**3GPP TSG-CT WG3 Meeting #127e C3-231373r1**

**E-meeting, 17th – 21st April, 2023 (Revision of C3-231373)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **29.522** | **CR** | **0782** | **rev** | **2** | **Current version:** | **18.1.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Update for UE Mobility support FL in AnalyticsExposure API | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Samsung, | | | | | | | | | |
| ***Source to TSG:*** | CT3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | AIMLsys | | | | |  | ***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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | TS 23.288 clause 6.7.2.2 and 6.7.2.3 implemented CR 0677 (S2-2301588) for adding "UE’s geographical distribution" and "UE’s direction" as new outputs for UE Mobility Analytics to support FL.  This CR update the AnalyticsExposure API to support UE Mobility Analytics for Federated Learning operation. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Added new feature to enhance UE Mobility support Federated Learning in the AnalyticsExposure Service. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Misalignment with stage 2. No support of the new outputs for UE Mobility Analytics to support FL operation in AnalyticsExposure API. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.6.3.2, 5.6.3.3.9, 5.6.3.3.10, 5.6.4, A.4 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 backward compatible feature into OpenAPI file for AnalytcsExposure API. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR’s revision history:*** | |  | | | | | | | | |

**Additional discussion(if needed):**

**Proposed changes:**

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

#### 5.6.3.2 Reused data types

The data types reused by the AnalyticsExposure API from other specifications are listed in table 5.6.3.2-1.

Table 5.6.3.2-1: Re-used Data Types

|  |  |  |
| --- | --- | --- |
| Data type | Reference | Comments |
| AdditionalMeasurement | 3GPP TS 29.520 [27] |  |
| AddrFqdn | 3GPP TS 29.517 [58] |  |
| AnalyticsSubset | 3GPP TS 29.520 [27] | Analytics Subset. |
| ReportingInformation | 3GPP TS 29.523 [22] | Describes the analytics reporting requirement information. |
| BitRate | 3GPP TS 29.571 [8] |  |
| BwRequirement | 3GPP TS 29.520 [27] |  |
| CongestionType | 3GPP TS 29.520 [27] |  |
| DateTime | 3GPP TS 29.122 [4] |  |
| DirectionInfo | 3GPP TS 29.520 [27] | Represents the UE direction information |
| DispersionInfo | 3GPP TS 29.520 [27] | Dispersion information. |
| DispersionRequirement | 3GPP TS 29.520 [27] | Dispersion requirement. |
| Dnai | 3GPP TS 29.571 [8] | Identifies a user plane access to one or more DN(s). |
| Dnn | 3GPP TS 29.571 [8] |  |
| DnPerfInfo | 3GPP TS 29.520 [27] | DN Performance information. |
| DnPerformanceReq | 3GPP TS 29.520 [27] | DN Performance requirement. |
| DurationSec | 3GPP TS 29.122 [4] | Seconds of duration. |
| EventReportingRequirement | 3GPP TS 29.520 [27] |  |
| ExternalGroupId | 3GPP TS 29.122 [4] | External Group Identifier for a user group. |
| Exception | 3GPP TS 29.520 [27] |  |
| ExceptionId | 3GPP TS 29.520 [27] |  |
| ExpectedAnalyticsType | 3GPP TS 29.520 [27] |  |
| ExpectedUeBehaviourData | 3GPP TS 29.503 [17] |  |
| Float | 3GPP TS 29.571 [8] |  |
| GeoDistributionInfo | 3GPP TS 29.520 [27] | Represents the geographical distribution of the UEs. |
| Gpsi | 3GPP TS 29.571 [8] | Identifies a GPSI. |
| MatchingDirection | 3GPP TS 29.520 [27] | Matching direction |
| NetworkPerfRequirement | 3GPP TS 29.520 [27] |  |
| NsiIdInfo | 3GPP TS 29.520 [27] |  |
| NwdafFailureCode | 3GPP TS 29.520 [27] | Identifies the analytics failure reason. |
| ProblemDetailsAnalyticsInfoRequest | 3GPP TS 29.520 [27] |  |
| QosRequirement | 3GPP TS 29.520 [27] |  |
| RatFreqInformation | 3GPP TS 29.520 [27] |  |
| RetainabilityThreshold | 3GPP TS 29.520 [27] |  |
| SamplingRatio | 3GPP TS 29.571 [8] | Indicates Sampling Ratio. |
| ScheduledCommunicationTime | 3GPP TS 29.122 [4] |  |
| ServiceExperienceInfo | 3GPP TS 29.520 [27] |  |
| Snssai | 3GPP TS 29.571 [8] |  |
| SupportedFeatures | 3GPP TS 29.571 [8] | Used to negotiate the applicability of the optional features defined in table 5.6.4-1. |
| TermCause | 3GPP TS 29.520 [27] | Cause for requesting the termination of a subscription. |
| ThresholdLevel | 3GPP TS 29.520 [27] |  |
| TimeWindow | 3GPP TS 29.122 [4] |  |
| TopApplication | 3GPP TS 29.520 [27] | Top application that contributes the most to the traffic. |
| UeCommunication | 3GPP TS 29.520 [27] |  |
| Uinteger | 3GPP TS 29.571 [8] | Unsigned integer. |
| Uri | 3GPP TS 29.571 [8] | Identifies a referenced resource. |
| LocationArea5G | 3GPP TS 29.122 [4] |  |

