**3GPP TSG-SA2 Meeting #164 S2-2409138**

**19 - 23 August, 2024, Maastricht, Netherlands *revision of S2-2409089 was 7754***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **23.288** | **CR** | **1132** | **rev** | **2** | **Current version:** | 18.6.0 |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
|  | | | | | | | | |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Support of QoS and policy assistance analytics | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Samsung, vivo, OPPO, SK Telecom, China Mobile, Tencent, Tencent Cloud, InterDigital Inc, ETRI, Lenovo, NTT DOCOMO | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | AIML\_CN | | | | |  | ***Date:*** | | | 2024-08-09 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | As it has been agreed in clause 8.3 of TR 23.700-84:  *- The PCF may send a analytics request or subscription to NWDAF for QoS and policy assistance information analytics. The PCF may include an analytics ID, Filter Information, one or multiple sets of QoS parameters, the candidate value list(s) for each QoS parameter, requesting expected service experience (e.g. QoE), etc.*  *- Based on the PCF request, the QoS and policy assistance information analytics provided by NWDAF may include: expected QoE can be achieved by the candidate QoS parameters (the values of the QoS parameters are within the candidate value list provided by the PCF).*  *- The PCF may request one or more analytics from the NWDAF that are used within the same analytics target period, i.e. Observed service experience, QoS sustainability, Network Performance analytics, analytics of the duration and usage of the established QoS Flows.*  In order to support the above conclusions for FS\_AIML\_CN KI#3, a new NWDAF-based analytics is introduced to provide QoS and Policy Assistance Analytics. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce a new NWDAF-based analytics to provide QoS and Policy Assistance Analytics to consumer to support QoS and policy enhancement. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The conclusions for FS\_AIML\_CN KI#3 cannot be supported. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.x (new), 6.x.1 (new), 6.x.2 (new), 6.x.3 (new), 6.x.4 (new), 7.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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's revision history:*** | |  | | | | | | | | |

\* \* \*Start of Changes (new text) \* \* \*

## 6.x QoS and Policy Assistance Analytics

Editor’s Note: the title of the clause is FFS.

### 6.x.1 General

Clause 6.x describes how NWDAF can provide the QoS and policy assistance analytics based on the consumer request.

The QoS and policy assistance analytics can be used to assist the consumer (i.e. PCF) with deciding policies, i.e. QoS parameters. The PCF may take the outputs of the analytics into account for QoS determination and modification for a service flow.

The consumer may provide the list of target QoS parameter set(s) of a service flow to the NWDAF. The service consumer may also optionally provide the allowed values of individual QoS parameters for the different QoS parameter set(s) in the list, and the target service experience (i.e. QoE) of the service flow. Using the list of target QoS and the allowed values of individual QoS parameters, the NWDAF generates the candidate QoS parameter set(s) that can fulfil the QoE indicated by the service consumer. The NWDAF informs the consumer of the candidate QoS parameter set(s) that can fulfil the QoE and the associated QoE(s).

NOTE: The list of candidate QoS parameter set(s) generated by NWDAF are the one or more of the target QoS parameter set(s) and allowed values provided by consumer (e.g. PCF).

In order to derive the QoS and policy assistance analytics, the NWDAF collects data from OAM, and 5GC NFs (e.g. SMF, PCF, AMF, LCS, etc.). The consumer can either subscribe to analytics notifications (i.e. a Subscribe-Notify model) or request a single notification (i.e. a Request-Response model).

The service consumer may be an NF (e.g. PCF or AF).

The consumer indicates the following information in the request or subscription:

- Analytics ID = " QoS and Policy Assistance".

Editor’s note: whether to use analytics ID or a dedicated identifier is FFS.

- Target of Analytics Reporting as defined in clause 6.1.3.

- Analytics Filter Information optionally includes:

- DNN;

- Application ID;

- Area of Interest (AOI(s)): restricts the scope of the QoS and policy assistance analytics to the provided area;

- A list of analytics subsets that are requested (see clause 6.x.3), e.g. QoS requirements (e.g. 5QI, QoE).

