**3GPP TSG- Meeting #**

**, , -**

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

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Wrong conditions for AOI attributes | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia | | | | | | | | | |
| ***Source to TSG:*** | CT3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eNetAE19 | | | | |  | ***Date:*** | | | 2024-10-07 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-19 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | For the case of the "E2E\_DATA\_VOL\_TRANS\_TIME" event, the condition related to the AOI needs to be updated to reflect the data model, i.e. that only the "networkArea" attribute shall be used to indicate the AOI.  Further, the AOI-related conditions are not properly captured in the service operation descriptions either. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Specified that the AOI for the "E2E\_DATA\_VOL\_TRANS\_TIME" event can be expressed be providing the "networkArea" attribute.  Aligned also the service operation description to the presence conditions of the AOI-related attributes. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Inconsistent specification and possible interoperability issues. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.2.2.2.2, 4.3.2.2.2, 5.1.6.2.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 does not impact any OpenAPI file. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\*\*\* First Change \*\*\*

4.2.2.2.2 Subscription for event notifications

Figure 4.2.2.2.2-1 shows a scenario where the NF service consumer sends a request to the NWDAF to subscribe for event notification(s) (as shown in 3GPP TS 23.288 [17]).

****

**Figure 4.2.2.2.2-1: NF service consumer subscribes to notifications**

The NF service consumer shall invoke the Nnwdaf\_EventsSubscription\_Subscribe service operation to subscribe to event notification(s). The NF service consumer shall send an HTTP POST request with "{apiRoot}/nnwdaf-eventssubscription/<apiVersion>/subscriptions" as Resource URI representing the "NWDAF Events Subscriptions", as shown in figure 4.2.2.2.2-1, step 1, to create a subscription for an "Individual NWDAF Event Subscription" according to the information in message body. The NnwdafEventsSubscription data structure provided in the request body shall include:

- an URI where to receive the requested notifications as "notificationURI" attribute; and

- a description of the subscribed events as "eventSubscriptions" attribute that, for each event, the EventSubscription data type shall include:

1) an event identifier as "event" attribute; and

2) if the event notification method "PERIODIC" is selected via the "notificationMethod" attribute, repetition period as "repetitionPeriod" attribute;

and the EventSubscription data type may include the "extraReportReq" attribute with the following attributes:

1) maximum number of objects in the "maxObjectNbr" attribute;

2) maximum number of SUPIs expected for an analytics report in the "maxSupiNbr" attribute;

3) identification of time window to which the subscription applies via identification of date-time(s) in the "startTs" and "endTs" attributes;

4) preferred level of accuracy of the analytics in the "accuracy" attribute;

5) identification of time when analytics information is needed in the "timeAnaNeeded" atribute if the feature "EneNA" is supported;

6) indication of which analytics metadata is requested to be delivered with the notification in the "anaMeta" attribute if the feature "Aggregation" is supported;

7) requested values for analytics metadata information to be used for the generation of the analytics in the "anaMetaInd" attribute if the feature "Aggregation" is supported;

8) offset period to the periodic reporting in the "offsetPeriod" attribute if the feature "EneNA" is supported. It may be present if the "repPeriod" attribute within the "evtReq" attribute or the "repetitionPeriod" attribute within the EventSubscription data type is included;

9) preferred accuracy level per analytics subset in the "accPerSubset" attribute if the "listOfAnaSubsets" attribute is present and the "EneNA" feature is supported; and/or

10) the time period of historical analytics in the "histAnaTimePeriod" attribute, if the "EneNA" feature is supported.

The NnwdafEventsSubscription data structure provided in the request body may include:

- event reporting information as the "evtReq" attribute, which applies for each event and may contain the following attributes:

1) event notification method (periodic, one time, on event detection) in the "notifMethod" attribute;

2) maximum Number of Reports in the "maxReportNbr" attribute;

3) monitoring duration in the "monDur" attribute;

4) repetition period for periodic reporting in the "repPeriod" attribute;

5) immediate reporting indication in the "immRep" attribute;

6) percentage of sampling among impacted UEs in the "sampRatio" attribute;

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

8) group reporting guard time for aggregating the reports for a group of UEs in the "grpRepTime" attribute; and/or

9) a notification flag (used for muting and retrieving notifications) as "notifFlag" attribute if the "EneNA" feature is supported

NOTE 1: The notification method indicated as the "notifMethod" attribute and the periodic reporting time indicated as the "repPeriod" attributes within the event reporting information as the "evtReq" attribute provided in NnwdafEventsSubscription data type, if present, supersedes the event notification method as the "notificationMethod" attribute and repetition period as the "repetitionPeriod" attribute respectively in the EventSubscription data type.

EventSubscription data type.

- information of previous analytics subscription in the "prevSub" attribute if the "AnaCtxTransfer" feature is supported;

- the notification correlation identifier in the "notifCorrId" attribute, if the "EneNA" feature is supported; and/or

- analytics consumer information as "consNfInfo" attribute, if the "AnaSubTransfer" feature is supported;

NOTE 2: The "consNfInfo" attribute enables the NWDAF to determine whether an analytics subscription transfer procedure is applicable. Otherwise, if the "consNfInfo" attribute is not provided in a subscription and the NWDAF cannot serve anymore or transfer this subscription, the NWDAF can notify the analytics consumer with a Termination Request so that the analytics consumer can select a new target NWDAF.

For all the event types, the "eventSubscriptions" attribute may include:

- the analytics accuracy requirement information in "accuReq" attribute as indication to the NWDAF to activate checking the analytics accuracy information of the subscribed event, if the "AnalyticsAccuracy" feature is supported and the NF service consumer discovered or local configured the NWDAF containing an AnLF supporting accuracy checking capability.

- the pause analytics consumption flag in "pauseFlg" attribute if the "AnalyticsAccuracy" feature is supported.

- the resume analytics consumption flag in "resumeFlg" attribute if the "AnalyticsAccuracy" feature is supported.

- use case context as "useCaseCxt" attribute, if the "ENAExt" feature is supported.

NOTE 3: The NWDAF can use the parameter "Use case context" to select the most relevant ML model, when several ML models are available for the requested Analytics ID(s). The NWDAF containing AnLF can additionally provide the parameter "Use case context" when requesting an ML model from an NWDAF containing MTLF. The values of this parameter are not standardized.

NOTE 4: The subscription for analytics accuracy information independently from subscription of the analytics event output is not supported in this release.

- information related to roaming within the "roamingInfo" attribute if the "RoamingAnalytics" feature is supported;

For different event types, the "eventSubscriptions" attribute:

- if the event is "SLICE\_LOAD\_LEVEL", shall provide:

1) network slice level load level threshold in the "loadLevelThreshold" attribute if the "notifMethod" attribute in "evtReq" attribute is set to "ON\_EVENT\_DETECTION" or the "notificationMethod" attribute in "eventSubscriptions" attribute is set to "THRESHOLD" or omitted; and

2) identification of network slice(s) to which the subscription applies via identification of network slice(s) in the "snssais" attribute or any slices indication in the "anySlice" attribute;

- if the feature "NsiLoad" is supported and the event is "NSI\_LOAD\_LEVEL", shall provide:

1) identification of network slice and the optionally associated network slice instance(s) if available, via the "nsiIdInfos" attribute or any slices indication in the "anySlice" attribute; and

NOTE 5: The network slice instance of a PDU session is not available in the PCF.

2) the network slice or network slice instance load level thresholds in the "nsiLevelThrds" attribute if the "notifMethod" attribute in "evtReq" attribute is set to "ON\_EVENT\_DETECTION" or the "notificationMethod" attribute in "eventSubscriptions" attribute is set to "THRESHOLD" or omitted;

and may include:

1) a list of analytics subsets carried by "listOfAnaSubsets" attribute with value(s) only applicable to "NSI\_LOAD\_LEVEL" event, if the "EneNA" feature is supported;

2) identification of network area to which the subscription applies via identification of network area(s) by "networkArea" attribute, if the "NsiLoadExt" feature is supported;

3) a matching direction in the "matchingDir" attribute if the "nsiLevelThrds" attribute is provided and the "NsiLoadExt" feature is supported; and/or

4) list of NF instance types in the "nfTypes" attribute, if the "NsiLoadExt" feature is supported.

- if the feature "NfLoad" is supported and the event is "NF\_LOAD", shall provide:

1) identification of target UE(s) to which the subscription applies by "supis" or "anyUe" attribute set to "true" in the "tgtUe" attribute; and

NOTE 6: Only NF instances of type AMF and SMF which are serving the UE can be determined using a SUPI in "supis" attribute.

NOTE 7: If a list of the NF Instance IDs (or respectively of NF Set IDs) is provided, the NWDAF needs to provide the analytics for each designated NF instance (or respectively for each NF instance belonging to each designated NF Set). In such case the target UE(s) of the Analytics Reporting need be ignored.

2) NF load level thresholds in the "nfLoadLvlThds" attribute if the "notifMethod" attribute in "evtReq" attribute is set to "ON\_EVENT\_DETECTION" or the "notificationMethod" attribute in "eventSubscriptions" attribute is set to "THRESHOLD" or omitted;

and may include:

1) either list of NF instance IDs in the "nfInstanceIds" attribute or list of NF set IDs in the "nfSetIds" attribute if the identification of target UE(s) applies to all UEs;

2) list of NF instance types in the "nfTypes" attribute;

3) identification of network slice(s) by "snssais" attribute;

4) a matching direction in the "matchingDir" attribute if the "nfLoadLvlThds" attribute is provided;

5) optional area of interest by "networkArea" attribute, if the "NfLoadExt" feature is supported; and/or

6) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to NF\_LOAD event, if the "EneNA" feature is supported;

- if the feature "NetworkPerformance" is supported and the event is "NETWORK\_PERFORMANCE", it shall provide:

1) identification of target UE(s) to which the subscription applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" in the "tgtUe" attribute; and

2) the network performance requirements via "nwPerfRequs" attribute;

and may provide:

1) identification of network area to which the subscription applies via identification of network area(s) by "networkArea" attribute (mandatory if "anyUe" attribute is set to true);

2) a matching direction in the "matchingDir" attribute if the "nwPerfRequs" attribute is provided;

3) the spatial granularity size of TA in the "spatialGranSizeTa" attribute if the "NetworkPerformanceExt\_eNA" feature is supported;

4) the spatial granularity size of cell in the "spatialGranSizeCell" attribute if the "NetworkPerformanceExt\_eNA" feature is supported; and/or

5) the temporal granularity size in the "temporalGranSize" attribute if the "NetworkPerformanceExt\_eNA" feature is supported.

