**3GPP TSG-CT WG3 Meeting #123e C3-224577**

**E-Meeting, 18th – 26th August 2022 (Revision of C3-224199)**

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| --- |
| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **29.517** | **CR** | **0076** | **rev** | **1** | **Current version:** | **17.6.0** |  |
|  |
| *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)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| --- |
|  |
| ***Title:***  | Updates to Media Streaming QoE metrics Event |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | EVEX |  | ***Date:*** | 2022-07-18 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** |  Rel-17 |
|  | *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 canbe 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:*** | The Media Streaming QoE metrics related editor’s notes in the procedures and data type need to be resolved to align with stage 2 descriptions.Upon step 2 in clause 5.8 of TS 26.531 describes the subscription indicating the Event ID and may nominate a specific Data Access Profile by citing its unique identifier, and clause 11.4.3 describes the QoE metrics reporting format, these stage 2 normative requirements need to be aligned in this specification. Upon the joint discussion with SA4 that the exisiting EventFilter attributes which including application identifier and location area are also applicable, hence also update in the related procedure description.Since TS 26.512 clause 18 describes the QoE specific as Media Streaming QoE, hence consider to also add Media Streaming to be aligned specific.Also upon the SA4 reply LS C3-224526 (S4-221118) and the attached TS 26.501 CR 0040r1 (S4-221108) confirmed that the exisiting commonly applicable UE Ids, the applicaton filter and location filter are applicable as the event filters during the subscription.The OpenAPI file need to be updated to align with above updates. |
|  |  |
| ***Summary of change:*** | Resolve the QoE metrics related editor’s notes in the procedures and update data types on QoE metrics aligned with stage 2 descriptions, and update the OpenAPI accordingly. |
|  |  |
| ***Consequences if not approved:*** | Not correct and specific implementation of the Media Streaming QoE metrics event subscription and notification in this specification. |
|  |  |
| ***Clauses affected:*** | 4.1.1, 4.2.2.1, 4.2.2.2, 4.2.4, 5.6.1, 5.6.2.2, 5.6.2.5, 5.6.2.6, 5.6.2.23, 5.6.3.3, 5.8, A.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 26.501 CR 0040  |
| ***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 the OpenAPI file applicable to Naf\_EventExposure API. |
|  |  |
| ***This CR's revision history:*** |  |

**Additional discussion(if needed):**

**Proposed changes:**

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

### 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). When the UE Application data is collected via the Data Collection AF, the Application Function Exposure Service, as defined in 3GPP TS 26.531 [28], 3GPP TS 26.501 [29], and 3GPP TS 26.512 [30], is provided by the Data Collection AF instantiated in 5GMS AF for the Event Consumer AF instantiated in 5GMS ASP.

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:

AF application events exposed by AF:

- Service Experience information for an application;

- UE mobility information;

- UE communication information;

- Exceptions information;

- User Data Congestion information;

- Collective Behaviour information;

- Dispersion information; and

- Performance Data information;

UE application events exposed via Data Collection AF:

- Media Streaming QoE metrics;

- Consumption reports;

- Network Assistance invocations;

- Charging and Policy invocations; and

- Media streaming access activity.

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]).

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

#### 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 by the NWDAF or NEF as the NF service consumer:

- Service Experience information for an application;

- UE mobility information;

- UE communication information;

- Exceptions information;

- User Data Congestion information;

- Collective Behaviour information;

- Dispersion information; and

- Performance Data information.

The following are the types of events for which a subscription can be made by the NWDAF, Event Consumer AF or NEF as the NF service consumer:

- Media Streaming QoE metrics.

The following are the types of events for which a subscription can be made by the Event Consumer AF or NEF as the NF service consumer:

- Consumption reports;

- Network Assistance invocations;

- Charging and Policy invocations; and

- Media streaming access activity.

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

- creating a new subscription;

- modifying an existing subscription.

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

#### 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 "AfEventExposureSubsc" data may include:

- a specific Data Access Profile Identifier as "dataAccProfId" attribute, if the feature "DataAccProfileId" is supported and the subscribed events including "MS\_QOE\_METRICS", "MS\_CONSUMPTION", "MS\_NET\_ASSIST\_INVOCATION", "MS\_DYN\_POLICY\_INVOCATION", and/or "MS\_ACCESS\_ACTIVITY".

