**3GPP TSG-SA4 Meeting # 128 *S4-240876***

**Jeju, KR, 20th - 24th May 2024**

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| *CR-Form-v12.2* | | | | | | | | |
| **PSEUDO CHANGE REQUEST** | | | | | | | | |
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|  | **26.942** | **CR** |  | **rev** |  | **Current version:** | **0.1.1** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | [FS\_MediaEnergyGREEN] Description of the existing collection and exposure of energy consumption information at UE | | | | | | | | | |
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| ***Source to WG:*** | Orange | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_MediaEnergyGREEN | | | | |  | ***Date:*** | | | 2024-05-20 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-19 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
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| ***Reason for change:*** | | Related work in 3GPP on Collection and exposure of data collection, reporting and exposure at UE needs to be described | | | | | | | | |
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| ***Summary of change:*** | | Description of the existing Data collection, reporting and exposure reference architecture in the clause on Collection and exposure of energy consumption information at UE. This is only a summary of existing work listing the main principles. If details are needed, for example on format or protocols, it will be described in the description of the solution using those format or protocols. | | | | | | | | |
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| ***Consequences if not approved:*** | | SID objectives will not be met. | | | | | | | | |
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| ***Clauses affected:*** | |  | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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| **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".

[28554] 3GPP TS 28.554: "5G end to end Key Performance Indicators (KPI)".

[28552] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[28533] 3GPP TS 28.533: "Management and orchestration; Architecture framework".

[28622] 3GPP TS 28.622: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[28532] 3GPP TS 28.532: "Management and orchestration; Generic management services".

[23501] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[23288] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".

[26531] 3GPP TS 26.531: "Data collection and reporting; General description and architecture".

[26532] 3GPP TS 26.532: "Data Collection and Reporting; Protocols and Formats".

[26501] 3GPP TS 26.501: "5G Media Streaming (5GMS); General description and architecture".

[26510] 3GPP TS 26.510: "Media delivery; interactions and APIs for provisioning and media session handling".

[26247] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[CTA-5005-A] Consumer Technology Association CTA‑5005‑A: "Web Application Video Ecosystem – DASH-HLS Interoperability Specification".

[L.1210] International Telecommunication Union, Recommendation ITU-T L.1210, "Sustainable power-feeding solutions for 5G networks", December 2019

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| **2nd Change** |

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

5GC 5G Core

5GMS 5G Media Streaming

AF Application Function

AMF Access and Mobility Management Function

ANBR Access Network Bitrate Recommendation

AS Application Server

ATSC Advanced Television Systems Committee

DVB Digital Video Broadcasting

IBC International Broadcasting Convention

ICT Information and Communications Technology

ITU-T The Telecommunication Sector of the ITU

NAB National Association of Broadcasters

NEF Network Exposure Function

NG-RAN Next Generation RAN

NSACF Network Slice Admission Control Function

NWDAF Network Data Analytics Function

OAM Operations, Administration and Maintenance

PCF Policy Control Function

PNF Physical Network Function

RAN Radio Access Network

SBMA Service-Based Management Architecture

SMF Session Management Function

UDM Unified Data Management

UE User Equipement

UPF User Plane Function

VNF Virtualized Network Function

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| **3rd Change** |

#### 4.2.2.3 Collection and exposure of energy consumption information at NF

[Editor’s note: Writing this clause will probably have to wait for the conclusions of TR 23.700-66 from SA2.]

#### 4.2.2.4 UE data collection, reporting and event exposure architecture

A generic architecture for the collection and reporting of UE data is defined in TS 26.531 [26531] and the corresponding APIs are specified in TS 26.532 [26532] but UE energy consumption has not been considered in these specifications up to and including in Release 18. Subject to study in the present document, a potential solution would be to expand the scope of these specifications to support the collection and exposure of energy consumption information at UE.

The main principle of the reference architecture defined in clause 4 of TS 26.531 [26531] and reproduced in figure 4.2.2.4‑1 below is the addition of an intermediary Application Function named the Data Collection AF which is used collected UE data reports from data collection clients and Application Servers, and to synthesise from those reports a set of events which are exposed to event consumer subscriber, such as the Network Data Analytics Function (NWDAF) or an Event Consumer AF deployed in the Application Service Provider.



Figure 4.2.2.4‑1: Reference architecture for data collection and reporting

Data collection and reporting functionality in the Data Collection AF is provisioned at reference point R1 by a *Provisioning AF* of the *Application Service Provider* that may be deployed either inside or outside the trusted domain. The purpose of the Data Collection AF is to receive UE data reports from one of three possible sources:

1. Directly from the UE. In this case the *Direct Data Collection Client* is responsible for collecting relevant data in the UE (typically from a UE Application using a suitable API at reference point R7) and for sending data reports to the Data Collection AF via reference point R2.

2. Indirectly from the UE. In this case, an Application Service Provider collects data from UE Applications privately via reference point R8 and employ an Indirect Data Collection Client subfunction to then send data reports to the Data Collection AF via reference point R3.

3. From an Application Server that has been used to deliver media to/from a UE. Application Server instances (AS) inside or outside the trusted domain may also collect data and report it to the Data Collection AF via reference point R4.