- if the feature "ServiceExperience" is supported and the event is "SERVICE\_EXPERIENCE", shall provide:

1) identification of target UE(s) to which the subscription applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" in the "tgtUe" attribute; and

2) any slices indication in the "anySlice" attribute or identification of network slice(s) together with the optionally associated network slice instance(s) if available, via the "nsiIdInfos" attribute;

NOTE 8: The network slice instance of a PDU session is not available in the PCF.

and may provide:

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

2) identification of network area to which the subscription applies via identification of network area(s) by "networkArea" attribute and/or, if the ServiceExperienceExt2\_eNA feature is supported, "fineGranAreas" attribute. If the "anyUe" attribute is set to "true", then the identification of the network area to which the subscription applies is required (see also clause 5.1.6.2.3);

3) identification of DNN to which the subscription applies via identification of application(s) by "dnns" attribute;

4) identification of user plane access to DN(s) which the subscription applies as the "dnais" attribute;

5) identification of a user plane access to one or more DN(s) where applications are deployed by "dnais" attribute;

6) if "appIds" attribute is provided, the bandwidth requirement of each application by "bwRequs" attribute;

7) indication of all the RAT types and/or all the frequencies that the NWDAF received for the application or specific RAT type(s) and/or frequency(ies) and the service experience threshold value(s) for the RAT Type(s) and/or Frequency value(s) where the UE camps on by "ratFreqs" attribute if the feature "ServiceExperienceExt" is also supported;

8) a list of analytics subsets carried by "listOfAnaSubsets" attribute with value(s) only applicable to "SERVICE\_EXPERIENCE" event, if the "EneNA" feature is supported;

9) the identification of the UPF as the "upfInfo" attribute if the feature "ServiceExperienceExt" is also supported;

10) IP address(s)/FQDN(s) of the Application Server(s) as the "appServerAddrs" attribute if the feature "ServiceExperienceExt" is also supported;

11) combination of PDU Session parameters as the "pduSesInfos" attribute if the feature "ServiceExperienceExt2\_eNA" is also supported; and/or

12) preferred granularity of location information as the "locGranularity" attribute if the feature "ServiceExperienceExt2\_eNA" is supported; and/or

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

1) identification of target UE(s) to which the subscription applies by "supis" or "intGroupIds" attribute in the "tgtUe" attribute;

NOTE 9: For LADN service, the consumer (e.g. SMF) provides the LADN DNN to refer the LADN service area as the AOI.

and may provide:

1) identification of network area to which the subscription applies via identification of network area(s) by "networkArea" attribute and/or, if the "UeMobilityExt2\_eNA" feature is supported, the "fineGranAreas" attribute;

2) preferred granularity of location information as the "locGranularity" attribute if the feature "UeMobilityExt2\_eNA" is supported.

3) identification of the preferred orientation of location information by " locOrientation" attribute if the feature "UeMobilityExt2\_eNA" is supported.

4) if the feature "UeMobilityExt" is supported,

i) identification of LADN DNN in the "ladnDnns" attribute;

ii) Visited Area(s) of Interest as the "visitedAreas" attirbute;

5) other UE mobility analytics requirements in "ueMobilityReqs" attribute, which may include ordering criterion and ordering direction, if the "UeMobilityExt2\_eNA" feature is supported;

6) an optional list of analytics subsets carried by "listOfAnaSubsets" attribute with value(s) only applicable to "UE\_MOBILITY" event, if the "UeMobilityExt2\_eNA" and "EneNA" features are supported;

7) the spatial granularity size of TA in the "spatialGranSizeTa" attribute if the "UeMobilityExt2\_eNA" feature is supported;

8) the spatial granularity size of cell in the "spatialGranSizeCell" attribute if the "UeMobilityExt2\_eNA" feature is supported;

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

1) identification of target UE(s) to which the subscription applies by "supis" or "intGroupIds" attribute in the "tgtUe" attribute;

and may include:

1) identification of the application in the "appIds" attribute;

2) identification of network area to which the subscription applies via identification of network area(s) by "networkArea" attribute;

3) an identification of DNN in the "dnns" attribute;

4) identification of network slice in the "snssais" attribute;

5) a list of analytics subsets carried by "listOfAnaSubsets" attribute with value(s) only applicable to "UE\_COMM" event, if the "EneNA" feature is supported;

6) other UE communication analytics requirements in "ueCommReqs" attribute, which may include ordering criterion and ordering direction, if the "EnUeCommunication" feature is supported;

7) the spatial granularity size of TA in the "spatialGranSizeTa" attribute if the "UeCommunicationExt\_eNA" feature is supported;

8) the spatial granularity size of cell in the "spatialGranSizeCell" attribute if the "UeCommunicationExt\_eNA" feature is supported.

- if the feature "QoSSustainability" is supported and the event is "QOS\_SUSTAINABILITY", shall provide:

1) identification of network area to which the subscription applies via the "networkArea" attribute and/or, if the "QoSSustainabilityExt\_eNA" feature is supported, the "fineGranAreas" attribute;

2) the QoS requirements via "qosRequ" attribute;

3) QoS flow retainability threshold(s) by the "qosFlowRetThds" attribute for the 5QI of GBR resource type or RAN UE throughout threshold(s) by the "ranUeThrouThds" attribute for the 5QI of non-GBR resource type, if the "notifMethod" attribute in "evtReq" attribute is set to "ON\_EVENT\_DETECTION" or the "notificationMethod" attribute in "eventSubscriptions" attribute is set to "THRESHOLD" or omitted; and

4) identification of target UE(s) to which the subscription applies by "anyUe" attribute set to "true" in the "tgtUe" attribute;

and may include:

1) identification of network slice(s) by "snssais" attribute;

2) a matching direction in the "matchingDir" attribute if the "qosFlowRetThds" attribute or the "ranUeThrouThds" attribute is provided;

3) acceptable deviations from the threshold levels in the "deviations" attribute, if the "EnQoSSustainability" feature is supported;

4) the spatial granularity size of TA in the "spatialGranSizeTa" attribute if the "QoSSustainabilityExt\_eNA" feature is supported;

5) the spatial granularity size of cell in the "spatialGranSizeCell" attribute if the "QoSSustainabilityExt\_eNA" feature is supported;

6) the temporal granularity size in the "temporalGranSize" attribute if the "QoSSustainabilityExt\_eNA" feature is supported; and/or

- if the feature "AbnormalBehaviour" is supported and the event is "ABNORMAL\_BEHAVIOUR", shall provide:

1) identification of target UE(s) to which the subscription applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" in the "tgtUe" attribute; and

2) either the expected analytics type via "exptAnaType" attribute or a list of exception Ids with the associated thresholds via "excepRequs" attribute. If the expected analytics type via "exptAnaType" attribute is provided, the NWDAF shall derive the corresponding Exception Ids from the received expected analytics type as follows:

a) if "exptAnaType" attribute sets to "MOBILITY", the corresponding list of Exception Ids are "UNEXPECTED\_UE\_LOCATION", "PING\_PONG\_ACROSS\_CELLS", "UNEXPECTED\_WAKEUP" and "UNEXPECTED\_RADIO\_LINK\_FAILURES";

b) if "exptAnaType" attribute sets to "COMMUN", the corresponding list of Exception Ids are "UNEXPECTED\_LONG\_LIVE\_FLOW", "UNEXPECTED\_LARGE\_RATE\_FLOW", "SUSPICION\_OF\_DDOS\_ATTACK", "WRONG\_DESTINATION\_ADDRESS" and "TOO\_FREQUENT\_SERVICE\_ACCESS"; and

c) if "exptAnaType" attribute sets to "MOBILITY\_AND\_COMMUN", the corresponding list of Exception Ids includes all above derived exception Ids.

The derived list of Exception Ids is used by the NWDAF to notify the NF service consumer when UE's behaviour is exceptional based on one or more Exception Ids within the list.

If the "anyUe" attribute in the "tgtUe" attribute sets to "true":

a) 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;

b) if the expected analytics type via the"exptAnaType" attribute or the list of Exception Ids via "excepRequs" attribute is mobility related, at least one of identification of network area(s) by "networkArea" attribute and identification of network slice(s) by "snssais" attribute should be provided; and

c) if the expected analytics type via the"exptAnaType" attribute or the list of Exception Ids via "excepRequs" attribute is communication related, at least one of identification of network area(s) by "networkArea" attribute, identification of application(s) by "appIds" attribute, identification of DNN(s) in the "dnns" attribute and identification of network slice(s) by "snssais" attribute should be provided;

and may provide:

1) expected UE behaviour via "exptUeBehav" attribute.

- if the feature "UserDataCongestion" is supported and the event is "USER\_DATA\_CONGESTION", shall provide:

1) identification of target UE(s) to which the subscription applies by "supis", "gpsis" (if feature "UserDataCongestionExt" is supported) or "anyUe" attribute set to "true";

and may include:

1) congestion threshold by the "congThresholds" attribute if the "notifMethod" attribute in "evtReq" attribute is set to "ON\_EVENT\_DETECTION" or the "notificationMethod" attribute in "eventSubscriptions" attribute is set to "THRESHOLD" or omitted;

2) identification of network area to which the subscription applies via identification of network area(s) by "networkArea" attribute (mandatory if "anyUe" attribute is set to true);

3) identification of network slice(s) by "snssais" attribute;

4) a matching direction in the "matchingDir" attribute if the "congThresholds" attribute is provided;

5) if the feature "UserDataCongestionExt" is also supported, request a list of top applications with maximum number that contribute the most to the traffic in uplink and/or downlink directions by the "maxTopAppUlNbr" attribute and/or the "maxTopAppDlNbr" attribute;

6) a list of analytics subsets carried by "listOfAnaSubsets" attribute with value(s) only applicable to "USER\_DATA\_CONGESTION" event, if the "EneNA" feature is supported; and/or

7) the ordering criterion for the list of User Data Congestion analytics in "userDataConOrderCri" attribute, if the "UserDataCongestionExt2\_eNA" feature is supported;

8) the temporal granularity size in the "temporalGranSize" attribute if the "UserDataCongestionExt2\_eNA" feature is supported.

