**3GPP TSG-SA WG4 Meeting #128S4-241032**

**Jeju, South Korea, 20 May - 24 April 2024**

**Source: Samsung Electronics Co., Ltd.**

**Title: [FS\_MediaEnergyGREEN] Use case on scheduled green media processing for reducing GHG**

**Spec: 3GPP TR 26.942 v0.1.1**

**Agenda item: 8.10**

**Document for: Agreement**

**1. Introduction**

The first objective of the FS\_MediaEnergyGREEN study includes the following text:

- Refine relevant SA1 use cases (5.5, 5.8, 5.9, 5.10 and 5.14) in TR 22.882 in the SA4 context.

This contribution presents a use case as a refinement of the SA1 use case in clause 5.14 of TR 22.882.

**2. Discussion**

Clause 5.14 of TR 22.882 describes a “Use case on reducing GHG footprint of Application Services”, where the training of an AI model is performed by a computing node provided by an operator, according to energy consumption information associated with the operator’s computing nodes and application servers.

In this document we present a refined use case based on the above, in the SA4 context.

**3. Proposal**

It is proposed to agree the following changes to 3GPP TR 26.942 v0.1.1.

\* \* \* First Change \* \* \* \*

4.3 Use cases

### 4.3.1 Scheduled green media processing for reducing GHG

Pre-conditions:

- A Mobile Network Operator (MNO) provides the computing services through computing nodes owned by itself or a third party via Service Level Agreement (SLA), which execute compute tasks (e.g., offloaded by users). Each computing node is powered by renewable energy (e.g., solar energy), non-renewable energy (e.g., coal) or mix of both. The highly variable nature of renewable energy sources means that the resulting GHG emissions by each computing node varies considerably by time and location. The high cost of large-scale energy storage systems (e.g., battery) incentivises the MNO to consume the renewable energy immediately when it is produced (e.g., to reduce the cost of installing a battery system). The ratio of renewable energy measures the ratio of the power used that comes from renewable energy sources as a percentage of total power usage in a given time unit.

NOTE: A computing node is the resource that executes compute tasks belonging to Application Service Providers, e.g., a server node hosted by an Edge Computing Service Provider (ECSP) in the Edge Data Network based on PLMN operator service agreement. Alternatively, the ECSP and the PLMN operator may be part of the same organisation.

Details:

1. User subscribes to the "green compute and communication service to save our planet" subscription offering of the MNO.

2. User A is an influencer and creates content of reasonably long duration (typically around 30 minutes) for publication on a on a weekly basis, at the same time every week, indicated in advance to the MNO.

3. User A captures and edits the weekly content in advance of the release time and contributes it to the MNO's Media Delivery System from a UE, offloading the transcoding compute task of the content to the MNO's Media Delivery System.

4. In the MNO's Media Delivery System, typically the nearest computing node is selected to execute User A’s task, but since User A is subscribed to the "green compute and communication service", the selection of a computing node for the computing task to be executed is based on the following factors:

- *Computing node green energy status.* Where a computing node has green energy available to it at the time of computation request.

- *Computing node green energy reserve.* Where a computing node has surplus green energy available to it in the form of stored renewable energy.

- *Computing node distance from User A.* Where nodes further away from User A consume more energy to deliver the content.

- *The type of task and the most optimized computing resource for the task*. For example, a hardware video encoder for a transcoding task, GPU accelerators for an AI inferencing task).

- *The urgency of the task.* Based on the deadline for publishing the final media asset.

- *Preferences on the minimum green energy ratio:* The proportion of green energy used to generate and encode the final published media asset.

5. Depending on the factors above, the "green compute and communication service" may also delay or schedule the uplink of the source media asset to the MNO's network, and the computation of the media transcoding task according to green energy availability.

6. No matter which computing node is selected for execution of User A’s task, the task is always completed by the publication deadline specified by User A.

7. By scheduling and selecting a computing node with available green energy for the task provided by the “green compute and communication” service, the computing tasks requested by User A can be nearly carbon-free, at the same time satisfying the weekly publication deadline.

Potential requirements include:

Req.1 Time stamps for the scheduling of such a service, in particular:

- Start time of the service request by the user.

- Target completion time requested by the user.

- Upload time (scheduled) when the pre-processed media is uploaded in the uplink direction from the user UE to the operator network.

- Start time of processing by computing node.

- Completion time of processing by computing node.

Req.2 Important time periods (durations):

- Estimated uplink time duration (depending on data size, uplink bandwidth – which also depends on renewable energy status of the operator)

- Processing time duration (depending on task complexity, computing node computation power)

Req.3 The exposure of computing resource information such that the most optimized solution (in terms of energy efficiency) can be selected based on the media processing task.

\* \* \* End of Changes \* \* \* \*