**3GPP TSG RAN WG1 #122 R1-2506442**

**Bengaluru, India, Aug 25th – 29th, 2025**

Agenda Item: 8.11.1

Source: Moderator (Thales)

Title: FL Summary #1 - Maintenance on NR-NTN downlink coverage enhancements

Document for: Discussion, Decision

## Introduction

This feature lead summary (FLS) document aims to collect and align on company views on Release-19 NR-NTN downlink coverage enhancements. It contains a summary of the contributions under 8.11.1 and 8.14 at TSG-RAN WG1 #122, together with identified key issues. The goal of this FLS is to facilitate consensus-building and offer recommendations for prioritizing discussions, including considerations for potential postponements of certain issues.

# Topic#1 BD counting in Type0-PDCCH CSS Inter-slot repetition

## Companies’ contributions summary

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| **Companies** | **Proposals** |
| Huawei | **Proposal 1:** Confirm the working assumption made in RAN1#121. |
| Thales | **Proposal 1:** Confirm the working assumption made in RAN1#121. |
| vivo | Proposal 4: Confirm the working assumption, where the “other PDCCH” is clarified as the PDCCH candidates for the DCI with CRC scrambled by RNTI other than SI-RNTI, e.g., C-RNTI, MCS-C-RNTI, and CS-RNTI when applicable. |
| Xiaomi | Proposal 1: Confirm the working assumption made in RAN1#121. |
| Ericsson | Proposal 1: RAN1 to confirm the working assumption for blind decoding rule for inter-slot Type-0 PDCCH repetition from RAN1#121 |
| Panasonic | **Proposal 8**: RAN1 agrees to the following modified working assumption:  Inter-slot Type-0 CSS PDCCH repetition is only applicable to the SI-RNTI, and the following rule for BD counting is defined:   * 1 BD in first slot. * 2BD in the second slot   + One BD for Type-0 CSS PDCCH repetition with SI-RNTI and one BD for other PDCCH |
| Spreadtrum | **Proposal 1** Update the working assumption in red words:  Inter-slot Type-0 CSS PDCCH repetition is only applicable to the SI-RNTI, and the following rule for BD counting is defined:   * 1 BD in first slot. * In the second slot: 2 BD ~~in RRC connected mode~~   Note: one BD for PDCCH repetitions with soft combining and one BD for independent PDCCH |
| OPPO | **Proposal 1:** Confirm the working assumption on Type0-PDCCH repetition with the following update:  **Working assumption**  Inter-slot Type-0 CSS PDCCH repetition is only applicable to the SI-RNTI, and the following rule for BD counting is defined:   * 1 BD in first slot. * In the second slot: 2 BDs ~~in RRC connected mode~~   + Note: One BD for Type-0 CSS PDCCH ~~repetition with SI-RNTI~~ monitoring with soft-combining and one BD for ~~other PDCCH~~ Type-0 CSS PDCCH without soft-combining |
| Apple | **Proposal 2:** Inter-slot type-0 CSS PDCCH repetition is only applicable to the SI-RNTI, and the following rule for BD counting is defined:   * 1 BD in first slot. * 2 BD in second slot, where one BD is for type-0 CSS PDCCH repetition and one BD is for PDCCH without repetition. |
| MediaTek | **Proposal 1:** Confirm RAN1#121 Working assumption on inter-slot Type-0 CSS PDCCH repetition. |

## Summary of companies’ contributions

Confirm the working assumption made in RAN1#121: Huawei, HiSilicon, CATT, Thales, vivo ( Clarifies BD counting for SI-RNTI and other RNTIs (e.g., C-RNTI, MCS-C-RNTI, CS-RNTI). Xiaomi, Panasonic (with revision). Oppo (with revision), Apple (with revision), MediaTek

## Initial proposal

Based on the above discussion the following initial proposal is made

### Proposal 1-1

**Proposal 1-1-v0**

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| Confirm the working assumption made in RAN1#121 with the following revision.  Working assumption  Inter-slot Type-0 CSS PDCCH repetition is only applicable to the SI-RNTI, and the following rule for BD counting is defined:   * 1 BD in first slot. * 2 BD in the second slot~~: 2 BD~~ ~~in RRC connected mode~~   Note: One BD for Type-0 CSS PDCCH ~~repetition with SI-RNTI~~ monitoring with soft-combining and one BD for ~~other PDCCH~~ Type-0 CSS PDCCH without soft-combining |

Companies are encouraged to share views on Proposal 1-1-v0

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| **Company** | **Comments** |
| DCM | In our understanding, this kind of proposal was already discussed at the last meeting and the original WA was reached. We are not sure whether this is agreeable. Rather, confirming the original WA may be easier/better. |
| Apple | Support. We remember the WA was not captured by editor due to the ambiguity (on RRC connected mode). Hence, we need to update/clarify the WA so that it can be captured by editor. |
| LGE | In my memory, we didn’t make consensus if we use the expression “soft combining”. Moreover, even with the repetition, it would be up to UE implementation whether or not to use soft-combining. It would rather keep the original WA while the RRC connected mode part is open for us. |
| Samsung | It is not clear why a UE would perform BD type-0 CSS PDCCH without soft combining, since the UE already knows from the PBCH payload that PDCCH repetition is enabled. Thus, the motivation for updating the working assumption is unclear.  Furthermore, the original working assumption is incorrect and contradicts the specifications. According to the specifications, BDs/PDCCH candidates are counted based on the DCIs of a given search space, regardless of the RNTI. Therefore, for a Type-0 PDCCH CSS set, it is against the specifications to count two PDCCH candidates for DCI 1\_0 simply because the CRC is checked for both SI-RNTI and C-RNTI. For these reasons, the WA should not be confirmed. |
| vivo | We’d better focus on any potential confusion part of the WA. So before starting discuss the revision, companies should first point out which part is confusing or problematic.  Regarding Samsung’s comment, while I understand that the argument on BD is correct regarding that the BD does not depends on the DCI or RNTI type, I think the argument is not relevant here because the WA is actually concerning the total # or BD in the slot. If this is the confusing part we can try to resolve it. |
| MTK | The soft combining is not defined. The Note could be clarified as “2 BD in second slot, where one BD is for type-0 CSS PDCCH repetition and one BD is for PDCCH without repetition.” |
| OPPO | Support. We share the similar view as Apple that the revision of the WA is necessary to address the editor concerns: 1) how to count the BD in the second slot for UE not in RRC connected mode and 2) what “one BD for other PDCCH” means. |
| Nokia | Support the proposal (that is, confirming the working assumption with the suggested modifications). |
| ZTE | Fine with the proposal. |
| Panasonic | Support. But we think that the original RAN1-121 WA is also in-line with current TS38.213. |
| CATT | Support it |
| Ericsson | We do not really understand the modifications proposed in the WA.  As this is for inter-slot repetition and if the first transmission fails, then it is natural to perform soft combining in the next slot while decoding Type-0 PDCCH. Moreover, we have already made a note in an agreement:   |  | | --- | | * + Note: From RAN1 perspective UE is expected to deliver performance no worse than soft combining |   In this case, we do not really see the need to count individually blind decodes with and without soft-combining. |
| NEC | We don’t see the necessity of this update. How to achieve the performance no worse than soft combining is just an implementation issue. |
| Huawei, HiSilicon | 1. To resolve Samsung’s concern, we are fine to add a “note” before the bullet of “***One BD for Type-0 CSS PDCCH repetition with SI-RNTI and one BD for other PDCCH****”*, which means this bullet does not need to be specified. 2. For other part, we don’t see a need to change the working assumption. |

# Topic#2 Msg4 PDSCH repetition

## Background

The following agreement still have one FFS regarding the condition for UE to report capability/request of Msg4 PDSCH repetition.

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| Agreement  For the activation/deactivation of Msg4 PDSCH repetition:   * Alt 1: UE specific PDSCH with Msg4 repetition activation indicated via DCI Format 1\_0:   + Signaling uses re-interpretation of 1 MSB in MCS field in DCI.   + A UE capable of Msg4 PDSCH repetition may report its capability/request in Msg3 PUSCH.     - Note: RAN1 considers there is no difference between capability and request     - FFS: whether to specify condition(s) for the UE to report its capability/request. Such conditions may be discussed in RAN1 or other WGs.   + The aggregation factor is configured in SIB1, with possible value 2 or 4   When the aggregation factor is configured in SIB1, the PDSCH MSG4 repetition is enabled. |

## Companies’ proposals

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| **Companies** | **Proposals** |
| Ericsson | **Proposal 7** Due to additional signaling overhead and given that benefits are unclear, RAN1 does not consider specifying additional condition(s) for the UE to report its capability/request for the support of repetitions for PDSCH with MSG4. |
| ZTE | **Proposal 5:** No need to specify condition for the UE to report its capability/request for Msg4 PDSCH repetition. |
| OPPO | **Proposal 5:** For Msg4 PDSCH repetition,   * A RSRP threshold are configured via SIB   + If the measured RSRP is less than the RSRP threshold, the UE reports its capability/request and 1 MSB in MCS field in DCI 1\_0 is re-interpreted for activation/deactivation of Msg4 PDSCH repetition.   + Otherwise, the UE detects DCI 1\_0 scheduling Msg4 PDSCH as legacy. |
| Apple | **Proposal 1:** The condition for a UE with capability/request of Msg4 PDSCH repetition to report this capability is its measured RSRP is smaller than a configured RSRP threshold. |
| Nokia | **Proposal 5:** Update specification text to also have Msg 3 PUSCH retransmission carry indication of support for msg4-NumberofRepetitions.  **Proposal 6:** Adopt the following text proposal for TS38.213:  **Reason for change:** In current specification text there is no capturing of UE indicating support for Msg4 PDSCH repetitions as part of the Msg3 PUSCH if this is provided as a Msg3 retransmission.  **Consequence if not approved:** UE may not be able to indicate support for Msg4 retransmissions if the UE is having to provide retransmissions of Msg3.  **Text proposal for TS38.213:** 8.4 PDSCH with UE contention resolution identity In response to a PUSCH transmission scheduled by a RAR UL grant or corresponding PUSCH retransmission scheduled by a DCI format 0\_0 with CRC scrambled by a TC-RNTI provided in the corresponding RAR message when a UE has not been provided a C-RNTI, the UE attempts to detect a DCI format 1\_0 with CRC scrambled by a corresponding TC-RNTI scheduling a PDSCH that includes a UE contention resolution identity [11, TS 38.321]. If *SIB1* provides *msg4-NumberofRepetitions*, the UE may indicate FG-XYZ in the PUSCH transmission or in a corresponding PUSCH retransmission scheduled by a DCI format 0\_0 with CRC scrambled by a TC-RNTI provided in the corresponding RAR message when a UE has not been provided a C-RNTI. If the UE provides FG-XYZ and the MSB value of the MCS field in the DCI format 1\_0 is 1, the UE assumes the PDSCH reception is with *msg4-NumberofRepetitions*.  < Unchanged text omitted > |
| CMCC | **Proposal 2:** For Msg4 PDSCH repetition,   * A RSRP threshold can be configured via SIB1 at least when the repetition factor is configured by SIB1. The UE capable of Msg4 PDSCH repetition may report its capability/request in Msg3 PUSCH when the measured RSRP is lower than the configured RSRP threshold. |

## Initial proposal

### Proposal 2-1

**Proposal 2-1-v0**

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| A RSRP threshold is configured via SIB   * If the measured RSRP is less than the RSRP threshold, the UE reports its capability/request and 1 MSB in MCS field in DCI 1\_0 is re-interpreted for activation/deactivation of Msg4 PDSCH repetition. * Otherwise, the UE detects DCI 1\_0 scheduling Msg4 PDSCH as legacy. |

