**3GPP SA WG2 Meeting #162 S2-2405162**

**Changsha, China, April 15 – 19, 2024**

**Source: Ericsson, CMCC**

**Title: KI#2: New Solution for Direct subscription of UPF event from NEF/trusted AF or NWDAF**

**Document for:** **Approval**

**Agenda Item:** **19.11**

**Work Item / Release:** **FS\_UPEAS Ph2 / Rel-19**

*Abstract of the contribution: The contribution proposes a solution to KI#2*

# 1. Introduction/Discussion

In the approved FS\_UPEAS\_Ph2, Key Issues #2 is to study potential enhancements on UPF event exposure service to optimize the procedures related to UPF data collection which includes identify the specific use case and scenarios that require optimizing the procedures related to UPF data collection with enhancements on UPF direct or indirect subscription.

As specified in clause 4.15.3.2.3 of TS 23.502 [3] in Rel-18, the UPF event exposure service requested by the AF for UPF event exposure service to collect traffic volume and UL/DL data rate are indirectly subscribed via the long subscription path AF->NEF->UDM->SMF->UPF and notification UPF->NEF->AF for the service as shown in Figure 4.15.3.2.3-1 of TS 23.502 [3]. This indirect subscription is not optimized when the AF is trusted AF and not requiring NEF handling, also not optimized for the non-specific ongoing UE PDU Session related UPF event exposure data collection. And ASP/AF may utilize the applications traffic usage/trends, average performance to optimize some following actions e.g., optimize the AF traffic influence guidance for certain application in some DNAI, optimize the application handling e.g., codec adaptation for better QoE etc, Indirect subscription for UPF data collection implies subscriptions to UPF becomes specific for each UE PDU Session. Also, the indirect subscription path currently is not e2e effective on signaling handling and not energy effective. Hence this proposal provides a solution to extend the cases when direct subscription from NEF or trusted AF to UPF event exposure service are possible. NWDAF could also benefit of the proposed enhancements.

It is proposed to introduce the following changes vs. TR 23.700-63.

\*\*\* 1st 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 23.501: "System Architecture for the 5G System (5GS); Stage 2".

[3] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[4] 3GPP TS 23.503: "Policies and Charging control framework for the 5G System; Stage 2".

[5] 3GPP TS 29.510: "5G System; Network function repository services; Stage 3".

[6] 3GPP TS 29.244: "Interface between the Control Plane and the User Plane nodes".

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

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

## 6.0 Mapping of Solutions to Key Issues

Table 6.0-1: Mapping of Solutions to Key Issues

|  |  |  |  |
| --- | --- | --- | --- |
|  | Key Issues | | |
| Solutions | Key Issue #1 | Key Issue #2 | Key Issue #3 |
| Solution #1: Provisioning of information for header handling |  |  | x |
| Solution #2: UPF provision and selection based on new UPF functionality #2 | x |  |  |
| Solution #3: Selection on UPF with extended user plane capabilities | x |  |  |
| Solution #4: Selection of UPF providing specific user plane functionalities | x |  |  |
| Solution #5: Direct subscription of UPF event exposure service for TSC management |  | x |  |
| Solution #6: UPF selection based on the status of the supported functionalities | x |  |  |
| Solution #7: Translating SUPI/GPSI to NATed IP address |  | x |  |
| Solution #m: Direct subscription of UPF event from NEF/trusted AF or NWDAF |  | x |  |
|  |  |  |  |

\*\*\* 3rd change (al new) \*\*\*

## 6.M Solution #M: Direct subscription of UPF event from NEF/trusted AF or NWDAF

### 6.M.1. Description

This solution addresses the case the NF service consumer of the UPF event exposure is NEF or trusted AF.

In this solution, the untrusted AF with SLA via NEF or trusted AF within the same 5GC domain directly can subscribe UPF exposure events in following cases:

- The solution is applicable if data collection from UPF if for one or more of these events:

- UserDataUsageMeasures,

- UserDataUsageTrends, (and/or applicable new events in the future subscribed using SBI to UPF).

- The solution extends the list of targets which allow direct subscription and filters. Those can be:

- Any UE or list of UEs (SUPIs, GPSIs or UE IP addresses).

The UE IP addresses are used for selecting the UPFs to subscribe to and by UPF for filtering the event reports. The consumer can identify the UPF for a UE IP address using NRF with existing functionality.

The SUPIs and GPSIs are used by UPF for filtering the event reports, not for selecting the serving UPFs to subscribe to. The UPF can store subscriptions for SUPIs and GPSIs and activate the reporing when/if a corresponding PDU Session is established. I.e the NF consumer provides the full list of SUPIs/GPSIs to the UPFs subscribed to, and the UPFs targets those GPSIs/SUPIs it serves.

