**3GPP TSG-SA WG6 Meeting #60 S6-24xxxx**

**Changsha, China, 15th– 19th April 2024 (revision of S6-240724)**

**Source: Ericsson, Convida**

**Title: Solution on New ADAE Analytics on UE Capability for Supporting FL Member (Re)Selection**

**Spec: 3GPP TR 23.700-82 V0.3.0**

**Agenda item: 8.3**

**Document for: Approval**

**Contact: Jing Yue (jing.yue@ericsson.com)**

**1. Introduction**

For the AI/ML Enablement Server to coordinate a FL process, FL member (re)selection before and during the FL process are important to gerantee the training process running in proper way and getting optimal ML model. UE capability is one of the key factors for FL member (re)selection. Statisticas and/or predictions on UE capability are needed to support/assistant the FL member (re)selection. Thus, define new ADAE analytics on UE capability is necessary.

**2. Reason for Change**

New ADAE analytics on UE Capabilityis necessary to support/assistant the AI/ML Enablement Server for coordinating a FL process by (re)selection of FL members.

**3. Conclusions**

This pCR proposes new ADAE analytics on UE Capabilityfor supporting FL member (re)selection.

**4. Proposal**

It is proposed to agree the following changes to 3GPP TR 23.700-82 V0.3.0.

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

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".

[3] 3GPP TS 28.104: "Management and orchestration; Management Data Analytics".

[4] 3GPP TS 23.436: "Functional architecture and information flows for Application Data Analytics Enablement Service".

[5] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[6] 3GPP TS 23.502: "Procedures for the 5G System (5GS)".

[7] 3GPP TS 23.434: "Service Enabler Architecture Layer for Verticals (SEAL); Functional architecture and information flows".

[8] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[9] 3GPP TS 28.105: "Management and orchestration; Artificial Intelligence/ Machine Learning (AI/ML) management".

[10] 3GPP TS 22.261: "Service requirements for the 5G system".

[11] 3GPP TR 26.927: “Study on Artificial Intelligence and Machine learning in 5G media services”.

[12] 3GPP TR 22.874: “Study on traffic characteristics and performance requirements for AI/ML model transfer”.

[Y] 3GPP TS 26.531: "Data Collection and Reporting; General Description and Architecture".

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

## 8.0 Mapping of solutions to key issues

Table 8.1-1: Mapping of solutions to key issues

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | KI #1 | KI #2 | KI #3 | KI #4 | KI #5 | KI #6 | KI #7 |
| Sol #1 |  |  |  |  |  |  |  |
| Sol #2 |  |  |  |  |  |  |  |
| Sol #3 |  | X |  |  |  |  |  |
| Sol #4 |  | X |  |  |  |  |  |
| Sol #5 |  | X |  |  |  |  |  |
| Sol #6 |  |  | X |  |  |  |  |
| Sol #7 |  |  | X |  |  |  |  |
| Sol #8 |  |  | X |  |  |  |  |
| Sol #9 |  |  | X |  |  |  |  |
| Sol #10 |  |  |  |  |  |  | X |
| Sol #11 | X |  |  |  |  |  |  |
| Sol #12 | X |  |  |  |  | X |  |
| Sol #13 | X |  | X |  |  |  |  |
| Sol #14 |  |  |  |  |  |  | X |
| Sol #15 |  | X |  |  |  |  |  |
| Sol #16 |  |  | X |  |  |  |  |
| Sol #17 |  |  | X |  |  |  |  |
| Sol #18 |  |  |  | X |  |  |  |
| Sol #19 |  |  |  |  | X |  |  |
| Sol #X |  | X |  |  |  |  |  |

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

## 8.X Solution #X: New ADAE Analytics for Supporting FL Member (re)selection

### 8.X.1 General

The following clauses specify procedures, information flows and APIs for KI#2 to enhance ADAE by introducing new Analytics for supporting FL member (re)selection.