- A list of one or more target QoS parameter set(s), including:

- QoS parameters (as defined in clause 5.7.2 of TS 23.501) includes: 5QI (standardized or pre-configured), ARP, RQA, and optional GFBR, MFBR and Packet Loss Rate for GBR flows, the corresponding value of each individual QoS parameter, and optional list of one or more the candidate values of individual QoS parameters;

- the QoS Characteristics attributes (as defined in clause 5.7.3 of TS 23.501) includes: Resource Type, Priority Level, PDB, PER, Averaging Window, Maximum Data Burst Volume, the corresponding value of each individual QoS Characteristics, and optional list of one or more the candidate values of individual QoS Characteristics;

- Optionally, the target QoE of the service that may include the thresholds of QoE (e.g. minimum QoE) for NWDAF to notify the analytics output to the consumer.

Editor’s Note: the scenario that the consumer does not include the target QoE in the request in FFS.

Editor’s Note: whether and what assistance constraint is included is FFS.

- An Analytics target period indicates the time period over which the analytics are requested.

- In a subscription, the Notification Correlation Id and the Notification Target Address are included.

- Optionally, preferred order of results for the list of QoE associated to QoS:

- ordering criterion: ”QoE” (i.e. QoE that is associated to QoS) or "duration" or "number of usages",

- order: ascending or descending.

- Optionally, Reporting Thresholds, which apply only for subscriptions and indicate conditions on the levels to be reached for the respective analytics subsets (see clause 6.x.3).

Editor’s Note: the details of Reporting Thresholds is FFS.

### 6.x.2 Input Data

The NWDAF supporting analytics on candidate QoS shall be able to collect information from OAM and 5GC NFs.

The input data collect from AF defined for Observed Service Experience related network data analytics in Table 6.4.2-1 and Table 6.4.2-1a is reused. In addition to the data in Table 6.4.2-1 and Table 6.4.2-1a.

The information collected by the NWDAF from relevant 5GC NFs (i.e. UPF, SMF, AMF, PCF) is defined in Table 6.x.2-1.

The input data collected from OAM for E2E data volume transfer time analytics in Table 6.18.2-1 is reused.



Table 6.x.2-1: Input data from 5GC NF related to QoS and policy assistance information

|  |  |  |
| --- | --- | --- |
| Information | Source | Description |
| QoS Flows Information (1..max) | SMF | List of QoS flow information |
| > Used QoS parameter set(s) | SMF | The QoS parameter set(s) already applied by SMF includes individual QoS parameters and QoS characteristics detailed in clause 6.x.1 (as defined in TS 23.501 [2]). |
| > Used Alternative QoS | SMF | The alternative QoS of a service flow. |
| > Used QoS profile | SMF | The QoS profile associated to the used QoS parameter set(s). |
| > Time stamp | SMF, | The time stamp associated to the collected data. |
| > UE identifier | SMF | The identifier of UE, e.g. SUPI, UE IP address, etc. |
|  |  |  |
| UE Location | AMF | The UE location information, e.g. cell ID or TAI. |
| > Event type | SMF | The type of QFI change, i.e., QoS Flow establishment (i.e., QFI Change) or QoS Flow termination (i.e., QFI deallocation) or Traffic binding of QoS Flow event |
| > QFI | SMF | QoS Flow identifier |
| > Traffic descriptor | SMF | One of Application Identifier or IP Packet Filter Set or Ethernet Packet Filter Set |
| > PDU Session ID | SMF | PDU session ID containing the QoS Flow |

Editor’s Note: the input data (e.g. data collected from OAM, NF and AF, or the output of other analytics IDs) in this clause is FFS.

### 6.x.3 Output Analytics

The NWDAF supporting QoS and Policy Assistance analytics is able to provide statistics and prediction to consumer NFs, e.g. PCF or AF, as defined in Table 6.x.3-1.

