**3GPP TSG- Meeting #C3-253639**

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

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** | **0245** | **rev** | **1** | **Current version:** |  |  |
|  | | | | | | | | |
| *For* [***HELP***](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:*** | Definition of Nnef\_VFLInference | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | , China Mobile | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | AIML\_CN | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | TS 23.288 shows on clause 6.2H.2.4.1 the usage of Nnef\_VFLInference service by the NWDAF when it is acting as VFL server for requesting/subscribing to VFL inference events for each one of the untrusted AF(s) acting as VFL client(s).  Contents of Nnef\_VFLInference service are specified in clauses 6.2H.2.4.3 and 12.3. The contents are the same ones as for Nwdaf\_VFLInference service except that for Nnef\_VFLInference service it is needed to send from the NWDAF acting as VFL server the identity of the untrusted AF targeted as VFL client.  Hence, new Nnef\_VFLInference service needs to be defined on TS 29.591 to allow NWDAF(s) acting as VFL server to request/subscribe to/unsubscribe from/be notified of VFL Inference events on untrusted AF(s) acting as VFL client. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | New Nnef\_VFLInference service is defined on TS 29.591 allowing:   * Subscribing to/unsubscribing from VFL Inference event subscriptions. * Update/partial modify existing VFL Inference event subscriptions. * Be notified about subscribed VFL Inference event(s). | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | No support of stage 2 requirements on Nnef\_VFLInference service. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.8 (new, including subclauses), A.9 (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 new OpenAPI file for:  TS29591\_Nnef\_VFLInference.yaml | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**Additional discussion(if needed):**

**Proposed changes:**

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

## 5.8 Nnef\_VFLInference Service API

### 5.8.1 Introduction

The Nnef\_VFLInference service shall use the Nnef\_VFLInference API.

The API URI of the Nnef\_VFLInference 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 "nnef-vfl-inference".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 5.8.3.

### 5.8.2 Usage of HTTP

#### 5.8.2.1 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 Nnef\_VFLInference API is contained in Annex A.

#### 5.8.2.2 HTTP standard headers

##### 5.8.2.2.1 General

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

##### 5.8.2.2.2 Content type

JSON, IETF RFC 8259 [12], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [4]. The use of the JSON format shall be signalled by the content type "application/json".

"Problem Details" JSON object shall be used to indicate additional details of the error in a HTTP response body and shall be signalled by the content type "application/problem+json", as defined in IETF RFC 9457 [13].

#### 5.8.2.3 HTTP custom headers

The Nnef\_VFLInference API shall support mandatory HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [4] and may support HTTP custom header fields specified in clause 5.2.3.3 of 3GPP TS 29.500 [4].

In this release of the specification, no specific custom headers are defined for the Nnef\_VFLInference API.

### 5.8.3 Resources

#### 5.8.3.1 Resource Structure

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

Figure 5.8.3.1-1 depicts the resource URIs structure for the Nnef\_VFLInference API.

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Figure 5.8.3.1-1: Resource URI structure of the Nnef\_VFLInference API

Table 5.8.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.8.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| **Resource name** | **Resource URI** | **HTTP method or custom operation** | **Description** |
| NEF VFL Inference Subscriptions | /subscriptions | POST | Creates a new Individual NEF VFL Inference Subscription resource. |
| Individual NEF VFL Inference Subscription | /subscriptions/{subscriptionId} | DELETE | Deletes an Individual NEF VFL Inference Subscription identified by subresource {subscriptionId}. |
| PUT | Updates an existing Individual NEF VFL Inference Subscription identified by subresource {subscriptionId}. |
| PATCH | Modifies an existing Individual NEF VFL Inference Subscription identified by subresource {subscriptionId}. |

#### 5.8.3.2 Resource: NEF VFL Inference Subscriptions

##### 5.8.3.2.1 Description

The NEF VFL Inference Subscriptions resource represents all VFL Inference subscriptions to the Nnef\_VFLInference service at a given NEF. The resource allows an NF service consumer to create a new Individual NEF VFL Inference Subscription resource.

##### 5.8.3.2.2 Resource Definition

Resource URI: **{apiRoot}/nnef-vfl-inference/<apiVersion>/subscriptions**

This resource shall support the resource URI variables defined in table 5.8.3.2.2-1.