Companies are encouraged to share views on Proposal 2-1-v0

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| **Companies** | **Comments** |
| DCM | Not support. Essentiality is unclear. |
| Apple | Support.  We think the RSRP threshold configuration is beneficial for resource efficiency. For a capable UE with good channel condition, the Msg4 PDSCH repetition should be avoided to save resources.  Since this is related to FFS point in an existing RAN1 agreement, we think it is worthy further conclusion. |
| LGE | We do not need it.  Situation is quite different with the repetition of PUCCH for Msg4 PDSCH. In this case, the gNB receives the PUCCH from the UE. So, RSRP threshold can be useful to determine the target pathloss to enable the PUCCH repetition since the gNB know the necessity of PUCCH repetition based on the pathloss.  On the other hand, Msg4 PDSCH is received by UE, and depending on the UE implementation, the necessity of the repetition would be different even with the same level of RSRP measurement. |
| Samsung | It seems that this is not a maintenance issue. |
| vivo | Agree with Samsung. |
| MTK | Same understanding as Samsung, not a maintenance issue based on RAN1 agreements |
| OPPO | Support. For Msg4 PDSCH repetition, it was FFS whether to specify conditions to report its capability/request, so we can continue discussing this potential enhancement. In this matter, we share the same view with Apple that the RSRP threshold is beneficial at least for the UE with good channel condition, for which all the MCS indices can be kept. |
| Nokia | We would like to highlight that our proposal above is not discussed as part of this proposal, and may need another track. The problem highlighted by our proposal is that with current text in TS38.213, there is no support for carrying indication of support for Msg4 repetitions for Msg3 retransmissions (basically it sems to be a minor issue with the logic in the current text).  On the RSRP threshold, we do not find any need for having a RSRP threshold for the indication of support for this feature. The network would anyway know if it has created a poor coverage deployment (as outlined by the poor link budget situation from the Rel-19 evaluation parameters) and enable the feature if needed. |
| ZTE | Not support. The RSRP within an NTN cell is similar. And different UEs may have different capability for Msg4 PDSCH decoding under same RSRP. Hence, RSRP threshold cannot be used to justify whether Msg4 PDSCH repetition is needed. And this is not maintenance issue. |
| Panasonic | Not a maintenance issue. |
| CATT | Not support. |
| Ericsson | We do not support this proposal.  We do not see the necessity for an RSRP threshold for the indication for this feature. If we recall the study phase discussions, coverage gap is primarily identified for a specific NTN deployment with reduced EIRP, i.e., Set 1-3, which implies this necessity for repetition is mainly determined by deployment, which is known to operator. However, the main point here is to know which UEs support this feature and which UEs do not support. This is already covered by existing agreements. |
| NEC | Not a maintenance issue. |

# Topic#3 Intra slot PDCCH repetition

This section is about intra slot PDCCH repetition for PDCCH-CSS other than Type-0 CSS and other than Type-3 CSS

## Background

RAN1#120bis made the following WA:

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| **Working assumption**  For PDCCH CSS other than Type-0 CSS and other than Type-3 CSS for common search spaces other than *SearchSpaceZero*, intra-slot PDCCH repetition is supported.  RAN1 to down select between option 1 and option 2:  Option 1: Use same CORESET and two different SS (SS Set1 and SS Set2)   * Linking two PDCCH candidates (adopt the same mechanism for SS linking specified in Release 17) * FFS: Blind decoding limit   Option 2: Use same CORESET associated with one SS which is repeated by introducing symbol domain offset X   * FFS: Blind decoding limit * FFS: details configuration and signalling |

RAN1#121 made the following agreement:

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| **Agreement**  For PDCCH CSS other than Type-0 CSS and other than Type-3 CSS for common search spaces other than *SearchSpaceZero*, support intra-slot repetition based on:   * The starting symbol of monitoring occasion of the second SS is located right after the ending symbol of monitoring occasion of the first SS. * BD is counted as one or two, subject to UE capability, in RRC connected mode   + UE assumes that a DCI Format with the same content is repeated on two PDCCH candidates.   + Note: From RAN1 perspective UE is expected to deliver performance no worse than soft combining * PDCCH repetition is applicable to RNTI of the CSS. * Repeated PDCCH candidates within the same CORESET repeated in the slot, and share the same aggregation level (AL), coded bits and same candidate index.   Up to editor how to capture this in writing the relevant RAN1 specification. |

The following CR for TS38.213 was drafted by editor but not endorsed:

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| For an NTN serving cell in FR1 and for search space sets and that include *searchSpaceLinkingId-r19* with same value, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , and a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, for search space sets and .  A UE can indicate by numBD-twoPDCCH-r19 a capability for counting PDCCH candidates and either as 1 PDCCH candidate or as 2 PDCCH candidates. |

## Companies’ proposals

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| **Companies** | **Proposals** |
| Huawei | **Proposal 3:** Take TP#3 as the TP for PDCCH repetition in CSS other than Type0-CSS and Type3-CSS, if Option 1 is used to capture the feature in TS 38.213 |
| CATT | Text Proposal #1: Intra-slot PDCCH Repetition in R1-2505315:  **TS 38.213 V19.0.0** 10.1 UE procedure for determining physical downlink control channel assignment \*\*\* Unchanged parts are omitted \*\*\*  For an NTN serving cell in FR1 and for common search space (other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero) sets and that the starting symbol of monitoring occasion of the second SS is located right after the ending symbol of monitoring occasion of the first SS, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , and a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, for search space sets and .  *A UE can indicate by numBD-twoPDCCH-r19 a capability for counting* PDCCH candidates and  *either as 1 PDCCH candidate or as 2 PDCCH candidates.*  \*\*\* Unchanged parts are omitted \*\*\* |
| Thales | TP in R1-2505360 to implement intra-slot repetition for CSS (excluding Type-0/3). |
| vivo | Proposal 2: Reuse the R17 intra-slot scheme and the corresponding RRC parameter for the linking between two CSS other than Type0/3. Suggest RAN1 endorse the TP#3. An LS is sent to RAN2 to update the RRC description, e.g., as TP#4.  Proposal 3: Down-select one of the following options to configure the linked searchspaces for CSS other than Type0/3 PDCCH repetition:   * Reuse the legacy commonSearchSpaceList and commonSearchSpaceListExt-r17 * Introduce two new RRC parameters dedicated to CSS PDCCH repetition (other than Type0/3), such as commonSearchSpaceListRep and commonSearchSpaceListRepExt-r19, where each of them can be linked to one of the legacy CSS configured by commonSearchSpaceList and commonSearchSpaceListExt-r17. |
| Xiaomi | Proposal 3. Adopt the following TP on BD counting for intra-slot other than Type-0 CSS and Type-3 CSS  \*\*\* TS 38.213 10.1\*\*\*  Denote by , , the number of counted PDCCH candidates for monitoring for CSS set and by , , the number of counted PDCCH candidates for monitoring for search space set . If a UE indicates *numBD-twoPDCCH-r19* with value of 1 and is provided *searchSpaceLinkingId* with same value for search space sets and , with , set . If a UE indicates *numBD-twoPDCCH-r17* with value of 3 and is provided *searchSpaceLinkingId* with same value for search space sets and , with , set if and are CSS sets or set if and are USS sets.  \*\*\* TS 38.213 10.1\*\*\* |
| Ericsson | Proposal 2 RAN1 to consider the following options to indicate the enabling/disabling of PDCCH CSS (other than Type-0 and Type-3 CSS) repetition: a) Use the same reserved bit in PBCH payload that is used for enabling/disabling of Type-0 CSS PDCCH repetition, and b) The enabling/disabling of PDCCH CSS (other than Type-0 and Type-3 CSS) repetition is configured in SIB1.  **Proposal 3** RAN1 to agree that soft combining of the two PDCCH candidates with blind decoding count as one for intra-slot repetition of PDCCH CSS other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero.  **Proposal 4** RAN1 to consider intra-slot repetition based on Option 1: Use same CORESET and two different SS (SS Set1 and SS Set2) for repetition of PDCCH CSS other than Type-0 CSS and other than Type-3 CSS.  **Proposal 5** RAN1 assumes that blind decoding limit definition in the context of repetitions of PDCCH CSS for NTN operation shall ensure UE is expected to deliver performance not worse than soft combining. |
| ZTE | **Proposal 2:** The enabling/disabling of PDCCH CSS except Type0 and Type3 can be indicated together with enabling/disabling of Type-0 CSS PDCCH repetition, i.e., via PBCH payload bit .  **Proposal 3:** For repetition of PDCCH CSS except Type0 and Type3, the following TP can be adopted in TS 38.213 V19.0.0. 10.1 UE procedure for determining physical downlink control channel assignment \*\*\* Unchanged parts are omitted \*\*\*  For a cell in FR1 and for common search space sets and that the starting symbol of monitoring occasion of the is located right after the ending symbol of monitoring occasion of the , if the PBCH payload bit has value 1, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , and a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, for search space sets and .  A UE can indicate by *numBD-twoPDCCH-r19* a capability for counting PDCCH candidates and either as 1 PDCCH candidate or as 2 PDCCH candidates.  \*\*\* Unchanged parts are omitted \*\*\* |
| Samsung | **Proposal 1:** RAN1 updates the following agreement to clarify search space linking, and send LS to RAN2 to capture it in TS 38.331.  **Agreement**  For PDCCH CSS other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero, support intra-slot repetition based on the same mechanism for SS linking specified in Release 17:   * The starting symbol of monitoring occasion of the second SS is located right after the ending symbol of monitoring occasion of the first SS. * BD is counted as one or two, subject to UE capability, in RRC connected mode   + UE assumes that a DCI Format with the same content is repeated on two PDCCH candidates.   + Note: From RAN1 perspective UE is expected to deliver performance no worse than soft combining * PDCCH repetition is applicable to RNTI of the CSS. * Repeated PDCCH candidates within the same CORESET repeated in the slot, and share the same aggregation level (AL), coded bits and same candidate index.   Up to editor how to capture this in writing the relevant RAN1 specification. |
| Panasonic | **Proposal 7**: Do not use search space ID linkage. Instead introduce a RRC parameter to enable CSS intra-slot PDCCH repetition, e.g., intra-slotPDCCHrepetitionCSS. Add text like the following in TS 38.213 clause 10.1:  --------------------- Begin of text proposal for Clause 10.1 in TS 38.213 ---------------------------  “If *intra-slotPDCCHrepetitionCSS* is configured in *PDCCH-ConfigCommon*, for search space set s\_j configured with CSS set by *searchSpaceType,* the monitoring occasion of search space set s\_j is repeated where the starting symbol of the repeated monitoring occasion is located right after the ending symbol of monitoring occasion of search space set s\_j. The PDCCH candidates are repeated within the same CORESET repeated in the slot, and share the same aggregation level, coded bits and same candidate index.”  ---------------------- Begin of text proposal for Clause 10.1 in TS 38.213 --------------------------- |
| Spreadtrum | **Proposal 4.** Endorse the description for intra-slot repetition in first draft CR of 38.213 |
| OPPO | **Proposal 3:** For PDCCH repetition for CSS other than Type0-CSS and Type3-CSS, the R17 parameter searchSpaceLinkingId-r17 cannot be reused and a new higher layer parameter (e.g., searchSpaceLinkingId-r19) should be introduced for this purpose.  **Proposal 4:** For intra-slot PDCCH repetition for CSS other than Type0-CSS and Type3-CSS, adopt the draft CR in [3] in AI 8.14.  -------------------- start of TP#2 for 38.213 --------------------  **10.1 UE procedure for determining physical downlink control channel assignment**  \*\*\* Unchanged parts are omitted \*\*\*  For search space sets and that include [*searchSpaceLinkingId-r19*] with same value, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, and the starting symbol of monitoring occasion corresponding to is located right after the ending symbol of monitoring occasion corresponding to , for search space sets and .  A UE can indicate by [*numBD-twoPDCCH-r19*] a capability for counting PDCCH candidates and either as 1 PDCCH candidate or as 2 PDCCH candidates.  \*\*\* Unchanged parts are omitted \*\*\*  -------------------- end of TP#2 --------------------------------- |
| Nokia | **Reason for change:** In current specification text there is no capturing of the CORESET duplication as agreed in RAN1 meetings.  **Consequence if not approved:** Specifications are incomplete and DL coverage enhancements may not be obtained for common control channels.  **Text proposal for TS38.213:** 10.1 UE procedure for determining physical downlink control channel assignment \*\*\* Unchanged parts are omitted \*\*\*  For search space sets and that include *searchSpaceLinkingId* with same value, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , and a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, for search space sets and . For CORESET associated with the search space set and for CORESET associated with the search space set , the UE is provided *tci-PresentInDCI* or tci-PresentDCI-1-2 for either none or both of CORESETs and . For CORESET associated with the search space set and for CORESET associated with the search space set , the UE is either not provided coresetPoolIndex value of 1 for any of the two CORESETs, or is provided coresetPoolIndex value of 1 for both CORESETs.  A UE can indicate by *numBD-twoPDCCH* a capability for counting PDCCH candidates and either as 2 PDCCH candidates or as 3 PDCCH candidates.  For search space sets and that include *searchSpaceLinkingId* with same value, and for search space sets and that include *searchSpaceLinkingId* with same value, a UE expects to simultaneously monitor PDCCH candidates , and = only if a first CCE of or has different index than a first CCE of or in a CORESET configured with *cce-REG-MappingType* = '*nonInterleaved*' and with duration of one symbol.  For an NTN serving cell in FR1 and for common search space sets and , other than Type-0 CSS and Type-3 CSS, where the starting symbol of monitoring occasion of the second SS is located right after the ending symbol of monitoring occasion of the first SS set, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , and a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, for search space sets and .  A UE can indicate by *numBD-twoPDCCH-r19* a capability for counting PDCCH candidates and either as 1 PDCCH candidate or as 2 PDCCH candidates.  \*\*\* Unchanged parts are omitted \*\*\* |
| CMCC | **Proposal 1:** To support intra-slot PDCCH repetition for PDCCH CSS other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero,   * The enabling/disabling of PDCCH repetition can be indicated via system information. |
| NTT DOCOMO | **Proposal 2:**   * If the PBCH payload bit has value 1, both PDCCH repetition for CSS type 0 and PDCCH repetition for CSS type 0A/0B/1/1A/2/2A are enabled. * When enabled,   + Use the same CORESET associated with one SS which is repeated contiguously * Adopt the following TP for TS 38.213.   **Reason for change:** For intra-slot PDCCH repetition for CSS type 0A/0B/1/1A/2/2A, the latest specifications does not include any corresponding descriptions as the details are still unclear. Texts are added based on what RAN1 will agree at RAN1#122.  **Summary of change:** Intra-slot PDCCH repetition for CSS type 0A/0B/1/1A/2/2A is performed with a single search space configuration with contiguously repeated CORESETs. BD is counted as 1 or 2, subject to UE capability as agreed at RAN1#121.  **Consequences if not approved:** Intra-slot PDCCH repetition for CSS type 0A/0B/1/1A/2/2A is not supported.  **10.1 UE procedure for determining physical downlink control channel assignment**  **<Unchanged parts omitted>**  In FR1, for a Type0A/0B/1/1A/2/2A-PDCCH CSS set with a CORESET other than a CORESET with index 0, if the PBCH payload bit has value 1, the UE monitors a search space set with a CORESET followed by the same CORESET in contiguous symbols in the same slot assuming that a same PDCCH candidate for a CCE aggregation level in the search space set provides same information. The UE in RRC\_CONNECTED state can indicate by [UE capability] a capability for counting each PDCCH candidate in the search space set as 1 PDCCH candidate or 2 PDCCH candidates.  **<Unchanged parts omitted>** |
| Google | **Proposal 1:** Refine the agreement from RAN1 #121 meeting in following options  **Option 1:**  Agreement  For PDCCH CSS other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero, support intra-slot repetition based on:   * Linking two PDCCH candidates (adopt the same mechanism for SS linking specified in Release 17) * The starting symbol of monitoring occasion of the second SS is located right after the ending symbol of monitoring occasion of the first SS. * BD is counted as one or two, subject to UE capability, in RRC connected mode   + UE assumes that a DCI Format with the same content is repeated on two PDCCH candidates.   + Note: From RAN1 perspective UE is expected to deliver performance no worse than soft combining * PDCCH repetition is applicable to RNTI of the CSS. * Repeated PDCCH candidates within the same CORESET repeated in the slot, and share the same aggregation level (AL), coded bits and same candidate index.   + Up to editor how to capture this in writing the relevant RAN1 specification.   **Option 2:**  Agreement  For PDCCH CSS other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero, support intra-slot repetition based on:   * The starting symbol of monitoring occasion of the second SS is located right after the ending symbol of monitoring occasion of the first SS. * BD is counted as one or two, subject to UE capability, in RRC connected mode   + UE assumes that a DCI Format with the same content is repeated on two PDCCH candidates.   + Note: From RAN1 perspective UE is expected to deliver performance no worse than soft combining * PDCCH repetition is applicable to RNTI of the CSS. * Repeated PDCCH candidates within the same CORESET repeated in the slot, and share the same aggregation level (AL), coded bits and same candidate index.   + Up to editor how to capture this in writing the relevant RAN1 specification.   Note: How to link the first and second SS in RRC is up to RAN2 decision. |