Table 6.x.3-1: QoS and Policy Assistance statistics

|  |  |
| --- | --- |
| Information | Description |
| UE ID or list of UE IDs (1..SUPImax) | Identifies the UE(s) for which the statistic applies by a list of SUPIs. |
| Time slot entry (1..max) | List of time slots during the Analytics target period. |
| > Time slot start | Time slot start within the Analytics target period. |
| > Duration | Duration of the time slot. |
| > QoS and Policy Assistance information (1…max) (NOTE 1) (NOTE 6) | Service experience information of a list of candidate QoS parameter set(s).  The candidate QoS could be the combination of the target QoS and allowed values of individual QoS parameters in the consumer request.  Max. is the number of the candidate QoS parameter set(s), if applicable. |
| >> QoS service experience | The service experience (e.g. QoE, MOS) of the corresponding QoS parameter set (e.g. average, maximum, minimum, variance). |
| >> Applicable duration of QoS and Policy Assistance information | The applicable duration/ time window of the QoS and Policy Assistance information. |
| >> Candidate QoS parameter set and characteristics (NOTE 5) | The values of one or more individual QoS parameters of each set and corresponding characteristics, e.g. one or more of the tuple (values of each QoS parameter). |
| >>> 5QI | The reference to 5G QoS characteristics and QoS parameters. |
| >>> ARP | The QoS parameter ARP contains information about the priority level, the pre-emption capability and the pre-emption vulnerability, as defined in TS 23.501 [2]. |
| >>> Alternative QoS parameters | The alternative QoS parameters of the QoS flow. |
| >>> Flow Bit Rates (NOTE 2) | The flow bit rates only applies to GBR QoS Flow. |
| >>>> GFBR | Guaranteed Flow Bit Rate (GFBR) for UL and/or DL. |
| >>>> MFBR | Maximum Flow Bit Rate (MFBR) for UL and/or DL. |
| >>> Packet Loss Rate (NOTE 2) | The Maximum Packet Loss Rate (UL, DL) indicates the maximum rate for lost packets of the QoS Flow that can be tolerated in the uplink and downlink direction.  This is provided to the QoS Flow if it is compliant to the GFBR |
| >>> Resource type | The resource type of the corresponding QoS flow, e.g. GBR QoS flow, non-GBR QoS flow, delay-critical QoS flow. |
| >>> Packet Delay Budget | Packet Delay Budget (PDB) indicates the upper bound for the time that a packet may be delayed between the UE and the N6 termination point at the UPF, as defined in TS 23.501 [2]. |
| >>> Packet Error Rate | Packet Error Rate (PER) defines an upper bound for a rate of non-congestion related packet losses, as defined in TS 23.501 [2]. |
| >>> Averaging Window (NOTE 2) | The Averaging window is applied when the resource type is GBR QoS.  The Averaging window represents the duration over which the GFBR and MFBR shall be calculated (e.g. in the (R)AN, UPF, UE), as defined in TS 23.501 [2]. |
| >>> Maximum Data Burst Volume (NOTE 3) | The Maximum Data Burst Volume (MDBV) applies to GBR QoS Flow with Delay-critical resource type.  The MDBV denotes the largest amount of data that the 5G-AN is required to serve within a period of 5G-AN PDB, as defined in TS 23.501 [2]. |
|  |  |
|  |  |
| >> Validity period | The validity period within the time slot for the analytics on service experience associated to QoS in clause 6.1.3. |
| >> Spatial validity | Area where the analytics on service experience associated to QoS applies. |
| >> Traff descriptor | One of Application Identifier or IP Packet Filter Set or Ethernet Packet Filter Set |
| >> Duration information (NOTE 7) | Maximum/Minimum/Average duration of QoS Flows associated to Candidate QoS parameter set and characteristics. |
| >> Number of usage (NOTE 7) | The number of times that the QoS Flows associated to Candidate QoS parameter set and characteristics were used. |
| NOTE 1: Analytics subset that can be used in "list of analytics subsets that are requested", "Preferred level of accuracy per analytics subset" and "Reporting Thresholds".  NOTE 2: The output analytics only applies to GBR QoS Flow.  NOTE 3: The output analytics only applies to GBR QoS Flow with Delay-critical resource type.  NOTE 4: The output analytics only applies to Reflective QoS.  NOTE 5: The subset of the output is provided by NWDAF if the consumer includes candidate values of individual parameters in the QoS parameter set(s) in the request.  NOTE 6: The QoS and Policy Assistance information is provided in the same order as the QoS parameters sets provided by the consumer.  NOTE 7: The duration and number of usage of QoS Flow is determined by NWDAF using the SMF Events QoS Flow establishment (i.e., QFI Change) or QoS Flow termination (i.e., QFI deallocation) or Traffic binding of QoS Flow events; i.e., the duration equals to different between the timestamp of QoS Flow establishment and QoS Flow termination events. | |