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

##### 5.6.3.3.9 Type UeMobilityExposure

Table 5.6.3.3.9-1: Definition of type UeMobilityExposure

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **Data type** | **P** | **Cardinality** | **Description** | **Applicability** |
| ts | DateTime | O | 0..1 | This attribute identifies the timestamp when the UE arrives the location. (NOTE 1) |  |
| recurringTime | ScheduledCommunicationTime | O | 0..1 | Identifies time of the day and day of the week which are valid within the observation period when the UE moves. (NOTE 1, NOTE 2) |  |
| duration | DurationSec | M | 1 | This attribute identifies the time duration the UE stays in the location.  If the analytics result applies for a group of UEs, it indicates the average duration for the group of UEs. |  |
| durationVariance | Float | C | 0..1 | This attribute indicates the variance of the analysed durations for the group of UEs. It shall be provided if the analytics result applies for a group of UEs. |  |
| locInfo | array(UeLocationInfo) | M | 1..N | This attribute includes a list of UE location information during the time duration. |  |
| directionInfos | array(DirectionInfo) | O | 1..N | This attribute includes a list of UE direction information. | UeMobilityExt\_AIML |
| NOTE 1: Either ts or recurringTime shall be provided.  NOTE 2: If this attribute is present, it indicates the UE movement is periodic. This attribute is suitable to be present for a recurring mobility in a long observation time. | | | | | |

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

##### 5.6.3.3.10 Type UeLocationInfo

Table 5.6.3.3.10-1: Definition of type UeLocationInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **Data type** | **P** | **Cardinality** | **Description** | **Applicability** |
| loc | LocationArea5G | M | 1 | This attribute contains the detailed location. |  |
| ratio | SamplingRatio | C | 0..1 | This attribute contains the percentage of UEs in the group.  Shall be present if the analytics result applies for a group of UEs. |  |
| confidence | Uinteger | C | 0..1 | Indicates the confidence of the prediction. (NOTE)  Shall be present if the analytics result is a prediction.  Minimum = 0. Maximum = 100. |  |
| geoDistrInfos | array(GeoDistributionInfo) | O | 1..N | Indicates the geographical distribution of the UEs that may be selected by the AF for application service. | UeMobilityExt\_AIML |
| NOTE: If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned. | | | | | |

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

### 5.6.4 Used Features

The table below defines the features applicable to the AnalyticsExposure API. Those features are negotiated as described in clause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.6.4-1: Features used by AnalyticsExposure API

