**3GPP TSG RAN WG1 Meeting #108-e  R1-** **22xxxxx**

**e-Meeting, February 21 – March 3, 2022**

**Agenda Item: 7.2.10**

**Source: Moderator (Huawei)**

**Title: Discussion on correction for Rel-16 UE dormancy adaptation**

**Document for: Discussion and Decision**

# Introduction

This document aims to discuss the correction on Rel1-6 dormancy indication raised in [1] per the following.

[108-e-R16-MRDC-CA-01] Email discussion/approval on the proposals in the draft CR in [R1-2202427](file:///D:\Users\t00496347\Documents\3GPP\download\RAN1%23108\Docs\R1-2202427.zip) by February 25 – Xiaolei (Huawei)

It is suggested to have companies’ initial round of input by the following

* check point 1: 23:59 UTC, February 22, 2022

It is suggested to have companies’ second round review on the TP by:

* check point 2: 4:00 UTC, February 24, 2022

# Summary of the issues

In R1-2202427, draft CR was proposed and the changes are summarized as following:

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| ***Reason for change:***   1. RAN2 changed the configuration structure regarding dormancy cell groups from *DormancySCellGroups,* which explicitly includes a list of dormancy groups*,* in v16.0.0 to *dormancyGroupWithinActiveTime* in v16.7.0. TS 38.331 v16.7.0 specifies *dormancyGroupWithinActiveTime* as dormancy group ID for each configured SCell. Under this new configuration structure of *dormancyGroupWithinActiveTime*, it is not clear how to determine the number of bits for PDCCH dormancy indication field by the description of “according to higher layer parameter *dormancyGroupWithinActiveTime*”. 2. Similar issues exists for the determination of the number of bits for PDCCH dormancy indication field by the description of “according to higher layer parameter *dormancyGroupOutsideActiveTime*”. 3. The description of “with MSB to LSB of the bitmap corresponding to the first to last configured SCell group” is also not clear considering *dormancyGroupWithinActiveTime* is configured per configured SCell in TS 38.331 v16.7.0.   ***Summary of change:***   1. Update the description for dormancy indication field to capture that the field size is according to “the highest group index provided by higher layer parameter *dormancyGroupWithinActiveTime*”. 2. Update the description of “with MSB to LSB of the bitmap corresponding to the first to last configured SCell group” to “with MSB to LSB of the bitmap corresponding to the configured SCell group with lowest to highest group index”. 3. Similar changes are applied for the case when *dormancyGroupOutsideActiveTime* is configured. |

# Discussion

During the preparation phase [2], 9 companies provided comments, and there is clear support to resolve the issues in the draft CR in R1-2202427 in RAN1#108.

## First round

**Discussion Point 1: the number of bits for SCell dormancy indication field**

The Change#1 and Change#3 are similar changes applied respectively for the cases where *dormancyGroupWithinActiveTime* and *dormancyGroupOutsideActiveTime* are configured. Therefore, the two changes can be discussed together.

According to the comments collected during preparation phase, companies have different understanding regarding the number of bits for SCell dormancy indication field. The reason seems that RAN2 changed the configuration structure regarding dormancy cell groups from *DormancySCellGroups*, which explicitly includes a list of dormancy groups, in v16.0.0 to *dormancyGroupWithinActiveTime*/ *dormancyGroupOutsideActiveTime* in v16.7.0. TS 38.331 v16.7.0 specifies *dormancyGroupWithinActiveTime* as dormancy group ID for each configured SCell. Under this signaling method in RAN2, it is unclear on how to figure out the number of bits of the field by the description of “according to higher layer parameter *dormancyGroupWithinActiveTime* or *dormancyGroupOutsideActiveTime*”.

**To align companies’ understanding, please provide your understanding between following Alt.1 and Alt.2. Your comments on the related TPs are also appreciated:**

* **Alt.1: the number of bits for SCell dormancy indication field is according to the highest group index provided by higher layer parameter *dormancyGroupWithinActiveTime* or dormancyGroupOutsideActiveTime for SCells.**