Table 6.x.3-2: QoS and Policy Assistance predictions

|  |  |
| --- | --- |
| Information | Description |
| UE ID or list of UE IDs (1..SUPImax) | Identifies the UE(s) for which the statistic applies by a list of SUPIs. |
| Time slot entry (1..max) | List of time slots during the Analytics target period. |
| > Time slot start | Time slot start within the Analytics target period. |
| > Duration | Duration of the time slot. |
| > QoS and Policy Assistance information (1…max) (NOTE 1) (NOTE 6) | Service experience information of a list of candidate QoS parameter set(s).  The candidate QoS could be the combination of the target QoS and allowed values of individual QoS parameters in the consumer request.  Max. is the number of the candidate QoS parameter set(s), if applicable. |
| >> QoS service experience | The service experience (e.g. QoE, MOS) of the corresponding QoS parameter set (e.g. average, maximum, minimum, variance). |
| >> Applicable duration of QoS and Policy Assistance information | The applicable duration/ time window of the QoS and Policy Assistance information. |
| >> Candidate QoS parameter set and characteristics (NOTE 5) | The values of one or more individual QoS parameters of each set and corresponding characteristics, e.g. one or more of the tuple (values of each QoS parameter). |
| >>> 5QI | The reference to 5G QoS characteristics and QoS parameters. |
| >>> ARP | The QoS parameter ARP contains information about the priority level, the pre-emption capability and the pre-emption vulnerability, as defined in TS 23.501 [2]. |
| >>> Alternative QoS parameters | The alternative QoS parameters of the QoS flow. |
| >>> Flow Bit Rates (NOTE 2) | The flow bit rates only applies to GBR QoS Flow. |
| >>>> GFBR | Guaranteed Flow Bit Rate (GFBR) for UL and/or DL. |
| >>>> MFBR | Maximum Flow Bit Rate (MFBR) for UL and/or DL. |
| >>> Packet Loss Rate (NOTE 2) | The Maximum Packet Loss Rate (UL, DL) indicates the maximum rate for lost packets of the QoS Flow that can be tolerated in the uplink and downlink direction.  This is provided to the QoS Flow if it is compliant to the GFBR |
| >>> Resource type | The resource type of the corresponding QoS flow, e.g. GBR QoS flow, non-GBR QoS flow, delay-critical QoS flow. |
| >>> Packet Delay Budget | Packet Delay Budget (PDB) indicates the upper bound for the time that a packet may be delayed between the UE and the N6 termination point at the UPF, as defined in TS 23.501 [2]. |
| >>> Packet Error Rate | Packet Error Rate (PER) defines an upper bound for a rate of non-congestion related packet losses, as defined in TS 23.501 [2]. |
| >>> Averaging Window (NOTE 2) | The Averaging window is applied when the resource type is GBR QoS.  The Averaging window represents the duration over which the GFBR and MFBR shall be calculated (e.g. in the (R)AN, UPF, UE), as defined in TS 23.501 [2]. |
| >>> Maximum Data Burst Volume (NOTE 3) | The Maximum Data Burst Volume (MDBV) applies to GBR QoS Flow with Delay-critical resource type.  The MDBV denotes the largest amount of data that the 5G-AN is required to serve within a period of 5G-AN PDB, as defined in TS 23.501 [2]. |
| >> Validity period | The validity period within the time slot for the analytics on service experience associated to QoS in clause 6.1.3. |
| >> Spatial validity | Area where the analytics on service experience associated to QoS applies. |
| >> Traff descriptor | One of Application Identifier or IP Packet Filter Set or Ethernet Packet Filter Set |
| >> Duration information (NOTE 7) | Maximum/Minimum/Average duration of QoS Flows associated to Candidate QoS parameter set and characteristics. |
| >> Number of usage (NOTE 7) | The number of times that the QoS Flows associated to Candidate QoS parameter set and characteristics to be used. |
| NOTE 1: Analytics subset that can be used in "list of analytics subsets that are requested", "Preferred level of accuracy per analytics subset" and "Reporting Thresholds".  NOTE 2: The output analytics only applies to GBR QoS Flow.  NOTE 3: The output analytics only applies to GBR QoS Flow with Delay-critical resource type.  NOTE 4: The output analytics only applies to Reflective QoS.  NOTE 5: The subset of the output is provided by NWDAF if the consumer includes candidate values of individual parameters in the QoS parameter set(s) in the request.  NOTE 6: The QoS and Policy Assistance information is provided in the same order as the QoS parameters sets provided by the consumer.  NOTE 7: The duration and number of usage of QoS Flow is determined by NWDAF using the SMF Events QoS Flow establishment (i.e., QFI Change) or QoS Flow termination (i.e., QFI deallocation) or Traffic binding of QoS Flow events; i.e., the duration equals to different between the timestamp of QoS Flow establishment and QoS Flow termination events. | |

