**3GPP TSG CT WG3 Meeting #142 *C3-253365***

**Goteborg, SE, 25th – 29th August, 2025**

**Source: Huawei**

**Title: Pseudo-CR on defining the API definition clauses of the Naf\_Training API**

**Spec: 3GPP TS 29.530**

**Agenda item: 19.39 (AIML\_CN)**

**Document for: Agreement**

**1. Introduction**

The stage 2 requirements for the new Naf\_Training API have been defined in clauses TS 23.288.

**2. Reason for Change**

Define the API definition clauses of this new API in the corresponding new AI/ML related AF Services TS.

**3. Conclusions**

N/A

**4. Proposal**

It is proposed to agree the following changes to 3GPP TS 29.530 V 0.0.0.

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

# 2 References

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

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

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

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

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

[2] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[3] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[4] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

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

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

[7] 3GPP TR 21.900: "Technical Specification Group working methods".

[8] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

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

[10] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[11] IETF RFC 9113: "HTTP/2".

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

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

[xx] 3GPP TS 29.122: "T8 reference point for Northbound APIs".

[yy] 3GPP TS 29.554: "5G System; Background Data Transfer Policy Control Service; Stage 3".

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

## 6.3 Naf\_Training Service API

### 6.3.1 Introduction

The Naf\_Training shall use the Naf\_Training API.

The API URI of the Naf\_Training API shall be:

**{apiRoot}/<apiName>/<apiVersion>**

The request URIs used in HTTP requests from the NF service consumer towards the NF service producer shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [5], i.e.:

**{apiRoot}/<apiName>/<apiVersion>/<apiSpecificResourceUriPart>**

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [5].

- The <apiName>shall be "naf-train".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clauses 6.3.3 and 6.3.4.

### 6.3.2 Usage of HTTP

#### 6.3.2.1 General

HTTP/2, IETF RFC 9113 [11], shall be used as specified in clause 5 of 3GPP TS 29.500 [4].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [4].

The OpenAPI [6] specification of HTTP messages and content bodies for the Naf\_Training API is contained in Annex A.

#### 6.3.2.2 HTTP standard headers

##### 6.3.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [4] for the usage of HTTP standard headers.

##### 6.3.2.2.2 Content type

If the AF is untrusted, support of HTTP/1.1 (IETF RFC 9112 [15], IETF RFC 9110 [16] and IETF RFC 9111[17] over TLS is mandatory and support of HTTP/2 (IETF RFC 9113 [11]) over TLS is recommended. TLS shall be used as specified in clause 12.3 and clause 13.1 of 3GPP TS 33.501 [8].

If the AF is trusted, HTTP/2, IETF RFC 9113 [11], shall be used as specified in clause 5.2 of 3GPP TS 29.500 [4].

HTTP/2, IETF RFC 9113 [11], shall be used as specified in clause 5 of 3GPP TS 29.500 [4].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [4].

The OpenAPI [6] specification of HTTP messages and content bodies for the Naf\_VFLInference API is contained in Annex A.

#### 6.3.2.3 HTTP custom headers

The mandatory HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [4] shall be supported, and the optional HTTP custom header fields specified in clause 5.2.3.3 of 3GPP TS 29.500 [4] may be supported.

### 6.3.3 Resources

#### 6.3.3.1 Overview

This clause describes the structure for the Resource URIs and the resources and methods used for the service.

Figure 6.3.3.1-1 depicts the resource URIs structure for the Naf\_Training API.



Figure 6.3.3.1-1: Resource URI structure of the Naf\_Training API

Table 6.3.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.3.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource purpose/name | Resource URI (relative path after API URI) | HTTP method or custom operation | Description (service operation) |
| Training Subscriptions | /subscriptions | GET | Retrieve all the Training Subscriptions managed by the AF. |
| POST | Create a new Training Subscription. |
| Individual Training Subscription | /subscriptions/{subscriptionId} | GET | Retrieve an existing "Individual Training Subscription" resource. |
| PUT | Request the update of an existing "Individual Training Subscription" resource. |
| PATCH | Request the modification of an existing "Individual Training Subscription" resource. |
| DELETE | Request the deletion of an existing "Individual Training Subscription" resource. |

#### 6.3.3.2 Resource: Training Subscriptions

##### 6.3.3.2.1 Description

This resource represents the collection of Training Subscription(s) managed by the AF.

