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** 

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# Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, certain modal verbs have the following meanings:

**shall** indicates a mandatory requirement to do something

**shall not** indicates an interdiction (prohibition) to do something

NOTE 1: The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

NOTE 2: The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

**should** indicates a recommendation to do something

**should not** indicates a recommendation not to do something

**may** indicates permission to do something

**need not** indicates permission not to do something

NOTE 3: The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

**can** indicates that something is possible

**cannot** indicates that something is impossible

NOTE 4: The constructions "can" and "cannot" shall not to be used as substitutes for "may" and "need Not".

**will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

**might not** indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

**is** (or any other verb in the indicative mood) indicates a statement of fact

**is not** (or any other negative verb in the indicative mood) indicates a statement of fact

NOTE 5: The constructions "is" and "is not" do not indicate requirements.

# 1 Scope

The present document specifies the stage 3 protocol and data model for the Application Function Event Exposure Service of the 5G System. It provides stage 3 protocol definitions, message flows and specifies the API for the Naf\_EventExposure service.

The 5G System stage 2 architecture and the procedures are specified in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3], and 3GPP TS 23.288 [4].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in 3GPP TS 29.500 [5] and 3GPP TS 29.501 [6].

The Application Function Event Exposure Service is provided by the Application Function (AF). This service exposes service experience events observed at the AF.

# 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 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".

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

[6] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[7] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".

[8] OpenAPI: "OpenAPI 3.0.0 Specification", <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md>.

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

[10] IETF RFC 7807: "Problem Details for HTTP APIs".

[11] 3GPP TR 21.900: "Technical Specification Group working methods".

[12] 3GPP TS 29.523: "5G System; Policy Control Event Exposure Service; Stage 3".

[13] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces Stage 3".

[14] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

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

[16] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[17] 3GPP TS 29.122: "T8 reference point for northbound Application Programming Interfaces (APIs)".

[18] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

[19] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".

[20] IETF RFC 5246, "The Transport Layer Security (TLS) Protocol Version 1.2".

[21] IETF RFC 7230: "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing".

[22] IETF RFC 7231: "Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content".

[23] IETF RFC 7232: "Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests".

[24] IETF RFC 7233: "Hypertext Transfer Protocol (HTTP/1.1): Range Requests".

[25] IETF RFC 7234: "Hypertext Transfer Protocol (HTTP/1.1): Caching".

[26] IETF RFC 7235: "Hypertext Transfer Protocol (HTTP/1.1): Authentication".

[27] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

(None)

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

(None)

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

AF Application Function

DNAI DN Access Identifier

GPSI Generic Public Subscription Identifier

NEF Network Exposure Function

NF Network Function

NWDAF Network Data Analytics Function

SUPI Subscription Permanent Identifier

URI Uniform Resource Identifier

# 4 Naf\_EventExposure Service

## 4.1 Service Description

### 4.1.1 Overview

The Application Function Exposure Service, as defined in 3GPP TS 23.502 [3] and 3GPP TS 23.288 [4], is provided by the Application Function (AF).

This service:

- allows NF service consumers to subscribe, modify and unsubscribe for application events; and

- notifies NF service consumers with a corresponding subscription about observed events on the AF.

The types of observed events include:

- Service Experience information for an application;

- UE mobility information;

- UE communication information; and

- Exceptions information.

When the event to which the NF service consumer has subscribed occurs, the AF reports the requested information to the NF service consumer based on the event reporting information definition requested by the NF service consumer (see 3GPP TS 23.502 [3]).

### 4.1.2 Service Architecture

The Data Analytics Architecture is defined in 3GPP TS 23.288 [4].

The Application Function Exposure Service (Naf\_EventExposure) is part of the Naf service-based interface exhibited by the Application Function (AF).

The known NF service consumers of the Naf\_EventExposure service are the Network Exposure Function (NEF) and the Network Data Analytics Function (NWDAF).

The Naf\_EventExposure service is provided by the AF and consumed by NF service consumers (e.g. NEF, NWDAF), as shown in figure 4.1.2-1 for the SBI representation model and in figure 4.1.2-2 for reference point representation model.



Figure 4.1.2-1: Naf\_EventExposure service Architecture, SBI representation



Figure 4.1.2-2: Naf\_EventExposure service Architecture, reference point representation

### 4.1.3 Network Functions

#### 4.1.3.1 Application Function (AF)

The AF is a functional element that provides service or application related information to NF service consumers.

The AF allows NF service consumers to subscribe to and unsubscribe from periodic notifications and/or notifications related to the detection of subscribed event.

#### 4.1.3.2 NF Service Consumers

The Network Data Analytics Function (NWDAF):

- supports (un)subscribing to notifications of subscribed event(s) from the AF;

- supports receiving the notifications of subscribed event(s) from the AF.

The Network Exposure Function (NEF):

- supports (un)subscribing to notifications of service experience information from the AF;

- supports receiving the notifications of subscribed event(s) from the AF.

## 4.2 Service Operations

### 4.2.1 Introduction

Service operations defined for the Naf\_EventExposure Service are shown in table 4.2.1-1.

*Table 4.2.1-1: Naf\_EventExposure Service Operations*

|  |  |  |
| --- | --- | --- |
| Service Operation Name | Description | Initiated by |
| Naf\_EventExposure\_Subscribe | This service operation is used by an NF service consumer to subscribe to, or modify a subscription in the AF for event notifications on a specified application related event for one or more UE(s) or any UE. | NF Consumer (NWDAF, NEF) |
| Naf\_EventExposure\_Unsubscribe | This service operation is used by an NF service consumer to unsubscribe from event notifications. | NF Consumer (NWDAF, NEF) |
| Naf\_EventExposure\_Notify | This service operation is used by the AF to report application related event(s) to the NF service consumer which has subscribed to the event report service. | AF |

### 4.2.2 Naf\_EventExposure\_Subscribe service operation

#### 4.2.2.1 General

This service operation is used by an NF service consumer to subscribe for event notifications on specific event(s), or to modify an existing subscription.

The following are the types of events for which a subscription can be made:

- Service Experience information for an application;

- UE mobility information;

- UE communication information; and

- Exceptions information.

The following procedures using the Naf\_EventExposure\_Subscribe service operation are supported:

- creating a new subscription;

- modifying an existing subscription.

#### 4.2.2.2 Creating a new subscription

Figure 4.2.2.2-1 illustrates the creation of a subscription.



Figure 4.2.2.2-1: Creation of a subscription

To subscribe to event notifications, the NF service consumer shall send an HTTP POST request to the AF with: "{apiRoot}/naf-eventexposure/<apiVersion>/subscriptions" as request URI as shown in step 1 of figure 4.2.2.2-1, and the "AfEventExposureSubsc" data structure as request body.

The "AfEventExposureSubsc" data structure shall include:

- description of subscribed event information as "eventsSubs" attribute by using one or more "EventsSubs" data;

- description of the event reporting information as "eventsRepInfo" attribute;

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

- a Notification Correlation Identifier assigned by the NF service consumer for the requested notifications as "notifId" attribute.

