModelProvisionExt |
| useCaseCxt | string | O | 0..1 | Indicates the context of the ML model.The value and format of this parameter are not standardized.This attribute is not applicable in the Nnwdaf\_MLModelProvision API. | ENAExt |
| NOTE 1: If the "addModelInfo" attribute is provided, then the attributes "validityPeriod" and "spatialValidity" shall not be provided and the value of the "mLFileAddr" attribute and "mLModelAdrf" attribute and "modelUniqueId" attribute of the MLEventNotif data type shall be ignored.NOTE 2: If the "ModelProvisionExt" feature is supported, one of the "mLFileAddr" or "mLModelAdrf" attribute shall be provided. |

\*\*\* 4th Change \*\*\*

##### 5.5.6.2.2 Type NwdafMLModelTrainSubsc

Table 5.5.6.2.2-1: Definition of type NwdafMLModelTrainSubsc

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| eventReq | ReportingInformation | O | 0..1 | Reporting requirement information of the subscription.If omitted, the default values within the ReportingInformation data type apply. |  |
| failEventReports | array(FailureEventInfoForMLModelTrain) | O | 1..N | Supplied by the NWDAF containing MTLF when available, shall contain the event(s) that the subscription is not successful including the failure reason(s). |  |
| mlCorreId | string | C | 0..1 | Identifies the Machine Learning procedure for training the ML model.It shall be present when the service is for Federated Learning. |  |
| mLEventSubscs | array(MLEventSubscription) | M | 1..N | Each element identifies the subscription for each event. The "modelInterInfo" attribute within the MLEventSubscription data type shall be provided. |  |
| mLModelInfos | array(MLEventNotif) | O | 1..N | Each element contains ML Model information for a specific analytics type. (NOTE 1) (NOTE 2) |  |
| immReports | array(NwdafMLModelTrainNotif) | O | 1..N | Immediately reported ML Model Training notifications. It may only be provided in the HTTP POST response of a subscription creation/update and only if the immediate reporting flag was set to "true" in the HTTP POST request. |  |
| mLModelTrainInfos | array(MLModelTrainInfo) | O | 1..N | Each element represents the ML Model training information for each event, include requirement on data availability and time availability. |  |
| mLPreFlag | boolean | C | 0..1 | Indicates whether the subscription is for preparation of ML Model training. Set to "true" if it is for ML training preparation, otherwise set to "false".Default value is "false" if omitted.It shall be present when the service is for preparation of Federated Learning. |  |
| mLAccChkFlg | boolean | O | 0..1 | Indicates whether request using the local training data as the testing dataset to calculate the Model Accuracy of the global ML model provided by the consumer. Set to "true" if it is requested, otherwise set to "false".Default value is "false" if omitted. |  |
| mLTrainRepInfo | MLTrainReportInfo | O | 0..1 | Indicates the training reporting information.This attribute can be provided when the "notifMethod" attribute within the ReportingInformation structure is set to "ON\_EVENT\_DETECTION" in the "eventReq" attribute. |  |
| notifCorreId | string | M | 1 | The value of Notification Correlation ID in the corresponding notification. |  |
| notifUri | Uri | M | 1 | URI at which the NF service consumer requests to receive notifications. |  |
| roundInd | Uinteger | O | 0..1 | Indicates the round number of the training in a multi-round training process. |  |
| suppFeats | SupportedFeatures | C | 0..1 | List of Supported features used as described in clause 5.5.8.It shall be supplied by NF service consumer in the POST requests that request the creation of an NWDAF ML Model Training Subscriptions resource and shall be supplied by the NWDAF in the reply of corresponding request. |  |
| tgtRepUe | TargetUeInformation | O | 0..1 | Indicates the UE(s) information for which data for ML model training is requested. |  |
|  |  |  |  |  |  |
| NOTE 1: It is up to implementation to determine whether to include the "mlFile" arttribute in the "MLEventNotif" data structure considering ML Model file size, etc.NOTE 2: Only the "event", "mlFile", "mLFileAddr", "mLModelAdrf" and "modelUniqueId" attributes contained in MLEventNotif data type are applicable. |

