**3GPP TSG RAN WG1 Meeting #116 R1-** **2401502**

**Athens, Greece, February 26th – March 1st, 2024**

**Source: Moderator (Intel Corporation)**

**Title: Summary #1 of discussion for Rel-18 NES enhancements on cell DTX/DRX mechanism**

**Agenda item: 8.4**

**Document for: Discussion**

# Introduction

In this contribution, moderator summarizes issues identified by the submitted maintanence contributions for RAN1 #116 agenda 8.4 regarding cell DTX/DRX operations.

# Suggested proposals for agreement/conclusion

This section will be completed by the moderator after offline discussions.

# Status summary of Proposal/TPs

Moderator will provide update of all proposals and text proposals made and discussion status in the following table.

|  |  |  |
| --- | --- | --- |
| Proposal/TP | Status | Moderator Notes |
| TP #1-1 | discuss |  |
| TP #1-2 | discuss |  |
| TP #1-3 | discuss |  |
| TP #1-4 | discuss |  |
| TP #1-5 | discuss |  |
| TP #1-6 | discuss |  |
| TP #1-7 | discuss |  |
| TP #1-8 | discuss | Needs cover page information. |
| TP #2-1 | discuss |  |
| TP #2-2 | discuss |  |
| TP #3-1 | discuss |  |
| Proposal #4-1 | discuss | TP for proposal needed. |
| Proposal #5-1 | discuss | Lower priority |
| Proposal #6-1 | discuss | Lower priority |
| TP #7-1 | discuss |  |
| TP #8-1 | discuss |  |
| TP #9-1 | discuss |  |
| TP #10-1 | discuss |  |
| TP #10-2 | discuss |  |
| TP #10-3 | discuss |  |
| TP #10-4 | discuss |  |
| Proposal #11-1 | discuss | TP for proposal needed. |
| TP #12-1 | discuss |  |
| TP #13-1 | Suggest for agreement |  |
| Proposal #15-1 | discuss |  |