The "EventsSubs" data shall include:

- a event to subscribe as a "event" attribute; and

- event filter information as "eventFilter" attribute associated with the event.

The "eventsRepInfo" attribute may include:

- event notification method (periodic, one time, on event detection) as "notifMethod" attribute;

- Maximum Number of Reports as "maxReportNbr" attribute;

- Monitoring Duration as "monDur" attribute;

- repetition period for periodic reporting as "repPeriod" attribute;

- immediate reporting indication as "immRep" attribute;

- sampling ratio as "sampRatio" attribute; and/or

- group reporting guard time as "grpRepTime" attribute.

The "eventFilter" shall include:

- identification of target UE(s) to which the subscription applies via :

1) identification of individual UE(s) via "gpsis" attribute or "supis" attribute; or

2) identification of group(s) of UE(s) via "exterGroupIds" attribute or "interGroupIds" attribute; or

3) identification of any UE via "anyUeInd" attribute.

Depending on the event type:

- if the feature "ServiceExperience" is supported and the event is "SVC\_EXPERIENCE", the "eventFilter" attribute may provide:

1) identification of application to which the subscription applies via "appIds" attribute;

2) an area of interest via "locArea" attribute.

- if the feature "Exceptions" is supported and the event is "EXCEPTIONS", the "eventFilter" attribute may provide:

1) identification of application to which the subscription applies via "appIds" attribute;

2) an area of interest via "locArea" attribute;

- if the feature "UeCommunication" is supported and the event is "UE\_COMM", the "eventFilter" attribute may provide:

1) identification of application to which the subscription applies via "appIds" attribute;

2) an area of interest via "locArea" attribute.

- if the feature "UeMobility" is supported and the event is "UE\_MOBILITY", the "eventFilter" attribute may provide:

1) identification of application to which the subscription applies via "appIds" attribute;

2) an area of interest via "locArea" attribute.

If the AF cannot successfully fulfil the received HTTP POST request due to an internal error or an error in the HTTP POST request, the AF shall send the HTTP error response as specified in clause 5.7.

Upon successful reception of the HTTP POST request with "{apiRoot}/naf-eventexposure/<apiVersion>/subscriptions" as request URI and "AfEventExposureSubsc" data structure as request body, the AF shall create a new "Individual Application Event Subscription" resource, store the subscription and send an HTTP "201 Created" response as shown in step 2 of figure 4.2.2.2-1, containing:

- a Location header field; and

- an "AfEventExposureSubsc" data type in the payload body.

The Location header field shall contain the URI of the created individual application session context resource i.e. "{apiRoot}/naf-eventexposure/<apiVersion>/subscriptions/{subscriptionId}".

The "AfEventExposureSubsc" data type payload body shall contain the representation of the created "Individual Application Event Subscription".

When the "monDur" attribute is included in the response by the AF, it represents AF selected expiry time that is equal or less than the expiry time received in the request.

When the "immRep" attribute is included and sets to "true" in the subscription and the subscribed events are available, the AF shall include the reports of the events subscribed, if available, in the HTTP POST response.

When the sampling ratio as, "sampRatio" attribute, is included in the subscription, the AF shall select a random subset of UEs among the target UEs according to the sampling ratio and only report the event(s) related to the selected subset of UEs.

When the group reporting guard time as the "grpRepTime" attribute is included in the subscription, the AF shall accumulate all the event reports for the target UEs until the group reporting guard time expires. Then the AF shall notify the NF service consumer using the Naf\_EventExposure\_Notify service operation, as described in clause 4.2.4.2.

#### 4.2.2.3 Modifying an existing subscription

Figure 4.2.2.3-1 illustrates the modification of an existing subscription.



Figure 4.2.2.3-1: Modification of an existing subscription

To modify an existing subscription to event notifications, the NF service consumer shall send an HTTP PUT request with: "{apiRoot}/naf-eventexposure/<apiVersion>/subscriptions/{subscriptionId}" as request URI, as shown in step 1 of figure 4.2.2.3-1, where "{subscriptionId}" is the subscription correlation ID of the existing subscription. The "AfEventExposureSubsc" data structure is included as request body as described in clause 4.2.2.2.

NOTE 1: An alternate NF service consumer than the one that requested the generation of the subscription resource can send the PUT request.

NOTE 2: The "notifUri" attribute within the AfEventExposureSubsc data structure can be modified to request that subsequent notifications are sent to a new NF service consumer.

NOTE 3: The "monDur" attribute within the AfEventExposureSubsc data structure can be modified to extend the expiry time to keep receiving notifications.

If the AF cannot successfully fulfil the received HTTP PUT request due to an internal error or an error in the HTTP PUT request, the AF shall send an HTTP error response as specified in clause 5.7.

If the feature "ES3XX" is supported, and the AF determines the received HTTP PUT request needs to be redirected, the AF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [5].

Upon successful reception of an HTTP PUT request with: "{apiRoot}/naf-eventexposure/<apiVersion>/subscriptions/{subscriptionId}" as request URI and "AfEventExposureSubsc" data structure as request body, the AF shall update the subscription and send either a HTTP "200 OK" response with the "AfEventExposureSubsc" data structure as response body containing the representation of the modified "Individual Application Event Subscription", or an HTTP "204 No Content" response, as shown in step 2 of figure 4.2.2.3-1.

When the "monDur" attribute is included in the response by the AF, it represents AF selected expiry time that is equal or less than the expiry time received in the request.

When the "immRep" attribute is included and sets to "true" in the subscription and the subscribed events are available, the AF shall include the reports of the events subscribed, if available, in the HTTP PUT response.

When the sampling ratio, as "sampRatio" attribute, is included in the subscription, the AF shall select a random subset of UEs among the target UEs according to the sampling ratio and only report the event(s) related to the selected subset of UEs.

When the group reporting guard time, as "grpRepTime" attribute, is included in the subscription, the AF shall accumulate all the event reports for the target UEs until the group reporting guard time expires. Then, the AF shall notify the NF service consumer using the Naf\_EventExposure\_Notify service operation, as described in clause 4.2.4.2.

### 4.2.3 Naf\_EventExposure\_Unsubscribe service operation

#### 4.2.3.1 General

This service operation is used by an NF service consumer to unsubscribe from event notifications.

The following procedure using the Naf\_EventExposure\_Unsubscribe service operation is supported:

- unsubscription from event notifications.

#### 4.2.3.2 Unsubscription from event notifications

Figure 4.2.3.2-1 illustrates the unsubscription from event notifications.



Figure 4.2.3.2-1: Unsubscription from event notifications

To unsubscribe from event notifications, the NF service consumer shall send an HTTP DELETE request with "{apiRoot}/naf-eventexposure/<apiVersion>/subscriptions/{subscriptionId}" as request URI, as shown in step 1 of figure 4.2.3.2-1, where "{subscriptionId}" is the subscription correlation identifier of the existing resource subscription that is to be deleted.

