**3GPP TSG-SA4 Meeting #127 S4-240438**

**Sophia-Antipolis, France, 29th Jan 2024 - 2nd Feb 2024**

**Source:** **Orange, Interdigital Europe, BBC, Vodafone, Ericsson, Qualcomm Incorporated, Fraunhofer IIS**

**Title: New SID on Media enerGy consumption exposuRE and EvaluatioN framework in 5G services**

**Document for: Approval**

**Agenda Item: 6.2**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

Title: Study on Media enerGy consumption exposuRE and EvaluatioN framework in 5G services

Acronym: FS\_ MediaGREEN

Unique identifier: XXXXXX

Potential target Release: Rel-19

# 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Affects: | UICC apps | ME | AN | CN | Others (specify) |
| Yes |  | X |  | X |  |
| No | X |  | X |  | X |
| Don't know |  |  |  |  |  |

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

### This work item is a …

|  |  |
| --- | --- |
| X | Study  |
|  | Normative – Stage 1 |
|  | Normative – Stage 2 |
|  | Normative – Stage 3 |
|  | Normative – Other\* |

**\* Other = e.g. testing**

## 2.2 Parent Work Item

|  |
| --- |
| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
| N/A |  |  |  |

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 960019 | FS\_EnergyServ (Study on Energy Efficiency as service criteria) | Rel-19 feasibility study WI in SA1 identifying use cases, providing gap analysis and defining potential requirements regarding enhancement on energy efficiency of 5G network and application service enabler aspects |
| 1000033 | EnergyServ (Energy Efficiency as Service Criteria) | Rel-19 WI in SA1 specifying 5G service requirements to support energy efficiency as service criteria |
| 1010029 | FS\_EnergySys (Study on Energy Efficiency and Energy Saving) | Rel-19 feasibility study in SA2 examining architectural impacts and functional extensions required to facilitate efficient energy use and energy saving. |
| 940037 | EE5GPLUS\_Ph2 (Enhancements of EE for 5G Phase 2) | Rel-18 WI in SA5 specifying use cases, requirements and solutions for the measurement of the energy efficiency of NG-RAN, 5GC and network slicing and for the optimization of the energy efficiency |

**Dependency on non-3GPP (draft) specification:**

N/A

# 3 Justification

Energy consumption is a significant source of operational cost to network, services, and also impacts the design of UEs. Furthermore, it has a significant impact on the environment.

Data centers, communication networks, and user devices accounted for an estimated 4-6% of global electricity use in 2020. With 70-80% of network traffic being video/media, media data transmission, media data centers and media consumption on UE (to a lesser extent [1]) contribute significantly to energy consumption of mobile media services. It is therefore important to raise awareness of the energy consumption of media services as a whole.

Multimedia standards being developed have both the potential to improve the user’s quality of experience and/or reduce the consumption of resources such as bandwidth. These KPIs are well-understood and often used to evaluate proposals for standardization. However, the impact of new features and proposals on energy consumption is not well-understood or explicitly considered during most standards-development. While the actual energy consumption will depend on implementation-specific optimizations in commercial products, the design and choice of a technology could ultimately influence the commercial energy usage, regardless of implementations.

Therefore, it could be useful to have implementation-independent metrics and a framework to estimate the energy use or savings of technologies being developed or considered for adoption in 3GPP SA4 and other standards bodies. Without a means of measuring or evaluating expected energy usage, it is difficult to reduce its usage. Developing such an implementation-dependent framework in SA4 could enable a standard methodology to evaluate technologies and enable development of truly energy-saving features.

3GPP SA Plenary has issued a 3GPP-wide recommendation on considering energy efficiency as an important design criterion for the technical solutions defined in its specifications (see SP-211621).

Stage 1 requirements for energy as a service criterion have been identified by SA WG1 in the EnergyServ work item. While the goal of energy efficiency is to provide the same services more efficiently, the goal of energy use control as a service criterion will be to supervise services in an energy-aware manner, while ensuring the services offered as intended by service providers and network operators to subscribers with determined constraints and consequences. A number of functional requirements have been identified that promise increased control over energy use to achieve service objectives for mobile network operators, service providers, and their customers in the SA1 EnergyServ work item.

In the FS\_EnergySys work item, SA WG2 is studying potential enhancements to the 5G System that improve energy efficiency, including:

* A framework for network energy consumption exposure;
* Enhancements to subscription and policy control to enable network energy savings as service criteria;
* General 5G System enhancements which do not rule out impact on the UE.

SA WG5 is defining use cases, requirements, and solutions for the measurement of the energy efficiency of NG-RAN, 5G Core and network slicing and for the optimization of the energy efficiency.

It is proposed that SA WG4 studies Media enerGy consumption exposuRE and EvaluatioN framework in 5G services 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.

[1] https://www.statista.com/statistics/1109623/electricity-consumption-video-streaming-by-device-globally/

# 4 Objective

The 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.

The main objectives of this study include:

* Refine relevant SA1 use cases (5.5, 5.8, 5.9, 5.10 and 5.14) in TR 22.882 in the SA4 context.
* 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.).
* Study the feasibility of having implementation-independent metrics and a framework to evaluate the energy usage/savings of multimedia standards features and proposals.

NOTE 1: The study will consider the work done by SA WG2 and WG5 regarding energy consumption measurement, information collection and energy saving, and reuse it as much as possible.

NOTE 2: Exchanges with other 3GPP WGs, CTA WAVE and DVB may be needed, e.g. via formal Liaison Statements.

# 5 Expected Output and Time scale

|  |
| --- |
| New specifications {One line per specification. Create/delete lines as needed} |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Editor |
| TR | 26.9XX | Study on media energy consumption exposure and evaluation framework in 5G services | SA#106 | SA#107 | Julien Lemotheux, Orange, julien.lemotheux@orange.com |

|  |
| --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
|  |  |  |  |

# 6 Work item Rapporteur(s)

Julien Lemotheux, Orange, julien.lemotheux@orange.com

# 7 Work item leadership

SA4

# 8 Aspects that involve other WGs

The study will consider the work done by SA WG2 and WG5 regarding energy consumption measurement, information collection and energy saving, and reuse it as much as possible.

# 9 Supporting Individual Members

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| --- |
| Supporting IM name |
| Orange  |
| InterDigital |
| BBC |
| Ericsson  |
| Vodafone |
| Qualcomm Incorporated |
| Fraunhofer IIS |
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