

3GPP TSG RAN #98-e

RP-223162

E-meeting, December 12th - 16th, 2022

Agenda Item: 9.2.5

Document for: Decision

Discussion on WID for NW energy savings

NTT DOCOMO, INC.

■ WID description (RP-213554)

4 Objective

4.1 Objective of SI or Core part WI or Testing part WI

The objectives of the study are the following:

1. Definition of a base station energy consumption model [RAN1]
 - Adapt the framework of the power consumption modelling and evaluation methodology of TR38.840 to the base station side, including relative energy consumption for DL and UL (considering factors like PA efficiency, number of TxRU, base station load, etc), sleep states and the associated transition times, and one or more reference parameters/configurations.
2. Definition of an evaluation methodology and KPIs [RAN1]
 - The evaluation methodology should target for evaluating system-level network energy consumption and energy savings gains, as well as assessing/balancing impact to network and user performance (e.g. spectral efficiency, capacity, UPT, latency, handover performance, call drop rate, initial access performance, SLA assurance related KPIs), energy efficiency, and UE power consumption, complexity. The evaluation methodology should not focus on a single KPI, and should reuse existing KPIs whenever applicable; where existing KPIs are found to be insufficient new KPIs may be developed as needed.

Note: WGs will decide KPIs to evaluate and how.

3. Study and identify techniques on the gNB and UE side to improve network energy savings in terms of both BS transmission and reception, which may include:
 - 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, and potential UE assistance information [RAN1, RAN2]
 - Information exchange/coordination over network interfaces [RAN3]

Note: Other techniques are not precluded

[...]

■ Conclusion and recommendation captured in TR 38.864

Based on the study and summary, from time and frequency domain,

- Technique A-4 of adaptation of DTX/DRX, including the alignment of Cell DTX/DRX with UE DRX, is beneficial for network energy savings.
- Adaptation/reduction/elimination of common channels/signals (UE WUS can also be considered) in single or multi-carrier operation are beneficial for network energy savings.

[...]

Based on the study, at least a technique based on C-1 is beneficial for network energy savings, and can be recommended. Technique C-2 also has the potential to provide large network energy saving gain.

[...]

Based on the study, at least a technique based on D-1 is beneficial for network energy savings.

- Target scope of WI on Rel-18 NW energy savings
 - Time and frequency domain enhancements
 - » Considering the evaluated gain, impacts on initial access delay and UE power consumption among the techniques listed in TR 38.864, following techniques, which are recognized to be beneficial in the TR, can be specified in the WI phase:
 - A-1-1: Simplified SSB
 - A-3: UE wake up signal for gNB
 - A-4: Adaptation of DTX/DRX
 - B-1-1: Inter-band CA with SSB-less SCell
 - Spatial domain enhancements
 - » C-1: Adaptation of spatial elements can be specified in the WI phase as recommended in TR 38.864.
 - Power domain enhancements
 - » D-1: Adaptation of transmission power of signals and channels can be specified in the WI phase as recognized to be beneficial in TR 38.864.
 - ***Proposal: following techniques should be included in scope of WID on Rel-18 NW energy savings***
 - » ***Technique A-1-1, A-3, A-4, and B-1-1 for time and frequency domain enhancements***
 - » ***Technique C-1 for spatial domain enhancements***
 - » ***Technique D-1 for power domain enhancements***

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