## Summary of companies’ contributions

Huawei: Propose a TP aligned with option 1: Linking two PDCCH candidates

CATT: For intra-slot PDCCH repetition is handled as two search spaces with fixed timing, where the second starts immediately after the first ends; unlike the m-TRP approach, these do not require linked IDs but are strictly confined by time-domain resources.

Vivo: Suggest reusing existing PDCCH intra-slot repetition mechanisms and RRC parameters for linking CSS. Observed that existing parameters can configure up to four CSSes with reduced flexibility. Propose introducing new RRC parameters can accommodate up to eight CSSes for enhanced flexibility.

Ericsson: It is unclear whether intra-slot repetition is enabled or not based on the existing RAN1 agreements.

Samsung: Suggest reusing search space linking by adding a configuration restriction in TS38.331 is a simpler option.

## Initial proposal

### Proposal 3-1

From Moderator’s perspective, reusing search space linking by adding a configuration restriction in TS38.331 is a reasonable way forward.

**Proposal 3-1-v0**

**RAN1 to update the following agreement to clarify search space linking and send LS to RAN2 to capture it in TS 38.331.**

|  |
| --- |
| **Agreement**  For PDCCH CSS other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero, support intra-slot repetition based on the same mechanism for SS linking specified in Release 17:   * The starting symbol of monitoring occasion of the second SS is located right after the ending symbol of monitoring occasion of the first SS. * BD is counted as one or two, subject to UE capability, in RRC connected mode   + UE assumes that a DCI Format with the same content is repeated on two PDCCH candidates.   + Note: From RAN1 perspective UE is expected to deliver performance no worse than soft combining * PDCCH repetition is applicable to RNTI of the CSS. * Repeated PDCCH candidates within the same CORESET repeated in the slot, and share the same aggregation level (AL), coded bits and same candidate index.   Up to editor how to capture this in writing the relevant RAN1 specification. |

Companies are encouraged to share views on Proposal 3-1-v0

|  |  |
| --- | --- |
| **Companies** | **Comments** |
| DCM | We prefer not to use search space linking. |
| Apple | Support |
| LGE | We are fine with the proposal. |
| Samsung | Support. |
| vivo | Support. |
| MTK | We are open to align RAN1 agreement with Option 1, but we think it is ambiguous to mention “the same mechanism for SS linking specified in Release 17”. It could be clearer if the proposal explicitly mention “Use same CORESET and two different SS (SS Set1 and SS Set2) linking two PDCCH candidates. |
| OPPO | We can directly discuss the higher layer parameters in Proposal 3-2, and LS to RAN2 is not needed. |
| Nokia | **Do not support.** We have an existing agreement which was reached after extensive discussions. The topic of search space linking was discussed and dismissed. Hence we should stick to existing agreements. There are several text proposals for capturing the needed functionality. Most of them are just fine and will do the job. |
| ZTE | Not support. The agreement has already specified that the starting symbol of monitoring occasion of the second SS is located right after the ending symbol of monitoring occasion of the first SS. Then, UE can identify the SSs used for repetition when PDCCH repetition enabled. Hence, SS linkage indication is not needed. Network only need to indicate UE whether PDCCH repetition is enabled. |
| Panasonic | Same view as Nokia and ZTE. |
| CATT | We share same view with Nokia and ZTE. Even if without the linkage, it can be workable by just following the first SS. |
| Lenovo | We also think current agreement is fine and not need to mention search space linking. |
| Ericsson | Due to lack of alignment among companies with respect to the solution, it would be good to explicitly mention the solution instead of referring to the Release-17 solution. |
| NEC | Same view as Ericsson. |
| Huawei, HiSilicon | Maybe companies can discuss TP directly based on the current agreement and inputs from companies. |

### Proposal 3-2

**Proposal 3-2-v0**

**The following parameter description is included in the LS to RAN2**

|  |
| --- |
| **SearchSpaceLinkingId*-r19***  This parameter is used to link two search spaces of same type in the same BWP. If two search spaces have the same SearchSpaceLinkingId UE assumes these search spaces are linked to PDCCH repetition REF. When PDCCH repetition is monitored in two linked search space (SS) sets, the UE does not expect a third monitored SS set to be linked with any of the two linked SS sets. The two linked SS sets have the same CSS set type other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero. The two linked SS sets have the same DCI formats to monitor. For intra-slot PDCCH repetition: The two SS sets should have the same periodicity and offset (monitoringSlotPeriodicityAndOffset), and the same duration. The starting symbol of monitoring occasion of the second SS is located right after the ending symbol of monitoring occasion of the first SS. For linking monitoring occasions across the two SS sets that exist in the same slot: The two SS sets have the same number of monitoring occasions within a slot and n-th monitoring occasion of one SS set is linked to n-th monitoring occasion of the other SS set. |

Companies are encouraged to share views on Proposal 3-2-v0

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | We are fine with the proposal. |
| Samsung | Support. Since it is evident that a new RRC parameter is needed to enable this feature, updating 36.331 is quite straightforward. |
| vivo | Before introducing a new RRC parameter of SearchSpaceLinkingId-r19, maybe we should first consider whether the existing SearchSpaceLinkingId-r17 can be reused or not. |
| MTK | Proposal 3-1 should first be agreed |
| OPPO | Support. |
| Nokia | **Do not support.** Since we have no agreement to introduce search space linking, there is no need to send a LS to RAN2. |
| ZTE | Proposal 3-1 discussed first. |
| Panasonic | Discuss Proposal 3-1 first. |
| CATT | Should firstly discuss proposal 3-1. |
| Lenovo | Agree with ZTE that proposal 3-1 should be discussed first. |
| Ericsson | It is essential to resolve the previous proposal before discussing this proposal. |
| NEC | We can discuss this after Proposal 3-1. |
| Huawe, HiSilicon | Why not discuss RAN1 TP and introduce this parameter *searchSpaceLinkingId-r19* in RRC parameter list?  A proposal on TP:  -------------------- Start of TP#3 for 38.213 V19.0.0 --------------------  **10.1 UE procedure for determining physical downlink control channel assignment**  \*\*\* Unchanged parts are omitted \*\*\*  For search space sets and that include *searchSpaceLinkingId* with same value, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , and a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, for search space sets and . For CORESET associated with the search space set and for CORESET associated with the search space set , the UE is provided *tci-PresentInDCI* or *tci-PresentDCI-1-*2 for either none or both of CORESETs and . For CORESET associated with the search space set and for CORESET associated with the search space set , the UE is either not provided *coresetPoolIndex* value of 1 for any of the two CORESETs, or is provided *coresetPoolIndex* value of 1 for both CORESETs.  In FR1, for search space sets and that are CSS sets, other than Type3-PDCCH CSS set and other than Type0-PDCCH CSS set, and include [*searchSpaceLinkingId-r19]* with same value, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , and a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, for search space sets and . The UE expects the same CORESET is associated with the search space set and search space set , and the starting symbol of PDCCH monitoring occasion of in one slot is the symbol right after the ending symbol of PDCCH monitoring occasion of in the same slot.  A UE can indicate by *numBD-twoPDCCH-r17* a capability for counting PDCCH candidates and either as 2 PDCCH candidates or as 3 PDCCH candidates.  For search space sets and that include *searchSpaceLinkingId* with same value, and for search space sets and that include *searchSpaceLinkingId* with same value, a UE expects to simultaneously monitor PDCCH candidates , and = only if a first CCE of or has different index than a first CCE of or in a CORESET configured with *cce-REG-MappingType* = '*nonInterleaved*' and with duration of one symbol.  \*\*\* Unchanged parts are omitted \*\*\*  -------------------- Start of TP#3 for 38.213 V19.0.0 -------------------- |