##### 6.3.3.2.2 Resource Definition

Resource URI: **{apiRoot}/naf-train/<apiVersion>/subscriptions**

This resource shall support the resource URI variables defined in table 6.3.3.2.2-1.

Table 6.3.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.3.1. |

##### 6.3.3.2.3 Resource Standard Methods

6.3.3.2.3.1 GET

The HTTP POST method allows a service consumer to request to retrieve all the active Training Subscription(s) managed by the AF.

This method shall support the URI query parameters specified in table 6.3.3.2.3.1-1.

Table 6.3.3.2.3.1-1: URI query parameters supported by the GET method on this resource

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description | Applicability |
| n/a |  |  |  |  |  |

This method shall support the request data structures specified in table 6.3.3.2.3.1-2 and the response data structures and response codes specified in table 6.3.3.2.3.1-3.

Table 6.3.3.2.3.1-2: Data structures supported by the GET Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| n/a |  |  |  |

Table 6.3.3.2.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| array*(*TrainEventsSubsc) | M | 0..N | 200 OK | Successful case. All the active Training Subscription(s) managed by the AF are returned.  If there are no existing "Individual Training Subscription" resources managed at the AF, an empty array is returned. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection.  (NOTE 2) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection.  (NOTE 2) |
| NOTE 1: The mandatory HTTP error status codes for the HTTP GET method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply.  NOTE 2: The RedirectResponse data structure may be provided by an SCP (cf. clause 6.30.9.1 of 3GPP TS 29.500 [4]). | | | | |

Table 6.3.3.2.3.1-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative AF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.30.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target AF (service) instance towards which the request is redirected. |

Table 6.3.3.2.3.1-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative AF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.30.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target AF (service) instance towards which the request is redirected. |

6.3.3.2.3.2 POST

6.3The HTTP POST method allows a service consumer to request the creation of a Training Subscription at the AF.

This method shall support the URI query parameters specified in table 6.3.3.2.3.2-1.

Table 6.3.3.2.3.2-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description | Applicability |
| n/a |  |  |  |  |  |

This method shall support the request data structures specified in table 6.3.3.2.3.2-2 and the response data structures and response codes specified in table 6.3.3.2.3.2-3.

Table 6.3.3.2.3.2-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| TrainEventsSubsc | M | 1 | Represents the parameters to request the creation of a Training Subscription. |

Table 6.3.3.2.3.2-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| TrainEventsSubsc | M | 1 | 201 Created | Successful case. The Training Subscription is successfully created and a representation of the created "Individual Training Subscription " resource shall be returned.  An HTTP "Location" header that contains the URI of the created resource shall also be included. |
| NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply. | | | | |

Table 6.3.3.2.3.2-4: Headers supported by the 201 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains the URI of the newly created resource, according to the structure:  {apiRoot}/naf-train/<apiVersion>/subscriptions/{subscriptionId} |

##### 6.3.3.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

#### 6.3.3.3 Resource: Individual Training Subscription

##### 6.3.3.3.1 Description

This resource represents a Training Subscription managed by the AF.

##### 6.3.3.3.2 Resource Definition

Resource URI: **{apiRoot}/naf-train/<apiVersion>/subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 6.3.3.3.2-1.

Table 6.3.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.3.1. |
| subscriptionId | string | Represents the unique identifier of the "Individual Training Subscription" resource. |

##### 6.3.3.3.3 Resource Standard Methods

###### 6.3.3.3.3.1 GET

The GET method allows an NF service consumer to retrieve an existing "Individual Training Subscription" resource managed by the AF.

This method shall support the URI query parameters specified in table 6.3.3.3.3.1-1.

Table 6.3.3.3.3.1-1: URI query parameters supported by the GET method on this resource

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description | Applicability |
| n/a |  |  |  |  |  |

This method shall support the request data structures specified in table 6.3.3.3.3.1-2 and the response data structures and response codes specified in table 6.3.3.3.3.1-3.