- if the feature "Dispersion" is supported and the event is "DISPERSION", shall provide:

1) identification of target UE(s) to which the subscription applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" in the "tgtUe" attribute, "anyUe" attribute set to "true" is only supported in combination with "snssais" attribute, "networkArea" attribute and/or "disperClass" attribute;

and may include:

1) identification of network area to which the subscription applies via identification of network area by "networkArea" attribute, if the "supis" attribute or "intGroupIds" attribute is included in the "tgtUe" attribute;

2) identification of network slice(s) by "snssais" attribute;

3) application identifier(s) in "appIds" attribute;

4) dispersion analytics requirements in "disperReqs" attribute, which for the requested dispersion type may include dispersion class, preferred ordering requirements;

5) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to DISPERSION event, if the "EneNA" feature is supported; and/or

6) preferred granularity of location information as the "locGranularity" attribute if the feature "DispersionExt\_eNA" is supported;

7) the spatial granularity size of TA in the "spatialGranSizeTa" attribute if the "DispersionExt\_eNA" feature is supported;

8) the spatial granularity size of cell in the "spatialGranSizeCell" attribute if the "DispersionExt\_eNA" feature is supported; and/or

9) the temporal granularity size in the "temporalGranSize" attribute if the "DispersionExt\_eNA" feature is supported.

- if the feature "RedundantTransmissionExp" is supported and the event is "RED\_TRANS\_EXP", shall provide:

1) identification of target UE(s) to which the subscription applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" in the "tgtUe" attribute;

- and may include:

1) identification of network area to which the subscription applies via identification of network area by "networkArea" attribute;

2) identification of network slice(s) by "snssais" attribute;

3) identification of DNN in the "dnns" attribute;

4) other redundant transmission experience analysis requirements in "redTransReqs" attribute, which may include preferred order of results for the list of Redundant Transmission Experience; and/or

5) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to RED\_TRANS\_EXP event, if the "EneNA" feature is supported;

6) the temporal granularity size in the "temporalGranSize" attribute if the "RedundantTransExpExt\_eNA" feature is supported.

- if the feature "WlanPerformance" is supported and the event is "WLAN\_PERFORMANCE", shall provide:

1) identification of target UE(s) to which the subscription applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" in the "tgtUe" attribute. If "anyUe" attribute set to "true" is included in the "tgtUe" attribute, then any of "networkArea" attribute, "ssIds" or "bssIds" attribute within "wlanReqs" attribute shall be present;

and may include:

1) identification of network area to which the subscription applies via identification of network area by "networkArea" attribute;

2) other WLAN performance analytics requirements in "wlanReqs" attribute, which may include SSID(s), BSSID(s), preferred order of results for the list of WLAN performance information and/or accuracy per analytics subset; and/or

3) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to WLAN\_PERFORMANCE event, if the "EneNA" feature is supported;

4) the temporal granularity size in the "temporalGranSize" attribute if the "WlanPerfExt\_eNA" feature is supported.

- if the feature "DnPerformance" is supported and the event is "DN\_PERFORMANCE", shall provide:

1) identification of target UE(s) to which the subscription applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" in the "tgtUe" attribute;

and may include:

1) identification of network area to which the subscription applies via identification of network area by "networkArea" attribute;

2) identification of network slice(s) in the "snssais" attribute;

3) identification of network slice and the optionally associated network slice instance(s) if available, via the "nsiIdInfos" attribute or any slices indication in the "anySlice" attribute;

4) application identifier(s) in "appIds" attribute;

5) an identification of DNN in the "dnns" attribute;

6) identification of a user plane access to one or more DN(s) where applications are deployed by "dnais" attribute;

7) the identification of the UPF as the "upfInfo" attribute;

8) IP address(s)/FQDN(s) of the Application Server(s) as the "appServerAddrs" attribute;

9) other DN performance analytics requirements in "dnPerfReqs" attribute, which may include the preferred order of results for the list of DN performance information and/or the reporting threshold of each applicable analytics subset; and/or

10) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to "DN\_PERFORMANCE" event, if the "EneNA" feature is supported and may include the attribute with value(s) only applicable to "DN\_PERFORMANCE" event and the "DnPerformanceExt\_AIML" feature if supported;

11) the spatial granularity size of TA in the "spatialGranSizeTa" attribute if the "DnPerformanceExt\_eNA" feature is supported;

12) the spatial granularity size of cell in the "spatialGranSizeCell" attribute if the "DnPerformanceExt\_eNA" feature is supported; and/or

13) the temporal granularity size in the "temporalGranSize" attribute if the "DnPerformanceExt\_eNA" feature is supported.

- if the feature "SMCCE" is supported and the event is "SM\_CONGESTION", shall provide:

1) an identification of DNN in the "dnns" attribute;

2) identification of network slice in the "snssais" attribute; and/or

3) identification of target UE(s) via "supis" attribute in the "tgtUe" attribute where the target UE(s) are one have the PDU Session for the DNN and/or S-NSSAI;

and may include:

1) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to "SM\_CONGESTION" event, if the "EneNA" feature is supported.

NOTE 10: The predictions are not applicable for Session Management Congestion Control Experience analytics.

- if the feature "PfdDetermination" is supported and the event is "PFD\_DETERMINATION", it shall provide:

1) a list of application identifier(s) in the "appIds" attribute.

and may provide:

1) identification of DNN in the "dnns" attribute; and/or

2) identification of network slice in the "snssais" attribute.

NOTE 11: PFD Determination analytics do not have a target UE, they are always for any UE. The predictions are not applicable for PFD Determination analytics.

- if the feature "E2eDataVolTransTime" is supported and the event is "E2E\_DATA\_VOL\_TRANS\_TIME", shall provide:

1) identification of target UE(s) to which the subscription applies by "supis" or "gpsis" attribute in the "tgtUe" attribute;

2) area of interest of the UEs by "networkArea" attribute; restricts the scope of the E2E data volume transfer time analytics to the provided area.

and may include:

1) an identification of DNN in the "dnns" attribute;

2) identification of network slice in the "snssais" attribute;

3) application identifier(s) in "appIds" attribute;

4) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to "E2E\_DATA\_VOL\_TRANS\_TIME" event, if the "EneNA" feature is supported;

5) the QoS requirements via "qosRequ" attribute; and/or

6) E2E data volume transfer time requirements in the "dataVlTrnsTmRqs" attribute;

- if the feature "PduSesTraffic" is supported and the event is "PDU\_SESSION\_TRAFFIC", shall provide:

1) identification of target UE(s) to which the subscription applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" in the "tgtUe" attribute;

2) PDU Session traffic analytics requirements in "pduSesTrafReqs" attribute, which includes the known Application Identifier, IP Descriptions or Domain Descriptors; and

3) DNN and/or S-NSSAI for the PDU Session(s) in the "dnns" and/or "snssais" attributes.

and may include:

1) identification of network area to which the subscription applies by "networkArea" attribute and/or

2) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to "PDU\_SESSION\_TRAFFIC" event, if the "EneNA" features is supported.

NOTE 12: The predictions are not applicable for PDU Session traffic analytics.

- if the feature "MovementBehaviour" is supported and the event is "MOVEMENT\_BEHAVIOUR", shall provide:

1) identification of network area to which the subscription applies to restricts the scope of the movement behaviour analytics to the provided area by the "networkArea" attribute and/or the "fineGranAreas" attribute;

- and may include:

1) identification of the preferred orientation of location information by the "locOrientation" attribute;

2) Movement Behaviour analytics requirements in the "movBehavReqs" attribute, which includes preferred granularity of location information or preferred orientation of location information; and/or

3) an optional list of analytics subsets by the "listOfAnaSubsets" attribute with value(s) only applicable to the "MOVEMENT\_BEHAVIOUR" event, if the "EneNA" features is supported.

- if the feature "LocAccuracy" is supported and the event is "LOC\_ACCURACY", it shall provide:

1) either a network area to which the subscription applies within the "networkArea" attribute or an exact location to which the subscription applies within the "location" attribute;

- and may include:

1) Location accuracy analytics requirements within the "locAccReqs" attribute; and/or

2) an optional list of analytics subsets within the "listOfAnaSubsets" attribute with value(s) only applicable to the "LOC\_ACCURACY" event, if the "EneNA" features is supported.

NOTE 13: Location accuracy analytics do not have a target UE, they are always for any UE.

- if the feature "RelativeProximity" is supported and the event is " RELATIVE\_PROXIMITY", shall provide:

1) identification of target UE(s) to which the subscription applies by "supis" or "intGroupIds" attribute in the "tgtUe" attribute;

- and may include:

1) identification of DNN in the "dnns" attribute;

2) identification of network slice in the "snssais" attribute;

3) identification of network area to which the subscription applies by "networkArea" attribute;

4) Relative Proximity analytics requirements in "relProxReqs" attribute; and/or

5) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to "RELATIVE\_PROXIMITY" event prediction, if the "EneNA" features is supported.

Upon the reception of an HTTP POST request with: "{apiRoot}/nnwdaf-eventssubscription/<apiVersion>/subscriptions" as Resource URI and NnwdafEventsSubscription data structure as request body, if no errors occur, the NWDAF shall:

- create a new subscription;

- assign an event subscriptionId; and

- store the subscription.

If the NWDAF created an "Individual NWDAF Event Subscription" resource, the NWDAF shall respond with "201 Created" status code with the message body containing a representation of the created subscription, as shown in figure 4.2.2.2.2-1, step 2. If not all the requested analytics events in the subscription are accepted, then the NWDAF may include the "failEventReports" attribute indicating the event(s) for which the subscription failed and the associated reason(s). The NWDAF shall include a Location HTTP header field. The Location header field shall contain the URI of the created subscription i.e. "{apiRoot}/nnwdaf-eventssubscription/<apiVersion>/subscriptions/{subscriptionId}". If the immediate reporting indication in the "immRep" attribute within the "evtReq" attribute sets to true in the event subscription, the NWDAF shall include the reports of the events subscribed, if available, in the HTTP POST response.