# TP#1 for TS 38.213: BD counting in Type0-PDCCH CSS Inter-slot repetition

## Companies’ proposals

|  |  |
| --- | --- |
| **Companies** | **Proposals** |
| Huawei | **Proposal 2:** Capture TP#2 in clause 10.1 in TS 38.213   * Reason for change: PDCCH repetition in Type0-CSS impacts the BD counting for connected mode UE according to the working assumption in RAN1#121. The BD counting behaviour needs to be captured. * Summary of change: It is specified that UE performs 1 BD is counted in slot n0 for Type-0 CSS PDCCH candidate, and two BDs are counted for Type-0 CSS PDCCH in slot n0+1. * Consequence if not approved: the network and UE may not be able to align the BD counting which may cause mis-alignment with respect to the monitored search spaces between gNB and UE. |
| vivo | *TP#5 for TS38.213* 10.1 UE procedure for determining physical downlink control channel assignment \*\*\* Unchanged parts are omitted \*\*\*  Denote by , , the number of counted PDCCH candidates for monitoring for CSS set and by , , the number of counted PDCCH candidates for monitoring for search space set . If a UE indicates *numBD-twoPDCCH-r17* with value of 3 and is provided *searchSpaceLinkingId* with same value for search space sets and , with , set if and are CSS sets or set if and are USS sets. For a UE capable of [PDCCH-repetition-for-Type0-PDCCH-CSS] operating in FR1, and for the CSS set provided by searchSpaceZero, a same PDCCH candidate in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI, set in slot .  For the CSS sets in , a UE monitors PDCCH candidates requiring a total of non-overlapping CCEs in a slot, of in group of slots for a corresponding combination , or in a span.  \*\*\* Unchanged parts are omitted \*\*\* |
| Xiaomi | Proposal 2. Adopt the following TP on BD counting for inter-slot type-0 CSS PDCCH repetition.  \*\*\* TS 38.213 10.1\*\*\*  Denote by , , the number of counted PDCCH candidates for monitoring for CSS set and by , , the number of counted PDCCH candidates for monitoring for search space set . If a UE indicates *numBD-twoPDCCH-r17* with value of 3 and is provided *searchSpaceLinkingId* with same value for search space sets and , with , set if and are CSS sets or set if and are USS sets. For FR1, if in PBCH payload has value 1, set in the second slot where the UE monitors the repeated PDDCH candidates.  \*\*\* TS 38.213 10.1\*\*\* |
| ZTE | **Proposal 4:** For BD counting for Type0 CSS repetition, the following TP can be adopted in TS 38.213 V19.0.0. 13 UE procedure for monitoring Type0-PDCCH CSS sets \*\*\* Unchanged parts are omitted \*\*\*  -For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For an NTN cell in FR1, if the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI. For a cell in FR1, if the PBCH payload bit has value 1, the UE counts the PDCCH candidate as one PDCCH candidate for the slots , and the UE counts the PDCCH candidate as two PDCCH candidates for the slots , in which one PDCCH candidate is for Type-0 CSS PDCCH repetition with SI-RNTI and the other one PDCCH candidate is for other PDCCH, if the UE is in RRC\_CONNECTED.  \*\*\* Unchanged parts are omitted \*\*\* |
| Spreadtrum | **Proposal 2.** Adopt TP#1 for blind decoding for inter-slot PDCCH repetition.  - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For an NTN cell in FR1, if the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI. A UE counts the PDCCH candidate as one PDCCH candidate in slot , two PDCCH candidates in slot . |
| Apple | **Proposal 3:** RAN1 to adopt the following text proposal:   * Reason for change: The blind decoding counting for type-0 PDCCH repetition on CSS set is not defined. * Summary of change: Define the blind decoding counting for type-0 PDCCH repetition on CSS set. * Consequences if not approved: UE behavior on blind decoding for type-0 PDCCH repetition is unclear.   **13 UE procedure for monitoring Type0-PDCCH CSS sets**  For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For an NTN cell in FR1, if the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI. In slot , UE counts one PDCCH candidate. In slot , UE counts one PDCCH candidate for Type-0 CSS PDCCH repetition and one PDCCH candidate for PDCCH without repetition. |
| NTT DoCoMo | **Proposal 1:**  Adopt the following TP for TS 38.213.  **Reason for change**: BD counting rule for inter-slot PDCCH repetition for CSS type 0, which was agreed as working assumption at RAN1#121, is not included in the latest specifications.  **Summary of change**: For inter-slot PDCCH repetition for CSS type 0, 1 BD is counted for slot n0 and 2 BDs are counted for slot n0+1.  **Consequences if not approved:** BD counting rule for inter-slot PDCCH repetition for CSS type 0 in RRC connected state is undefined and gNB cannot know how many BDs are counted at UE side.  **13 UE procedure for monitoring Type0-PDCCH CSS sets**  **<Unchanged parts omitted>**  - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For an NTN cell in FR1, if the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI. The UE in RRC\_CONNECTED state counts each PDCCH candidate in slot as 1 PDCCH candidate and in slot as 2 PDCCH candidates, where one PDCCH candidate is for DCI format 1\_0 with CRC scrambled by the SI-RNTI and the other PDCCH candidate is for DCI format with CRC scrambled by other than the SI-RNTI.  **<Unchanged parts omitted>** |

## Summary of companies’ contributions

## Initial proposal

Based on the above discussion the following initial proposal is made

### Proposal 4-1

**Proposal 4-1-v0**

**Adopt the following TP for TS 38.213**

|  |
| --- |
| * **Reason for change:** Specify BD counting for inter-slot Type0 CSS repetition. * **Summary of change:** For inter-slot PDCCH repetition for CSS type 0, 1 BD is counted for slot n0 and 2 BDs are counted for slot n0+1. * **Consequence if not approved:** The BD counting for type0 CSS repetition is not clearly defined. |
| **10.1 UE procedure for determining physical downlink control channel assignment**  \*\*\* Unchanged parts are omitted \*\*\*  If a UE  - is provided *monitoringCapabilityConfig* = *r16monitoringcapability* for a downlink cell,  - is provided, by *searchSpaceLinkingId* a same value for search space sets and on the downlink cell, and  - indicates *numBD-twoPDCCH-r17* with value of 3  the UE counts each PDCCH candidate for the one of the search space sets and that the UE monitors PDCCH in the later span, as two PDCCH candidates. The UE does not expect a first PDCCH candidate from search space set or and a second PDCCH candidate from a search space set that does not include *searchSpaceLinkingId* to use a same set of CCEs and same scrambling in a same CORESET, and provide respective first and second DCI formats with same size, in any span other than the first span in a slot.  For FR1, if in PBCH payload has value 1, for the CSS set provided by searchSpaceZero, a same PDCCH candidate in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI, and in slot .  \*\*\* Unchanged parts are omitted \*\*\*  -------------------- End of TP#1 for 38.213 -------------------- |

Companies are encouraged to share views on Proposal 4-1-v0

|  |  |
| --- | --- |
| **Company** | **Comments** |
| DCM | At least “same information” part seems to be redundant as the texts in section 13 are already covering the same intention. |
| Apple | Fine with the TP. |
| LGE | I understand the intention, but the expression is unclear to me. Especially, “” seems like C source code. |
| Samsung | This is related to proposal 1. As we mentioned in proposal 1, motivation is quite unclear. |
| vivo | There are several issues:   1. is not defined in the context. 2. is not clearly defined in the context (i.e., in 10.1) 3. This feature should depend on UE capability |
| MTK | Proposal 1-1 should first be discussed. |
| OPPO | We can just confirm Proposal 1-1, and how to capture this can be up to editor. |
| Nokia | We are a bit confused with this TP. Most fitting section for discussing BD counting/handling would be clause 13 of TS38.213. |
| ZTE | Proposal 1-1 can be discussed first. |
| Panasonic | Discuss Proposal 1-1 and let the editor implement it. |
| CATT | We first discuss the proposal 1-1. |
| NEC | We can discuss this proposal after proposal 1-1. |
| Huawei, HiSilicon | we think this is somehow repeated in section 13.  We propose the following for consideration:   * -------------------- Start of TP#2 for 38.213 V19.0.0 --------------------   **10.1 UE procedure for determining physical downlink control channel assignment**  \*\*\* Unchanged parts are omitted \*\*\*  If a UE  - is provided *monitoringCapabilityConfig* = *r16monitoringcapability* for a downlink cell,  - is provided, by *searchSpaceLinkingId* a same value for search space sets and on the downlink cell, and  - indicates *numBD-twoPDCCH-r17* with value of 3  the UE counts each PDCCH candidate for the one of the search space sets and that the UE monitors PDCCH in the later span, as two PDCCH candidates. The UE does not expect a first PDCCH candidate from search space set or and a second PDCCH candidate from a search space set that does not include *searchSpaceLinkingId* to use a same set of CCEs and same scrambling in a same CORESET, and provide respective first and second DCI formats with same size, in any span other than the first span in a slot.  If a UE is provided  - a C-RNTI, an MCS-C-RNTI, or a CS-RNTI, and  - the PBCH payload bit with value of 1,  the UE counts each PDCCH candidate for the Type0-PDCCH CSS set that the UE monitors PDCCH in the later slot, as two PDCCH candidates.  A UE does not expect to be provided *freqMonitorLocations* for a search space set in a serving cell if *intraCellGuardBandsDL-List* indicates that no intra-cell guard-bands are configured for the serving cell.  \*\*\* Unchanged parts are omitted \*\*\*  -------------------- End of TP#1 for 38.213 V19.0.0 -------------------- |

# TP#2 for TS 38.214: SIB1 PDSCH repetition

## Background

## Companies’ proposals

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| --- | --- |
| **Companies** | **Proposals** |
| CATT | Proposal 2: Adopt the following TP#2 for TS 38.214.  5.1 UE procedure for receiving the physical downlink shared channel  \*\*\* Unchanged parts are omitted \*\*\*  A UE capable of PDSCH repetitions for broadcast channels, when the DCI format 1\_0 in the Type0 PDCCH CSS of searchSpaceZero transmitted with two inter-slot repetitions, PDSCHs scheduled by the DCI format 1\_0 have also been transmitted with inter-slot repetitions in the same slots as the Type0 PDCCH CSS, with the same RV as indicated by the DCI format 1\_0.  For a cell detected in cell search procedure with synchronization raster defined in Table 5.4.3.1-2 or Table 5.4.3.1-3 of [8, TS 38.101-1], the size of CORESET 0 for the cell in this clause refers to the size of punctured CORESET 0 as defined in clause 7.3.2.2 of [4, TS 38.211] if any.  \*\*\* Unchanged parts are omitted \*\*\* |
| vivo | *TP#2 for TS38.214* 5 Physical downlink shared channel related procedures5.1 UE procedure for receiving the physical downlink shared channel <omitted text>  A UE capable of ~~PDSCH repetitions for broadcast channels and~~ [NTN-SIB1-PDSCH-repetition], which assumed the DCI format 1\_0 in the Type0 PDCCH CSS of searchSpaceZero transmitted with two inter-slot repetitions may assume that PDSCHs scheduled by the DCI format 1\_0 have also been transmitted with inter-slot repetitions in the same slots as the Type0 PDCCH CSS, with the same RV as indicated by the DCI format 1\_0.  For a cell detected in cell search procedure with synchronization raster defined in Table 5.4.3.1-2 or Table 5.4.3.1-3 of [8, TS 38.101-1], the size of CORESET 0 for the cell in this clause refers to the size of punctured CORESET 0 as defined in clause 7.3.2.2 of [4, TS 38.211] if any.  <omitted text> |

## Summary of companies’ contributions

CATT: For SIB1 PDSCH repetition, the word "assume" inherently carries a sense of supposition and uncertainty, making it inappropriate for specification descriptions

Vivo: The indication of SIB1 PDSCH repetition is associated with the Type0 CSS PDCCH repetition, but the feature of SIB1 PDSCH repetition is not agreed to be extended to TN.

## Initial proposal

Based on the above discussion the following initial proposal is made

### Proposal 5-1

**Proposal 5-1-v0**

**Adopt the following TP for TS 38.214**

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| --- |
| * **Reason for change:** The indication of SIB1 PDSCH repetition is associated with the Type0 CSS PDCCH repetition, but the feature of SIB1 PDSCH repetition is not agreed to be extended to TN. * **Summary of change:** Consider only UEs with NTN SIB1 PDSCH repetition capability. * **Consequence if not approved:** The SIB1 PDSCH repetition not clearly defined. |
| **5.1 UE procedure for receiving the physical downlink shared channel**  \*\*\* Unchanged parts are omitted \*\*\*  A UE capable of ~~PDSCH repetitions for broadcast channels and~~ NTN-SIB1-PDSCH-repetition, which assumed the DCI format 1\_0 in the Type0 PDCCH CSS of searchSpaceZero transmitted with two inter-slot repetitions may assume that PDSCHs scheduled by the DCI format 1\_0 have also been transmitted with inter-slot repetitions in the same slots as the Type0 PDCCH CSS, with the same RV as indicated by the DCI format 1\_0.  \*\*\* Unchanged parts are omitted \*\*\* |

Companies are encouraged to share views on Proposal 5-1-v0

|  |  |
| --- | --- |
| **Company** | **Comments** |
| DCM | The parameter name has already been fixed? If not, then brackets are necessary. |
| Apple | We do not think the TP is necessary. This could be part of TEI discussion and/or UE feature discussion. |
| Samsung | This is not a maintenance issue. Furthermore, the extension of the TN issue should be discussed in TEI, as noted in the RAN highlight document (R1-2505101). The only agreement so far is on PDCCH repetition. This feature should not be extended to SIB1 PDSCH by default.  Note: This proposal is taken as an exception. According to RANP clarification, solutions achieved in items targeting to NTN can’t be adopted by TN by default in WGs. TEI/WI should be proposed for applying such solutions to TN additionally. |
| vivo | We are a bit confusing on Samsung’s comment. According to the guideline Samsung cited, the SIB repetition should not be directly extended to TN, that is why this TP is proposed – **the current spec applies to both** TN and NTN, and this TP is to make it **clear that the SIB repetition is only applicable to TN** (**because the UE feature [NTN-SIB1-PDSCH-repetition] is NTN only**).  My question to Apple and Samsung that does not support this change: does you intent to automatically extend this feature to TN? |
| OPPO | We also do not see the necessity of this TP, and the UE feature already captures that SIB1 PDSCH repetition only applies to FR1 NTN band. |
| Nokia | To our understanding, there is a direct coupling between the inter-slot PDCCH repetitions for SIB1 and the subsequent inter-slot PDSCH repetitions. So when TSG-RAN agreed to extend the scope for inter-slot repetitions to TN, it would be obvious that it was also for the scheduled PDSCH repetitions (since they are coupled). |
| ZTE | The TP seems not needed now since the UE feature for SIB1 repetition is not stable. |
| CATT | Can wait for UE feature discussion. |
| NEC | We can discuss this when the UE feature is stable. |
| Huawei, HiSilicon | We think this TP may not be needed. This can be reflected anyway in UE feature for SIB1 PDSCH. |

# TP#3 for TS 38.213: Msg4 PDSCH repetition

## Background

## Companies’ proposals

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| --- | --- |
| **Companies** | **Proposals** |
| Panasonic | **Proposal 9**: In TS 38.213, the highlighted part (yellow) is duplicated with TS38.214. We propose to remove it |
| Nokia | **Proposal 3:** RAN1 to remove the duplicate text from 38.213 to avoid operation being described multiple places. |

