**3GPP TSG RAN Meeting #109 RP-25abcd**

**Beijing, China, September 15-18, 2025**

**Agenda Item:** **9.6.1.5**

**Source: Ericsson, Apple**

**Title: WI summary for enhancements of network energy savings for NR**

**WI code(s): Netw\_Energy\_NR\_enh**

**Leading WG: RAN1**

**Release: Rel-19**

# Introduction

Energy performance continues to be a critical part of network operations and energy savings techniques are important in reducing operation costs while maintaining high network quality. Following up on Rel-18 study and work items on network energy savings ([1][2]), the Rel-19 work item ([3]) introduces the following new functionalities for network energy savings in NR:

• On-demand SSB operation for SCells

• On-demand SIB1 for UEs in idle/inactive mode

• Adaptation of common signal/channel transmissions

# Description

Below is a brief description of the functionalities introduced in the Rel-19 network energy savings enhancements work item.

**On-demand SSB operation for SCells**

Network energy consumption on SCells can be reduced by providing SSBs on demand. On-demand SSB operation for an SCell is introduced for both of the following cases: 1) no always-on SSB on the SCell, and 2) always-on SSB on the SCell. The on-demand SSBs can be configured by higher layers, and the on-demand SSB transmissions can be activated, deactivated or adapted using RRC-based and/or MAC-CE based signalling from the network. The center frequency locations of always-on SSB and on-demand SSB can be same or different. Both L1 and L3 measurements based on on-demand SSBs are supported. The on-demand SSBs are not cell-defining.

**On-demand SIB1**

Energy consumption due to periodic SIB1 transmissions can be reduced by transmitting SIB1 on demand. A UE can transmit an uplink wakeup signal based on a SIB1 request configuration to request SIB1 transmission from a gNB. A cell can transmit SIB1 request configuration(s) of one or multiple cells including its own SIB1 request configuration. The uplink wakeup signal is based on PRACH. Upon transmission of the uplink wakeup signal, the UE monitors for RAR and the UE can receive SIB1 in a time window. Inter NG-RAN node signalling is introduced for the exchange of the SIB1 request configurations.

**Adaptation of common signal/channel transmissions**

For an SCell, SSB periodicity adaptation (e.g. between sparse and dense periodicities) can facilitate network energy savings. A UE can be configured with up to two additional SSB periodicities and corresponding frame-level/half-frame offsets for an SCell. Group-common DCI 2\_9 signalling is introduced to indicate the applicable SSB periodicity value for an SCell, and the indication is also used for indicating the applicable SMTC from a set of SMTCs configured for the SCell. SSB periodicity adaptation is supported for SSBs that are not cell-defining.

Adaptation of PRACH in time domain (e.g. between sparse and dense random-access occasions in time domain) can facilitate network energy savings. A gNB can configure additional RACH resources in addition to legacy RACH resources in a cell and the availability of the additional RACH resources can be indicated using DCI 1\_0 with P-RNTI and a configured validity duration or using DCI 1\_0 with C-RNTI for PDCCH order. A PRACH subset mask is also introduced to allow selection of a subset of the additional RACH resources. Adaptation of PRACH is supported for both idle/inactive and connected mode operation.

Adaptation of paging by confining paging occasions in time domain can facilitate network energy savings. The value range for parameter N is extended to make it possible to have an increased interval between PFs. The value range for the number of paging occasions within one paging frame is increased to compensate forthe decrease in the number of PFs. UEs supporting paging adaption and PEI can monitor PEI according to the additional PEI configuration, if configured.

# References

1. TR 38.864, Study on network energy savings for NR, March 2023
2. RP-230566, WID revision: Network energy savings for NR, RAN#99, March 2023
3. RP-251678, Revised WID on enhancements of network energy savings for NR, RAN#108, June 2025
4. RP-252331, Status report for enhancements of network energy savings for NR, Ericsson, Apple, RAN#109, Sep 2025