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3GPP TSG RAN Meeting #101 RP-231793

Bangalore, September 11 - 15, 2023

Agenda Item: 8A.2.5

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Title: Rel-19 Network energy saving enhancements (RAN1-led)

Document for: Discussion

NR NES in Rel-19 - Background

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Observations from Rel-18 SID and WID

- Following techniques are beneficial for network energy saving based on SID outcome
  - Time domain:
    - Technique A-3-1/A-5-2: On demand SSB/SIB1 by UE WUS
    - Technique A-4: Cell DTX/DRX enhancement
      - Specification of Cell DTX/DRX mechanism will be done in Rel-18 WI
  - Frequency domain:
    - Techniques A-5-1/B-1-1: SSB-less and/or SIB1-less operation in single or multi-carrier scenarios
      - Specification of SSB-less Scell operation will be done in Rel-18 WI
  - Spatial domain:
    - Technique C-1: Dynamic adaptation of spatial elements
      - Specification of dynamic adaptation of spatial elements in single-TRP case will be done in Rel-18 WI
  - Power domain:
    - Technique D-1: Dynamic adaptation of power domain
      - Specification of dynamic adaptation of power domain will be done in Rel-18 WI

NR NES in Rel-19 – On demand SSB/SIB1 by UE WUS

- On-demand SSB/SIB1 by UE WUS is the only technique in time domain that is proved beneficial by >3 sources in Rel-18 SI phase but not specified in Rel-18 WI phase
  - Motivation: Introduction of UE WUS mechanism can enable NR cell to be turned off or transmit only sparse SSB with little impact on UE performance
  - Details:
    - A gNB without traffic is turned off (the cell area can be covered by other cell/ RAT) and monitor UE WUS
    - A UE that moves to the turned off cell may trigger UE WUS transmission
    - The gNB recovers to send SSB/SIB1 for the UE to camp or connect

- Support to specify on-demand SSB/SIB1 by UE WUS for RRC_idle/inactive/connected UEs in Rel-19 WI, including
  - Design/signaling of wake up signal (WUS)
  - Procedures related to WUS
- **Proposal: Specify support of on demand SSB/SIB1 by UE WUS in Rel-19 NES WI.**

NR NES in Rel-19 – SIB-less cell in multi-carrier scenario

- SIB-less cell operation is beneficial for network energy saving based on SI outcome
  - Motivation: further reduce common message overhead without impacting RACH capacity
  - Detail: UE obtains system information for anchor carrier and necessary system information for non-anchor SIB-less carriers in anchor carrier only. Then a UE may perform random access/data transmission/data reception in one or more of anchor carrier or non-anchor carriers.

- Support to specify SIB-less cell in multi-carrier scenario in Rel-19 WI, including
  - Anchor carrier carrying SIB for non-anchor (SIB-less) carriers
  - RACH carrier selection
- **Proposal: Specify support of SIB-less cell operation in multi-carrier scenario in Rel-19 NES WI.**

Work planning for Rel-19 NES

- <u>Objectives:</u>
  - Specify on-demand SSB/SIB1 by UE WUS for RRC_idle/inactive/connected UEs (RAN1, RAN2, RAN3)
    - Design of UE wake-up signal/channel (RAN1)
    - Signaling of UE wake-up signal/channel (RAN1, RAN2)
    - Procedures related with UE wake-up signal/channel (RAN2, RAN1)
      - Conditions for triggering UE WUS
      - UE behavior after transmitting UE WUS
    - Inter-node coordination on WUS configuration and reception (RAN3)
  - Specify SIB-less cell in multi-carrier scenario (RAN2, RAN1)
    - Anchor carrier carrying SIB for non-anchor (SIB-less) carriers
    - Random access procedure after acquiring SIB from anchor carrier
  - Specify the corresponding RRM/RF core requirements, if necessary, for the above features [RAN4]
- <u>TU:</u>
  - RAN1 (leading group): up to 2 TU, RAN2: up to 2 TU, RAN3: 0.5 TU, RAN4: 0.5 TU

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THANK YOU.
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