**SA WG2 Meeting #162 S2-2404949r01**

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

**Source: InterDigital Inc., OPPO,ICS?**

**Title: KI#3, New Solution, Sustainability-based QoS policies determination**

**Document for: Approval**

**Agenda Item: 19.15**

**Work Item / Release: FS\_AIML\_CN/ Rel-19**

*Abstract of the contribution: This p-CR proposes a new solution for Key issue 3 for NWDAF assistance to QoS policies determination.*

# Discussion

**This pCR proposes a solution for KI3 on NWDAF assisted QoS policies determination. The Key issue mentions:**

“This key issue aims to study whether and what is additionally needed to be supported in order to enhance 5GC NF operations related to policy control and QoS with the assistance of the NWDAF.

In this key issue, the following aspects will be studied:

- Identification of use cases where policy control and QoS can be further enhanced with assistance from NWDAF.

- **Whether and how to introduce new 5GC functionality e.g. of the NWDAF and/or PCF to enhance the policy control and QoS, considering operator’s policies**.

- Whether and what additional input information is needed by the NWDAF for providing an assistance to policy control and QoS, and how to gather it.

- Whether and what output information, on top of already provided, the NWDAF can provide to assist with policy control and QoS enhancements.

- Whether and how to evaluate the quality of the enhanced NWDAF assistance to policy control and QoS.

NOTE: The study will focus primarily on existing enforcement mechanisms when available and identify new ones only when no existing ones can be used.”

This solution proposes enhancements to the 5GS to take advantage of network data analytics concepts, by combining Observed Service Experience and QoS Sustainability, into a new combined network analytic. The consumer of this analytic, the PCF in this case, is configured with conditions, e.g., in the form of operator policies, that trigger the PCF to request this new analytic, in order to enahnced QoS policy control, thereby addressing aspects of KI#3.

# 2. Proposal

It is proposed to agree the following solution into TR 23.700-84.

Start of Change (all new changes)

 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; Stage 2".

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

[4] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System".

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

[6] 3GPP TR 38.843: " Study on Artificial Intelligence (AI)/Machine Learning (ML) for NR air interface".

[7] 3GPP TS 23.273: "5G System (5GS) Location Services (LCS)".

[X] 3GPP TS 28.104: “Management and orchestration; Management Data Analytics (MDA)”

\* \* \* \* Next change \* \* \* \*

# 6 Solutions

## 6.0 Mapping of Solutions to Key Issues

Table 6.0-1: Mapping of Solutions to Key Issues and Use Cases

|  |  |  |
| --- | --- | --- |
|  | Key Issues | Use cases (optional) |
| Solutions | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 5 | 6 |
| #X |  |  | X |  |  |  |  |  |  |  |

## 6.X Solution #X: NWDAF-assisted optimized QoS policies determination

### 6.X.1 Description

This solution addresses aspects of key issue #3 on NWDAF-assisted policy control and QoS enhancement.

This solution proposes a new network analytic that considers both Observed service experience and QoS sustainability aspects jointly. These new analytics are called “Observed Service Experience Sustainability”.

The PCF may be configured, based on operator policies, with conditions that trigger the PCF to determine when this new analytic or any other relevant analytic may be requested to enhance QoS Policy control and optimized QoS policies determination. Such conditions include configuring the PCF with a threshold of the number of SMF-PCF interactions that request changing PCC rules, per time period.

The input data used by the NWDAF to derive Observed Service Experience Sustainability analytcs, includes input data collected for existing Observed service experience analytics (tables in clause 6.4.2 in TS 23.288), and input data collected for the existing QoS sustainability analytics. (tables in clause 6.9.2 TS 23.288). Furthermore, additional input data may be collected in relation to QoS sustainability include data for a UE ID or group of UE IDs, application ID, service type, S-NSSAI, and DNN.

NOTE: The input data for service experience analytics received by the NWDAF defined by the TS 23.288 [5]), Table 6.4.2-5 is also enhanced to support newly introduced/updated fields as per TS 28.104 [X], Table 8.4.2.1.3-1 (i.e serviceInformation and affectedObjects fields) by introducing serviceInformation field and extending the definition of affectedObjects field.

### 6.X.2 Procedures

#### 6.x.2.1 Procedure for optimized QoS determination based on Observed Service Experience Sustainability analytics (OSES)

The following shows an example procedure where the PCF is triggered to Optimize QoS policies, and requests Observed Service Experience Sustainability analytics and use the analytics results to determines optimized QoS parameters.



Figure 6.x.2.1-1 Procedure for PCF to be triggered to obtain Observed Service Experience Sustainability analytics to optimized QoS policies.

1. 0a. the AF requests a NEF service operation that involves AIML interactions, e.g., Observed Service Experience determination, e.g., using VFL, as per UC#5. This may be used by the NEF or the PCF to determine whether additional analytics and predictions may be used, when setting QoS parameters.

0b, alternatively, the PCF may identify, e.g., using an operator configured threshold, that it has received a large amount of SMF interaction requesting changes to the Policy and Charging Control rules, within certain time period. The time period can, for example, be based on the Revalidation time limit used by the PCF to trigger an SMF interaction, due to enforced PCC rule request.

1. PCF is triggered to send a request to an NWDAF network function to obtain Observed Service Experience Sustainability analytics, e.g., based on step 0a or step 0b.

PCF uses Nnwdaf\_analyticsSubscription\_Subscribe or Nnwdaf\_AnalyticsInfo\_Request messages. PCF includes analytics ID = “Observed Service Experience Sustainability”, UE ID as the target of analytics reporting, and analytics reporting parameters, such as analytics target period. PCF may further include Analytics filter information, such as S-NSSAI/DNN value, and Application ID. Alternatively, the PCF may subscribe to NWDAF analytics via the DCCF, using Ndccf\_DataManagement\_Subscribe service operation. Whether the NWDAF service consumer (e.g. the PCF) may determine whether it directly contacts the NWDAF or goes via the DCCF is based on e.g., a need to subscribe, simultaneously, to multiple Analytic IDs, that require data collection from common sources, or as determine by network operator policies.

1. NWDAF Service consumer sends a Nnwdaf\_MLModelInfo\_Request message to a NWDAF containing MTLF to request info about ML model for the analytics ID “Observed Service Experience Sustainability”.
2. NWDAF containing MTLF checks whether such ML model for “Observed Service Experience Sustainability” analytics is available and if it needs to be further trained. The NWDAF containing MTLF may determine that the relevant ML model is not available or need to be re-trained and initiates data collection from different entities (e.g., UPF, SMF, OAM) for ML model training.
3. NWDAF containing MTLF perform ML model training using the data collected from the NFs and OAM.
4. After the ML model is training is complete, the NWDAF containing MTLF sends the ML model to the NWDAF Service consumer, e.g., by sending Nnwdaf\_MLModelInfo\_Request response message to the first NWDAF.
5. NWDAF service consumer determine analytics for the Observed Service Experience Sustainability analytic, based the received ML Model.
6. NWDAF service consumer provides the Observed Service Experience Sustainability analytics results to PCF, via a Nnwdaf\_AnalyticsInfo\_Request response.
7. PCF uses the Observed Service Experience Sustainability analytics, to determine an optimal QoS for the UE ID and the application traffic of interest (i.e., QoS that maximizes Observed Service Experience Sustainabiity).

### 6.X.3 Impacts on services, entities and interfaces

Editor's note: This clause captures impacts on existing services, entities and interfaces.

NWDAF:

- Support for new Service Experience Sustainability analytics.

PCF:

- Configured to be triggered to determine to optimize QoS policies.

End of Changes