**3GPP TSG-CT WG3 Meeting #128 C3-232227**

**Bratislava, Slovakia, 22nd - 26th May, 2023 (Revision of C3-230562)**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **29.520** | **CR** | **0678** | **rev** | **1** | **Current version:** | **18.1.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | Support use case context in Nnwdaf\_AnalyticsInfo API |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | eNA\_Ph3 |  | ***Date:*** | 2023-05-08 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** |  Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | According to TS 23.288 CR 0561 updates in TS 23.288 clause 6.1.3 and clause 7.2.2, the optional use case context may be subscribed/requested by the Analytics consumer or NWDAF contains AnLF, with Note that 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). 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.Hence the corresponding implementation is need in this specification in the Nnwdaf\_AnalyticsInfo API. |
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| ***Summary of change:*** | Add use case context attribute in the EventFilter data type. |
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| ***Consequences if not approved:*** | Not aligned with stage 2 normative requirement on supporting the optional use case context in the Nnwdaf\_AnalyticsInfo API. |
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| ***Clauses affected:*** | 4.3.2.2.2, 5.2.6.2.3, A.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 introduce backwards compatible feature in the OpenAPI files of the Nnwdaf\_AnalyticsInfo API. |
|  |  |
| ***This CR's revision history:*** | **Revision of C3-230562:**- feature name is updated.- Note description is updated. |

**Additional discussion(if needed):**

**Proposed changes:**

\*\*\* 1st 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;

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

11) use case context as "useCaseCxt" attribute, if the "ENAExt" 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 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 2: 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;

- 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" in the "tgt-ue" attribute; and

NOTE 3: Only NF instances of type AMF and SMF which are serving the UE can be determined using a SUPI in "supis" attribute.

NOTE 4: 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 provide:

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

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

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;

NOTE 5: 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 provide:

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; and/or

f) other UE communication requirements in "ueCommReqs" 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 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 user data congestion requirements via "userDataConReqs" attribute, if the feature "UserDataCongestionExt2\_eNA" is supported;

c) 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).

- 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 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 6: 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 identification of network area(s) by "networkArea" attribute (mandatory if "anyUe" attribute is set to true);

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; and/or

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

- 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

b) QoS requirements via "qosRequ" attribute;

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

 the "event-filter" attribute may provide:

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

- 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 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 within "tgt-ue" attribute;

 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;

- 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 7: 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 within "tgt-ue" attribute, "anyUe" attribute 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; and/or

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

- 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 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; 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;

- 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 in the "tgt-ue" attribute. If "anyUe" attribute 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; 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;

- 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 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

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.

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

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

- and may include:

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

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

NOTE 8: PFD Determination analytics do not have a target UE, they are always for any UE.

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.

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".