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| 7.3.1.1.2 Format 0\_1 ========================= Unchanged parts =========================  - SCell dormancy indication – 0 bit if higher layer parameter *dormancyGroupWithinActiveTime* is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to the highest group index provided by higher layer parameter *dormancyGroupWithinActiveTime* for SCells*,* where each bit corresponds to one of the SCell group(s) configured by higher layers parameter *dormancyGroupWithinActiveTime,* with MSB to LSB of the bitmap corresponding to the first to last configured SCell group. The field is only present when this format is carried by PDCCH on the primary cell within DRX Active Time and the UE is configured with at least two DL BWPs for an SCell.  ========================= Unchanged parts ========================= 7.3.1.2.2 Format 1\_1 ========================= Unchanged parts =========================  - SCell dormancy indication – 0 bit if higher layer parameter *dormancyGroupWithinActiveTime* is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to the highest group index provided by higher layer parameter *dormancyGroupWithinActiveTime* for SCells*,* where each bit corresponds to one of the SCell group(s) configured by higher layers parameter *dormancyGroupWithinActiveTime,* with MSB to LSB of the bitmap corresponding to the first to last configured SCell group. The field is only present when this format is carried by PDCCH on the primary cell within DRX Active Time and the UE is configured with at least two DL BWPs for an SCell.  ========================= Unchanged parts ========================= 7.3.1.3.7 Format 2\_6 ========================= Unchanged parts =========================  - SCell dormancy indication – 0 bit if higher layer parameter *dormancyGroupOutsideActiveTime* is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to the highest group index provided by higher layer parameter *dormancyGroupOutsideActiveTime* for SCells*,* where each bit corresponds to one of the SCell group(s) configured by higher layers parameter *dormancyGroupOutsideActiveTime,* with MSB to LSB of the bitmap corresponding to the first to last configured SCell group. |

* **Alt.2: the number of bits for SCell dormancy indication field is according to the number of configured group indexes provided by higher layer parameter *dormancyGroupWithinActiveTime* or dormancyGroupOutsideActiveTime for SCells.**

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| 7.3.1.1.2 Format 0\_1 ========================= Unchanged parts =========================  - SCell dormancy indication – 0 bit if higher layer parameter *dormancyGroupWithinActiveTime* is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to the number of configured group indexes provided by higher layer parameter *dormancyGroupWithinActiveTime* for SCells*,* where each bit corresponds to one of the SCell group(s) configured by higher layers parameter *dormancyGroupWithinActiveTime,* with MSB to LSB of the bitmap corresponding to the first to last configured SCell group. The field is only present when this format is carried by PDCCH on the primary cell within DRX Active Time and the UE is configured with at least two DL BWPs for an SCell.  ========================= Unchanged parts ========================= 7.3.1.2.2 Format 1\_1 ========================= Unchanged parts =========================  - SCell dormancy indication – 0 bit if higher layer parameter *dormancyGroupWithinActiveTime* is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to the number of configured group indexes provided by higher layer parameter *dormancyGroupWithinActiveTime* for SCells*,* where each bit corresponds to one of the SCell group(s) configured by higher layers parameter *dormancyGroupWithinActiveTime,* with MSB to LSB of the bitmap corresponding to the first to last configured SCell group. The field is only present when this format is carried by PDCCH on the primary cell within DRX Active Time and the UE is configured with at least two DL BWPs for an SCell.  ========================= Unchanged parts ========================= 7.3.1.3.7 Format 2\_6 ========================= Unchanged parts =========================  - SCell dormancy indication – 0 bit if higher layer parameter dormancyGroupOutsideActiveTime is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to the number of configured group indexes provided by higher layer parameter dormancyGroupOutsideActiveTime for SCells, where each bit corresponds to one of the SCell group(s) configured by higher layers parameter dormancyGroupOutsideActiveTime, with MSB to LSB of the bitmap corresponding to the first to last configured SCell group. |

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| Company | Alternatives | Comments |
| ZTE | Alt.2 | Based on the following conclusion reached in RAN1#103-e meeting, the number of bits is based on the number of groups configured by RRC. Thus, Alt.2 is the correct understanding.  Conclusion:  In description of SCell dormancy indication in 38.212, “…*MSB to LSB of the bitmap corresponding to the first to last configured SCell group*...” implies that the MSB to LSB of the bitmap correspond to the first to last configured SCell group in ascending order of *DormancyGroupID*.  Regarding the TP, with the above conclusion, we don’t see a strong motivation to have such a TP. |
| Qualcomm | Alt. 2 | Agree with ZTE on Alt. 2.  We support to have a TP to make the spec clear. |
| vivo | Alt.2 | In our view, the conclusion in RAN1#103-e represents the 2nd understanding (i.e., Alt.2). Thus, we think the TP is not needed.  Further, the TP for Alt.2 itself is problematic because the term “group index” is not defined. If majority prefers to have a TP for clarification, some refinements are needed, for example:  ... determined according to the number of the configured SCell group(s) provided by higher layer parameter *dormancyGroupWithinActiveTime* |
| NTT DOCOMO | Alt.2 | We share the same understanding with ZTE, Qualcomm and vivo, and fine with having TP to clarify that the number of bits for SCell dormancy indication field is determined according to the number of configured IDs of SCell groups provided by higher layer parameter dormancyGroupWithinActiveTime or dormancyGroupOutsideActiveTime for SCells. |
| Intel | Alt.2 | We share similar views from other companies. Alt.2 is better aligned with the existing conclusion. Vivo’s revision is fine for us. |
| MTK | Alt. 2 | Agree with ZTE on Alt. 2.  We support to have a TP to make the spec clear.  For vivo’s comment on “group index” being not defined, we think one possible replacement for “group index” is “*DormancyGroupID*” as defined in 38.331   * … determined according to the number of different configured ~~group indexes~~*DormancyGroupID*s provided by higher layer … |
| CATT | Alt. 2 | Our understanding of RAN1#103-e agreement is Alt 2. TP is not needed. |
| Huawei, HiSilicon |  | We are OK to go with Alt.2 if the majority understanding is Alt.2. A TP is needed to make it clear. |