Table 6.3.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| n/a |  |  |  |

Table 6.3.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| TrainEventsSubsc | M | 1 | 200 OK | Successful case. The requested "Individual Training Subscription" resource is returned. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection.  (NOTE 2) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection.  (NOTE 2) |
| NOTE 1: The mandatory HTTP error status codes for the HTTP GET method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply.  NOTE 2: The RedirectResponse data structure may be provided by an SCP (cf. clause 6.30.9.1 of 3GPP TS 29.500 [4]). | | | | |

Table 6.3.3.3.3.1-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative AF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.30.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target AF (service) instance towards which the request is redirected. |

Table 6.3.3.3.3.1-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative AF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.30.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target AF (service) instance towards which the request is redirected. |

###### 6.3.3.3.3.2 PUT

The PUT method allows an NF service consumer to request the update of an existing "Individual Training Subscription" resource managed by the AF.

This method shall support the URI query parameters specified in table 6.3.3.3.3.2-1.

Table 6.3.3.3.3.2-1: URI query parameters supported by the PUT method on this resource

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description | Applicability |
| n/a |  |  |  |  |  |

This method shall support the request data structures specified in table 6.3.3.3.3.2-2 and the response data structures and response codes specified in table 6.3.3.3.3.2-3.

Table 6.3.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| TrainEventsSubsc | M | 1 | Contains the updated representation of the "Individual Training Subscription" resource. |

Table 6.3.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| TrainEventsSubsc | M | 1 | 200 OK | Successful case. The "Individual Training Subscription" resource is successfully updated and a representation of the updated resource is returned in the response body. |
| n/a |  |  | 204 No Content | Successful case. The "Individual Training Subscription" resource is successfully updated and no content is returned in the response body. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection.  (NOTE 2) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection.  (NOTE 2) |
| NOTE 1: The mandatory HTTP error status codes for the HTTP PUT method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply.  NOTE 2: The RedirectResponse data structure may be provided by an SCP (cf. clause 6.30.9.1 of 3GPP TS 29.500 [4]). | | | | |

Table 6.3.3.3.3.2-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative AF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target AF (service) instance towards which the request is redirected. |

Table 6.3.3.3.3.2-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative AF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target AF (service) instance towards which the request is redirected. |

###### 6.3.3.3.3.3 PATCH

The PATCH method allows an NF service consumer to request the modification of an existing "Individual Training Subscription" resource managed by the AF.

This method shall support the URI query parameters specified in table 6.3.3.3.3.3-1.

Table 6.3.3.3.3.3-1: URI query parameters supported by the PATCH method on this resource

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description | Applicability |
| n/a |  |  |  |  |  |

This method shall support the request data structures specified in table 6.3.3.3.3.3-2 and the response data structures and response codes specified in table 6.3.3.3.3.3-3.

Table 6.3.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| TrainEventsSubscPatch | M | 1 | Contains the parameters to request the modification of the "Individual Training Subscription" resource. |

Table 6.3.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| TrainEventsSubsc | M | 1 | 200 OK | Successful case. The "Individual Training Subscription" resource is successfully modified and a representation of the updated resource is returned in the response body. |
| n/a |  |  | 204 No Content | Successful case. The "Individual Training Subscription" resource is successfully modified and no content is returned in the response body. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection.  (NOTE 2) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection.  (NOTE 2) |
| NOTE 1: The mandatory HTTP error status codes for the HTTP PATCH method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply.  NOTE 2: The RedirectResponse data structure may be provided by an SCP (cf. clause 6.10.9.1 of 3GPP TS 29.500 [4]). | | | | |

Table 6.3.3.3.3.3-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative AF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target AF (service) instance towards which the request is redirected. |

Table 6.3.3.3.3.3-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative AF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target AF (service) instance towards which the request is redirected. |

###### 6.3.3.3.3.4 DELETE

The DELETE method allows an NF service consumer to request the deletion of an existing "Individual Training Subscription" resource managed by the AF.

This method shall support the URI query parameters specified in table 6.3.3.3.3.4-1.

Table 6.3.3.3.3.4-1: URI query parameters supported by the DELETE method on this resource

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description | Applicability |
| n/a |  |  |  |  |  |

This method shall support the request data structures specified in table 6.3.3.3.3.4-2 and the response data structures and response codes specified in table 6.3.3.3.3.4-3.

