**3GPP TSG-CT WG3 Meeting #130C3-234300r1**

**Xiamen, China, 9 - 13 October, 2023**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** | **0064** | **rev** | **1** | **Current version:** |  |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Correction to MLModelManagement\_Delete service operation | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | |  |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories 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:*** | | SA2 has agreed in CR 0877 to TS 23.288 clause 10.3.3 (see S2-2308758) that the Nadrf\_MLModelManagement\_Delete service operation shall provide as a mandatory output parameter an operation execution result indication (i.e. ML Model deleted, ML Model not found, ML Model found but not deleted). *“10.3.3 Nadrf\_MLModelManagement\_Delete service operation* ***Service operation name:*** *Nadrf\_MLModelManagement\_Delete*  ***Description:*** *This service operation instructs the ADRF to delete stored ML Model file(s) or ML Model address(es).*  ***Inputs, Required:***  *- Storage Transaction Identifier; or*  *- one or more unique ML Model identifier(s).*  *When a Storage Transaction Identifier is given, ADRF shall delete all the models that stored in the corresponding storage transaction.*  ***Inputs, Optional:*** *None.*  ***Outputs, Required:*** *Operation execution result indication (i.e. ML Model deleted, ML Model not found, ML Model found but not deleted).*  ***Outputs, Optional:*** *None.”*  Accordingly, this CR proposes to update the Nadrf\_MLModelManagement\_Delete service operation to provide an operation execution result. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Update the Nadrf\_MLModelManagement\_Delete service operation to provide an operation execution result indication. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Stage 3 not aligned with Stage 2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.3.2.4.3, 5.2.4.4.2, 5.2.6.1, 5.2.6.2.3, 5.2.6.2.X (new), 5.2.6.2.Y (new), A.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 backwards compatible changes to the Nnwdaf\_MLModelManagement API. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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

##### 4.3.2.4.3 Requesting removal of stored ML model(s) using unique ML model identifier

Figure 4.3.2.4.3-1 shows a scenario where the NF service consumer sends a request to the ADRF to delete stored ML model(s) based on the unique ML model identifier.

Figure 4.3.2.4.3-1: NF service consumer requesting to remove stored ML model(s)

The NF service consumer shall invoke the Nadrf\_MLModelManagement\_Delete service operation to remove stored ML model(s) based on the unique ML model identifier. The NF service consumer shall send an HTTP POST request with "{apiRoot}/nadrf-mlmodelmanagement/<apiVersion>/remove-stored-mlmodel" as URI, as shown in figure 4.3.2.4.3-1, step 1. The POST request body shall contain a NadrfMLModelStoreRecord data structure. The NadrfMLModelStoreRecord data structure provided in the request body shall include the MLModelInfo data structure in the "mlModelInfo" attribute with the unique ML model identifier in the "modelUniqueId" attribute.

Upon the reception of an HTTP POST request with "{apiRoot}/nadrf-mlmodelmanagement/<apiVersion>/remove-stored-mlmodel" as URI, if the ADRF successfully processed and accepted the received HTTP POST request, the ADRF shall remove any stored ML model(s) that match the unique ML model identifier received in the request and respond with HTTP "200 OK" status with the message body containing the MLModelDelResult data structure. The ADRF shall include the unique ML model identifier in the "modelUniqueId" attribute and the result (i.e. ML model deleted, ML model not found, ML model found but not deleted) in the "delResult" attribute. If errors occur when processing the HTTP POST request, the ADRF shall send an HTTP error response as specified in clause 5.2.7.

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

##### 5.2.4.4.2 Operation Definition

This operation shall support the request data structures shown in Table 5.2.4.4.2-1 and the response data structures and error codes specified in Tables 5.2.4.4.2-2.