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;

- partitioning criteria for partitioning the UEs before performing sampling as "partitionCriteria" attribute if the EneNA feature is supported;

- group reporting guard time as "grpRepTime" attribute; and/or

- a notification flag as "notifFlag" attribute if the EneNA feature is supported.

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.

NOTE: It is assumed that the AF is provisioned with the list of UE IDs (GPSIs or SUPIs) belonging to an External or Internal Group ID.

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 feature "UserDataCongestion" is supported and the event is "USER\_DATA\_CONGESTION", 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 "PerformanceData" is supported and the event is "PERF\_DATA", 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 "CollectiveBehaviour" is supported and the event is "COLLECTIVE\_BEHAVIOUR", the "eventFilter" attribute may provide:

1) collective attributes information via "collAttrs" attribute;

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

- if the feature "Dispersion" is supported and the event is "DISPERSION", 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 "MSQoeMetrics" is supported and the event is "MS\_QOE\_METRICS", 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 "Consumption" is supported and the event is "CONSUMPTION", the "eventFilter" attribute may provide:

Editor's note: It’s for FFS on the needed attributes for the feature "Consumption".

- if the feature "NetAssInvocation" is supported and the event is "NET\_ASSIST\_INVOCATION", the "eventFilter" attribute may provide:

Editor's note: It’s for FFS on the needed attributes for the feature "NetAssInvocation".

- if the feature "ChargingPolicyInvocation" is supported and the event is "CHARGING\_POLICY\_INVOCATION", the "eventFilter" attribute may provide:

Editor's note: It’s for FFS on the needed attributes for the feature "ChargingPolicyInvocation".

- if the feature "MSAccessActivity" is supported and the event is "MS\_ACCESS\_ACTIVITY", the "eventFilter" attribute may provide:

Editor's note: It’s for FFS on the needed attributes for the feature "MSAccessActivity".

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 without a "partitionCriteria" attribute, 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. If the "partitionCriteria" attribute is additionally included, then the AF shall first partition the UEs according to the value of the "partitionCriteria" attribute and then select a random subset of UEs from each partition according to the sampling ratio and only report the event(s) related to the selected subsets 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.

When the "notifFlag" attribute is included and set to "DEACTIVATE" in the request, the AF shall mute the event notification and store the available events.

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

### 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;

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

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

7) if the "event" attribute is "COLLECTIVE\_BEHAVIOUR":

- collective beahviour information associated with the UEs and its applications as "collBhvrInfs" attribute;

8) if the "event" attribute is "PERF\_DATA":

- performance data information associated with the application as "perfDataInfos" attribute;

9) if the "event" attribute is "USER\_DATA\_CONGESTION":

- user data congestion information collected for an AF application as "congestionInfos" attribute; and

10) if the "event" attribute is "DISPERSION":

- UE dispersion information collected for an AF application as "dispersionInfos" attribute.

11) if the "event" attribute is "MS\_QOE\_METRICS":

- Media Streaming QoE metrics information collected for an UE application via the Data Collection AF as "msQoeMetrInfos" attribute.

12) if the "event" attribute is "CONSUMPTION":

- Consumption reports collected for an UE application via the Data Collection AF as "consumpInfos" attribute.

13) if the "event" attribute is "NET\_ASSIST\_INVOCATION":

- Network Assistance invocations collected for an UE application via the Data Collection AF as "netAssInvInfos" attribute.

14) if the "event" attribute is "CHARGING\_POLICY\_INVOCATION":

- Charging and Policy invocations collected for an UE application via the Data Collection AF as "chgPlyInvInfos" attribute.

15) if the "event" attribute is "MS\_ACCESS\_ACTIVITY":

- Media Streaming access activity collected for an UE application via the Data Collection AF as "msAccActInfos" 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.

