**3GPP TSG-SA5 Meeting #157 *S5-246116d1***

Hyderabad, India, 14 - 18 October 2024

**Source: Huawei**

**Title: Conclusion and recommendation for multi-dimensional energy efficiency metrics**

**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 conclusion and recommendation for multi-dimensional energy efficiency metrics in TR 28.880 [1].

# 4 Detailed proposal

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

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| **1st Change** |

# 6 Conclusions and recommendations

## 6.6 Multi-dimensional network energy efficiency metrics

The following bullets are recommended for normative work for use case #6:

1) Define multi-dimensional EE metrics as per the following categories:

**- Network data traffic**, which measures the number or amount of network traffic provided.

- For example, the amount of data transferred as the Data Volume used in EE KPI, the number of connections supported, etc.

- As proposed by potential solution #1, no need to introduce new EE KPIs for this category in normative work.

**- Network quality**, which measures the quality of network provided.

- Such as user throughput, coverage quality, or connection quality, etc.

- New EE KPIs, as proposed by potential solution #3, need to be introduced for this category in normative work.

**- Network availability**, which measures the availability of network.

- - New EE KPIs, as proposed by potential solution #2, need to be introduced for this category in normative work.

2) The new EE KPIs to be defined in normative work are listed in Table 6.6-1.

Table 6.6-1: New EE KPIs evaluated from network quality and network availability performance dimensions

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| --- | --- | --- | --- |
| 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]. |
| **Network availability** | **Availability** as the network availability performance indicator |  |  |
|  | This new EE KPI provides the energy efficiency of an RAN sub-network.  This new EE KPI is obtained by Radio access network availability KPI divided by the energy consumption of the RAN sub-network over the same observation period. The energy consumption of the RAN sub-network is obtained by summing up the Energy Consumption of all the Network Functions (ECNF) that constitute the RAN sub-network. ECNF is defined in clause 6.7.3.1 of TS 28.554 [2]. |

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| **End of change** |