Table 5.2.4.4.2-1: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| NadrfMLModelStoreRecord | M | 1 | Unique ML model identifier of the ML model stored in ADRF. |

Table 5.1.4.4.2-2: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
|  |  |  |  |  |
| array(MLModelDelResult) |  | 1..N | 200 OK | Attempted to remove ML model(s) in in the ADRF based on the unique ML model identifier. A representation of ML Model delete result information is returned. |
| NOTE: The mandatory HTTP error status code for the POST method listed in Table 5.1.7.1-1 of 3GPP TS 29.500 [4] also apply. | | | | |

#### 5.2.6.1 General

This clause specifies the application data model supported by the Nadrf\_MLModelManagement API.

Table 5.2.6.1-1 specifies the data types defined for the Nadrf\_MLModelManagement service based interface protocol.

Table 5.2.6.1-1: Nadrf\_MLModelManagement specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Clause defined | Description | Applicability |
| NadrfMLModelStoreRecord | 5.2.6.2.2 | Represents an Individual ADRF ML Model Store Record resource. |  |
| MLModelInfo | 5.2.6.2.3 | Represents informatiom of the ML Model. |  |
| MLModelDelResult | 5.2.6.2.X | Represents information provided in the response to the ML Model Nadrf\_MLModelManagement Delete service operation. |  |
| DeleteResult | 5.2.6.2.Y | Indicates the result of the delete operation. |  |

Table 5.2.6.1-2 specifies data types re-used by the Nadrf\_MLModelManagement 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 Nadrf\_MLModelManagement service based interface.

Table 5.2.6.1-2: Nadrf\_MLModelManagement re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| MLModelAddr | 3GPP TS 29.520 [15] | Address of ML model file |  |
| NfInstanceId | 3GPP TS 29.571 [16] | NF instance identifier. |  |
| NfSetId | 3GPP TS 29.571 [16] | NF set identifier. |  |
| SupportedFeatures | 3GPP TS 29.571 [16] | Used to negotiate the applicability of the optional features defined in table 5.2.8-1. |  |
| Uinteger | 3GPP TS 29.571 [16] | Unsigned Integer, i.e. only value 0 and integers above 0 are permissible. |  |

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

##### 5.2.6.2.3 Type: MLModelInfo

Table 5.2.6.2.3-1: Definition of type MLModelInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| modelUniqueId | Uinteger | M | 1 | Unique ML Model identifier |  |
| mlFileAddr | MLModelAddr | M | 1 | Address (e.g. a URL or an FQDN) of the ML model file. |  |
| mlStorageSize | Uinteger | M | 1 | Storage size in octets required for each of the ML model. |  |
|  | | | | | |

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

##### 5.2.6.2.X Type: MLModelDelResult

Table 5.2.6.2.X-1: Definition of type MLModelOpResult

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| modelUniqueId | Uinteger | M | 1 | Unique ML Model identifier |  |
| delResult | DeleteResult | M | 1 | Indicates the result of the delete operation |  |
|  | | | | | |

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

5.2.6.2.Y Enumeration: DeleteResult

Table 5.2.6.2.Y-1: Enumeration DeleteResult

|  |  |  |
| --- | --- | --- |
| Attribute name | Description | Applicability |
| ML\_MODEL\_DELETED | Indicates that the ML model was deleted in ADRF. |  |
| ML\_MODEL\_NOT\_FOUND | Indicates that the ML model was not found in ADRF. |  |
| ML\_MODEL\_FOUND\_BUT\_NOT\_DELETED | Indicates that the ML model was found in ADRF but not deleted. |  |

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

# A.3 Nadrf\_MLModelManagement API

openapi: 3.0.0

info:

version: 1.0.0-alpha.1

title: Nadrf\_MLModelManagement

description: |

ADRF ML Model Management Service.

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externalDocs:

description: 3GPP TS 29.575 V18.3.0; 5G System; Analytics Data Repository Services; Stage 3.

