**3GPP TSG-SA WG4 Meeting 129e S4-241561r1**

**eMeeting, 4**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **26.942** | **pCR** |  | **rev** | **01** | **Current version:** | **0.2.1** |  |
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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:***  | Potential solution to Key Issue #1: Information exposure |
|  |  |
| ***Source to WG:*** | Nokia  |
| ***Source to TSG:*** | S4 |
|  |  |
| ***Work item code:*** | FS\_MediaEnergyGREEN |  | ***Date:*** | 2024-08-13 |
|  |  |  |  |  |
| ***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 canbe 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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | The latest draft of 3GPP TR 26.942 contains clause 7 on Potential Solutions to the already defined and described key issues. In this context, under KI #1; the following questions were defined:In this context, the subsequent analysis by this Key Issue should consider:1. How should UE energy consumption data be reported by a UE to the 5G System2. Which reference points should be used to report UE energy consumption data to the Data Collection AF3. 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 wayIt is proposed to add the proposed content to the latest draft of TR 26.942 v 0.2.1 under clause 7.1 as one of the potential solutions so that it is not left incomplete. |
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| ***Summary of change:*** | This CR proposes new text to be added in TR 26.942 on “Clause 7 Potential Solutions”. |
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| ***Consequences if not approved:*** | Proposed objectives will not be met. |
|  |  |
| ***Clauses affected:*** | 7 (new), 7.1 (new), 7.1.2 (new) |
|  |  |
|  | **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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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| 1st Change |

# 2 References

[22261] 3GPP TS 22.261: "Service requirements for the 5G system".

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| 2nd Change |

## 7 Potential Solutions

## [Editor’s note: Description of potential solutions]

## 7.1 Mapping of Solutions to Key issues

Table 7.1-1: Mapping of Solutions to Key Issues

|  |  |  |  |
| --- | --- | --- | --- |
| Solutions |  |  |  |
|  | KI#1 | KI#2 | KI#3 |
| #1 | X |  |  |
| #2 |  |  |  |
| #3 |  |  |  |
| #4 |  |  |  |
| #5 |  |  |  |
| #6 |  |  |  |
| #7 |  |  |  |
| #8 |  |  |  |
| #9 |  |  |  |

## 7.2 Solution #<1>: < Energy-related information exposure from UE :>

## 7.2.1 Key issue mapping

This solution addresses the key issue #1

## 7.2.3 Background

Energy credit is a service concept introduced by TS 22.261 clause 6.15a.5 which can be used as an abstract measure of the energy impact on the network of delivering a service to a UE. According to this clause, subject to operator’s policy, the 5G system is required to support a mechanism to perform energy consumption credit limit control for services without QoS criteria. Energy credits, associated to a subscriber and used by the operator network’s “credit control” ,are consumed depending on the UE behavior, e.g. depending on the data volume time, location, and based on the amount of energy consumed by the network to provide the service.

This potential solution to Key Issue #1 determines the method of obtaining this additional information, enhancements to the entities involved in obtaining relevant information, and the impact of them on taking into consideration the media context (e.g., the 5G Media Streaming System according to TS 26.501 [26501], 5G Multicast–Broadcast User Services according to TS 26.502 [26502], the Real-time Media Communication according to TS 26.506 [26506]) including UE-related energy information exposure.

## 7.2.4 Functional Description

To obtain and maintain the UE energy-related information, a new generic logical entity in the UE called UE energy information handler is defined. It maintains the UE energy-related information such as UE energy state, UE energy preference, UE energy capacity, UE energy supply and UE energy consumption rate. UE energy information handler can maintain the following UE energy-related information, for example:

* UE energy state: the current battery level of the UE (e.g. as value or abstracted as low/medium/high)
* UE energy preference: e.g. UE prefers to operate in the energy saving mode and the validity time interval of this preference.
* UE energy capacity: the UE battery capacity.
* UE energy supply: whether the UE is currently operating on battery or being powered by grid (“plugged-in”) or by renewable energy (e.g. solar panel). This can include the ratio of renewable energy over different time granularities (e.g. 30% renewable over the last 24h).
* UE energy consumption rate: UE charging/discharging rate or speed (e.g. in mA/h), or the remaining time before full charge/discharge

Fig 7.2.4-1. shows different interfaces between UE and DN, including the new UE energy information management/handler in the device. UE energy information handler is a logical entity and could interface as UE energy information handler inside the MSH.

Figure 7. 2.4-1- UE energy information handler entity within UE

UE energy-related information is private UE information, and it is possible that UE does not want to share that information with 3rd parties. Hence, we have introduced the concept of energy cost (index). The UE client can calculate the energy cost index based on the UE energy-related information which are obtained from UE energy information handler. This index can be considered as an abstract measure of the energy being consumed at the UE, without compromising the privacy aspects.

As an example, the energy cost index can simply be determined by a mapping table as below:

Table 1. Device energy cost index

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Energy cost index | UE energy state | UE energy preference | UE energy capacity | UE energy Supply | UE energy consumption rate at a voltage of 5V |
| 900 | 20% | 120mn | 4000mAh | Battery  |  3 Wh |
| 500 | 50% | 30mn | 4000mAh  | Battery |  1 Wh |
| 50 | 95% | - | 4000mAh  | Green |  7.5 Wh |
| 0 | 100% |  | 4000mAh | Socket | 15 Wh |

The energy cost (index) can be a parameter in range of e.g. [0 1000]. If the cost is higher then it means that this specific UE request is more critical, and it cannot run more parts of application in its own device.

The energy information can be provided by the UE client through the configuration message. This can be transmitted as part of the “DeviceCapabilities” object, or through a dedicated new object. The new object could be defined as depicted below:

Table 2. Device energy information object

|  |  |  |  |
| --- | --- | --- | --- |
| DeviceEnergyInformation | Array | 0..1 | This contains a list of energy-related information from the device |
|  UE energy state | Number | 0..1 | Level of the battery of the UE (e.g. in %) |
| UE energy consumption rate | Number | 0..1 | UE charging/discharging rate or speed (e.g. in W/h, negative or positive) |
| UE energy preference | Number | 0..1 | Remaining time during which the UE wants to be considered in energy saving (e.g. in mn). “0” means that the end time in unknown. |
| UE energy capacity | Number | 0..1 | The total UE battery capacity (e.g. in mAh) |
| UE energy supply | enum | 0..1 | e.g. “battery”, “plug-in”, “renewable” |
| Energy cost (index) | Number | 1..1 | e.g. between 0 and 1000 |

## 7.X.3 Procedures

## 7.X.4 Impacts on existing services, entities and interfaces

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| End of change |