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

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

##### 5.2.6.2.3 Type EventFilter

Table 5.2.6.2.3-1: Definition of type EventFilter

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 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). The absence of appIds means applicable to all applications. (NOTE 4) (NOTE 10) | ServiceExperience UeCommunication AbnormalBehaviourDispersionDnPerformancePfdDetermination |
| dnns | array(Dnn) | C | 1..N | Represents the DNN(s). 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 applicable to all DNNs. (NOTE 4) | ServiceExperienceUeCommunicationAbnormalBehaviourSMCCEDnPerformanceRedundantTransmissionExpPfdDetermination |
| dnais | array(Dnai) | C | 1..N | Represents the Data Network Access Identifier(s) of user plane accesses to DN(s) where applications are deployed. It may be included when event-id is "SERVICE\_EXPERIENCE" or "DN\_PERFORMANCE". | ServiceExperienceDnPerformance |
| ladnDnns | array(Dnn) | O | 1..N | Represents the LADN DNN(s) to indicate the LADN service area(s) as the AoI(s). | UeMobilityExt |
| snssais | array(Snssai) | C | 1..N | Identification(s) of network slice(s). (NOTE 1), (NOTE 4) |  |
| 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 8) | NfLoadNsiLoadExt |
| networkArea | NetworkAreaInfo | C | 0..1 | This IE represents the network area where the NF service consumer wants to know the analytics result. (NOTE 2), (NOTE 4) | UeMobility UeCommunicationNetworkPerformanceQoSSustainabilityServiceExperienceUserDataCongestionAbnormalBehaviour NsiLoadExtNfLoadExtDispersionRedundantTransmissionExpWlanPerformanceDnPerformance |
| visitedAreas | array(NetworkAreaInfo) | O | 1..N | Identification(s) of network area(s) which the UEs had previously been in at least one of the Visited Area(s) of Interest. (NOTE 9) | 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 |
| nsiIdInfos | array(NsiIdInfo) | O | 1..N | Each element identifies the S-NSSAI and the optionally associated network slice instance(s).May be included when the event-id is "NSI\_LOAD\_LEVEL","SERVICE\_EXPERIENCE" or "DN\_PERFORMANCE".(NOTE 1) | ServiceExperienceNsiLoadDnPerformance |
| nwPerfReqs | array(NetworkPerfReq) | O | 1..N | Represents the network performance requirements. This attribute may be included when the event-id is "NETWORK\_PERFORMANCE". | NetworkPerformanceExt\_eNA |
| nwPerfTypes | array(NetworkPerfType) | C | 1..N | Represents the network performance types. This attribute shall be included when event-id is "NETWORK\_PERFORMANCE". | NetworkPerformance |
| userDataConReqs | array(UserDataCongestReq) | O | 1..N | Represents the network performance requirements. This attribute may be included when the event-id is "NETWORK\_PERFORMANCE". | UserDataCongestionExt2\_eNA |
| qosRequ | QoSRequirement | C | 0..1 | Represents the QoS requirements. This attribute shall be included when event-id is "QOS\_SUSTAINABILITY". | QoSSustainability |
| bwRequs | array(BwRequirement) | O | 1..N | Represents the media/application bandwidth requirement for each application.It may only be present if "appIds" attribute is provided. | ServiceExperience |
| excepIds | array(ExceptionId) | C | 1..N | Represents a list of Exception Ids.(NOTE 3), (NOTE 4) | AbnormalBehaviour |
| exptAnaType | ExpectedAnalyticsType | C | 0..1 | Represents expected UE analytics type.(NOTE 3), (NOTE 4) | 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 request applies. (NOTE 5) | ServiceExperienceExt |
| 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 |
| listOfAnaSubsets | array(AnalyticsSubset) | O | 1..N | The list of analytics subsets used to indicate the content of the analytics. | EneNA |
| upfInfo | UpfInformation | O | 0..1 | Identifies the UPF. (NOTE 7) | ServiceExperienceExtDnPerformance |
| appServerAddrs | array(AddrFqdn) | C | 1..N | Each element represents the Application Server Instance (IP address/FQDN of the Application Server). (NOTE 6) | ServiceExperienceExtDnPerformance |
| dnPerfReqs | array(DnPerformanceReq) | O | 1..N | Represents the DN performance requirements. This attribute shall be included when event-id is "DN\_PERFORMANCE". | DnPerformance |
| ueMobilityReqs | array(UeMobilityReq) | O | 1..N | Represents the UE mobility requirements. This attribute may be included when the event-id is "UE\_MOBILITY". | UeMobilityExt2\_eNA |
| ueCommReqs | array(UeCommReq) | O | 1..N | Represents the UE communication requirements. This attribute may be included when the event-id is "UE\_MOBILITY". | UeCommunicationExt\_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 |
| 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 event-id in the request is "LOAD\_LEVEL\_INFORMATION", the identifications of network slices, either information about slice(s) identified by the "snssais" attribute, or "anySlice" set to "true", shall be included. When the requested event-id is "NSI\_LOAD\_LEVEL" or "SERVICE\_EXPERIENCE", either the "nsiIdInfos" attribute or anySlice set to "true" shall be included. When the requested event-id is "QOS\_SUSTAINABILITY", "NF\_LOAD", "UE\_COMM", "ABNORMAL\_BEHAVIOUR", "USER\_DATA\_CONGESTION", "DISPERSION" "RED\_TRANS\_EXP" or "PFD\_DETERMINATION", the identifications of network slices identified by the "snssais" attribute is optional.NOTE 2: For "NETWORK\_PERFORMANCE", "SERVICE\_EXPERIENCE" or "USER\_DATA\_CONGESTION" event, this attribute shall be provided if the event applied for all UEs (i.e. "anyUe" attribute set to true). For "QOS\_SUSTAINABILITY", this attribute shall be provided.NOTE 3: Either "excepIds" or "exptAnaType" shall be provided if event-id in the request is "ABNORMAL\_BEHAVIOUR".NOTE 4: For "ABNORMAL\_BEHAVIOUR" event with "anyUe" attribute in "tgt-ue" 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 "excepIds" 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 "excepIds" attribute is communication related; - 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.NOTE 5: If both the "allFreq" attribute and the "allRat" attributes in RatFreqInformation data type are present, then the only one instance of the RatFreqInformation data type shall be present to indicate for all the RAT type and Frequency value the NWDAF has received for the application.NOTE 6: This parameter shall be provided when a consumer requires analytics for an edge application over a UP path.NOTE 7: This parameter may be provided when a consumer requires analytics for an edge application over a UP path.NOTE 8: When event-id in the request 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.NOTE 9: If this attribute is provided, the analytics target period shall be a past time period (i.e. only statistics is supported).NOTE 10: When event-id in the request is "PFD\_DETERMINATION" and the PfdDetermination feature is supported, the "appIds" attribute shall be included. |

