**3GPP TSG-CT WG4 Meeting #124C4-243538**

**Maastricht, Netherlands; 19th – 23rd August 2024 was3164**

**Source: China Mobile, Nokia, Ericsson**

**Title: Pseudo-CR on Architectural Assumptions and Principles and Key Issues update for PAIDC**

**Spec: 3GPP TR 29.889**

**Agenda item: 6.1.4**

**Document for: Decision**

**1. Introduction**

<Introduction part (optional)>

**2. Reason for Change**

Clauses of Architectural Assumptions and Principles, Key Issues are needed.

**3. Conclusions**

<Conclusion part (optional)>

**4. Proposal**

It is proposed to agree the following changes to 3GPP TR 29.889.

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

# 4 Architectural Requirements

## 4.1 Overview of the UPF data collection architecture

This clause provides an overview of the architecture and mechanisms supported to collect data from the UPF:

- The UPF can provide event exposure via indirect subscription by SMF (PFCP or HTTP) or direct subscription by other NF consumers. Three different UPF event subscription/notification modes can be identified as below:

- Mode 1: NF consumer subscribes the UPF event via SMF using the PFCP protocol via N4 interface as illustrated in Figure 4.1.1-1.



Figure 4.1.1-1: UPF event subscription/notification mode 1

- Mode 2: NF consumer subscribes the UPF event via SMF using the HTTP protocol via the Nupf SBI interface as illustrated in Figure 4.1.1-2.



Figure 4.1.1-2: UPF event subscription/notification mode 2

- Mode 3: NF consumer subscribes the UPF event directly using the HTTP protocol via the Nupf SBI interface as illustrated in Figure 4.1.1-2.



Figure 4.1.1-3: UPF event subscription/notification mode 3

- As of Rel-18, the UPF supports four types of UPF events, and one specific UPF event subscription/notification mode was specified for each supported event as specified in clause 5.2.1.3 of 3GPP TS 29.564 [5]. Table 4.1-1 provodes a summary of the UPF event exposure.

Table 4.1-1: UPF event exposure supported by the Nupf\_EventExposure service

|  |  |  |  |
| --- | --- | --- | --- |
| Event Type | Subscription Mode | Report Type | Data consumers |
| QoS Monitoring | Mode 1 | Continuous (event triggered) ReportPeriodic Report | NEF, AF, NWDAF, TSCTSF, TSNAF, DCCF, MFAF |
| User Data Usage MeasurementUser Data Usage Trends | Mode 2(Target to a specific UE or a group of UEs; or any UE with AoI, BSSID/SSID or DNAI information) | One-Time ReportPeriodic Report | NWDAF, DCCF, MFAF |
| Mode 3(Target to any UE without any AoI, BSSID/SSID or DNAI information) |
| TSC Management Information | Mode 1 | Continuous (event triggered) Report. | TSCTSF, TSNAF |

## 4.2 Architectural Requirements

The solutions studied in the present study shall comply with the stage 2 architecture and requirements specified in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3], and 3GPP TS 23.503 [4]. Specifically, the proposed solution shall build on the 5GS UPF event subscription and notification principles as specified in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 29.564 [5].

The N4 and Nupf interface shall be based on the existing interface design.

Solutions developed in this TR shall be backward compatible.

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

# 5 Key Issues

## 5.1 Key Issue#1: Identifying and lowering the network performance impacts of intensive data collection from UPF

### 5.1.1 General

The service-based architecture in 5G facilitates flexible information exchange between network functions via standardized Service Based Interfaces (SBI). This definition provides a suitable framework for 5G system especially the AI/ML functions (e.g. NWDAF) to collect required data from various sources.

However, as AI/ML adoption grows for 5G use cases like network automation, analytics and others, which like results in massive network signalling messages, including both event subscription creation/modification/deletion signalling and the event reports generated for the corresponding subscriptions, this massive signalling will consume considerable processing and memory in the UPF, which downgrades the UPF performance/capability for packets forwarding which is the main task of the UPF.

Therefore it is proposed to study potential optimisations of the Nupf\_EventExposure service which aim at reducing the network signalling and the processing required for events subscription and events reporting, improving the quality of event reports which do help the business logic. For use cases where the subscription triggers the UPF to generate very frequent event reports with a large volume, alternative protocols or enhancements to the existing protocol to deliver those event reports may be investigated.

### 5.1.2 Key Issue Definition

This Key Issue will study the following aspects:

- Identify the use cases which leads extra signalling and unnecessary processing load and study corresponding potential optimisations.

- Study whether the existing protocol can be enhanced to reduce the signaling and processing required to subscribe to the UPF for UPF data collection;

- Identify the use cases where very frequent event reports with a large volume will be generated which ignificantly impacts the UPF performance, and if so:

- Study whether the existing protocol can be enhanced to reduce the signaling and processing required to report UPF data;

- Study whether alternative protocols for collecting the data from the UPF may help enhancing the performances compared to the existing protocol.

## 5.2 Key Issue#2: Data collection protocol selection

### 5.2.1 General

As AI/ML adoption grows for 5G use cases like network automation, analytics and others, various NF service consumers (including those indirect service consumer) for Nupf\_EventExposure service, for different application traffic and different use cases, may prefer to use different protocols to request the UPF to deliver those event reports to the relevant NF service consumer in more efficient ways, while allowing the UPF to send the event reports in a single format, i.e. using the existing JSON object "NotificationData" to avoid transcoding between SBI and other protocols.

However, per existing specification, a NF service consumer has only one alternative to provide an eventNotifyUri URI together with a notifyCorrelationId to receive the event reports; and the UPF, as the NF service producer can only send the report to this Uri together with the correlationId using the HTTP POST as specified in clause 5.2.2.3 of 3GPP TS 29.564 [X].

Based on the study of Key Issue #1, the original SBI based protocol and one or more alternative protocols may be possible to be used between data collector (e.g. NWDAF) and the UPF. After the NF consumer subscribes to UPF events, the UPF needs to have enough information to decide which protocol shall be used to fulfil the data collection requirement from NF consumer. So, this KI targets to study the data collection protocol selection and possible enhancement to UPF event exposure for the data collection protocol selection.

### 5.2.2 Key Issue Definition

This Key Issue will study the following aspects:

- Whether and how to negotiate the supported and the selected data collection protocol between the NF service consumer (of Nupf\_EventExposure service) and the UPF. The data collection protocols can be used for delivering the event reports generated for the given subscription based on the existing SBI framework.

- Whether and how UPF event subscription and notification procedures need to be enhanced to support the data collection protocol selection.

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