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.575/'

#

servers:

- url: '{apiRoot}/nadrf-mlmodelmanagement/v1'

variables:

apiRoot:

default: https://example.com

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

#

security:

- {}

- oAuth2ClientCredentials:

- nadrf-mlmodelmanagement

#

paths:

/mlmodel-store-records:

post:

summary: Creates a new Individual ADRF ML Model Store Record resource.

operationId: CreateADRFMLModelStoreRecord

tags:

- ADRF ML Model Store Records (Collection)

requestBody:

content:

application/json:

schema:

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

required: true

description: ADRF ML model store record to be stored.

responses:

'201':

description: Successful creation of new Individual ADRF ML Model Store Record resource.

headers:

Location:

description: >

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

{apiRoot}/nadrf-mlmodelmanagement/<apiVersion>/mlmodel-store-records/{storeTransId}

required: true

schema:

type: string

content:

application/json:

schema:

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

'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'

get:

summary: Retrieves existing Individual ADRF ML Model Store Record.

operationId: GetAdrfMLModelStoreRecord

tags:

- ADRF ML Model Store Records (Collection)

parameters:

- name: store-trans-id

description: A storage transaction identifier of a ML model store record in ADRF.

in: query

required: false

schema:

type: string

- name: modelUniqueId

description: Unique Model identifier of a ML model.

in: query

required: false

schema:

type: array

items:

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

minItems: 1

responses:

'200':

description: ML model store records are returned.

content:

application/json:

schema:

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

'204':

description: No matching ADRF ML Model were found.

'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'

'406':

$ref: 'TS29571\_CommonData.yaml#/components/responses/406'

'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'

/mlmodel-store-records/{storeTransId}:

delete:

summary: Delete an existing Individual ADRF ML Model Store Record.

operationId: DeleteADRFMLModelStoreRecord

tags:

- Individual ADRF ML Model Store Record (Document)

parameters:

- name: storeTransId

in: path

description: String identifying a ML Model Store Record in ADRF.

required: true

schema:

type: string

responses:

'204':

description: >

No Content. The Individual ADRF ML Model Store Record resource matching the

storeTransId 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'

/remove-stored-mlmodel:

post:

summary: Remove stored ML model based on unique ML model identifier.

operationId: DeleteADRFMLModel

tags:

- ADRF Stored ML Model

requestBody:

content:

application/json:

schema:

type: array

items:

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

minItems: 1

required: true

responses:

'200':

description: >

The ADRF ML model matching the provided unique ML model identifier

was attempted to be deleted. The result is returned.

content:

application/json:

schema:

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

'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'

#

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{nrfApiRoot}/oauth2/token'

scopes:

nadrf-mlmodelmanagement: Access to the nadrf-mlmodelmanagement API

#

schemas:

#

NadrfMLModelStoreRecord:

description: Represents an Individual ADRF ML Model Store Record.

type: object

allOf:

- oneOf:

- required: [nfInstanceId]

- required: [nfSetId]

- required: [mlModelIdnfo]

properties:

nfInstanceId:

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

nfSetId:

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

mlModelInfo:

type: array

items:

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

minItems: 1

description: List of ML Model Information.

suppFeat:

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

#

MLModelInfo:

description: Represents informatiom of the ML Model.

type: object

allOf:

- required: [modelUniqueId]

- required: [mlFileAddr]

- required: [mlStorageSize]

properties:

modelUniqueId:

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

mlModelAddr:

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

mlStorageSize:

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

#

MLModelDelResult:

description: Represents informatiom of the ML Model.

type: object

allOf:

- required: [modelUniqueId]

- required: [DeleteResult]

properties:

modelUniqueId:

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

deleteResult:

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

#

# ENUMERATIONS DATA TYPES

#

DeleteResult:

anyOf:

- type: string

enum:

- ML\_MODEL\_DELETED

- ML\_MODEL\_NOT\_FOUND

- ML\_MODEL\_FOUND\_BUT\_NOT\_DELETED

- 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 store result type.

Possible values are:

- ML\_MODEL\_DELETED: Indicates that the ML model was deleted in ADRF.

- ML\_MODEL\_FILE\_ADDRESS\_NOT\_FOUND: Indicates that the ML model was not found in ADRF.

- ML\_MODEL\_FOUND\_BUT\_NOT\_DELETED: Indicates that the ML model was found in ADRF but not deleted.

\* \* \* End Change \* \* \* \*