Table 6.3.3.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| n/a |  |  |  |

Table 6.3.3.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Successful case. The "Individual Training Subscription" resource is successfully deleted. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection.  (NOTE 2) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection.  (NOTE 2) |
| NOTE 1: The mandatory HTTP error status codes for the HTTP DELETE method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply.  NOTE 2: The RedirectResponse data structure may be provided by an SCP (cf. clause 6.10.9.1 of 3GPP TS 29.500 [4]). | | | | |

Table 6.3.3.3.3.4-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative AF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target AF (service) instance towards which the request is redirected. |

Table 6.3.3.3.3.4-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI of the resource located in an alternative AF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target AF (service) instance towards which the request is redirected. |

### 6.3.4 Custom Operations without associated resources

There are no custom operations without associated resources defined for this API in this release of the specification.

### 6.3.5 Notifications

#### 6.3.5.1 General

Notifications shall comply to clause 6.2 of 3GPP TS 29.500 [4] and clause 4.6.2.3 of 3GPP TS 29.501 [5].

Table 6.3.5.1-1: Notifications overview

|  |  |  |  |
| --- | --- | --- | --- |
| Notification | Callback URI | HTTP method or custom operation | Description  (service operation) |
| Training Notification | {notifUri} | POST | Enables the AF to notify a previously subscribed NF service consumer on Training report(s). |

#### 6.3.5.2 Training Notification

##### 6.3.5.2.1 Description

The Training Notification is used by the AF to notify a previously subscribed NF service consumer on Training report(s).

##### 6.3.5.2.2 Target URI

The Callback URI **"{notifUri}"** shall be used with the callback URI variables defined in table 6.3.5.2.2-1.

Table 6.3.5.2.2-1: Callback URI variables

|  |  |
| --- | --- |
| Name | Definition |
| notifUri | Represents the callback URI encoded as a string formatted as a URI. |

##### 6.3.5.2.3 Standard Methods

6.3.5.2.3.1 POST

This method shall support the request data structures specified in table 6.3.5.2.3.1-1 and the response data structures and response codes specified in table 6.3.5.2.3.1-2.

Table 6.3.5.2.3.1-1: Data structures supported by the POST Request Body

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| TrainEventsNotif | M | 1 | Represents the Training Notification. |

Table 6.3.5.2.3.1-2: Data structures supported by the POST Response Body

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| n/a |  |  | 204 No Content | Successful case. The Training Notification is successfully received. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection.  (NOTE 2) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection.  (NOTE 2) |
| NOTE 1: The mandatory HTTP error status codes for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.  NOTE 2: The RedirectResponse data structure may be provided by an SCP (cf. clause 6.10.9.1 of 3GPP TS 29.500 [4]). | | | | |

Table 6.3.5.2.3.1-3: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF service consumer (service) instance towards which the notification request is redirected. |

Table 6.3.5.2.3.1-4: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF service consumer (service) instance towards which the notification request is redirected. |

### 6.3.6 Data Model

#### 6.3.6.1 General

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

Table 6.3.6.1-1 specifies the data types defined for the Naf\_Training service-based interface protocol.

Table 6.3.6.1-1: Naf\_Training API specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Clause defined | Description | Applicability |
| EventNotif | 6.3.6.2.7 | Represents notification on event training. |  |
| EventSubsc | 6.3.6.2.4 | Represents an event training subscription. |  |
| MlModelMonitorInfo | 6.3.6.2.5 | Represents the ML model monitoring information. |  |
| TrainEventsNotif | 6.3.6.2.6 | Represents notification on training event(s) that occurred. |  |
| TrainEventsSubsc | 6.3.6.2.2 | Represents event(s) training subscription. |  |
| TrainEventsSubscPatch | 6.3.6.2.3 | Represents the requested modifications to an event training subscription. |  |

Table 6.1.6.1-2 specifies data types re-used by the Naf\_Training 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 Naf\_Training service-based interface.

