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Network Energy Saving Enhancements in Rel-19

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Document for discussion

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High layer view

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Rel-18 NES: Specification of techniques with less legacy impact

Rel-19 NES: To achieve more NES gain, <u>specify techniques including modification of common channels design</u>, in addition to the leftovers from Rel-18 WI

- New techniques
  - Adaptive/on-demand type SIB1/SSB transmission
  - Other common channel re-design
- Enhancement from Rel-18
  - Cell DTX/DRX enhancements
  - CSI overhead reduction and UE CSI processing complexity reduction
  - Necessary modification to handle non-Rel-19 NES capable UE

<u>Proposal 1</u>: The techniques which assume non-backward compatibility on cells should be included in the Rel-19 scope.

General aspect on common channel re-designing

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- For common channels re-designing, Rel-18 specifies only SSB-less Scell, to guarantee connectivity of legacy UEs on Pcell in multi-cell deployment.
- To enhance NES gain, <u>it is beneficial to discuss common channels re-designing both for Pcell and Scell, to increase the number of applicable cells</u>.
- For legacy UEs, it is necessary to provide schemes to avoid connecting to such non-backward compatible cells. <u>It should be confirmed whether the access control scheme discussed in Rel-18 (SIB1 indication of NES capable cell) is sufficient or not.</u>

<u>Proposal 2</u>: Rel-19 NES should assume application of NES techniques including Pcell.

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Adaptive/On-demand SIB1/SSB transmission

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- Background and Motivation
  - Reduction of SIB1/SSB transmissions is one of the key factors to further reduce energy consumption in Rel-19
  - A potential option is to configure SIB1/SSB transmission periodicity in an adaptive manner (to longer periodicity).
  - The other option is on-demand transmission of SIB1/SSB. Specification of triggering schemes to transmit SSB in an on-demand manner necessary.
- Proposed Objectives
  - To specify adaptive configuration scheme for SIB1/SSB transmission
  - To specify on-demand SSB transmission framework
    - Transmission configuration of on-demand SSB
    - Schemes to initiate/stop on-demand SSB transmission

Proposal 3: Adaptive/on-demand transmission of SSB/SIB1 should be specified in Rel-19.

Adaptive transmission of other common channels

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- Background and Motivation
  - In addition to the SIB1/SSB transmission, adaptive transmission of other common signaling, including paging, initial access and SR can be beneficial.
  - Configuration method of the adaptive Tx/Rx occasions should be discussed
- Potential channels and example of optimizations
  - Paging: more compact paging occasion to increase the gNB sleeping duration.
  - Initial access/SR: dynamic adaptation of PRACH/SR occasions

Proposal 4: Enhancement for other common signaling, including paging, initial access, and SR should be specified in Rel-19.

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Other Aspects

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- Cell DTX/DRX enhancements
  - Discussion to apply to RRC_Idle, Inactive mode UEs.
  - Consideration of further longer cell DTX/DRX cycle to increase duration of off state at gNB can be considered with potential impact to other operations. Longer periodicity may be useful for cells where RRC_Idle mode UEs are dominant. Such situation can happen e.g., in midnight urban area, by applying appropriate access control.
- CSI enhancement

  CSI reporting for spatial & power domain enhancements can be optimized in the following 2 aspects in Rel-19 to enhance the feasibility and flexibility of the operation.
  - CSI report overhead reduction
  - CSI processing complexity reduction at UE side

Proposal 5: Further enhancement on cell DTX/DRX mechanisms, including application to RRC_Idle/Inactive state with longer DTX/DRX cycle, should be specified in Rel-19

Proposal 6: CSI overhead reduction & UE CSI processing complexity reduction for NES should be specified in Rel-19

Summary

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- Proposal 1: The techniques which assume non-backward compatibility on cells should be considered in Rel-19.
- Proposal 2: Rel-19 NES should assume application of NES techniques including Pcell.
- Proposal 3: Adaptive/on-demand transmission of SSB/SIB1 should be specified in Rel-19.
- Proposal 4: Enhancement for other common signaling, including paging, initial access, and SR should be specified in Rel-19.
- Proposal 5: Further enhancement on cell DTX/DRX mechanisms, including application to RRC_Idle/Inactive state with longer DTX/DRX cycle, should be specified in Rel-19
- Proposal 6: CSI overhead reduction & UE CSI processing complexity reduction for NES should be specified in Rel-19

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Thank you!

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