NOTE 1: In a deployment where UPF reporting filtered per SUPI and/or GPSI is expected, the SMF should provide UPF with the necessary information over N4. If the SMF is not configured to provide UPF with this information, then such UPF reporting filtering is not possible

NOTE 2: In the case of subscription for a list of SUPIs/GPSIs, whether it is more optimal to subscribe via SMF or directly to UPF depends on the size of the SUPI/GPSI range and the number of UPFs.

* Application ID(s).

It is unclear why a subscription needs to be sent via SMF when application Id is included. UPF may report for the PDU Sessions where traffic of this application is identified.

* DNN(s) and S-NSSAI(s) (like is baseline)

Based on above the NEF or trusted AF may directly subscribe to the UPF event exposure service and optionally providing the requested UPF events data collection time period, to enhance UPF data collection subscription procedures.

NWDAF could also benefit of these enhancements.

### 6.M.2 Procedures

#### 6.M.2.1 Direct subscription of UPF Event Exposure service from NEF/trusted AF



Figure 1: Direct subscription of UPF event exposure from NEF or trusted AF

The untrusted AF with SLA between the ASP and the operator, invokes the Nnef\_EventExposure\_Subscribe service operation for the applicable events and applied targets to request UPF event exposure e.g. traffic volume, UL/DL data rate with any UE or list of UEs SUPIs, GPSIs or IP addresses, Application ID(s), DNN(s) and/or S-NSSAI(s) as the UPF detected monitoring events as defined in clause 4.15.3.1 of TS 23.502 [3] and may include requested reporting information.

2a/2b. The NEF / trusted AF invokes the Nnrf\_NFDiscovery service operation to discover the serving UPF(s) supporting the requested UPF event exposure service and filters. 3(a/b)/4. Upon receiving the discovered UPF(s) from the NRF, the NEF / trusted AF invokes the Nupf\_EventExposure Subscribe service operation with target list of UE SUPIs, GPSIs or IP addresses, Application Id(s), DNN(s) and/or S-NSSAI(s).

5a. If step 3a is used, the UPF notifies the detected UPF events to the subscribed NEF.

5b. Upon receiving the UPF event notification from the UPF, the NEF notifies the subscribed untrusted AF with the UPF events requested in the subscription.

6. If step 4 is used, the UPF notifies the detected UPF events to the subscribed trusted AF.

#### 6.M.2.2 Direct subscription of UPF Event Exposure service from NWDAF



Figure 2: Direction subscription of UPF event exposure from NWDAF

Pre-condition as step 0: NWDAF service consumer send Nnwdaf\_AnalyticsInfo\_Request or Nnwdaf\_AnalyticsSubscription\_Subscribe request to the NWDAF, including requested target(s) and optionally AoI.

1. The NWDAF determines whether needs to collect the corresponding data from UPF, e.g., if NWDAF already has the related data collection or other methods to collect data, then needn’t invoke the following data collection steps. If the UPF data needs to be collected, the NWDAF further determine whether the UPF data to be collected indirectly via SMF or directly from UPF. E.g., for QoS Monitoring event data collection for the ongoing specific PDU Session, the indirect UPF data collection via SMF is always needed. While if not required for the ongoing specific UE’s PDU Session and only the target(s) presented in the target period by the serving UPF(s) to be collected, then direct UPF data collection steps can be proceeded as Option 2 from step 3.

2. If the NWDAF determined indirect UPF data collection is needed as Option 1, then same procedure as step 3 – 5 in Figure 4.15.4.5.2-1 in TS 23.502 [3] to be followed.

3. If the NWDAF determined direct UPF data collection is needed as Option 2, the NWDAF invokes Nnrf\_NFDiscovery\_Request message including the target(s) information.

4. the NRF responds with the discovered UPF(s) information.

5. Upon receiving the discovered UPF(s) from the NRF, the NWDAF invokes the Nupf\_EventExposure Subscribe service operation with target list of UE SUPIs, GPSIs or IP addresses, Applicationd Id(s), DNN(s)and/or S-NSSAI(s).

6. The subscribed UPF event(s) is detected meeting the reporting requirement, the UPF notifies the detected UPF events to the subscribed NWDAF.

### 6.M.4 Impacts on services, entities and interfaces

NEF or trusted AF:

- Supports direct subscription of UPF event exposure service for the applicable events with extension of possible requested target(s) and filters.

- Support to invoke Nnrf\_NFDiscovery service operation with requested target(s) to discover the serving UPF(s) for the requested UPF event.

NWDAF:

- Supports direct subscription of UPF event exposure service for the applicable events with extension of possible requested targets and filters.

- Support to invoke Nnrf\_NFDiscovery service operation with requested target(s) to discover the serving UPF(s) for the requested UPF event.

- Support input data collection for UPF exposure enhancement and the related analytics output enhancement,

UPF:

- Supports NEF and trusted AF as service consumer for direct subscription of the applied event exposure services.

- Supports Application Id filter.

- Supports subscriptions to SUPI(s) and GPSI(s) and activates reporting for the PDU session when they are established.

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