If the AF cannot successfully fulfil the received HTTP DELETE request due to an internal error or an error in the HTTP DELETE request, the AF shall send an HTTP error response as specified in clause 5.7.

If the feature "ES3XX" is supported, and the AF determines the received HTTP DELETE request needs to be redirected, the AF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [5].

Upon successful reception of the HTTP DELETE request with: "{apiRoot}/naf-eventexposure/<apiVersion>/subscriptions/{subscriptionId}" as request URI, the AF shall remove the corresponding subscription and send an HTTP "204 No Content" response as shown in step 2 of figure 4.2.3.2-1.

### 4.2.4 Naf\_EventExposure\_Notify service operation

#### 4.2.4.1 General

The Naf\_EventExposure\_Notify service operation enables the AF to notify to the NF service consumer(s) that the previously subscribed application related event occurred.

The following procedure using the Naf\_EventExposure\_Notify service operation is supported:

- notification about subscribed events.

#### 4.2.4.2 Notification about subscribed events

Figure 4.2.4.2-1 illustrates the notification about subscribed events.



Figure 4.2.4.2-1: Notification about subscribed events

If the AF observes application related event(s) for which an NF service consumer has subscribed, the AF shall send an HTTP POST request as shown in step 1 of figure 4.2.4.2-1, with the "{notifUri}" as request URI containing the value previously provided by the NF service consumer within the corresponding subscription, and the "AfEventExposureNotif" data structure.

The "AfEventExposureNotif" data structure shall include:

a) the notification correlation ID provided by the NF service consumer during the subscription as "notifId" attribute; and

b) information about the observed event(s) within the "eventNotifs" attribute that shall contain for each observed event an "AfEventNotification" data structure that shall include:

1) the application related event as "event" attribute;

2) the time at which the event was observed encoded as "timeStamp" attribute;

3) if the "event" attribute is "SVC\_EXPERIENCE":

- service experience information about the application involved in the reported event in the "svcExprcInfos" attribute;

4) if the "event" attribute is "UE\_MOBILITY":

- UE mobility information associated with the application as "ueMobilityInfos" attribute;

5) if the "event" attribute is "UE\_COMM":

- application communication information associated with the application as "ueCommInfos" attribute; and

6) if the "event" attribute is "EXCEPTIONS":

- exceptions information associated with a service flow as "excepInfos" attribute.

If the NF service consumer cannot successfully fulfil the received HTTP POST request due to an internal error or an error in the HTTP POST request, the NF service consumer shall send an HTTP error response as specified in clause 5.7.

If the feature "ES3XX" is supported, and the NF service consumer determines the received HTTP POST request needs to be redirected, the NF service consumer shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [5].

Upon successful reception of the HTTP POST request with "{notifUri}" as request URI and "AfEventExposureNotif" data structure as request body, the NF service consumer shall send a "204 No Content" HTTP response, as shown in step 2 of figure 4.2.4.2-1.

# 5 Naf\_EventExposure Service API

## 5.1 Introduction

The Naf\_EventExposure Service shall use the Naf\_EventExposure API.

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

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

The request URIs used in HTTP requests from the NF service consumer towards the AF shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [6], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [6].

- The **<**apiName**>** shall be "naf-eventexposure".

- The **<**apiVersion**>** shall be "v1".

- The **<**apiSpecificResourceUriPart**>** shall be set as described in clause 5.3.

## 5.2 Usage of HTTP

### 5.2.1 General

If the AF is untrusted, support of HTTP/1.1 (IETF RFC 7230 [21], IETF RFC 7231 [22], IETF RFC 7232 [23], IETF RFC 7233 [24], IETF RFC 7234 [25] and IETF RFC 7235 [26]) over TLS (IETF RFC 5246 [20]) is mandatory and support of HTTP/2 (IETF RFC 7540 [7]) over TLS (IETF RFC 5246 [20]) is recommended.

If the AF is trusted, HTTP/2, IETF RFC 7540 [7], shall be used as specified in clause 5.2 of 3GPP TS 29.500 [5].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [5].

The OpenAPI [8] specification of HTTP messages and content bodies for the Naf\_EventExposure is contained in Annex A.

### 5.2.2 HTTP standard headers

#### 5.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [5] for the usage of HTTP standard headers.

#### 5.2.2.2 Content type

JSON, IETF RFC 8259 [9], 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 [5]. 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 7807 [10].

### 5.2.3 HTTP custom headers

#### 5.2.3.1 General

The mandatory HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [5] shall be applicable.

In this Release of the specification, no specific custom headers are defined for the Naf\_EventExposure API.

## 5.3 Resources

### 5.3.1 Resource Structure



Figure 5.3.1-1: Resource URI structure of the Naf\_EventExposure API

Table 5.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| Application Event Subscriptions | /subscriptions | POST | Subscription to the notification of application events and creation of an Individual Application Event Subscription resource. |
| Individual Application Event Subscription | /subscriptions/ {subscriptionId} | GET | Reads an Individual Application Event Subscription resource. |
| PUT | Modifies an Individual Application Event Subscription. |
| DELETE | Cancels an individual subscription to notifications of application event. |

### 5.3.2 Resource: Application Event Subscriptions

#### 5.3.2.1 Description

The Application Event Subscriptions resource represents all subscriptions of the Naf\_EventExposure service at a given AF.

#### 5.3.2.2 Resource definition

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

This resource shall support the resource URI variables defined in table 5.3.2.2-1.

Table 5.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 5.1 |
| apiVersion | string | See clause 5.1 |

#### 5.3.2.3 Resource Standard Methods

##### 5.3.2.3.1 POST

This method shall support the URI query parameters specified in table 5.3.2.3.1-1.

Table 5.3.2.3.1-1: URI query parameters supported by the POST method on this resource

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

This method shall support the request data structures specified in table 5.3.2.3.1-2 and the response data structures and response codes specified in table 5.3.2.3.1-3.

Table 5.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| AfEventExposureSubsc | M | 1 | Contains the information required for the creation of a new individual application event subscription. |

Table 5.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| AfEventExposureSubsc | M | 1 | 201 Created | Contains the representation of the Individual Application Event Subscription resource. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [5] also apply. | | | | |

Table 5.3.2.3.1-4: 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}/naf-eventexposure/<apiVersion>/subscriptions/{subscriptionId} |

### 5.3.3 Resource: Individual Application Event Subscription

#### 5.3.3.1 Description

The Individual Application Event Subscription resource represents a single subscription of the Naf\_EventExposure service at a given AF.

#### 5.3.3.2 Resource definition

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

This resource shall support the resource URI variables defined in table 5.3.3.2-1.

Table 5.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 5.1 |
| apiVersion | string | See clause 5.1 |
| subscriptionId | string | Identifies a subscription to the AF event exposure service. |

#### 5.3.3.3 Resource Standard Methods

##### 5.3.3.3.1 GET

This method shall support the URI query parameters specified in table 5.3.3.3.1-1.