When the "notifFlag" attribute is included and set to "DEACTIVATE" in the request, the NWDAF shall mute the event notification and store the available events until the NF service consumer requests to retrieve them by setting the "notifFlag" attribute to "RETRIEVAL" or until a muting exception occurs (e.g. full buffer).

If the analytics target period provided in the body of the HTTP POST request includes the start time in the past and the end time in the future, the NWDAF shall reject the request with an HTTP "400 Bad Request" response including the "cause" attribute set to "BOTH\_STAT\_PRED\_NOT\_ALLOWED".

When the "PredictionError" feature is supported, if the analytics target period provided in the body of the HTTP POST request includes the prediction time period in the future and the event is "SM\_CONGESTION", "PFD\_DETERMINATION" and/or "PDU\_SESSION\_TRAFFIC", the NWDAF shall reject the request with an HTTP "400 Bad Request" response including the "cause" attribute set to "PREDICTION\_NOT\_ALLOWED".

If the statistics in the past are requested but the necessary data to perform the service is unavailable, the NWDAF shall reject the request with an HTTP "500 Internal Server Error" response including the "cause" attribute set to "UNAVAILABLE\_DATA".

If the user consent has not been checked by the NF service consumer and is required for the requested analytics collection depending on local policy and regulations, then the NWDAF shall check user consent for the targeted UE(s) based on the user consent subscription data that is retrieved via the Nudm\_SDM service API of the UDM as described in clause 5.2.2.24 and clause 6.1.3.32 of 3GPP TS 29.503 [23]. If the user consent subscription data retrieved from the UDM indicate that the user consent is not granted for the impacted user(s), then the NWDAF shall send an HTTP "403 Forbidden" error response including the "cause" attribute set to "USER\_CONSENT\_NOT\_GRANTED".

NOTE 14: When the target of reporting is a SUPI or a GPSI then the subscription can be rejected, e.g. because user consent is not granted, and the error is sent to the consumer. When the target of reporting is an Internal Group Id, or a list of SUPIs/GPSI(s) or any UE, and the user consent is not granted for a subset of the impacted users, then no error is sent, but a subset of the SUPIs/GPSIs is skipped if user consent is not granted.

Otherwise, if the user consent subscription data retrieved from the UDM indicate that the user consent is granted for the impacted user(s), the NWDAF shall subscribe to notification of changes of the user consent (unless it is already subscribed) by invoking the Nudm\_SDM\_Subscribe service operation by sending an HTTP POST request targeting the resource "SdmSubscriptions" to the UDM as described in clause 5.2.2.3 of 3GPP TS 29.503 [23].

If the RoamingAnalytics feature is supported and the NWDAF determines based on operator configuration and the requested analytics that analytics or input data from the VPLMN are required, and the NWDAF does not support roaming exchange and it cannot forward the request to another NWDAF, then the NWDAF shall reject the request with an HTTP "403 Forbidden" response including the "cause" attribute set to "NO\_ROAMING\_SUPPORT".

If an error occurs when processing the HTTP POST request, the NWDAF shall send an HTTP error response as specified in clause 5.1.7.

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

4.3.2.2.2 Request and get from NWDAF Analytics information

Figure 4.3.2.2.2-1 shows a scenario where the NF service consumer (e.g. PCF) sends a request to the NWDAF to request and get from the NWDAF analytics information (as shown in 3GPP TS 23.288 [17]).

****

**Figure 4.3.2.2.2-1: Requesting a NWDAF Analytics information**

The NF service consumer (e.g. PCF) shall invoke the Nnwdaf\_AnalyticsInfo\_Request service operation when requesting the NWDAF analytics information. The NF service consumer shall send an HTTP GET request on the resource URI "{apiRoot}/nnwdaf-analyticsinfo/<apiVersion>/analytics" representing the "NWDAF Analytics" (as shown in figure 4.3.2.2.2-1, step 1), to request analytics data according to the query parameter value of the "event-id" attribute. In addition, the following information may be provided:

- common reporting requirement in the "ana-req" attribute as follows:

1) identification of time window for the requested analytics data applies via identification of date-time(s) in the "startTs" and "endTs" attributes;

2) preferred level of accuracy of the analytics in "accuracy" attribute;

3) percentage of sampling among impacted UEs in the "sampRatio" attribute;

4) maximum number of objects in the "maxObjectNbr" attribute;

5) maximum number of SUPIs expected for an analytics report in the "maxSupiNbr" attribute;

6) identification of time when analytics information is needed in the "timeAnaNeeded" attribute if the feature "EneNA" is supported;

7) indication of which analytics metadata is requested to be delivered with the response in the "anaMeta" attribute if the feature "Aggregation" is supported;

8) requested values for the analytics metadata information to be used for the generation of the analytics in the "anaMetaInd" attribute if the feature "Aggregation" is supported;

9) preferred accuracy level per analytics subset in the "accPerSubset" attribute if the "listOfAnaSubsets" attribute is present and the EneNA feature is supported; and/or

10) the time period of historical analytics in the "histAnaTimePeriod" attribute if the "EneNA" feature is supported;

NOTE 1: The NWDAF can use the use case context to select the most relevant ML model, when several ML models are available for the requested Analytics ID(s). The NWDAF containing AnLF can additionally provide the use case context when requesting an ML model from an NWDAF containing MTLF. The values of this parameter are not standardized.

For all the event types, the "event-filter" attribute may include:

- the analytics accuracy requirement information in "accuReq" attribute as indication to the NWDAF to activate checking the analytics accuracy information of the requested event, if the "AnalyticsAccuracy" feature is supported and the NF service consumer discovered or local configured the NWDAF containing an AnLF supporting the accuracy checking capability.

- use case context as "useCaseCxt" attribute, if the "ENAExt" feature is supported.

- information related to roaming within the "roamingInfo" attribute if the "RoamingAnalytics" feature is supported;

NOTE 2: The request for analytics accuracy information independently from request of the analytics event output is not supported in this release.

For different event types:

- if the event is "LOAD\_LEVEL\_INFORMATION", it shall provide the event specific filter information within "event-filter" attribute including identification(s) of the network slice via:

1) identification of network slice(s) in the "snssais" attribute; or

2) any slices indication in the "anySlice" attribute;

- if the feature "NsiLoad" is supported and the event is "NSI\_LOAD\_LEVEL", it shall provide the event specific filter information within "event-filter" attribute including identification(s) of the network slice via:

1) identification of network slice(s) and the optionally associated instance(s) if available, in the "nsiIdInfos" attribute; or

NOTE 3: The network slice instance of a PDU session is not available in the PCF.

2) any slices indication in the "anySlice" attribute;

and may include:

1) a list of analytics subsets carried by "listOfAnaSubsets" attribute with value(s) only applicable to "NSI\_LOAD\_LEVEL" event, if the "EneNA" feature is supported;

2) event specific filter information in the "event-filter" attribute:

a) list of NF instance types in the "nfTypes" attribute, if the "NsiLoadExt" feature is supported; and/or

b) identification of network area to which the request applies via identification of network area by "networkArea" attribute, if the "NsiLoadExt" feature is supported.

- if the feature "NfLoad" is supported and the event is "NF\_LOAD", it shall provide:

1) identification of target UE(s) to which the request applies by "supis" or "anyUe" attribute set to "true" in the "tgt-ue" attribute; and

NOTE 4: Only NF instances of type AMF and SMF which are serving the UE can be determined using a SUPI in "supis" attribute.

NOTE 5: If a list of the NF Instance IDs (or respectively of NF Set IDs) is provided, the NWDAF needs to provide the analytics for each designated NF instance (or respectively for each NF instance belonging to each designated NF Set). In such case the target UE(s) of the Analytics Reporting need be ignored.

- the "event-filter" attribute may provide:

a) either list of NF instance IDs in the "nfInstanceIds" attribute or list of NF set IDs in the "nfSetIds" attribute if the identification of target UE(s) applies to all UEs;

b) list of NF instance types in the "nfTypes" attribute;

c) identification of network slice(s) in the "snssais" attribute;

d) optional area of interest by "networkArea" attribute; and/or

e) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to NF\_LOAD event, if the "EneNA" feature is supported;

- if the feature "UeMobility" is supported and the event is "UE\_MOBILITY", it shall provide:

1) identification of target UE(s) to which the request applies by "supis" or "intGroupIds" attribute in the "tgt-ue" attribute;

and may include:

a) identification of network area to which the request applies via the "networkArea" attribute and/or, if the "UeMobilityExt2\_eNA" feature is supported, the "fineGranAreas" attribute;

b) if the feature "UeMobilityExt" is supported,

i) identification of LADN DNN in the "ladnDnns" attribute;

ii) visited Area(s) of Interest as the "visitedAreas" attirbute;

c) other UE mobility requirements in "ueMobilityReqs" attribute, if the "UeMobilityExt2\_eNA" feature is supported;

d) preferred granularity of location information as the "locGranularity" attribute if the feature "UeMobilityExt2\_eNA" is also supported;

e) identification of the preferred orientation of location information by " locOrientation" attribute if the feature "UeMobilityExt2\_eNA" is supported

f) a list of analytics subsets carried by "listOfAnaSubsets" attribute with value(s) only applicable to "UE\_MOBILITY" event, if the "UeMobilityExt2\_eNA" and "EneNA" features are supported;

g) the spatial granularity size of TA in the "spatialGranSizeTa" attribute if the "UeMobilityExt2\_eNA" feature is supported;

h) the spatial granularity size of cell in the "spatialGranSizeCell" attribute if the "UeMobilityExt2\_eNA" feature is supported;

i) the temporal granularity size in the "temporalGranSize" attribute if the "UeMobilityExt2\_eNA" feature is supported; and/or

NOTE 6: For LADN service, the consumer (e.g. SMF) provides the LADN DNN to refer the LADN service area as the AOI.