Editor’s Note: the output data is FFS.

Editor’s Note: whether the NWDAF derives the statistics of QoS and Policy Assistance is FFS.

### 6.x.4 Procedures

The NWDAF may provide the QoS and policy assistance analytics to a consumer 5GC NF (e.g. PCF).



Figure 6.x.4-1: Procedure for QoS and Policy Assistance Analytics

1. The Consumer NF, e.g. PCF or AF, requests or subscribes to QoS and policy assistance analytics from NWDAF (possibly via NEF in case the consumer NF is an untrusted AF) and provides the input information as specified in clause 6.x.1 to 5GC.

2a. The NWDAF may subscribe to the service data from AMF as defined in Table 6.x.2-2 using Namf\_EventExposure\_Subscribe service operation for collecting UE location(s) for a UE or a group of UEs, or any UE.

If NWDAF the required UE location information is finer granularity than TA/cell level, then NWDAF collects the location data from GMLC instead of AMF by invoking the Ngmlc\_Location service as defined in TS 23.273 [39] and TS 29.515 [48].

2c-1. The NWDAF may subscribe to service data from SMF as defined in Table 6.x.2-2 by invoking Nsmf\_EventExposure\_Subscribe service operation (Event ID, QoS profile ID, PCC rule ID, SUPI(s) or Application ID).

2d. In order to provide the QoS flow Packet delay to NWDAF the SMF subscribe to QoS Monitoring information from UPF, as defined in Table 6.x.2-2, using the N4 Session level Reporting procedure defined in TS 23.502 [3].

2e. The subscribed event is triggered in the UPF.

2c-2. The SMF notifies the NWDAF of the subscribed service data.

2f. Alternatively, the UPF may notify the subscribed event report directly to the NWDAF.

2g. The NWDAF may subscribe to the service data from as defined AF in the Table 6.x-2-1 by invoking Nnef\_EventExposure\_Subscribe or Naf\_EventExposure\_Subscribe (Event ID = QoS and Policy Assistance, Application ID, Event Filter information, Target of Event Reporting = UE ID(s)) service as defined in TS 23.502 [3].

2h. The NWDAF may subscribe to the input data from the OAM as defined in the Table 6.18.2-1 according to the data collection principles described in clause 6.2.3.