Table 5.3.3.3.1-1: URI query parameters supported by the GET method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| supp-feat | SupportedFeatures | O | 0..1 | The features supported by the NF service consumer. |

This method shall support the request data structures specified in table 5.3.3.3.1-2 and the response data structures and response codes specified in table 5.3.3.3.1-3.

Table 5.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 5.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| AfEventExposureSubsc | M | 1 | 200 OK | Contains the representation of the Individual Application Event Subscription resource. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AF (service) instance.  Applicable if the feature "ES3XX" is supported. |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AF (service) instance.  Applicable if the feature "ES3XX" is supported. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [5] also apply. | | | | |

Table 5.3.3.3.1-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative AF (service) instance. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the request is redirected. |

Table 5.3.3.3.1-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative AF (service) instance. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the request is redirected. |

##### 5.3.3.3.2 PUT

This method shall support the URI query parameters specified in table 5.3.3.3.2-1.

Table 5.3.3.3.2-1: 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 5.3.3.3.2-2 and the response data structures and response codes specified in table 5.3.3.3.2-3.

Table 5.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| AfEventExposureSubsc | M | 1 | Modifies the existing Individual Application Event Subscription resource. |

Table 5.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| AfEventExposureSubsc | M | 1 | 200 OK | Successful case.  The Individual Application Event Subscription resource was modified and a representation is returned. |
| n/a |  |  | 204 No Content | Successful case.  The Individual Application Event Subscription resource was modified. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AF (service) instance.  Applicable if the feature "ES3XX" is supported. |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AF (service) instance.  Applicable if the feature "ES3XX" is supported. |
| NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [5] also apply. | | | | |

Table 5.3.3.3.2-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative AF (service) instance. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the request is redirected. |

Table 5.3.3.3.2-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative AF (service) instance. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the request is redirected. |

##### 5.3.3.3.3 DELETE

This method shall support the URI query parameters specified in table 5.3.3.3.3-1.

Table 5.3.3.3.3-1: 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 5.3.3.3.3-2 and the response data structures and response codes specified in table 5.3.3.3.3-3.

Table 5.3.3.3.3-2: Data structures supported by the DELETE Request Body on this resource

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

Table 5.3.3.3.3-3: 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 Application Event Subscription resource matching the subscriptionId was deleted. |
| RedirectResponse | O | 0..1 | 307 Temporary Redirect | Temporary redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AF (service) instance.  Applicable if the feature "ES3XX" is supported. |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AF (service) instance.  Applicable if the feature "ES3XX" is supported. |
| NOTE: The mandatory HTTP error status code for the DELETE method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [5] also apply. | | | | |

Table 5.3.3.3.3-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative AF (service) instance. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the request is redirected. |

Table 5.3.3.3.3-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative AF (service) instance. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the request is redirected. |

## 5.4 Custom Operations without associated resources

No custom operation is defined in this Release of the specification.

## 5.5 Notifications

### 5.5.1 General

Notifications shall comply with clause 6.2 of 3GPP TS 29.500 [5] and clause 4.6.2.3 of 3GPP TS 29.501 [6].

Table 5.5.1-1: Notifications overview

|  |  |  |  |
| --- | --- | --- | --- |
| Notification | Callback URI | HTTP method or custom operation | Description  (service operation) |
| Application Event Notification | {notifUri} | POST | Notification of application related event reporting. |

### 5.5.2 Application Event Notification

#### 5.5.2.1 Description

The Application Event Notification is used by the AF to report one or several observed application related events to the NF service consumer that has subscribed to such notifications.

#### 5.5.2.2 Target URI

The callback URI **"{notifUri}"** shall be used with the callback URI variables defined in table 5.5.2.2-1.

Table 5.5.2.2-1: Callback URI variables

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| notifUri | Uri | The Notification Uri as assigned by the NF service consumer during the subscription service operation and described within the AfEventExposureSubsc data type (see table 5.6.2.2-1). |

#### 5.5.2.3 Standard Methods

##### 5.5.2.3.1 POST

This method shall support the URI query parameters specified in table 5.5.2.3.1-1.

Table 5.5.2.3.1-1: URI query parameters supported by the POST method on this resource

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

This method shall support the request data structures specified in table 5.5.2.3.1-2 and the response data structures and response codes specified in table 5.5.2.3.1-3.

Table 5.5.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| AfEventExposureNotif | M | 1 | Provides Information about observed application related events |

Table 5.5.2.3.1-3: 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. The response shall include a Location header field containing an alternative URI representing the end point of an alternative NF consumer (service) instance where the notification should be sent.  Applicable if the feature "ES3XX" is supported. |
| RedirectResponse | O | 0..1 | 308 Permanent Redirect | Permanent redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative NF consumer (service) instance where the notification should be sent.  Applicable if the feature "ES3XX" is supported. |
| NOTE: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [5] for the POST method shall also apply. | | | | |

Table 5.5.2.3.1-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the notification request is redirected. |

Table 5.5.2.3.1-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI representing the end point of an alternative NF consumer (service) instance towards which the notification should be redirected. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance towards which the notification request is redirected. |

## 5.6 Data Model

### 5.6.1 General

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

Table 5.6.1-1 specifies the data types defined for the Naf\_EventExposure service based interface protocol.

Table 5.6.1-1: Naf\_EventExposure specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| AfEvent | 5.6.3.3 | Application Events. |  |
| AfEventExposureSubsc | 5.6.2.2 | Represents an Individual Application Event Subscription resource. |  |
| AfEventExposureNotif | 5.6.2.3 | Describes notifications about application event that occurred in an Individual Application Event Subscription resource. |  |
| AfEventNotification | 5.6.2.6 | AfEventNotification |  |
| CommunicationCollection | 5.6.2.13 |  |  |
| EventFilter | 5.6.2.5 | Represents event filter information |  |
| EventsSubs | 5.6.2.4 |  |  |
| ExceptionInfo | 5.6.2.14 | Describes the exceptions information provided by AF. |  |
| SvcExperience | 5.6.2.9 | Mean opinion score with the customized range. |  |
| ServiceExperienceInfoPerApp | 5.6.2.7 | Contains service experience associated with the application |  |
| ServiceExperienceInfoPerFlow | 5.6.2.8 | Contains service experience associated with the service flow |  |
| UeCommunicationCollection | 5.6.2.11 | Contains UE communication information associated with the application. |  |
| UeMobilityCollection | 5.6.2.10 | Contains UE mobility information associated with the application. |  |
| UeTrajectoryCollection | 5.6.2.12 |  |  |

Table 5.6.1-2 specifies data types re-used by the Naf\_EventExposure 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\_EventExposure service based interface.