- if the feature "UeCommunication" is supported and the event is "UE\_COMM", it shall provide:

1) identification of target UE(s) to which the request applies by "supis" or "intGroupIds" attribute in the "tgt-ue" attribute;

and may include:

1) event specific filter information in the "event-filter" attribute:

a) identification of the application as "appIds" attribute;

b) identification of network area to which the request applies via identification of network area by "networkArea" attribute;

c) identification of DNN in the "dnns" attribute;

d) identification of network slice(s) in the "snssais" attribute;

e) a list of analytics subsets carried by "listOfAnaSubsets" attribute with value(s) only applicable to "UE\_COMM" event, if the "EneNA" feature is supported;

f) other UE communication requirements in "ueCommReqs" attribute, if the "UeCommunicationExt\_eNA" feature is supported; and/or

g) the spatial granularity size of TA in the "spatialGranSizeTa" attribute if the "UeCommunicationExt\_eNA" feature is supported.

h) the spatial granularity size of cell in the "spatialGranSizeCell" attribute if the "UeCommunicationExt\_eNA" feature is supported.

- if the feature "NetworkPerformance" is supported and the event is "NETWORK\_PERFORMANCE", it shall provide:

1) identification of target UE(s) to which the request applies by "supis", "intGroupIds" or "anyUe" attribute set to "true"in the "tgt-ue" attribute;

2) event specific filter information in the "event-filter" attribute which shall provide:

a) the network performance types via "nwPerfTypes" attribute;

b) the network performance requirements via "nwPerfReqs" attribute, if the feature "NetworkPerformanceExt\_eNA" is supported;

the "event-filter" attribute may provide:

a) identification of network area to which the request applies via identification of network area(s) by "networkArea" attribute (mandatory if "anyUe" attribute is set to true);

b) for each network performance type identified by "nwPerfTypes" attribute, the additional requirement by "addNwPerfReqs" attribute if the "NetworkPerformanceExt\_AIML" feature is supported; and/or

c) the spatial granularity size of TA in the "spatialGranSizeTa" attribute if the "DnPerfExt\_eNA" feature is supported;

d) the spatial granularity size of TA in the "spatialGranSizeCell" attribute if the "DnPerfExt\_eNA" feature is supported; and/or

e) the temporal granularity size of cell in the "temporalGranSize" attribute if the "DnPerfExt\_eNA" feature is supported.- if the feature "ServiceExperience" is supported and the event is "SERVICE\_EXPERIENCE", it shall provide:

1) identification of target UE(s) to which the request applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" in the "tgt-ue" attribute;

2) event specific filter information in the "event-filter" attribute which shall provide:

a) any slices indication in the "anySlice" attribute or identification of network slice(s) together with the optionally associated network slice instance(s) if available, via the "nsiIdInfos" attribute; and

NOTE 7: The network slice instance of a PDU session is not available in the PCF.

the "event-filter" attribute may provide:

a) identification of application(s) to which the request applies via "appIds" attribute;

b) identification of DNN via identification of Dnn(s) by "dnns" attribute;

c) identification of user plane accesses to one or more DN(s) where applications are deployed via "dnais" attribute;

d) identification of network area to which the request applies via the "networkArea" attribute and/or, if the "ServiceExperienceExt2\_eNA" feature is supported, the "fineGranAreas" attribute. If the "anyUe" attribute is set to "true" the identification of the network area to which the request applies is required (see also clause 5.2.6.2.3);

e) if "appIds" attribute is provided, the bandwidth requirement of each application by "bwRequs" attribute;

f) identication of all the RAT types and/or all the frequencies that the NWDAF received for the application or specific RAT type(s) and/or frequency(ies) by "ratFreqs" attribute if the feature "ServiceExperienceExt" is also supported;

g) a list of analytics subsets carried by "listOfAnaSubsets" attribute with value(s) only applicable to "SERVICE\_EXPERIENCE" event, if the "EneNA" feature is supported;

h) the identification of the UPF as the "upfInfo" attribute if the feature "ServiceExperienceExt" is also supported;

i) IP address(s)/FQDN(s) of the Application Server(s) as the "appServerAddrs" attribute if the feature "ServiceExperienceExt" is also supported;

j) combination of PDU Session parameters as the "pduSesInfos" attribute if the feature "ServiceExperienceExt2\_eNA" is also supported;

k) preferred granularity of location information as the "locGranularity" attribute if the feature "ServiceExperienceExt2\_eNA" is supported; and/or

- if the feature "QoSSustainability" is supported and the event is "QOS\_SUSTAINABILITY", it shall provide:

1) event specific filter information in the "event-filter" attribute which shall provide:

a) identification of network area to which the request applies via identification of network area by "networkArea" attribute and/or, if the "QoSSustainExt\_eNA" feature is supported, the "fineGranAreas" attribute; and

b) QoS requirements via "qosRequ" attribute;

2) identification of target UE(s) to which the request applies by "anyUe" attribute set to "true" in the "tgt-ue" attribute;

the "event-filter" attribute may provide:

a) identification of network slice(s) by "snssais" attribute;

b) the spatial granularity size of TA in the "spatialGranSizeTa" attribute if the "QoSSustainExt\_eNA" feature is supported;

c) the spatial granularity size of cell in the "spatialGranSizeCell" attribute if the "QoSSustainExt\_eNA" feature is supported;

d) the temporal granularity size in the "temporalGranSize" attribute if the "QoSSustainExt\_eNA" feature is supported;

- if the feature "AbnormalBehaviour" is supported and the event is "ABNORMAL\_BEHAVIOUR", it shall provide:

1) identification of target UE(s) to which the request applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" in the "tgt-ue" attribute; and

2) event specific filter information in the "event-filter" attribute which shall provide

a) either the expected analytics type via "exptAnaType" attribute or a list of exception Ids via "excepIds" attribute. If the expected analytics type via "exptAnaType" attribute is provided, the NWDAF shall derive the corresponding Exception Ids from the received expected analytics type as follows:

- if "exptAnaType" attribute sets to "MOBILITY", the corresponding list of Exception Ids are "UNEXPECTED\_UE\_LOCATION", "PING\_PONG\_ACROSS\_CELLS", "UNEXPECTED\_WAKEUP" and "UNEXPECTED\_RADIO\_LINK\_FAILURES";

- if "exptAnaType" attribute sets to "COMMUN", the corresponding list of Exception Ids are "UNEXPECTED\_LONG\_LIVE\_FLOW", "UNEXPECTED\_LARGE\_RATE\_FLOW", "SUSPICION\_OF\_DDOS\_ATTACK", "WRONG\_DESTINATION\_ADDRESS" and "TOO\_FREQUENT\_SERVICE\_ACCESS";

- if "exptAnaType" attribute sets to "MOBILITY\_AND\_COMMUN", the corresponding list of Exception Ids includes all above derived exception Ids.

The derived list of Exception Ids are used by the NWDAF to notify the NF service consumer when UE's behaviour is exceptional based on one or more Exception Ids within the list.

If the "anyUe" attribute in the "tgt-ue" attribute sets to "true":

a) the expected analytics type via the"exptAnaType" attribute or the list of Exception Ids via "excepIds" attribute shall not be requested for both mobility and communication related analytics at the same time;

b) if the expected analytics type via the"exptAnaType" attribute or the list of Exception Ids via "excepIds" attribute is mobility related, at least one of identification of network area by "networkArea" attribute and identification of network slice(s) by "snssais" attribute should be provided; and

c) if the expected analytics type via the"exptAnaType" attribute or the list of Exception Ids via "excepIds" attribute is communication related, at least one of identification of network area by "networkArea" attribute, identification of application(s) by "appIds" attribute, identification of DNN(s) in the "dnns" attribute and identification of network slice(s) by "snssais" attribute should be provided;

the "event-filter" attribute may provide:

a) expected UE behaviour via "exptUeBehav" attribute;

- if the feature "UserDataCongestion" is supported and the event is "USER\_DATA\_CONGESTION", it shall provide one of the following attributes:

1) identification of target UE(s) via "supis" "gpsis" (if feature "UserDataCongestionExt" is supported) or "anyUe" attribute set to "true" within "tgt-ue" attribute;

2) event specific filter information in the "event-filter" attribute which shall provide:

a) the user data congestion requirements via "userDataConReqs" attribute, if the feature "UserDataCongestionExt2\_eNA" is supported;

and may provide:

1) event specific filter information in the "event-filter" attribute which may provide:

a) identification of network slice(s) by "snssais" attribute;

b) identification of network area to which the request applies via identification of network area by "networkArea" attribute (mandatory if "anyUe" attribute is set to true);

c) if the feature "UserDataCongestionExt" is also supported, request a list of top applications with maximum number that contribute the most to the traffic in uplink and/or downlink directions bythe "maxTopAppUlNbr" attribute and/or the "maxTopAppDlNbr" attribute; and/or

d) a list of analytics subsets carried by "listOfAnaSubsets" attribute with value(s) only applicable to "USER\_DATA\_CONGESTION" event, if the "EneNA" feature is supported;

e) the temporal granularity size in the "temporalGranSize" attribute if the "UserDataCongestionExt2\_eNA" feature is supported.

- if the feature "SMCCE" is supported and the event is "SM\_CONGESTION", it shall provide:

1) event specific filter information in the "event-filter" attribute which shall provide:

a) identification of DNN in the "dnns" attribute; and/or

b) identification of network slice(s) in the "snssais" attribute; and

2) identification of target UE(s) via "supis" attribute in the "tgt-ue" attribute where the target UE(s) are one have the PDU Session for the DNN and/or S-NSSAI indicated by the event specific filter information;

and may include:

1) a list of analytics subsets carried by "listOfAnaSubsets" attribute with value(s) only applicable to "SM\_CONGESTION" event, if the "EneNA" feature is supported;

NOTE 8: The predictions are not applicable for Session Management Congestion Control Experience analytics.

