**3GPP TSG-SA WG2 Meeting #164S2-xxxxxx**

**19 - 23 August, 2024, Maastricht. (revision of)**

**Source:** Long list of companies

**Title: New WID on Energy Efficiency and Energy Saving**

**Document for: Approval**

**Agenda Item: 6.2.2**

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: Energy Efficiency and Energy Saving

Acronym: EnergySys

Unique identifier: TBD

{A number to be provided by MCC at the plenary}

Potential target Release: Rel-19

# 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Affects: | UICC apps | ME | AN | CN | Others (specify) |
| Yes |  |  |  | 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 …

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

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

## 2.2 Parent Work Item

For a brand-new topic, use “N/A” in the table below. Otherwise indicate the parent Work Item.

|  |
| --- |
| Parent Work / Study Items |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
| EnergyServ | SA1 | 1000033 | Energy Efficiency as service criteria |

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 940037 | Enhancements of EE for 5G Phase 2 | The Rel-18 WI in SA5 may be potentially related to the proposed SA2 study. |
| 870022 | Enhancements on EE for 5G networks | The Rel-17 WI in SA5 may be potentially related to the proposed SA2 study. |
| 810023 | Energy efficiency of 5G | The Rel-16 WI in SA5 may be potentially related to the proposed SA2 study. |
| 981137 | Network energy savings for NR | The Rel-18 work in RAN1 and RAN2 may be potentially related to the proposed SA2 study, depending on the agreed Rel-19 scope. |

# 3 Justification

Energy consumption is a significant source of operations costs for Mobile Network Operators (MNOs) and depending on the energy generation mix that is used to power networks, it can also have impact on the environment. There has been increasing work in 3GPP on improving energy efficiency and energy saving. Some solutions studied how to optimize energy consumption by adapting the network itself, e.g. activating and deactivating parts of the network. Such change to the topology and components of the network could be done transparent to the network architecture in some cases, or it had to have implications with the architecture in other cases, e.g. reselection of proper network functions.

Stage 1 requirements for energy as a service criteria have been identified in Rel-19 EnergyServ by SA1. While the goal of energy efficiency is to provide the same services more efficiently, the goal of energy use control as service criteria will be to supervise services in an energy-aware manner, with ensuring the services offered as intended by service providers, network operators or 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 Rel-19 EnergyServ. Examples of these functional requirements include the ability to control energy use based on operator policies such as 'energy credit limits' and 'maximum energy usage rate' applying to services provided to a UE or group of UEs.

Also, 3GPP has already undertaken work in different working groups to provide recommendations on energy saving and actual OAM or Radio Network enhancements to save energy. SA plenary has issued also a 3GPP-wide recommendation on considering Energy efficiency as an important design criterion for the technical solutions 3GPP defines in their specifications (see SP-211621). SA2 will also be required to investigates options for improved system behaviour aimed at energy saving.

This work item is to complete the design of stage 2 solutions and document the normative specifications, based on the conclusions of the FS\_EnergySys study.

# 4 Objective

This work aims to specify required 5GS enhancements needed to improve energy efficiency and to support energy saving in the network, for the following aspects, based on the conclusions in the TR 23.700-66:

- WT #1. The following enhancements for the exposure of energy related information will be specified for Exposure to AF from NEF, based on information to be defined in cooperation with SA5):

- exposure to the authorized consumer subject to operator’s policy of energy related information at the following granularities

- Per UE)

- Per UE/PDU session

- Per UE/ QoS flow (i.e. per AF of the UE)

- The support of the collection, and exposure of energy-related information for the granularity defined above will be specified in cooperation with SA5. This information is considered for exposure:

- Energy consumption information

- Renewable energy consumption information

- The energy-related information exposure may support periodic reporting or event-based reporting.

- WT #2. The following enhancements will be specified:

- Relevant subscription information of a UE to assist the network to perform energy saving strategies in the network related to the specific UE.

- How new and/or existing (e.g. subscribed RFSP Index, Subscribed S-NSSAIs) subscription information is used to influence the handling of the UE in the 5GC and in the RAN.

- The PCF may receive UE subscription data and other energy related information to trigger making policy decisions.NOTE: Further details, will be defined during the normative work. To be confirmed whether the accuracy of the WT#1 exposed information is sufficient to trigger policy decisions.- WT #3. The following 5GS procedures enhancements will be specified to achieve energy saving:

- New energy-related information and/or existing NF profile parameters in the NF Profile to allow an operator to influence NF discovery and selection based on its energy strategy.

- Only parameters captured in existing solutions in the TR 23.700-66 will be considered. Coordination with SA WG5 may be needed to enable certain new parameters to be provisioned/updated by OAM at the NRF.

NOTE: The information within NF profile is expected not to change frequently, e.g., constantly reflecting changes in energy consumption.

- Enhancement on NF discovery and (re-)selection to consider the energy-related information from the NF profiles and/or discovery request from the NF consumer.

- UP path adjustment for PDU sessions.

# 5 Expected Output and Time scale

|  |
| --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
| 23.501 | System architecture for support of Energy Efficiency and Energy Saving | TSG SA #106 (Dec., 2024) |  |
| 23.502 | Procedures for support of Energy Efficiency and Energy Saving | TSG SA #106 (Dec., 2024) |  |
| 23.503 | Policy control for support of Energy Efficiency and Energy Saving | TSG SA #106 (Dec., 2024) |  |

# 6 Work item Rapporteur(s)

Primary Rapporteur: Jungshin Park (Samsung), shin02.park@samsung.com

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# 7 Work item leadership

SA2

# 8 Aspects that involve other WGs

Potential RAN issues are covered by RAN WGs (e. g. RAN2, RAN3)

Potential charging and OAM issues are covered by SA5.

Potential security issues are to be covered by SA3.

# 9 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| AT&T |
| BT |
| CATT |
| China Mobile |
| China Telecom |
| Cybercore |
| Deutsche Telekom |
| DISH Network |
| Ericsson |
| ETRI |
| Futurewei |
| Huawei |
| Intel |
| InterDigital |
| KDDI |
| KPN |
| Lenovo |
| LG Electronics |
| LG Uplus |
| MATRIXX Software |
| MediaTek |
| NEC |
| Nokia |
| NTT DOCOMO |
| OPPO |
| ORANGE |
| Rakuten Mobile |
| Samsung |
| SK Telecom |
| Toyota |
| Verizon |
| Vivo |
| ZTE |