Table 5.6.1-2: Naf\_EventExposure re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| ApplicationId | 3GPP TS 29.571 [13] |  |  |
| DateTime | 3GPP TS 29.571 [13] |  |  |
| Dnai | 3GPP TS 29.571 [13] |  |  |
| EthFlowDescription | 3GPP TS 29.514 [18] |  |  |
| Exception | 3GPP TS 29.520 [19] |  |  |
| Float | 3GPP TS 29.571 [13] |  |  |
| FlowInfo | 3GPP TS 29.122 [17] |  |  |
| Gpsi | 3GPP TS 29.571 [13] |  |  |
| GroupId | 3GPP TS 29.571 [13] |  |  |
| LocationArea5G | 3GPP TS 29.122 [17] |  |  |
| RedirectResponse | 3GPP TS 29.571 [13] | Contains redirection related information. | ES3XX |
| ReportingInformation | 3GPP TS 29.523 [12] |  |  |
| SupportedFeatures | 3GPP TS 29.571 [13] |  |  |
| TimeWindow | 3GPP TS 29.122 [17] |  |  |
| Uri | 3GPP TS 29.571 [13] |  |  |
| Volume | 3GPP TS 29.122 [17] |  |  |
| Supi | 3GPP TS 29.571 [13] |  |  |
| ExtGroupId | 3GPP TS 29.503 [27] |  |  |

### 5.6.2 Structured data types

#### 5.6.2.1 Introduction

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

#### 5.6.2.2 Type AfEventExposureSubsc

Table 5.6.2.2-1: Definition of type AfEventExposureSubsc

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| eventsSubs | array(EventsSubs) | M | 1..N | Subscribed events and the related event filters. |  |
| eventsRepInfo | ReportingInformation | M | 1 | Represents the reporting requirements of the subscription. |  |
| notifUri | Uri | M | 1 | Notification URI for event reporting. |  |
| notifId | string | M | 1 | Notification Correlation ID assigned by the NF service consumer. |  |
| eventNotifs | array(AfEventNotification) | C | 1..N | Represents the Events to be reported.  Shall only be present if the immediate reporting indication in the "immRep" attribute within the "eventsRepInfo" attribute sets to true in the event subscription, and the reports are available. |  |
| suppFeat | SupportedFeatures | C | 0..1 | This IE represents a list of Supported features used as described in clause 5.8.  Shall be present in the HTTP POST request/response; or in the HTTP GET response if the "supp-feat" attribute query parameter is included in the HTTP GET request. (NOTE) |  |
| NOTE: In the HTTP POST request it represents the set of NF service consumer supported features. In the HTTP POST and GET responses it represents the set of features supported by both the NF service consumer and the AF. | | | | | |

#### 5.6.2.3 Type AfEventExposureNotif

Table 5.6.2.3-1: Definition of type AfEventExposureNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| notifId | string | M | 1 | Notification Correlation ID assigned by the NF service consumer. |  |
| eventNotifs | array(AfEventNotification) | M | 1..N | Represents the Events to be reported according to the subscription corresponding to the Notification Correlation ID. |  |

#### 5.6.2.4 Type EventsSubs

Table 5.6.2.4-1: Definition of type EventsSubs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| event | AfEvent | M | 1 | Subscribed event. |  |
| eventFilter | EventFilter | M | 1 | Represents the event filter information associated with each event. |  |

#### 5.6.2.5 Type EventFilter

Table 5.6.2.5-1: Definition of type EventFilter

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | | P | | Cardinality | | Description | | Applicability  (NOTE 4) | |
| gpsis | array(Gpsi) | | O | | 1..N | | Each element represents external UE identifier.  (NOTE 1, NOTE 2) | |  | |
| supis | | array(Supi) | | O | | 1..N | | Each element represents a SUPI identifying a UE (NOTE 1, NOTE 2) | |  |
| exterGroupIds | array(ExtGroupId) | | O | | 1..N | | Each element represents a group of UEs identified by an External Group Identifier.  (NOTE 1, NOTE 2) | |  | |
| interGroupIds | | array(GroupId) | | O | | 1..N | | Each element represents a group of UEs identified by an Internal Group Identifier (NOTE 1, NOTE 2) | |  |
| anyUeInd | boolean | | O | | 0..1 | | Identifies whether the request applies to any UE.  This attribute shall set to "true" if applicable for any UE, otherwise, set to "false".  May only be present and sets to "true" if "AfEvent" sets to "SVC\_EXPERIENCE" or "EXCEPTIONS".  (NOTE 2) | | ServiceExperience  Exceptions | |
| appIds | array(ApplicationId) | | O | | 1..N | | Each element indicates an application identifier.  If absent, the EventFilter data applies to any application (i.e. all applications)  (NOTE 3) | |  | |
| locArea | LocationArea5G | | O | | 0..1 | | Represents area of interest. | |  | |
| NOTE 1: For untrusted AF, only gpsis and exterGroupIds are applicable. For trusted AF, only supis and interGroupIds are applicable.  NOTE 2: For an applicable feature, only one attribute identifying the target UE shall be provided.  NOTE 3: For event "UE\_COMM", "UE\_MOBILITY" and "EXCEPTIONS", the "appIds" attribute, if present, shall include only one element.  NOTE 4: Properties marked with a feature as defined in clause 5.8 are applicable as described in clause 6.6 of 3GPP TS 29.500 [5]. If no features are indicated, the related property applies for all the features. | | | | | | | | | | |

#### 5.6.2.6 Type AfEventNotification

Table 5.6.2.6-1: Definition of type AfEventNotification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| event | AfEvent | M | 1 | Reported application related event. |  |
| timeStamp | DateTime | M | 1 | Time at which the event is observed. |  |
| svcExprcInfos | array(ServiceExperienceInfoPerApp) | C | 1..N | Contains the service experience information.  Shall be present if the "event" attribute sets to "SVC\_EXPERIENCE" | ServiceExperience |
| ueMobilityInfos | array(UeMobilityCollection) | C | 1..N | Contains the UE mobility information.  Shall be present if the "event" attribute sets to "UE\_MOBILITY" | UeMobility |
| ueCommInfos | array(UeCommunicationCollection) | C | 1..N | Contains the application communication information.  Shall be present if the "event" attribute sets to "UE\_COMM" | UeCommunication |
| excepInfos | array(ExceptionInfo) | C | 1..N | Each element represents the exception information for a service flow.  Shall be present if the "event" attribute sets to "EXCEPTIONS". | Exceptions |

#### 5.6.2.7 Type ServiceExperienceInfoPerApp

Table 5.6.2.7-1: Definition of type ServiceExperienceInfoPerApp

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| appId | ApplicationId | C | 0..1 | Indicates an application identifier.  Shall be present if the AF event exposure service request applies to more than one application. |  |
| svcExpPerFlows | array(ServiceExperienceInfoPerFlow) | M | 1..N | Each element represents service experience for each service flow. |  |
| gpsis | array(Gpsi) | O | 1..N | Each element represents external UE identifier. (NOTE) |  |
| supis | array(Supi) | O | 1..N | SUPI identifying a UE. (NOTE) |  |
| NOTE: Either gpsis or supis shall be present. For untrusted AF, only gpsis is applicable. For trusted AF, only supis is applicable. | | | | | |