- if the feature "Dispersion" is supported and the event is "DISPERSION", shall provide:

1) identification of target UE(s) applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" within "tgt-ue" attribute, "anyUe" attribute set to "true" is only supported in combination with "snssais" attribute, "networkArea" attribute and/or "disperClass" attribute;

and may include:

1) identification of network area applies via identification of network area by "networkArea" attribute;

2) identification of network slice(s) by "snssais" attribute;

3) application identifier(s) in "appIds" attribute;

4) dispersion analytics requirements in "disperReqs" attribute, which for the requested dispersion type may include dispersion class, ranking, ordering and/or accuracy requirments;

5) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to "DISPERSION" event;

6) preferred granularity of location information as the "locGranularity" attribute if the feature "DispersionExt\_eNA" is supported;

7) the spatial granularity size of TA in the "spatialGranSizeTa" attribute if the "DispersionExt\_eNA" feature is supported;

7) the spatial granularity size of cell in the "spatialGranSizeCell" attribute if the "DispersionExt\_eNA" feature is supported; and/or

8) the temporal granularity size in the "temporalGranSize" attribute if the "DispersionExt\_eNA" feature is supported.

- if the feature "RedundantTransmissionExp" is supported and the event is "RED\_TRANS\_EXP", shall provide:

1) identification of target UE(s) applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" within "tgt-ue" attribute;

and may include:

1) identification of network area applies via identification of network area by "networkArea" attribute, if the "supis" attribute or "intGroupIds" attribute is included in the "tgt-ue" attribute;

2) identification of network slice(s) by "snssais" attribute;

3) identification of DNN in the "dnns" attribute;

4) other redundant transmission experience analysis requirements in "redTransReqs" attribute, which may include preferred order of results for the list of Redundant Transmission Experience;

5) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to RED\_TRANS\_EXP event, if the "EneNA" feature is supported; and/or

6) the temporal granularity size in the "temporalGranSize" attribute if the "RedundantTransExpExt\_eNA" feature is supported.

- if the feature "WlanPerformance" is supported and the event is "WLAN\_PERFORMANCE", shall provide:

1) identification of target UE(s) by "supis", "intGroupIds" or "anyUe" attribute set to "true" in the "tgt-ue" attribute. If "anyUe" attribute set to "true" is included in the "tgt-ue" attribute, then any of "networkArea" attribute, "ssIds" or "bssIds" attribute shall be present in the "wlanReqs" attribute;

and may include:

1) identification of network area to which the request applies via identification of network area by "networkArea" attribute;

2) other WLAN performance analytics requirements in "wlanReqs" attribute, which may include SSID(s), BSSID(s), preferred order of results for the list of WLAN performance information and/or accuracy per analytics subset;

3) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to WLAN\_PERFORMANCE event, if the "EneNA" feature is supported; and/or

4) the temporal granularity size in the "temporalGranSize" attribute if the "WlanPerfExt\_eNA" feature is supported.

- if the feature "DnPerformance" is supported and the event is "DN\_PERFORMANCE", shall provide:

1) identification of target UE(s) to which the request applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" in the "tgt-ue" attribute;

and may include:

1) identification of network area to which the request applies via identification of network area by "networkArea" attribute;

2) identification of network slice(s) in the "snssais" attribute;

3) identification of network slice and the optionally associated network slice instance(s) if available, via the "nsiIdInfos" attribute or any slices indication in the "anySlice" attribute;

4) application identifier(s) in "appIds" attribute;

5) an identification of DNN in the "dnns" attribute;

6) identification of a user plane access to one or more DN(s) where applications are deployed by "dnais" attribute;

7) the identification of the UPF as the "upfInfo" attribute;

8) IP address(s)/FQDN(s) of the Application Server(s) as the "appServerAddrs" attribute;

9) DN performance analytics requirements in "dnPerfReqs" attribute, which may include the preferred order of results for the list of DN performance information and/or the reporting threshold of each applicable analytics subset; and/or

10) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to "DN\_PERFORMANCE" event, if the "EneNA" feature is supported and may include the attribute with value(s) only applicable to "DN\_PERFORMANCE" event and "DnPerformanceExt\_AIML" feature if supported.

11) the spatial granularity size of TA in the "spatialGranSizeTa" attribute if the "DnPerfExt\_eNA" feature is supported.

11) the spatial granularity size of cell in the "spatialGranSizeCell" attribute if the "DnPerfExt\_eNA" feature is supported.

12) the temporal granularity size in the "temporalGranSize" attribute if the "DnPerfExt\_eNA" feature is supported.

- if the feature "E2eDataVolTransTime" is supported and the event is "E2E\_DATA\_VOL\_TRANS\_TIME", shall provide:

1) identification of target UE(s) to which the subscription applies by "supis" or "gpsis" attribute in the "tgt-ue" attribute;

2) area of interest of the UEs by "networkArea" attribute; restricts the scope of the E2E data volume transfer time analytics to the provided area.

and may include:

1) an identification of DNN in the "dnns" attribute;

2) identification of network slice in the "snssais" attribute;

3) application identifier(s) in "appIds" attribute;

4) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to "E2E\_DATA\_VOL\_TRANS\_TIME" event, if the "EneNA" feature is supported;

5) the QoS requirements via "qosRequ" attribute; and

6) E2E data volume transfer time requirements in the "dataVlTrnsTmRqs" attribute;

- if the feature "PduSesTraffic" is supported and the event is "PDU\_SESSION\_TRAFFIC", shall provide:

1) identification of target UE(s) to which the subscription applies by "supis", "intGroupIds" or "anyUe" attribute set to "true" in the "tgt-ue" attribute;

2) PDU Session traffic analytics requirements in "pduSesTrafReqs" attribute, which includes the known Application Identifier, IP Descriptions or Domain Descriptors.

3) DNN and/or S-NSSAI for the PDU Session(s) in the "dnns" and/or "snssais" attributes.

and may include:

1) identification of network area to which the request applies via identification of network area by "networkArea" attribute; and/or

2) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to "PDU\_SESSION\_TRAFFIC" event, if the "EneNA" feature is supported.

NOTE 10: The predictions are not applicable for PDU Session traffic analytics.

- if the feature "MovementBehaviour" is supported and the event is "MOVEMENT\_BEHAVIOUR", shall provide:

1) identification of network area to which the request applies to restrict the scope of the movement behaviour analytics to the provided area by the "networkArea" attribute and/or the "fineGranAreas" attribute;

- and may include:

1) identification of the preferred orientation of location information by the "locOrientation" attribute;

2) Movement Behaviour analytics requirements in the "movBehavReqs" attribute, which includes preferred granularity of location information or preferred orientation of location information; and/or

3) an optional list of analytics subsets by the "listOfAnaSubsets" attribute with value(s) only applicable to the "MOVEMENT\_BEHAVIOUR" event, if the "EneNA" features is supported.

- if the feature "LocAccuracy" is supported and the event is "LOC\_ACCURACY", the "event-filter" attribute shall include:

1) either a network area to which the request applies within the "networkArea" attribute or an exact location to which the request applies within the "location" attribute;

- and the "event-filter" attribute may include:

1) Location accuracy analytics requirements within the "locAccReqs" attribute; and/or

2) an optional list of analytics subsets within the "listOfAnaSubsets" attribute with value(s) only applicable to the "LOC\_ACCURACY" event, if the "EneNA" features is supported.

NOTE 11: Location accuracy analytics do not have a target UE, they are always for any UE.

- if the feature "RelativeProximity" is supported and the event is " RELATIVE\_PROXIMITY", shall provide:

1) identification of target UE(s) to which the request applies by "supis"or "intGroupIds" attribute in the "tgt-ue" attribute;

- and may include in the "event-filter" attribute:

1) identification of DNN in the "dnns" attribute;

2) identification of network slice in the "snssais" attribute;

3) identification of network area to which the request applies via identification of network area by "networkArea" attribute;

4) Relative Proximity analytics requirements in "relProxReqs" attribute; and/or

5) an optional list of analytics subsets by "listOfAnaSubsets" attribute with value(s) only applicable to "RELATIVE\_PROXIMITY" event prediction, if the "EneNA" features is supported.

Upon the reception of the HTTP GET request, the NWDAF shall:

- analyse the requested analytic data according to the requested event.

If the HTTP request message from the NF service consumer is accepted, the NWDAF shall respond with "200 OK" status code with the message body containing the analytics with parameters as relevant for the requesting NF service consumer. The AnalyticsData data structure in the response body shall include:

- analytics with the corresponding information as described in clause 4.2.2.4.2.

- the analytics accuracy information in the "accuInfo" attribute, if the feature "AnalyticsAccuracy" is supported and the analytics accuracy requirement was requested in the "accuReq" attribute.

NOTE 12: In this version of the specification, NWDAF containing AnLF can provide accuracy information to an NF consumer that requests both the analytics and the accuracy information.

NOTE 13: When receiving a request from an NF consumer that includes a request for accuracy information, the analytics and the accuracy information can be provided by NWDAF containing AnLF within the single response.

If the requested NWDAF Analytics data does not exist, the NWDAF shall respond with "204 No Content" status code.

If the "timeAnaNeeded" attribute within EventReportingRequirement is provided during the request, if the time is reached but the requested analytics information is not ready, the consumer does not need to wait for the analytics information any longer, the NWDAF may send a "500 Internal Server Error" status code to the NF service consumer. In addition, if the EneNA feature is supported, the NWDAF may provide, within the ProblemDetailsAnalyticsInfoRequestdata in the response, the corresponding failure reason via a "problemDetails" attribute with the "cause" attribute set to "UNSATISFIED\_REQUESTED\_ANALYTICS\_TIME" and a minimum time interval recommended by the NWDAF via a "rvWaitTime" attribute which is used by the NF service consumer to determine the time when analytics information is needed in similar future analytics requests.

If the analytics target period provided in the body of the HTTP GET request includes the start time in the past and the end time in the future, the NWDAF shall reject the request with an HTTP "400 Bad Request" response including the "cause" attribute set to "BOTH\_STAT\_PRED\_NOT\_ALLOWED".

When the "PredictionError" feature is supported, if the analytics target period provided in the body of the HTTP GET request includes the prediction time period in the future and the event is "SM\_CONGESTION" and/or "PDU\_SESSION\_TRAFFIC", the NWDAF shall reject the request with an HTTP "400 Bad Request" response including the "cause" attribute set to "PREDICTION\_NOT\_ALLOWED".