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

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

# A.3 Nnwdaf\_AnalyticsInfo API

openapi: 3.0.0

info:

 version: 1.3.0-alpha.2

 title: Nnwdaf\_AnalyticsInfo

 description: |

 Nnwdaf\_AnalyticsInfo Service API.

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externalDocs:

 description: 3GPP TS 29.520 V18.1.0; 5G System; Network Data Analytics Services.

 url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.520/'

security:

 - {}

 - oAuth2ClientCredentials:

 - nnwdaf-analyticsinfo

servers:

 - url: '{apiRoot}/nnwdaf-analyticsinfo/v1'

 variables:

 apiRoot:

 default: https://example.com

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

paths:

 /analytics:

 get:

 summary: Read a NWDAF Analytics

 operationId: GetNWDAFAnalytics

 tags:

 - NWDAF Analytics (Document)

 parameters:

 - name: event-id

 in: query

 description: Identify the analytics.

 required: true

 schema:

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

 - name: ana-req

 in: query

 description: Identifies the analytics reporting requirement information.

 required: false

 content:

 application/json:

 schema:

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

 - name: event-filter

 in: query

 description: Identify the analytics.

 required: false

 content:

 application/json:

 schema:

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

 - name: supported-features

 in: query

 description: To filter irrelevant responses related to unsupported features.

 schema:

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

 - name: tgt-ue

 in: query

 description: Identify the target UE information.

 required: false

 content:

 application/json:

 schema:

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

 responses:

 '200':

 description: >

 Containing the analytics with parameters as relevant for the requesting NF service

 consumer.

 content:

 application/json:

 schema:

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

 '204':

 description: No Content. The requested NWDAF Analytics data does not exist.

 '400':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/400'

 '401':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/401'

 '403':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/403'

 '404':

 description: Indicates that the NWDAF Analytics resource does not exist.

 content:

 application/problem+json:

 schema:

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

 '406':

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

 '414':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/414'

 '429':

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

 '500':

 description: >

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

 returned.

 content:

 application/problem+json:

 schema:

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

 '502':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/502'

 '503':

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

 default:

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

 /context:

 get:

 summary: Get context information related to analytics subscriptions.

 operationId: GetNwdafContext

 tags:

 - NWDAF Context (Document)

 security:

 - {}

 - oAuth2ClientCredentials:

 - nnwdaf-analyticsinfo

 - oAuth2ClientCredentials:

 - nnwdaf-analyticsinfo

 - nnwdaf-analyticsinfo:contexttransfer

 parameters:

 - name: context-ids

 in: query

 description: Identifies specific context information related to analytics subscriptions.

 required: true

 content:

 application/json:

 schema:

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

 - name: req-context

 in: query

 description: >

 Identfies the type(s) of the analytics context information the consumer wishes

 to receive.

 required: false

 content:

 application/json:

 schema:

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

 responses:

 '200':

 description: >

 Contains context information related to analytics subscriptions corresponding with

 one or more context identifiers.

 content:

 application/json:

 schema:

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

 '204':

 description: >

 No Content. (\No context information could be retrieved for the requested context

 Identifiers.

