**3GPP TSG-SA WG4 Meeting #130S4-241967r1**

**USA, Orlando, 18 – 22 November 2024**

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| *CR-Form-v12.2* | | | | | | | | |
| **PSEUDO CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26.942** | **CR** |  | **rev** |  | **Current version:** | **0.3.2** |  |
|  | | | | | | | | |
| *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] Solution for KI2 based on existing UE energy-related information measurement | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Orange | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_MediaEnergyGREEN | | | | |  | ***Date:*** | | | 2024-11-12 |
|  |  | | | |  | |  | | |  |
| ***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:*** | | Add a potential solution for KI#2 Monitoring and measurement | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add a potential solution for KI#2 based on existing UE energy-related information measurement | | | | | | | | |
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| ***Consequences if not approved:*** | | No solution for KI#2 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2 and 7.3 (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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| **1st Change** |

# 2 References

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[BatteryMgr] Android BatteryManager API, <https://developer.android.com/reference/kotlin/android/os/BatteryManager>

[ohos] Harmony OS Battery information API, <https://developer.huawei.com/consumer/en/doc/harmonyos-references/js-apis-battery-info-V5>

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| **2nd Change (all new text)** |

## 7.3 Solution #2: Existing UE energy-related information measurement

### 7.3.1 Key issue mapping

This solution partially addresses Key Issue#2 (Monitoring and measureent) described in clause 6.2.

### 7.3.2 Functional description

This solution addresses only energy-related information measurement from the UE; it does not address energy-related information measurement from the network. The two main questions raised in the Key Issue description are about which UE energy related information is collected and which UE entity is collecting.

Currently, the 5G System does not have access to energy-related information on UEs. Because neither a component external to the UE nor mechanisms requiring debug mode are excluded by the use cases described in clause X, this candidate solution proposes to use an existing entity allowing to provide energy-related information to the 5G System via existing API.

Most UE Operating Systems already provide tools to assess the energy footprint of applications using system-wide metrics. Different Operating Systems provide different data about energy consumption. However, common basic data are available on two of the three main smartphone OS: Android [BatteryMgr] and Harmony OS [ohos], enabling the requirements of the Key Issue to be fulfilled. The common basic data between those two OSs are:

- *Charging status:* Battery charging state of the current device. Indicates if the battery is being/not being/fully charged.

- *Voltage:* Instantaneous battery voltage of the device, expressed in unit of microvolts (μV).

- *Current:* Instantaneous current of the device battery, expressed in units of milliamperes (mA).

Using APIs providing this information, the 5GMS Client is able to calculate the energy consumption during media streaming in Joules using the formula:

energyInJoules = currentInAmps × timeDifference × voltage

However, this method as several key limitations:

- Such public API are not available on iOS (but some iOS applications are able to provide these basic data).

- Energy consumption during charging phases is not included.

### 7.3.3 Summary

This solution indicates how applications currently measure energy consumption of a smartphone. This has the advantage of answering questions raised in the description of Key Issue #2:

1. Which UE entity is appropriate to measure this UE energy-related information?

Answer: This is done by the UE directly.

2. Which UE energy-related information will be collected to measure?

Answer: The parameters commonly exposed by some smartphone Operating Systems.

However, in the context of this study, this solution has major limitations:

- UE energy-related information is not publicly available on all UE Operating Systems, including some major ones (e.g., iOS)

- This energy-related information is related to the entire smartphone, and is not limited to media consumption.

- Accuracy of information provided by the APIs is uncertain and likely to vary between different devices.

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| **End of Changes** |