#### 5.6.2.8 Type ServiceExperienceInfoPerFlow

Table 5.6.2.8-1: Definition of type ServiceExperienceInfoPerFlow

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| svcExprc | SvcExperience | M | 1 | Service experience |  |
| timeIntev | TimeWindow | M | 1 | Represents a start and stop time of the measurement period for the AF service experience. |  |
| dnai | Dnai | O | 0..1 | Indicates the DN Access Identifiers representing location of the service flow. |  |
| ipTrafficFilter | FlowInfo | O | 0..1 | Identifies IP packet filter.(NOTE) |  |
| ethTrafficFilter | EthFlowDescription | O | 0..1 | Identifies Ethernet packet filter.(NOTE) |  |
| NOTE: Either "ipTrafficFilter" or "ethTrafficFilter" shall be provided. | | | | | |

#### 5.6.2.9 Type SvcExperience

Table 5.6.2.9-1: Definition of type SvcExperience

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| mos | Float | M | 1 | Mean opinion score. |  |
| upperRange | Float | M | 1 | The upper value within the rating scale range |  |
| lowerRange | Float | M | 1 | The lower value within the [rating scale](https://en.wikipedia.org/wiki/Rating_scale) range |  |

#### 5.6.2.10 Type UeMobilityCollection

Table 5.6.2.10-1: Definition of type UeMobilityCollection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| gpsi | Gpsi | O | 0..1 | Identifies a UE. (NOTE) |  |
| supi | Supi | O | 0..1 | SUPI identifying a UE. (NOTE) |  |
| appId | ApplicationId | M | 1 | Identifies an application identifier. |  |
| ueTrajs | array(UeTrajectoryCollection) | M | 1..N | Identifies a list of UE moving trajectories. |  |
| NOTE: Either gpsi or supi shall be present. For untrusted AF, only gpsi is applicable. For trusted AF, only supi is applicable. | | | | | |

#### 5.6.2.11 Type UeCommunicationCollection

Table 5.6.2.11-1: Definition of type UeCommunicationCollection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| gpsi | Gpsi | O | 0..1 | Identifies a UE. (NOTE 1) |  |
| supi | Supi | O | 0..1 | SUPI identifying a UE. (NOTE 1) |  |
| exterGroupId | ExtGroupId | O | 0..1 | Identifies an external group of UEs. (NOTE 2) |  |
| interGroupId | GroupId | O | 0..1 | Identifies an internal group of UEs. (NOTE 2) |  |
| appId | ApplicationId | M | 1 | Identifies an application identifier. |  |
| comms | array(CommunicationCollection) | M | 1..N | This attribute contains a list of communication information. |  |
| NOTE 1: Either gpsi or supi shall be present. For untrusted AF, only gpsi is applicable. For trusted AF, only supi is applicable.  NOTE 2: "interGroupId" attribute only applies to trusted AF and "exterGroupId" only applies to untrusted AF. | | | | | |

#### 5.6.2.12 Type UeTrajectoryCollection

Table 5.6.2.12-1: Definition of type UeTrajectoryCollection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ts | DateTime | M | 1 | This attribute identifies the timestamp when the UE enters the location. |  |
| locArea | LocationArea5G | M | 1 | This attribute includes the location information of the UE. |  |

#### 5.6.2.13 Type CommunicationCollection

Table 5.6.2.13-1: Definition of type CommunicationCollection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| startTime | DateTime | M | 1 | Identifies the timestamp this communication starts. |  |
| endTime | DateTime | M | 1 | Identifies the timestamp this communication stops. |  |
| ulVol | Volume | O | 0..1 | Identifies the uplink traffic volume. (NOTE) |  |
| dlVol | Volume | O | 0..1 | Identifies the downlink traffic volume. (NOTE) |  |
| NOTE: At least one of ulVol or dlVol shall be provided. | | | | | |

#### 5.6.2.14 Type ExceptionInfo

Table 5.6.2.14-1: Definition of type ExceptionInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ipTrafficFilter | FlowInfo | O | 0..1 | Identifies IP flow.(NOTE 1) |  |
| ethTrafficFilter | EthFlowDescription | O | 0..1 | Identifies Ethernet flow.(NOTE 1) |  |
| exceps | array(Exception) | M | 1..N | Contains the description of one or more exception information. (NOTE 2) |  |
| NOTE 1: Either "ipTrafficFilter" or "ethTrafficFilter" shall be provided.  NOTE 2: Only "excepId", "excepLevel" and "excepTrend" within the Exception data type as defined in 3GPP TS 29.520 [19] apply to the ExceptionInfo data type. | | | | | |

### 5.6.3 Simple data types and enumerations

#### 5.6.3.1 Introduction

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

#### 5.6.3.2 Simple data types

The simple data types defined in table 5.6.3.2-1 shall be supported.

Table 5.6.3.2-1: Simple data types

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

#### 5.6.3.3 Enumeration: AfEvent

The enumeration AfEvent represents the application events that can be subscribed. It shall comply with the provisions defined in table 5.6.3.3-1.

Table 5.6.3.3-1: Enumeration AfEvent

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| SVC\_EXPERIENCE | Indicates that the event subscribed is service experience data for an application. | ServiceExperience |
| UE\_MOBILITY | Indicates that the event subscribed is UE mobility information. | UeMobility |
| UE\_COMM | Indicates that the event subscribed is UE communication information. | UeCommunication |
| EXCEPTIONS | Indicates that the event subscribed is exceptions information. | Exceptions |

## 5.7 Error handling

### 5.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [5].

For the Naf\_EventExposure API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [6]. Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [5] 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 [5].

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

### 5.7.2 Protocol Errors

In this Release of the specification, there are no service specific protocol errors applicable for the Naf\_EventExposure API.

### 5.7.3 Application Errors

The application errors defined for the Naf\_EventExposure service are listed in table 5.7.3-1.

Table 5.7.3-1: Application errors

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

## 5.8 Feature negotiation

The optional features in table 5.8-1 are defined for the Naf\_EventExposure API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [5].

Table 5.8-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
| 1 | ServiceExperience | This feature indicates support for the event related to service experience. |
| 2 | UeMobility | This feature indicates support for the event related to UE mobility. |
| 3 | UeCommunication | This feature indicates support for the event related to UE communication information. |
| 4 | Exceptions | This feature indicates support for the event related to exception information. |
| 5 | ES3XX | Extended Support for 3xx redirections. This feature indicates the support of redirection for any service operation, according to Stateless NF procedures as specified in subclauses 6.5.3.2 and 6.5.3.3 of 3GPP TS 29.500 [5] and according to HTTP redirection principles for indirect communication, as specified in subclause 6.10.9 of 3GPP TS 29.500 [5]. |

## 5.9 Security

TLS (IETF RFC 5246 [20]) shall be used to support the security communication between the NF Service Consumer and the AF as defined in clause 12.3 and clause 13.1 of 3GPP TS 33.501 [14].