\*\*\* 5th Change \*\*\*

##### 5.5.6.2.3 Type NwdafMLModelTrainSubscPatch

Table 5.5.6.2.3-1: Definition of type NwdafMLModelTrainSubscPatch

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| eventReq | ReportingInformation | O | 0..1 | Reporting requirement information of the subscription.If omitted, the default values within the ReportingInformation data type apply. |  |
| mLModelInfos | array(MLEventNotif) | O | 1..N | Each element contains ML Model information for a specific analytics type. (NOTE 1) |  |
| mLModelTrainInfos | array(MLModelTrainInfo) | O | 1..N | Each element represents the ML Model training information, include requirement on data availability and time availability, training filter information. |  |
| mLPreFlag | boolean | O | 0..1 | Indicates whether the subscription is for preparation of ML Model training. Set to "true" if it is for ML training preparation, otherwise set to "false". |  |
| mLAccChkFlg | boolean | O | 0..1 | Indicates whether request using the local training data as the testing dataset to calculate the Model Accuracy of the global ML model provided by the consumer. Set to "true" if it is requested, otherwise set to "false". |  |
| mLTrainRepInfo | MLTrainReportInfo | O | 0..1 | Indicates the training reporting information.This attribute can be provided when the "notifMethod" attribute within the ReportingInformation structure is set to "ON\_EVENT\_DETECTION" in the "eventReq" attribute. |  |
| notifUri | Uri | O | 1 | URI at which the NF service consumer requests to receive notifications. |  |
| roundInd | Uinteger | O | 0..1 | Indicates the round number of the training in a multi-round training process. |  |
| tgtRepUe | TargetUeInformation | O | 0..1 | Indicates the UE(s) information for which data for ML model training is requested. |  |
|  |  |  |  |  |  |
| NOTE 1: It is up to implementation to determine whether to include the "mlFile" arttribute in the "MLEventNotif" data structure considering ML Model file size, etc.NOTE 2: Only the "event", "mlFile", "mLFileAddr", "mLModelAdrf" and "modelUniqueId" attributes contained in MLEventNotif data type are applicable. |

\*\*\* 6th Change \*\*\*

##### 5.5.6.2.8 Type NwdafMLModelTrainNotif

Table 5.5.6.2.8-1: Definition of type NwdafMLModelTrainNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| delayEventNotif | DelayEventNotif | C | 0..1 | Indicates that the NWDAF containing MTLF is not able to complete the training of ML model within the maximum response time, the cause code, and the expected time complete the training.May be provided for Federated Learning training.(NOTE 1) |  |
| mlCorreId | string | C | 0..1 | Identifies the Machine Learning procedure for training the ML model.It shall be present when the service is for Federated Learning. |  |
| mLModelInfos | array(MLEventNotif) | C | 1..N | Represents the ML Model information. (NOTE 1) (NOTE 2) |  |
| notifCorreId | string | M | 1 | Notification correlation ID used to identify the subscription to which the notification relates. It shall be set to the same value as the "notifCorreId" attribute of NwdafMLModelTrainSubsc data type. |  |
| roundInd | Uinteger | O | 0..1 | Indicates the round number of the training in a multi-round training process. |  |
| statusReport | StatusReportInfo | O | 0..1 | Indicates status information generated by the NWDAF containing MTLF during ML model training.May be provided for Federated Learning training. |  |
| termTrainReq | TermTrainCause | C | 0..1 | If provided, it indicates that the subscription is requested to be terminated (i.e. no further notifications related to this subscription will be provided) and itcontains the reason why the subscription is requested to be terminated.(NOTE 1) |  |
|  |  |  |  |  |  |
| NOTE 1: At least one of the "delayEventNotif", "mLModelInfos" or "termTrainReq" attribute shall be provided. The "delayEventNotif" attribute and "mLModelInfos" attribute are mutually exclusive. The "delayEventNotif" attribute and "termTrainReq" attribute are mutually exclusive.NOTE 2: Only the "event", "mLFileAddr", "mLModelAdrf", "modelUniqueId" and "useCaseCxt" attributes contained in MLEventNotif data type are applicable. |

\*\*\* 7th Change \*\*\*

# A.5 Nnwdaf\_MLModelProvision API

openapi: 3.0.0

info:

 title: Nnwdaf\_MLModelProvision

 version: 1.1.0-alpha.6

 description: |

 Nnwdaf\_MLModelProvision API Service.

