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**Agenda item:** 8.8

**Source:** Qualcomm Incorporated

**Title:** Interfaces and Formats for AF Data Collection and Event Exposure

**Document for** Discussion and Agreement

# Introduction

This DP provides some thoughts and ideas on the intersection and inter-relationship between several related topics in existing and likely emerging work in SA4 and SA2. These topics are centered on AF-based collection and reporting of application specific event information, referred to as “UE data” in SA2. The data collection part pertains to an AF, such as the 5GMS AF, receiving application event information either directly from the UE, or indirectly from an Application Service Provider (ASP). The data reporting part involves the AF offering the collected application event information to consumer entities such as the NWDAF, but may also include the operator’s OAM system, the ASP or third-party analytics or application servers. The FS\_5GMS\_EXT study item already includes a section on Network Event usage which covers the collection of information about the progress and status of media streaming sessions, and shared with other NFs or the ASP according to the AF Event Exposure service architecture and solution mechanisms defined in TS 23.502 [1]) and TS 29.517 [2]. A new work item, EVEX [3] has been proposed in SA4 to formalize the framework and technical mechanisms of the application event information collection and reporting to consumer entities.

In the meantime, SA2 has indicated to SA4 their interest and related architecture specification that uses the AF to accommodate the collection and reporting of UE information that is not related to 5G Media Streaming, as well as exposing that information to the NWDAF for data analytics and subsequent sharing of aggregated/normalized/filtered information with NF consumers of the NWDAF. A discussion paper in S4-210723 [4] has been submitted to SA4#114-e in describing a potential solution approach via a generic reference architecture for UE data collection and reporting that achieves the SA2 objectives without overloading the original and well-defined purpose of the 5GMS AF for media session specific data collection, reporting and event exposure.

# UE Data Collection via Direct and Indirect Methods

The 5GMS AF is designed to be the recipient of various types of application event information specific to media streaming, such as consumption reports, metrics reports and AF-based network assistance interactions, from the 5GMS Client (its Media Session Handler) over the M5 interface. Such *collection* of UE data is referred to in SA2’s eNA\_Ph2 work item (see TS 23.288 [5]) as “direct data collection”.

It is possible that data collection from the UE is accomplished by the M8 application layer interface between the 5GMS-Aware Application and the 5GMS Application Provider (or, more generically, the Application Service Provider), and in turn forwarded by the ASP to the 5GMS AF, for further exposure s event services to NF consumers. Such mechanism, also referred by SA2 in [5] as “indirect data collection”, is not specified in TS 26.501 [6] and TS 26.512 [7], mainly because M8 functionality is outside the scope of 5GMS, and additionally, there was no use case/requirement in the 5GMSA/5GMS3 work items to drive the related stage 2 and stage 3 definition. On the other hand, due to the outreach from SA2 for AF support of indirect data collection, as shown by Figure 1, at least from the standpoint of such UE data being specific to media streaming services, it would make sense to define the requisite interface (i.e., between the ASP and the 5GMS AF) to support indirect data collection.



Figure 1: Indirect UE data collection
(copied from TR 23.700-91 [8])

While in principle the M1 interface could be extended for the purpose of indirect data collection (as even suggested by SA2 in the above diagram), logically it would make more sense to define a separate (SBI-based) interface for such purpose. M1 is mainly intended to support provisioning of session-based media streaming services. Indirect UE data collection by the 5GMS AF from the ASP corresponds to a more peripheral or auxiliary feature and might be better served by defining a separate interface or API exposed by the 5GMS AF, for example R1, which is the interface name identified in the BBC *et al.* discussion paper [4], as shown in Figure 2.



Figure 2: Generic reference architecture for UE data collection and reporting
(copied from S4-210723 [4])

It can be seen from the above diagram that R1 represents more than simply the indirect data collection procedure (referred to in Figure 2 as “indirect reporting from ASP”), by including reporting provisioning and event subscription and event publication (event exposure, e.g., via notifications) to the ASP, as further described in [4].

Note that reporting-related provisioning may pertain to the configuration of rules to be applied by the AF in the processing (e.g., anonymization, normalization, filtering, aggregation) of the data it has collected via direct or indirect methods. Such processing rules may differ for data to be reported by the AF to the ASP versus the data to be reported by the AF (via event exposure) to other NF consumers such as the NWDAF. From that perspective, when the Data Collection AF is instantiated inside a 5GMS AF, the reporting provisioning/configuration function logically belongs to M1 as part of overall provisioning functionality for 5G Media Streaming. Such extension of M1 along with additional specification of R1 is also reflected in [4] as shown in Figure 3:



Figure 3: 5GMS instantiation of generic architecture for data collection and reporting
(copied from S4-210723 [4])

The details of R1 coupling to and decoupling from M1 should be further studied for each of the R1 functions, with particular regard for the associated procedures, resources and data structures, for example, via emulation of M1 mechanisms and/or reuse of those defined for the Naf Event Exposure service defined in TS 29.517 [2].