3. The NWDAF derives the requested analytics on QoS and Policy Assistance, e.g. based on NWDAF internal logic, the NWDAF derives the QoS and Policy Assistance analytics directly based on the inputs, or the NWDAF may derive the QoS and Policy Assistance analytics by consuming the Observed Service Experience, DN Performance, QoS sustainability analytics and input parameters in Table 6.x.2-1 and Table 6.x.2-2.

4. The NWDAF provides the requested QoS and Policy Assistance to the consumer NF, using either Nnwdaf\_AnalyticsInfo\_Request response or Nnwdaf\_AnalyticsSubscription\_Notify, depending on the service used in step 1.

5-7. If the consumer NF subscribed to QoS and Policy Assistance in step 1, once the NWDAF generates new analytics for Service Experience Associated to QoS, it provides a notification using Nnwdaf\_AnalyticsSubscription\_Notify to the Consumer NF.

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

## 7.1 General

Table 7.1-1 illustrates the NWDAF Services.

Table 7.1-1: NF services provided by NWDAF

|  |  |  |  |
| --- | --- | --- | --- |
| Service Name | Service Operations | Operation  Semantics | Example Consumer(s) |
| Nnwdaf\_AnalyticsSubscription | Subscribe | Subscribe / Notify | PCF, NSSF, AMF, SMF, NEF, AF, OAM, CEF, NWDAF, DCCF, LMF |
|  | Unsubscribe |  | PCF, NSSF, AMF, SMF, NEF, AF, OAM, CEF, NWDAF, DCCF, LMF |
|  | Notify |  | PCF, NSSF, AMF, SMF, NEF, AF, OAM, CEF, NWDAF, DCCF, MFAF, LMF |
|  | Transfer | Request / Response | NWDAF |
| Nnwdaf\_AnalyticsInfo | Request | Request / Response | PCF, NSSF, AMF, SMF, NEF, AF, OAM, CEF, NWDAF, DCCF, LMF |
|  | ContextTransfer | Request / Response | NWDAF |
| Nnwdaf\_DataManagement | Subscribe | Subscribe / Notify | NWDAF, DCCF |
|  | Notify |  | NWDAF, DCCF, MFAF, ADRF |
|  | Fetch | Request / Response | NWDAF, DCCF, MFAF, ADRF |
| Nnwdaf\_MLModelProvision | Subscribe | Subscribe / Notify | NWDAF |
|  | Unsubscribe |  | NWDAF |
|  | Notify |  | NWDAF |
| Nnwdaf\_MLModelInfo | Request | Request / Response | NWDAF |
| Nnwdaf\_MLModelMonitor | Subscribe | Subscribe / Notify | NWDAF |
|  | Unsubscribe |  | NWDAF |
|  | Notify |  | NWDAF |
|  | Register | Request / Response | NWDAF |
|  | Request |  | NWDAF |
| Nnwdaf\_MLModelTraining | Subscribe | Subscribe / Notify | NWDAF |
|  | Unsubscribe |  | NWDAF |
|  | Notify |  | NWDAF |
| Nnwdaf\_MLModelTrainingInfo | Request | Request / Response | NWDAF |
| Nnwdaf\_RoamingAnalytics | Subscribe | Subscribe / Notify | H-RE-NWDAF, V-RE-NWDAF |
|  | Unsubscribe |  | H-RE-NWDAF, V-RE-NWDAF |
|  | Notify |  | H-RE-NWDAF, V-RE-NWDAF |
|  | Request | Request / Response | H-RE-NWDAF, V-RE-NWDAF |
| Nnwdaf\_RoamingData | Subscribe | Subscribe / Notify | H-RE-NWDAF, V-RE-NWDAF |
|  | Unsubscribe |  | H-RE-NWDAF, V-RE-NWDAF |
|  | Notify |  | H-RE-NWDAF, V-RE-NWDAF |
| NOTE 1: How OAM consumes Nnwdaf services and which Analytics information is relevant is defined in TS 28.550 [7] Annex H and out of the scope of this TS.  NOTE 2: How CEF consumes Nnwdaf services and which Analytics information is relevant is defined in TS 28.201 [21] and out of the scope of this TS.  NOTE 3: The Nnwdaf\_MLModelProvision service and the Nnwdaf\_MLModelInfo service are provided by an NWDAF containing MTLF and consumed by an NWDAF containing AnLF or provided by an NWDAF containing MTLF supporting FL as a server and consumed by an NWDAF containing MTLF. | | | |

Table 7.1-2 shows the analytics information provided by NWDAF service.