### 8.X.2 Procedure

#### 8.X.2.1 Subscribe-notify model



Figure 8.X.2.1-1: ADAES support for UE capability analytics

1. The analytics consumer (e.g. VAL Server, AI/ML Enablement Server) sends analytics subscription request for UE capability analytics to ADAE server. For analytics subscription request, the request contains message as defined in table 8.X.3.2-1.
2. Upon receiving the event subscription request from the consumer, the ADAE server checks for the relevant authorization for the event subscription. If the authorization is successful, the ADAE server stores the request information. The ADAE server sends a service API event subscription response indicating successful subscription.
3. The ADAE server sends a subscription request to the Data Producers (ADAE client, A-ADRF) with the respective Data Collection Event ID and the requirement for data collection. Data collection at the UE(s) reuses the SA4 mechanism based on EVEX study (3GPP TS 26.531 [Y]).
4. The Data Producers (e.g., ADAE client, A-ADRF) send subscription response as a positive or negative acknowledgement to the ADAE server.
5. The ADAE server based on subscription receive data on the UE capability based on the data collection event ID from ADAE client.
6. The ADAE server based on subscription receive data/analytics on the UE capability based on the data/analytics collection event ID from A-ADRF.

NOTE 1: The procedures for data collection for UE capability analytics need to take user consent into account.

1. The ADAES performs analytics relevant operations to generate the analytics based on the data/analytics received from the ADAEC.
2. The ADAES sends notifications to the consumer with the required UE capability analytics.

NOTE 2: The implementation of the analytics on UE capability targets 3GPP TS 23.436.

Editor’s Note: What UE capability information (e.g. the compute utilization, battery level or energy consumption on performing AL/ML operations, memory consumption for AI/ML operations), and on what exposure level of the information from UE are FFS.

#### 8.X.2.2 Request-response model

Pre-conditions:

- ADAE server already have the analytics data derived from steps 3-8 in the procedure introduced in clause 8.X.2.1.



Figure 8.X.2.2-1: ADAES support for UE capability analytics

1. The analytics consumer (e.g. VAL Server, AI/ML Enablement Server) sends a request message to the ADAE server to receive analytics data for UE capability. The request contains message as defined in table 8.X.3.8-1.

2. Upon receiving the request, the ADAE server authenticates and authorizes the analytics consumer.

3. If the analytics consumer is authorized, the ADAE server sends a response message including the analytics data (statistical and/or predictive) of the UE capability.

### 8.X.3 Information flows

#### 8.X.3.1 General

The following information flows are specified for UE capbility analytics based on clause 8.X.2.

#### 8.X.3.2 UE capability analytics subscription request

Table 8.X.3.2-1 describes the information flow from the consumer (e.g. VAL server, AI/ML Enablement server) as a request or update request for the UE capability analytics.

Table 8.X.3.2-1: UE capability analytics subscription request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Requestor ID | M  (NOTE) | The identifier of the consumer. |
| Analytics ID | M  (NOTE) | The identifier of the analytics event. This ID can be for example "UE capability analytics". |
| Analytics type | M | The type of analytics for the event, e.g. statistics or predictions. |
| List of VAL users or VAL UE IDs | M | The VAL users or VAL UE(s) identifiers for which the data/analytics apply. |
| VAL service ID | O | The identifier of the VAL service which is associated with UE capability. |
| UE capability attributes | M | The UE capability attributes to be analyzed at the ADAE client. |
| Reporting requirements | O | It describes the requirements for analytics reporting. This requirement may include e.g. the type and frequency of reporting (periodic or event triggered), the reporting periodicity in case of periodic, and reporting thresholds. |
| Area of Interest | O | The geographical or service area for which the subscription request applies. |
| Preferred confidence level | O | The level of accuracy for the analytics service (in case of prediction). |
| Time validity | O | The time validity of the subscription request. |
| NOTE: This information element shall not be updated. | | |

Editor’s note: Whether and what in the UE capability attributes is for FFS.

#### 8.X.3.3 UE capability analytics subscription response

Table 8.X.3.3-1 describes the information elements for the UE capability analytics subscription response from the ADAE server to the consumer.

Table 8.X.3.3-1: UE capability analytics subscription response

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Result | M | The result of the analytics subscription request (positive or negative acknowledgement). |

#### 8.X.3.4 UE capability analytics notification

Table 8.X.3.4-1 describes the information flow from the ADAES to the consumer (e.g. VAL Server, AI/ML Enablement Server) as a response for the UE capability analytics.

