**SA WG2 Meeting #S2-160 S2-2311989**

**13 - 17 November, 2023, Chicago, US**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** | **0970** | **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:*** | to AI/ML functionality descriptions related to E2E data volume transfer time analytics | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | , NTT DOCOMO, LG Electronics, ETRI, CATT | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | AIMLsys | | | | |  | ***Date:*** | | | 2023-10-15 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Clarifications of the AI/ML related text and some corrections are needed | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Several corrections related to AI/ML functionality are introduced | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Incorrect wording and unclear statements stay in the specification | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.18.1, 6.18.2, 6.18.4 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\*\*\*\*\*\*\*\*\*\* Start of Changes \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

6.18.1 General

Clause 6.18 describes how NWDAF can provide E2E data volume transfer time analytics, in the form of statistics or predictions or both, to a service consumer. NWDAF collects E2E data volume transfer time related input data from 5GC NFs, OAM and AF. 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 E2E data volume transfer time refers to a time delay for completing the transmission of a specific data volume from UE to AF, or from AF to UE. If a target number of repeating data transmissions or a target time interval between data transmissions is given, the E2E data volume transfer time can be provided as an average value of the data volume transfer times within the Analytics target period. The E2E data volume transfer time analytics may be used to assist an AF hosting AI/ML-based services, e.g. for member UE selection of federated learning.

The E2E data volume transfer time analytics may be provided as defined in clause 6.18.3 for a single UE or a list of UEs.

More than one E2E data volume transfer time classes might be assigned by operator or AF to a list of UEs. The UEs might be classified into high-, medium- and low-transfer time classes with respect to the threshold(s) of the corresponding class.

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

The consumer of these analytics may indicate in the request:

- Analytics ID = "E2E data volume transfer time ".

- Target of Analytics Reporting: a single UE (SUPI/GPSI) or a list of UEs (a list of SUPIs/GPSIs).

- Analytics Filter Information, optionally including:

- DNN;

- S-NSSAI;

- Application ID;

- Area of Interest (AOI(s)): restricts the scope of the E2E data volume transfer time analytics to the provided area;

- A list of analytics subsets that are requested (see clause 6.18.3);

- Data Volume UL/DL: indicates a specific data volume transmitted once from UE to AF and/or from AF to UE;

- QoS requirements (e.g. 5QI, QoS Characteristics);

- Either a target number of repeating data transmissions or a target time interval between data transmissions within the Analytics target period;

- A request for geographical distribution (i.e. the AoIs) of the UEs.

- An Analytics target period indicates the time period over which the statistics or predictions are requested.

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

- Optionally, preferred level of accuracy of the analytics.

- Optionally, preferred level of accuracy per analytics subset (see clause 6.18.3).

- Optionally, preferred order of results for the list of E2E data volume transfer time:

- ordering criterion: "E2E data volume transfer time",

- 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 6.18.3)

- Optionally, maximum number of UEs.

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

6.18.2 Input Data

The NWDAF supporting analytics on E2E data volume transfer time shall be able to collect E2E data volume transfer time information from AF, OAM and 5GC NFs.

More detailed information collected by the NWDAF from the OAM is defined in the Table 6.18.2-1, from relevant 5GC NFs (i.e. UPF, SMF, AMF) is defined in Table 6.18.2-2 and from AF is defined in Table 6.18.2-3.

**Table 6.18.2-1: Input data from OAM related to E2E data volume transfer time**

|  |  |  |
| --- | --- | --- |
| **Information** | **Source** | **Description** |
| RAN part delay | OAM TS 28.554 [10] | Average packet transmission delay through the RAN part to the UE, per timeslot, per 5QI and per S-NSSAI |
| Timestamp | OAM | A time stamp associated with the collected information |
| RAN Throughput for DL and UL | OAM  (see NOTE 1) | The per UE measurement of the throughput for DL and UL as specified in clauses 5.2.1.1 and 5.4.1.1 of TS 37.320 [20] |
| RAN Packet delay for DL and UL | OAM  (see NOTE 1) | The per UE measurement of the packet delay for DL and UL, including per DRB per UE packet delay as specified in clause 5.4.1.1 of TS 37.320 [20] |
| RAN Packet loss rate for DL and UL | OAM  (see NOTE 1) | The per UE measurement of the packet loss rate for DL and UL, including per DRB per UE packet loss rate as specified in clause 5.4.1.1 of TS 37.320 [20] |
| Average UL/DL packet delay between PSA UPF and UE | OAM | The average of UL/DL packet delay between PSA UPF and UE as captured in clauses 5.4.9.1.1 and 5.4.9.2.1 of TS 28.552 [8] |
| NOTE 1: Per UE measurement for a specific UE from OAM (via MDT), is as captured in clause 6.2.3.1. | | |

Editor's note: The inclusion of the following OAM inputs: *RAN part delay* and Average *UL/DL packed delay between PSA UPF and UE* is subject to SA WG5 verification.