**Discussion point 2**

**Please provide your comments on Change#2 in the table.**

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| 7.3.1.1.2 Format 0\_1 ========================= Unchanged parts =========================  - SCell dormancy indication – 0 bit if higher layer parameter *dormancyGroupWithinActiveTime* is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to higher layer parameter *dormancyGroupWithinActiveTime,* where each bit corresponds to one of the SCell group(s) configured by higher layers parameter *dormancyGroupWithinActiveTime,* with MSB to LSB of the bitmap corresponding to the ~~first to last~~ configured SCell group with lowest to highest group index. The field is only present when this format is carried by PDCCH on the primary cell within DRX Active Time and the UE is configured with at least two DL BWPs for an SCell.  ========================= Unchanged parts ========================= 7.3.1.2.2 Format 1\_1 ========================= Unchanged parts =========================  - SCell dormancy indication – 0 bit if higher layer parameter *dormancyGroupWithinActiveTime* is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to higher layer parameter *dormancyGroupWithinActiveTime,* where each bit corresponds to one of the SCell group(s) configured by higher layers parameter *dormancyGroupWithinActiveTime,* with MSB to LSB of the bitmap corresponding to the ~~first to last~~ configured SCell group with lowest to highest group index. The field is only present when this format is carried by PDCCH on the primary cell within DRX Active Time and the UE is configured with at least two DL BWPs for an SCell.  ========================= Unchanged parts ========================= 7.3.1.3.7 Format 2\_6 ========================= Unchanged parts =========================  - SCell dormancy indication – 0 bit if higher layer parameter *dormancyGroupOutsideActiveTime* is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to higher layer parameter *dormancyGroupOutsideActiveTime,* where each bit corresponds to one of the SCell group(s) configured by higher layers parameter *dormancyGroupOutsideActiveTime,* with MSB to LSB of the bitmap corresponding to the ~~first to last~~ configured SCell group with lowest to highest group index. |

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| Company | Alternatives | Comments |
| ZTE |  | We don’t see the need to have such a change. To us, the existing spec reflects the same meaning. |
| Qualcomm |  | We support this TP to make the spec clear. |
| vivo |  | Same view as ZTE. |
| NTT DOCOMO |  | We share similar view as ZTE and vivo, but having the proposed TP is also acceptable for us. |
| Intel |  | Same view as ZTE. |
| MTK |  | We support to have the TP. A small suggestion is to revise as below:   * ... SCell group with lowest to highest ~~group index~~*DormancyGroupID* |
| CATT |  | We don’t see the technical reason of this TP. |
| Huawei, HiSilicon |  | We support Qualcomm and MTK’s view to clarify this in the spec to avoid any confusion. |

## Second round

**Summary of first round inputs:**

For Change#1 and Change#3, eight companies provided inputs during the first round discussion. Seven companies’ understanding is Alt.2, and one company is OK to follow the majority understanding. Five companies think a TP or draft CR is needed to make the spec clear. vivo and MTK proposed changes upon the TP provided by the Moderator.

For Change#2, four companies think a TP is needed and MTK proposed changes upon the TP provided by the Moderator.

Considering the majority view , moderator suggests a TP is needed to resolve the issues.