# Summary of issues

## 4.1 UCI multiplexing and dropping during cell DRX

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [1] Huawei | * If a UE would transmit multiple overlapping PUCCHs in a slot or overlapping PUCCH(s) and PUSCH(s) in a slot, while the slot is in the non-active periods of cell DRX on the respective serving cell,   + - if all of the UCI types associated with PUCCH(s) are impacted by cell DRX,       * the UE drops all the corresponding PUCCH transmission(s)     - if all of the PUSCH(s) are impacted by cell DRX,       * the UE drops all the corresponding PUCCH(s) and PUSCH transmission(s);     - otherwise,       * the UE expects to multiplex all corresponding PUCCH(s) or all corresponding PUCCH(s) and PUSCH(s) as described in clauses 9.2.5.1 to 9.2.5.4.   **Summary of change:**  Clarify that during the non-active periods of cell DRX, if all the overlapping signals or channels that are impacted by cell DRX then drop them all, otherwise report them all.  **Consequence if not approved:**  The UL signal or channels that are not impacted by cell DRX will be dropped if they are multiplexed with other UL signal or channels that are impacted by cell DRX.  ***Proposal 3: For UL multiplexing during Cell DRX operation, adopt the TP3 for clause 9.2.5 of TS 38.213.***  ---------------------------- Start of Text Proposal 3 for TS 38.213 -----------------------------  < Unchanged parts are omitted >  9.2.5 UE procedure for reporting multiple UCI types  < Unchanged parts are omitted >  If a UE would transmit multiple overlapping PUCCHs in a slot or overlapping PUCCH(s) and PUSCH(s) in a slot, one of the PUCCHs includes HARQ-ACK information in response to an SPS PDSCH reception, and any PUSCH is not in response to a DCI format detection, the UE expects that the first symbol of the earliest PUCCH or PUSCH satisfies the first of the previous timeline conditions with the exception that components associated to a SCS configuration for a PDCCH scheduling a PDSCH or a PUSCH are absent from the timeline conditions.  A UE does not expect a PUCCH or a PUSCH that is in response to a DCI format detection to overlap with any other PUCCH or PUSCH that does not satisfy the above timing conditions.  If a UE would transmit multiple overlapping PUCCHs in a slot or overlapping PUCCH(s) and PUSCH(s) in a slot that is in the non-active periods of cell DRX, and if all of the UCI types associated with PUCCH(s), or all of the PUSCH(s) would be omitted due to cell DRX, the UE drops all the corresponding PUCCH transmission(s) or all the corresponding PUSCH transmission(s); otherwise, the UE would multiplex all the corresponding PUCCH(s) or all the corresponding PUSCH(s) as described in clauses 9.2.5.1 to 9.2.5.4.  < Unchanged parts are omitted >  --------------------------------------- End of Text Proposal ---------------------------------- |
| [4] Intel | **Proposal 2:**  Down-select among the following options:   * If a UE would transmit a PUCCH with multiple UCI types (HARQ-ACK and SR and/or P/SP-CSI, SR and P/SP-CSI) after performing Operation A (Resolve the overlapping among PUCCHs/PUSCHs (TS 38.213 clause 9 including sub-clauses)), when performing Operation B (Determine whether to transmit a PUCCH/PUSCH overlapping with non-active period of cell DRX.), * Option 1) If the PUCCH overlaps with non-active time of cell DRX on the respective serving cell, the UE transmits the PUCCH if the PUCCH includes HARQ-ACK and UE does not transmit the PUCCH if the PUCCH does not include HARQ-ACK. * Option 2) UE does not transmit the PUCCH. * Option 2) UE transmits PUCCH that contain multiple UCI types (for all combinations of UCI).   **Proposal 3:**  Down-select among the following options:   * If a UE multiplexes UCI (HARQ-ACK and SR and/or P/SP-CSI) in a CG PUSCH when performing Operation A (Resolve the overlapping among PUCCHs/PUSCHs (TS 38.213 clause 9 including sub-clauses)), when performing Operation B (Determine whether to transmit a PUCCH/PUSCH overlapping with non-active period of cell DRX.), * Option 1) UE transmit the CG PUSCH if the CG PUSCH includes HARQ-ACK and UE does not transmit the CG PUSCH if the CG PUSCH does not include HARQ-ACK. * Option 2) UE does not transmit the CG PUSCH. * Option 3) UE transmits CG-PUSCH that carries multiplexed UCI (for all combinations of UCI).   **Proposal 4:**  Down-select among the following options:   * If a UE multiplexes HARQ-ACK in a PUSCH with SP-CSI when performing Operation A (Resolve the overlapping among PUCCHs/PUSCHs (TS 38.213 clause 9 including sub-clauses)), when performing Operation B (Determine whether to transmit a PUCCH/PUSCH overlapping with non-active period of cell DRX.), * Option 1) UE transmit the PUSCH. * Option 2) UE does not transmit the PUSCH |
| [7] ZTE, Sanechips | **Observation**: The case that the UE would transmit the overlapping channels and the channel transmission is with repetitions but the UE does not support multiplexing information of different priorities in a PUCCH/PUSCH transmission as described in Section 9 of TS 38.213 should be performed according to the mechanism of agreements in RAN1#115.  **Proposal**: The following TP is proposed to be agreed.   |  | | --- | | **Reason for change:** The order of resolving overlapping PUCCH(s) and/or PUSCH(s) and performing cell DRX operation is not clear in spec. | | **Summary of change:** First resolving overlapping PUCCH(s) and/or PUSCH(s) and then performing cell DRX operation. | | **Consequences if not approved:**The order of resolving overlapping PUCCH(s) and/or PUSCH(s) and performing cell DRX operation is not defined in spec. | | **TS 38.213 V18.1.0**  9      UE procedure for reporting control information  \*\*\* Unchanged text is omitted \*\*\*  When a UE determines overlapping for PUCCH and/or PUSCH transmissions of different priority indexes, other than PUCCH transmissions with SL HARQ-ACK reports, before considering limitations for transmission due to cell DRX operation or as described in clauses 11.1, 11.1.1, 11.2A, 15 and 17.2, including repetitions if any, if the UE is provided *uci-MuxWithDiffPrio* and the timeline conditions in clause 9.2.5 for multiplexing UCI in a PUCCH or a PUSCH are satisfied  \*\*\* Unchanged text is omitted \*\*\*  - if // this is for cases the UE supports multiplexing information of different priorities in a PUCCH/PUSCH transmission  \*\*\* Unchanged text is omitted \*\*\*  - else  - if the UE would transmit the following channels that would overlap in time where, if a channel transmission is with repetitions, the following are applicable per repetition  - a first PUCCH transmission of larger priority index and a second PUCCH transmission of smaller priority index  - a first PUCCH transmission of larger priority index and a second PUSCH transmission of smaller priority index when the UE cannot simultaneously transmit the first PUCCH and second PUSCH  - a first PUCCH transmission of smaller priority index and a second PUSCH transmission of larger priority index when the UE cannot simultaneously transmit the first PUCCH and second PUSCH  the UE  - transmits the PUCCH or the PUSCH of the larger priority index subject to the limitations for UE transmissions due to cell DRX operation or described in clauses 11.1, 11.1.1, 11.2A, and 15 and  - does not transmit a PUCCH or a PUSCH of smaller priority index  \*\*\* Unchanged text is omitted \*\*\* |   **Proposal:** It is proposed that when the UE performs Operation B, for the cases of one or more UCI types multiplexed in a PUCCH and/or PUSCH during cell DRX non-active periods, the UE transmits all the corresponding PUCCH(s) and/or PUSCH(s) except for the cases that 1) all UCI types in a PUCCH and PUSCH; or 2) all PUCCH(s) and PUSCH(s) are impacted by cell DRX. |
| [8] Xiaomi | ***Proposal 5: Suggest to adopt the following TP#3 in TS 38.213,***   |  | | --- | | **TP#3:**  **Reasons for change:**  For UCI multiplexing, whether to transmit the multiplexed UCI/PUSCH is not determined yet, and should be determined otherwise the current spec is not complete  **Summary of change:**  UE would transmit the multiplexed UCI/PUSCH if only the original channels before multiplexing contains at least one channel fall into cell DRX active period or the channel is for HARQ-ACK, dynamic scheduled PUSCH, or P/SP CSI for CSI report configured by CSI-ReportConfig not associated with the higher layer parameter *reportQuantity* comprising ‘RI’. Otherwise, UE would drop the multiplexed UCI/PUSCH.  **Consequences if not adopted:**  Incomplete specification. | | 9      UE procedure for reporting control information  \*\*\* Unchanged text is omitted \*\*\*  In the remaining of this clause, a UE multiplexes UCIs with same priority index in a PUCCH or a PUSCH before considering limitations for UE transmission due to cell DRX operation or as described in clauses 11.1, 11.1.1, 11.2A, 15 and 17.2. A PUCCH or a PUSCH is assumed to have a same priority index as a priority index of UCIs a UE multiplexes in the PUCCH or the PUSCH.  In the remaining of this clause, the multiplexing or prioritization for overlapping channels are for overlapping channels with same priority index or for overlapping channels with a PUCCH carrying SL HARQ-ACK information unless stated otherwise.  In the remaining of this clause, if a UE is provided subslotLengthForPUCCH for a cell for PUCCH transmission, a slot for an associated PUCCH resource of a PUCCH transmission with HARQ-ACK information on the cell includes a number of symbols indicated by subslotLengthForPUCCH, unless stated otherwise.  If cell DRX is activated as described in clause 11.5, UE would transmit the multiplexed UCI/PUSCH if only the original channels before multiplexing contains at least one channel fall into cell DRX active period or the channel is for HARQ-ACK, dynamic scheduled PUSCH, or P/SP CSI for CSI report configured by CSI-ReportConfig not associated with the higher layer parameter reportQuantity comprising ‘RI’. Otherwise, UE would drop the multiplexed UCI/PUSCH.  If a UE would transmit on a serving cell a PUSCH without UL-SCH that overlaps with a PUCCH transmission on a serving cell that includes positive SR information, the UE does not transmit the PUSCH.  If a UE would transmit CSI reports on overlapping physical channels, the UE applies the priority rules described in [6, TS 38.214] for the multiplexing of CSI reports.  \*\*\* Unchanged text is omitted \*\*\* |   ***Proposal 6: Suggest to adopt the following TP#4 in TS 38.213,***   |  | | --- | | **TP#4:**  **Reasons for change:**  If the SPS PDSCH(s) fall into the DTX non-active period, the SPS PDSCH(s) would not be transmitted, thus the HARQ-ACK information deferral would be meaningless.  **Summary of change:**  For the SPS PDSCH during cell DTX non-active period, HARQ-ACK is not deferred  **Consequences if not adopted:**  Useless SPS PDSCH HARQ-ACK deferral. | | 9.2.5.4 UE procedure for deferring HARQ-ACK for SPS PDSCH  \*\*\* Unchanged text is omitted \*\*\*  If a UE is provided *sps-HARQ-Deferral* and, after performing the procedures in clauses 9 and 9.2.5 to resolve overlapping among PUCCHs and PUSCHs in a first slot, if any, the UE determines a PUCCH resource for a PUCCH transmission with first HARQ-ACK information bits for SPS PDSCH receptions not overlapped with cell DTX non-active time that the UE would report for a first time, and the PUCCH resource  - is provided by *SPS-PUCCH-AN-List* as described in clause 9.2.1, or by *n1PUCCH-AN* if *SPS-PUCCH-AN-List* is not provided  - is not cancelled by an overlapping PUCCH or PUSCH transmission of larger priority index  - overlaps with a symbol indicated as downlink by *tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigDedicated*, or indicated for a SS/PBCH block by *ssb-PositionsInBurst*, or belonging to a CORESET associated with a Type0-PDCCH CSS set  \*\*\* Unchanged text is omitted \*\*\* | |
| [10] Samsung | **Observation 3:** It is not clear whether a UE first perform Operation C (Resolve the overlapping among PDSCHs (TS 38.214 clause 5.1) and Operation D (Determine whether to receive a SPS PDSCH overlapping with non-active period of cell DTX.)  **Observation 4:** In legacy, a UE first resolves the overlapping between PDSCHs and semi-static UL symbols and then resolves the overlapping between PDSCHs.  **Proposal 9:** If a UE would receive multiple overlapping PDSCHs in a slot on a same serving cell, where at least one SPS PDSCH overlaps with non-active periods of cell DTX on the serving cell, the UE first performs Operation D (Determine whether to receive a SPS PDSCH overlapping with non-active period of cell DTX.) and then performs Operation C (Resolve the overlapping among PDSCHs (TS 38.214 clause 5.1) . Adopt the following TP for TS 38.214.  **Reason for change:** UE behaviour is not clear on whether a UE first perform Operation C (Resolve the overlapping among PDSCHs (TS 38.214 clause 5) and Operation D (Determine whether to receive a SPS PDSCH overlapping with non-active period of cell DTX.)  **Summary of change:** the UE first performs Operation D (Determine whether to receive a SPS PDSCH overlapping with non-active period of cell DTX.) and then performs Operation C (Resolve the overlapping among PDSCHs (TS 38.214 clause 5.1) .  **Consequences if not approved:**Unclear UE behaviour on which PDSCH should be received among the overlapping PDSCHs due to cell DTX operation   |  | | --- | | 5.1 UE procedure for receiving the physical downlink shared channel \*\*\* Unchanged text is omitted \*\*\*  The UE is not expected to decode a PDSCH in a serving cell scheduled by a PDCCH with C-RNTI, CS-RNTI, MCS-C-RNTI, G-RNTI, G-CS-RNTI or MCCH-RNTI and one or multiple PDSCH(s) required to be received according to this Clause in the same serving cell without a corresponding PDCCH transmission except the PDSCH(s) overlapping with non-active periods of cell DTX if the PDSCHs partially or fully overlap in time except if the PDCCH scheduling the PDSCH ends at least 14 symbols before the earliest starting symbol of the PDSCH(s) without the corresponding PDCCH transmission, where** and the symbol duration are based on the smallest numerology between the scheduling PDCCH and the PDSCH, in which case the UE shall decode the PDSCH scheduled by the PDCCH. When the PDCCH reception incudes two PDCCH candidates from two respective search space sets, as described in clause 10 of [6, TS 38.213], for the purpose of determining the PDCCH with C-RNTI, CS-RNTI or MCS-C-RNTI scheduling the PDSCH ends at least 14 symbols before the earliest starting symbol of the PDSCH(s) without the corresponding PDCCH transmission, the PDCCH candidate that ends later in time is used.  \*\*\* Unchanged text is omitted \*\*\*  If more than one PDSCH on a serving cell each without a corresponding PDCCH transmission are in a slot, after resolving overlapping with symbols in the slot indicated as uplink by *tdd-UL-DL-ConfigurationCommon*, or by *tdd-UL-DL-ConfigurationDedicated*,or determined as non-active periods of cell DTX, a UE receives one or more PDSCHs without corresponding PDCCH transmissions in the slot as specified below.  ‒ Step 0: set *j=0*, where *j* is thenumber of selected PDSCH(s) for decoding. *Q* is the set of activated PDSCHs without corresponding PDCCH transmissions within the slot  ‒ Step 1: A UE receives one PDSCH with the lowest configured *sps-ConfigIndex* within *Q*, set *j=j+1*. Designate the received PDSCH as survivor PDSCH.  ‒ Step 2: The survivor PDSCH in step 1 and any other PDSCH(s) overlapping (even partially) with the survivor PDSCH in step 1 are excluded from *Q*.  ‒ Step 3: Repeat step 1 and 2 until Q is empty or j is equal to the number of unicast/multicast PDSCHs in a slot supported by the UE |   **Observation 5:** Not transmitting HARQ-ACK contradicts previous RAN2 agreement as well as degrades performance of DL data transmission.  Proposal 10: If a UE multiplexes multiple UCI types (HARQ-ACK and SR and/or P/SP-CSI, SR and P/SP-CSI) in a PUCCH when performing Operation A (Resolve the overlapping among PUCCHs/PUSCHs (TS 38.213 clause 9 including sub-clauses)), and the PUCCH overlaps with non-active time of cell DRX on the respective serving cell when performing Operation B (Determine whether to transmit a PUCCH/PUSCH overlapping with non-active period of cell DRX.), the UE transmits the PUCCH if the PUCCH includes HARQ-ACK and UE does not transmit the PUCCH if the PUCCH does not include HARQ-ACK.  **Proposal 11:** If a UE multiplexes UCI (HARQ-ACK and/or P/SP-CSI) in a CG PUSCH when performing Operation A (Resolve the overlapping among PUCCHs/PUSCHs (TS 38.213 clause 9 including sub-clauses)), and the CG PUSCH overlaps with non-active period of cell DRX on the respective serving cell when performing Operation B (Determine whether to transmit a PUCCH/PUSCH overlapping with non-active period of cell DRX.), the UE transmit the CG PUSCH if the CG PUSCH includes HARQ-ACK and UE does not transmit the CG PUSCH if the CG PUSCH does not include HARQ-ACK.  **Proposal 12:** If a UE multiplexes HARQ-ACK in a PUSCH with SP-CSI when performing Operation A (Resolve the overlapping among PUCCHs/PUSCHs (TS 38.213 clause 9 including sub-clauses)), and the PUSCH overlaps with non-active period of cell DRX on the respective serving cell when performing Operation B (Determine whether to transmit a PUCCH/PUSCH overlapping with non-active period of cell DRX.), the UE transmit the PUSCH.  **Proposal 13:** Adopt the following TP for TS 38.214.  **Reason for change:** UE behaviour is not clear on whether a UE transmits a PUCCH/PUSCH after resolving the overlapping PUCCH/PUSCH transmissions due to cell DTX operation  **Summary of change:** the UE a PUCCH/PUSCH with HARQ-ACK after resolving the overlapping PUCCH/PUSCH transmissions if the PUCCH/PUSCH overlap with non-active period of cell DRX  **Consequences if not approved:**Unclear UE behaviour on PUCCH/PUSCH transmission due to cell DTX operation   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 11.5 Adaptation of cell operation \*\*\* Unchanged text is omitted \*\*\*  When a UE receives in slot on the active DL BWP of a first serving cell a PDCCH providing DCI format 2\_9 that indicates a change in activation or deactivation of a current cell DTX operation or cell DRX operation for a second serving cell, the UE operates on the second serving cell according to the indicated cell DTX operation or cell DRX operation starting from a slot on the active DL BWP or on the active UL BWP of the second serving cell, respectively, that is not before the beginning of the slot on the active DL BWP of the first serving cell where is a number of slots for the SCS of the active DL BWP of the first serving cell in Table 11.5-1.  Table 11.5-1: Minimum time gap value   |  |  | | --- | --- | | **SCS (kHz)** | **Number of slots** | | 15 | 3 | | 30 | 6 | | 60 | 12 | | 120 | 24 | | 480 | 96 | | 960 | 192 |   After resolving the overlapping for PUCCH and/or PUSCH transmissions, the UE   * transmits a PUCCH with HARQ-ACK and does not transmit a PUCCH without HARQ-ACK if the PUCCH transmission overlaps with non-active period of cell DRX of PCell, and * transmits a CG PUSCH with HARQ-ACK and does not transmit a CG PUSCH without HARQ-ACK on a serving cell if the CG PUSCH transmission overlaps with non-active period of cell DRX of the serving cell, and * transmits a PUSCH with SP-CSI and HARQ-ACK on a serving cell if the PUSCH transmission overlaps with non-active period of cell DRX of the serving cell,   before considering limitations for UE transmission as described in clauses 11.1, 11.1.1, 11.2A, 15 and 17.2. | |
| [11] Panasonic | **Proposal 1:** After UE resolves multiplexing, whether to transmit or drop the PUCCH/PUSCH needs to consider the all the channel/signals that are not impacted by the Cell DRX, i.e., HARQ-ACK, SRS for position and aperiodic CSI.  **Proposal 2:** If a UE would transmit a PUCCH or PUSCH with one or multiple UCI types (HARQ-ACK, SR, and/or AP/P/SP-CSI) after performing Operation A (Resolve the overlapping among PUCCHs/PUSCHs (TS 38.213 clause 9 including sub-clauses)), when performing Operation B (Determine whether to transmit a PUCCH/PUSCH overlapping with non-active period of cell DRX.),   * If the PUCCH/PUSCH overlaps with non-active time of cell DRX on the respective serving cell, and if the PUCCH/PUSCH does not include any of HARQ-ACK and AP-CSI, and if the PUCCH/PUSCH does not overlap with SRS for positioning, UE does not transmit the PUCCH/PUSCH and otherwise UE transmits the PUCCH/PUSCH. |
| [16] MediaTek | Inputs for Proposal #3-5C from moderator summary from RAN1 #115.  **Proposal #3-5C**  If a UE would transmit multiple overlapping PUCCHs in a slot or overlapping PUCCH(s) and PUSCH(s) in a slot, while the slot is in the non-active periods of cell DRX on the respective serving cell,   * if all of the UCI types associated with PUCCH(s) are impacted by cell DRX,   + the UE drops all the corresponding PUCCH transmission(s) * if all of the PUCCH(s) and PUSCH(s) are impacted by cell DRX,   + the UE drops all the corresponding PUCCH(s) and PUSCH transmission(s); * otherwise,   + the UE expects to multiplex all corresponding PUCCH(s) or all corresponding PUCCH(s) and PUSCH(s) as described in clauses 9.2.5.0 to 9.2.5.4.   **MTK view**: This proposal seems aligned with the existing agreements that periodic/semi-persistent CSI reports and SRS are not transmitted in cell DRX non-active periods. However, it may unnecessarily restrict transmission of other UCIs like HARQ-ACK multiplexed on PUCCH. Suggest to revise the proposal to allow transmission of PUCCH with HARQ-ACK in cell DRX non-active period.  Inputs for Proposal #3-12 from moderator summary from RAN1 #115.  **Proposal #3-12**  If a UE would transmit a PUCCH with multiple UCI types (HARQ-ACK and SR and/or P/SP-CSI, SR and P/SP-CSI) after performing Operation A (Resolve the overlapping among PUCCHs/PUSCHs (TS 38.213 clause 9 including sub-clauses)), when performing Operation B (Determine whether to transmit a PUCCH/PUSCH overlapping with non-active period of cell DRX.),   * If the PUCCH overlaps with non-active time of cell DRX on the respective serving cell, the UE transmits the PUCCH if the PUCCH includes HARQ-ACK and UE does not transmit the PUCCH if the PUCCH does not include HARQ-ACK.   **MTK view**: This seems aligned with the agreement that HARQ-ACK is not impacted by cell DRX. However, unnecessarily restricting other UCIs (e.g. SR) multiplexed with HARQ-ACK could limit performance. Suggest to allow transmission of PUCCH with HARQ-ACK and any other multiplexed UCIs in cell DRX non-active period.  Inputs for Proposal #3-12 from moderator summary from RAN1 #115.  **Proposal #3-13**  If a UE multiplexes UCI (HARQ-ACK and SR and/or P/SP-CSI) in a CG PUSCH when performing Operation A (Resolve the overlapping among PUCCHs/PUSCHs (TS 38.213 clause 9 including sub-clauses)), when performing Operation B (Determine whether to transmit a PUCCH/PUSCH overlapping with non-active period of cell DRX.),   * Option 1) UE transmit the CG PUSCH if the CG PUSCH includes HARQ-ACK and UE does not transmit the CG PUSCH if the CG PUSCH does not include HARQ-ACK. * Option 2) UE does not transmit the CG PUSCH   **MTK view**: Allowing CG PUSCH with HARQ-ACK in cell DRX non-active period seems aligned with agreements. However, option 2 to not transmit CG PUSCH at all seems unnecessarily restrictive. Support option 1.  Inputs for Proposal #3-14 from moderator summary from RAN1 #115.  **Proposal #3-14**  If a UE multiplexes HARQ-ACK in a PUSCH with SP-CSI when performing Operation A (Resolve the overlapping among PUCCHs/PUSCHs (TS 38.213 clause 9 including sub-clauses)), when performing Operation B (Determine whether to transmit a PUCCH/PUSCH overlapping with non-active period of cell DRX.),   * Option 1) UE transmit the PUSCH if the PUSCH includes HARQ-ACK and UE does not transmit the PUSCH if the PUSCH does not include HARQ-ACK. * Option 2) UE does not transmit the PUSCH   **MTK view**: Allowing PUSCH with HARQ-ACK in cell DRX non-active period seems aligned with agreements. However, option 2 to not transmit PUSCH at all seems unnecessarily restrictive. Support option 1.  Inputs for Proposal #3-10 from moderator summary from RAN1 #115.  TP #3-10 (old TP #7-1)   * Adopt the following TP for TS38.213  |  | | --- | | Reason for change: The overlapping PUCCHs/PUSCHs does not differentiate CG PUSCH transmissions and PUSCH transmissions with SP-CSI with or without non-active period of cell DRX in the current specification  Summary of change: the UE excludes CG PUSCH transmissions and PUSCH transmissions with SP-CSI overlapping with non-active periods of cell DRX for resolving overlapping for PUCCH and/or PUSCH transmissions  Consequences if not approved:Unnecessarily enforce UE to not transmit HARQ-ACK multiplexed in CG PUSCH transmissions and PUSCH transmissions with SP-CSI in non-active periods of cell DRX | | 9 UE procedure for reporting control information  \*\*\* Unchanged text is omitted \*\*\*  A DCI format indicating a SPS PDSCH release, or SCell dormancy without scheduling a PDSCH reception, or indicating a TCI state update without scheduling PDSCH reception, is referred to as a DCI format having associated HARQ-ACK information without scheduling a PDSCH reception.  When a UE determines overlapping for PUCCH and/or PUSCH transmissions, the UE excludes CG PUSCH transmissions and PUSCH transmissions with SP-CSI overlapping with non-active periods of cell DRX.  For the remaining of this clause, when a UE  - is not provided *coresetPoolIndex* or is provided *coresetPoolIndex* with a value of 0 for first CORESETs, and is provided *coresetPoolIndex* with a value of 1 for second CORESETs, on active DL BWPs of serving cells, and  - is provided *enableSTx2PofmDCI*  the UE separately determines and resolves time overlapping among first PUSCH transmissions that use respective first spatial domain filters corresponding to first *TCI-State* or *TCI-UL-State* associated with the first CORESETs, and among second PUSCH transmissions that use respective second spatial domain filters corresponding to second *TCI-State* or *TCI-UL-State* associated with the second CORESETs. |   **MTK view**: This seems unnecessarily restrictive for HARQ-ACK multiplexed in these PUSCHs. Suggest to revise the proposal to only exclude CG PUSCH and PUSCH with SP CSI that do not contain HARQ-ACK.  Inputs for Proposal #3-3A from moderator summary from RAN1 #115.  **TP #3-3A**   * Adopt the following TP for TS38.213  |  | | --- | | **Reasons for change:**  To avoid complex UL multiplexing rules for cases that multiple UCIs/PUSCHs overlap in a slot during the non-active periods of cell DRX, and part of the UCIs/PUSCHs are impacted by cell DRX. | | **Summary of change:**  Specify that during the non-active periods of cell DRX, while multiple UCIs/PUSCHs overlap in a slot and part of them are impacted by cell DRX, the UCIs/PUSCHs impacted by cell DRX should be considered within the UL multiplexing procedure. And the UE follows the multiplexing rule as legacy. | | **Consequence if not approved:**  When there is a detection error in DCI format 2\_9, the understanding of UL multiplexing during the non-active periods of cell DRX from the UE and NW side can be totally different (e.g., the payload of the UL transmission, and the UL resource it uses), so that the gNB cannot receive the UL transmission sent by UE. | | 9.2.5 UE procedure for reporting multiple UCI types  < Unchanged parts are omitted >  If a UE would transmit multiple overlapping PUCCHs in a slot or overlapping PUCCH(s) and PUSCH(s) in a slot, one of the PUCCHs includes HARQ-ACK information in response to an SPS PDSCH reception, and any PUSCH is not in response to a DCI format detection, the UE expects that the first symbol of the earliest PUCCH or PUSCH satisfies the first of the previous timeline conditions with the exception that components associated to a SCS configuration for a PDCCH scheduling a PDSCH or a PUSCH are absent from the timeline conditions.  A UE does not expect a PUCCH or a PUSCH that is in response to a DCI format detection to overlap with any other PUCCH or PUSCH that does not satisfy the above timing conditions.  If UE would transmit multiple overlapping PUCCHs in a slot or overlapping PUCCH(s) and PUSCH(s) in a slot, while the slot is in the non-active periods of cell DRX, and part of UCI type associated with PUCCH(s) are impacted by cell DRX or part of PUSCH(s) are impacted by cell DRX, the UE expects to multiplex all corresponding PUCCH(s) or all corresponding PUSCH(s) as described in clauses 9.2.5.0 to 9.2.5.4.  < Unchanged parts are omitted > |   **MTK view**: This seems reasonable and implementation friendly. The behavior aligns with the existing agreements. Support this TP.  Inputs for Proposal #3-4 from moderator summary from RAN1 #115.  **TP #3-4**   * Adopt the following TP for TS38.213  |  | | --- | | Reasons for change:  Summary of change:  Consequences if not adopted: | | 9 UE procedure for reporting control information  <unchanged parts are omitted>  A DCI format indicating a SPS PDSCH release, or SCell dormancy without scheduling a PDSCH reception, or indicating a TCI state update without scheduling PDSCH reception, is referred to as a DCI format having associated HARQ-ACK information without scheduling a PDSCH reception.  When a UE determines overlapping for PUCCH and/or PUSCH transmissions, the UE excludes CG PUSCH transmissions and PUSCH transmissions with SP-CSI if the UE is configured to monitor PDCCH for DCI format 2\_9; otherwise, the UE excludes CG PUSCH transmissions and PUSCH transmissions with SP-CSI overlapping with non-active periods of cell DRX.  <unchanged parts are omitted> |   **MTK view**: The exclusion should be only for CG PUSCH and PUSCH with SP CSI not containing HARQ-ACK. Monitoring DCI 2\_9 need not impact the exclusion rules. Suggest to revise accordingly. |