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

### 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 |
| AddrFqdn | 5.6.2.18 | IP address and/or FQDN. | PerformanceDataServiceExperienceExt |
| AfEvent | 5.6.3.3 | Represents 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 | Represents information related to an event to be reported. |  |
| ChargPolicyInvocationCollection | 5.6.2.26 | Represents the Charging and Policy invocations of UE Application collected via Data Collection AF. | ChargingPolicyInvocation |
| CollectiveBehaviourFilter | 5.6.2.19 | Contains the parameter type and value pair to express the collective behaviour event filters. | CollectiveBehaviour |
| CollectiveBehaviourFilterType | 5.6.3.4 |  | CollectiveBehaviour |
| CollectiveBehaviourInfo | 5.6.2.20 | Contains the collective behaviour analytics information. | CollectiveBehaviour |
| CommunicationCollection | 5.6.2.13 | Contains communication information. | UeCommunication |
| ConsumptionCollection | 5.6.2.24 | Represents the Consumption reports of UE Application collected via Data Collection AF. | Consumption |
| DispersionCollection | 5.6.2.21 | Contains Dispersion information collected. | Dispersion |
| EventFilter | 5.6.2.5 | Represents event filter information |  |
| EventsSubs | 5.6.2.4 | Represents an event to be subscribed and the related event filter information. |  |
| ExceptionInfo | 5.6.2.14 | Describes the exceptions information provided by AF. | Exceptions |
| MSAccessActivityCollection | 5.6.2.27 | Represents the Media Streaming access activities of UE Application collected via Data Collection AF. | MSAccessActivity |
| MsQoeMetricsCollection | 5.6.2.23 | Represents the Media Streaming QoE Metrics of UE Application collected via Data Collection AF. | MSQoeMetrics |
| NetAssInvocationCollection | 5.6.2.25 | Represents the Network Assistance invocations of UE Application collected via Data Collection AF. | NetAssInvocation |
| PerformanceData | 5.6.2.17 | Indicates the performance data. | PerformanceData |
| PerformanceDataCollection | 5.6.2.16 | Represents the performance data information collected for an AF application. | PerformanceData |
| PerUeAttribute | 5.6.2.22 | UE application data collected per UE. | CollectiveBehaviour |
|  |  |  |  |
| ServiceExperienceInfoPerApp | 5.6.2.7 | Contains service experience associated with the application | ServiceExperience |
| ServiceExperienceInfoPerFlow | 5.6.2.8 | Contains service experience associated with the service flow | ServiceExperience |
| SvcExperience | 5.6.2.9 | Contains a mean opinion score with the customized range. | ServiceExperience |
| UeCommunicationCollection | 5.6.2.11 | Contains UE communication information associated with the application. | UeCommunication |
| UeMobilityCollection | 5.6.2.10 | Contains UE mobility information associated with the application. | UeMobility |
| UeTrajectoryCollection | 5.6.2.12 | Contains UE trajectory information associated with the application. | UeMobility |
| UserDataCongestionCollection | 5.6.2.15 | Contains User Data Congestion Analytics related information collected. | UserDataCongestion |