Table 6.3.6.1-2: Naf\_Training API re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| Accuracy | 3GPP TS 29.520 [15] | Represents accuracy levels of interest for ML models. |  |
| DateTime | 3GPP TS 29.571 [14] | Identifies the time. |  |
| EventFilter | 3GPP TS 29.520 [15] | Represents the event filters used to identify the subscribed analytics. |  |
| InferenceDataForModelTrain | 3GPP TS 29.520 [15] | Represents the inference data for model training. |  |
| InputDataInfo | 3GPP TS 29.520 [15] | Represents the metrics of the input data. |  |
| MLModelMetric | 3GPP TS 29.520 [15] | Represents the ML Model Metric. |  |
| NetworkAreaInfo | 3GPP TS 29.554 [yy] | Identifies the network area. |  |
| NwdafEvent | 3GPP TS 29.520 [15] | Represents the NWDAF event. |  |
| ReportingInformation | 3GPP TS 29.523 [16] | Represents the event reporting requirements. |  |
| SupportedFeatures | 3GPP TS 29.571 [14] | Represents the list of supported feature(s) and used to negotiate the applicability of the optional features. |  |
| TargetUeInformation | 3GPP TS 29.520 [15] | Identifies the target UE information. |  |
| TimeWindow | 3GPP TS 29.122 [xx] | Represents a time window. |  |
| Uinteger | 3GPP TS 29.571 [14] | Represents an unsigned integer. |  |
| Uri | 3GPP TS 29.571 [14] | Represents a URI. |  |

#### 6.3.6.2 Structured data types

##### 6.3.6.2.1 Introduction

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

##### 6.3.6.2.2 Type: TrainEventsSubsc

Table 6.3.6.2.2-1: Definition of type TrainEventsSubsc

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| trainEventSubs | map(EventSubsc) | M | 1..N | Contains the subscribed training events.  The key of the map shall be set to the value of the "event" attribute in the EventSubsc data structure. |  |
| notifUri | Uri | M | 1 | Contains the URI via which the training related notifications shall be delivered. |  |
| notifCorreId | string | M | 1 | The value of Notification Correlation ID in the corresponding notification. |  |
| reportingReqs | ReportingInformation | O | 0..1 | Contains reporting requirement information of the subscription.  If omitted, the default values within the ReportingInformation data type apply. |  |
| eventNotifs | array(EventNotif) | C | 1..N | Contains the training related even(s) report(s).  This attribute may be present only if immediate reporting was requested via the "eventReq" attribute. |  |
| suppFeat | SupportedFeatures | C | 0..1 | Contains the list of supported features among the ones defined in clause 6.3.8.  This attribute shall be present only when feature negotiation is required. |  |

##### 6.3.6.2.3 Type: TrainEventsSubscPatch

Table 6.3.6.2.3-1: Definition of type TrainEventsSubscPatch

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| trainEventSubs | map(EventSubsc) | O | 1..N | Contains the updated subscribed training events.  The key of the map shall be set to the value of the "event" attribute in the EventSubsc data structure. |  |
| notifUri | Uri | O | 0..1 | Contains the updated URI via which the training related notifications shall be delivered. |  |
| notifCorreId | string | O | 0..1 | The value of Notification Correlation ID in the corresponding notification. |  |
| reportingReqs | ReportingInformation | O | 0..1 | Contains the reporting requirement information of the subscription. |  |

##### 6.3.6.2.4 Type: EventSubsc

Table 6.3.6.2.4-1: Definition of type EventSubsc

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| event | NwdafEvent | M | 1 | Event that is subscribed. |  |
| useCaseCxt | string | O | 0..1 | Indicates the context of usage of the analytics.  The value and format of this parameter are not standardized. |  |
| trainFilter | EventFilter | O | 0..1 | Identifies the training filter information for the monitored event. |  |
| tgtUe | TargetUeInformation | O | 0..1 | Identifies target UE information |  |
| repRatio | 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. |  |
| targetPeriod | TimeWindow | O | 0..1 | Indicates the time interval for which the ML model for the analytics is requested. |  |
| inferInputData | InputDataInfo | O | 0..1 | Indicates the Inference Input Data information. |  |
| timeModelNeeded | DateTime | O | 0..1 | Indicating the latest time when the consumer expects to receive the ML Model(s). |  |
| modelMonInfo | MlModelMonitorInfo | O | 0..1 | Contains the ML Model Monitoring Information. |  |
| accuLevel | Accuracy | O | 0..1 | Contains the accuracy level of interest. |  |

