**3GPP TSG-SA WG4 Adhoc Telcos post 130 S4aI250051r01**

**Adhoc eMeeting, 5**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **26.942** | **pCR** |  | **rev** | **1** | **Current version:** | **1.0.0** |  |
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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:***  | Solution #7: Potential solution to Key Issue #2: QMC-based monitoring and measurement  |
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| ***Source to WG:*** | Nokia |
| ***Source to TSG:*** | S4 |
|  |  |
| ***Work item code:*** | FS\_MediaEnergyGREEN |  | ***Date:*** | 2025-02-06 |
|  |  |  |  |  |
| ***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 6.2 Key Issue #2: Energy-related monitoring and measurement. In this context, under KI #2; the following questions were defined:In this context, the subsequent analysis by this Key Issue will consider the following questions:1. Which UE energy-related information will be collected to measure, correlate, and optimize energy usage across the entire streaming distribution chain?
2. Can existing methods be leveraged to measure/monitor the identified UE energy-related information?
3. Which UE entity is appropriate to measure this UE energy-related information?

It is proposed to add the proposed content to the latest draft of TR 26.942 v1.0.0 as one of the potential solutions to KI #2 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. |
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| ***Clauses affected:*** | 7.x (new) |
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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 ...  |
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| ***Other comments:*** |  |
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| ***This CR's revision history:*** | S4-242024S4aI250008S4aI250044 |

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| 1st Change |

# 2 References

[26114] 3GPP TS 26.114: "IP Multimedia Subsystem (IMS); Multimedia Telephony; Media handling and interaction".

[26247] 3GPP TS 26.247: "Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP‑DASH)".

[28405] 3GPP TS 28.405: “Telecommunication management; Quality of Experience (QoE) measurement collection; Control and configuration”.

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| 2nd Change |

## 7 Potential solutions

## 7.1 Mapping of solutions to Key Issues

Table 7.1-1: Mapping of solutions to Key Issues

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

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| 3rd Change **(all new text)** |

## 7.x Solution #7: QMC-based monitoring and measurement.

### 7.x.1 Key Issue mapping

This Candidate Solution addresses Key Issue #2.

### 7.x.2 Functional description

#### 7.x.2.1 Introduction

There is currently no solution enabling to monitor energy-saving actions at the application layer and in the RAN access stratum based on information provided by the application layer on the UE. To this end, an energy consumption-aware mechanism for media handling and delivery (in both uplink and downlink directions) based on QoE metrics collection, configuration and reporting is proposed here for different types of media services. The mechanism for media handling and delivery includes UE-side and network-side operations according to the reported energy consumption information.

This Candidate Solution focuses on the energy consumption monitoring. As a result of collecting and evaluating energy-related measurements on the UE, energy consumption in the network may be reduced, thus triggering network energy savings. A typical use case is for the network (potentially acting on behalf of an application) 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 delivery session). In particular, in the contex of QoE measurement, 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).

In this context, this Candiate Solution proposes a method leveraging energy consumption information to monitor and measure the way the media content is handled and delivered to the users, and to provide better Quality of Experience (QoE) for users. Specifically, this Candidate Solution focuses on extending the UE QoE reporting mechanism with energy-related information.

#### 7.x.2.2 MTSI Quality of Experience (QoE) metrics

MTSI Quality of Experience (QoE) metrics is a relevant background for this Candidate Solution. As defined in TS 26.114 [26114], the metrics are valid for speech, video and text media, and are calculated for each measurement resolution interval "Measure-Resolution". They are reported to the OAM or QoE server via the gNodeB according to the measurement reporting interval "Sending-Rate", and also after the end of the session. The metrics defined in [26114] include:

- Corruption duration metric.

- Successive loss of RTP packets

- Frame rate

- Jitter.

- Sync loss duration.

- Average codec bit rate

- Codec information.

- Call setup time.

However, the specified metrics don’t include energy consumption related information.