The Data Collection AF aggregates and filters UE data that is reported to it. The processed UE data is exposed by the Data Collection AF to the NWDAF in the form of data reporting event notifications via reference point R5. Certain UE data may also be exposed in the form of data reporting events by the Data Collection AF to an Event Consumer AF residing in the Application Service Provider via reference point R6.

When they are deployed in different trust domains, the interactions between the system actors of the UE data collection, reporting and event exposure architecture may be mediated through the NEF, as illustrated by various collaboration scenarios defined in annex A of TS 26.531 [26531].

#### 4.2.2.5 UE data collection, reporting and event exposure for 5G Media Streaming

The instantiation of the UE data collection, reporting and event exposure architecture in the 5GMS System is defined in clause 4.7 of TS 26.501 [26501] and the reference architecture for this instantiation is reproduced in figure 4.2.2.4-2.



Figure 4.2.2.5‑1: Data collection and reporting architecture instantiation for 5G Media Streaming

Three existing 5GMS reference points are reused in this instantiation: M1 (for provisioning UE data collection, reporting and event exposure), M5 (for media session handling) and M6 (for interacting with the Media Session Handler).

- The *Provisioning AF* of the Application Service Provider is not instantiated in the 5GMS architecture. Data collection and reporting is instead provisioned using the procedures using M1 defined in TS 26.501 [26501].

- The *Data Collection AF* for 5G Media Streaming is instantiated in the 5GMS AF.

- The *Direct Data Collection Client* for 5G Media Streaming is instantiated in the Media Session Handler. This takes logical responsibility for the UE data collection activities of the *Metrics Collection & Reporting* and *Consumption Collection & Reporting* subfunctions and the subsequent reporting of this UE data via reference point M5. It also takes logical responsibility for thelogging of ANBR-based Network Assistance invocations by the *Network Assistance* subfunction and their subsequent reporting to the Data Collection AF instantiated in the 5GMS AF via reference point R2.

NOTE: The use of M5 instead of R2 is due to the definition of some procedures before the definition of this instantiation. M5 was already used for QoE metrics and consumption reports, or invocations of the downlink dynamic policy procedures and invocations of the *AF-based downlink Network Assistance* procedures. Thus, for these procedures, M5 is used instead of R2.

- The Indirect Data Collection Client is not instantiated in the 5GMS architecture. Indirect reporting of UE data is outside the scope of 5G Media Streaming. Thus, R8 is not instantiated in the 5GMS architecture.

- The role of the AS in the abstract reference architecture is played by 5GMS AS. (This may be deployed as a trusted AS within the 5G System or deployed externally.)

- The Event Consumer AF is instantiated in the 5GMS Application Provider as a consumer of 5G Media Streaming events from the Data Collection AF.

- Reference point R7 is not instantiated in the 5GMS architecture. Configuration of 5GMS-related data reporting in the Media Session Handler by the 5GMS-Aware Application is managed through the existing media session handling client API at reference point M6.

[Editor’s note: Data collection and reporting architecture seems a good basis for collection and exposure of energy consumption information at UE, but a series of questions arises in connection with reaching this goal:

1. What energy-related information will be provided by the UE? Is this information related only to the communication part or media part?

2. Which UE function will be the source of the energy consumption information (e.g., per-application energy usage data collected by a system-level service running on the UE, or contributed by individual applications running on the UE reporting their own energy usage data)?

3. How should UE energy consumption data be reported by a UE to the 5G System?

a) Reuse the existing 5GMS consumption reporting mechanism by extending relevant data type(s) specified in TS 26.510 [26510] to report UE energy consumption data?

b) Reuse the existing 5GMS QoE metrics reporting mechanism and reporting format by extending the QM10 XML schema schema specified in clause 10.2 of TS 26.247[26247] to report UE energy consumption data?

c) Reuse the existing 5GMS QoE metrics reporting mechanism but specify a brand new QoE metrics reporting scheme in TS 26.510 [26510] to report UE energy consumption data?

d) Specify a new generic UE data domain in TS 26.531 [26531] and a JSON-based reporting format in TS 26.532 [26532] to report UE energy consumption data to the generic Data Collection AF?

4. In the context of options 3(c) and 3(d), can commonly supported metrics and client data reporting format and protocols like CTA-WAVE CMCD [CTA-5005-A] be used to cover the required scope?

NOTE: The parallel study of future reporting mechanisms and formats in TR 26.804 is relevant in the context of question 4.

5. Which reference points should be used to report UE energy consumption data to the Data Collection AF?

a) If using the generic UE data collection, reporting and event exposure architecture defined in TS 26.531 [26531], data could be reported through reference points R2, R3 and/or R4.

b) If using the 5GMS instantiation of the generic UE data collection, reporting and event exposure architecture defined in clause 4.7 of TS 26.501 [26501], the Indirect Data Collection Client is not available in Release 18, so only R2 (or M5) and R4 are available for data reporting. Are there use cases requiring reference point R3? Is it relevant to be able to use several interfaces?

6. Would it be useful to expose energy-related information of the network to the Media Session Handler to help it optimize its media session in an energy-efficient way?]



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| **End of Changes** |