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**Source: ZTE Corporation**

**pCR Title: New use case on energy sources information used for network node selection**

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*Abstract: This contribution proposes a new use case for FS\_EnergyServ\_ph2 in which energy sources information is used for network node selection.*

**1. Introduction**

Please read the use case below.

**2. Reason for Change**

This is a new use case related to energy sources information for the FS\_EnergyServ\_ph2 study.

**3. Conclusions**

None.

**4. Proposal**

It is proposed that the following changes to 3GPP TR 22.883 be agreed upon.

\* \* \*Start of Change (All new text)\* \* \* \*

## 5.y Use case on energy sources information used for network node selection

### 5.y.1 Description

In order to cut down carbon emissions and enhance network efficiency, more and more operators seek to green energy sources (e.g. solar energy, wind power, geothermal energy, biomass and hydroelectric power) for their network. Due to the highly variable and unpredictable nature of green energy sources, different network nodes may be powered with different types of energy. For example, some network nodes may be powered by non-green energy while other network nodes may be powered by green energy. Some network nodes may also be powered by a mixture of non-green energy and green energy. In this case, the ratio of green energy of network node is determined as the ratio of the power that is used from green energy sources as a percentage of total power usage in a given time unit. Calculation of ratio of green energy is done by means of averaging or applying a statistical model.

Moreover, for the green energy used by network node, it can be generated at the site or delivered from the grid. For example, on-site wind power generation equipment is installed together with a network node, so the network node can use the green energy conveniently. For the network node which uses the green energy delivered from the grid, the energy transmission loss should be taken into account. From the perspective of carbon emission reduction, the network node powered by on-site green energy should be prioritized over the network node powered by green energy far away.

In the following use case, telecom operator provides communication service to subscribers considering the energy related characteristics of network node. Here the energy related characteristics denote energy type (e.g. green energy, non-green energy, or the ratio of green energy) and energy location (e.g. energy at the site or delivered from grid). By taking the energy related characteristics of the network nodes into account, the UE can be served by the network nodes with more green energy. Besides, during the data delivery, the 5G system can select the connection path with more green energy for the UE in a best effort manner.

### 5.y.2 Pre-conditions

Maggie receives 5G service from the mobile network operator A.

The 5G system operated by operator A is powered by both green energy and non-green energy. Different network nodes may be powered with different energy sources, e.g. non-green energy, green energy, or a mixture of non-green energy and green energy.

The operator A offers a “Green Comm.” service. That means user’s UE can be served by the network nodes with more green energy when possible. During the data delivery, the 5G system can select the connection path with more green energy for the UE in a best effort manner, once the “Green Comm.” service is subscribed by a user.

Maggie loves our planet, so she subscribes the “Green Comm.” service which utilize as much local green energy as possible.

### 5.y.3 Service Flows

1. The 5G system monitors the energy sources of its network nodes.
2. Maggie wants to upload a video through the “Green Comm.”. By taking into account the energy related characteristics (e.g. ratio of green energy, location of the green energy) of nearby network nodes, Maggie’s UE can be served by the network node with high ratio of on-site green energy.
3. Then, the connection path is set up considering the energy related characteristics of the network nodes in the path.
4. Maggie’s video is uploaded through the green connection path.
5. By selecting the network node which is powered by local green energy as much as possible, Maggie can be nearly carbon-free and still obtains the desired communication service.

### 5.y.4 Post-conditions

Maggie can enjoy the communication service with the satisfied quality of service while reducing her carbon footprint.

### 5.y.5 Existing features partly or fully covering the use case functionality

In TS 22.261, clause 6.15a.1 on description, clause 6.15a.2 on energy related information as a service criteria and clause 6.15a.5 on information exposure include the following requirements:

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.

Subject to operator policy and agreement with 3rd party, the 5G system shall provide a mechanism to support the selection of an application server based on energy related information associated with a set of application servers.

Subject to operator’s policy and agreement with 3rd party, the 5G system shall be able to expose information on energy consumption for serving this 3rd party.

NOTE 1: Energy consumption information can include ratio of renewable energy and carbon emission information when available. The reporting period could be set, e.g., on monthly or yearly basis and can vary based on location.

NOTE 2: The energy consumption information can be related to the network resources of network slice, NPNs, etc.

### 5.y.6 Potential New Requirements needed to support the use case

[PR.5.y.6-1] Subject to operator’s policy, the 5G system shall provide a method to support that the user is served by the network taking into account the energy related characteristics (e.g. ratio of green energy, on-site or grid location for the green energy) of the network nodes.

[PR.5.y.6-2] Subject to operator’s policy, the 5G system shall support routing user’s traffic to selected connection path, taking into account the energy related characteristics (e.g. ratio of green energy, on-site or grid location for the green energy) of the network nodes in the connection path.

NOTE 1: It is assumed that 5G system can monitor the energy related characteristics of its network nodes.

\* \* \*End of Change \* \* \* \*