**3GPP TSG-CT3 Meeting #130 *C3-234241***

**Xiamen, China, 9th Oct 2023 - 13th Oct 2023**

|  |
| --- |
| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **29.522** | **CR** | **1072** | **rev** | **-** | **Current version:** | **18.3.0** |  |
|  |
| *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** |

|  |
| --- |
|  |
| ***Title:***  | Analytics feedback information in Analytics exposure |
|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell, Ericsson |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | eNA\_Ph3 |  | ***Date:*** | 2023-09-29 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-18 |
|  | *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:*** | 23.288 clauses 6.1.1.2 and 6.1.3 specify that the analytics consumer may provide analytics feedback information in analytics exposure subscription modification requests. |
|  |  |
| ***Summary of change:*** | Added the analytics feedback information to the inputs of the EventsSubscription\_Subscribe for subscription updates. |
|  |  |
| ***Consequences if not approved:*** | Not fulfilled stage 2 requirements. |
|  |  |
| ***Clauses affected:*** | 5.6.3.2, 5.6.3.3.6, 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 a backwards compatible feature into the OpenAPI file of the AnalyticsExposure API. |
|  |  |
| ***This CR's revision history:*** |  |

\* \* \* \* First 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] | Represents additional measurement information. |
| AddrFqdn | 3GPP TS 29.517 [58] | Represents an IP address and/or an FQDN. |
| AnalyticsFeedbackInfo | 3GPP TS 29.520 [27] | Represents analytics feedback information. |
| AnalyticsSubset | 3GPP TS 29.520 [27] | Represents an analytics Subset used to indicate the content of the analytics. |
|  |  |  |
| BitRate | 3GPP TS 29.571 [8] | Represents a bit rate. |
| BwRequirement | 3GPP TS 29.520 [27] | Represents bandwidth requirements. |
| CongestionType | 3GPP TS 29.520 [27] | Represents a congestion analytics type. |
| DateTime | 3GPP TS 29.122 [4] | Represents a date and a time. |
| 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] | Represents a DNN. |
| 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] | Represents the required type of reporting. |
| ExternalGroupId | 3GPP TS 29.122 [4] | External Group Identifier for a user group. |
| Exception | 3GPP TS 29.520 [27] | Represents exception information. |
| ExceptionId | 3GPP TS 29.520 [27] | Represents the identifier of an exception. |
| ExpectedAnalyticsType | 3GPP TS 29.520 [27] | Represents the exception's trend. |
| ExpectedUeBehaviourData | 3GPP TS 29.503 [17] | Represents the expected UE behaviour data. |
| Float | 3GPP TS 29.571 [8] | Represents a number with the "float" format. |
| GeoDistributionInfo | 3GPP TS 29.520 [27] | Represents the geographical distribution of the UEs. |
| GeographicalArea | 5.17.3.3.4 | Identifies the geographical information with shapes. |
| Gpsi | 3GPP TS 29.571 [8] | Identifies a GPSI. |
| LocInfoGranularity | 3GPP TS 29.520 [27] | Represents the preferred granularity of location information. |
| MatchingDirection | 3GPP TS 29.520 [27] | Matching direction |
| MovBehavInfo | 3GPP TS 29.520 [27] | Represents the Movement Behaviour information. |
| MovBehavReq | 3GPP TS 29.520 [27] | Represents the Movement Behaviour analytics requirements. |
| NetworkPerfRequirement | 3GPP TS 29.520 [27] | Represents a network performance requirement. |
| NsiIdInfo | 3GPP TS 29.520 [27] | Represents the S-NSSAI and the optionally associated Network Slice Instance Identifier(s). |
| NwdafFailureCode | 3GPP TS 29.520 [27] | Identifies the analytics failure reason. |
| PduSessionInfo | 3GPP TS 29.520 [27] | Identifies combination of PDU Session parameters information. |
| ProblemDetails | 3GPP TS 29.122 [4] | Represents error related information. |
| ProblemDetailsAnalyticsInfoRequest | 3GPP TS 29.520 [27] | Represents an extension to the ProblemDetails data structure with additional information on why the analytics request is rejected |
| QosRequirement | 3GPP TS 29.520 [27] | Represents QoS requirements. |
| RatFreqInformation | 3GPP TS 29.520 [27] | Represents the RAT type and/or Frequency information. |
|  |  |  |
| ResourceUsageRequirement | 3GPP TS 29.520 [27] |  |
| RetainabilityThreshold | 3GPP TS 29.520 [27] | Represents a QoS flow retainability threshold. |
| SamplingRatio | 3GPP TS 29.571 [8] | Indicates Sampling Ratio. |
| ScheduledCommunicationTime | 3GPP TS 29.122 [4] | Represents an offered scheduled communication time. |
| ServiceExperienceInfo | 3GPP TS 29.520 [27] | Represents the service experience information. |
| Snssai | 3GPP TS 29.571 [8] | Represents an S-NSSAI. |
| SupportedFeatures | 3GPP TS 29.571 [8] | Used to negotiate the applicability of the optional features. |
| TermCause | 3GPP TS 29.520 [27] | Cause for requesting the termination of a subscription. |
| ThresholdLevel | 3GPP TS 29.520 [27] | Represents a threshold level. |
| TimeWindow | 3GPP TS 29.122 [4] | Represents a time window. |
| TopApplication | 3GPP TS 29.520 [27] | Top application that contributes the most to the traffic. |
| UeCommunication | 3GPP TS 29.520 [27] | Represents UE communication information. |
| UeCommReq | 3GPP TS 29.520 [27] | UE communication analytics requirement. |
| UeMobilityReq | 3GPP TS 29.520 [27] | UE mobility analytics requirement. |
| Uinteger | 3GPP TS 29.571 [8] | Unsigned integer. |
| Uri | 3GPP TS 29.571 [8] | Identifies a referenced resource. |
| UserDataCongestReq | 3GPP TS 29.520 [27] | The User Data Congestion requirement. |
| UserDataConOrderCrit | 3GPP TS 29.520 [27] | The ordering criterion for the list of User Data Congestion analytics. |
| LocationArea5G | 3GPP TS 29.122 [4] | Represents a user location area when the UE is attached to 5G. |