## Summary of companies’ contributions

Panasonic: The description of Msg4 PDSCH repetition is duplicated and slightly different between TS38.213 and TS38.214. Since PDSCH repetition behavior is concerned, the description in TS38.214 is the correct place. The relevant text (i.e., the yellow part) in TS38.213 should be removed.

|  |
| --- |
| TS38.213  8.4 PDSCH with UE contention resolution identity  In response to a PUSCH transmission scheduled by a RAR UL grant or corresponding PUSCH retransmission scheduled by a DCI format 0\_0 with CRC scrambled by a TC-RNTI provided in the corresponding RAR message when a UE has not been provided a C-RNTI, the UE attempts to detect a DCI format 1\_0 with CRC scrambled by a corresponding TC-RNTI scheduling a PDSCH that includes a UE contention resolution identity [11, TS 38.321]. If *SIB1* provides *msg4-NumberofRepetitions*, the UE may indicate FG-XYZ in the PUSCH transmission. If the UE provides FG-XYZ and the MSB value of the MCS field in the DCI format 1\_0 is 1, the UE assumes the PDSCH reception is with *msg4-NumberofRepetitions*. |
| TS38.214  5.1.2.1 Resource allocation in time domain  When receiving PDSCH scheduled by DCI format 1\_0 in PDCCH with CRC scrambled by TC-RNTI, if the UE is configured with [*pdsch-mgs4AggregationFactor]*, the UE has indicated support for [*pdsch-msg4AggregationFactor*] via Msg3, and the MSB of MCS field of the DCI format is ‘1’, the same symbol allocation is applied across the [*pdsch-msg4AggregationFactor]* consecutive slots. The UE may expect that the TB is repeated within each symbol allocation among each of the [*pdsch-msg4AggregationFactor]* consecutive slots and the PDSCH is limited to a single transmission layer. The redundancy version to be applied on the *n*th transmission occasion of the TB, where n = 0, 1, …[*pdsch-msg4AggregationFactor]* -1, is determined according to table 5.1.2.1-2 and "*rvid* indicated by the DCI scheduling the PDSCH" in table 5.1.2.1-2 is provided by the DCI format. |

## Initial proposal

Based on the above discussion the following initial proposal is made

### Proposal 6-1

**Proposal 6-1-v0**

**Adopt the following TP for TS 38.214**

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| --- |
| * **Reason for change:** The description of Msg4 PDSCH repetition is duplicated between TS38.213 and TS38.214. Since PDSCH repetition behavior is concerned, the description in TS38.214 is the correct place. * **Summary of change:** Remove the duplicate text from 38.213 to avoid operation being described multiple places. * **Consequence if not approved:** Unnecessary duplicated text in different RAN1 specifications. |
| --------------------------------------- Begin of text proposal for TS38.213 ---------------------------------------  8.4 PDSCH with UE contention resolution identity  In response to a PUSCH transmission scheduled by a RAR UL grant or corresponding PUSCH retransmission scheduled by a DCI format 0\_0 with CRC scrambled by a TC-RNTI provided in the corresponding RAR message when a UE has not been provided a C-RNTI, the UE attempts to detect a DCI format 1\_0 with CRC scrambled by a corresponding TC-RNTI scheduling a PDSCH that includes a UE contention resolution identity [11, TS 38.321]. ~~If~~ *~~SIB1~~* ~~provides~~ *~~msg4-NumberofRepetitions~~*~~, the UE may indicate FG-XYZ in the PUSCH transmission. If the UE provides FG-XYZ and the MSB value of the MCS field in the DCI format 1\_0 is 1, the UE assumes the PDSCH reception is with~~ *~~msg4-NumberofRepetitions~~*~~.~~  --------------------------------------- End of text proposal for TS38.213 --------------------------------------- |

Companies are encouraged to share views on Proposal 6-1-v0

|  |  |
| --- | --- |
| **Company** | **Comments** |
| DCM | OK and should be “**Adopt the following TP for TS 38.21~~4~~3**” |
| Apple | Fine to remove duplicated descriptions. |
| Nokia | In principle support the TP, but we would prefer if we maintain the part of “UE indicating support for the FG in the PUSCH transmission”, as this would be seen as part of the RACH procedure normally covered in TS38.213.  And support DCM’s note that this TP is for TS38.213. |
| Panasonic | Support to remove duplicate description. |
| CATT | OK |
| Ericsson | We are fine to remove duplicate description mentioned in the proposal. |
| Huawei, HiSilicon | Agree to remove duplicated descriptions. |

# TP#4 for TS 38.214: Msg4 PDSCH repetition

## Background

## Companies’ proposals

|  |  |
| --- | --- |
| **Companies** | **Proposals** |
| Nokia | **Proposal 1:** Adopt the following text proposal for TS38.214:  **Reason for change:** Current implementation of activation indication for PDSCH repetitions for Msg4 is colliding with TBS indication for HARQ operation for Msg4.  **Consequence if not approved:** Scheduling of retransmissions for PDSCH carrying Msg4 may not be possible if the physical resources for retransmissions are changed compared to earlier transmissions. 5.1.3.1 Modulation order and target code rate determination < Unchanged text omitted >  elseif the UE has indicated support for [*pdsch-msg4AggregationFactor*] via Msg3, and the MSB of MCS field of the DCI format is ‘1’, and the value of the MCS Index *IMCS is less than 29,*  < Unchanged text omitted >  **Proposal 2:** Adopt the following text proposal for TS38.214:  **Reason for change:** Current implementation of activation indication for PDSCH repetitions for Msg4 is colliding with TBS indication for HARQ operation for Msg4.  **Consequence if not approved:** Scheduling of retransmissions for PDSCH carrying Msg4 may not be possible if the physical resources for retransmissions are changed compared to earlier transmissions.  **Text proposal for TS38.214:** 5.1.2.1 Resource allocation in time domain < Unchanged text omitted >  When receiving PDSCH scheduled by DCI format 1\_0 in PDCCH with CRC scrambled by TC-RNTI, if the UE is configured with [*pdsch-mgs4AggregationFactor]*, the UE has indicated support for [*pdsch-msg4AggregationFactor*] via Msg3, and the MSB of MCS field of the DCI format is ‘1’ and the value of the MCS Index *IMCS is less than 29,*, the same symbol allocation is applied across the [*pdsch-msg4AggregationFactor]* consecutive slots. The UE may expect that the TB is repeated within each symbol allocation among each of the [*pdsch-msg4AggregationFactor]* consecutive slots and the PDSCH is limited to a single transmission layer. The redundancy version to be applied on the *n*th transmission occasion of the TB, where n = 0, 1, …[*pdsch-msg4AggregationFactor]* -1, is determined according to table 5.1.2.1-2 and "*rvid* indicated by the DCI scheduling the PDSCH" in table 5.1.2.1-2 is provided by the DCI format.  < Unchanged text omitted > |
| NTT DOCOMO | 5.1.3.1 Modulation order and target code rate determination  **<Unchanged parts omitted>**  elseif the UE has indicated support for [*pdsch-msg4AggregationFactor*] via Msg3, ~~and the MSB of MCS field of the DCI format is ‘1’~~  - the 4 LSBs of the MCS field of DCI format 1\_0 with CRC scrambled by the TC-RNTI provide a codepoint to determine the MCS index *IMCS* according to Table 5.1.3.1-5, based on whether or not the higher layer parameter [*mcs-Msg4-Repetitions*]is configured. ~~the UE shall assume the MSB of MCS field to be ´0´, and the~~ The UE shall use *IMCS* and Table 5.1.3.1-1 to determine the modulation order (*Qm*) and Target code rate (*R*) used in the physical downlink shared channel.  **<Unchanged parts omitted>**  **Table 5.1.3.1-5: MCS index *IMCS* as a function of 4 LSBs of MCS field in DCI format 1\_0 with CRC scrambled by the TC-RNTI**   |  |  |  |  | | --- | --- | --- | --- | | ***[mcs-Msg4-Repetitions] is configured*** | | ***[mcs-Msg4-Repetitions] is not configured*** | | | ***Codepoint*** | ***IMCS*** | **Codepoint** | ***IMCS*** | | 0000 | First value of [*mcs-Msg4-Repetitions]* | 0000 | 0 | | 0001 | Second value of [*mcs-Msg4-Repetitions]* | 0001 | 1 | | 0010 | Third value of [*mcs-Msg4-Repetitions]* | 0010 | 2 | | 0011 | Fourth value of [*mcs-Msg4-Repetitions]* | 0011 | 3 | | 0100 | Fifth value of [*mcs-Msg4-Repetitions]* | 0100 | 4 | | 0101 | Sixth value of [*mcs-Msg4-Repetitions]* | 0101 | 5 | | 0110 | Seventh value of [*mcs-Msg4-Repetitions]* | 0110 | 6 | | 0111 | Eighth value of [*mcs-Msg4-Repetitions]* | 0111 | 7 | | 1000 | Nineth value of [*mcs-Msg4-Repetitions]* | 1000 | 8 | | 1001 | Tenth value of [*mcs-Msg4-Repetitions]* | 1001 | 9 | | 1010 | Eleventh value of [*mcs-Msg4-Repetitions]* | 1010 | 10 | | 1011 | Twelfth value of [*mcs-Msg4-Repetitions]* | 1011 | 11 | | 1100 | Thirteenth value of [*mcs-Msg4-Repetitions]* | 1100 | 12 | | 1101 | Fourteenth value of [*mcs-Msg4-Repetitions]* | 1101 | 13 | | 1110 | Fifteenth value of [*mcs-Msg4-Repetitions]* | 1110 | 14 | | 1111 | Sixteenth value of [*mcs-Msg4-Repetitions]* | 1111 | 15 | |

## Summary of companies’ contributions

Nokia observed that the decision to use the MSB of the MCS index indication has a logical conflict with the TBS determination for HARQ retransmissions. And propose modifying the RAN1#121agreement so that TBS indication from previous PDSCH transmissions can still be reused, enabling HARQ operation for dynamic PDSCH allocations related to Msg4 retransmissions.

DCM observed that it has been specified in the latest spec that the 4 bits indicate one from 0 to 15 in MCS table 1, which means that MCS with “reserved” target code rate is not available anymore.

## Initial proposals

Based on the above discussion the following initial proposal is made

### Proposal 7-1

**Proposal 7-1-v0**

**Companies are invited to comment on the two following TPs:**

**Draft TP#4-1 for TS 38.214:**

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| * **Reason for change:** Current implementation of activation indication for PDSCH repetitions for Msg4 is colliding with TBS indication for HARQ operation for Msg4. * **Summary of change:** Modifying the RAN1#121 agreement so that TBS indication from previous PDSCH transmissions can still be reused * **Consequence if not approved:** Scheduling of retransmissions for PDSCH carrying Msg4 may not be possible if the physical resources for retransmissions are changed compared to earlier transmissions. |
| 5.1.3.1 Modulation order and target code rate determination < Unchanged text omitted >  elseif the UE is configured with the higher layer parameter *mcs-Table* given by *SPS-Config* or *mcs-Table* of *pdsch-ConfigMulticast* in the same *CFR-ConfigMulticast* set to 'qam64LowSE'  - if the GC-PDSCH is scheduled by a GC-PDCCH with CRC scrambled by G-CS-RNTI or  - if the GC-PDSCH is scheduled without corresponding GC-PDCCH transmission using *SPS-Config*,  - the UE shall use *IMCS* and Table 5.1.3.1-3 to determine the modulation order (*Qm*) and Target code rate (*R*) used in the physical downlink shared channel.  elseif the UE has indicated support for [*pdsch-msg4AggregationFactor*] via Msg3, and the MSB of MCS field of the DCI format is ‘1’, and the value of the MCS Index *IMCS is less than 29,*  - the UE shall assume the MSB of MCS field to be ´0´, and the UE shall use *IMCS* and Table 5.1.3.1-1 to determine the modulation order (*Qm*) and Target code rate (*R*) used in the physical downlink shared channel.  else  - the UE shall use *IMCS* and Table 5.1.3.1-1 to determine the modulation order (*Qm*) and Target code rate (*R*) used in the physical downlink shared channel.  end  < Unchanged text omitted > |