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externalDocs:

 description: 3GPP TS 29.520 V18.5.0; 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:

 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'

 timeModelNeeded:

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

 mlEvRepCon:

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

 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.

 inferDataForModel:

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

 modelId:

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

 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

 description: >

 Contains notification correlation ID used to identify the subscription to which the

 notification relates. It shall be set to the same value as the "notifCorreId" attribute

 of NwdafMLModelProvSubsc data type.

 mlFile:

 type: string

 description: Contains the ML model file.

 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:

 type: array

 items:

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

 minItems: 1

 description: Contains the additional ML Model Information besides the ML Model Address

 modelUniqueId:

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

 useCaseCxt:

 type: string

 description: >

 String identifying the context of use of ML model. The value and format of this

 parameter are not standardized.

 allOf:

 - required: [event]

 - oneOf:

 - required: [mLFileAddr]

 - required: [mLModelAdrf]

 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]

 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'

 modelMetric:

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

 AdditionalMLModelInformation:

 description: Represents the additional ML Model Information.

 type: object

 properties:

 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'

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

 oneOf:

 - required: [mLFileAddr]

 - required: [mLModelAdrf]

 required:

 - modelUniqueId

 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: string

 InferenceDataForModelTrain:

 description: >

 Indicates the inference data stored in ADRF which can be used by MTLF to retrain or

 reprovision of the ML model.

 type: object

 properties:

 adrfId:

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

 adrfSetId:

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

 dataSetTag:

 $ref: 'TS29575\_Nadrf\_DataManagement.yaml#/components/schemas/DataSetTag'

 modelId:

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

 oneOf:

 - required: [adrfId]

 - required: [adrfSetId]

#

# 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.

 MLModelMetric:

 anyOf:

 - type: string

 enum:

 - ACCURACY

 - 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 metric of the ML model.

 Possible values are:

 - ACCURACY: ML Model Accuracy metric.

\*\*\* 8th Change \*\*\*

# A.6 Nnwdaf\_MLModelTraining API

openapi: 3.0.0

info:

 title: Nnwdaf\_MLModelTraining

 version: 1.0.0-alpha.3

 description: |

 Nnwdaf\_MLModelTraining API Service.

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externalDocs:

 description: 3GPP TS 29.520 V18.4.0; 5G System; Network Data Analytics Services.

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

servers:

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

 variables:

 apiRoot:

 default: https://example.com

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

security:

 - {}

 - oAuth2ClientCredentials:

 - nnwdaf-mlmodeltraining

paths:

 /subscriptions:

 post:

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

 operationId: CreateNWDAFMLModelTrainingSubcription

 tags:

 - Subscriptions (Collection)

 requestBody:

 required: true

 content:

 application/json:

 schema:

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

 responses:

 '201':

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

 content:

 application/json:

 schema:

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

 headers:

 Location:

 description: >

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

 {apiRoot}/nnwdaf-mlmodeltraining/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/NwdafMLModelTrainNotif'

 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 Training Subscription

 operationId: UpdateNWDAFMLModelTrainingSubcription

 tags:

 - Individual NWDAF ML Model Training Subscription (Document)

 requestBody:

 required: true

 content:

 application/json:

 schema:

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

 parameters:

 - name: subscriptionId

 in: path

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

 required: true

 schema:

 type: string

 responses:

 '200':

 description: >

 The Individual NWDAF ML Model Training Subscription resource was modified successfully

 and a representation of that resource is returned.

 content:

 application/json:

 schema:

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

 '204':

 description: >

 The Individual NWDAF ML Model Training 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'

 patch:

 summary: partial update an existing Individual NWDAF ML Model Training Subscription

 operationId: PartialUpdateNWDAFMLModelTrainingSubcription

 tags:

 - Individual NWDAF ML Model Training Subscription (Document)

 requestBody:

 required: true

 content:

 application/merge-patch+json:

 schema:

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

 parameters:

 - name: subscriptionId

 in: path

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

 required: true

 schema:

 type: string

 responses:

 '200':

 description: >

 The Individual NWDAF ML Model Training Subscription resource was partial modified

 successfully and a representation of that resource is returned.

 content:

 application/json:

 schema:

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

 '204':

 description: >

 The Individual NWDAF ML Model Training Subscription resource was partial 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 Training Subscription.

 operationId: DeleteNWDAFMLModelTrainingSubcription

 tags:

 - Individual NWDAF ML Model Training Subscription (Document)

 parameters:

 - name: subscriptionId

 in: path

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

 required: true

 schema:

 type: string

 responses:

 '204':

 description: >

 No Content. The Individual NWDAF ML Model Training 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-mlmodeltraining: Access to the Nnwdaf\_MLModelTraining API

 schemas:

 NwdafMLModelTrainSubsc:

 description: Represents a ML Model Training subscription.

 type: object

 properties:

 mLEventSubscs:

 type: array

 items:

 $ref: 'TS29520\_Nnwdaf\_MLModelProvision.yaml#/components/schemas/MLEventSubscription'

 minItems: 1

 description: Subscribed events

 notifUri:

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

 suppFeats:

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

 eventReq:

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

 failEventReports:

 type: array

 items:

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

 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).

 mlCorreId:

 type: string

 description: String identifying the subscription is for a Federated Learning procedure.

 mLModelInfos:

 type: array

 items:

 $ref: 'TS29520\_Nnwdaf\_MLModelProvision.yaml#/components/schemas/MLEventNotif'

 minItems: 1

 description: Represents the ML Model information.

 immReports:

 type: array

 items:

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

 minItems: 1

 description: Immediately reported ML Model Training notifications.

 mLModelTrainInfos:

 type: array

 items:

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

 minItems: 1

 description: Represents the ML Model training information.

 mLPreFlag:

 type: boolean

 description: >

 Indicates whether the subscription is for preparation of ML Model training. Set to

 "true" if it is for ML training preparation, otherwise set to "false".

 mLAccChkFlg:

 type: boolean

 description: >

 Indicates whether request using the local training data as the testing dataset to

 calculate the Model Accuracy of the global ML model provided by the consumer. Set to

 "true" if it is requested, otherwise set to "false".

 mLTrainRepInfo:

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

 notifCorreId:

 type: string

 description: >

 String identifying the Notification Correlation ID in the corresponding notification.

 roundInd:

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

 tgtRepUe:

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

 required:

 - mLEventSubscs

 - notifUri

 - notifCorreId

 NwdafMLModelTrainSubscPatch:

 description: >

 Represents parameters to request the modification of a ML Model Training subscription.

 type: object

 properties:

 notifUri:

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

 eventReq:

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

 mLModelInfos:

 type: array

 items:

 $ref: 'TS29520\_Nnwdaf\_MLModelProvision.yaml#/components/schemas/MLEventNotif'

 minItems: 1

 description: Represents the ML Model information.

 mLModelTrainInfos:

 type: array

 items:

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

 minItems: 1

 description: Represents the ML Model training information.

 mLPreFlag:

 type: boolean

 description: >

 Indicates whether the subscription is for preparation of ML Model training. Set to

 "true" if it is for ML training preparation, otherwise set to "false".

 mLAccChkFlg:

 type: boolean

 description: >

 Indicates whether request using the local training data as the testing dataset to

 Calculate the Model Accuracy of the global ML model provided by the consumer. Set to

 "true" if it is requested, otherwise set to "false".

 mLTrainRepInfo:

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

 roundInd:

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

 tgtRepUe:

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

 NwdafMLModelTrainNotif:

 description: Represents notifications on events that occurred.

 type: object

 properties:

 delayEventNotif:

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

 mlCorreId:

 type: string

 description: String identifying the subscription is for a Federated Learning procedure.

 mLModelInfos:

 type: array

 items:

 $ref: 'TS29520\_Nnwdaf\_MLModelProvision.yaml#/components/schemas/MLEventNotif'

 minItems: 1

 description: Represents the ML Model information.

 notifCorreId:

 type: string

 description: >

 String identifying the Notification Correlation ID in the corresponding notification.

 roundInd:

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

 statusReport:

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

 termTrainReq:

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

 uCaseCont:

 type: string

 description: >

 String identifying the context of use of ML model. The value and format of this

 parameter are not standardized.

 required:

 - notifCorreId

 oneOf:

 - required: [delayEventNotif]

 - required: [mLModelInfos]

 - required: [termTrainReq]

 - required: [mLModelInfos, termTrainReq]

 MLModelTrainInfo:

 description: >

 Represents the ML Model training information, include requirement on data availability and

 time availability, training filter information.

 type: object

 properties:

 dataAvReq:

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

 timeAvReq:

 type: string

 description: >

 String representing the requirement on available time for the ML model training.

 MLTrainReportInfo:

 description: Represents the ML Model training reporting information.

 type: object

 properties:

 maxResTime:

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

 FailureEventInfoForMLModelTrain:

 description: Represents the failure event information for a ML Model Training subscription.

 type: object

 properties:

 mLTrainEvent:

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

 failureCodeTrain:

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

 required:

 - mLTrainEvent

 - failureCodeTrain

 DataAvReq:

 description: Represents the requirement on available data for the ML model training.

 type: object

 properties:

 dataStatProps:

 type: array

 items:

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

 minItems: 1

 inpEvents:

 type: array

 items:

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

 minItems: 1

 minNumSamples:

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

 timeWindows:

 type: array

 items:

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

 minItems: 1

 required:

 - inpEvents

 DelayEventNotif:

 description: >

 Indicating that the NWDAF containing MTLF is not able to complete the training of ML model

 within the maximum response time, the cause code, and the expected time complete the

 training.

 type: object

 properties:

 delayEventInd:

 type: boolean

 description: >

 Indicates that the NWDAF containing MTLF is not able to complete the training of ML

 model within the maximum response time. Set to "true" if not able to complete the ML

 model training on time, otherwise set to "false".

 delayCause:

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

 expCompTime:

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

 required:

 - delayEventInd

 StatusReportInfo:

 description: >

 Indicating status information generated by the NWDAF containing MTLF during ML model

 training.

 type: object

 properties:

 mlModelAcc:

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

 trainInDataInfo:

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

 TrainDataInfo:

 description: Represents the training input data information.

 type: object

 properties:

 areaDataSet:

 type: string

 description: Indicates the areas covered by the data set.

 maxValues:

 type: array

 items:

 type: string

 minItems: 1

 description: Represents the maximum value of one dimension of data.

 minValues:

 type: array

 items:

 type: string

 minItems: 1

 description: Represents the minimum value of one dimension of data.

 samplRatio:

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

#

# ENUMERATIONS DATA TYPES

#

 FailureCodeTrain:

 anyOf:

 - type: string

 enum:

 - UNAVAILABLE\_ML\_MODEL\_TRAIN

 - 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 reason.

 Possible values are:

 - UNAVAILABLE\_ML\_MODEL\_TRAIN: The ML model training is unavailable.

 TermTrainCause:

 anyOf:

 - type: string

 enum:

 - NWDAF\_OVERLOAD

 - NOT\_AVAILABLE\_ML\_TRAIN

 - OTHERS

 - 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 reasons that ML Model Training to be terminated.

 Possible values are:

 - NWDAF\_OVERLOAD: The NWDAF is overloaded for the ML model training.

 - NOT\_AVAILABLE\_ML\_TRAIN: The ML model training process is not available.

 - OTHERS: Other cause.

 DelayCause:

 anyOf:

 - type: string

 enum:

 - ML\_MODEL\_TRAIN\_FAILURE

 - NEED\_MORE\_TIME

 - OTHERS

 - 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 reasons for ML Model training delay.

 Possible values are:

 - ML\_MODEL\_TRAIN\_FAILURE: The ML model training is failure.

 - NEED\_MORE\_TIME: The ML model training needs more time.

 - OTHERS: Other cause.

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