**Proposed TP for discussion**

Based on the inputs in the first round, the following TP is proposed with the following updates to take into account companies comments:

* Adopt the slight change of MTK’s revision of “the number of different configured ~~group indexes~~*DormancyGroupID*s” to resolve vivo’s concern on “group index” being not defined.
* Thanks to the MTK’s proposed revision of “SCell group with lowest to highest ~~group index~~*DormancyGroupID*”. Maybe we could directly use the same description in the conclusion, i.e. “the first to last configured SCell group in ascending order of *DormancyGroupID*”

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| 7.3.1.1.2 Format 0\_1 ========================= Unchanged parts =========================  - SCell dormancy indication – 0 bit if higher layer parameter *dormancyGroupWithinActiveTime* is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to the number of different *DormancyGroupID*s provided by higher layer parameter *dormancyGroupWithinActiveTime* for SCells*,* where each bit corresponds to one of the SCell group(s) configured by higher layers parameter *dormancyGroupWithinActiveTime,* with MSB to LSB of the bitmap corresponding to the first to last configured SCell group in ascending order of *DormancyGroupID*. The field is only present when this format is carried by PDCCH on the primary cell within DRX Active Time and the UE is configured with at least two DL BWPs for an SCell.  ========================= Unchanged parts ========================= 7.3.1.2.2 Format 1\_1 ========================= Unchanged parts =========================  - SCell dormancy indication – 0 bit if higher layer parameter *dormancyGroupWithinActiveTime* is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to the number of different *DormancyGroupID*s provided by higher layer parameter *dormancyGroupWithinActiveTime* for SCells*,* where each bit corresponds to one of the SCell group(s) configured by higher layers parameter *dormancyGroupWithinActiveTime,* with MSB to LSB of the bitmap corresponding to the first to last configured SCell group in ascending order of *DormancyGroupID*. The field is only present when this format is carried by PDCCH on the primary cell within DRX Active Time and the UE is configured with at least two DL BWPs for an SCell.  ========================= Unchanged parts ========================= 7.3.1.3.7 Format 2\_6 ========================= Unchanged parts =========================  - SCell dormancy indication – 0 bit if higher layer parameter dormancyGroupOutsideActiveTime is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to the number of different *DormancyGroupID*s provided by higher layer parameter dormancyGroupOutsideActiveTime for SCells, where each bit corresponds to one of the SCell group(s) configured by higher layers parameter dormancyGroupOutsideActiveTime, with MSB to LSB of the bitmap corresponding to the first to last configured SCell group in ascending order of *DormancyGroupID*. |

**Please provide your input on the TP. A proposed change is appreciated if any.**

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| Company | Alternatives | Comments |
| NTT DOCOMO |  | We are fine with the proposed TP. |
| MTK |  | **We support the TP**. Although there is a previous RAN1 conclusion available, we think spec text should be self-contained for the readers to understand, not depending on some RAN1 conclusions. |
| Intel |  | We are fine with the proposed TP. |
| CATT |  | We don’t think this is an essential correction. We don’t agree with the TR. |
| Qualcomm |  | We support the TP to make the spec clear. The current spec indeed is ambiguous. |
| Huawei, HiSilicon |  | We support the TP and we agree with Qualcomm that current specification is ambiguous. |
| ZTE |  | We can live with the TP above. We suggest to add the previous conclusion in the CR cover page to provide some background information. Thanks. |
| vivo |  | Although we don’t think the TP is needed, we can accept the TP if majority support this. Just a minor suggestion - note that possibly only one DormancyGroupID is configured, and anyway it can only be configured to SCell according to the RRC spec (thus the “for Scell” text can be omitted for simplicity). Here is the suggestion for the TP:    ... according to the number of different *DormancyGroupID(s)* provided by higher layer parameter *dormancyGroupWithinActiveTime* ~~for SCells~~ |

# Conclusion

In the second round discussion, eight companies provided inputs regarding the proposed TP from moderator. Seven companies support to endorse the TP, and among them, three companies strongly support the TP to avoid ambiguous of the existing specification. Only one company commented that the TP is not an essential correction, but didn’t provide any suggestion/comment regarding the detailed change in the TP.

Considering the situation and the majority views, moderator suggest the Chairman to endorse the mirror CR based on the TP discussed in this email discussion, with the following minor updates:

* add the previous conclusion in the CR cover page to provide some background information, as suggested by ZTE;
* adopt the suggestion from vivo to have the change of “the number of different *DormancyGroupID(s)* provided by”. Regarding another suggestion to remove “for SCells”, moderator suggests to keep it considering it can reflect that the parameter of “*dormancyGroupWithinActiveTime/dormancyGroupOutsideActiveTime*” is provided per SCell.

The draft mirror CR is uploaded in the draft folder for further check and for Chairman’s endorsement.

# References

1. [R1-2202427](file:///C:\Users\t00496347\AppData\Local\Docs\R1-2202427.zip), Correction on Rel-16 UE Power Saving Huawei, HiSilicon.

[2] [R1-2202509](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Inbox/R1-2202509.zip), [108-e-Prep-AI7.2.10] Preparation phase summary for Rel-16 NR MR-DC & CA maintenance, Moderator (Nokia)