## Source: Nokia Corporation

**Title: Discussion on UE energy consumption information reporting**

## Document for: Agreement

## Agenda Item: 8.10 FS\_MediaEnergyGREEN

## Discussion

The FS\_MediaEnergyGREEN study aims to identify sustainable media metrics, architectural impacts (APIs), functional extensions required for SA4 service enablers and evaluate the feasibility of an evaluation framework to facilitate efficient energy use and energy saving for media services.

One of the objectives is to:

• Document existing APIs, metrics, and mechanisms inside or outside 3GPP that could be used for energy measurement, reporting and exposure of media services. This includes whether and what information is exposed, how it is exposed, and at what granularity (QoE measurement and reporting, QoS measurement and reporting, audience measurement and reporting, event exposure, CMCD reporting, etc.).

During the discussion of S4al240056 (MBS SWG telco on 2024-05-07), it was mentioned that it is not clear which kinds of the UE information would be reported, and how the reports are delivered, etc. Further information are expected to be provided.

The motivation of this contribution is to trigger the discuss on what energy-related information will be provided by UE, and how this information would be reported by UE to the 5G system.

A typical use case is for the network (potentially acting on behalf of an application server) to initiate a campaign of UE energy-measurements in order to evaluate the impacts of a specific action taken (e.g. updating some parameters of a media session). When contextual to QoE measurements, the network, or an application, can appreciate the relationship between QoE and energy consumption on the UE, that is to look for an optimum configuration that would save most energy on the UE whilst preserving the target QoE (trade-off).

A new set of QoE metrics related UE energy consumption information is proposed in following table, related to three types of major sources of energy consumption at the UE: device related, application related and processing related:

Table 1: Proposed UE energy consumption metrics

|  |  |
| --- | --- |
| Key | Description |
| UE energy consumption metrics |
| Screen on duration | The time duration of the display screen on during the session (e.g. in ms). |
| Screen energy consumption | The energy consumed by the display screen during the session (e.g. in mAh). |
| Camera on duration | The time duration of the camera on during the session (e.g. in ms) |
| Camera energy consumption | The energy consumed by the camera during the session (e.g. in mAh). |
| Loudspeaker on duration | The time duration of the loudspeaker on during the session (e.g. in ms). |
| Loudspeaker energy consumption | The energy consumed by the loudspeaker during the session (e.g. in mAh). |
| Sensor on duration | The time duration of a sensor on during the session, the sensor can be e.g. GPS sensor. |
| Sensor energy consumption | The energy consumed by the sensor during the session (e.g. in mAh). |
| … |  |
|  |  |  |
| Application-specific energy consumption metrics |
| Application identifier | Single entry in the list. |
| Application energy consumption | The energy consumed by the application during the session (e.g. in mAh). |
| … |  |
| UE processing energy consumption metrics |
| Modem energy consumption | The energy consumed by the UE modem as a result of uplink radio transmission and downlink radio reception during the session. |
| Media codec energy consumption | Energy consumed by the UE as a result of media encoding or decoding associated with a media delivery session. |
| Media rendering energy consumption | Energy consumed by the UE as a result of the split rendering process and split-rendered media processing associated with media session. |

Furthermore, QoE configuration and reporting can already optionally be specified by the QoE Measurement Collection (QMC) functionality.

It would be good to reuse the QMC functionality e.g. based on TS 26.114 for the MTSI use cases, the signalling diagram example is shown in the figure 1 below.



Figure 1: Example signalling diagram for QoE reporting

1. **Proposal**

It is proposed to:

1. take into consideration of UE energy consumption information in the key issues and solutions of TR 26.942.
2. reuse existing QoE configuration and reporting mechanisms (e.g. QMC) which already defined in 3GPP Specifications for energy related QoE measurement and reporting.