\* \* \* \* Next change \* \* \* \*

5.6.3.3.6 Type: AnalyticsEventFilterSubsc

**Table 5.6.3.3.6-1: Definition of type AnalyticsEventFilterSubsc**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **Data type** | **P** | **Cardinality** | **Description** | **Applicability** |
| locArea | LocationArea5G | O | 0..1 | Identification of network area to which the subscription applies.(NOTE 1) (NOTE 7) (NOTE 14) | Abnormal\_BehaviorCongestionUe\_CommunicationUe\_MobilityQoS\_SustainabilityNetwork\_PerformanceDispersionDnPerformanceServiceExperienceE2eDataVolTransTimeMovementBehaviour |
| fineGranAreas | array(GeographicalArea) | O | 1..N | Indicates the fine granularity areas to which the subscription applies. (i.e. with a finer granularity than cell).(NOTE 1, NOTE 14) | ServiceExperienceExt\_eNAUe\_MobilityExt\_eNAQoS\_SustainabilityExt\_eNA |
| dnn | Dnn | O | 0..1 | Identifies the DNN. (NOTE 7) | Ue\_Communication Abnormal\_BehaviorServiceExperienceDnPerformance |
| dnns | array(Dnn) | O | 1..N | Identifies the DNN(s) to which the subscription applies. (NOTE 7) | UeCommunicationExt\_eNAAbnormal\_BehaviorExt\_eNAServiceExperienceExt\_eNADnPerformanceExt\_eNAE2eDataVolTransTime |
| dnais | array(Dnai) | O | 1..N | Identification(s) of user plane access to DN(s) which the subscription applies. | DnPerformanceServiceExperienceE2eDataVolTransTime |
| appIds | array(ApplicationId) | O | 1..N | Each element identifies an application. (NOTE 7) (NOTE 13) | Abnormal\_BehaviorUe\_CommunicationDispersionDnPerformanceServiceExperienceE2eDataVolTransTime |
| dataVlTrnsTmRqs | array(e2eDataVolTransTimeReq) | O | 1..N | Represents the E2E data volume transfer time requirements | E2eDataVolTransTime |
| excepRequs | array(Exception) | O | 1..N | Represents a list of Exception Ids with associated thresholds.(NOTE 2, NOTE 3) | Abnormal\_Behavior |
| exptAnaType | ExpectedAnalyticsType | O | 0..1 | Represents expected UE analytics type.(NOTE 3) | Abnormal\_Behavior |
| exptUeBehav | ExpectedUeBehaviourData | O | 0..1 | Represents expected UE behaviour. | Abnormal\_Behavior |
| matchingDir | MatchingDirection | O | 0..1 | A matching direction may be provided alongside a threshold. If omitted, the default value is CROSSED. | QoS\_SustainabilityCongestion,Network\_Performance  |
| reptThlds | array(ThresholdLevel) | O | 1..N | Represents the levels to be reached in order to be notified by the NEF.(NOTE 4) | Congestion |
| nwPerfReqs | array(NetworkPerfRequirement) | C | 1..N | Represents the network performance requirements. This attribute shall be included when subscribed event is "NETWORK\_PERFORMANCE". | Network\_Performance |
| snssai | Snssai | O | 0..1 | Identifies the network slice information. (NOTE 7) | UeCommunicationQoS\_Sustainability Abnormal\_BehaviorCongestionDispersionServiceExperienceDnPerformance |
| snssais | array(Snssai) | O | 1..N | Identifies the network slice information. (NOTE 7) | Ue\_CommunicationExt\_eNAQoS\_SustainabilityExt\_eNAAbnormal\_BehaviorExt\_eNACongestionExt\_eNADispersionExt\_eNA ServiceExperienceExt\_eNADnPerformanceExt\_eNAE2eDataVolTransTime |
| nsiIdInfos | array(NsiIdInfo) | O | 1..N | Each element identifies the S-NSSAI and the optionally associated network slice instance(s).May be included when subscribed event is "SERVICE\_EXPERIENCE" or "DN\_PERFORMANCE". | ServiceExperienceDnPerformance |