### Summary of Issues

There are several TPs that companies have provided to resolve the open issue on handling of UCI during non-active periods of cell DRX. The following are list of the TPs.

##### TP #1-1

**Reasons for change:**

**Summary of change:**

Clarify that during the non-active periods of cell DRX, if all the overlapping signals or channels that are impacted by cell DRX then drop them all, otherwise report them all.

**Consequence if not approved:**

The UL signal or channels that are not impacted by cell DRX will be dropped if they are multiplexed with other UL signal or channels that are impacted by cell DRX.

---------------------------- Start of Text Proposal 3 for TS 38.213 -----------------------------

< Unchanged parts are omitted >

9.2.5 UE procedure for reporting multiple UCI types

< Unchanged parts are omitted >

If a UE would transmit multiple overlapping PUCCHs in a slot or overlapping PUCCH(s) and PUSCH(s) in a slot, one of the PUCCHs includes HARQ-ACK information in response to an SPS PDSCH reception, and any PUSCH is not in response to a DCI format detection, the UE expects that the first symbol of the earliest PUCCH or PUSCH satisfies the first of the previous timeline conditions with the exception that components associated to a SCS configuration for a PDCCH scheduling a PDSCH or a PUSCH are absent from the timeline conditions.

A UE does not expect a PUCCH or a PUSCH that is in response to a DCI format detection to overlap with any other PUCCH or PUSCH that does not satisfy the above timing conditions.

If a UE would transmit multiple overlapping PUCCHs in a slot or overlapping PUCCH(s) and PUSCH(s) in a slot that is in the non-active periods of cell DRX, and if all of the UCI types associated with PUCCH(s), or all of the PUSCH(s) would be omitted due to cell DRX, the UE drops all the corresponding PUCCH transmission(s) or all the corresponding PUSCH transmission(s); otherwise, the UE would multiplex all the corresponding PUCCH(s) or all the corresponding PUSCH(s) as described in clauses 9.2.5.1 to 9.2.5.4.

< Unchanged parts are omitted >

--------------------------------------- End of Text Proposal ----------------------------------

##### TP #1-2

**Reason for change:** The order of resolving overlapping PUCCH(s) and/or PUSCH(s) and performing cell DRX operation is not clear in spec.

**Summary of change:** First resolving overlapping PUCCH(s) and/or PUSCH(s) and then performing cell DRX operation.

**Consequences if not approved:** The order of resolving overlapping PUCCH(s) and/or PUSCH(s) and performing cell DRX operation is not defined in spec.