If the AF is trusted, as indicated in 3GPP TS 33.501 [14] and 3GPP TS 29.500 [5], the access to the Naf\_EventExposure API may be authorized by means of the OAuth 2.0 protocol (see IETF RFC 6749 [15]), based on local configuration, using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [16]) plays the role of the authorization server.

If OAuth 2.0 is used, an NF Service Consumer, prior to consuming services offered by the Naf\_EventExposure API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [16], clause 5.4.2.2.

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 Naf\_EventExposure service.

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

If the AF is untrusted, the access to Naf\_EventExposure API shall be authorized by means of OAuth2 protocol (see IETF RFC 6749 [15]), based on local configuration, using the "Client Credentials" authorization grant. If OAuth2 is used, a NF Service Consumer (e.g. NEF), prior to consuming services offered by the Naf\_EventExposure API, shall obtain a "token" from the authorization server.

Annex A (normative):  
OpenAPI specification

# A.1 General

This Annex is based on the OpenAPI 3.0.0 specification [8] and provides corresponding representations of all APIs defined in the present specification.

NOTE 1: An OpenAPIs representation embeds JSON Schema representations of HTTP message bodies.

This Annex shall take precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API(s).

NOTE 2: The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification files contained in this 3GPP Technical Specification are available on a Git-based repository that uses the GitLab software version control system (see clause 5B of the 3GPP TR 21.900 [11] and clause 5.3.1 of the 3GPP TS 29.501 [6] for further information).

The security scheme defined below for the Naf\_EventExposure API shows the case when the AF is in untrusted domain and the "scopes" and "tokenUrl" are undefined. For the trusted AF, the "scopes" definition shall use "naf-eventexposure" and the "tokenUrl" definition shall use "{nrfApiRoot}/oauth2/token".

# A.2 Naf\_EventExposure API

openapi: 3.0.0

info:

version: 1.0.3

title: Naf\_EventExposure

description: |

AF Event Exposure Service.

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externalDocs:

description: 3GPP TS 29.517 V16.5.0; 5G System; Application Function Event Exposure Service; Stage 3.

url: http://www.3gpp.org/ftp/Specs/archive/29\_series/29.517/

servers:

- url: '{apiRoot}/naf-eventexposure/v1'

variables:

apiRoot:

default: https://example.com

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

security:

- {}

- oAuth2ClientCredentials: []

paths:

/subscriptions:

post:

summary: Creates a new Individual Application Event Exposure Subscription resource

operationId: PostAfEventExposureSubsc

tags:

- Application Event Subscription (Collection)

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'201':

description: Success

content:

application/json:

schema:

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

headers:

Location:

description: 'Contains the URI of the created individual application event subscription resource'

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'

'503':

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

default:

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

callbacks:

AfEventExposureNotif:

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

post:

requestBody:

required: true

content:

application/json:

schema:

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

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'

'503':

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

default:

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

/subscriptions/{subscriptionId}:

get:

summary: "Reads an existing Individual Application Event Subscription"

operationId: GetAfEventExposureSubsc

tags:

- Individual Application Event Subscription (Document)

parameters:

- name: subscriptionId

in: path

description: Application Event Subscription ID

required: true

schema:

type: string

- name: supp-feat

in: query

description: Features supported by the NF service consumer

required: false

schema:

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

responses:

'200':

description: OK. Resource representation is returned

content:

application/json:

schema:

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

'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'

'406':

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

'429':

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

'500':

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

'503':

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

default:

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

put:

summary: "Modifies an existing Individual Application Event Subscription "

operationId: PutAfEventExposureSubsc

tags:

- Individual Application Event Subscription (Document)

requestBody:

required: true

content:

application/json:

schema:

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

parameters:

- name: subscriptionId

in: path

description: Application Event Subscription ID

required: true

schema:

type: string

responses:

'200':

description: OK. Resource was successfully modified and representation is returned

content:

application/json:

schema:

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

'204':

description: No Content. Resource was successfully modified

'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'

'503':

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

default:

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

delete:

summary: "Cancels an existing Individual Application Event Subscription "

operationId: DeleteAfEventExposureSubsc

tags:

- Individual Application Event Subscription (Document)

parameters:

- name: subscriptionId

in: path

description: Application Event Subscription ID

required: true

schema:

type: string

responses:

'204':

description: No Content. Resource was successfully 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'

'503':

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

default:

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

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{tokenUri}'

scopes: {}

description: for trusted AF, the 'naf-eventexposure' shall be used as 'scopes' and '{nrfApiRoot}/oauth2/token' shall be used as 'tokenUri'.

schemas:

AfEventExposureNotif:

type: object

properties:

notifId:

type: string

eventNotifs:

type: array

items:

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

minItems: 1

required:

- notifId

- eventNotifs

AfEventExposureSubsc:

type: object

properties:

eventsSubs:

type: array

items:

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

minItems: 1

eventsRepInfo:

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

notifUri:

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

notifId:

type: string

eventNotifs:

type: array

items:

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

minItems: 1

suppFeat:

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

required:

- eventsSubs

- eventsRepInfo

- notifId

- notifUri

AfEventNotification:

type: object

properties:

event:

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

timeStamp:

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

svcExprcInfos:

type: array

items:

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

minItems: 1

ueMobilityInfos:

type: array

items:

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

minItems: 1

ueCommInfos:

type: array

items:

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

minItems: 1

excepInfos:

type: array

items:

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

minItems: 1

required:

- event

- timeStamp

EventsSubs:

type: object

properties:

event:

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

eventFilter:

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

required:

- event

- eventFilter

EventFilter:

type: object

properties:

gpsis:

type: array

items:

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

minItems: 1

supis:

type: array

items:

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

minItems: 1

exterGroupIds:

type: array

items:

$ref: 'TS29503\_Nudm\_SDM.yaml#/components/schemas/ExtGroupId'

minItems: 1

interGroupIds:

type: array

items:

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

anyUeInd:

type: boolean

appIds:

type: array

items:

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

minItems: 1

locArea:

$ref: 'TS29122\_CommonData.yaml#/components/schemas/LocationArea5G'

ServiceExperienceInfoPerApp:

type: object

properties:

appId:

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

svcExpPerFlows:

type: array

items:

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

minItems: 1

gpsis:

type: array

items:

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

minItems: 1

supis:

type: array

items:

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

minItems: 1

required:

- svcExpPerFlows

ServiceExperienceInfoPerFlow:

type: object

properties:

svcExprc:

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

timeIntev:

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

dnai:

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

ipTrafficFilter:

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

ethTrafficFilter:

$ref: 'TS29514\_Npcf\_PolicyAuthorization.yaml#/components/schemas/EthFlowDescription'