 '400':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/400'

 '401':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/401'

 '403':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/403'

 '404':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/404'

 '406':

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

 '414':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/414'

 '429':

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

 '500':

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

 '502':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/502'

 '503':

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

 default:

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

components:

 securitySchemes:

 oAuth2ClientCredentials:

 type: oauth2

 flows:

 clientCredentials:

 tokenUrl: '{nrfApiRoot}/oauth2/token'

 scopes:

 nnwdaf-analyticsinfo: Access to the Nnwdaf\_AnalyticsInfo API

 nnwdaf-analyticsinfo:contexttransfer: >

 Access to service operations applying to NWDAF context transfer related service

 operations, i.e. ContextTransfer.

 schemas:

 AnalyticsData:

 description: >

 Represents the description of analytics with parameters as relevant for the requesting NF

 service consumer.

 type: object

 properties:

 start:

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

 expiry:

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

 timeStampGen:

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

 anaMetaInfo:

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

 sliceLoadLevelInfos:

 type: array

 items:

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

 minItems: 1

 description: The slices and their load level information.

 nsiLoadLevelInfos:

 type: array

 items:

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

 minItems: 1

 nfLoadLevelInfos:

 type: array

 items:

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

 minItems: 1

 nwPerfs:

 type: array

 items:

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

 minItems: 1

 svcExps:

 type: array

 items:

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

 minItems: 1

 qosSustainInfos:

 type: array

 items:

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

 minItems: 1

 ueMobs:

 type: array

 items:

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

 minItems: 1

 ueComms:

 type: array

 items:

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

 minItems: 1

 userDataCongInfos:

 type: array

 items:

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

 minItems: 1

 abnorBehavrs:

 type: array

 items:

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

 minItems: 1

 smccExps:

 type: array

 items:

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

 minItems: 1

 disperInfos:

 type: array

 items:

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

 minItems: 1

 redTransInfos:

 type: array

 items:

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

 minItems: 1

 wlanInfos:

 type: array

 items:

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

 minItems: 1

 dnPerfInfos:

 type: array

 items:

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

 minItems: 1

 suppFeat:

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

 EventFilter:

 description: Represents the event filters used to identify the requested analytics.

 type: object

 properties:

 anySlice:

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

 snssais:

 type: array

 items:

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

 minItems: 1

 description: Identification(s) of network slice.

 appIds:

 type: array

 items:

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

 minItems: 1

 dnns:

 type: array

 items:

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

 minItems: 1

 dnais:

 type: array

 items:

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

 minItems: 1

 ladnDnns:

 type: array

 items:

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

 minItems: 1

 description: Identification(s) of LADN DNN to indicate the LADN service area as the AOI.

 networkArea:

 $ref: 'TS29554\_Npcf\_BDTPolicyControl.yaml#/components/schemas/NetworkAreaInfo'

 visitedAreas:

 type: array

 items:

 $ref: 'TS29554\_Npcf\_BDTPolicyControl.yaml#/components/schemas/NetworkAreaInfo'

 minItems: 1

 maxTopAppUlNbr:

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

 maxTopAppDlNbr:

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

 nfInstanceIds:

 type: array

 items:

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

 minItems: 1

 nfSetIds:

 type: array

 items:

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

 minItems: 1

 nfTypes:

 type: array

 items:

 $ref: 'TS29510\_Nnrf\_NFManagement.yaml#/components/schemas/NFType'

 minItems: 1

 nsiIdInfos:

 type: array

 items:

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

 minItems: 1

 qosRequ:

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

 nwPerfReqs:

 type: array

 items:

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

 minItems: 1

 nwPerfTypes:

 type: array

 items:

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

 minItems: 1

 userDataConReqs:

 type: array

 items:

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

 minItems: 1

 bwRequs:

 type: array

 items:

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

 minItems: 1

 excepIds:

 type: array

 items:

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

 minItems: 1

 exptAnaType:

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

 exptUeBehav:

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

 ratFreqs:

 type: array

 items:

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

 minItems: 1

 disperReqs:

 type: array

 items:

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

 minItems: 1

 redTransReqs:

 type: array

 items:

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

 minItems: 1

 wlanReqs:

 type: array

 items:

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

 minItems: 1

 listOfAnaSubsets:

 type: array

 items:

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

 minItems: 1

 upfInfo:

 $ref: 'TS29508\_Nsmf\_EventExposure.yaml#/components/schemas/UpfInformation'

 appServerAddrs:

 type: array

 items:

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

 minItems: 1

 dnPerfReqs:

 type: array

 items:

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

 minItems: 1

 ueMobilityReqs:

 type: array

 items:

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

 minItems: 1

 ueCommReqs:

 type: array

 items:

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

 minItems: 1

 useCaseCxt:

 type: string

 description: >

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

 are not standardized.

