**3GPP TSG-SA5 Meeting #154 *S5-242000***

Changsha, China, 15 - 19 April 2024 is revision of S5-241459

Merged with S5-241641, and clauses 5.X.1 and 5.X.2 of S5-241204

**Source: Nokia, Huawei, China Mobile**

**Title: Rel-19 pCR TR 28.880 Add use case and potential requirements to Enable renewable energy consumption and carbon emission information reporting**

**Document for: Approval**

**Agenda Item: 6.19.20**

# 1 Decision/action requested

***The group is requested to discuss and approve the pCR below.***

# 2 References

[1] 3GPP TS 22.261: Service requirements for the 5G system; Stage 1

[2] 3GPP SP-231723: Study on energy efficiency and energy saving aspects of 5G networks and services

[3] 3GPP TR 28.880 0.1.0: Study on energy efficiency and energy saving aspects of 5G networks and services

# 3 Rationale

TS 22.261 [1] clause 6.15a makes the following statements:

“

6.15a Energy Efficiency as a Service Criteria

6.15a.1 Description

Climate change and the rising consumption of energy motivate increased energy efficiency. Energy efficiency is a strategic priority for telecom operators around the world.

Energy efficiency as a service criteria allows services to be delivered with diverse energy efficiency and energy consumption policies. Energy consumption and efficiency information and network energy states can be exposed to third parties and energy consumption can be constrained.

**Energy related information can include ratio of renewable energy and carbon emission information when available**. Calculation of energy related information as described in the following requirements is done by means of averaging or applying a statistical model. The requirements do not imply that some form of 'real time' monitoring is required.

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Amongst other study objectives in [2], WT-2.2 addresses the issue about which and how carbon emission information and renewable energy consumption information of the 5G system can be obtained:

“

* **WT-2: New Rel-19 topics from other SA WGs**
* WT-2.1 Consideration of energy consumption measurement/estimation at various granularities
* WT-2.2 Study whether and how mapping measured or estimated energy consumption measurements on to carbon emissions is possible. Study the estimation of carbon emissions efficiency and how to achieve carbon emissions saving in the 5G system. Additionally, whether and how renewable energy consumption information can be obtained will be studied
* WT-2.3 Study the support of different energy states of network elements and network functions. SA5 may have to provide OAM support

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To address whether and how energy related information (e.g. carbon emission information, carbon emission efficiency and renewable/non-renewable energy information) about the 5G system can be obtained, this contribution proposes to introduce a new use case in TR 28.880 [3].

# 4 Detailed proposal

The following changes are proposed for TR 28.880[1].

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| **1st Change** |

## 5.A Use case #<A>: Enable renewable energy consumption and carbon emission information reporting

### 5.A.1 Description

In Rel-18, the 3GPP management system is capable to manage the following types of energy related information:

- energy consumption measurements and/or KPIs

- energy saving state.

In Rel-19, new aspects of energy related information are expected to be provided by the 5G system. TS 22.261 [a] clause 6.15a states:

"

Energy consumption and efficiency information and network energy states can be exposed to third parties and energy consumption can be constrained.

Energy related information can include ratio of renewable energy and carbon emission information when available. Calculation of energy related information as described in the following requirements is done by means of averaging or applying a statistical model. The requirements do not imply that some form of 'real time' monitoring is required.

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There are different energy sources existing, producing different energy types, e.g., non-renewable, renewable/green energy, carbon-free energy, solar-energy, wind-originated, aerothermal, geothermal, hydrothermal and ocean energy, hydro-power, biomass, landfill gas, sewage treatment plant gas, bio-gases etc. Thus, the equipment and infrastructure of the network could be powered by different types of energy sources and the energy consumption measurements could correspond to such different energy types.

Due to the highly variable and unpredictable nature of renewable energy sources, the supply of renewable energy varies substantially by time and location. There is a need for the 3GPP management system to report the energy consumption metrics along with the type of consumed energy and carbon emission information, for example:

* Network slice customers may request some minimal amount/ratio for renewable energy to be used for the slice realization, and hence the network slice provider needs to have a means to monitor and report on the energy consumption for different energy types.
* Awareness of energy consumption of different energy types is useful for energy type aware network management, e.g., defining energy saving policies such that the consumption of renewable energy can be favoured.

In this use case, the 3GPP management system is capable, based on energy related information obtained from various sources, to estimate per 5GC NF and per gNB energy related information, i.e.:

- carbon emission information, i.e.

- carbon emission,

- carbon emission efficiency

- ratio of renewable energy

, and to provide this information to authorized consumers. How this energy related information is exposed to authorized consumers is not addressed by this use case.

### 5.A.2 Potential requirements

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**REQ-Energy\_related\_info-CON-1**: The 3GPP management system should be able to estimate per 5GC NF and gNB energy related information, i.e. carbon emission information and report it to authorized consumers.

**REQ-Energy\_related\_info-CON-2**: The 3GPP management system should be able to estimate per 5GC NF and gNB energy related information, i.e. renewable energy consumed, non-renewable energy consumed and report it to authorized consumers.

### 5.A.3 Potential solutions

#### 5.A.3.i Potential solution #<i>: <Potential Solution i Title>

##### 5.A.3.i.1 Introduction

Editor's Note: This clause describes briefly the potential solution at a high-level.

##### 5.A.3.i.2 Description

Editor's Note: This clause further details the potential solution and any assumptions made.

### 5.A.4 Evaluation of potential solutions

Editor's Note: This clause provides the evaluation of potential solutions.

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| **End of change** |