Table 5.8.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Definition** |
| apiRoot | string | See clause 5.8.1 |

##### 5.8.3.2.3 Resource Standard Methods

###### 5.8.3.2.3.1 POST

This method shall support the URI query parameters specified in table 5.8.3.2.3.1-1.

Table 5.8.3.2.3.1-1: 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 5.8.3.2.3.1-2 and the response data structures and response codes specified in table 5.8.3.2.3.1-3.

Table 5.8.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **P** | **Cardinality** | **Description** |
| VflInferSub | M | 1 | Creates a new Individual NEF VFL Inference Subscription resource.  "exterGroupIds" and "gpsis" target VFL identities on " vflInferAnaSubs" attribute under this structure are not applicable to this API. |

Table 5.8.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Data type** | **P** | **Cardinality** | **Response**  **codes** | **Description** |
| VflInferSub | M | 1 | 201 Created | The creation of an Individual NEF VFL Inference Subscription resource is confirmed and a representation of that resource is returned. |
| ProblemDetails | O | 0..1 | 403 Forbidden | (NOTE 2) |
| NOTE 1: The mandatory HTTP error status code for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.  NOTE 2: Failure cases are described in clause 5.8.7. | | | | |

Table 5.8.3.2.3.1-4: 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}/nnef-vfl-inference/<apiVersion>/subscriptions/{subscriptionId} |

##### 5.8.3.2.4 Resource Custom Operations

None in this release of the specification.

#### 5.8.3.3 Resource: Individual NEF VFL Inference Subscription

##### 5.8.3.3.1 Description

The Individual NEF VFL Inference Subscription resource represents a single VFL inference subscription to the Nnef\_VFLInference service at a given NEF. It allows NF service consumers to read/modify/cancel a subscription to notifications on application or user related event(s).

##### 5.8.3.3.2 Resource definition

Resource URI: **{apiRoot}/nnef-vfl-inference/<apiVersion>/subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 5.8.3.3.2-1.

Table 5.8.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Definition** |
| apiRoot | string | See clause 5.8.1 |
| subscriptionId | string | Identifies a subscription to the Nnef\_VFLInference service. |

##### 5.8.3.3.3 Resource Standard Methods

###### 5.8.3.3.3.1 PUT

This method shall support the URI query parameters specified in table 5.8.3.3.3.1-1.

Table 5.8.3.3.3.1-1: URI query parameters supported by the PUT method on this resource

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

This method shall support the request data structures specified in table 5.8.3.3.3.1-2 and the response data structures and response codes specified in table 5.8.3.3.3.1-3.

Table 5.8.3.3.3.1-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **P** | **Cardinality** | **Description** |
| VflInferSub | M | 1 | Parameters to replace a subscription to NEF VFL Subscription resource. |

Table 5.8.3.3.3.1-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Data type** | **P** | **Cardinality** | **Response codes** | **Description** |
| VflInferSub | M | 1 | 200 OK | Successful case.  The Individual VFL Inference Subscription resource was modified and a representation is returned.  "exterGroupIds" and "gpsis" target VFL identities on " vflInferAnaSub" attribute under this structure are not applicable to this API. |
| n/a |  |  | 204 No Content | Successful case.  The Individual VFL Inference Subscription resource was modified. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection, during subscription modification.  (NOTE 3) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during subscription modification.  (NOTE 3) |
| ProblemDetails | O | 0..1 | 403 Forbidden | (NOTE 2) |
| NOTE 1: The mandatory HTTP error status codes for the PUT method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.  NOTE 2: Failure cases are described in clause 5.8.7.  NOTE 3: The RedirectResponse data structure may be provided by an SCP (cf. clause 6.10.9.1 of 3GPP TS 29.500 [4]). | | | | |

Table 5.8.3.3.3.1-4: 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 NEF (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 | Contains the identifier of the target NF (service) instance towards which the request is redirected. |

Table 5.8.3.3.3.1-5: 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 NEF (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 | Contains the identifier of the target NF (service) instance towards which the request is redirected. |

###### 5.8.3.3.3.2 PATCH

This method shall support the URI query parameters specified in table 5.8.3.3.3.2-1.

Table 5.8.3.3.3.2-1: URI query parameters supported by the PATCH method on this resource

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

This method shall support the request data structures specified in table 5.8.3.3.3.2-2 and the response data structures and response codes specified in table 5.8.3.3.3.2-3.