Table 7.1-2: Analytics information provided by NWDAF

|  |  |  |
| --- | --- | --- |
| Analytics Information | Request Description | Response Description |
| Slice Load level information | Analytics ID: load level information | Load level provided as number of UE registrations and number of PDU sessions for a Network Slice and Network Slice instances as well as resource utilization for Network Slice instances. |
| Observed Service experience information | Analytics ID: Service Experience | Observed Service experience statistics or predictions may be provided for a Network Slice or an Application. They may be derived from an individual UE, a group of UEs or any UE. For slice service experience, they may be derived from an Application, a set of Applications or all Applications on the Network Slice. |
| NF Load information | Analytics ID: NF load information | Load statistics or predictions information for specific NF(s). |
| Network Performance information | Analytics ID: Network Performance | Statistics or predictions on the load in an Area of Interest; in addition, statistics or predictions on the number of UEs that are located in that Area of Interest. |
| UE mobility information | Analytics ID: UE Mobility | Statistics or predictions on UE mobility. When visited AOI(s) is included in the Analytics Filter information, only statistics on UE mobility can be provided. |
| UE Communication information | Analytics ID: UE Communication | Statistics or predictions on UE communication. |
| Expected UE behavioural parameters | Analytics ID: UE Mobility and/or UE Communication | Analytics on UE Mobility and/or UE Communication. |
| UE Abnormal behaviour information | Analytics ID: Abnormal behaviour | List of observed or expected exceptions, with Exception ID, Exception Level and other information, depending on the observed or expected exceptions. |
| End-to-end data volume transfer time | Analytics ID: E2E data volume transfer time | Analytics on E2E data volume transfer time. |
| User Data Congestion information | Analytics ID: User Data Congestion | Statistics or predictions on the user data congestion for transfer over the user plane, for transfer over the control plane, or for both. |
| QoS Sustainability | Analytics ID: QoS Sustainability | For statistics, the information on the location and the time for the QoS change and the threshold(s) that were crossed; or, for predictions, the information on the location and the time when a potential QoS change may occur and what threshold(s) may be crossed. |
| Session Management Congestion Control Experience | Analytics ID: Session Management Congestion Control Experience | Statistics on session management congestion control experience for specific DNN and/or S-NSSAI. |
| Redundant Transmission Experience | Analytics ID: Redundant Transmission Experience | Statistics or predictions aimed at supporting redundant transmission decisions for URLLC services. |
| WLAN performance | Analytics ID: WLAN performance | Statistics or predictions on WLAN performance of UE. |
| Dispersion | Analytics ID: UE Dispersion | Statistics or predictions that identify the location (i.e. areas of interest) or network slice(s) where a UE, or a group of UEs disperse their data volume, or disperse mobility or session management transactions or both. |
| DN Performance | Analytics ID: DN Performance | Statistics or predictions on user plane performance for a specific Edge Computing application. |
| PFD Determination | Analytics ID: PFD Determination | Statistics on PFD information for a known application identifier(s). |
| Movement Behaviour | Analytics ID: Movement Behaviour | Statistics or predictions on movement behaviour for an applicable area. |
| Location Accuracy | Analytics ID: Location Accuracy | Predictions on Location Accuracy. |
| Relative Proximity | Analytics ID: Relative Proximity | Statistics or predictions on Relative Proximity among UEs. |
| PDU Session traffic | Analytics ID: PDU Session traffic | Statistics on whether traffic of UEs via one or multiple PDU sessions is according to the information provided by the service consumer. |
| QoS and Policy Assistance | Analytics ID: QoS and Policy Assistance | Analytics on candidate QoS parameter set(s) and the associated QoE(s). |

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