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] | Application Identifier. |  |
| BitRate | 3GPP TS 29.571 [13] | String representing a bit rate that shall be formatted as follows:pattern: "^\d+(\.\d+)? (bps|Kbps|Mbps|Gbps|Tbps)$"Examples: "125 Mbps", "0.125 Gbps", "125000 Kbps". | UserDataCongestionCollectiveBehaviour |
| DateTime | 3GPP TS 29.571 [13] | Contains a date and a time. |  |
| Dnai | 3GPP TS 29.571 [13] | Identifies a DNAI. |  |
| DurationSec | 3GPP TS 29.571 [13] | Indicates a period of time in units of seconds. | Dispersion |
| EthFlowDescription | 3GPP TS 29.514 [18] | Defines a packet filter for an Ethernet flow. |  |
| Exception | 3GPP TS 29.520 [19] | Describes the Exception information. |  |
| Float | 3GPP TS 29.571 [13] | Number with format "float" as defined in OpenAPI Specification [8]. |  |
| FlowDescription | 3GPP TS 29.514 [18] | Only IP 5-tuple (protocol, source and destination IP address, Source and destination port) is applicable. | Dispersion |
| FlowInfo | 3GPP TS 29.122 [17] | Represents flow information. |  |
| Gpsi | 3GPP TS 29.571 [13] | Identifies a GPSI. |  |
| GroupId | 3GPP TS 29.571 [13] | Contains a Group identifier. |  |
| IpAddr | 3GPP TS 29.571 [13] | Identifies IP address. | Dispersion |
| LocationArea5G | 3GPP TS 29.122 [17] | Represents a user location area when the UE is attached to 5G. |  |
|  |  |  |  |
| PacketDelBudget | 3GPP TS 29.571 [13] | Indicates average Packet Delay. | PerformanceData |
| PacketLossRate | 3GPP TS 29.571 [13] | Indicates average Loss Rate. | PerformanceData |
| RedirectResponse | 3GPP TS 29.571 [13] | Contains redirection related information. | ES3XX |
| ReportingInformation | 3GPP TS 29.523 [12] | Represents the requirements of reporting the subscription. |  |
| SupportedFeatures | 3GPP TS 29.571 [13] | Indicates the features supported. |  |
| TimeWindow | 3GPP TS 29.122 [17] | Represents a time window identified by a start time and a stop time. |  |
| Uri | 3GPP TS 29.571 [13] | Contains a URI. |  |
| Volume | 3GPP TS 29.122 [17] | Unsigned integer identifying a volume in units of bytes. |  |
| UsageThreshold | 3GPP TS 29.122 [17] | data volume during the period | Dispersion |
| Supi | 3GPP TS 29.571 [13] | Contains a SUPI. |  |
| ExtGroupId | 3GPP TS 29.503 [27] | External Group Identifier for a user group. |  |

\*\*\* 6th Change \*\*\*

#### 5.6.2.2 Type AfEventExposureSubsc

Table 5.6.2.2-1: Definition of type AfEventExposureSubsc

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| dataAccProfId | string | O | 0..1 | Represents a unique identifier for the Data Access Profile. | DataAccProfileId |
| 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. |

\*\*\* 7th Change \*\*\*

#### 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", "EXCEPTIONS" or "USER\_DATA\_CONGESTION".(NOTE 2) | ServiceExperienceExceptionsUserDataCongestion |
| 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) | ServiceExperienceUeMobilityUeCommunicationExceptionsUserDataCongestionPerformanceDataDispersionCollectiveBehaviourMSQoeMetrics |
| locArea | LocationArea5G | O | 0..1 | Represents area of interest. (NOTE 5) | ServiceExperienceUeMobilityUeCommunicationExceptionsUserDataCongestionPerformanceDataDispersionCollectiveBehaviourMSQoeMetrics |
| collAttrs | array(CollectiveBehaviourFilter) | O | 1..N | Each element indicates a collective attribute parameter type and value. | CollectiveBehaviour |
| msQoeMetrReq | MsQoeMetrRequest | O | 0..1 | Indicates the Media Streaming QoE metrics reporting request. May only be present if the "AfEvent" sets to "MS\_QOE\_METRICS". | MSQoeMetrics |
| 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", "EXCEPTIONS" and "PERF\_DATA", 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. NOTE 5: The NetworkAreaInfo data within the LocationArea5G data is only applicable for trusted AF. In addition, for event "SVC\_EXPERIENCE", only the "tais" attribute within the NetworkAreaInfo data is applicable for the trusted AF. |