SvcExperience:

type: object

properties:

mos:

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

upperRange:

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

lowerRange:

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

UeMobilityCollection:

type: object

properties:

gpsi:

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

supi:

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

appId:

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

ueTrajs:

type: array

items:

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

minItems: 1

required:

- appId

- ueTrajs

UeCommunicationCollection:

type: object

properties:

gpsi:

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

supi:

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

exterGroupId:

$ref: 'TS29503\_Nudm\_SDM.yaml#/components/schemas/ExtGroupId'

interGroupId:

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

appId:

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

comms:

type: array

items:

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

minItems: 1

required:

- appId

- comms

UeTrajectoryCollection:

type: object

properties:

ts:

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

locArea:

$ref: 'TS29122\_CommonData.yaml#/components/schemas/LocationArea5G'

required:

- ts

- locArea

CommunicationCollection:

type: object

properties:

startTime:

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

endTime:

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

ulVol:

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

dlVol:

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

required:

- startTime

- endTime

- ulVol

- dlVol

ExceptionInfo:

type: object

properties:

ipTrafficFilter:

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

ethTrafficFilter:

$ref: 'TS29514\_Npcf\_PolicyAuthorization.yaml#/components/schemas/EthFlowDescription'

exceps:

type: array

items:

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

minItems: 1

# Simple data types and Enumerations

AfEvent:

anyOf:

- type: string

enum:

- SVC\_EXPERIENCE

- UE\_MOBILITY

- UE\_COMM

- EXCEPTIONS

- type: string

Annex B (informative):  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New** |
| 2019-03 |  |  |  |  |  | TS skeleton of Application Function Event Exposure Service | 0.0.0 |
| 2019-04 | CT3#102 |  |  |  |  | Inclusion of C3-191230, C3-191374 and editorial change from Rapporteur. | 0.1.0 |
| 2019-05 | CT3#103 |  |  |  |  | Inclusion of C3-192194, C3-192393, C3-192260 and C3-192261. | 0.2.0 |
| 2019-08 | CT3#105 |  |  |  |  | Inclusion of C3-193373, C3-193440, C3-193441 and C3-193446. | 0.3.0 |
| 2019-10 | CT3#106 |  |  |  |  | Inclusion of C3-194263, C3-194264, C3-194393 and C3-194439. | 0.4.0 |
| 2019-11 | CT3#107 |  |  |  |  | Inclusion of C3-195068, C3-195226, C3-195238. | 0.5.0 |
| 2019-12 | CT#86 | CP-193178 |  |  |  | Presented for information | 1.0.0 |
| 2019-12 | CT#86 | CP-193295 |  |  |  | A title corrected | 1.0.1 |
| 2020-02 | CT3#108e |  |  |  |  | Inclusion of C3-201297, C3-201369, C3-201385, C3-201399, C3-201440 and C3-201466. | 1.1.0 |
| 2020-03 | CT#87e | CP-200188 |  |  |  | TS sent to plenary for approval | 2.0.0 |
| 2020-03 | CT#87e | CP-200188 |  |  |  | TS approved by plenary | 16.0.0 |
| 2020-06 | CT#88e | CP-201234 | 0001 | - | F | Update service operation for Ue Communication | 16.1.0 |
| 2020-06 | CT#88e | CP-201234 | 0002 | - | F | Corrections in TS 29.517 | 16.1.0 |
| 2020-06 | CT#88e | CP-201234 | 0003 | - | F | Definition of AfEventExposureSubsc in OpenAPI | 16.1.0 |
| 2020-06 | CT#88e | CP-201234 | 0004 | 1 | D | Unsubscribe service operation | 16.1.0 |
| 2020-06 | CT#88e | CP-201234 | 0005 | 1 | F | Correction to event description | 16.1.0 |
| 2020-06 | CT#88e | CP-201234 | 0006 | 1 | F | Correction to target UE description | 16.1.0 |
| 2020-06 | CT#88e | CP-201244 | 0007 | 1 | F | Storage of YAML files in ETSI Forge | 16.1.0 |
| 2020-06 | CT#88e | CP-201234 | 0008 | - | F | Service operation description for UE mobility | 16.1.0 |
| 2020-06 | CT#88e | CP-201256 | 0009 | 1 | F | URI of the Naf\_EventExposure service | 16.1.0 |
| 2020-06 | CT#88e | CP-201234 | 0010 | - | F | Support of immediate reporting | 16.1.0 |
| 2020-06 | CT#88e | CP-201077 | 0012 | 1 | F | Supported features definition | 16.1.0 |
| 2020-06 | CT#88e | CP-201234 | 0013 | 1 | F | Target UE information | 16.1.0 |
| 2020-06 | CT#88e | CP-201234 | 0014 | 1 | F | Supported headers, Resource Data type and yaml mapping | 16.1.0 |
| 2020-06 | CT#88e | CP-201255 | 0015 | - | F | Update of OpenAPI version and TS version in externalDocs field | 16.1.0 |
| 2020-09 | CT#89e | CP-202066 | 0017 | 1 | F | Missed data type definition | 16.2.0 |
| 2020-09 | CT#89e | CP-202066 | 0018 | - | F | Corrections on UE Mobility | 16.2.0 |
| 2020-09 | CT#89e | CP-202066 | 0019 | - | F | Missed response code | 16.2.0 |
| 2020-09 | CT#89e | CP-202066 | 0020 | 1 | F | Any UE indication applies to EXCEPTIONS | 16.2.0 |
| 2020-12 | CT#90e | CP-203139 | 0021 | 1 | F | Essential Corrections and alignments | 16.3.0 |
| 2020-12 | CT#90e | CP-203139 | 0022 | - | F | Storage of YAML files in 3GPP Forge | 16.3.0 |
| 2020-12 | CT#90e | CP-203129 | 0023 | 1 | F | Removal of trailing forward slash in resource URI | 16.3.0 |
| 2020-12 | CT#90e | CP-203139 | 0024 | 1 | F | Callback URI correction | 16.3.0 |
| 2020-12 | CT#90e | CP-203152 | 0027 | - | F | Update of OpenAPI version and TS version in externalDocs field | 16.3.0 |
| 2021-03 | CT#91e | CP-210206 | 0028 | - | F | Correction to anyUeInd attribute | 16.4.0 |
| 2021-03 | CT#91e | CP-210191 | 0030 | - | F | Support Stateless NFs | 16.4.0 |
| 2021-03 | CT#91e | CP-210206 | 0035 | - | F | Resource URI correction | 16.4.0 |
| 2021-03 | CT#91e | CP-210239 | 0037 | - | F | Update of OpenAPI version and TS version in externalDocs field | 16.4.0 |
| 2021-06 | CT#92e | CP-211200 | 0042 | 1 | F | Redirection responses | 16.5.0 |
| 2021-06 | CT#92e | CP-211264 | 0044 | - | F | Update of OpenAPI version and TS version in externalDocs field | 16.5.0 |