**3GPP TSG-SA5 Meeting #162 *S5-253925***

Goteborg, Sweden, 25 - 29 August 2025

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** | **1** | **Current version:** |  |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network | **X** |

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| ***Title:*** | Rel-19 CR TS 28.310 Add missing solution description for multi-dimensional energy efficiency | | | | | | | | | |
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| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** | SA5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | Energy\_OAM\_Ph3 | | | | |  | ***Date:*** | | | 2025-08-15 |
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| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-19 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
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| ***Reason for change:*** | | The energy efficiency KPIs evaluated from dimensions of network availability and network quality have been introduced into TS 28.554. However, the corresponding multi-dimensional energy efficiency solution description is missing in TS 28.310. It is proposed to update TS 28.310 solution part accordingly. | | | | | | | | |
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| ***Summary of change:*** | | Adding the solution description for energy efficiency KPIs evaluated from dimensions of network availability and network quality. | | | | | | | | |
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| ***Consequences if not approved:*** | | Lack of multi-dimensional energy efficiency solution description in specification and may lead to incomplete implementation. | | | | | | | | |
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| ***Clauses affected:*** | | 6.1.1, 6.1.2.1 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
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| ***Other comments:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

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| **1st Change** |

### 6.1.1 Energy efficiency of NG-RAN

Assessment of NG-RAN data EE is based on the high-level mobile network data EE KPI defined in clause 3.1 and clause 5.3 of ETSI ES 203 228 [2]:



NG-RAN data EE KPI is is obtained by the data volume divided by Energy Consumption (EC) of the considered network elements. The KPI is defined for both non-split and split gNB scenarios. This KPI is defined in clause 6.7.1 of TS 28.554 [18].The following PEE (Power, Energy and Environmental) measurement may be used as the ECMN:

- PNF Energy consumption (cf. clause 5.1.1.19.3 of TS 28.552 [15]): This measurement provides the energy consumed (in kilowatt-hours) by the subject gNB.

The following EE KPIs, defined in TS 28.554 [18], consider additional dimensions for different network scenarios:

- Energy efficiency evaluated from network availability (see clause 6.7.5 of TS 28.554 [18])

- Energy efficiency evaluated from network quality (see clause 6.7.6 of TS 28.554 [18])

While each EE KPI is derived from a single dimension, the overall set provides a comprehensive multi-dimensional EE view.

### 6.1.2 Energy efficiency of network slices

#### 6.1.2.1 Introduction

Assessment of the energy efficiency of 5G network slices is based on KPIs defined in TS 28.554 [18] clause 6.7.2.

The Generic network slice Energy Efficiency KPI is defined as the ratio between the performance of network slice to the Energy Consumption of the network slice. The KPI for Energy Consumption of the network slice is defined in TS 28.554 [18] clause 6.7.3.3.

The energy efficiency of 5G network slice is defined for each slice type as follows:

1) Energy efficiency of eMBB network slice, with the following variants:

- Energy efficiency of eMBB network slice, where the KPI is obtained by the sum of UL and DL data volumes at N3 interface(s) of the network slice, divided by the energy consumption of the network slice. This KPI is defined in TS 28.554 [18] clause 6.7.2.2.

- Energy efficiency of eMBB network slice – RAN-based, where the performance of the network slice is is obtained by summing up UL and DL data volumes at F1-U, Xn-U and X2-U interface(s) of gNBs, on a per S-NSSAI basis, divided by energy consumption of the RAN-only network slice. This KPI is defined in TS 28.554 [18] clause 6.7.2.2a.

2) Energy efficiency of URLLC network slice, with the following variants:

- Energy efficiency of URLLC network slice based on latency of the network slice, where the KPI is obtained by the inverse of the average end-to-end User Plane (UP) latency of the network slice divided by the energy consumption of the network slice. This KPI is defined in TS 28.554 [18] clause 6.7.2.3.2.

- Based on both latency and data volume of the network slice, where the KPI is obtained by the product of the sum of the weighted UL and DL traffic data volumes at N3 interface(s) or N9 interface of the PSA UPF of the network slice multiplied by the inverse of the end-to-end User Plane (UP) latency of the network slice, divided by the energy consumption of the network slice. This KPI is defined in TS 28.554 [18] clause 6.7.2.3.3.

3) Energy efficiency of MIoT network slice, with the following variants:

- Based on the number of registered subscribers of the network slice, where the KPI is obtained by the maximum number of registered subscribers to the network slice divided by the energy consumption of the network slice. This KPI is defined in TS 28.554 [18] clause 6.7.2.4.1.

- Based on the number of active UEs in the network slice, where the KPI is obtained by the mean number of active UEs of the network slice divided by the energy consumption of the network slice. This KPI is defined in TS 28.554 [18] clause 6.7.2.4.2.

The following EE KPIs, defined in TS 28.554 [18], consider additional dimensions for different network scenarios:

- Energy efficiency evaluated from network quality (see clause 6.7.6 of TS 28.554 [18])

While each EE KPI is derived from a single dimension, the overall set provides a comprehensive multi-dimensional EE view.

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| **End of change** |