**3GPP TSG-SA2 Meeting #170S2-2506172**

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**Source: Nokia**

**Title: KI#2: proposed agreement of principles**

**Document for: Approval**

**Agenda Item: 20.4.1**

**Work Item / Release: FS\_EnergySys\_Ph2 / Rel-20**

*Abstract: This document proposes to agree principles for KI#2*

# 1. Introduction

In the scope of KI#2 there is the notion that the network may at any point in time modify the data transmission service offered to a UE to achieve some energy goals.

Various options are possible:

1. Use estimates of energy consumption at various granularity of the UP-energy consumption from EIF. These estimates may be at UE level granularity or across all UEs of a slice. Action is taken at the granularity of the estimates that trigger the action. The fairness of this type of actuation and its effectiveness may be linked to the accuracy and confidence level on the measurement. From that perspective it could be useful to have information samples for the UE repeated over a number of periods T before the action is taken and also it is beneficial to have some estimates of the relative energy consumption at the desired granularity over the population of the ongoing measurements as proposed in solution 6.2. So, in general the robustness of the input may be improved by the number of measurements and some analysis of the relative consumption as in sol 6.1.
2. Use estimates at slice level across UEs. We should note that while the slice level energy consumption KPI e.g. used in sol.6.2 is available from TS 28.554 [x] clause 6.7.3.3 "Network Slice Energy Consumption (EC)", the estimate is equivalent to summing up the per PDU session consumption for all PDU sessions of the slice for the UE, so it is to be included at a conceptual level in the same category 1) above when the number of UEs in the slice is not elevated. When the number of UEs is high, however the problem exists of how to actuate so that energy is saved, i.e. which UEs to select for actuation. In principle restricting the service provided to a subset of UEs may not immediately be beneficial if e.g. the UEs that are not the main sources of consumption are targeted or if other UEs take over the capacity that the limited users make available. Hence if any action is taken it may e.g. consider rate limiting the whole slice using e.g. the feature in clause 6.1.4 of TS 23.503 [x] or apply NSAC defined in clause 5.15.11 of TS 23.501. Otherwise, some form of feedback loop may be needed to modify/expand the affected UE population or consider action on all UEs.
3. The SM PCF may configure the UE with Alternative QoS Policies (AQP) for Energy (Energy Saving QoS profiles) that can be used upon certain configurable energy criteria being detected at the gNB. The advantage of this approach is that there is no need of a centralized decision and each gNB can trigger service adjustment based on operator defined policy for energy that apply to the UE based on gNB logic. Charging subsystem should receive indication of change of QoS when it happens.
4. Policy Data managed by the Operator OAM is used by the PCF for policy decisions. Such a policy data can be additionally provisioned to have energy saving policy for a UE, which can be activated by the AF.

# 2. Text Proposal

It is proposed to capture the following changes in TR 23.700-67.

\* \* \* \* First change (all new text) \* \* \* \*

### 7.1.2 Agreed Principles for KI#2

Editor's note: This clause will include the principles that are agreed as work progresses for the specific KI#Y. This may be populated directly or e.g. also when a topic in clause 7.2.Y gets resolved and a principle is agreed.

The following principles are agreed for KI#2:

- Subscribing to the additional information in solution 6.1 and the energy consumption information can allow a PCF to implement more robust policies by considering multiple samples of the information from the same UE.

- When slice-level energy consumption is considered, only if the slice is used by a high number of UEs the mechanism could be more robust from a measurement standpoint, but from an actuation standpoint the action should be at slice level (i.e. slice level rate control - e.g. the feature in clause 6.1.4 of TS 23.503 [x] ) or apply to all UEs for the network slice. Application of actuation to a subset of UEs requires a feedback loop and a control logic to keep the system stable and achieve energy consumption targets.

- Alternative QoS profiles for energy can be provided to the NG-RAN by the SMF to cause service adjustment based on information locally available at the NG-RAN. These are generated by the PCF and provided to the SMF. The PCF can take AF input for the alternative QoS parameters. NG-RAN should provide indication of the applied QoS to the SMF for SMF to let the CHF for charging purposes.

- PCF considers energy saving policy provisioned and available in the UDR activated by an AF for SM policy decisions.

- PCF informs SMF and AMF about the information received from EIF that caused service adjustments, and accordingly SMF and AMF includes this information when communicating with the CHF for CHF to implement rating and reporting as required.

- Without impact to the TS, the PCF with the current specifications, could consider the location (gNB change) (with PRA) and/or time as the criteria and could implement policies that are configured on PCF with the awareness that specific gNB at certain time periods use certain type of energy (e.g., renewable).

\* \* \* \* Next change (all new text) \* \* \* \*

### 7.2.2 Topics for further consideration for KI#2

Editor's note: This clause will include the topics for further consideration as work progresses for the specific KI#Z. Eventually this clause should only contain topics for further consideration that did not result in agreements (i.e. in agreed principle(s) in a clause 7.1.Z) and can either be then marked as not pursued or postponed to a future Release.

- The aspect of PCF fetching from the OAM, EnC information using SA5 defined services needs to be established. Currently there is no interface between the PCF and the OAM for using the SA5 defined services. If this is required (as defined in 6.2) is to be established useful (e.g., improvements to have new interface) when compared to current PCF being provisioned through general OAM mechanisms.

- The aspect of efficacy of the solution 6.2 proposing selection of UEs to be affected by service adjustment and whether the service adjustments provide energy saving in an application-agnostic manner still needs clarification and is yet to be established.

- Whether, how and which renewable aspects (renewable energy or the ratio of renewable energy) needs to be considered based on the SA5 conclusions is to be established.

\* \* \* \* End of change \* \* \* \*