\*\*\* 8th Change \*\*\*

#### 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 | Represents the 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 |
| congestionInfos | array(UserDataCongestionCollection) | C | 1..N | Each element represents the user data congestion information collected for an AF application. Shall be present if the "event" attribute sets to "USER\_DATA\_CONGESTION". | UserDataCongestion |
| perfDataInfos | array(PerformanceDataCollection) | C | 1..N | Each element represents the performance data information collected for an AF application. Shall be present if the "event" attribute sets to "PERF\_DATA". | PerformanceData |
| collBhvrInfs | array(CollectiveBehaviourInfo) | C | 1..N | Each element represents the collective behaviour information related to a set of UEs, applications. Shall be present if the "event" attribute sets to "COLLECTIVE\_BEHAVIOUR". | CollectiveBehaviour |
| dispersionInfos | array(DispersionCollection) | C | 1..N | Each element represents the UE dispersion information collected for an AF application. Shall be present if the "event" attribute sets to "DISPERSION". | Dispersion |
| msQoeMetrInfos | array(MsQoeMetricsCollection) | C | 1..N | Each element represents the Media Streaming QoE metrics information collected for an UE application via the Data Collection AF. Shall be present if the "event" attribute sets to "MS\_QOE\_METRICS". | MSQoeMetrics |
| consumpInfos | array(ConsumptionCollection) | C | 1..N | Each element represents the Consumption information collected for an UE application via the Data Collection AF. Shall be present if the "event" attribute sets to "CONSUMPTION". | Consumption |
| netAssInvInfos | array(NetAssInvocationCollection) | C | 1..N | Each element represents the Network Assistance invocations information collected for an UE application via the Data Collection AF. Shall be present if the "event" attribute sets to "NET\_ASSIST\_INVOCATION". | NetAssInvocation |
| chgPlyInvInfos | array(ChargPolicyInvocationCollection) | C | 1..N | Each element represents the Charging and Policy invocation information collected for an UE application via the Data Collection AF. Shall be present if the "event" attribute sets to "CHARGING\_POLIC\_INVOCATION". | ChargingPolicInvocation |
| msAccActInfos | array(MSAccessActivityCollection) | C | 1..N | Each element represents the Media Streaming access activity collected for an UE application via the Data Collection AF. Shall be present if the "event" attribute sets to "MS\_ACCESS\_ACTIVITY". | MSAccessActivity |

\*\*\* 9th Change \*\*\*

#### 5.6.2.23 Type MsQoeMetricsCollection

**Table 5.6.2.23-1: Definition of type MsQoeMetricsCollection**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **Data type** | **P** | **Cardinality** | **Description** | **Applicability** |
| msQoeMetrics | array(string) | M | 1..N | Represents the Media Streaming Quality of Experience metrics with formatting as specified in clause 11.4.3 of 3GPP TS 26.512 [30], if required for the QoE metrics for Media Streaming UE Application. |  |

\*\*\* 10th Change \*\*\*

#### 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 information 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 |
| USER\_DATA\_CONGESTION | Indicates that the event subscribed is user data congestion analytics related information. | UserDataCongestion |
| PERF\_DATA | Indicates that the event subscribed is performance data information. | PerformanceData |
| COLLECTIVE\_BEHAVIOUR | Indicates that the event subscribed is collective behaviour information. | CollectiveBehaviour |
| DISPERSION | Indicates that the event subscribed is dispersion information. | Dispersion |
| MS\_QOE\_METRICS | Indicates that the event subscribed is Media Streaming QoE metrics. | MSQoeMetrics |
| CONSUMPTION | Indicates that the event subscribed is Consumption reports. | Consumption |
| NET\_ASSIST\_INVOCATION | Indicates that the event subscribed is Network Assistance invocations. | NetAssInvocation |
| CHARGING\_POLICY\_INVOCATION | Indicates that the event subscribed is Charging and Policy invocations. | ChargingPolicyInvocation |
| MS\_ACCESS\_ACTIVITY | Indicates that the event subscribed is Media Streaming access activity. | MSAccessActivity |

\*\*\* 11th Change \*\*\*

## 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 clauses 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 clause 6.10.9 of 3GPP TS 29.500 [5].  |
| 6 | EneNA | This feature indicates support for the enhancements of network data analytics requirements. |
| 7 | UserDataCongestion | This feature indicates support for the event related to User Data Congestion Analytics related information. |
| 8 | PerformanceData | This feature indicates support for the event related to performance data information. |
| 9 | Dispersion | This feature indicates support for the event related to Dispersion Analytics related information. |
| 10 | CollectiveBehaviour | This feature indicates support for the event related to collective behaviour information. |
| 11 | ServiceExperienceExt | This feature indicates support for the extensions to the event related to service experience, including reporting Application Server Instance. Supporting this feature also requires the support of feature ServiceExperience. |
| 12 | MSQoeMetrics | This feature indicates support for the event related to Media Streaming QoE metrics for UE Application collected via the Data Collection AF. |
| 13 | Consumption | This feature indicates support for the event related to Consumption reports for UE Application collected via the Data Collection AF. |
| 14 | NetAssInvocation | This feature indicates support for the event related to Network Assistance invocations for UE Application collected via the Data Collection AF. |
| 15 | ChargingPolicyInvocation | This feature indicates support for the event related to Charging and Policy invocations for UE Application collected via the Data Collection AF. |
| 16 | MSAccessActivity | This feature indicates support for the event related to Media Streaming access activity for UE Application collected via the Data Collection AF. |
| 17 | DataAccProfileId | This feature indicates support for Data Access Profile Identifier. |

\*\*\* 12th Change \*\*\*

# A.2 Naf\_EventExposure API

openapi: 3.0.0

info:

 version: 1.1.0

 title: Naf\_EventExposure

 description: |

 AF Event Exposure Service.

