**3GPP TSG-SA5 Meeting #157 *S5-246113d2***

Hyderabad, India, 14 - 18 October 2024

**Source: Huawei**

**Title: Potential solution of EE KPIs evaluated from network quality performance dimension**

**Document for: Approval**

**Agenda Item: 6.19.20**

# 1 Decision/action requested

***The group is asked to discuss and agree on the proposal.***

# 2 References

[1] 3GPP TR 28.880 v1.0.1: Study on energy efficiency and energy saving aspects of 5G networks and services

# 3 Rationale

This contribution proposes to add potential solution of EE KPIs evaluated from network quality performance dimension in TR 28.880 [1]. It is revised based on the S5-244898, therefore, changes on changes are kept intentionally.

# 4 Detailed proposal

This document proposes the following changes in TR 28.880 [1].

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| **1st Change** |

### 5.6.3 Potential solutions

#### 5.6.3.3 Potential solution #3: <EE KPIs evaluated from network quality dimension>

##### 5.6.3.3.1 Introduction

As defined in TS 28.310 [12], EE is the ratio between performance and energy consumption. In this potential solution, new EE KPIs are considered from network quality performance dimension.

##### 5.6.3.3.2 Description

Network quality performance, reflected from the following performance measurements

* DL RAN UE throughput
* UL RAN UE throughput

Note: The network quality performance include other aspects such as coverage quality, or connection quality, etc. This solution focuses only on the user throughput aspect.

The UE perceived throughput in NG-RAN is an important performance parameter for operating 5G network. If the UE throughput of the NR cell cannot meet the performance requirement, some actions need to be performed to the network, e.g. reconfiguration or capacity increase. So it is necessary to define UE throughput KPI to evaluate whether the end-users are satisfied. See clause A.7 of TS 28.554 [2].

The proposed performance dimension of new EE KPIs, i.e. the numerator part of the formula of new EE KPIs, is evaluated from network quality performance dimension as reflected by some existing KPIs in TS 28.554 [2], see Table 5.6.3.3.2-1.

Table 5.6.3.3.2-1: Network quality performance dimension from which new EE KPIs are evaluated

|  |  |  |  |
| --- | --- | --- | --- |
| Performance dimension to evaluate EE KPIs | Performance part of new EE KPIs | Reference to the clause number in TS 28.554 [2] | Note |
| **UE throughput** |  |  |  |
| DL RAN UE throughput for a sub-network | 6.3.6.3.2 | This UE throughput based KPI describes the average DL RAN UE throughput for a sub-network. |
| DL RAN UE throughput for a network slice subnet | 6.3.6.3.3 | This UE throughput based KPI describes the average DL RAN UE throughput for a network slice subnet. |
|  |  |  |
| UL RAN UE throughput for a sub-network | 6.3.6.4.2 | This UE throughput based KPI describes the average UL RAN UE throughput for a sub-network. |
| UL RAN UE throughput for a network slice subnet | 6.3.6.4.3 | This UE throughput based KPI describes the average UL RAN UE throughput for a network slice subnet. |

The new EE KPIs, which are evaluated as the ratio between performance (see UE throughput KPIs captured in Table 5.6.3.3.2-1) and energy consumption, are captured in Table 5.6.3.3.2-2.

Table 5.6.3.3.2-2: New EE KPIs evaluated from network quality performance dimension

|  |  |  |  |
| --- | --- | --- | --- |
| Performance dimension to evaluate EE KPIs | | New EE KPIs | Note |
| **Network quality** | **UE throughput** as the network quality performance indicator |  |  |
|  | This new EE KPI provides the energy efficiency of a sub-network.  This new EE KPI is obtained by DL RAN UE throughput for a sub-network KPI divided by the energy consumption of the sub-network over the same observation period. The energy consumption of the sub-network is obtained by summing up the Energy Consumption of all the Network Functions (ECNF) that constitute the sub-network. ECNF is defined in clause 6.7.3.1 of TS 28.554 [2]. |
|  | This new EE KPI provides the energy efficiency of a network slice subnet.  This new EE KPI is obtained by DL RAN UE throughput for a network slice subnet KPI divided by the energy consumption of the network slice subnet over the same observation period. The energy consumption of the network slice subnet is obtained by summing up the Energy Consumption of all the Network Functions (ECNF) that constitute the network slice subnet. ECNF is defined in clause 6.7.3.1 of TS 28.554 [2]. |
|  |  |
|  | This new EE KPI provides the energy efficiency of a sub-network.  This new EE KPI is obtained by UL RAN UE throughput for a sub-network KPI divided by the energy consumption of the sub-network over the same observation period. The energy consumption of the sub-network is obtained by summing up the Energy Consumption of all the Network Functions (ECNF) that constitute the sub-network. ECNF is defined in clause 6.7.3.1 of TS 28.554 [2]. |
|  | This new EE KPI provides the energy efficiency of a network slice subnet.  This new EE KPI is obtained by UL RAN UE throughput for a network slice subnet KPI divided by the energy consumption of the network slice subnet over the same observation period. The energy consumption of the network slice subnet is obtained by summing up the Energy Consumption of all the Network Functions (ECNF) that constitute the network slice subnet. ECNF is defined in clause 6.7.3.1 of TS 28.554 [2]. |

The existing EE KPIs evaluated from network quality and data traffic performance dimensions are captured in Table 5.6.3.3.2-3.

Table 5.6.3.3.2-3: Existing EE KPIs evaluated from network quality and data traffic performance dimensions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Performance dimensions to evaluate EE KPIs | | Existing EE KPIs | Reference to the clause number in TS 28.554 [2] for the definition of EE KPIs | Note |
| **Network quality and network data traffic** | **Latency** as the network quality performance indicator and **Data Volume (DV)** as the network data traffic performance indicator in combined dimensions mode | Energy efficiency of URLLC network slice (Based on both latency and Data Volume (DV) of the network slice) | 6.7.2.3.3 | This EE KPI shows the energy efficiency of network slices of type URLLC. |

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| **End of change** |