| qosReq | QosRequirement | C | 0..1 | Represents the QoS requirements. This attribute shall be included when subscribed event is "QOS\_SUSTAINABILITY". | QoS\_SustainabilityE2eDataVolTransTime |
| qosFlowRetThds | array(RetainabilityThreshold) | C | 1..N | Represents the QoS flow retainability thresholds,Shall be supplied for the 5QI of GBR resource type. (NOTE 5)  | QoS\_Sustainability |
| ranUeThrouThds | array(BitRate) | C | 1..N | Represents the RAN UE throughput thresholds.Shall be supplied for the 5QI of non-GBR resource type. (NOTE 5) | QoS\_Sustainability |
| disperReqs | array(DispersionRequirement) | O | 1..N | Represents the dispersion analytics requirements. | Dispersion |
| dnPerfReqs | array(DnPerformanceReq) | O | 1..N | Represents the DN performance analytics requirements. | DnPerformance |
| bwRequs | array(BwRequirement) | O | 1..N | Represents the bandwidth requirement for each application. | ServiceExperience |
| ratFreqs | array(RatFreqInformation) | O | 1..N | Identification(s) of the RAT type and/or frequencies of UE’s serving cell(s) which the subscriptiont applies. (NOTE 8) | ServiceExperience |
| appServerAddrs | array(AddrFqdn) | C | 1..N | Each of the element represents the Application Server Instance (IP address/FQDN of the Application Server) (NOTE 9) | ServiceExperienceDnPerformance |
| listOfAnaSubsets | array(AnalyticsSubset) | O | 1..N | The list of analytics subsets can be used to indicate the content of the analytics. (NOTE 12) | EneNA |
| extraReportReq | EventReportingRequirement | O | 0..1 | The extra event reporting requirement information. (NOTE 6) |  |
| maxNumOfTopAppUl | Uinteger | O | 0..1 | Indicates the requested maximum number of top applications that contribute the most to the traffic in Uplink direction. Minimum = 1.May be included when one of the element in the "listOfAnaSubsets" attribute is set to LIST\_OF\_TOP\_APP\_UL. | CongestionExt |
| maxNumOfTopAppDl | Uinteger | O | 0..1 | Indicates the requested maximum number of top applications that contribute the most to the traffic in Downlink direction.Minimum = 1.May be included when one of the element in the "listOfAnaSubsets" attribute is set to LIST\_OF\_TOP\_APP\_DL. | CongestionExt |
| visitedLocAreas | array(LocationArea5G) | O | 1..N | Identifications of network areas which the UEs had previously been in at least one of the Visited Area(s) of Interest.(NOTE 10) | Ue\_Mobility |
| ueCommReqs | array(UeCommReq) | O | 1..N | Represents the UE communication requirements. This attribute may be included when the subscribed event is "UE\_COMM". | UeCommunicationExt\_eNA |
| userDataConOrderCri | UserDataConOrderCrit | O | 0..1 | The ordering criterion for the list of User Data Congestion analytics. (NOTE 11) | CongestionExt\_eNA |
| locGranularity | LocInfoGranularity | O | 0..1 | The preferred granularity of UE location information. | ServiceExperienceExt\_eNAUe\_MobilityExt\_eNADispersionExt\_eNA |
| locOrientation | LocationOrientation | O | 0..1 | Indicates the preferred orientation of location information. | Ue\_MobilityExt\_eNAMovementBehaviour |