===== Start of TP for TS38.213 ======

9      UE procedure for reporting control information

\*\*\* Unchanged text is omitted \*\*\*

When a UE determines overlapping for PUCCH and/or PUSCH transmissions of different priority indexes, other than PUCCH transmissions with SL HARQ-ACK reports, before considering limitations for transmission due to cell DRX operation or as described in clauses 11.1, 11.1.1, 11.2A, 15 and 17.2, including repetitions if any, if the UE is provided *uci-MuxWithDiffPrio* and the timeline conditions in clause 9.2.5 for multiplexing UCI in a PUCCH or a PUSCH are satisfied

\*\*\* Unchanged text is omitted \*\*\*

- if // this is for cases the UE supports multiplexing information of different priorities in a PUCCH/PUSCH transmission

\*\*\* Unchanged text is omitted \*\*\*

- else

- if the UE would transmit the following channels that would overlap in time where, if a channel transmission is with repetitions, the following are applicable per repetition

- a first PUCCH transmission of larger priority index and a second PUCCH transmission of smaller priority index

- a first PUCCH transmission of larger priority index and a second PUSCH transmission of smaller priority index when the UE cannot simultaneously transmit the first PUCCH and second PUSCH

- a first PUCCH transmission of smaller priority index and a second PUSCH transmission of larger priority index when the UE cannot simultaneously transmit the first PUCCH and second PUSCH

the UE

- transmits the PUCCH or the PUSCH of the larger priority index subject to the limitations for UE transmissions due to cell DRX operation or described in clauses 11.1, 11.1.1, 11.2A, and 15 and

- does not transmit a PUCCH or a PUSCH of smaller priority index

\*\*\* Unchanged text is omitted \*\*\*

===== End of TP for TS38.213 =======

##### TP #1-3

**Reasons for change:**

For UCI multiplexing, whether to transmit the multiplexed UCI/PUSCH is not determined yet, and should be determined otherwise the current spec is not complete

**Summary of change:**

UE would transmit the multiplexed UCI/PUSCH if only the original channels before multiplexing contains at least one channel fall into cell DRX active period or the channel is for HARQ-ACK, dynamic scheduled PUSCH, or P/SP CSI for CSI report configured by CSI-ReportConfig not associated with the higher layer parameter *reportQuantity* comprising ‘RI’. Otherwise, UE would drop the multiplexed UCI/PUSCH.

**Consequences if not adopted:**

Incomplete specification.

===== Start of TP for TS38.213 ======

9      UE procedure for reporting control information

\*\*\* Unchanged text is omitted \*\*\*

In the remaining of this clause, a UE multiplexes UCIs with same priority index in a PUCCH or a PUSCH before considering limitations for UE transmission due to cell DRX operation or as described in clauses 11.1, 11.1.1, 11.2A, 15 and 17.2. A PUCCH or a PUSCH is assumed to have a same priority index as a priority index of UCIs a UE multiplexes in the PUCCH or the PUSCH.

In the remaining of this clause, the multiplexing or prioritization for overlapping channels are for overlapping channels with same priority index or for overlapping channels with a PUCCH carrying SL HARQ-ACK information unless stated otherwise.

In the remaining of this clause, if a UE is provided subslotLengthForPUCCH for a cell for PUCCH transmission, a slot for an associated PUCCH resource of a PUCCH transmission with HARQ-ACK information on the cell includes a number of symbols indicated by subslotLengthForPUCCH, unless stated otherwise.

If cell DRX is activated as described in clause 11.5, UE would transmit the multiplexed UCI/PUSCH if only the original channels before multiplexing contains at least one channel fall into cell DRX active period or the channel is for HARQ-ACK, dynamic scheduled PUSCH, or P/SP CSI for CSI report configured by CSI-ReportConfig not associated with the higher layer parameter reportQuantity comprising ‘RI’. Otherwise, UE would drop the multiplexed UCI/PUSCH.

If a UE would transmit on a serving cell a PUSCH without UL-SCH that overlaps with a PUCCH transmission on a serving cell that includes positive SR information, the UE does not transmit the PUSCH.

If a UE would transmit CSI reports on overlapping physical channels, the UE applies the priority rules described in [6, TS 38.214] for the multiplexing of CSI reports.

\*\*\* Unchanged text is omitted \*\*\*

===== End of TP for TS38.213 =======

##### TP #1-4

**Reasons for change:**

If the SPS PDSCH(s) fall into the DTX non-active period, the SPS PDSCH(s) would not be transmitted, thus the HARQ-ACK information deferral would be meaningless.

**Summary of change:**

For the SPS PDSCH during cell DTX non-active period, HARQ-ACK is not deferred

**Consequences if not adopted:**

Useless SPS PDSCH HARQ-ACK deferral.

===== Start of TP for TS38.213 =======,

9.2.5.4 UE procedure for deferring HARQ-ACK for SPS PDSCH

\*\*\* Unchanged text is omitted \*\*\*

If a UE is provided *sps-HARQ-Deferral* and, after performing the procedures in clauses 9 and 9.2.5 to resolve overlapping among PUCCHs and PUSCHs in a first slot, if any, the UE determines a PUCCH resource for a PUCCH transmission with first HARQ-ACK information bits for SPS PDSCH receptions not overlapped with cell DTX non-active time that the UE would report for a first time, and the PUCCH resource

- is provided by *SPS-PUCCH-AN-List* as described in clause 9.2.1, or by *n1PUCCH-AN* if *SPS-PUCCH-AN-List* is not provided

- is not cancelled by an overlapping PUCCH or PUSCH transmission of larger priority index

- overlaps with a symbol indicated as downlink by *tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigDedicated*, or indicated for a SS/PBCH block by *ssb-PositionsInBurst*, or belonging to a CORESET associated with a Type0-PDCCH CSS set

\*\*\* Unchanged text is omitted \*\*\*

===== End of TP for TS38.213 =======

##### TP #1-5

**Reason for change:** UE behaviour is not clear on whether a UE first perform Operation C (Resolve the overlapping among PDSCHs (TS 38.214 clause 5) and Operation D (Determine whether to receive a SPS PDSCH overlapping with non-active period of cell DTX.)

**Summary of change:** the UE first performs Operation D (Determine whether to receive a SPS PDSCH overlapping with non-active period of cell DTX.) and then performs Operation C (Resolve the overlapping among PDSCHs (TS 38.214 clause 5.1) .

**Consequences if not approved:**Unclear UE behaviour on which PDSCH should be received among the overlapping PDSCHs due to cell DTX operation

===== Start of TP for TS38.214 =======

**5.1 UE procedure for receiving the physical downlink shared channel**

\*\*\* Unchanged text is omitted \*\*\*

The UE is not expected to decode a PDSCH in a serving cell scheduled by a PDCCH with C-RNTI, CS-RNTI, MCS-C-RNTI, G-RNTI, G-CS-RNTI or MCCH-RNTI and one or multiple PDSCH(s) required to be received according to this Clause in the same serving cell without a corresponding PDCCH transmission except the PDSCH(s) overlapping with non-active periods of cell DTX if the PDSCHs partially or fully overlap in time except if the PDCCH scheduling the PDSCH ends at least 14 symbols before the earliest starting symbol of the PDSCH(s) without the corresponding PDCCH transmission, where** and the symbol duration are based on the smallest numerology between the scheduling PDCCH and the PDSCH, in which case the UE shall decode the PDSCH scheduled by the PDCCH. When the PDCCH reception incudes two PDCCH candidates from two respective search space sets, as described in clause 10 of [6, TS 38.213], for the purpose of determining the PDCCH with C-RNTI, CS-RNTI or MCS-C-RNTI scheduling the PDSCH ends at least 14 symbols before the earliest starting symbol of the PDSCH(s) without the corresponding PDCCH transmission, the PDCCH candidate that ends later in time is used.

\*\*\* Unchanged text is omitted \*\*\*

If more than one PDSCH on a serving cell each without a corresponding PDCCH transmission are in a slot, after resolving overlapping with symbols in the slot indicated as uplink by *tdd-UL-DL-ConfigurationCommon*, or by *tdd-UL-DL-ConfigurationDedicated*,or determined as non-active periods of cell DTX, a UE receives one or more PDSCHs without corresponding PDCCH transmissions in the slot as specified below.

‒ Step 0: set *j=0*, where *j* is thenumber of selected PDSCH(s) for decoding. *Q* is the set of activated PDSCHs without corresponding PDCCH transmissions within the slot

‒ Step 1: A UE receives one PDSCH with the lowest configured *sps-ConfigIndex* within *Q*, set *j=j+1*. Designate the received PDSCH as survivor PDSCH.

‒ Step 2: The survivor PDSCH in step 1 and any other PDSCH(s) overlapping (even partially) with the survivor PDSCH in step 1 are excluded from *Q*.

‒ Step 3: Repeat step 1 and 2 until Q is empty or j is equal to the number of unicast/multicast PDSCHs in a slot supported by the UE

===== End of TP for TS38.214 =======

##### TP #1-6

**Reason for change:** UE behaviour is not clear on whether a UE transmits a PUCCH/PUSCH after resolving the overlapping PUCCH/PUSCH transmissions due to cell DTX operation

**Summary of change:** the UE a PUCCH/PUSCH with HARQ-ACK after resolving the overlapping PUCCH/PUSCH transmissions if the PUCCH/PUSCH overlap with non-active period of cell DRX

**Consequences if not approved:**Unclear UE behaviour on PUCCH/PUSCH transmission due to cell DTX operation

===== Start of TP for TS38.213 =======

**11.5 Adaptation of cell operation**

\*\*\* Unchanged text is omitted \*\*\*

When a UE receives in slot on the active DL BWP of a first serving cell a PDCCH providing DCI format 2\_9 that indicates a change in activation or deactivation of a current cell DTX operation or cell DRX operation for a second serving cell, the UE operates on the second serving cell according to the indicated cell DTX operation or cell DRX operation starting from a slot on the active DL BWP or on the active UL BWP of the second serving cell, respectively, that is not before the beginning of the slot on the active DL BWP of the first serving cell where is a number of slots for the SCS of the active DL BWP of the first serving cell in Table 11.5-1.

Table 11.5-1: Minimum time gap value

|  |  |
| --- | --- |
| **SCS (kHz)** | **Number of slots** |
| 15 | 3 |
| 30 | 6 |
| 60 | 12 |
| 120 | 24 |
| 480 | 96 |
| 960 | 192 |

After resolving the overlapping for PUCCH and/or PUSCH transmissions, the UE

* transmits a PUCCH with HARQ-ACK and does not transmit a PUCCH without HARQ-ACK if the PUCCH transmission overlaps with non-active period of cell DRX of PCell, and
* transmits a CG PUSCH with HARQ-ACK and does not transmit a CG PUSCH without HARQ-ACK on a serving cell if the CG PUSCH transmission overlaps with non-active period of cell DRX of the serving cell, and
* transmits a PUSCH with SP-CSI and HARQ-ACK on a serving cell if the PUSCH transmission overlaps with non-active period of cell DRX of the serving cell,

before considering limitations for UE transmission as described in clauses 11.1, 11.1.1, 11.2A, 15 and 17.2.

===== End of TP for TS38.213 =======

##### TP #1-7

**Reasons for change:**

To avoid complex UL multiplexing rules for cases that multiple UCIs/PUSCHs overlap in a slot during the non-active periods of cell DRX, and part of the UCIs/PUSCHs are impacted by cell DRX.

**Summary of change:**

Specify that during the non-active periods of cell DRX, while multiple UCIs/PUSCHs overlap in a slot and part of them are impacted by cell DRX, the UCIs/PUSCHs impacted by cell DRX should be considered within the UL multiplexing procedure. And the UE follows the multiplexing rule as legacy.