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
| 1 | Ue\_Mobility | This feature indicates support for the analytics event related to UE mobility. |
| 2 | Ue\_Communication | This feature indicates support for the analytics event related to UE communication information. |
| 3 | Abnormal\_Behavior | This feature indicates support for the analytics event related to UE's abnormal behaviour. |
| 4 | Congestion | This feature indicates support for the analytics event related to UE's user data congestion information. |
| 5 | Network\_Performance | This feature indicates support for the analytics event related to network performance. |
| 6 | QoS\_Sustainability | This feature indicates support for the analytics event related to QoS sustainability. |
| 7 | Notification\_websocket | The delivery of notifications over Websocket is supported as described in 3GPP TS 29.122 [4]. This feature requires that the Notification\_test\_event feature is also supported. |
| 8 | Notification\_test\_event | The testing of notification connection is supported as described in 3GPP TS 29.122 [4]. |
| 9 | Dispersion | This feature indicates support for the analytics event related to Dispersion analytics. |
| 10 | EneNA | This feature indicates support for the enhancements of network data analytics requirements. |
| 11 | DnPerformance | This feature indicates the support of the analytics event related to DN performance. |
| 12 | ServiceExperience | This feature indicates support for the event related to service experience. |
| 13 | CongestionExt | This feature indicates support for the extensions to the event related to user data congestion, including support of GPSI and/or list of Top applications. Supporting this feature also requires the support of feature Congestion. |
| 14 | Abnormal\_Behavior\_Ext | This feature indicates support for the extensions to the event related to abnormal behavior, including support of exposing DNN and S-NSSAI information.  Supporting this feature also requires the support of feature Abnormal\_Behavior. |
| 15 | QoS\_Sustainability\_Ext | This feature indicates support for the extensions to the event related to QoS sustainability, including support of exposing S-NSSAI information.  Supporting this feature also requires the support of feature QoS\_Sustainability. |
| 16 | TermRequest | This feature indicates support for Analytics Exposure Subscription termination requests sent by the NEF to the NF service consumer. |
| 17 | QoS\_SustainabilityExt\_eNA | This feature indicates support for the extensions related to eNA to the event related to QoS sustainability, including support of exposing S-NSSAI information.  Supporting this feature also requires the support of feature QoS\_Sustainability. |
| 18 | ServiceExperienceExt\_eNA | This feature indicates support for the extensions event related to service experience. Supporting this feature also requires the support of feature ServiceExperience. |
| 19 | Abnormal\_BehaviorExt\_eNA | This feature indicates support for the extensions to the event related to abnormal behavior related to eNA, including support of exposing DNN and S-NSSAI information.  Supporting this feature also requires the support of feature Abnormal\_Behavior. |
| 20 | CongestionExt\_eNA | This feature indicates support for the extensions to the event related to user data congestion related to eNA, including support of GPSI and/or list of Top applications. Supporting this feature also requires the support of feature Congestion. |
| 21 | DispersionExt\_eNA | This feature indicates support for the extensions associated with analytics event related to Dispersion analytics. Supporting this feature also requires the support of feature Congestion. |
| 22 | DnPerformanceExt\_eNA | This feature indicates the support of the analytics event related to DN performance. Supporting this feature also requires the support of feature DnPerformance. |
| 25 | UeMobilityExt\_AIML | This feature indicates support for further extensions to the event related to UE mobility supporting AIML, including support of UE’s geographical distribution and direction analytics. Supporting this feature also requires the support of feature UeMobility. |

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

# A.4 AnalyticsExposure API

openapi: 3.0.0

info:

title: 3gpp-analyticsexposure

version: 1.2.0-alpha.2

description: |

API for Analytics Exposure.

© 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

All rights reserved.

externalDocs:

description: >

3GPP TS 29.522 V18.1.0; 5G System; Network Exposure Function Northbound APIs.