Table 5.8.3.3.3.2-2: Data structures supported by the PATCH Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| VflInferSubPatch | M | 1 | Partially modify an existing subscription to VFL Inference events. |

Table 5.8.3.3.3.2-3: Data structures supported by the PATCH Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| VflInferSub | M | 1 | 200 OK | The Individual NEF VFL Inference Subscription resource was partial modified successfully and a representation of that resource is returned. |
| n/a |  |  | 204 No Content | The Individual NEF VFL Inference Subscription resource was partial modified successfully.and no content is returned in the response body. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection, during subscription retrieval.  (NOTE 2) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during subscription retrieval.  (NOTE 2) |
| NOTE 1: The mandatory HTTP error status codes for the PATCH 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 5.8.3.3.3.2-4: 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 NEF (service) instance towards which the request is redirected. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NEF (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]. |

Table 5.8.3.3.3.2-5: 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 NEF (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 NEF (service) instance towards which the request is redirected. |

###### 5.8.3.3.3.3 DELETE

This method shall support the URI query parameters specified in table 5.8.3.3.3.3-1.

Table 5.8.3.3.3.3-1: URI query parameters supported by the DELETE method on this resource

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

This method shall support the request data structures specified in table 5.8.3.3.3.3-2 and the response data structures and response codes specified in table 5.8.3.3.3.3-3.

Table 5.8.3.3.3.3-2: Data structures supported by the DELETE Request Body on this resource

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

Table 5.8.3.3.3.3-3: 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 VFL Inference Subscription resource matching the subscriptionId was deleted. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection, during subscription termination.  (NOTE 2) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during subscription termination.  (NOTE 2) |
| NOTE 1: The mandatory HTTP error status code for the DELETE 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 5.8.3.3.3.3-4: 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 NEF (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 NEF (service) instance towards which the request is redirected. |

Table 5.8.3.3.3.3-5: 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 NEF (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 NEF (service) instance towards which the request is redirected. |

##### 5.8.3.3.4 Resource Standard Methods

None in this release of the specification.

### 5.8.4 Custom Operations without associated resources

None in this release of the specification.

### 5.8.5 Notifications

#### 5.8.5.1 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 5.8.5.1-1: Notifications overview

|  |  |  |  |
| --- | --- | --- | --- |
| **Notification** | **Callback URI** | **HTTP method or custom operation** | **Description**  **(service operation)** |
| Event Notification | {notifUri} | POST | Reports one or several observed Events. |

#### 5.8.5.2 VFL Inference Event Notification

##### 5.8.5.2.1 Description

The VFL Inference Event Notification is used by the NEF to report one or several observed VFL Inference Events to a NF service consumer that has subscribed to such Notifications via the Individual NEF VFL Inference Subscription Resource.

##### 5.8.5.2.2 Operation Definition

Callback URI: **{notifUri}**

The operation shall support the callback URI variables defined in table 5.8.5.2.2-1, the request data structures specified in table 5.8.5.2.2-2 and the response data structure and response codes specified in table 5.8.5.2.2-3.

Table 5.8.5.2.2-1: Callback URI variables

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Definition** |
| notifUri | Uri | The Notification Uri as assigned within the Individual NEF VFL Inference Subscription. |

Table 5.8.5.2.2-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **P** | **Cardinality** | **Description** |
| VflInferNotif | M | 1 | Provides Information about observed events. |

Table 5.8.5.2.2-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Data type** | **P** | **Cardinality** | **Response codes** | **Description** |
| n/a |  |  | 204 No Content | The receipt of the Notification is acknowledged. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection, during event notification.  (NOTE 2) |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during event notification.  (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 5.8.5.2.2-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Data type** | **P** | **Cardinality** | **Description** |
| Location | string | M | 1 | Contains an alternative URI 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 | Contains the identifier of the target NF (service) instance towards which the notification request is redirected. |

Table 5.8.5.2.2-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Data type** | **P** | **Cardinality** | **Description** |
| Location | string | M | 1 | Contains an alternative URI 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) instance towards which the notification request is redirected. |

### 5.8.6 Data Model

#### 5.8.6.1 General

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

Table 5.8.6.1-1 specifies the data types defined for the Nnef\_VFLInference service based interface protocol.