| ueMobilityReqs | array(UeMobilityReq) | O | 1..N | Represents the UE mobility requirements. This attribute may be included when the subscribed event is "UE\_MOBILITY". | Ue\_MobilityExt\_eNA |
| movBehavReqs | array(MovBehavReq) | O | 1..N | Represents the Movement Behaviour analytics requirements. | MovementBehaviour |
| pduSesInfos | array(PduSessionInfo) | O | 1..N | Represents combination of PDU Session parameters information. (NOTE 13) | ServiceExperienceExt\_eNA |
| useCaseCxt | string | O | 0..1 | Indicates the context of usage of the analytics.The value and format of this parameter are not standardized. | ENAExt |
| pauseFlg | boolean | O | 0..1 | Pause analytics consumption flag and is applicable on analytics ID level. Set to "true" to indicate the NWDAF to stop including analytics of this event type in its notifications (without cancelling the subscription), because the accuracy level needs to be increased.Default value is "false" if omitted.This attribute may be present in a update request message if the "pauseInd" attribute was provided in the notification. | AnalyticsAccuracy |
| resumeFlg | boolean | O | 0..1 | Resume analytics consumption flag and is applicable on analytics ID level. Set to "true" to indicate the NWDAF to resume sending the notifications of analytics because the accuracy has been improved.Default value is "false" if omitted.This attribute may be present in a update request message if the "resumeInd" attribute was provided in the notification. | AnalyticsAccuracy |
| temporalGranSize | DurationSec | O | 0..1 | Indicates the minimum duration of each time slot for which the analytics are provided. | NetworkPerfExt\_eNAUe\_MobilityExt\_eNACongestionExt\_eNAQoS\_SustainabilityExt\_eNADispersionExt\_eNADnPerformanceExt\_eNA |
| spatialGranSizeTa | Uinteger | O | 0..1 | Indicates the maximum number of TAs used to define an area for which the analytics are provided.May be included when the "networkArea" attribute in the EventSubscription data type is provided. | NetworkPerfExt\_eNAUe\_MobilityExt\_eNAUeCommunicationExt\_eNAQoS\_SustainabilityExt\_eNADispersionExt\_eNADnPerformanceExt\_eNA |
| spatialGranSizeCell | Uinteger | O | 0..1 | Indicates the maximum number of cells used to define an area for which the analytics are provided.May be included when the "networkArea" attribute in the EventSubscription data type is provided. | NetworkPerfExt\_eNAUe\_MobilityExt\_eNAUeCommunicationExt\_eNAQoS\_SustainabilityExt\_eNADispersionExt\_eNADnPerformanceExt\_eNA |
| feedback | AnalyticsFeedbackInfo | O | 0..1 | Analytics feedback information. It may only be provided in requests to update an existing analytics subscription for predictions. | AnalyticsAccuracy |
| NOTE 1: The NetworkAreaInfo within the "locArea" attribute is not applicable for the untrusted AF. For "NETWORK\_PERFORMANCE" or "CONGESTION" or "E2E\_DATA\_VOL\_TRANS\_TIME" event, the "locArea" attribute shall be provided if the event applied for all UEs (i.e. "anyUeInd" attribute set to true within the TargetUeId data). For "QOS\_SUSTAINABILITY" or "MOVEMENT\_BEHAVIOUR" event, at least one of the "locArea" attribute and "fineGranAreas" attribute shall be provided.NOTE 2: Only "excepId" and "excepLevel" within the Exception data type apply to the "excepRequs" attribute.NOTE 3: Either "excepRequs" or "exptAnaType" shall be provided if the subscribed event is "ABNORMAL\_BEHAVIOR".NOTE 4: If the subscribed event is "CONGESTION" or "DN\_PERFORMANCE", this attribute shall be provided if "notifMethod" within "analyRepInfo" sets to "ON\_EVENT\_DETECTION" or omitted.NOTE 5: For "QOS\_SUSTAINABILITY", this property shall be provided if the "notifMethod" in "analyRepInfo" is set to "ON\_EVENT\_DETECTION" or omitted. NOTE 6: The "sampRatio" attribute and the "histAnaTimePeriod" attribute within EventReportingRequirement data type is not applicable for the present API. The attributes "accPerSubset", "offsetPeriod", and "timeAnaNeeded" within the EventReportingRequirement data type are applicable only if the "EneNA" feature is supported.NOTE 7: For "ABNORMAL\_BEHAVIOR" event with "anyUeInd" attribute in "tgtUe" attribute sets to true,- at least one of the "locArea" and the "snssai" attribute should be included, if the expected analytics type via the"exptAnaType" attribute or the list of Exception Ids via the "excepRequs" attribute is mobility related;- at least one of the "locArea", "appIds", "dnn", ”dnns”, ”snssai” and "snssais" attribute should be included, if the expected analytics type via the"exptAnaType" attribute or the list of Exception Ids via the "excepRequs" attribute is communication related; - the expected analytics type via the"exptAnaType" attribute or the list of Exception Ids via "excepRequs" attribute shall not be requested for both mobility and communication related analytics at the same time.- “dnns” and “snssais” is mutually exclusive for “dnn” and “snssai”. “dnn” and “snssai” are available for the backward compatibility to the previous release of this specification.NOTE 8: If both the "allFreq" attribute and the "allRat" attribute within the "ratFreqs" attribute are present, then the cardinality shall be 1 as the "all" indication for all the RAT type and Frequency value the NWDAF has received for the application.NOTE 9: This parameter shall be provided when a consumer requires analytics for an edge application over a UP path.NOTE 10: The NetworkAreaInfo within the "visitedLocAreas" attribute is not applicable for the untrusted AF. If this attribute is provided, the analytics target period shall be a past time period (i.e. only statistics is supported).NOTE 11: If the the value of "userDataConOrderCri" attribute is "APPLICABLE\_TIME\_WINDOW", the "ASCENDING" direction indicates that the list of User Data Congestion analytics are in chronological order and the "DESCENDING" direction indicates that the list of User Data Congestion analytics are in reverse chronological order.NOTE 12: The "AGG\_TRAFFIC\_RATE", "VAR\_TRAFFIC\_RATE", "VAR\_PACKET\_DELAY", "MAX\_PACKET\_LOSS\_RATE" and "VAR\_PACKET\_LOSS\_RATE" enumeration value(s) within the AnalyticsSubset data type is applicable only if the "DnPerformanceExt\_AIML” feature is supported.NOTE 13: When the "pduSesInfos" attribute is provided, the associated "appIds" attribute shall also be provided for the NWDAF to be able to compute the service experience per application.NOTE 14: If both "locArea" and "fineGranAreas" attributes are provided, the Area of Interest is interpreted as the intersection area indicated by these two attributes. |