**Draft TP#4-2 for TS 38.214:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5.1.3.1 Modulation order and target code rate determination  **<Unchanged parts omitted>**  elseif the UE has indicated support for [*pdsch-msg4AggregationFactor*] via Msg3, ~~and the MSB of MCS field of the DCI format is ‘1’~~  - the 4 LSBs of the MCS field of DCI format 1\_0 with CRC scrambled by the TC-RNTI provide a codepoint to determine the MCS index *IMCS* according to Table 5.1.3.1-5, based on whether or not the higher layer parameter [*mcs-Msg4-Repetitions*]is configured. ~~the UE shall assume the MSB of MCS field to be ´0´, and the~~ The UE shall use *IMCS* and Table 5.1.3.1-1 to determine the modulation order (*Qm*) and Target code rate (*R*) used in the physical downlink shared channel.  **<Unchanged parts omitted>**  **Table 5.1.3.1-5: MCS index *IMCS* as a function of 4 LSBs of MCS field in DCI format 1\_0 with CRC scrambled by the TC-RNTI**   |  |  |  |  | | --- | --- | --- | --- | | ***[mcs-Msg4-Repetitions] is configured*** | | ***[mcs-Msg4-Repetitions] is not configured*** | | | ***Codepoint*** | ***IMCS*** | **Codepoint** | ***IMCS*** | | 0000 | First value of [*mcs-Msg4-Repetitions]* | 0000 | 0 | | 0001 | Second value of [*mcs-Msg4-Repetitions]* | 0001 | 1 | | 0010 | Third value of [*mcs-Msg4-Repetitions]* | 0010 | 2 | | 0011 | Fourth value of [*mcs-Msg4-Repetitions]* | 0011 | 3 | | 0100 | Fifth value of [*mcs-Msg4-Repetitions]* | 0100 | 4 | | 0101 | Sixth value of [*mcs-Msg4-Repetitions]* | 0101 | 5 | | 0110 | Seventh value of [*mcs-Msg4-Repetitions]* | 0110 | 6 | | 0111 | Eighth value of [*mcs-Msg4-Repetitions]* | 0111 | 7 | | 1000 | Nineth value of [*mcs-Msg4-Repetitions]* | 1000 | 8 | | 1001 | Tenth value of [*mcs-Msg4-Repetitions]* | 1001 | 9 | | 1010 | Eleventh value of [*mcs-Msg4-Repetitions]* | 1010 | 10 | | 1011 | Twelfth value of [*mcs-Msg4-Repetitions]* | 1011 | 11 | | 1100 | Thirteenth value of [*mcs-Msg4-Repetitions]* | 1100 | 12 | | 1101 | Fourteenth value of [*mcs-Msg4-Repetitions]* | 1101 | 13 | | 1110 | Fifteenth value of [*mcs-Msg4-Repetitions]* | 1110 | 14 | | 1111 | Sixteenth value of [*mcs-Msg4-Repetitions]* | 1111 | 15 | |

Companies are encouraged to comment on the two above TPs

|  |  |
| --- | --- |
| **Companies** | **Comments** |
| DCM | At least we would like to hear other companies’ view as we have not discussed how to use the remaining 4 bits. |
| LGE | On the first TP, it may have some chicken-egg problem. Before UE assumes that the MSB of MCS field is 0, it cannot know the value of I\_MCS. So, we cannot add a condition with respect to the value I\_MCS.  On the second TP, the latest version of TS38.214 already assumes that the 4 LSB of MCS field will be used while the MSB of the MCS field will be set to 0. |
| Samsung | For the first proposal, we don’t see any issue in current specification. For the second proposal, it needs more discussion. However, it is understood that current spec can work without the update. |
| vivo | We don’t think either of the TP is needed. Moreover, especially for the 2nd TP, we think this is kind of enhancement, not maintenance. |
| Nokia | Support TP4-1.  If TP4-1 is adopted, the TP4-2 is not needed. Additionally, TP4-2 would still suffer from the problem that is raised (and targeted as part of TP4-1). |
| ZTE | Current specification can work and the TPs are not needed. |
| CATT | Not need this TP. Current specification can work. |

### FL Recommendation

The issue under this section 7 is discussed for the first time, may be companies need to further check the need for such clarification in the specifications.

The issue could be discussed in RAN1#122bis if deemed necessary.

# TP#5 Extension of common PDCCH repetition to TN

## Background

In RAN#108, it was agreed that the common PDCCH repetition is also applicable for TN for FR1.

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| Proposal in RP-251857 (revision of RP-251651) was endorsed for applying common PDCCH repetition for TN for FR1 only.  Note: This proposal is taken as an exception. According to RANP clarification, solutions achieved in items targeting to NTN can’t be adopted by TN by default in WGs. TEI/WI should be proposed for applying such solutions to TN additionally. |

## Companies’ proposals

Companies’ proposals on Issue#1-1 are listed hereafter:

|  |  |
| --- | --- |
| **Companies** | **Proposals** |
| Huawei | -------------------- Start of TP#1 for 38.213 V19.0.0 --------------------  **13 UE procedure for monitoring Type0-PDCCH CSS sets**  \*\*\* Unchanged parts are omitted \*\*\*  - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For a cell in FR1, if the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI.  \*\*\* Unchanged parts are omitted \*\*\*  -------------------- End of TP#1 for 38.213 V19.0.0 -------------------- |
| vivo | TP#1 for TS38.21313 UE procedure for monitoring Type0-PDCCH CSS sets - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For a~~n NTN serving cell~~ UE capable of [PDCCH-repetition-for-Type0-PDCCH-CSS] operating in FR1, if the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI.  \*\*\* Unchanged parts are omitted \*\*\* |
| ZTE | Proposal 1: For applying common PDCCH repetition for TN FR1, the following TP can be adopted in TS 38.213 V19.0.0. **Reason for change**: In RAN#108, it was agreed to apply common PDCCH repetition for TN for FR1 only.  **Summary of change:** Update the condition for common PDCCH repetition, i.e., remove “NTN” in “For an NTN cell in FR1”.  **Consequences if not approved:** Common PDCCH repetition in TN FR1 is not supported.  **13 UE procedure for monitoring Type0-PDCCH CSS sets**  \*\*\* Unchanged parts are omitted \*\*\*  - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For a~~n NTN~~ cell in FR1, if the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI.  \*\*\* Unchanged parts are omitted \*\*\*  ***Proposal 1:*** *For applying common PDCCH repetition for TN FR1, the following TP can be adopted in TS 38.213 V19.0.0.*   |  |  | | --- | --- | |  |  | | ***Reason for change:*** | In RAN#108, it was agreed to apply common PDCCH repetition for TN for FR1 only. | |  |  | | ***Summary of change:*** | Update the condition for common PDCCH repetition, i.e., remove “NTN” in “For an NTN cell in FR1”. | |  |  | | ***Consequences if not approved:*** | Common PDCCH repetition in TN FR1 is not supported. | | 13 UE procedure for monitoring Type0-PDCCH CSS sets \*\*\* Unchanged parts are omitted \*\*\*  For operation without shared spectrum channel access and for the SS/PBCH block and CORESET multiplexing pattern 1, a UE monitors PDCCH in the Type0-PDCCH CSS set over two slots. For SS/PBCH block with index , the UE determines an index of slot as that is in a frame with system frame number (SFN) satisfying if , or in a frame with SFN satisfying if where based on the SCS for PDCCH receptions in the CORESET [4, TS 38.211].  - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For a~~n NTN~~ cell in FR1, if the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI.  \*\*\* Unchanged parts are omitted \*\*\* | | |  |  |   ***Proposal 2:*** *The enabling/disabling of PDCCH CSS except Type0 and Type3 can be indicated together with enabling/disabling of Type-0 CSS PDCCH repetition, i.e., via PBCH payload bit .*  ***Proposal 3:*** *For repetition of PDCCH CSS except Type0 and Type3, the following TP can be adopted in TS 38.213 V19.0.0.*   |  |  | | --- | --- | |  |  | | ***Reason for change:*** | Introduction of repetition for PDCCH CSS except type0 and type3. | |  |  | | ***Summary of change:*** | Introduction of repetition for PDCCH CSS except type0 and type3. | |  |  | | ***Consequences if not approved:*** | No support of repetition for PDCCH CSS except type0 and type3. | | UE procedure for receiving control information\*\*\* Unchanged parts are omitted \*\*\*10.1 UE procedure for determining physical downlink control channel assignment \*\*\* Unchanged parts are omitted \*\*\*  For search space sets and that include *searchSpaceLinkingId* with same value, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , and a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, for search space sets and . For CORESET associated with the search space set and for CORESET associated with the search space set , the UE is provided *tci-PresentInDCI* or tci-PresentDCI-1-2 for either none or both of CORESETs and . For CORESET associated with the search space set and for CORESET associated with the search space set , the UE is either not provided coresetPoolIndex value of 1 for any of the two CORESETs, or is provided coresetPoolIndex value of 1 for both CORESETs.  A UE can indicate by *numBD-twoPDCCH-r17* a capability for counting PDCCH candidates and either as 2 PDCCH candidates or as 3 PDCCH candidates.  For a cell in FR1 and for common search space sets and that the starting symbol of monitoring occasion of the is located right after the ending symbol of monitoring occasion of the , if the PBCH payload bit has value 1, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , and a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, for search space sets and .  A UE can indicate by *numBD-twoPDCCH-r19* a capability for counting PDCCH candidates and either as 1 PDCCH candidate or as 2 PDCCH candidates.  \*\*\* Unchanged parts are omitted \*\*\* | |   ***Proposal 4:*** *For BD counting for Type0 CSS repetition, the following TP can be adopted in TS 38.213 V19.0.0.*   |  |  | | --- | --- | |  |  | | ***Reason for change:*** | Introduction of BD counting for type0 CSS repetition. | |  |  | | ***Summary of change:*** | Introduction of BD counting for type0 CSS repetition. | |  |  | | ***Consequences if not approved:*** | The BD counting for type0 CSS repetition is unclear. | | 13 UE procedure for monitoring Type0-PDCCH CSS sets \*\*\* Unchanged parts are omitted \*\*\*  For operation without shared spectrum channel access and for the SS/PBCH block and CORESET multiplexing pattern 1, a UE monitors PDCCH in the Type0-PDCCH CSS set over two slots. For SS/PBCH block with index , the UE determines an index of slot as that is in a frame with system frame number (SFN) satisfying if , or in a frame with SFN satisfying if where based on the SCS for PDCCH receptions in the CORESET [4, TS 38.211].  - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For an NTN cell in FR1, if the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI. For a cell in FR1, if the PBCH payload bit has value 1, the UE counts the PDCCH candidate as one PDCCH candidate for the slots , and the UE counts the PDCCH candidate as two PDCCH candidates for the slots , in which one PDCCH candidate is for Type-0 CSS PDCCH repetition with SI-RNTI and the other one PDCCH candidate is for other PDCCH, if the UE is in RRC\_CONNECTED.  \*\*\* Unchanged parts are omitted \*\*\* | | |
| OPPO | Proposal 2: For PDCCH repetition for Type0-PDCCH CSS of searchSpaceZero configured within MIB pdcch-ConfigSIB1, adopt the draft CR in [R1-2506049] in AI 8.14.  * Reason for change   It is not specified how to count BD for Type0-PDCCH repetition, and it is not captured that common PDCCH repetition introduced in Rel-19 NR NTN WI is also applicable for TN for FR1 only.   * Summary of change   It is specified that 1 BD is counted in slot and 2 BDs are counted in slot for Type0-PDCCH repetition. In addition, it is captured that Type0-PDCCH repetition introduced in Rel-19 NR NTN WI is also applicable for TN for FR1 only   * Consequences if not approved   It is not clear how to count BD for Type0-PDCCH repetition, and Type0-PDCCH repetition is not supported in TN for FR1.  **13 UE procedure for monitoring Type0-PDCCH CSS sets**  \*\*\* Unchanged parts are omitted \*\*\*  For operation without shared spectrum channel access and for the SS/PBCH block and CORESET multiplexing pattern 1, a UE monitors PDCCH in the Type0-PDCCH CSS set over two slots. For SS/PBCH block with index , the UE determines an index of slot as that is in a frame with system frame number (SFN) satisfying if , or in a frame with SFN satisfying if where based on the SCS for PDCCH receptions in the CORESET [4, TS 38.211].  - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. ~~For an NTN cell in FR1, i~~ If the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI, and the UE counts PDCCH candidates as 1 PDCCH candidate in slot and 2 PDCCH candidates in slot .  \*\*\* Unchanged parts are omitted \*\*\*  Draft CR R1-2506049:  **Reason for change:** 1. For intra-slot PDCCH repetition for CSS other than Type0-CSS and Type3-CSS, the intra-slot PDCCH repetition related agreements made in R19 NR-NTN are not captured in the specification.  2. For inter-slot Type0-PDCCH repetition, it is not specified how to count BD in slot n\_0 and n\_0+1, and it is not captured that common PDCCH repetition introduced in Rel-19 NR NTN WI is also applicable for TN for FR1 only.  **Summary of change:**1. Capture the agreements on the intra-slot PDCCH repetition for PDCCH CSS other than Type0-CSS and Type3 CSS into the specification  2. It is specified that 1 BD is counted in slot n\_0 and 2 BDs are counted in slot n\_0+1 for Type0-PDCCH repetition. In addition, it is captured that Type0-PDCCH repetition introduced in Rel-19 NR NTN WI is also applicable for TN for FR1 only.  **Consequences if not approved:**1. The intra-slot PDCCH repetition for PDCCH CSS other than Type0-CSS and Type3 CSS is not supported.  2. It is not clear how to count BD for Type0-PDCCH repetition, and Type0-PDCCH repetition is not supported in TN for FR1.   * 1. UE procedure for determining physical downlink control channel assignment   \*\*\* Unchanged parts are omitted \*\*\*  For search space sets and that include *searchSpaceLinkingId* with same value, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , and a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, for search space sets and . For CORESET associated with the search space set and for CORESET associated with the search space set , the UE is provided *tci-PresentInDCI* or tci-PresentDCI-1-2 for either none or both of CORESETs and . For CORESET associated with the search space set and for CORESET associated with the search space set , the UE is either not provided coresetPoolIndex value of 1 for any of the two CORESETs, or is provided coresetPoolIndex value of 1 for both CORESETs.  A UE can indicate by *numBD-twoPDCCH* a capability for counting PDCCH candidates and either as 2 PDCCH candidates or as 3 PDCCH candidates.  For search space sets and that include *searchSpaceLinkingId* with same value, and for search space sets and that include *searchSpaceLinkingId* with same value, a UE expects to simultaneously monitor PDCCH candidates , and = only if a first CCE of or has different index than a first CCE of or in a CORESET configured with *cce-REG-MappingType* = ‘*nonInterleaved*’ and with duration of one symbol.  For search space sets and that include [*searchSpaceLinkingId-r19*] with same value, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, and the starting symbol of monitoring occasion corresponding to is located right after the ending symbol of monitoring occasion corresponding to , for search space sets and .  A UE can indicate by [*numBD-twoPDCCH-r19*] a capability for counting PDCCH candidates and either as 1 PDCCH candidate or as 2 PDCCH candidates.  \*\*\* Unchanged parts are omitted \*\*\*  13 UE procedure for monitoring Type0-PDCCH CSS sets  \*\*\* Unchanged parts are omitted \*\*\*  For operation without shared spectrum channel access and for the SS/PBCH block and CORESET multiplexing pattern 1, a UE monitors PDCCH in the Type0-PDCCH CSS set over two slots. For SS/PBCH block with index , the UE determines an index of slot as that is in a frame with system frame number (SFN) satisfying if , or in a frame with SFN satisfying if where based on the SCS for PDCCH receptions in the CORESET [4, TS 38.211].  - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. ~~For an NTN cell in FR1, i~~ If the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI, and the UE counts PDCCH candidates as 1 PDCCH candidate in slot and 2 PDCCH candidates in slot .  \*\*\* Unchanged parts are omitted \*\*\* |
| Spreadtrum | Proposal 1. Clarify SIB1 PDSCH is not supportive in TN if PDCCH repetition in Type0 PDCCH CSS is introduced in TN. **TP#1 for indication in PBCH payload:**  - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For a~~n NTN~~ cell in FR1, if the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI.  **TP#2 for the number of blind decoding**:  - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For an NTN cell in FR1, if the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI. A UE counts the PDCCH candidate as one PDCCH candidate in slot , two PDCCH candidates in slot .  **TP#3 for linkage of two search spaces**:  For a~~n NTN~~ serving cell in FR1 and for search space sets and that include searchSpaceLinkingId-r19 with same value, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , and a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding monitoringSymbolsWithinSlot, for search space sets and .  A UE can indicate by numBD-twoPDCCH-r19 a capability for counting PDCCH candidates and either as 1 PDCCH candidate or as 2 PDCCH candidates. |