If the statistics in the past are requested but the necessary data to perform the service is unavailable, the NWDAF shall reject the request with an HTTP "500 Internal Server Error" response including the "cause" attribute set to "UNAVAILABLE\_DATA".

If the user consent has not been checked by the NF service consumer and is required for the requested analytics collection depending on local policy and regulations, then the NWDAF shall check user consent for the targeted UE(s) by retrieving the user consent subscription data via the Nudm\_SDM service API of the UDM as described in clause 5.2.2 of 3GPP TS 29.503 [23]. If the NWDAF receive the response from the UDM that it is not granted for the impacted user(s), then the NWDAF shall send an HTTP "403 Forbidden" error response including the "cause" attribute set to "USER\_CONSENT\_NOT\_GRANTED".

NOTE 13: When the target of reporting is a SUPI or a GPSI then the subscription can be rejected, e.g. because user consent is not granted, and the error is sent to the consumer. When the target of reporting is an Internal Group Id, or a list of SUPIs/GPSI(s) or any UE, and the user consent is not granted for a subset of the impacted users, then no error is sent, but a subset of the SUPIs/GPSIs is skipped if user consent is not granted.

If the RoamingAnalytics feature is supported and the NWDAF determines based on operator configuration and the requested analytics that analytics or input data from the VPLMN are required, and the NWDAF does not support roaming exchange and it cannot forward the request to another NWDAF, then the NWDAF shall reject the request with an HTTP "403 Forbidden" response including the "cause" attribute set to "NO\_ROAMING\_SUPPORT".

If an error occurs when processing the HTTP GET request, the NWDAF shall send an HTTP error response as specified in clause 5.2.7.