NWDAF subscribes to the input data from OAM as defined in the Table 6.18.2-1 by using the services provided by OAM as described in clause 6.2.3.

NOTE 1: Whether the UE(s) is supporting a Slice or not can be checked by retrieving the registered AMF details from UDM or by asking AMF about what Slice is used by the UE(s) at the current registration (Alternatively, if NSACF is deployed, NSACF can provide a report on what slices are used by the UE(s)).

NOTE 2: User consent checking from UDM can apply to these analytics.

**Table 6.18.2-2: Service Data from 5GC NFs for E2E data volume transfer time analytics**

|  |  |  |
| --- | --- | --- |
| **Information** | **Source** | **Description** |
| Timestamp | 5GC NF | A time stamp associated with the collected information |
| UE location | AMF, GMLC | Location of the UE(s) needs to be selected via AMF if the application needs to be started at the same time. If the AoI indicated by the AF is a finer granularity area than the Cell level, the current location of the UE(s) needs to be selected via GMLC instead |
| UE ID | AMF | (list of) SUPI(s) |
| 5QI | SMF | A reference to 5G QoS characteristics |
| QoS flow Packet Delay | SMF, UPF | The observed Packet delay for UL/DL/round trip directions between UE and PSA\_UPF |
| RAT Type | SMF | The RAT types the UE camps on |
| Access Type | SMF | The list of Access Type(s) used for the PDU Session |

**Table 6.18.2-3: Service Data from AF for E2E data volume transfer time analytics**

|  |  |  |
| --- | --- | --- |
| **Information** | **Source** | **Description** |
| Timestamp | AF | Timestamp of the collected information |
| Application ID | AF | Identifier of the application at the AF |
| UE ID(s) | AF | Internal or External UE IDs (i.e. SUPI or GPSI, respectively) |
| Transmitted UL/DL data volume | AF | The volume of the transmitted UL/DL data |
| UL/DL transmission time duration | AF | The time duration (start and end time) needed for sending the volume of UL/DL data |
| Application Server Instance information | AF | The IP address/FQDN of the Application Server |

NOTE 3: How to derive the time delay for sending a specific data volume between UPF and AF on N6 interface is out of scope of the present specification.

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

6.18.4 Procedures

The NWDAF may provide E2E data volume transfer time analytics to a 5GC NF (e.g. AF, or NEF).



**Figure 6.18.4-1: Procedure for E2E data volume transfer time analytics**

1. The Consumer NF, e.g. AF, or NEF, requests or subscribes to analytics for E2E data volume transfer time analytics from NWDAF (possibly via NEF in case the consumer NF is AF) and provides the input information as specified in clause 6.18.1 to 5GC.

2a-b. The NWDAF subscribes the service data from AMF in Table 6.18.2-2 using Namf\_EventExposure\_Subscribe service for collecting UE location(s) for a UE or a group of UEs.

NOTE: If NWDAF requires UE location information with finer granularity than TA/cell, then NWDAF collects the location data from GMLC instead of AMF.

2c. NWDAF subscribes to service data from SMF in Table 6.18.2-2 by invoking Nsmf\_EventExposure\_Subscribe (Event ID, SUPI(s) or Application ID).

In order to provide the requested analytics, the NWDAF subscribes to information of the UE and may subscribe to N4 Session related input data from SMFs as defined in Table 6.18.2-2.

2d-e. N4 related input data is provided by UPF to SMF.

2f. SMF provides the requested input data to NWDAF.

2g-h. 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.

2i-j. The NWDAF may subscribe to the service data from AF as defined in the Table 6.18-3 by invoking Nnef\_EventExposure\_Subscribe or Naf\_EventExposure\_Subscribe (Event ID = E2E data volume transfer time information, Application ID, Event Filter information, Target of Event Reporting = UE ID(s)) service as defined in TS 23.502 [3].

3. The NWDAF derives requested analytics, in the form of E2E data volume transfer time statistics and/or predictions.

4. The NWDAF provides requested E2E data volume transfer timeanalytics 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 NF subscribed to E2E data volume transfer time analytics in step 1, once the NWDAF generates new analytics for E2E data volume transfer time, it provides a notification using Nnwdaf\_AnalyticsSubscription\_Notify according to the Nnwdaf\_AnalyticsSubscription\_Subscribe service operation if received in step 1.

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