## Summary of companies’ contributions

## Initial proposal

### Proposal 8-1

**Proposal 8-1-v0**

Adopt the following TP for TS 38.213

|  |
| --- |
| **Reason for change**: In RAN#108, it was agreed to apply common PDCCH repetition for TN for FR1.  **Summary of change:** Type0-PDCCH repetition introduced in Rel-19 NR NTN WI is also applicable for TN for FR1 only, “NTN” in “For an NTN cell in FR1” is removed.  **Consequence if not approved:** Extension of common PDCCH repetition to TN is not captured in the specifications. |

|  |
| --- |
| **13 UE procedure for monitoring Type0-PDCCH CSS sets**  \*\*\* Unchanged parts are omitted \*\*\*  - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For a~~n NTN~~ cell in FR1, if the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI.  \*\*\* Unchanged parts are omitted \*\*\* |

Companies are encouraged to share views on Proposal 8-1-v0

|  |  |
| --- | --- |
| **Companies** | **Comments** |
| vivo | Simply remove the NTN may cause the confusion that *every* UE should assume PDCCH is repeated in *every* FR1 cell, which is incorrect. Thus, we believe our TP is better, i.e., by directly linking the UE feature of inter-slot PDCCH repetition.  For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For a~~n NTN serving cell~~ UE capable of [PDCCH-repetition-for-Type0-PDCCH-CSS] or [TEI- PDCCH-repetition-for-Type0-PDCCH-CSS] operating in FR1, if the PBCH payload bit has value 1, the UE assumes that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI. |
| OPPO | Support. |
| Nokia | OK and support the text proposal in general. However, we do expect all UE and chipset manufacturers to understand the implications from this (any pre-Rel-19 UE may not make any assumptions on a\_{A+7}). This may happen with Rel-19 based networks and legacy devices.  Regarding Vivo’s comment on the addition of UE capability will not address the aspect of backwards compatibility. |
| ZTE | Fine with the proposal. |
| Panasonic | OK |
| CATT | Support |
| NEC | Support |
| Huawei, HiSilicon | OK. Support it for TEI. |

# Offline on Wednesday

## TP for TS 38.213: Msg4 PDSCH repetition

### Proposal 6-1

**Proposal 6-1-v1**

**Adopt the following TP for TS 38.213**

|  |
| --- |
| * **Reason for change:** The description of Msg4 PDSCH repetition is duplicated between TS38.213 and TS38.214. Since PDSCH repetition behavior is concerned, the description in TS38.214 is the correct place. * **Summary of change:** Remove the duplicate text from 38.213 to avoid operation being described multiple places. * **Consequence if not approved:** Unnecessary duplicated text in different RAN1 specifications. |
| --------------------------------------- Begin of text proposal for TS38.213 ---------------------------------------  8.4 PDSCH with UE contention resolution identity  In response to a PUSCH transmission scheduled by a RAR UL grant or corresponding PUSCH retransmission scheduled by a DCI format 0\_0 with CRC scrambled by a TC-RNTI provided in the corresponding RAR message when a UE has not been provided a C-RNTI, the UE attempts to detect a DCI format 1\_0 with CRC scrambled by a corresponding TC-RNTI scheduling a PDSCH that includes a UE contention resolution identity [11, TS 38.321]. If *SIB1* provides *msg4-NumberofRepetitions*, the UE may indicate FG-XYZ in the PUSCH transmission~~. If the UE provides FG-XYZ and the MSB value of the MCS field in the DCI format 1\_0 is 1, the UE assumes the PDSCH reception is with~~ *~~msg4-NumberofRepetitions~~*~~.~~  --------------------------------------- End of text proposal for TS38.213 --------------------------------------- |

## TP Extension of common PDCCH repetition to TN

### Proposal 8-1

**Proposal 8-1-v0**

Adopt the following TP for TS 38.213

|  |
| --- |
| **Reason for change**: In RAN#108, it was agreed to apply common PDCCH repetition for TN for FR1.  **Summary of change:** Type0-PDCCH repetition introduced in Rel-19 NR NTN WI is also applicable for TN for FR1 only, “NTN” in “For an NTN cell in FR1” is removed.  **Consequence if not approved:** Extension of common PDCCH repetition to TN is not captured in the specifications. |

|  |
| --- |
| **13 UE procedure for monitoring Type0-PDCCH CSS sets**  \*\*\* Unchanged parts are omitted \*\*\*  - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For a~~n NTN~~ cell in FR1, if the PBCH payload bit has value 1, the UE ~~capable of [PDCCH-repetition-for-Type0-PDCCH-CSS] or [TEI- PDCCH-repetition-for-Type0-PDCCH-CSS]~~ assumes ~~subject to UE capability~~ that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI.  \*\*\* Unchanged parts are omitted \*\*\* |

## BD counting in Type0-PDCCH CSS Inter-slot repetition

### Proposal 1-1

**Proposal 1-1-v1**

|  |
| --- |
| Confirm the working assumption made in RAN1#121 with the following revision.  Working assumption  Inter-slot Type-0 CSS PDCCH repetition is only applicable to the SI-RNTI, and the following rule for BD counting is defined:   * 1 BD in first slot. * 2 BD in the second slot. ~~: 2 BD~~ ~~in RRC connected mod.~~   Note: One BD for Type-0 CSS PDCCH repetition ~~with SI-RNTI~~ and one BD for PDCCH without repetition ~~other PDCCH Type-0.~~ |

## TP for TS 38.213: BD counting in Type0-PDCCH CSS Inter-slot repetition

### Proposal 4-1

**Proposal 4-1-v1**

**Adopt the following TP for TS 38.213**

|  |
| --- |
| * **Reason for change:** Specify BD counting for inter-slot Type0 CSS repetition. * **Summary of change:** For inter-slot PDCCH repetition for CSS type 0, 1 BD is counted for slot n0 and 2 BDs are counted for slot n0+1. * **Consequence if not approved:** The BD counting for type0 CSS repetition is not clearly defined. |
| **10.1 UE procedure for determining physical downlink control channel assignment**  \*\*\* Unchanged parts are omitted \*\*\*  If a UE  - is provided *monitoringCapabilityConfig* = *r16monitoringcapability* for a downlink cell,  - is provided, by *searchSpaceLinkingId* a same value for search space sets and on the downlink cell, and  - indicates *numBD-twoPDCCH-r17* with value of 3  the UE counts each PDCCH candidate for the one of the search space sets and that the UE monitors PDCCH in the later span, as two PDCCH candidates. The UE does not expect a first PDCCH candidate from search space set or and a second PDCCH candidate from a search space set that does not include *searchSpaceLinkingId* to use a same set of CCEs and same scrambling in a same CORESET, and provide respective first and second DCI formats with same size, in any span other than the first span in a slot.  If a UE is provided  - a C-RNTI, an MCS-C-RNTI, or a CS-RNTI, and  - the PBCH payload bit with value of 1,  the UE counts each PDCCH candidate for the Type0-PDCCH CSS set that the UE monitors PDCCH in the later slot, as two PDCCH candidates.  A UE does not expect to be provided *freqMonitorLocations* for a search space set in a serving cell if *intraCellGuardBandsDL-List* indicates that no intra-cell guard-bands are configured for the serving cell.  \*\*\* Unchanged parts are omitted \*\*\*  -------------------- End of TP#1 for 38.213 -------------------- |

## Msg4 PDSCH repetition

### Proposal 2-1

**Proposal 2-1-v1**

**Adopt one of the following WFs**

**WF1**

**Conclusion**

**RAN1 does not consider specifying additional condition(s) for the UE to report its capability/request for the support of repetitions for PDSCH with MSG4.**

**WF2**

**Update specification text to also have Msg 3 PUSCH retransmission carry indication of support for msg4-NumberofRepetitions.**

**WF3**

A RSRP threshold is configured via SIB

* If the measured RSRP is less than the RSRP threshold, the UE reports its capability/request and 1 MSB in MCS field in DCI 1\_0 is re-interpreted for activation/deactivation of Msg4 PDSCH repetition.
* Otherwise, the UE detects DCI 1\_0 scheduling Msg4 PDSCH as legacy.