# AF Collection of CDN Access Logs

# As indicated in TS 26.501, the 5GMS AS acts as a CDN server (e.g., edge server) in the hosting and delivery of streaming media content (i.e., of ingested/egested content in downlink/uplink streaming). The corresponding content hosting related information, i.e., CDN access logs, available at the 5GMS AS can be forwarded to the 5GMS AF for subsequent event exposure to consumer entities such as the NWDAF or the Application (Service) Provider. Doing so requires the specification of an interface between the 5GMS AS and 5GMS AF. Such interface is logically represented by M3, although this internal interface, intended for the exchange of content hosting related information, is not further described/specified in Rel-16 TS 26.501 and TS 26.512. As part of the present study, it would seem possible to define M3 for the transfer of CDN log information between these entities. However, as defined in TS 26.501, M3 is intended to represent an undefined interface between the 5GMS AF and 5GMS AS for the exchange of content hosting related information. Therefore, it would be more logical to define an SBI-based reporting interface across R3, as shown in Figure 3, for the transfer of CDN access logs.

# Candidate media-related information for Event Exposure

As indicated previously, the stage 2 and stage 3 specifications for the Naf\_EventExposure service are provided by TS 23.502 [1] and TS 29.517 [2], respectively. Up through Release 16, the categories of UE data at the AF available for event information subscription by NF consumers are the following:

- Service Experience information for an application;

- UE mobility information;

- UE communication information; and

- Exceptions information.

Comparison of the above categories with QoE metrics (as defined in TS 26.247 [9] for progressive download and DASH streaming services) and service experience and UE communication information types eligible for Naf event exposure (as defined in TS 23.288 [5]) shows the only common information attribute to be ***throughput***. “Average throughput” is a defined quality metric in TS 26.247 for both progressive download and 3GP-DASH services, and “Throughput” is a defined type of performance data from the AF in TS 23.288. However, it is not unreasonable to expect that other QoE metrics collected by the 5GMS AF (based on TS 26.247 definitions for progressive download and DASH streaming) will also be eligible for event exposure to the NWDAF. In particular, at SA2#144-e, a CR to Rel-17 TS 23.288 in S2-2103267 [10] was agreed which adds “QoE metrics” as an additional type of service data related to Service Experience information for subscription by the NWDAF from the AF. Although the identified QoE metrics in that CR references those defined by MTSI in TS 26.114 [11], a CR from Qualcomm in S2-2104496 [12] proposes the inclusion in TS 23.288 of QoE metrics defined for 3GP-DASH and progressive download (per TS 26.247 [9]), VR (per TS 26.118 [13]), MBMS (per TS 26.346 [14]) and 5GMS (per TS 26.512 [7]). Therefore, it is possible that the QoE metrics defined by the 5GMS architecture will be adopted as valid service data for NWDAF subscription to Naf\_EventExposure services in Rel-17 TS 23.288 [5] and TS 29.517 [2].

Other types of valid performance data for NWDAF collection from the AF defined in TS 23.288 include average packet delay and average loss rate. These could be considered as additional types of QoE metrics information to be included in Rel-17 TS 26.512 for either or both uplink and downlink streaming services.

The definition of application event types, data components and formats relating to media streaming should be coordinated by SA4 with SA2 and CT3 in the production of the associated stage 2 and stage 3 specifications of Naf\_EventExposure services.

# Proposal

It is proposed that the text in Sections 2, 3 and 4 be incorporated in TR 26.804, under clause 5.8 (Network Event usage).

# References

[1] 3GPP TS 23.502: “5G; Procedures for the 5G System (5GS)”.

[2] 3GPP TS 29.517: “5G System; Application Function Event Exposure Service; Stage 3”.

[3] Tdoc S4-210715: “Draft New WID on 5GMS AF Event Exposure”, Work Item proposal submission from Qualcomm Inc., AT&T, Ericsson LM, Enensys, BBC and Huawei to SA4#114-e, May 19-28, 2021.

[4] Tdoc S4-210723: “Generic architecture for data collection and reporting”, submission from BBC, Dolby Laboratories Inc., LM Ericsson and Qualcomm Incorporated to SA4#114-e, May 19-28, 2021.

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

[6] 3GPP TS 26.501: “5G Media Streaming (5GMS); General description and architecture”.

[7] 3GPP TS 26.512: “5G Media Streaming (5GMS); Protocols”.

[8] 3GPP TR 23.700-91: “Study on enablers for network automation for the 5G System (5GS); Phase 2”.

[9] 3GPP TS 26.247: “Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH”.

[10] Tdoc S2-2103267: “Extension of Naf\_EventExposure for observed service experience data collection from UEs”, CR from InterDigital to SA2#144e, Apr 12-16, 2021.

[11] 3GPP TS 26.114: “IP Multimedia Subsystem (IMS); Multimedia telephony; Media handling and interaction”.

[12] Tdoc S2-2104496: “Extension of Naf\_EventExposure for observed service experience data collection from UEs”, CR from Qualcomm Incorporated to SA2#145e, May 17-28, 2021.

[13] 3GPP TS 26.118: “Virtual Reality (VR) profiles for streaming applications”.

[14] 3GPP TS 26.346: “Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs”.