3GPP TSG SA WG5 Meeting 137-e S5-213324

E-meeting, online, 10 - 19 May 2021

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **28.310** | **CR** | **0016** | **rev** | **-** | **Current version:** | **17.0.0** |  |
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| *For* [***HELP***](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-17 CR TS28.310 Update of the EE KPIs Overview |
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| ***Source to WG:*** | Huawei, TELEFONICA S.A. |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** | EE5GPLUS |  | ***Date:*** | 2021-04-27 |
|  |  |  |  |  |
| ***Category:*** | B |  | ***Release:*** | *Rel-17* |
|  | *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 canbe 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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | For different the network characteristics and different network classifications the energy efficiency results behave quite different. It is an important aspect in using the EE KPI evaluation.  |
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| ***Summary of change:*** | Add the description of parameters needed in the network energy efficiency evaluation to interpret variations in energy efficiency results of different networks besides the parameters used in the energy efficiency evaluation.  |
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| ***Consequences if not approved:*** | There will be no description in the TS for the other parameters to interpret variations in energy efficiency results of different networks. |
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| ***Clauses affected:*** | 4.1 |
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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:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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| **First modified section** |

# 4 Concepts and overview

## 4.1 EE KPIs Overview

Telecommunication networks energy efficiency KPIs are defined by various SDOs / organizations and are of various natures. They can be applied to either:

- whole networks (i.e. end-to-end), or to

- sub-networks (e.g. the radio access network), or to

- single network elements, or to

- telecommunication sites, which contain network elements and site equipment.

NOTE 1: Data centers used by network operators are considered in the present document as telecommunication sites.

Moreover, EE KPIs can also be categorized according to the operator's network life cycle phase they may apply to, e.g.:

- during the Buy phase, mobile network operators may be willing to compare network elements from various vendors from an EE standpoint. Some EE KPIs and measurement methods have been specified for this purpose.

- during the Design / Build phase, mobile network operators are always faced to several design options, and may be willing to compare them from an EE standpoint. This may happen for the whole network, sub-networks and for telecom sites. For telecom sites, EE KPIs have been specified.

- during the Run phase, mobile network operators need to assess the energy efficiency of the live network, as a whole (i.e. end-to-end), or for sub-networks, or for single network elements or telecom sites. Some EE KPIs and measurement methods have also been specified for this purpose.

NOTE 2: EE KPIs in the present document are only applicable for the Run phase.

Generally, EE KPIs for network elements are expressed in terms of Data Volume divided by the Energy Consumption of the considered network elements. In the case of radio access networks, an EE KPI variant may also be used, expressed by the Coverage Area divided by the Energy Consumption of the considered network elements.

The calculation of the energy efficiency of 5G networks relies on the following principles:

- it is based on the two high-level EE KPIs defined in ETSI ES 203 228 [2]:

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- EEMN,DV may apply to the whole 5G network whereas EEMN,CoA may apply only to NG-RAN;

- EEMN,DV requires the collection of both Data Volumes (DV) and Energy Consumption (EC) of 5G Network Functions (NF);

- In NG-RAN, DV is measured per cell;

- In 5GC, DV is measured per NF;

- EC definition and measurement method for 5G PNFs rely on ETSI ES 202 336-1 [3] and ETSI ES 202 336-12 [4];

- EC is measured by PEE parameters (cf. ETSI ES 202 336-12 [4] – Annexes A and B);

- PEE measurements requirements for all deployment scenario in NG-RAN: The 3GPP management system responsible for the management of the gNB (single or multiple vendor gNB) shall be able to collect PEE measurements data from all PNFs in the gNB, in the same way as the other PM measurements;

- When gNBCU/gNBCU-CP/gNBCU-UP energy consumption is assumed to be very small compared to gNBDU and given that, in some cases, the gNBCU/gNBCU-CP/gNBCU-UP may be virtualized, the present document only considers the energy consumed in gNBDU(s) (in case of split scenarios) and in non-split gNBs (see clause 4.2.1 of 3GPP TS 28.541 [11] and clause 6.1.1 of 3GPP TS 38.401 [12]). There might be a need for some correction in KPI between the different deployment scenarios.

NOTE 3: The vendor(s) of 2-split (gNBDU/gNBCU) or 3-split gNB/en-gNB components (gNBDU/gNBCU-CP/gNBCU-UP) may be same or different depending on the implementations.

- EC definition and measurement method for 5G VNFs are not in the scope of 3GPP;

- In the present document, it is assumed that NG-RAN is only composed of base stations with built-in sensors (cf. ETSI ES 202 336-12 [4] – clause 4.4.1).

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| Besides the parameters required to calculate the energy efficiency, e.g. DV and EC, other parameters may be used to interpret variations in energy efficiency KPI values from different networks. These parameters can be classified into demography, topography and climate classes (cf. ETSI ES 203 228 [2] – section 4.3), which describe the network characteristics with regard to population density, geographical conditions and climate zones. For each class of parameters, there can be subclasses, e.g. demography can be further classified into dense urban, urban, sub-urban, rural or unpopulated scenarios. For each class / subclass, the energy efficiency KPI values may be interpreted differently.**End of first modified section** |