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

5.1.6.2.3 Type EventSubscription

**Table 5.1.6.2.3-1: Definition of type EventSubscription**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Attribute name** | | **Data type** | | **P** | | **Cardinality** | | **Description** | | **Applicability** | |
| anySlice | | AnySlice | | C | | 0..1 | | Default is "false". (NOTE 1) | |  | |
| appIds | | array(ApplicationId) | | C | | 1..N | | Represents the Application Identifier(s) to which the subscription applies.  The absence of appIds means subscription to all applications. (NOTE 8) (NOTE 15) (NOTE 16) | | ServiceExperience  UeCommunication  AbnormalBehaviour  Dispersion  DnPerformance  PfdDetermination  E2eDataVolTransTime | |
| deviations | | array(Uinteger) | | O | | 1..N | | Each element indicates an acceptable deviation from the threshold level included in "ranUeThrouThds" attribute or "qosFlowRetThds" attribute. This attribute may only be present if either the "ranUeThrouThds" attribute or "qosFlowRetThds" attribute is provided. | | EnQoSSustainability | |
| dnns | | array(Dnn) | | C | | 1..N | | Represents the DNN(s) to which the subscription applies. Each DNN is a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only.  The absence of dnns means subscription to all DNNs. (NOTE 8) (NOTE 17) | | ServiceExperience, AbnormalBehaviour  UeCommunication  RedundantTransmissionExp  DnPerformance  SMCCE  PfdDetermination  PduSesTraffic  E2eDataVolTransTime  RelativeProximity | |
| dnais | | array(Dnai) | | O | | 1..N | | Represents the Data Network Access Identifier(s) of user plane access to DN(s) which the subscription applies. | | ServiceExperience  DnPerformance | |
| dataVlTrnsTmRqs | | array(E2eDataVolTransTimeReq) | | O | | 1..N | | Represents the E2E data volume transfer time requirements | | E2eDataVolTransTime | |
| event | | NwdafEvent | | M | | 1 | | Event that is subscribed. | |  | |
| extraReportReq | | EventReportingRequirement | | O | | 0..1 | | The extra event reporting requirement information. | |  | |
| ladnDnns | | array(Dnn) | | O | | 1..N | | LADN DNN(s) to indicate the LADN service area(s) as the AoI(s). | | UeMobilityExt | |
| loadLevelThreshold | | integer | | C | | 0..1 | | Indicates that the NWDAF shall report the corresponding network slice load level to the NF service consumer where the load level of the network slice identified by snssais is reached. (NOTE 4)  May be included when subscribed event is "SLICE\_LOAD\_LEVEL".  Minimum = 0. Maximum = 100. | |  | |
| matchingDir | | MatchingDirection | | O | | 0..1 | | A matching direction may be provided alongside a threshold. If omitted, the default value is CROSSED. | | NfLoad, QoSSustainability, UserDataCongestion, NetworkPerformance, NsiLoadExt | |
| nfLoadLvlThds | | array(ThresholdLevel) | | C | | 1..N | | Shall be supplied in order to start reporting when an average load level is reached. (NOTE 4) | | NfLoad | |
| networkArea | | NetworkAreaInfo | | C | | 0..1 | | Identification of network area to which the subscription applies.  The absence of "networkArea" and "fineGranAreas" means subscription to all network areas. (NOTE 7, NOTE 8, NOTE 20 , NOTE 22) | | ServiceExperience  UeMobility  UeCommunication  QoSSustainability  AbnormalBehaviour  UserDataCongestion  NetworkPerformance  NsiLoadExt  NfLoadExt  Dispersion  RedundantTransmissionExp  WlanPerformance  DnPerformance  PduSesTraffic  E2eDataVolTransTime  MovementBehaviour  LocAccuracy  RelativeProximity | |
| location | | GeoLocation | | C | | 0..1 | | A location (i.e. geographical location or location in local coordinates) to which the subscription applies. (NOTE 22) | | LocAccuracy | |
| temporalGranSize | | DurationSec | | O | | 0..1 | | Indicates the minimum duration of each time slot for which the analytics are provided.  (NOTE 18) | | NetworkPerformanceExt\_eNA  UeMobilityExt2\_eNA  UserDataCongestionExt2\_eNA  QoSSustainabilityExt\_eNA  DispersionExt\_eNA  WlanPerfExt\_eNA  RedundantTransExpExt\_eNA  DnPerformanceExt\_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.  (NOTE 19) | | NetworkPerformanceExt\_eNA  UeMobilityExt2\_eNA  UeCommunicationExt\_eNA  QoSSustainabilityExt\_eNA  DispersionExt\_eNA  DnPerformanceExt\_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.  (NOTE 19) | | NetworkPerformanceExt\_eNA  UeMobilityExt2\_eNA  UeCommunicationExt\_eNA  QoSSustainabilityExt\_eNA  DispersionExt\_eNA  DnPerformanceExt\_eNA | |
| 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 7, NOTE 20) | | ServiceExperienceExt2\_eNA  UeMobilityExt2\_eNA  QoSSustainabilityExt\_eNA  MovementBehaviour | |
| visitedAreas | | array(NetworkAreaInfo) | | O | | 1..N | | Indicates the visited network area(s) which the UEs had previously been in at least one of the Visited Area(s) of Interest.  (NOTE 10) | | UeMobilityExt | |
| maxTopAppUlNbr | | 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 elements in the "listOfAnaSubsets" attribute is set to LIST\_OF\_TOP\_APP\_UL. | | UserDataCongestionExt | |
| maxTopAppDlNbr | | 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 elements in the "listOfAnaSubsets" attribute is set to LIST\_OF\_TOP\_APP\_DL. | | UserDataCongestionExt | |
| nfInstanceIds | | array(NfInstanceId) | | O | | 1..N | | Identification(s) of NF instance(s). | | NfLoad | |
| nfSetIds | | array(NfSetId) | | O | | 1..N | | Identification(s) of NF instance set(s). | | NfLoad | |
| nfTypes | | array(NFType) | | O | | 1..N | | Identification(s) of NF type(s). (NOTE 13) | | NfLoad  NsiLoadExt | |
| notificationMethod | | NotificationMethod | | O | | 0..1 | | Indicate the notification method. (NOTE 2) | |  | |
| 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 "NSI\_LOAD\_LEVEL",  "SERVICE\_EXPERIENCE" or "DN\_PERFORMANCE".  (NOTE 1) | | ServiceExperience  NsiLoad  DnPerformance | |
| nsiLevelThrds | | array(Uinteger) | | O | | 1..N | | Identifies the load threshold for each S-NSSAI or S-NSSAI and the optionally associated network slice instance identified by the "nsiIds" attribute within the "nsiIdInfos" attribute.  (NOTE 4)  Minimum = 0. Maximum = 100. | | NsiLoad | |
| qosRequ | | QosRequirement | | C | | 0..1 | | Indicates the QoS requirements. It shall be included when subscribed event is "QOS\_SUSTAINABILITY" or "E2E\_DATA\_VOL\_TRANS\_TIME". | | QoSSustainability  E2eDataVolTransTime | |
| qosFlowRetThds | | array(RetainabilityThreshold) | | C | | 1..N | | Represents the QoS flow retainability thresholds. Shall be supplied for the 5QI ("5qi" in "qosRequ") or resource type ("resType" in "qosRequ") of GBR resource type. (NOTE 4) | | QoSSustainability | |
| ranUeThrouThds | | array(BitRate) | | C | | 1..N | | Represents the RAN UE throughput thresholds.  Shall be supplied for the 5QI ("5qi" in "qosRequ") or resource type ("resType" in "qosRequ") of non-GBR resource type. (NOTE 4) | | QoSSustainability | |
| repetitionPeriod | | DurationSec | | C | | 0..1 | | Shall be supplied for notification method "PERIODIC" by the "notificationMethod" attribute. | |  | |
| snssais | | array(Snssai) | | C | | 1..N | | Identification(s) of network slice(s) to which the subscription applies. (NOTE 1, NOTE 8) (NOTE 17) | |  | |
| tgtUe | | TargetUeInformation | | O | | 0..1 | | Identifies target UE information.  (NOTE 3) | |  | |
| roamingInfo | | RoamingInfo | | O | | 0..1 | | Information about roaming analytics. When this attribute is provided, the request should contain only attributes that are applicable also in the Nnwdaf\_RoamingAnalytics service. | | RoamingAnalytics | |
| congThresholds | | array(ThresholdLevel) | | C | | 1..N | | Represents the congestion threshold levels. (NOTE 4) | | UserDataCongestion | |
| nwPerfRequs | | array(NetworkPerfRequirement) | | C | | 1..N | | Represents the network performance requirements. This attribute shall be included when subscribed event is "NETWORK\_PERFORMANCE". | | NetworkPerformance | |
| bwRequs | | array(BwRequirement) | | O | | 1..N | | Represents the bandwidth requirement for each application.  It may only be present if "appIds" attribute is provided. | | ServiceExperience | |
| excepRequs | | array(Exception) | | C | | 1..N | | Represents a list of Exception Ids with associated thresholds. May only be present when subscribed event is "ABNORMAL\_BEHAVIOUR".  (NOTE 5, NOTE 6, NOTE 8) | | AbnormalBehaviour | |
| exptAnaType | | ExpectedAnalyticsType | | C | | 0..1 | | Represents expected UE analytics type.  It shall not be present if the "excepRequs" attribute is provided. (NOTE 6, NOTE 8) | | AbnormalBehaviour | |
| exptUeBehav | | ExpectedUeBehaviourData | | O | | 0..1 | | Represents expected UE behaviour. | | AbnormalBehaviour | |
| ratFreqs | | array(RatFreqInformation) | | O | | 1..N | | Identification(s) of the RAT type(s) and/or frequency(ies) of UE's serving cell(s) which the subscription applies. (NOTE 9) | | ServiceExperienceExt | |
| listOfAnaSubsets | | array(AnalyticsSubset) | | O | | 1..N | | The list of analytics subsets can be used to indicate the content of the analytics. | | EneNA | |
| disperReqs | | array(DispersionRequirement) | | O | | 1..N | | Represents the dispersion analytics requirements. | | Dispersion | |
| redTransReqs | | array(RedundantTransmissionExpReq) | | O | | 1..N | | Represents the redundant transmission experience analytics requirements. | | RedundantTransmissionExp | |
| wlanReqs | | array(WlanPerformanceReq) | | O | | 1..N | | Represents other WLAN performance analytics requirements. If the attribute contains no content, may take default handling action. | | WlanPerformance | |
| 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 | |
| ueMobilityReqs | | array(UeMobilityReq) | | O | | 1..N | | Represents the UE mobility requirements. This attribute may be included when the subscribed event is "UE\_MOBILITY". | | UeMobilityExt2\_eNA | |
| upfInfo | | UpfInformation | | O | | 0..1 | | Identifies the UPF. (NOTE 12) | | ServiceExperienceExt  DnPerformance | |
| userDataConOrderCri | | UserDataConOrderCrit | | O | | 0..1 | | The ordering criterion for the list of User Data Congestion analytics. (NOTE 14) | | userDataConOrderCri | |
| appServerAddrs | | array(AddrFqdn) | | C | | 1..N | | Each element represents the Application Server Instance (IP address/FQDN of the Application Server). (NOTE 11) | | ServiceExperienceExt  DnPerformance | |
| dnPerfReqs | | array(DnPerformanceReq) | | O | | 1..N | | Represents the DN performance analytics requirements. | | DnPerformance | |
| pduSesInfos | | array(PduSessionInfo) | | C | | 1..N | | Represents combination of PDU Session parameter(s). (NOTE 15) | | ServiceExperienceExt2\_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 | |
| pduSesTrafReqs | | array(PduSesTrafficReq) | | C | | 1..N | | Represents the PDU Session traffic analytics requirements. This attribute shall be included when subscribed event is "PDU\_SESSION\_TRAFFIC". | | PduSesTraffic | |
| locAccReqs | | array(LocAccuracyReq) | | O | | 1..N | | Represents the Location Accuracy analytics requirements. This attribute may only be included when the subscribed event is "LOC\_ACCURACY". | | LocAccuracy | |
| locGranularity | | LocInfoGranularity | | O | | 0..1 | | The preferred granularity of UE location information.  (NOTE 21) | | ServiceExperienceExt2\_eNA  UeMobilityExt2\_eNA  DispersionExt\_eNA  MovementBehaviour | |
| locOrientation | | LocationOrientation | | O | | 0..1 | | Indicates the preferred orientation of location information. | | MovementBehaviour  UeMobilityExt2\_eNA | |
| accuReq | | AccuracyReq | | O | | 0..1 | | Represents the analytics accuracy requirement information.  May be included as indication to the NWDAF (containing an AnLF supporting Accuracy checking capability) to activate checking the analytics accuracy information of the event. | | AnalyticsAccuracy | |
| movBehavReqs | | array(MovBehavReq) | | O | | 1..N | | Represents the Movement Behaviour analytics requirements. | | MovementBehaviour | |
| relProxReqs | | array(RelProxReq) | | O | | 1..N | | Represents the Relative Proximity analytics requirements. | | RelativeProximity | |
| pauseFlg | | boolean | | O | | 0..1 | | Pause analytics consumption flag 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 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 | |
| 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 "anySlice" attribute is not applicable to features "UeMobility" and "NetworkPerformance". The "snssais" attribute is not applicable to features "ServiceExperience", "NsiLoad", "UeMobility" and "NetworkPerformance". When subscribed event is "SLICE\_LOAD\_LEVEL", the identifications of network slices, either information about slice(s) identified by "snssais", or "anySlice" set to "true" shall be included. When subscribed event is "QOS\_SUSTAINABILITY", "NF\_LOAD", "UE\_COMM", "ABNORMAL\_BEHAVIOUR", "USER\_DATA\_CONGESTION", "DISPERSION", "RED\_TRANS\_EXP", "PDU\_SESSION\_TRAFFIC", "PFD\_DETERMINATION" or "RELATIVE\_PROXIMITY", the identifications of network slices identified by "snssais" is optional. When subscribed event is "NSI\_LOAD\_LEVEL", "SERVICE\_EXPERIENCE" or "DN\_PERFORMANCE", either the "nsiIdInfos" attribute or "anySlice" set to "true" shall be included.  NOTE 2: When notificationMethod is not supplied, the default value is "THRESHOLD".  NOTE 3: Applicability is further described in the corresponding data type. All target UE(s) indicated by this attribute shall belong to the same PLMN. When the RoamingAnalytics feature is supported and the target UE(s) indicated by this attribute belong to a PLMN different than the PLMN of the NF service consumer, the request should contain only attributes that are applicable also in the Nnwdaf\_RoamingAnalytics service.  NOTE 4: This property shall be provided if the "notifMethod" in "evtReq" is set to "ON\_EVENT\_DETECTION" or "notificationMethod" in "eventSubscriptions" is set to "THRESHOLD" or omitted.  NOTE 5: Only "excepId" and "excepLevel" within the Exception data type apply to the "excepRequs" attribute within EventSubscription data type.  NOTE 6: Either "excepRequs" or "exptAnaType" shall be provided if subscribed event is "ABNORMAL\_BEHAVIOUR".  NOTE 7: For different events, the following rules apply:  - For "NETWORK\_PERFORMANCE", "USER\_DATA\_CONGESTION" or "DN\_PERFORMANCE" event, the "networkArea" attribute shall be provided if the event applied for all UEs (i.e. "anyUe" attribute set to true within the "tgtUe" attribute).  - For "QOS\_SUSTAINABILITY", at least one of "networkArea" and "fineGranAreas" attributes shall be provided.  - For "E2E\_DATA\_VOL\_TRANS\_TIME" event, the "networkArea" attribute shall be provided.  - For "SERVICE\_EXPERIENCE" event, if the event applied for all UEs (i.e. "anyUe" attribute set to true within the "tgtUe" attribute): at least one of "networkArea" or "fineGranAreas" attributes shall be provided.  - For "MOVEMENT\_BEHAVIOUR" event, at least one of the "networkArea" or "fineGranAreas" attributes shall be provided.  NOTE 8: For "ABNORMAL\_BEHAVIOUR" event with "anyUe" attribute in "tgtUe" attribute sets to true,  - at least one of the "networkArea" and the "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 mobility related;  - at least one of the "networkArea", "appIds", "dnns" 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.  NOTE 9: If both the "allFreq" attribute and the "allRat" attribute are present within the RatFreqInformation data type, then only one instance of the RatFreqInformation data typeshall be present to indicate for all the RAT type and all the Frequency values the NWDAF has received for the application.  NOTE 10: If this attribute is provided, the analytics target period shall be a past time period (i.e. only statistics is supported).  NOTE 11: For service experience analytics, this parameter shall be provided when a consumer requires analytics for an edge application over a UP path.  NOTE 12: For service experience analytics, this parameter may be provided when a consumer requires analytics for an edge application over a UP path, and it is only needed when the target of the service experience analytics is a specific UPF included in this UP path.  NOTE 13: When subscribed event is "NSI\_LOAD\_LEVEL" and the NsiLoadExt feature is supported, and the NF service consumer provides the "nfTypes" attribute, then the NWDAF accounts only for the resource usage of the NF types included in "nfTypes" to derive the output analytics. If the "nfTypes" attribute is not provided, then NWDAF accounts for the resource usage of all NF types.  NOTE 14: 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 15: 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 16: When subscribed event is "PFD\_DETERMINATION" and the PfdDetermination feature is supported, the "appIds" attribute shall be included.  NOTE 17: When the subscribed event is "PDU\_SESSION\_TRAFFIC" and the PduSesTraffic feature is supported, at least one of the "dnns" and/or "snssais" attributes as the route selection descriptor(s) for the URSP rule shall be included.  NOTE 18: When this attribute is provided, the NWDAF shall provide the analytics per elementary time slot accordingly.  NOTE 19: When this attribute is provided, the NWDAF shall provide the analytics per group of TAs or cells accordingly.  NOTE 20: If both "networkArea" and "fineGranAreas" attributes are provided, the Area of Interest is interpreted as the intersection area indicated by these two attributes.  NOTE 21: The "LON\_AND\_LAT\_LEVEL" value of "locGranularity" attribute is not applicable to features "DispersionExt\_eNA". The "TA\_LEVEL" or "CELL\_LEVEL" value of "locGranularity" attribute is not applicable to features "MovementBehaviour".  NOTE 22: When the subscribed event is "LOC\_ACCURACY", only one of the "networkArea" attribute or "location" attribute shall be included. | | | | | | | | | | | |

NOTE: Care needs to be taken to avoid excessive signalling.

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