### 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 to the event related to service experience supporting eNA, including support for DNN, S-NSSAI, Location Area, PDU Session parameters information for service experience analytics. 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. |
| 23 | UeCommunicationExt\_eNA | This feature indicates the support of the analytics event related to UE communication related to eNA. Supporting this feature also requires the support of feature Ue\_Communication. |
| 24 | Ue\_MobilityExt\_eNA | This feature indicates the support of the analytics event related to UE Mobility supporting eNA, including ordering criterion and preferred granularity of location. Supporting this feature also requires the support of feature Ue\_Mobility. |
| 25 | DnPerformanceExt\_AIML | This feature indicates support for extensions to the event related to DN Performance supporting AIML, including support of extended DN Performance Analytics for group of UEs. Supporting this feature also requires the support of feature DnPerformance. |
| 26 | 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. |
| 27 | NetworkPerformanceExt\_AIML | This feature indicates support of the network performance enhancements for AI/ML-based Services. Within this feature the following enhacements are covered:- support of providing gNB resource usage for GBR traffic and Delay-critical GBR traffic.Supporting this feature also requires the support of Network\_Performance feature. |
| 28 | EnhDataMgmt | Indicates the support of enhanced data management mechanisms. Supporting this feature also requires the support of feature EneNA. |
| 29 | E2eDataVolTransTime | This feature indicates support for E2E data volume transfer time analytics |
| 30 | ENAExt | This feature indicates support for the general enhancements of analytics exposure requirements, including support for use case context sent by the NF service consumer to the NEF. |
| 31 | NetworkPerfExt\_eNA | This feature indicates support for the enhancements of network performance. Within this feature the following enhacements are covered:- support of providing target period subset in the analytics.Supporting this feature also requires the support of Network\_Performance feature. |
| 32 | MovementBehaviour | This feature indicates support for the Movement Behaviour information. |
| 33 | AnalyticsAccuracy | This feature indicates support for the Analytics Accuracy information. |

