3GPP RAN #85
Newport Beach
16-20 September 2019

RP-191737

Agenda Item: 9.4.6

Qualcomm Incorporated

Views on UE power saving WI

RAN1 Priorities

- In RAN1#98, SCell dormancy and enhancements to SCell activation are discussed in 7.2.13.3
  - Feasible options are summarized in Chairman's notes
  - In particular, for SCell dormancy, it was concluded that "L1 based mechanism for transitioning between 'dormancy-like' and 'non dormancy-like' behavior on activated Scells can be supported"

Qualcomm views:

- Interactions with PDCCH-based power saving signal/channel should be considered
  - Outside active time: If UE is indicated to "wake-up" for ON duration, a subset of SCells can be indicated to start with dormancy behavior
    - If SCell dormancy behavior is based on BWP adaptation, BWP indication for SCells would be necessary information in WUS
    - **Supporting BWP indication for both PCell and SCell(s) in WUS is important for power saving**
  - Inside active time: Using power saving signal/channel for triggering transition between dormancy and non-dormancy can be considered
- Besides completing the current sub-agendas in UE power saving, support for SCell power saving is the highest priority!
  - Start discussion of **interactions between UE power saving signal/channel and SCell operation** after RAN#85

RAN1 Priorities

Clarification of RAN1#97 agreement:

Agreements:
Outside Active Time, the PDCCH-based power saving signal/channel is configured for triggering UE to or not to monitor the subsequent ON duration(s)

- FFS a single vs. multiple durations, particularlly checking consistency with RAN2 agreements

Further study in the new DCI how to potentially indicate at least the following techniques (subject to further WID update):

- Indicating UE to use the aperiodic RS
  - Aperiodic CSI-RS
  - Aperiodic SRS
  - TRS
- Triggering aperiodic CSI report
- Cross-slot scheduling
- Rel-15 DCI-based BWP switching

The power saving techniques can be explicitly included in the DCI contents or implicitly indicated by other techniques (e.g., BWP switching).

Qualcomm view

- Above information fields are to be considered for WUS payload design discussion in RAN1#98bis and RAN1#99

RAN1 Priorities

- RAN1 study (TR38.840) shows the benefit of DCI-based techniques for PDCCH monitoring reduction
  - It was not captured in WID approved in RAN#83 because RAN2 study was still in progress
  - In RAN#84, it was noted that PDCCH skipping aspect could be re-discussed further in RAN#85

- Qualcomm views
  - DCI-based techniques for PDCCH monitoring reduction should be considered in Rel-16
  - Instead of introducing a new sub-agenda item for PDCCH monitoring reduction, it can be discussed as an additive feature or slight enhancement of current UE power saving schemes
  - For example,
    - Cross-slot scheduling feature can be enhanced for UE to skip PDCCH monitoring for the slots between the scheduling PDCCH and the scheduled PDSCH/PUSCH
  - Alternatively, BWP switching enhancement for PDCCH monitoring periodicity adaptation can be considered
    - RAN4 can study the feasibility of faster BWP switching when only baseband configuration changes are involved

RAN2 Priorities

- In RAN2#107 substantial progress was made for almost every item in the current WID. The following agreements have been made
  - Most aspects of UE behaviors with wakeup signaling
  - Procedure for efficient state transitions, with only stage-3 signaling details to be discussed
  - BWP based MIMO layer adaptation (including stage-3 details)
  - Support DRX configuration in UE assistance. BWP and SCell information for FFS
  - Reuse LTE's relaxed monitoring for RRM relaxation, with only minor issues left to be discussed
- RAN2 has three TUs left for the power saving WI, which should be more than enough to cover the remaining issues for the above topics
- RAN is kindly requested to update the WID with the following items, which have been studied during the SI phase
  - Discuss and specify upper-layer techniques for reducing PDCCH monitoring on activated SCells, in both CA and DC configurations. Solutions can include
    - Adaptive PDCCH monitoring on SCells based on indications in wakeup signals and/or DRX states
    - Cross cell-group power management in DC configuration
  - Discuss and specify eenhancements to Rel-15 DRX procedure. Solutions can include
    - Differentiated procedures on FR1 and FR2 serving cells
    - Adaptation of power parameters based on DRX states

Conclusion

Recommended WID Update

- Besides updating the current objectives based on the respective status reports, it is important to at least promote the following note in current WID (RP-191607) to an objective

> Note:
>
> The following objective may be considered in RAN#85 pending progress on SCell dormant behaviour and will be re-evaluated in RAN#85
>
> - Study and specify (if agreed) power saving techniques to reduce PDCCH monitoring on activated SCells for CA and DC (EN-DC in particular).
> - Solutions (e.g. power saving signal/channel, enhancing Rel-15 DRX procedure) are to be discussed
> - Enhancements to Rel-15 DRX procedure can be studied further if they do not violate the general principle of single DRX configuration per MAC entity

- For the current objective 1-b: Specify the procedure of cross-slot scheduling power saving techniques
  - Add a sub-objective to “Specify enhancement of existing feature to support DCI-based techniques for PDCCH monitoring reduction”

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