##### 6.3.6.2.5 Type: MlModelMonitorInfo

Table 6.3.6.2.5-1: Definition of type MlModelMonitorInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| modelMetric | MLModelMetric | O | 0..1 | Indicates the ML model metric. |  |
| accuThreshold | Uinteger | O | 0..1 | Accuracy reporting threshold. Indicates the accuracy threshold of the ML Model requested by the consumer  Minimum = 0. Maximum = 100. |  |
| storedData | InferenceDataForModelTrain | O | 0..1 | Indicates the inference data stored in the ADRF. |  |

##### 6.3.6.2.6 Type: TrainEventsNotif

Table 6.3.6.2.6-1: Definition of type TrainEventsNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| notifCorreId | string | M | 1 | Contains the notification correlation identifier. |  |
| eventNotifs | array(EventNotif) | M | 1..N | Contains the Training related event(s) notification(s). |  |

##### 6.3.6.2.7 Type: EventNotif

Table 6.3.6.2.7-1: Definition of type EventNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| event | NwdafEvent | M | 1 | Contains the identifier of the analytics to which the training notifications is related. |  |
| trainingInd | boolean | O | 0..1 | Set to "true" to indicate that the ML model training is ongoing.  Set to "false" to indicate that the ML model training is done.  Default value is "false" if omitted. |  |
| 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. |  |
| repRatio | 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. |  |
| accMLModel | Uinteger | O | 0..1 | Indicates the accuracy value of the ML model.  Minimum = 0. Maximum = 100. |  |

#### 6.3.6.3 Simple data types and enumerations

##### 6.3.6.3.1 Introduction

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

##### 6.3.6.3.2 Simple data types

The simple data types defined in table 6.3.6.3.2-1 shall be supported.

Table 6.3.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
|  |  |  |  |

#### 6.3.6.4 Data types describing alternative data types or combinations of data types

There are no data types describing alternative data types or combinations of data types defined for this API in this release of the specification.

#### 6.3.6.5 Binary data

##### 6.3.6.5.1 Binary Data Types

Table 6.1.6.5.1-1: Binary Data Types

|  |  |  |
| --- | --- | --- |
| Name | Clause defined | Content type |
|  |  |  |

### 6.3.7 Error Handling

#### 6.3.7.1 General

For the Naf\_Training API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [5]. Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [4] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [4].

In addition, the requirements in the following clauses are applicable for the Naf\_Training API.

#### 6.3.7.2 Protocol Errors

No specific procedures for the Naf\_Training service are specified.

#### 6.3.7.3 Application Errors

The application errors defined for the Naf\_Training service are listed in Table 6.1.7.3-1.

Table 6.3.7.3-1: Application errors

|  |  |  |  |
| --- | --- | --- | --- |
| Application Error | HTTP status code | Description | Applicability |
|  |  |  |  |

### 6.3.8 Feature negotiation

The optional features in table 6.1.8-1 are defined for the Naf\_Training API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [4].

Table 6.3.8-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
|  |  |  |

### 6.3.9 Security

As indicated in 3GPP TS 33.501 [8] and 3GPP TS 29.500 [4], the access to the Naf\_Training API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [9]), based on local configuration, using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [10]) plays the role of the authorization server.

If OAuth2 is used, an NF Service Consumer, prior to consuming services offered by the Naf\_Training API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in clause 5.4.2.2 of 3GPP TS 29.510 [10].

NOTE: When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Naf\_Training service.

The Naf\_Training API defines a single scope "naf-train" for the entire service, and it does not define any additional scopes at resource or operation level.

### 6.3.10 HTTP redirection

An HTTP request may be redirected to a different AF service instance when using direct or indirect communications (see 3GPP TS 29.500 [4]).

An SCP that reselects a different AF producer instance will return the NF Instance ID of the new AF producer instance in the 3gpp-Sbi-Producer-Id header, as specified in clause 6.10.3.4 of 3GPP TS 29.500 [4].

If an AF redirects a service request to a different AF using an HTTP "307 Temporary Redirect" or "308 Permanent Redirect" status code, the identity of the new AF towards which the service request is redirected shall be indicated in the "3gpp-Sbi-Target-Nf-Id" header of the HTTP "307 Temporary Redirect" or "308 Permanent Redirect" response as specified in clause 6.10.9.1 of 3GPP TS 29.500 [4].

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