\* \* \* \* Next change \* \* \* \*

A.4 AnalyticsExposure API

openapi: 3.0.0

info:

 title: 3gpp-analyticsexposure

 version: 1.2.0-alpha.4

 description: |

 API for Analytics Exposure.

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externalDocs:

 description: >

 3GPP TS 29.522 V18.3.0; 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

 dataVlTrnsTmIfs:

 type: array

 items:

 $ref: 'TS29520\_Nnwdaf\_EventsSubscription.yaml#/components/schemas/E2eDataVolTransTimeInfo'

 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

 movBehavInfos:

 type: array

 items:

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

 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'

 pauseInd:

 type: boolean

 description: >

 Pause analytics consumption indication. Set to "true" to indicate the consumer to stop

 the consumption of the analytics. Default value is "false" if omitted.

 resumeInd:

 type: boolean

 description: >

 Resume analytics consumption indication. Set to "true" to indicate the consumer to

 resume the consumption of the analytics. Default value is "false" if omitted.

 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'

 fineGranAreas:

 type: array

 items:

 $ref: 'TS29522\_AMPolicyAuthorization.yaml#/components/schemas/GeographicalArea'

 minItems: 1

 description: Indicates the fine granularity areas to which the subscription applies.

 temporalGranSize:

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

 spatialGranSizeTa:

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

 spatialGranSizeCell:

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

 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

 dataVlTrnsTmRqs:

 type: array

 items:

 $ref: 'TS29520\_Nnwdaf\_EventsSubscription.yaml#/components/schemas/E2eDataVolTransTimeReq'

 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

 dataVlTrnsTmReqs:

 type: array

 items:

 $ref: 'TS29520\_Nnwdaf\_EventsSubscription.yaml#/components/schemas/E2eDataVolTransTimeReq'

 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

 pduSesInfos:

 type: array

 items:

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

 minItems: 1

 ueCommReqs:

 type: array

 items:

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

 minItems: 1

 userDataConOrderCri:

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

 locGranularity:

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

 locOrientation:

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

 ueMobilityReqs:

 type: array

 items:

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

 minItems: 1

 movBehavReqs:

 type: array

 items:

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

 minItems: 1

 useCaseCxt:

 type: string

 description: >

 Indicates the context of usage of the analytics. The value and format of this parameter

 are not standardized.

 pauseFlg:

 type: boolean

 description: >

 Pause analytics consumption flag. Set to "true" to indicate the NWDAF to stop sending

 the notifications of analytics. Default value is "false" if omitted.

 resumeFlg:

 type: boolean

 description: >

 Resume analytics consumption flag. Set to "true" to indicate the NWDAF to resume sending

 the notifications of analytics. Default value is "false" if omitted.

 feedback:

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

 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'

 fineGranAreas:

 type: array

 items:

 $ref: 'TS29522\_AMPolicyAuthorization.yaml#/components/schemas/GeographicalArea'

 minItems: 1

 description: Indicates the fine granularity areas to which the request applies.

 temporalGranSize:

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

 spatialGranSizeTa:

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

 spatialGranSizeCell:

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

 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

 pduSesInfos:

 type: array

 items:

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

 minItems: 1

 ueCommReqs:

 type: array

 items:

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

 minItems: 1

 userDataConReq:

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

 locGranularity:

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

 locOrientation:

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

 ueMobilityReqs:

 type: array

 items:

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

 minItems: 1

 movBehavReqs:

 type: array

 items:

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

 minItems: 1

 useCaseCxt:

 type: string

 description: >

 Indicates the context of usage of the analytics. The value and format of this parameter

 are not standardized.

 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

 dataVlTrnsTmInfos:

 type: array

 items:

 $ref: 'TS29520\_Nnwdaf\_EventsSubscription.yaml#/components/schemas/E2eDataVolTransTimeInfo'

 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

 movBehavInfos:

 type: array

 items:

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

 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'

 anaPeriod:

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

 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'

 rscUsgReq:

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

 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'

 fineAreaInfos:

 type: array

 items:

 $ref: 'TS29522\_AMPolicyAuthorization.yaml#/components/schemas/GeographicalArea'

 minItems: 1

 description: This attribute contains the geographical locations in a fine granularity.

 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

 - E2E\_DATA\_VOL\_TRANS\_TIME

 - MOVEMENT\_BEHAVIOUR

 - 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.

 - E2E\_DATA\_VOL\_TRANS\_TIME: Indicates that the event subscribed is of E2E data volume

 transfer time.

 - MOVEMENT\_BEHAVIOUR: Indicates that the event subscribed is the Movement Behaviour

 information.

 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 \* \* \* \*