 not:

 required: [anySlice, snssais]

 ProblemDetailsAnalyticsInfoRequest:

 description: >

 Extends ProblemDetails to indicate more details why the analytics request is rejected.

 allOf:

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

 - $ref: '#/components/schemas/AdditionInfoAnalyticsInfoRequest'

 AdditionInfoAnalyticsInfoRequest:

 description: Indicates additional information why the analytics request is rejected.

 type: object

 properties:

 rvWaitTime:

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

 ContextData:

 description: >

 Contains context information related to analytics subscriptions corresponding with one or

 more context identifiers.

 type: object

 properties:

 contextElems:

 type: array

 items:

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

 minItems: 1

 description: >

 List of items that contain context information corresponding with a context identifier.

 required:

 - contextElems

 ContextElement:

 description: Contains context information corresponding with a specific context identifier.

 type: object

 properties:

 contextId:

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

 pendAnalytics:

 type: array

 items:

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

 minItems: 1

 description: >

 Output analytics for the analytics subscription which have not yet been sent to the

 analytics consumer.

 histAnalytics:

 type: array

 items:

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

 minItems: 1

 description: Historical output analytics.

 lastOutputTime:

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

 aggrSubs:

 type: array

 items:

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

 minItems: 1

 description: >

 Information about analytics subscriptions that the NWDAF has with other NWDAFs to perform

 aggregation.

 histData:

 type: array

 items:

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

 minItems: 1

 description: Historical data related to the analytics subscription.

 adrfId:

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

 adrfDataTypes:

 type: array

 items:

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

 minItems: 1

 description: Type(s) of data stored in the ADRF by the NWDAF.

 aggrNwdafIds:

 type: array

 items:

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

 minItems: 1

 description: >

 NWDAF identifiers of NWDAF instances used by the NWDAF service consumer when aggregating

 multiple analytics subscriptions.

 modelInfo:

 type: array

 items:

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

 minItems: 1

 description: >

 Contains information identifying the ML model(s) that the consumer NWDAF is currently

 subscribing for the analytics.

 required:

 - contextId

 ContextIdList:

 description: >

 Contains a list of context identifiers of context information of analytics subscriptions.

 type: object

 properties:

 contextIds:

 type: array

 items:

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

 minItems: 1

 required:

 - contextIds

 HistoricalData:

 description: Contains historical data related to an analytics subscription.

 type: object

 properties:

 startTime:

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

 endTime:

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

 subsWithSources:

 type: array

 items:

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

 minItems: 1

 description: Information about subscriptions with the data sources.

 data:

 type: array

 items:

 $ref: 'TS29575\_Nadrf\_DataManagement.yaml#/components/schemas/DataNotification'

 minItems: 1

 description: Historical data related to the analytics.

 required:

 - data

 NetworkPerfReq:

 description: Represents a network performance requirement.

 type: object

 properties:

 orderCriterion:

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

 orderDirection:

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

 SpecificAnalyticsSubscription:

 description: >

 Represents an existing subscription for a specific type of analytics to a specific NWDAF.

 type: object

 properties:

 subscriptionId:

 type: string

 producerId:

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

 producerSetId:

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

 nwdafEvSub:

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

 allOf:

 - oneOf:

 - required: [producerId]

 - required: [producerSetId]

 - required: [subscriptionId]

 - required: [nwdafEvSub]

 RequestedContext:

 description: Contains types of analytics context information.

 type: object

 properties:

 contexts:

 type: array

 items:

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

 minItems: 1

 description: List of analytics context types.

 required:

 - contexts

 SmcceInfo:

 description: Represents the Session Management congestion control experience information.

 type: object

 properties:

 dnn:

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

 snssai:

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

 smcceUeList:

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

 required:

 - smcceUeList

 SmcceUeList:

 description: >

 Represents the List of UEs classified based on experience level of Session Management

 congestion control.

 type: object

 properties:

 highLevel:

 type: array

 items:

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

 minItems: 1

 mediumLevel:

 type: array

 items:

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

 minItems: 1

 lowLevel:

 type: array

 items:

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

 minItems: 1

 anyOf:

 - required: [highLevel]

 - required: [mediumLevel]

 - required: [lowLevel]

 SpecificDataSubscription:

 description: >

 Represents an existing subscription for data collection to a specific data source NF.

 type: object

 properties:

 subscriptionId:

 type: string

 producerId:

