**3GPP TSG-RAN WG1 Meeting #109-e R1-220xxxx**

**e-Meeting, May 9– May 20, 2022**

**Agenda Item: 9.7**

**Source: Moderator (Huawei)**

**Title: Email discussion on [109-e-R18-NW\_ES-01] TR skeleton 38864**

**Document for: Discussion and Decision**

# Introduction

Study Item (SI) for network energy savings for NR is approved in [1]. The original draft TR skeleton can be found in [R1-2203947](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203947.zip).

For completion of the approval, the following email discussion is assigned.

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| [109-e-R18-NW\_ES-01] Email discussion and approval of TR skeleton for Rel-18 SI on network energy savings for NR by May 13 – Yi (Huawei) |

# Comments and discussion

Main content/structure of the current TR skeleton is also provided next. Companies comments and suggestions are invited into below.

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| Company | Comment |
| LG Electronics | We have two comments.  First of all, regarding Section 5, according to TR 38.840 for UE power saving, UE power consumption model and evaluation methodology are all contained in the Annex in that TR, which is different from this TR. I wonder if there is any particular reason to separate Section 5 from simulation assumptions in Annex A. Otherwise, we can combine Section 5 into Annex A, similar to UE power saving TR. Or, it would be appreciated if the Rapporteur can clarify which contents will be included in each of section 5 and Annex A.  Secondly, regarding Section 6, for physical layer techniques, it can be considered to categorize them into per each of domains, as stated in WID, which means having separate subsections for time/frequency/spatial and power domains, respectively. We wonder if this kind of discussion can be treated after endorsing TR skeleton or we can discuss how to categorize layer 1 techniques before endorsement. |
| Samsung | As discussed during Day 1 GTW, where to capture evaluation results? Either in dedicated section under 5.3 (?) or in each corresponding scheme under section 6.x (?).  In addition, we would prefer to have separate sections for RAN2 and RAN3 aspects which facilitate the TR drafting across different WGs. |
| CATT | We are OK with the basic structure of the skeleton. We would like to clarify a few points in deriving the evaluation results and the structure of capturing the evaluation results.   1. The network energy saving gain would heavily depend on the baseline network configuration and operation. Thus, we need to have a section of baseline operation for network energy saving. This is different to that in Rel-16 UE power saving study since UE always follow network’s configuration for operation. 2. The evaluation results of network energy saving techniques from different companies might have different assumptions. How do we capture it the TR? |
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| 1. 4 Introduction   Network energy saving is of great importance for environmental sustainability, to reduce environmental impact (greenhouse gas emissions), and for operational cost savings. As 5G is becoming pervasive across industries and geographical areas, handling more advanced services and applications requiring very high data rates (e.g. XR), networks are being denser, use more antennas, larger bandwidths and more frequency bands. The environmental impact of 5G needs to stay under control, and novel solutions to improve network energy savings need to be developed.  Energy consumption has become a key part of the operators’ OPEX. According to the report from GSMA [3], the energy cost on mobile networks accounts for ~23% of the total operator cost. Most of the energy consumption comes from the radio access network and in particular from the AAU, with data centres and fibre transport accounting for a smaller share. The power consumption of a radio access can be split into two parts: the dynamic part which is only consumed when data transmission/reception is ongoing, and the static part which is consumed all the time to maintain the necessary operation of the radio access devices, even when the data transmission/reception is not on-going.  Therefore, there is a need to study and develop a network energy consumption model especially for the base station (a UE power consumption model was already defined in TR38.840), KPIs, an evaluation methodology and to identify and study network energy savings techniques in targeted deployment scenarios. The study investigates how to achieve more efficient operation dynamically and/or semi-statically and finer granularity adaptation of transmissions and/or receptions in one or more of network energy saving techniques in time, frequency, spatial, and power domains, with potential support/feedback from UE, potential UE assistance information, and information exchange/coordination over network interfaces.  The study not only evaluates the potential network energy consumption gains, but also assesses and balances the impact on network and user performance, e.g. by looking at KPIs such as spectral efficiency, capacity, UPT, latency, UE power consumption, complexity, handover performance, call drop rate, initial access performance, SLA assurance related KPIs, etc. The techniques studied could avoid having a large impact to such KPIs.   1. 5 Modeling and evaluation methodology 2. 5.1 Energy consumption model for BS 3. 5.2 Evaluation methodology 4. 6 Techniques to improve network energy savings   *Editor’s note: RAN2 and RAN3 related aspect may be provided for corresponding techniques listed here, or using separate sections when needed.*   1. X Conclusions 2. Annex <A>: Simulation assumptions | |

# References

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|  | RP-[220297](https://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_95e/Docs/RP-220297.zip) | Revised SI: Study on network energy savings for NR | Huawei |