**Consequence if not approved:**

When there is a detection error in DCI format 2\_9, the understanding of UL multiplexing during the non-active periods of cell DRX from the UE and NW side can be totally different (e.g., the payload of the UL transmission, and the UL resource it uses), so that the gNB cannot receive the UL transmission sent by UE.

===== Start of TP for TS38.213 =======

9.2.5 UE procedure for reporting multiple UCI types

< Unchanged parts are omitted >

If a UE would transmit multiple overlapping PUCCHs in a slot or overlapping PUCCH(s) and PUSCH(s) in a slot, one of the PUCCHs includes HARQ-ACK information in response to an SPS PDSCH reception, and any PUSCH is not in response to a DCI format detection, the UE expects that the first symbol of the earliest PUCCH or PUSCH satisfies the first of the previous timeline conditions with the exception that components associated to a SCS configuration for a PDCCH scheduling a PDSCH or a PUSCH are absent from the timeline conditions.

A UE does not expect a PUCCH or a PUSCH that is in response to a DCI format detection to overlap with any other PUCCH or PUSCH that does not satisfy the above timing conditions.

If UE would transmit multiple overlapping PUCCHs in a slot or overlapping PUCCH(s) and PUSCH(s) in a slot, while the slot is in the non-active periods of cell DRX, and part of UCI type associated with PUCCH(s) are impacted by cell DRX or part of PUSCH(s) are impacted by cell DRX, the UE expects to multiplex all corresponding PUCCH(s) or all corresponding PUSCH(s) as described in clauses 9.2.5.0 to 9.2.5.4.

< Unchanged parts are omitted >

===== End of TP for TS38.213 =======

##### TP #1-8

**Reasons for change:**

**Summary of change:**

**Consequences if not adopted:**

===== Start of TP for TS38.213 =======

9 UE procedure for reporting control information

<unchanged parts are omitted>

A DCI format indicating a SPS PDSCH release, or SCell dormancy without scheduling a PDSCH reception, or indicating a TCI state update without scheduling PDSCH reception, is referred to as a DCI format having associated HARQ-ACK information without scheduling a PDSCH reception.

When a UE determines overlapping for PUCCH and/or PUSCH transmissions, the UE excludes CG PUSCH transmissions and PUSCH transmissions with SP-CSI and not containing HARQ-ACK; otherwise, the UE excludes CG PUSCH transmissions and PUSCH transmissions with SP-CSI and not containing HARQ-ACK overlapping with non-active periods of cell DRX.

<unchanged parts are omitted>

===== End of TP for TS38.213 =======

### Round 1 - Discussion

Moderator suggests discussion on the proposals #1-1 ~ #1-8.

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | If network energy saving is similar, we choose simple solutions. |
| Samsung | We supported TP #1-6 based on the reasons we discussion in our contribution. |
| Xiaomi | **For TP 1-1/1-3/1-7**,  From our reading, their solutions are similar, that is, if any one of the original channels befor multiplexing is not impacted by cell DTX/DRX, then all the channels are multiplexed and transmitted.  But how to wording solution needs to be carefully considered. **We support TP 1-3,** as it lists all the situations that original channels not impacted by cell DTX/DRX.  **For TP 1-2/1-4**  Support  **For TP 1-5**,  OK with the second part. But for the first part, we do not think it is needed, since SPS PDSCH overlapped with cell DTX non-active time is not transmitted.  **For TP 1-6**,  Seems the TP is added to a not suitable place. And as to the solution itself, we prefer to choose TP 1-3  **For TP 1-8**,  Also OK with the proposal. But we think the solution is not complete. It only says, some certain channels are excluded from the multiplexing, but not to say about other channels. |
| Huawei, HiSilicon | The issue of UL PUCCH/PPUSCH channel multiplexing discussed in TPs # 1-1\1-2\1-3\1-4\1-6\1-7 is important for discussion. It defines if the UE should transmit or not the UL multiplexed PUCCH/PPUSCH when part of them individually is affected by cell DRX.  In our TP #1-1, we are proposing a smile and a unified rule for the dropping, the dropping rule at the final stage will be based on a simple rule that if all the overlapping signals or channels are impacted by cell DRX then drop them all, otherwise report them all. This rule is simplifying the gNB and UE implementation and since the gNB is active and receiving some channels then dropping part and leaving part will not have significant power saving gain since the static power consumption part will be consumed by the cell.  We are also OK to discuss the other TPs (TP 1-3 from Xiaomi) and the wording to achieve the above rule. |

## 4.2 UTO-UCI during cell DRX

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [1] Huawei | **Reason for change:**  The UE behavior to handle Rel-18 CG PUSCH TOs during the non-active periods of cell DRX is not clear in the current Rel-18 RAN1 specification.  **Summary of change:**  Clarify that the UE can use CG PUSCH TOs that are located in the non-active periods of cell DRX while there is a UTO-UCI indicates value ‘0’ for the corresponding CG PUSCH TO.  **Consequence if not approved:**  UE behaviour of handling CG PUSCH TOs will not be clear when these TOs are located in the non-active periods of cell DRX.  ***Proposal 4: For UE behaviour on XR CG transmission during the non-active periods of cell DRX, adopt the TP4 for clause 9.3.1 of TS 38.213.***  ---------------------------- Start of Text Proposal 4 for TS 38.213 -----------------------------  < Unchanged parts are omitted >  9.3.1 UE procedure for reporting UTO-UCI  < Unchanged parts are omitted >  If the UE is provided *nrof\_UTO\_UCI* with value equal to in *configuredGrantConfig* of a CG-PUSCH configuration, the UE multiplexes UTO-UCI represented by a bitmap of bits in each CG-PUSCH transmission for the CG-PUSCH configuration.  The bits of UTO-UCI, , have a one-to-one mapping to subsequent CG-PUSCH TOs in ascending order of start time. For unpaired spectrum operation, the subsequent CG-PUSCH TOs exclude invalid ones where a UE does not transmit a PUSCH due to collision of the PUSCH with DL symbol(s) indicated by *tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigurationDedicated* if provided, or with symbol(s) of an SS/PBCH block with index provided by *ssb-PositionsInBurst*, based on the procedures in Clause 11.1. A bit value of '0' indicates that the UE may transmit CG-PUSCH, and a bit value of '1' indicates that the UE will not transmit CG-PUSCH, in a corresponding CG-PUSCH TO. When the UE indicates by UTO-UCI a value of '1' for a CG-PUSCH TO, the UE continues to indicate the value of '1' for the CG-PUSCH TO by UTO-UCI multiplexed in subsequent CG-PUSCH transmissions, and the UE does not transmit CG-PUSCH in the CG-PUSCH TO. If cell DRX is activated and the UE indicates by UTO-UCI the value of ‘0’ for the CG-PUSCH TO that is in the non-active periods of cell DRX, the UE may transmit CG-PUSCH on the corresponding CG-PUSCH TO.  --------------------------------------- End of Text Proposal ---------------------------------- |
| [17] LGE | **Proposal #12:** For consistency with UTO-UCI configuration principle in XR, the CG occasions in the cell DRX non-active period can be treated as invalid occasions for indication of the unused CG PUSCH transmission occasions (i.e., UTO-UCI).  **Proposal #13:** Adopt the TP #4 in Appendix for TS 38.213 Section 9.3.1.  **Reason for Change:**   * If the UE is provided *nrof\_UTO\_UCI* with value equal to in *configuredGrantConfig* of a CG-PUSCH configuration, the UE multiplexes UTO-UCI represented by a bitmap of bits in each CG-PUSCH transmission for the CG-PUSCH configuration. Since, UE does not transmit on CG-PUSCH during cell DRX inactive periods, it is necessary to determine how to configure the UTO-UCI information for CG-PUSCH TOs belonging to the cell DRX non-active period.   **Summary of Changes:**   * Consider CG-PUSCH TOs in the cell DRX non-active period as invalid and exclude them when configuring the UTO-UCI information about unused CG PUSCH transmission occasions.   **Consequences if not approved:**   * Unclear UE behavior to configure the UTO-UCI information for CG-PUSCH TOs belonging to the cell DRX non-active period.   9.3.1 UE procedure for reporting UTO-UCI  If the UE is provided *nrof\_UTO\_UCI* with value equal to in *configuredGrantConfig* of a CG-PUSCH configuration, the UE multiplexes UTO-UCI represented by a bitmap of bits in each CG-PUSCH transmission for the CG-PUSCH configuration.  The bits of UTO-UCI, , have a one-to-one mapping to subsequent CG-PUSCH TOs in ascending order of start time. For unpaired spectrum operation, the subsequent CG-PUSCH TOs exclude invalid ones where a UE does not transmit a PUSCH based on the procedures in Clause 11.1. For cell DRX operation, the subsequent CG-PUSCH TOs exclude invalid ones where a UE does not transmit a CG-PUSCH overlapping with non-active period of cell DRX when cell DRX is activated. A bit value of ‘0’ indicates that the UE may transmit CG-PUSCH, and a bit value of ‘1’ indicates that the UE will not transmit CG-PUSCH, in a corresponding CG-PUSCH TO. When the UE indicates by UTO-UCI a value of ‘1’ for a CG-PUSCH TO, the UE continues to indicate the value of ‘1’ for the CG-PUSCH TO by UTO-UCI multiplexed in subsequent CG-PUSCH transmissions, and the UE does not transmit CG-PUSCH in the CG-PUSCH TO. |

### Summary of Issues

Two companies provided inputs on handling of UTO-UCI when overlaps with cell DRX. The proposal defer in how UTO-UCI is handled. Moderator suggests discussion them both.

##### TP #2-1

**Reason for change:**

The UE behavior to handle Rel-18 CG PUSCH TOs during the non-active periods of cell DRX is not clear in the current Rel-18 RAN1 specification.

**Summary of change:**

Clarify that the UE can use CG PUSCH TOs that are located in the non-active periods of cell DRX while there is a UTO-UCI indicates value ‘0’ for the corresponding CG PUSCH TO.

**Consequence if not approved:**

UE behaviour of handling CG PUSCH TOs will not be clear when these TOs are located in the non-active periods of cell DRX.

---------------------------- Start of Text Proposal 4 for TS 38.213 -----------------------------

< Unchanged parts are omitted >

9.3.1 UE procedure for reporting UTO-UCI

< Unchanged parts are omitted >

If the UE is provided *nrof\_UTO\_UCI* with value equal to in *configuredGrantConfig* of a CG-PUSCH configuration, the UE multiplexes UTO-UCI represented by a bitmap of bits in each CG-PUSCH transmission for the CG-PUSCH configuration.

The bits of UTO-UCI, , have a one-to-one mapping to subsequent CG-PUSCH TOs in ascending order of start time. For unpaired spectrum operation, the subsequent CG-PUSCH TOs exclude invalid ones where a UE does not transmit a PUSCH due to collision of the PUSCH with DL symbol(s) indicated by *tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigurationDedicated* if provided, or with symbol(s) of an SS/PBCH block with index provided by *ssb-PositionsInBurst*, based on the procedures in Clause 11.1. A bit value of '0' indicates that the UE may transmit CG-PUSCH, and a bit value of '1' indicates that the UE will not transmit CG-PUSCH, in a corresponding CG-PUSCH TO. When the UE indicates by UTO-UCI a value of '1' for a CG-PUSCH TO, the UE continues to indicate the value of '1' for the CG-PUSCH TO by UTO-UCI multiplexed in subsequent CG-PUSCH transmissions, and the UE does not transmit CG-PUSCH in the CG-PUSCH TO. If cell DRX is activated and the UE indicates by UTO-UCI the value of ‘0’ for the CG-PUSCH TO that is in the non-active periods of cell DRX, the UE may transmit CG-PUSCH on the corresponding CG-PUSCH TO.