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

 producerSetId:

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

 dataSub:

 $ref: 'TS29575\_Nadrf\_DataManagement.yaml#/components/schemas/DataSubscription'

 allOf:

 - oneOf:

 - required: [producerId]

 - required: [producerSetId]

 - required: [subscriptionId]

 - required: [dataSub]

 UserDataCongestReq:

 description: >

 Represents a user data congesion requirement.

 type: object

 properties:

 orderCriterion:

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

 orderDirection:

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

 EventId:

 anyOf:

 - type: string

 enum:

 - LOAD\_LEVEL\_INFORMATION

 - NETWORK\_PERFORMANCE

 - NF\_LOAD

 - SERVICE\_EXPERIENCE

 - UE\_MOBILITY

 - UE\_COMMUNICATION

 - QOS\_SUSTAINABILITY

 - ABNORMAL\_BEHAVIOUR

 - USER\_DATA\_CONGESTION

 - NSI\_LOAD\_LEVEL

 - SM\_CONGESTION

 - DISPERSION

 - RED\_TRANS\_EXP

 - WLAN\_PERFORMANCE

 - DN\_PERFORMANCE

 - PFD\_DETERMINATION

 - type: string

 description: >

 This string provides forward-compatibility with future

 extensions to the enumeration but is not used to encode

 content defined in the present version of this API.

 description: |

 Represents the analytics type.

 Possible values are:

 - LOAD\_LEVEL\_INFORMATION: Represent the analytics of load level information of corresponding

 network slice.

 - NETWORK\_PERFORMANCE: Represent the analytics of network performance information.

 - NF\_LOAD: Indicates that the event subscribed is NF Load.

 - SERVICE\_EXPERIENCE: Represent the analytics of service experience information of the

 specific applications.

 - UE\_MOBILITY: Represent the analytics of UE mobility.

 - UE\_COMMUNICATION: Represent the analytics of UE communication.

 - QOS\_SUSTAINABILITY: Represent the analytics of QoS sustainability information in the

 certain area.

 - ABNORMAL\_BEHAVIOUR: Indicates that the event subscribed is abnormal behaviour information.

 - USER\_DATA\_CONGESTION: Represent the analytics of the user data congestion in the certain

 area.

 - NSI\_LOAD\_LEVEL: Represent the analytics of Network Slice and the optionally associated

 Network Slice Instance.

 - SM\_CONGESTION: Represent the analytics of Session Management congestion control experience

 information for specific DNN and/or S-NSSAI.

 - DISPERSION: Represents the analytics of dispersion.

 - RED\_TRANS\_EXP: Represents the analytics of Redundant Transmission Experience.

 - WLAN\_PERFORMANCE: Represents the analytics of WLAN performance.

 - DN\_PERFORMANCE: Represents the analytics of DN performance.

 - PFD\_DETERMINATION: Represents the analytics of PFD Determination information for known application identifier(s).

 ContextType:

 anyOf:

 - type: string

 enum:

 - PENDING\_ANALYTICS

 - HISTORICAL\_ANALYTICS

 - AGGR\_SUBS

 - DATA

 - AGGR\_INFO

 - ML\_MODELS

 - type: string

 description: |

 Represents the analytics context information type.

 Possible values are:

 - PENDING\_ANALYTICS: Represents context information that relates to pending output

 analytics.

 - HISTORICAL\_ANALYTICS: Represents context information that relates to historical output

 analytics.

 - AGGR\_SUBS: Represents context information about the analytics subscriptions that an NWDAF

 has with other NWDAFs that collectively serve an analytics subscription.

 - DATA: Represents context information about historical data that is available.

 - AGGR\_INFO: Represents context information that is related to aggregation of analytics

 from multiple NWDAF subscriptions.

 - ML\_MODELS: Represents context information about used ML models.

 AdrfDataType:

 anyOf:

 - type: string

 enum:

 - HISTORICAL\_ANALYTICS

 - HISTORICAL\_DATA

 - type: string

 description: >

 This string provides forward-compatibility with future

 extensions to the enumeration but is not used to encode

 content defined in the present version of this API.

 description: |

 Represents a type of data that is stored in the ADRF.

 Possible values are:

 - HISTORICAL\_ANALYTICS: Indicates that historical analytics are stored in the ADRF.

 - HISTORICAL\_DATA: Indicates that historical data are stored in the ADRF.

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