Table 5.8.6.1-1: Nnef\_VFLInference specific Data Types

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Data type** | | **Section defined** | | **Description** | | **Applicability** | |
| VflInferSub | | 5.8.6.2.2 | | Represents an Individual VLF Inference Subscription resource. | |  | |
| VflInferSubPatch | | 5.8.6.2.3 | | Represents parameters to request the modification of a VFL inference subscription. | |  | |

Table 5.8.6.1-2 specifies data types re-used by the Nnef\_VFLInference 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 Nnef\_VFLInference service based interface.

Table 5.8.6.1-2: Nnef\_VFLInference re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **Reference** | **Comments** | **Applicability** |
| RedirectResponse | 3GPP TS 29.571 [16] | Contains redirection related information. |  |
| ReportingInformation | 3GPP TS 29.523 [20] | Represents the type of reporting the subscription requires. |  |
| SupportedFeatures | 3GPP TS 29.571 [8] | Used to negotiate the applicability of the optional features. |  |
| Uri | 3GPP TS 29.571 [8] | Represents a URI. |  |
| VflInferAnaSub | 3GPP TS 29.520 [17] | Represents an Individual NEF VLF Inference Subscription resource per analytics id. |  |
| VflInferNotif | 3GPP TS 29.520 [17] | Represents notification of a VFL inference subscription. |  |
| VflInferReq | 3GPP TS 29.520 [17] | Represents requirements for VFL inference |  |
| VflInferResult | 3GPP TS 29.520 [17] | Represents intermediate VFL inference result per target. |  |

#### 5.8.6.2 Structured data types

##### 5.8.6.2.1 Introduction

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

##### 5.8.6.2.2 Type VflInferSub

Table 5.8.6.2.2-1: Definition of type VflInferSub

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| 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. |  |
| suppFeats | SupportedFeatures | C | 0..1 | List of Supported features used as described in clause 5.10.8.  It shall be supplied by NF service consumer in the POST requests that request the creation of an NEF VFL Subscriptions resource and shall be supplied by the NEF in the reply of corresponding request. |  |
| vflClientId | string | O | 0..1 | Target VFL Client identity. |  |
| vflInferAnaSubs | array(VflInferAnaSub) | M | 1..N | Identifies the VFL inference subscription information for the subscribed analytics ID(s). |  |
| vflInferResults | array(VflInferResult) | O | 1..N | Represents intermediate VFL inference results |  |
| vlfReportInfo | ReportingInformation | O | 0..1 | Reporting requirement information of the VFL inference subscription.  If omitted, the default values within the ReportingInformation data type apply. |  |

##### 5.8.6.2.3 Type VflInferSubPatch

Table 5.8.6.2.3-1: Definition of type VflInferSubPatch

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| notifUri | Uri | O | 0..1 | URI at which the NF service consumer requests to receive notifications. |  |
| vflInferReq | VflInferReq | O | 0..1 | Represents required conditions to apply VFL inference. |  |
| vflReportInfo | ReportingInformation | O | 0..1 | Reporting requirement information of the VFL inference subscription. |  |

#### 5.8.6.3 Simple data types and enumerations

##### 5.8.6.3.1 Introduction

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

##### 5.8.6.3.2 Simple data types

The simple data types defined in table 5.8.6.3.2-1 shall be supported.

Table 5.8.6.3.2-1: Simple data types

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

### 5.8.7 Error Handling

#### 5.8.7.1 General

For the Nnef\_VFLInference 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 Nnef\_VFLInference API.

#### 5.8.7.2 Protocol Errors

No specific procedures for the Nnef\_VFLInference service are specified.

#### 5.8.7.3 Application Errors

The application errors defined for the Nnef\_VFLInference service are listed in Table 5.8.7.3-1.

Table 5.8.7.3-1: Application errors

|  |  |  |
| --- | --- | --- |
| **Application Error** | **HTTP status code** | **Description** |
| OVERLOAD | 403 Forbidden | Indicates the NF is overloaded. |
| NOTE: Including a "ProblemDetails" data structure with the "cause" attribute in the HTTP response is optional unless explicitly mandated in the service operation clauses. | | |

### 5.8.8 Feature negotiation

The optional features in table 5.8.8-1 are defined for the Nnef\_VFLInference API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [4].

Table 5.8.8-1: Supported Features

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

### 5.8.9 Security

As indicated in 3GPP TS 33.501 [8] and 3GPP TS 29.500 [4], the access to the Nnef\_VFLInference 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 Nnef\_VFLInference API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [10], clause 5.4.9.2.