--------------------------------------- End of Text Proposal ----------------------------------

##### TP #2-2

**Reason for Change:**

* If the UE is provided *nrof\_UTO\_UCI* with value equal to in *configuredGrantConfig* of a CG-PUSCH configuration, the UE multiplexes UTO-UCI represented by a bitmap of bits in each CG-PUSCH transmission for the CG-PUSCH configuration. Since, UE does not transmit on CG-PUSCH during cell DRX inactive periods, it is necessary to determine how to configure the UTO-UCI information for CG-PUSCH TOs belonging to the cell DRX non-active period.

**Summary of Changes:**

* Consider CG-PUSCH TOs in the cell DRX non-active period as invalid and exclude them when configuring the UTO-UCI information about unused CG PUSCH transmission occasions.

**Consequences if not approved:**

* Unclear UE behavior to configure the UTO-UCI information for CG-PUSCH TOs belonging to the cell DRX non-active period.

======= Start of TP for TS38.213 =========

**9.3.1 UE procedure for reporting UTO-UCI**

If the UE is provided *nrof\_UTO\_UCI* with value equal to in *configuredGrantConfig* of a CG-PUSCH configuration, the UE multiplexes UTO-UCI represented by a bitmap of bits in each CG-PUSCH transmission for the CG-PUSCH configuration.

The bits of UTO-UCI, , have a one-to-one mapping to subsequent CG-PUSCH TOs in ascending order of start time. For unpaired spectrum operation, the subsequent CG-PUSCH TOs exclude invalid ones where a UE does not transmit a PUSCH based on the procedures in Clause 11.1. For cell DRX operation, the subsequent CG-PUSCH TOs exclude invalid ones where a UE does not transmit a CG-PUSCH overlapping with non-active period of cell DRX when cell DRX is activated. A bit value of ‘0’ indicates that the UE may transmit CG-PUSCH, and a bit value of ‘1’ indicates that the UE will not transmit CG-PUSCH, in a corresponding CG-PUSCH TO. When the UE indicates by UTO-UCI a value of ‘1’ for a CG-PUSCH TO, the UE continues to indicate the value of ‘1’ for the CG-PUSCH TO by UTO-UCI multiplexed in subsequent CG-PUSCH transmissions, and the UE does not transmit CG-PUSCH in the CG-PUSCH TO.

======= End of TP for TS38.213 =========

### Round 1 - Discussion

Moderator suggests discussion on proposals #2-1 and #2-2.

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Spec may not be optimized for joint NES and XR case. |
| Samsung | Justification of simultaneously supporting both features need clarification. NES is targeting low-medium traffic load but XR is with large packet and high reliability requirements, the traffic load for XR is usually high.  Even if the two features are enabled together, following legacy CG operation seems to be enough. |
| Huawei, HiSilicon | In current spec, when both Cell DRX and UTO-UCI are enabled in the same cell, then the UE behavior will not be clear. We think this issue should be discussed. And considering the contiguous flow of XR traffic and its required QoS, then proposal #2-1 is preferred because it make sure that the XR traffic is not interrupted by cell DRX inactive time when it require so. |

## 4.3 CG bundle transmission during cell DRX

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [1] Huawei | **Reason for change:**  During last RAN1 meetings, it is agreed that UE shall omit the transmission occasions in a CG bundle during the non-active periods of cell DRX.   |  | | --- | | Agreement  UE transmits a subset of the repetitions in a CG bundle that do not overlap with the cell DRX non-active period |   Though the agreement was made, the current spec still does not capture it properly. Hence, it is recommended that the additional description be added to in spec to avoid ambiguity.  **Summary of change:**  Clarify that the UE shall omit transmission occasions in a CG bundle during the non-active periods of cell DRX.  **Consequence if not approved:**  The UE behaviour on CG bundle transmission during the non-active periods of cell DRX is ambiguous.  ***Proposal 5: For UE behaviour on CG bundle transmission during the non-active periods of cell DRX, adopt the TP5 for clause 6.1.2.1, clause 6.1.2.3.1, clause 6.1.2.3.3 and clause 6.1.7 of TS 38.214.***  ---------------------------- Start of Text Proposal 5 for TS 38.214 -----------------------------  < Unchanged parts are omitted >  6.1.2.1 Resource allocation in time domain  < Unchanged parts are omitted >  If a UE would transmit a PUSCH of PUSCH repetition Type A when *AvailableSlotCounting* is enabled and K>1 or a TB processing over multiple slots over slots, and the UE does not transmit the PUSCH of a TB processing over multiple slots or the PUSCH repetition Type A in a slot from the slots, according to Clause 9, Clause 11.1, Clause 11.2A, Clause 15 and Clause 17.2 of [6, TS 38.213] , or due to overlapping with non-active period of cell DRX, the UE counts the slots in the number of slots.  < Unchanged parts are omitted >  For PUSCH repetition Type A and TB processing over multiple slots, a PUSCH transmission in a slot of a multi-slot PUSCH transmission is omitted according to the conditions in Clause 9, Clause 11.1, Clause 11.2A, Clause 15 and Clause 17.2 of [6, TS 38.213], or due to overlapping with non-active period of cell DRX.  < Unchanged parts are omitted >  For PUSCH repetition Type B, after determining the invalid symbol(s) for PUSCH repetition type B transmission for each of the *K* nominal repetitions, the remaining symbols are considered as potentially valid symbols for PUSCH repetition Type B transmission. If the number of potentially valid symbols for PUSCH repetition type B transmission is greater than zero for a nominal repetition, the nominal repetition consists of one or more actual repetitions, where each actual repetition consists of a consecutive set of all potentially valid symbols that can be used for PUSCH repetition Type B transmission within a slot. An actual repetition with a single symbol is omitted except for the case of *L*=1. An actual repetition is omitted according to the conditions in Clause 9, Clause 11.1, Clause 11.2A, Clause 15 and Clause 17.2 of [6, TS 38.213], or due to overlapping with non-active period of cell DRX. The UE shall repeat the TB across actual repetitions. The redundancy version to be applied on the *n*th actual repetition (with the counting including the actual repetitions that are omitted) is determined according to table 6.1.2.1-2, where *N*=1.  For PUSCH repetition Type B, when a UE receives a DCI that schedules aperiodic CSI report(s) or activates semi-persistent CSI report(s) on PUSCH with no transport block by a '*CSI request'* field on a DCI, the number of nominal repetitions is always assumed to be 1, regardless of the value of *numberOfRepetitions*. When the UE is scheduled to transmit a PUSCH repetition Type B with no transport block and with aperiodic or semi-persistent CSI report(s) by a '*CSI request'* field on a DCI, the first nominal repetition is expected to be the same as the first actual repetition. For PUSCH repetition Type B carrying semi-persistent CSI report(s) without a corresponding PDCCH after being activated on PUSCH by a '*CSI request'* field on a DCI, if the first nominal repetition is not the same as the first actual repetition, the first nominal repetition is omitted; otherwise, the first nominal repetition is omitted according to the conditions in Clause 9, Clause 11.1, Clause 11.2A, Clause 15 and Clause 17.2 of [6, TS 38.213] , or due to overlapping with non-active period of cell DRX.  < Unchanged parts are omitted >  6.1.2.3.1 Transport Block repetition for uplink transmissions of PUSCH repetition Type A with a configured grant  < Unchanged parts are omitted >  A Type 1 or Type 2 PUSCH transmission with a configured grant in a slot is omitted according to the conditions in Clause 9, Clause 11.1, Clause 11.2A, Clause 15 and Clause 17.2 of [6, TS 38.213], or due to overlapping with non-active period of cell DRX.  < Unchanged parts are omitted >  6.1.2.3.3 Transport Block repetition for uplink transmissions of TB processing over multiple slots with a configured grant  < Unchanged parts are omitted >  For Type 2 PUSCH transmission with a configured grant of TB processing over multiple slots*,* the UE shall transmit the TB across the slots determined for the PUSCH transmission applying the same symbol allocation in each slot. A Type 2 PUSCH transmission with a configured grant of TB processing over multiple slots is omitted in a slot according to the conditions in clause 9, clause 11.1, clause 11.2A, Clause 15 and Clause 17.2 of [6, TS 38.213], or due to overlapping with non-active period of cell DRX.  < Unchanged parts are omitted >  6.1.7 UE procedure for determining time domain windows for bundling DM-RS  < Unchanged parts are omitted >  Events which cause power consistency and phase continuity not to be maintained across PUSCH transmissions of PUSCH repetition type A scheduled by DCI format 0\_1 or 0\_2, or PUSCH repetition Type A with a configured grant, or PUSCH repetition type B or TB processing over multiple slots, or PUCCH transmissions of PUCCH repetition, within the nominal TDW, are:  < Unchanged parts are omitted >  - For PUSCH transmissions of PUSCH repetition type A, or PUSCH repetition type B or TB processing over multiple slots, a dropping or cancellation of a PUSCH transmission according to clause 9, clause 11.1 and clause 11.2A of [6, TS 38.213], or due to overlapping with non-active period of cell DRX.  < Unchanged parts are omitted >  --------------------------------------- End of Text Proposal ---------------------------------- |

### Summary of Issues

Huawei has pointed out that previous RAN1 agreement has not be correctly captured in the specifications.

##### 82TP #3-1

**Reason for change:**

During last RAN1 meetings, it is agreed that UE shall omit the transmission occasions in a CG bundle during the non-active periods of cell DRX.

|  |
| --- |
| Agreement  UE transmits a subset of the repetitions in a CG bundle that do not overlap with the cell DRX non-active period |

Though the agreement was made, the current spec still does not capture it properly. Hence, it is recommended that the additional description be added to in spec to avoid ambiguity.

**Summary of change:**

Clarify that the UE shall omit transmission occasions in a CG bundle during the non-active periods of cell DRX.

**Consequence if not approved:**

The UE behaviour on CG bundle transmission during the non-active periods of cell DRX is ambiguous.

---------------------------- Start of Text Proposal 5 for TS 38.214 -----------------------------

< Unchanged parts are omitted >

6.1.2.1 Resource allocation in time domain

< Unchanged parts are omitted >

If a UE would transmit a PUSCH of PUSCH repetition Type A when *AvailableSlotCounting* is enabled and K>1 or a TB processing over multiple slots over slots, and the UE does not transmit the PUSCH of a TB processing over multiple slots or the PUSCH repetition Type A in a slot from the slots, according to Clause 9, Clause 11.1, Clause 11.2A, Clause 15 and Clause 17.2 of [6, TS 38.213], or due to overlapping with non-active period of cell DRX, the UE counts the slots in the number of slots.

< Unchanged parts are omitted >

For PUSCH repetition Type A and TB processing over multiple slots, a PUSCH transmission in a slot of a multi-slot PUSCH transmission is omitted according to the conditions in Clause 9, Clause 11.1, Clause 11.2A, Clause 15 and Clause 17.2 of [6, TS 38.213], or due to overlapping with non-active period of cell DRX.