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.522/'

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/3gpp-analyticsexposure/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.

paths:

/{afId}/subscriptions:

get:

summary: read all of the active subscriptions for the AF

operationId: ReadAllSubscriptions

tags:

- Analytics Exposure Subscriptions

parameters:

- name: afId

in: path

description: Identifier of the AF

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 (Successful get all of the active subscriptions for the AF)

content:

application/json:

schema:

type: array

items:

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

minItems: 0

'307':

$ref: 'TS29122\_CommonData.yaml#/components/responses/307'

'308':

$ref: 'TS29122\_CommonData.yaml#/components/responses/308'

'400':

$ref: 'TS29122\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29122\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29122\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29122\_CommonData.yaml#/components/responses/404'

'406':

$ref: 'TS29122\_CommonData.yaml#/components/responses/406'

'429':

$ref: 'TS29122\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29122\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29122\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29122\_CommonData.yaml#/components/responses/default'

post:

summary: Creates a new subscription resource

operationId: CreateNewSubscription

tags:

- Analytics Exposure Subscriptions

parameters:

- name: afId

in: path

description: Identifier of the AF

required: true

schema:

type: string

requestBody:

description: new subscription creation

required: true

content:

application/json:

schema:

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

callbacks:

notification:

'{request.body#/notifUri}':

post:

requestBody: # contents of the callback message

required: true

content:

application/json:

schema:

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

responses:

'204':

description: No Content (successful notification)

'307':

$ref: 'TS29122\_CommonData.yaml#/components/responses/307'

'308':

$ref: 'TS29122\_CommonData.yaml#/components/responses/308'

'400':

$ref: 'TS29122\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29122\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29122\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29122\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29122\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29122\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29122\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29122\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29122\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29122\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29122\_CommonData.yaml#/components/responses/default'

responses:

'201':

description: Created (Successful creation)

content:

application/json:

schema:

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

headers:

Location:

description: Contains the URI of the newly created resource.

required: true

schema:

type: string

'204':

description: >

Successful case. The resource has been successfully created and no additional

content is to be sent in the response message.

'400':

$ref: 'TS29122\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29122\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29122\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29122\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29122\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29122\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29122\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29122\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29122\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29122\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29122\_CommonData.yaml#/components/responses/default'

/{afId}/subscriptions/{subscriptionId}:

get:

summary: read an active subscription for the AF and the subscription Id

operationId: ReadAnSubscription

tags:

- Individual Analytics Exposure Subscription

parameters:

- name: afId

in: path

description: Identifier of the AF

required: true

schema:

type: string

- name: subscriptionId

in: path

description: Identifier of the subscription resource

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 (Successful get the active subscription)

content:

application/json:

schema:

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

'307':

$ref: 'TS29122\_CommonData.yaml#/components/responses/307'

'308':

$ref: 'TS29122\_CommonData.yaml#/components/responses/308'

'400':

$ref: 'TS29122\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29122\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29122\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29122\_CommonData.yaml#/components/responses/404'

'406':

$ref: 'TS29122\_CommonData.yaml#/components/responses/406'

'429':

$ref: 'TS29122\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29122\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29122\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29122\_CommonData.yaml#/components/responses/default'

put:

summary: Fully updates/replaces an existing subscription resource

operationId: FullyUpdateAnSubscription

tags:

- Individual Analytics Exposure Subscription

parameters:

- name: afId

in: path

description: Identifier of the AF

required: true

schema:

type: string

- name: subscriptionId

in: path

description: Identifier of the subscription resource

required: true

schema:

type: string

requestBody:

description: Parameters to update/replace the existing subscription

required: true

content:

application/json:

schema:

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

responses:

'200':

description: OK (Successful deletion of the existing subscription)

content:

application/json:

schema:

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

'204':

description: >

Successful case. The resource has been successfully updated and no additional

content is to be sent in the response message.

'307':

$ref: 'TS29122\_CommonData.yaml#/components/responses/307'

'308':

$ref: 'TS29122\_CommonData.yaml#/components/responses/308'

'400':

$ref: 'TS29122\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29122\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29122\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29122\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29122\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29122\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29122\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29122\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29122\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29122\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29122\_CommonData.yaml#/components/responses/default'

delete:

summary: Deletes an already existing subscription

operationId: DeleteAnSubscription

tags:

- Individual Analytics Exposure Subscription

parameters:

- name: afId

in: path

description: Identifier of the AF

required: true

schema:

type: string

- name: subscriptionId

in: path

description: Identifier of the subscription resource

required: true

schema:

type: string

responses:

'204':

description: No Content (Successful deletion of the existing subscription)

'307':

$ref: 'TS29122\_CommonData.yaml#/components/responses/307'

'308':

$ref: 'TS29122\_CommonData.yaml#/components/responses/308'

'400':

$ref: 'TS29122\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29122\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29122\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29122\_CommonData.yaml#/components/responses/404'

'429':

$ref: 'TS29122\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29122\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29122\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29122\_CommonData.yaml#/components/responses/default'

/{afId}/fetch:

post:

summary: Fetch analytics information

operationId: FetchAnalyticsInfo

tags:

- AnalyticsExposure API Fetch analytics information

parameters:

- name: afId

in: path

description: Identifier of the AF

required: true

schema:

type: string

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'200':

description: The requested information was returned successfully.

content:

application/json:

schema:

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

'204':

description: No Content (The requested Analytics data does not exist)

'307':

$ref: 'TS29122\_CommonData.yaml#/components/responses/307'

'308':

$ref: 'TS29122\_CommonData.yaml#/components/responses/308'

'400':

$ref: 'TS29122\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29122\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29122\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29122\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29122\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29122\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29122\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29122\_CommonData.yaml#/components/responses/429'

'500':

description: >

The request is rejected by the NEF and more details (not only the ProblemDetails)

are returned.

content:

application/problem+json:

schema:

$ref: 'TS29520\_Nnwdaf\_AnalyticsInfo.yaml#/components/schemas/ProblemDetailsAnalyticsInfoRequest'

'503':

$ref: 'TS29122\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29122\_CommonData.yaml#/components/responses/default'

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{tokenUrl}'

scopes: {}

schemas:

AnalyticsExposureSubsc:

description: Represents an analytics exposure subscription.

type: object

properties:

analyEventsSubs:

type: array

items:

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

minItems: 1

analyRepInfo:

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

notifUri:

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

notifId:

type: string

eventNotifis:

type: array

items:

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

minItems: 1

failEventReports:

type: array

items:

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

minItems: 1

suppFeat:

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

self:

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

requestTestNotification:

type: boolean

description: >

Set to true by the AF to request the NEF to send a test notification

as defined in clause 5.2.5.3 of 3GPP TS 29.122. Set to false or omitted otherwise.

websockNotifConfig:

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

required:

- analyEventsSubs

- notifUri

- notifId

AnalyticsEventNotification:

description: Represents an analytics event(s) notification.

type: object

properties:

notifId:

type: string

analyEventNotifs:

type: array

items:

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

minItems: 1

termCause:

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

required:

- notifId

- analyEventNotifs

AnalyticsEventNotif:

description: Represents an analytics event to be reported.

type: object

properties:

analyEvent:

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

expiry:

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

timeStamp:

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

failNotifyCode:

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

rvWaitTime:

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

ueMobilityInfos:

type: array

items:

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

minItems: 1

ueCommInfos:

type: array

items:

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

minItems: 1

abnormalInfos:

type: array

items:

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

minItems: 1

congestInfos:

type: array

items:

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

minItems: 1

nwPerfInfos:

type: array

items:

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

minItems: 1

qosSustainInfos:

type: array

items:

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

minItems: 1

disperInfos:

type: array

items:

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

minItems: 1

dnPerfInfos:

type: array

items:

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

minItems: 1

svcExps:

type: array

items:

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

minItems: 1

start:

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

timeStampGen:

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

locArea:

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

required:

- analyEvent

- timeStamp

AnalyticsEventSubsc:

description: Represents a subscribed analytics event.

type: object

properties:

analyEvent:

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

analyEventFilter:

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

tgtUe:

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

required:

- analyEvent

AnalyticsEventFilterSubsc:

description: Represents an analytics event filter.

type: object

properties:

nwPerfReqs:

type: array

items:

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

minItems: 1

locArea:

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

appIds:

type: array

items:

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

minItems: 1

dnn:

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

dnns:

type: array

items:

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

minItems: 1

dnais:

type: array

items:

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

minItems: 1

excepRequs:

type: array

items:

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

minItems: 1

exptAnaType:

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

exptUeBehav:

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

matchingDir:

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

reptThlds:

type: array

items:

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

minItems: 1

snssai:

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

snssais:

type: array

items:

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

minItems: 1

nsiIdInfos:

type: array

items:

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

minItems: 1

qosReq:

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

qosFlowRetThds:

type: array

items:

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

minItems: 1

ranUeThrouThds:

type: array

items:

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

minItems: 1

disperReqs:

type: array

items:

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

minItems: 1

listOfAnaSubsets:

type: array

items:

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

minItems: 1

dnPerfReqs:

type: array

items:

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

minItems: 1

bwRequs:

type: array

items:

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

minItems: 1

ratFreqs:

type: array

items:

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

minItems: 1

appServerAddrs:

type: array

items:

$ref: 'TS29517\_Naf\_EventExposure.yaml#/components/schemas/AddrFqdn'

minItems: 1

extraReportReq:

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

maxNumOfTopAppUl:

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

maxNumOfTopAppDl:

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

visitedLocAreas:

type: array

items:

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

minItems: 1

TargetUeId:

description: Represents the target UE(s) information.

type: object

properties:

anyUeInd:

type: boolean

gpsi:

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

exterGroupId:

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

UeMobilityExposure:

description: Represents a UE mobility information.

type: object

properties:

ts:

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

recurringTime:

$ref: 'TS29122\_CpProvisioning.yaml#/components/schemas/ScheduledCommunicationTime'

duration:

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

durationVariance:

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

locInfo:

type: array

items:

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

minItems: 1

directionInfos:

type: array

items:

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

minItems: 1

required:

- duration

- locInfo

UeLocationInfo:

description: Represents a UE location information.

type: object

properties:

loc:

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

ratio:

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

confidence:

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

geoDistrInfos:

type: array

items:

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

minItems: 1

required:

- loc

AnalyticsRequest:

description: Represents the parameters to request to retrieve analytics information.

type: object

properties:

analyEvent:

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

analyEventFilter:

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

analyRep:

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

tgtUe:

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

suppFeat:

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

required:

- analyEvent

- suppFeat

AnalyticsEventFilter:

description: Represents analytics event filter information.

type: object

properties:

locArea:

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

dnn:

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

dnns:

type: array

items:

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

minItems: 1

dnais:

type: array

items:

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

minItems: 1

nwPerfTypes:

type: array

items:

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

minItems: 1

appIds:

type: array

items:

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

minItems: 1

excepIds:

type: array

items:

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

minItems: 1

exptAnaType:

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

exptUeBehav:

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

snssai:

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

snssais:

type: array

items:

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

minItems: 1

nsiIdInfos:

type: array

items:

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

minItems: 1

qosReq:

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

listOfAnaSubsets:

type: array

items:

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

minItems: 1

dnPerfReqs:

type: array

items:

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

minItems: 1

bwRequs:

type: array

items:

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

minItems: 1

ratFreqs:

type: array

items:

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

minItems: 1

appServerAddrs:

type: array

items:

$ref: 'TS29517\_Naf\_EventExposure.yaml#/components/schemas/AddrFqdn'

minItems: 1

maxNumOfTopAppUl:

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

maxNumOfTopAppDl:

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

visitedLocAreas:

type: array

items:

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

minItems: 1

AnalyticsData:

description: Represents analytics data.

type: object

properties:

start:

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

expiry:

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

timeStampGen:

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

ueMobilityInfos:

type: array

items:

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

minItems: 1

ueCommInfos:

type: array

items:

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

minItems: 1

nwPerfInfos:

type: array

items:

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

minItems: 1

abnormalInfos:

type: array

items:

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

minItems: 1

congestInfos:

type: array

items:

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

minItems: 1

qosSustainInfos:

type: array

items:

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

minItems: 1

disperInfos:

type: array

items:

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

minItems: 1

dnPerfInfos:

type: array

items:

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

minItems: 1

svcExps:

type: array

items:

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

minItems: 1

disperReqs:

type: array

items:

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

minItems: 1

suppFeat:

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

required:

- suppFeat

NetworkPerfExposure:

description: Represents network performance information.

type: object

properties:

locArea:

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

nwPerfType:

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

relativeRatio:

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

absoluteNum:

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

confidence:

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

required:

- locArea

- nwPerfType

AbnormalExposure:

description: Represents a user's abnormal behavior information.

type: object

properties:

gpsis:

type: array

items:

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

minItems: 1

appId:

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

dnn:

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

snssai:

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

excep:

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

ratio:

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

confidence:

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

addtMeasInfo:

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

required:

- excep

CongestInfo:

description: Represents a UE's user data congestion information.

type: object

properties:

locArea:

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

cngAnas:

type: array

items:

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

minItems: 1

required:

- locArea

- cngAnas

CongestionAnalytics:

description: >

Represents data congestion analytics for transfer over the user plane,

control plane or both.

type: object

properties:

cngType:

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

tmWdw:

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

nsi:

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

confidence:

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

topAppListUl:

type: array

items:

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

minItems: 1

topAppListDl:

type: array

items:

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

minItems: 1

required:

- cngType

- tmWdw

- nsi

QosSustainabilityExposure:

description: Represents a QoS sustainability information.

type: object

properties:

locArea:

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

startTs:

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

endTs:

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

qosFlowRetThd:

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

ranUeThrouThd:

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

snssai:

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

confidence:

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

required:

- locArea

- startTs

- endTs

AnalyticsFailureEventInfo:

description: >

Represents an event for which the subscription request was not successful

and including the associated failure reason.

type: object

properties:

event:

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

failureCode:

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

required:

- event

- failureCode

AnalyticsEvent:

anyOf:

- type: string

enum:

- UE\_MOBILITY

- UE\_COMM

- ABNORMAL\_BEHAVIOR

- CONGESTION

- NETWORK\_PERFORMANCE

- QOS\_SUSTAINABILITY

- DISPERSION

- DN\_PERFORMANCE

- SERVICE\_EXPERIENCE

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration but is not used to encode

content defined in the present version of this API.

description: |

Represents the analytics event that is subscribed or notified.

Possible values are:

- UE\_MOBILITY: The AF requests to be notified about analytics information of UE mobility.

- UE\_COMM: The AF requests to be notified about analytics information of UE communication.

- ABNORMAL\_BEHAVIOR: The AF requests to be notified about analytics information of UE's

abnormal behavior.

- CONGESTION: The AF requests to be notified about analytics information of user data

congestion information.

- NETWORK\_PERFORMANCE: The AF requests to be notified about analytics information

of network performance.

- QOS\_SUSTAINABILITY: The AF requests to be notified about analytics information

of QoS sustainability.

- DISPERSION: The AF requests to be notified about analytics information of Dispersion

analytics.

- DN\_PERFORMANCE: The AF requests to be notified about analytics information of DN

performance.

- SERVICE\_EXPERIENCE: The AF requests to be notified about analytics information of service

experience.

AnalyticsFailureCode:

anyOf:

- type: string

enum:

- UNAVAILABLE\_DATA

- BOTH\_STAT\_PRED\_NOT\_ALLOWED

- UNSATISFIED\_REQUESTED\_ANALYTICS\_TIME

- OTHER

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration but is not used to encode

content defined in the present version of this API.

description: |

Identifies the failure reason.

Possible values are:

- UNAVAILABLE\_DATA: The event is rejected since necessary data to perform the service

is unavailable.

- BOTH\_STAT\_PRED\_NOT\_ALLOWED: The event is rejected since the start time is in the past

and the end time is in the future, which means the NF service consumer requested both

statistics and prediction for the analytics.

- UNSATISFIED\_REQUESTED\_ANALYTICS\_TIME: Indicates that the requested event is rejected

since the analytics information is not ready when the time indicated by the timeAnaNeeded

attribute (as provided during the creation or modification of subscription) is reached.

- OTHER: The event is rejected due to other reasons.

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