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 Nnef\_VFLInference service.

The Nnef\_VFLInference API defines a single scope "nnef-vfl-inference" for the entire service, and it does not define any additional scopes at resource or operation level.

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

# A.9 Nnef\_VFLInference API

openapi: 3.0.0

info:

title: Nnef\_VFLInference

version: 1.0.0-alpha.1

description: |

API for Nnef\_VFLInference Service.

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externalDocs:

description: >

3GPP TS 29.591 V19.4.0; 5G System; Network Exposure Function Southbound Services; Stage 3.

url: https://www.3gpp.org/ftp/Specs/archive/29\_series/29.591/

servers:

- url: '{apiRoot}/nnef-vfl-inference/v1'

variables:

apiRoot:

default: https://example.com

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

security:

- {}

- oAuth2ClientCredentials:

- nnef-vfl-inference

paths:

/subscriptions:

post:

summary: Create a new Individual VFL Inference Subscription resource.

operationId: CreateVFLInferenceSubcription

tags:

- Subscriptions (Collection)

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'201':

description: Create a new Individual VFL Inference Subscription resource.

content:

application/json:

schema:

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

headers:

Location:

description: >

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

structure

{apiRoot}/nnef-vfl-inference/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:

$ref: 'TS29520\_Nnwdaf\_VFLInference.yaml#/components/schemas/VflInferNotif'

responses:

'204':

description: No Content, Notification was successful

'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 VFL Inference Subscription

operationId: UpdateVFLInferenceSubcription

tags:

- Individual VFL Inference Subscription (Document)

requestBody:

required: true

content:

application/json:

schema:

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

parameters:

- name: subscriptionId

in: path

description: String identifying an Individual VFL Inference Subscription.

required: true

schema:

type: string

responses:

'200':

description: >

The Individual VFL Inference Subscription resource was modified

successfully and a representation of that resource is returned.

content:

application/json:

schema:

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

'204':

description: >

The Individual VFL Inference 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 VFL Inference Subscription

operationId: PartialUpdateVFLInferenceSubcription

tags:

- Individual VFL Inference Subscription (Document)

requestBody:

required: true

content:

application/merge-patch+json:

schema:

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

parameters:

- name: subscriptionId

in: path

description: String identifying an Individual VFL Inference Subscription.

required: true

schema:

type: string

responses:

'200':

description: >

The Individual VFL Inference Subscription resource was partial

modified successfully and a representation of that resource is returned.

content:

application/json:

schema:

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

'204':

description: >

The Individual VFL Inference 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 VFL Inference Subscription.

operationId: DeleteVFLInferenceSubcription

tags:

- Individual VFL Inference Subscription (Document)

parameters:

- name: subscriptionId

in: path

description: >

String identifying an Individual VFL Inference Subscription.

required: true

schema:

type: string

responses:

'204':

description: >

No Content. The Individual VFL Inference 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:

nnef-vfl-inference: Access to the Nnef\_VFLInference API

schemas:

VflInferSub:

description: Represents a VFL Inference subscription.

type: object

properties:

notifCorreId:

type: string

description: >

String identifying the Notification Correlation ID in the corresponding

notification.

notifUri:

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

suppFeats:

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

vflClientId:

type: string

description: String identifying the target VFL client.

vflInferAnaSubs:

type: array

items:

$ref: 'TS29520\_Nnwdaf\_VFLInference.yaml#/components/schemas/VflInferAnaSub'

minItems: 1

description: Represents inference subscription per analytics Id.

vflInferReq:

$ref: 'TS29520\_Nnwdaf\_VFLInference.yaml#/components/schemas/VflInferReq'

vflInferResults:

type: array

items:

$ref: 'TS29520\_Nnwdaf\_VFLInference.yaml#/components/schemas/VflInferResult'

minItems: 1

description: Represents intermediate VFL Inference result.

vflReportInfo:

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

required:

- notifUri

- notifCorreId

- vflInferAnaSubs

VflInferSubPatch:

description: >

Represents parameters to request the modification of a VFL Inference

subscription.

type: object

properties:

notifUri:

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

vflInferReq:

$ref: 'TS29520\_Nnwdaf\_VFLInference.yaml#/components/schemas/VflInferReq'

vflReportInfo:

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

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