< Unchanged parts are omitted >

For PUSCH repetition Type B, after determining the invalid symbol(s) for PUSCH repetition type B transmission for each of the *K* nominal repetitions, the remaining symbols are considered as potentially valid symbols for PUSCH repetition Type B transmission. If the number of potentially valid symbols for PUSCH repetition type B transmission is greater than zero for a nominal repetition, the nominal repetition consists of one or more actual repetitions, where each actual repetition consists of a consecutive set of all potentially valid symbols that can be used for PUSCH repetition Type B transmission within a slot. An actual repetition with a single symbol is omitted except for the case of *L*=1. An actual repetition is omitted according to the conditions in Clause 9, Clause 11.1, Clause 11.2A, Clause 15 and Clause 17.2 of [6, TS 38.213], or due to overlapping with non-active period of cell DRX. The UE shall repeat the TB across actual repetitions. The redundancy version to be applied on the *n*th actual repetition (with the counting including the actual repetitions that are omitted) is determined according to table 6.1.2.1-2, where *N*=1.

For PUSCH repetition Type B, when a UE receives a DCI that schedules aperiodic CSI report(s) or activates semi-persistent CSI report(s) on PUSCH with no transport block by a '*CSI request'* field on a DCI, the number of nominal repetitions is always assumed to be 1, regardless of the value of *numberOfRepetitions*. When the UE is scheduled to transmit a PUSCH repetition Type B with no transport block and with aperiodic or semi-persistent CSI report(s) by a '*CSI request'* field on a DCI, the first nominal repetition is expected to be the same as the first actual repetition. For PUSCH repetition Type B carrying semi-persistent CSI report(s) without a corresponding PDCCH after being activated on PUSCH by a '*CSI request'* field on a DCI, if the first nominal repetition is not the same as the first actual repetition, the first nominal repetition is omitted; otherwise, the first nominal repetition is omitted according to the conditions in Clause 9, Clause 11.1, Clause 11.2A, Clause 15 and Clause 17.2 of [6, TS 38.213], or due to overlapping with non-active period of cell DRX.

< Unchanged parts are omitted >

6.1.2.3.1 Transport Block repetition for uplink transmissions of PUSCH repetition Type A with a configured grant

< Unchanged parts are omitted >

A Type 1 or Type 2 PUSCH transmission with a configured grant in a slot is omitted according to the conditions in Clause 9, Clause 11.1, Clause 11.2A, Clause 15 and Clause 17.2 of [6, TS 38.213], or due to overlapping with non-active period of cell DRX.

< Unchanged parts are omitted >

6.1.2.3.3 Transport Block repetition for uplink transmissions of TB processing over multiple slots with a configured grant

< Unchanged parts are omitted >

For Type 2 PUSCH transmission with a configured grant of TB processing over multiple slots*,* the UE shall transmit the TB across the slots determined for the PUSCH transmission applying the same symbol allocation in each slot. A Type 2 PUSCH transmission with a configured grant of TB processing over multiple slots is omitted in a slot according to the conditions in clause 9, clause 11.1, clause 11.2A, Clause 15 and Clause 17.2 of [6, TS 38.213], or due to overlapping with non-active period of cell DRX.

< Unchanged parts are omitted >

6.1.7 UE procedure for determining time domain windows for bundling DM-RS

< Unchanged parts are omitted >

Events which cause power consistency and phase continuity not to be maintained across PUSCH transmissions of PUSCH repetition type A scheduled by DCI format 0\_1 or 0\_2, or PUSCH repetition Type A with a configured grant, or PUSCH repetition type B or TB processing over multiple slots, or PUCCH transmissions of PUCCH repetition, within the nominal TDW, are:

< Unchanged parts are omitted >

- For PUSCH transmissions of PUSCH repetition type A, or PUSCH repetition type B or TB processing over multiple slots, a dropping or cancellation of a PUSCH transmission according to clause 9, clause 11.1 and clause 11.2A of [6, TS 38.213], or due to overlapping with non-active period of cell DRX.

< Unchanged parts are omitted >

--------------------------------------- End of Text Proposal ----------------------------------

### Round 1 - Discussion

Moderator suggests discussion on proposal #3-1.

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | OK |
| Samsung | We should clarify the partial overlapping case first, for example, a CG PUSCH repetition overlaps with both active and non-active periods in a slot. |
| Huawei, HiSilicon | OK |

## 4.4 DCI 2-9 Monitoring during cell DTX

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [2] Nokia, NSB | **Proposal-1:** Clarify the understanding on RAN2 agreement and confirm that the UE should monitor DCI format 2-9 during the non-active period of cell DTX.  **Proposal-2:** RAN1 may send LS to RAN2 to confirm the understanding on RAN2 agreement, where the original intention of RAN2 agreement was targeting only on UE monitoring with USS during the cell DTX non-active period, where the UE monitoring with CSS, i.e. for DCI format 2-9, was not covered by the RAN2 agreement. |
| [6] CATT | **Proposal 6:** For cell DTX/DRX activation and deactivation, UE does not monitor DCI format 2\_9 during cell DTX non-active time.  **Proposal 7:** For cell DTX/DRX activation and deactivation, if the PDCCH monitoring occasion of DCI format 2\_9 is determined based on common search space configuration, the periodicity of common search space is determined by the periodicity of cell DTX.  Proposal 8: A time window is introduced to monitor DCI format 2\_9 for cell DTX/DRX activation and deactivation.  **Proposal 9:** For cell DTX/DRX activation and deactivation, if a periodic time window for monitoring DCI format 2\_9 is introduced, one of the following alternatives for determining the time window is supported:   * Alt 1: The periodicity of time window is determined and derived by the periodicity of cell DTX. * Alt 2: The time window is determined by the reference point, which could be the start of the cell DTX non-active time or the end of the cell DTX active time.   **Proposal 10:** If UE is expected to monitor DCI format 2\_9 during cell DTX non-active time or C-DRX non-active time, one of the following alternatives is supported:   * Alt 1: The common search space configurations for determining the DCI format 2\_9 monitoring occasion is different between cell DTX active time and cell DTX non-active time. * Alt 2: The common search space configurations for determining the DCI format 2\_9 monitoring occasion is different between C-DRX active time and C-DRX non-active time. * Alt 3: A time window is introduced for determining the DCI format 2\_9 monitoring occasion during cell DTX non-active time or C-DRX non-active time. |
| [8] Xiaomi | **Observation 1:** Current specification already support to use the high layer parameter ps-Wakeup to configure whether start the next on duration if DCI 2-6 is not monitored.  **Proposal 2:** UE does not monitor DCI 2-6 during cell DTX non-active period.  **Proposal 3:** As to whether monitor DCI 2-9 during UE C-DRX non-active period, down select from the two alternatives  Alt 1, UE does not monitor DCI 2-9 during UE C-DRX non-active period.  Alt 2, UE monitor DCI 2-9 during the overlapping period between C-DRX non-active time and cell-DTX non-active time. |
| [14] ASUSTek | **Proposal 1:** UE is not expected to monitor DCI format 2-9 during non-active periods of C-DRX  **Proposal 2:** RAN1 send LS to RAN2 to include proposal 1 in their specification. |
| [17] LGE | **Proposal #9:** Clarify whether UE monitors DCI format 2\_9 during onDuration of C-DRX in case that DCI format 2\_6 indicates ‘go-to-sleep’ or is monitored but not detected if *ps-Wakeup* is not configured. |

### Summary of Issues

On the issue of monitoring DCI 2-9 during non-active periods of UE C-DRX, the issue was extensively discussed in the previous RAN1 meetings. However, company views were quite split and no consensus was made. It is not clear to the moderator if company positions have changed to untangle the non-consensus status.

Unless there are significant updates that could be provided by companies, moderator suggests not to further discuss something that reached no consensus.

Nokia suggest sending a LS to RAN2 to inform the information about DCI 2-9. However, given the lack of consensus on the matter, it is not clear what the LS content should be. Moderator suggest bit further about potential LS to RAN2.

LGE suggests clarifying one monitoring operation during UE C-DRX.

##### Proposal #4-1

* UE monitors DCI format 2\_9 during onDuration of C-DRX in case that DCI format 2\_6 indicates ‘go-to-sleep’ or is monitored but not detected if *ps-Wakeup* is not configured.

### Round 1 - Discussion

Moderator suggests discussion on the proposal #4-1. Moderator ask LGE to provide a text proposal of the proposal.

Moderator asks company to provide comment on sending of LS to RAN2 on the DCI format 2-9 monitoring issue during non-active periods of UE C-DRX. If sent, what should be the content. Please note the content should be something that has been concluded or agreed in the RAN1.

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | This issue has been discussed for several meeting. From UE power saving perspective, we support DCI format 2\_9 is not monitored during non-active time of UE C-DRX. |
| Samsung | Support the intention with the following updateProposal #4-1  * UE monitors DCI format 2\_9 during onDuration of C-DRX regardless of the indication/detection of ~~in case that~~ DCI format 2\_6 ~~indicates ‘go-to-sleep’ or is monitored but not detected if~~ *~~ps-Wakeup~~* ~~is not configured~~. |
| Xiaomi | Not OK with the Proposal#4-1. If gNB has indicate DCI format 2\_6 as ‘go-to-sleep’, why UE has to wake up and monitor DCI 2-9? It is not a usual UE behavior.  Our suggestion is to down select from the two alternatives  Alt 1, UE does not monitor DCI 2-9 during UE C-DRX non-active period.  Alt 2, UE monitor DCI 2-9 during the overlapping period between C-DRX non-active time and cell-DTX non-active time. |

## 4.5 Extension of PDCCH monitoring during cell DTX

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [6] CATT | **Observation 1:** When cell DTX/DRX is activated and some UL/DL data packets at UE/gNB buffer, UL/DL data packets transmission may be interrupted by entering the cell DTX/DRX non-active time even if the C-DRX *drx-InactivityTimer* is running at the UE. These UL/DL data packets need to wait till the next cell DTX/DRX active time, which results in significant degradation of user perceived throughput or increasing the latency.  **Proposal 3:** The L1 signaling is supported to indicate the extension of PDCCH monitoring for dynamic grant/assignment beyond cell DTX/DRX active time, e.g. DCI format 0\_1 and DCI format 1\_1. |

### Summary of Issues

CATT has proposed to extend the PDCCH monitoring of dynamic grants and assignments beyond the cell DTX/DRX active time. Moderator notes that it was RAN2 that decided UE should not monitor dynamic grants during cell DTX. Therefore, RAN2 might be a better forum for this proposal discussion. With that said, RAN1 could debate the proposal further, but suggest discussing with a lower priority.

##### Proposal #5-1

* The L1 signaling is supported to indicate the extension of PDCCH monitoring for dynamic grant/assignment beyond cell DTX/DRX active time, e.g. DCI format 0\_1 and DCI format 1\_1.

### Round 1 - Discussion

Moderator suggests discussion on proposal #5-1.

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | It seems an optimization |
| Samsung | Seems not essential. |
| Xiaomi | Similar view as Spreadtrum |
| Huawei, HiSilicon | Agree with Spreadtrum, it is an optimization. And it is RAN2 related issue. |

## 4.6 DCI Format 2-9 field design

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [6] CATT | **Proposal 11:** For cell DTX/DRX activation and deactivation, the DCI format 2\_9 contains N information blocks corresponding to M serving cells, and UE may be configured with more than one information block for a serving cell.  **Proposal 12:** For DCI format 2\_9 based cell DTX/DRX activation and deactivation, when a UE is configured with more than one information blocks for a serving cell containing a cell-specific information block and a UE-group-specific information block, UE determines the cell DTX/DRX activation and deactivation based on the indication of UE-group-specific information block. |

### Summary of Issues

CATT has proposed to support indication more than one information for a serving cell in DCI format 2-9. Based on moderator’s reading of proponents contribution, the motivation is support different cell DTX/DRX configuration for different traffic flows of the UE. However, given that cell DTX/DRX is effectively a cell based operation even though the indication is performed UE specifically, it is not clear how the multiple information blocks for a serving cell is functioning. All in all, the proposal seems to be inclusion of a new feature instead of correcting an essential aspect.