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externalDocs:

 description: >

 3GPP TS 29.517 V17.6.0; 5G System; Application Function Event Exposure Service; Stage 3.

 url: https://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:

 description: >

 Represents notifications on application event(s) that occurred for an Individual Application

 Event Subscription resource.

 type: object

 properties:

 notifId:

 type: string

 eventNotifs:

 type: array

 items:

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

 minItems: 1

 required:

 - notifId

 - eventNotifs

 AfEventExposureSubsc:

 description: Represents an Individual Application Event Subscription resource.

 type: object

 properties:

 dataAccProfId:

 type: string

 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:

 description: Represents information related to an event to be reported.

 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

 congestionInfos:

 type: array

 items:

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

 minItems: 1

 perfDataInfos:

 type: array

 items:

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

 minItems: 1

 dispersionInfos:

 type: array

 items:

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

 minItems: 1

 collBhvrInfs:

 type: array

 items:

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

 minItems: 1

 msQoeMetrInfos:

 type: array

 items:

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

 minItems: 1

 consumpInfos:

 type: array

 items:

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

 minItems: 1

 netAssInvInfos:

 type: array

 items:

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

 minItems: 1

 chgPlyInvInfos:

 type: array

 items:

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

 minItems: 1

 msAccActInfos:

 type: array

 items:

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

 minItems: 1

 required:

 - event

 - timeStamp

 EventsSubs:

 description: Represents an event to be subscribed and the related event filter information.

 type: object

 properties:

 event:

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

 eventFilter:

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

 required:

 - event

 - eventFilter

 EventFilter:

 description: Represents event filter information for an event.

 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'

 collAttrs:

 type: array

 items:

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

 minItems: 1

 ServiceExperienceInfoPerApp:

 description: Contains service experience information associated with an application.

 type: object

 properties:

 appId:

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

 appServerIns:

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

 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:

 description: Contains service experience information associated with a service flow.

 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:

 description: Contains a mean opinion score with the customized range.

 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:

 description: Contains UE mobility information associated with an application.

 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:

 description: Contains UE communication information associated with an application.

 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:

 description: Contains UE trajectory information associated with an application.

 type: object

 properties:

 ts:

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

 locArea:

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

 required:

 - ts

 - locArea

 CommunicationCollection:

 description: Contains communication information.

 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:

 description: Represents the exceptions information provided by the AF.

 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

 required:

 - exceps

 oneOf:

 - required: [ipTrafficFilter]

 - required: [ethTrafficFilter]

 UserDataCongestionCollection:

 description: Contains User Data Congestion Analytics related information collection.

 type: object

 properties:

 appId:

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

 ipTrafficFilter:

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

 timeInterv:

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

 thrputUl:

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

 thrputDl:

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

 thrputPkUl:

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

 thrputPkDl:

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

 oneOf:

 - required: [appId]

 - required: [ipTrafficFilter]

 PerformanceDataCollection:

 description: Contains Performance Data Analytics related information collection.

 type: object

 properties:

 appId:

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

 ueIpAddr:

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

 ipTrafficFilter:

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

 ueLoc:

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

 appLocs:

 type: array

 items:

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

 minItems: 1

 asAddr:

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

 perfData:

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

 timeStamp:

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

 required:

 - perfData

 - timeStamp

 PerformanceData:

 description: Contains Performance Data.

 type: object

 properties:

 pdb:

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

 plr:

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

 thrputUl:

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

 thrputDl:

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

 AddrFqdn:

 description: IP address and/or FQDN.

 type: object

 properties:

 ipAddr:

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

 fqdn:

 type: string

 description: Indicates an FQDN.