Furthermore, the QoE configuration and reporting can optionally be specified by the QoE Measurement Collection (QMC) functionality. In this case, the QoE configuration is received via specific RRC messages for UMTS, RRC messages for LTE, and RRC messages for NR over the control plane, and the QoE reporting is also sent back via RRC messages over the control plane. An example signaling diagram for NR is reproduced in figure 7.x.2.2‑1 below.



Figure 7.x.2.2‑1: Example signalling diagram for NR [Source: TS 28 405 (28405)]

#### 7.x.2.3 DASH Quality of Experience (QoE) metrics

TS 26.247 [26247] defines QoE metrics and procedures for progressive download and DASH media streaming. Configuration and reporting can be based on the same mechanisms (QMC) as for MTSI, or via MPD or OMA-DM.

### 7.x.3 Procedures

This Candidate Solution proposes a new metric; procedures for reporting this metric from the UE to an external entity are described in solution #4 in clause 7.5.

#### 7.x.3.1 Network-triggered QoE configuration

##### 7.x.3.1.1 Introduction

QoE Measurement Collection (QMC) functionality can be reused according to one of the two following procedures.

##### 7.x.3.1.2 Option 1: Adding Energy Consumption as a new flag in MTSI QoE reporting, relating to a specific media delivery session

The following signalling diagram is based on TS 26.114 [114] for MTSI use cases.



Figure 7.x.3.1.2‑1: Example signalling diagram for Option 1

The steps are as follows:

0: When UE starts/registers, the QMC handler of the UE indicates "qoe-MeasReport"capability via UE Access Stratum when supported.

1a: The OAM sends QoE configuration requests with EC flag (energy consumption) inside MTSI QoE reporting request which is associated with media session ID, time stamp, etc.

1b: The gNB triggers the QMC handler with for QoE reporting to collect QoE metrics.

1c: The QMC Handler within the UE triggers the MTSI Client to collect MTSI QoE metrics;

2: The MTSI Client in the UE collects Energy-related QoE metrics related to the media session. This may be done e.g. based on new AT commands between the UE Application Layer and the UE Access Stratum.

 The UE may rely on the “Energy information collector” defined in Solution: #5 including via the QMC handler entity.

3: A new QoE report is created and sent to OAM via QMC Handler, including the requested EC information in the MTSI QoE container.

3c: After the OAM has received UE energy consumption status report, the OAM may forward this information to an MnS Consumer (e.g. AF), the AF can accordingly propose an optimized network configuration (e.g. different QoS) or slice to the UE via the 5GC to fit the UE energy consumption status.

##### 7.x.3.1.3 Option 2: Dedicated QoE configuration for energy reporting only



Figure 7.x.3.1.3‑1: Example signalling diagram for option 2

The steps are as follows:

0: The UE indicates to the gNB that it supports energy consumption measurement via "capability = qoe-EC-MeasReport"

1a: The OAM requests energy consumption reporting via a dedicated QoE configuration request "qoe-EC-MeasReport".

1c: The Energy Information Collector in the UE forwards this request to the client.

2: The client in the UE collects QoE metrics including the requested EC information and creates the new QoE report.

3: The UE sends the QoE report (periodically) to the OAM via UE (Energy Information Collector) with the requested EC information.

3c: After the OAM has received a UE QoE status report, the OAM may forward this information to an MnS Consumer (e.g. AF), the AF can accordingly propose an optimized network configuration (e.g. different QoS) or slice to the UE via the 5GC to fit the UE energy consumption status.

The same mechanisms apply to DASH and XR use cases using QMC: similarly to MTSI, the Energy Consumption information mentioned above can be incorporated into the "qoe-Streaming-MeasReport" QoE configuration request and reported using QMC.

### 7.x.4 Summary

This candidate solution introduces:

1. New QoE metrics related to UE Energy Consumption by the UE, along with processing at the application level, which can be associated with a dedicated media session.

2. UE-side configuration to optimize user experience based on the collected energy and media session QoE-related metrics, including requesting the network or AF to optimise the session or split-rendering support.

3. Network-triggered mechanisms for configuration and reporting of UE energy metrics, either inside or outside the scope of QoE metrics collection for a particular media delivery session, as well as RAN-visible QoE reporting of UE energy consumption information.

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| End of change |