# TP for TS 38.214: SIB1 PDSCH repetition

### Proposal 5-1

**Proposal 5-1-v0**

Adopt the following TP for TS 38.214

|  |
| --- |
| * **Reason for change:** The indication of SIB1 PDSCH repetition is associated with the Type0 CSS PDCCH repetition, but the feature of SIB1 PDSCH repetition is not agreed to be extended to TN. * **Summary of change:** Consider only UEs with NTN SIB1 PDSCH repetition capability. * **Consequence if not approved:** The SIB1 PDSCH repetition not clearly defined. |
| **5.1 UE procedure for receiving the physical downlink shared channel**  \*\*\* Unchanged parts are omitted \*\*\*  A UE capable of ~~PDSCH repetitions for broadcast channels and~~ NTN-SIB1-PDSCH-repetition, which assumed the DCI format 1\_0 in the Type0 PDCCH CSS of searchSpaceZero transmitted with two inter-slot repetitions may assume that PDSCHs scheduled by the DCI format 1\_0 have also been transmitted with inter-slot repetitions in the same slots as the Type0 PDCCH CSS, with the same RV as indicated by the DCI format 1\_0.  \*\*\* Unchanged parts are omitted \*\*\* |

# Proposals for online on Wednesday

## TP for TS 38.213: Msg4 PDSCH repetition

### Proposal 6-1

**Proposal 6-1-v1**

Adopt the following TP for TS 38.213

|  |
| --- |
| * **Reason for change:** The description of Msg4 PDSCH repetition is duplicated between TS38.213 and TS38.214. Since PDSCH repetition behavior is concerned, the description in TS38.214 is the correct place. * **Summary of change:** Remove the duplicate text from 38.213 to avoid operation being described multiple places. * **Consequence if not approved:** Unnecessary duplicated text in different RAN1 specifications. |
| --------------------------------------- Begin of text proposal for TS38.213 ---------------------------------------  8.4 PDSCH with UE contention resolution identity  In response to a PUSCH transmission scheduled by a RAR UL grant or corresponding PUSCH retransmission scheduled by a DCI format 0\_0 with CRC scrambled by a TC-RNTI provided in the corresponding RAR message when a UE has not been provided a C-RNTI, the UE attempts to detect a DCI format 1\_0 with CRC scrambled by a corresponding TC-RNTI scheduling a PDSCH that includes a UE contention resolution identity [11, TS 38.321]. If *SIB1* provides *msg4-NumberofRepetitions*, the UE may indicate FG-XYZ in the PUSCH transmission~~. If the UE provides FG-XYZ and the MSB value of the MCS field in the DCI format 1\_0 is 1, the UE assumes the PDSCH reception is with~~ *~~msg4-NumberofRepetitions~~*~~.~~  --------------------------------------- End of text proposal for TS38.213 --------------------------------------- |

## TP Extension of common PDCCH repetition to TN

### Proposal 8-1

**Proposal 8-1-v0**

Adopt the following TP for TS 38.213

|  |
| --- |
| **Reason for change**: In RAN#108, it was agreed to apply common PDCCH repetition for TN for FR1.  **Summary of change:** Type0-PDCCH repetition introduced in Rel-19 NR NTN WI is also applicable for TN for FR1 only, “NTN” in “For an NTN cell in FR1” is removed.  **Consequence if not approved:** Extension of common PDCCH repetition to TN is not captured in the specifications. |

|  |
| --- |
| **13 UE procedure for monitoring Type0-PDCCH CSS sets**  \*\*\* Unchanged parts are omitted \*\*\*  - For and for a SS/PBCH block index , the two slots including the associated Type0-PDCCH monitoring occasions are slots and . , , and the index of the first symbol of the CORESET in slots and are provided by Table 13-11 and Table 13-12. For a~~n NTN~~ cell in FR1, if the PBCH payload bit has value 1, the UE ~~capable of [PDCCH-repetition-for-Type0-PDCCH-CSS] or [TEI- PDCCH-repetition-for-Type0-PDCCH-CSS]~~ assumes ~~subject to UE capability~~ that a same PDCCH candidate for a CCE aggregation level in slots and provides same information for DCI format 1\_0 with CRC scrambled by the SI-RNTI.  \*\*\* Unchanged parts are omitted \*\*\* |

## BD counting in Type0-PDCCH CSS Inter-slot repetition

### Proposal 1-1

**Proposal 1-1-v1**

Confirm the working assumption made in RAN1#121 with the following revision.

Working assumption

Inter-slot Type-0 CSS PDCCH repetition is only applicable to the SI-RNTI, and the following rule for BD counting is defined:

* 1 BD in first slot.
* 2 BD in the second slot. ~~: 2 BD~~ ~~in RRC connected mod.~~

Note: One BD for Type-0 CSS PDCCH repetition ~~with SI-RNTI~~ and one BD for PDCCH without repetition ~~other PDCCH Type-0.~~

## TP for TS 38.213: BD counting in Type0-PDCCH CSS Inter-slot repetition

### Proposal 4-1

**Proposal 4-1-v1**

Adopt the following TP for TS 38.213

|  |
| --- |
| * **Reason for change:** Specify BD counting for inter-slot Type0 CSS repetition. * **Summary of change:** For inter-slot PDCCH repetition for CSS type 0, 1 BD is counted for slot n0 and 2 BDs are counted for slot n0+1. * **Consequence if not approved:** The BD counting for type0 CSS repetition is not clearly defined. |
| **10.1 UE procedure for determining physical downlink control channel assignment**  \*\*\* Unchanged parts are omitted \*\*\*  If a UE  - is provided *monitoringCapabilityConfig* = *r16monitoringcapability* for a downlink cell,  - is provided, by *searchSpaceLinkingId* a same value for search space sets and on the downlink cell, and  - indicates *numBD-twoPDCCH-r17* with value of 3  the UE counts each PDCCH candidate for the one of the search space sets and that the UE monitors PDCCH in the later span, as two PDCCH candidates. The UE does not expect a first PDCCH candidate from search space set or and a second PDCCH candidate from a search space set that does not include *searchSpaceLinkingId* to use a same set of CCEs and same scrambling in a same CORESET, and provide respective first and second DCI formats with same size, in any span other than the first span in a slot.  If a UE is provided  - a C-RNTI, an MCS-C-RNTI, or a CS-RNTI, and  - the PBCH payload bit with value of 1,  the UE counts each PDCCH candidate for the Type0-PDCCH CSS set that the UE monitors PDCCH in the later slot, as two PDCCH candidates.  A UE does not expect to be provided *freqMonitorLocations* for a search space set in a serving cell if *intraCellGuardBandsDL-List* indicates that no intra-cell guard-bands are configured for the serving cell.  \*\*\* Unchanged parts are omitted \*\*\*  -------------------- End of TP for 38.213 -------------------- |

## Msg4 PDSCH repetition

### Proposal 2-1

**Proposal 2-1-v1**

**Conclusion**

RAN1 does not consider specifying additional condition(s) for the UE to report its capability/request for the support of repetitions for PDSCH with MSG4.

## TP for TS 38.214: SIB1 PDSCH repetition

### Proposal 5-1

**Proposal 5-1-v0**

Adopt the following TP for TS 38.214

|  |
| --- |
| * **Reason for change:** The indication of SIB1 PDSCH repetition is associated with the Type0 CSS PDCCH repetition, but the feature of SIB1 PDSCH repetition is not agreed to be extended to TN. * **Summary of change:** Consider only UEs with NTN SIB1 PDSCH repetition capability. * **Consequence if not approved:** The SIB1 PDSCH repetition not clearly defined. |
| **5.1 UE procedure for receiving the physical downlink shared channel**  \*\*\* Unchanged parts are omitted \*\*\*  A UE capable of ~~PDSCH repetitions for broadcast channels and~~ NTN-SIB1-PDSCH-repetition, which assumed the DCI format 1\_0 in the Type0 PDCCH CSS of searchSpaceZero transmitted with two inter-slot repetitions may assume that PDSCHs scheduled by the DCI format 1\_0 have also been transmitted with inter-slot repetitions in the same slots as the Type0 PDCCH CSS, with the same RV as indicated by the DCI format 1\_0.  \*\*\* Unchanged parts are omitted \*\*\* |

## Intra slot PDCCH repetition

### Proposal 3-1

**Proposal 3-1-v0**

RAN1 to update the following agreement to clarify search space linking and send LS to RAN2 to capture it in TS 38.331.

**Agreement**

For PDCCH CSS other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero, support intra-slot repetition based on the same mechanism for SS linking specified in Release 17:

* The starting symbol of monitoring occasion of the second SS is located right after the ending symbol of monitoring occasion of the first SS.
* BD is counted as one or two, subject to UE capability, in RRC connected mode
  + UE assumes that a DCI Format with the same content is repeated on two PDCCH candidates.
  + Note: From RAN1 perspective UE is expected to deliver performance no worse than soft combining
* PDCCH repetition is applicable to RNTI of the CSS.
* Repeated PDCCH candidates within the same CORESET repeated in the slot, and share the same aggregation level (AL), coded bits and same candidate index.

Up to editor how to capture this in writing the relevant RAN1 specification.

### Proposal 3-2

**Proposal 3-2-v0**

The following parameter description is included in the LS to RAN2

|  |
| --- |
| **SearchSpaceLinkingId*-r19***  This parameter is used to link two search spaces of same type in the same BWP. If two search spaces have the same SearchSpaceLinkingId UE assumes these search spaces are linked to PDCCH repetition REF. When PDCCH repetition is monitored in two linked search space (SS) sets, the UE does not expect a third monitored SS set to be linked with any of the two linked SS sets. The two linked SS sets have the same CSS set type other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero. The two linked SS sets have the same DCI formats to monitor. For intra-slot PDCCH repetition: The two SS sets should have the same periodicity and offset (monitoringSlotPeriodicityAndOffset), and the same duration. The starting symbol of monitoring occasion of the second SS is located right after the ending symbol of monitoring occasion of the first SS. For linking monitoring occasions across the two SS sets that exist in the same slot: The two SS sets have the same number of monitoring occasions within a slot and n-th monitoring occasion of one SS set is linked to n-th monitoring occasion of the other SS set. |

# Proposals for Friday online

## Intra slot PDCCH repetition

**Companies are encouraged to comment on** TP#1 and TP#2:

**Proposal 3-3**

TP#1 on Intra slot PDCCH repetition

|  |
| --- |
| * **Reason for change:** Specify intra-slot PDCCH repetition for PDCCH CSS other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero. * **Summary of change:** Specify an implicit linkage of two SS for intra-slot PDCCH repetition. That is, the starting symbol of monitoring occasion of the second SS is located right after the ending symbol of monitoring occasion of the first SS. * **Consequence if not approved:** Intra-slot PDCCH repetition for PDCCH CSS other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero is not clearly defined. |
| **10.1 UE procedure for determining physical downlink control channel assignment**  \*\*\* Unchanged parts are omitted \*\*\*  For a cell in FR1 and for common search space sets and that the starting symbol of monitoring occasion of the is located right after the ending symbol of monitoring occasion of the , if the PBCH payload bit has value 1, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , and a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, for search space sets and .  A UE can indicate by *numBD-twoPDCCH-r19* a capability for counting PDCCH candidates and either as 1 PDCCH candidate or as 2 PDCCH candidates.  \*\*\* Unchanged parts are omitted \*\*\* |

TP#2 on Intra slot PDCCH repetition

|  |
| --- |
| * **Reason for change:** Specify intra-slot PDCCH repetition for PDCCH CSS other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero. * **Summary of change:** Specify an explicit linkage of two SS for intra-slot PDCCH repetition. That is, anew parameter is introduced for SS linkage. * **Consequence if not approved:** Intra-slot PDCCH repetition for PDCCH CSS other than Type-0 CSS and other than Type-3 CSS for common search spaces other than SearchSpaceZero is not clearly defined. |
| **10.1 UE procedure for determining physical downlink control channel assignment**  \*\*\* Unchanged parts are omitted \*\*\*  For an NTN serving cell in FR1 and for search space sets and that include *searchSpaceLinkingId-r19* with same value, a UE monitors, in monitoring occasions with same index according to each of search space sets and in a slot, PDCCH candidates and , with , for detection of a DCI format with same information. The UE expects , , , and a same number of non-overlapping PDCCH monitoring occasions per slot based on corresponding *monitoringSymbolsWithinSlot*, for search space sets and .  A UE can indicate by numBD-twoPDCCH-r19 a capability for counting PDCCH candidates and either as 1 PDCCH candidate or as 2 PDCCH candidates.  \*\*\* Unchanged parts are omitted \*\*\* |

Companies are encouraged to comment on the above two TPs:

|  |  |
| --- | --- |
| **Companies** | **Comments** |
|  |  |

## TP for TS 38.213: BD counting in Type0-PDCCH CSS Inter-slot repetition

**Proposal 4-1-v1**

Adopt the following TP for TS 38.213

|  |
| --- |
| * **Reason for change:** Specify BD counting for inter-slot Type0 CSS repetition. * **Summary of change:** For inter-slot PDCCH repetition for CSS type 0, 1 BD is counted for slot n0 and 2 BDs are counted for slot n0+1. * **Consequence if not approved:** The BD counting for type0 CSS repetition is not clearly defined. |
| **10.1 UE procedure for determining physical downlink control channel assignment**  \*\*\* Unchanged parts are omitted \*\*\*  If a UE  - is provided *monitoringCapabilityConfig* = *r16monitoringcapability* for a downlink cell,  - is provided, by *searchSpaceLinkingId* a same value for search space sets and on the downlink cell, and  - indicates *numBD-twoPDCCH-r17* with value of 3  the UE counts each PDCCH candidate for the one of the search space sets and that the UE monitors PDCCH in the later span, as two PDCCH candidates. The UE does not expect a first PDCCH candidate from search space set or and a second PDCCH candidate from a search space set that does not include *searchSpaceLinkingId* to use a same set of CCEs and same scrambling in a same CORESET, and provide respective first and second DCI formats with same size, in any span other than the first span in a slot.  If a UE is provided the PBCH payload bit with value of 1, the UE counts each PDCCH candidate for the Type0-PDCCH CSS set that the UE monitors PDCCH in the later slot, as two PDCCH candidates.  A UE does not expect to be provided *freqMonitorLocations* for a search space set in a serving cell if *intraCellGuardBandsDL-List* indicates that no intra-cell guard-bands are configured for the serving cell.  \*\*\* Unchanged parts are omitted \*\*\*  -------------------- End of TP for 38.213 -------------------- |

Companies are encouraged to comment on the above TP:

|  |  |
| --- | --- |
| **Companies** | **Comments** |
|  |  |

# Conclusion

# References

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