Table 8.X.3.4-1: UE capability analytics notification

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Analytics ID | M | The identifier of the analytics event. This ID can be for example "UE capability analytics". |
| List of VAL users or VAL UE IDs | M | The VAL users or VAL UE(s) identifiers for which the data/analytics apply. |
| >VAL user or VAL UE ID in the list | M | The VAL user or VAL UE identifier for which the data/analytics apply. |
| >>Analytics Output | M | The reported analytics for the UE capability. The predictive or statistical parameter. |
| >>Confidence level | O | For predictive analytics, the achieved confidence level can be provided. |

#### 8.X.3.5 UE capability data collection subscription request

Table 8.X.3.5-1 describes information elements for the UE capability data collection subscription request from the ADAE server to the Data Producer at the ADAE client or the A-ADRF.

Table 8.X.3.5-1: Data collection subscription request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Requestor ID | M | The identifier of the consumer. |
| Data Collection Event ID | M | The identifier of the data collection event |
| Data collection requirements | O | The requirements for data collection, including the format of data, frequency of reporting, level of abstraction of data, level of accuracy of data. |
| Analytics ID | O | The identifier of the analytics event, for which the data collection is needed. This ID can be for example "UE capability analytics". |
| List of Data Producer IDs | O | In case when this request is performed via A-DCCF, then the list of Data Producer IDs is needed. |
| Target data producer profile criteria | O | Characteristics of the data producers to be used. |
| List of VAL users or VAL UE IDs | M | The VAL users or VAL UE(s) identifiers for which the data/analytics apply. |
| VAL service ID list | O | The identifier(s) of the VAL service(s) which is associated with UE capability. |
| UE capability attributes | M | The UE capability attributes to be analyzed at the ADAE client. |
| Area of Interest | O | The geographical or service area for which the requirement request applies. |
| Time validity | O | The time validity of the request. |

#### 8.X.3.6 UE capability data collection subscription response

Table 8.X.3.6-1 describes information elements for the Data collection subscription response from the UE capability data Producer at the ADAE client or the A-DCCF to the ADAE server.

Table 8.X.3.6-1: Data collection subscription response

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Result | M | The result of the UE capability data collection subscription request (positive or negative acknowledgement). |

#### 8.X.3.7 Data Notification

Table 8.X.3.7-1 describes information elements for the Data Notification from the Data Producer to the ADAE server.

Table 8.X.3.7-1: Data notification

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Data Collection Event ID | M | The identifier of the data collection event. |
| Data Producer ID | M | The identity of Data Producer. |
| Analytics ID | O | The identifier of the analytics event. This ID can be for example "UE capability analytics". |
| Data Type | M | The type of reported data samples which can be network data, application data, edge data, or different granularities / abstraction of data (e.g. real time, non-real time). This also indicates whether data are offline (from A-ADRF or not). |
| Data Output | M | The reported data, which can be inform of measurements or offline/historical data on the requested parameter based on subscription. |

#### 8.X.3.8 Get analytics data request

Table 8.X.3.8-1 describes information elements for the Get UE capability analytics request from the analytics consumer to the ADAE server.

Table 8.X.3.8-1: Get analytics data request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Requestor ID | M | The identifier of the consumer. |
| Analytics ID | M | The identifier of the analytics event. The identifier of the analytics event. This ID can be for example "UE capability analytics". |
| Analytics type | M | The type of analytics, e.g. statistics or predictions. |
| List of VAL users or VAL UE IDs | M | The VAL users or VAL UE(s) identifiers for which the data/analytics apply. |
| VAL service ID | O | The identifier of the VAL service which is associated with UE capability. |
| UE capability attributes | M | The UE capability attributes to be analyzed at the ADAE client. |
| Preferred confidence level | O | The level of accuracy for the analytics service (in case of prediction). |
| Time window | O | The start and end time requirements on the generation of the analytics data to be collected. |
| Time validity | O | The time validity of the request. |

#### 8.X.3.9 Get analytics data response

Table 8.X.3.9-1 describes information elements for the Get UE capability analytics response from the ADAE server to the consumer.

Table 8.X.3.9-1: Get analytics response

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Result | M | The result of the analytics data request (positive or negative acknowledgement). |
| Analytics ID | O | The identifier of the analytics event. This ID can be for example "UE capability analytics". |
| List of VAL users or VAL UE IDs | M | The VAL users or VAL UE(s) identifiers for which the data/analytics apply. |
| >VAL user or VAL UE ID in the list | M | The VAL user or VAL UE identifier for which the data/analytics apply. |
| >>Analytics Output | M | The predictive or statistical parameter. |
| >>Confidence level | O | For predictive analytics, the achieved confidence level can be provided. |
| >>Timestamp | O | Timestamp of the collected analytics data. |

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