 DispersionCollection:

 description: Contains the dispersion information collected for an AF.

 type: object

 properties:

 gpsi:

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

 supi:

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

 ueAddr:

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

 dataUsage:

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

 flowDesp:

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

 appId:

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

 dnais:

 type: array

 items:

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

 minItems: 1

 appDur:

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

 required:

 - dataUsage

 oneOf:

 - required: [gpsi]

 - required: [supi]

 - required: [ueAddr]

 CollectiveBehaviourFilter:

 description: Contains the collective behaviour filter information to be collected from UE.

 type: object

 properties:

 type:

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

 value:

 type: string

 description: Value of the parameter type as in the type attribute.

 listOfUeInd:

 type: boolean

 description: >

 Indicates whether request list of UE IDs that fulfill a collective behaviour within the

 area of interest. This attribute shall set to "true" if request the list of UE IDs,

 otherwise, set to "false". May only be present and sets to "true" if "AfEvent" sets to

 "COLLECTIVE\_BEHAVIOUR".

 required:

 - type

 - value

 CollectiveBehaviourInfo:

 description: Contains the collective behaviour information to be reported to the subscriber.

 type: object

 properties:

 colAttrib:

 type: array

 items:

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

 minItems: 1

 noOfUes:

 type: integer

 description: Total number of UEs that fulfil a collective within the area of interest.

 appIds:

 type: array

 items:

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

 minItems: 1

 extUeIds:

 type: array

 items:

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

 minItems: 1

 ueIds:

 type: array

 items:

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

 minItems: 1

 required:

 - colAttrib

 oneOf:

 - required: [extUeIds]

 - required: [ueIds]

 PerUeAttribute:

 description: UE application data collected per UE.

 type: object

 properties:

 ueDest:

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

 route:

 type: string

 avgSpeed:

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

 timeOfArrival:

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

 MsQoeMetricsCollection:

 description: >

 Contains the Media Streaming QoE metrics information collected for an UE Application via AF.

 type: object

 properties:

 msQoeMetrics:

 type: array

 items:

 type: string

 description: >

 Represents the Media Streaming Quality of Experience metrics with formatting as

 specified in clause 11.4.3 of 3GPP TS 26.512 [30], if required for the QoE metrics for

 Media Streaming UE Application.

 minItems: 1

 required:

 - msQoeMetrics

 ConsumptionCollection:

 description: Contains the Consumption information collected for an UE Application via AF.

 type: object

 properties:

 consumps:

 type: array

 items:

 type: string

 minItems: 1

 required:

 - consumps

 NetAssInvocationCollection:

 description: Contains Network Assistance invocations collected for an UE Application via AF.

 type: object

 properties:

 netAssInvocs:

 type: array

 items:

 type: string

 minItems: 1

 required:

 - netAssInvocs

 ChargPolicyInvocationCollection:

 description: Contains Charging and Policy invocations collected for an UE Application via AF.

 type: object

 properties:

 chgPlyInvocs:

 type: array

 items:

 type: string

 minItems: 1

 required:

 - chgPlyInvocs

 MSAccessActivityCollection:

 description: Contains Media Streaming access activity collected for an UE Application via AF.

 type: object

 properties:

 msAccActs:

 type: array

 items:

 type: string

 minItems: 1

 required:

 - msAccActs

# Simple data types and Enumerations

 AfEvent:

 description: Represents Application Events.

 anyOf:

 - type: string

 enum:

 - SVC\_EXPERIENCE

 - UE\_MOBILITY

 - UE\_COMM

 - EXCEPTIONS

 - USER\_DATA\_CONGESTION

 - PERF\_DATA

 - DISPERSION

 - COLLECTIVE\_BEHAVIOUR

 - MS\_QOE\_METRICS

 - CONSUMPTION

 - NET\_ASSIST\_INVOCATION

 - CHARGING\_POLICY\_INVOCATION

 - MS\_ACCESS\_ACTIVITY

 - type: string

 CollectiveBehaviourFilterType:

 description: Represents collective behaviour parameter type.

 anyOf:

 - type: string

 enum:

 - COLLECTIVE\_ATTRIBUTE

 - DATA\_PROCESSING

 - type: string

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