While moderator asks companies to provide inputs on CATT proposal, given that it seems to be an entirely new proposal, moderator would suggest not to put priority on this discussion.

##### Proposal #6-1

* For cell DTX/DRX activation and deactivation, the DCI format 2\_9 contains N information blocks corresponding to M serving cells, and UE may be configured with more than one information block for a serving cell.
* For DCI format 2\_9 based cell DTX/DRX activation and deactivation, when a UE is configured with more than one information blocks for a serving cell containing a cell-specific information block and a UE-group-specific information block, UE determines the cell DTX/DRX activation and deactivation based on the indication of UE-group-specific information block.

### Round 1 - Discussion

Moderator suggests discussion on Proposal #6-1.

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | It seems late. DCI format 2\_9 is defined as cell specific already. |
| Samsung | Not support.  The first bullet reverts previous agreement. |
| Xiaomi | Similar view as Spreadtrum |
| Huawei, HiSilicon | UE-group-specific information block is a new issue and should not be discussed. |

## 4.7 Handling of Type 2 HARQ Codebook

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [8] Xiaomi | **Proposal 1:** Suggest to adopt the following TP#1 for TS 38.213,   |  | | --- | | **TP#1:**  **Reasons for change:**  It is already agreed the HARQ feedback of cancelled SPS PDSCH by non-active period of cell DTX is not transmitted by UE. But for Type 2 HARQ-ACK codebook for SPS PDSCHs, it is not differentiated SPS PDSCH with or without non-active period of cell DTX in the current specification.  **Summary of change:**  UE does not generate a HARQ-ACK information bit for anSPS PDSCH overlapping with non-active period of cell DTX for Type 2 HARQ-ACK codebook for SPS PDSCHs.  **Consequences if not adopted:**  Un-aligned UE behaviour for Type 1 and Type 2 HARQ-ACK codebook generation | | **9.1.3.1 Type-2 HARQ-ACK codebook in physical uplink control channel**  \*\*\* Unchanged text omitted \*\*\*  If a UE is configured to receive SPS PDSCH and the UE multiplexes HARQ-ACK information for one activated SPS PDSCH reception based on *downlinkHARQ-FeedbackDisabled* if provided [12, TS 38.331], including the ones associated with the corresponding activation DCI, in the PUCCH in slot , the UE generates one HARQ-ACK information bit associated with the SPS PDSCH reception not overlapping with non-active period of cell DTX and appends it to the HARQ-ACK information bits.  If a UE is configured to receive SPS PDSCH and the UE multiplexes HARQ-ACK information for multiple activated SPS PDSCH receptions, including the ones associated with the corresponding activation DCI and excluding the ones that provide only transport blocks for HARQ processes associated with disabled HARQ-ACK information if *downlinkHARQ-FeedbackDisabled* is provided, in the PUCCH in slot , the UE generates the HARQ-ACK information as described in clause 9.1.2 and appends it to the HARQ-ACK information bits.  \*\*\* Unchanged text omitted \*\*\* | |
| [17] LGE | **Proposal #10:** For HARQ-ACK Type-2 codebook, if all SPS occasions corresponding to a PUCCH slot are included in the Cell DTX non-active period and the corresponding HARQ-ACK bits are multiplexed with other HARQ-ACKs, the HARQ-ACK codebook can be constructed without the HARQ-ACK corresponding to SPS PDSCH(s). |

### Summary of Issues

Xiaomi and LGE have proposed the generation of HARQ-ACK Type 2 codebook should follow the Type 1 codebook cases.

##### TP #7-1

**Reasons for change:**

It is already agreed the HARQ feedback of cancelled SPS PDSCH by non-active period of cell DTX is not transmitted by UE. But for Type 2 HARQ-ACK codebook for SPS PDSCHs, it is not differentiated SPS PDSCH with or without non-active period of cell DTX in the current specification.

**Summary of change:**

UE does not generate a HARQ-ACK information bit for anSPS PDSCH overlapping with non-active period of cell DTX for Type 2 HARQ-ACK codebook for SPS PDSCHs.

**Consequences if not adopted:**

Un-aligned UE behaviour for Type 1 and Type 2 HARQ-ACK codebook generation

========== Start of TP for TS38.213 ===========

**9.1.3.1 Type-2 HARQ-ACK codebook in physical uplink control channel**

\*\*\* Unchanged text omitted \*\*\*

If a UE is configured to receive SPS PDSCH and the UE multiplexes HARQ-ACK information for one activated SPS PDSCH reception based on *downlinkHARQ-FeedbackDisabled* if provided [12, TS 38.331], including the ones associated with the corresponding activation DCI, in the PUCCH in slot , the UE generates one HARQ-ACK information bit associated with the SPS PDSCH reception not overlapping with non-active period of cell DTX and appends it to the HARQ-ACK information bits.

If a UE is configured to receive SPS PDSCH and the UE multiplexes HARQ-ACK information for multiple activated SPS PDSCH receptions, including the ones associated with the corresponding activation DCI and excluding the ones that provide only transport blocks for HARQ processes associated with disabled HARQ-ACK information if *downlinkHARQ-FeedbackDisabled* is provided, in the PUCCH in slot , the UE generates the HARQ-ACK information as described in clause 9.1.2 and appends it to the HARQ-ACK information bits.

\*\*\* Unchanged text omitted \*\*\*

========== End of TP for TS38.213 ============

### Round 1 - Discussion

Moderator suggests discussion on proposal #7-1.

|  |  |
| --- | --- |
| Company | Comments |
| Samsung | Fine in principle, suggest the following update  If a UE is configured to receive SPS PDSCH on a serving cell and the UE multiplexes HARQ-ACK information for one activated SPS PDSCH reception based on *downlinkHARQ-FeedbackDisabled* if provided [12, TS 38.331], including the ones associated with the corresponding activation DCI, in the PUCCH in slot , the UE generates one HARQ-ACK information bit associated with the SPS PDSCH reception not overlapping with non-active period of cell DTX of the serving cell and appends it to the HARQ-ACK information bits. |
| Xiaomi | support |
| Huawei, HiSilicon | ok |

## 4.8 DCI Format 2-9 application delay

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [8] Xiaomi | **Proposal 4:** Suggest to adopt the following TP#2 in TS 38.213,   |  | | --- | | **TP#2:**  **Reasons for change:**  After receiving DCI 2-9, UE need some preparation time, which is the application delay, for corresponding UE behaviour for cell DTX/DRX activation/deactivation. It is common understanding that gNB should not change cell DTX/DRX activation/deactivation in DCI 2-9 too frequently to cause UE behaviour disorder.  **Summary of change:**  If UE receive a first DCI 2-9, and within the largest application delay of all corresponding cells, UE does not expect to receive another DCI 2-9 which has different activation/ deactivation indication from the first DCI 2-9.  **Consequences if not adopted:**  Too frequent DCI 2-9 indication may cause UE behaviour disorder. | | **11.5 Adaptation of cell operation**  \*\*\* Unchanged text omitted \*\*\*  When a UE receives in slot on the active DL BWP of a first serving cell a PDCCH providing DCI format 2\_9 that indicates a change in activation or deactivation of a current cell DTX operation or cell DRX operation for a second serving cell, the UE operates on the second serving cell according to the indicated cell DTX operation or cell DRX operation starting from a slot on the active DL BWP or on the active UL BWP of the second serving cell, respectively, that is not before the beginning of the slot on the active DL BWP of the first serving cell where is a number of slots for the SCS of the active DL BWP of the first serving cell in Table 11.5-1. If UE receive a first DCI 2-9, and within the largest application delay of all corresponding cells, UE does not expect to receive another DCI 2-9 which has different activation/ deactivation indication from the first DCI 2-9.  Table 11.5-1: Minimum time gap value   |  |  | | --- | --- | | **SCS (kHz)** | **Number of slots** | | 15 | 3 | | 30 | 6 | | 60 | 12 | | 120 | 24 | | 480 | 96 | | 960 | 192 |   \*\*\* Unchanged text omitted \*\*\* | |

### Summary of Issues

Xiaomi has proposed to update on reception of DCI 2-9 prior to completion of application time from a previous DCI 2-9 transmission.

##### TP #8-1

**Reasons for change:**

After receiving DCI 2-9, UE need some preparation time, which is the application delay, for corresponding UE behaviour for cell DTX/DRX activation/deactivation. It is common understanding that gNB should not change cell DTX/DRX activation/deactivation in DCI 2-9 too frequently to cause UE behaviour disorder.

**Summary of change:**

If UE receive a first DCI 2-9, and within the largest application delay of all corresponding cells, UE does not expect to receive another DCI 2-9 which has different activation/ deactivation indication from the first DCI 2-9.

**Consequences if not adopted:**

Too frequent DCI 2-9 indication may cause UE behaviour disorder.

==== Start of TP for TS38.213 ==========

**11.5 Adaptation of cell operation**

\*\*\* Unchanged text omitted \*\*\*

When a UE receives in slot on the active DL BWP of a first serving cell a PDCCH providing DCI format 2\_9 that indicates a change in activation or deactivation of a current cell DTX operation or cell DRX operation for a second serving cell, the UE operates on the second serving cell according to the indicated cell DTX operation or cell DRX operation starting from a slot on the active DL BWP or on the active UL BWP of the second serving cell, respectively, that is not before the beginning of the slot on the active DL BWP of the first serving cell where is a number of slots for the SCS of the active DL BWP of the first serving cell in Table 11.5-1. If UE receive a first DCI 2-9, and within the largest application delay of all corresponding cells, UE does not expect to receive another DCI 2-9 which has different activation/ deactivation indication from the first DCI 2-9.

\*\*\* Unchanged text omitted \*\*\*

====== End of TP for TS38.213 =======

### Round 1 - Discussion

Moderator suggests discussion on proposals #8-1.

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | It seems corner case. DCI format 2\_9 may not configured in short periodicity typically. |
| Xiaomi | Support the proposal as we are the proponent. And this case is not a minor case, it is a usual solution which has already be adopted in R16/17 SSSG switching DCI indication. And it can prevent disorder in UE behavior thus is quite necessary. |
| Huawei, HiSilicon | ok |

## 4.9 PDCCH Monitoring in cell DTX

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [9] OPPO | **Reason of change**: the agreement in RAN1#114 on UE monitoring behavior for DCI 2\_0 to DCI 2\_5 during non-active periods of cell DTX is not captured in the specification.  **Summary of change**: add UE monitoring behavior for DCI 2\_0 to DCI 2\_5 during non-active periods of cell DTX  **Consequences if not approved**: the UE behavior is completely different from the agreement  ------------ start of TP for TS 38.213-----------------------  11 UE-group common signaling 11.5 Adaptation of cell operation <unchanged parts are omitted>  A UE does not expect to monitor PDCCH for detection of DCI format 2\_9 on more than one serving cells of one cell group.  A UE does not expect to monitor PDCCH for detection of DCI format 2\_0, DCI format 2\_1, DCI format 2\_2, DCI format 2\_3, DCI format 2\_4 or DCI format 2\_5 if configured, and if cell DTX operation is activated and the Serving Cell is not in the cell DTX Active Period.  When a UE receives in slot on the active DL BWP of a first serving cell a PDCCH providing DCI format 2\_9 that indicates a change in activation or deactivation of a current cell DTX operation or cell DRX operation for a second serving cell, the UE operates on the second serving cell according to the indicated cell DTX operation or cell DRX operation starting from a slot on the active DL BWP or on the active UL BWP of the second serving cell, respectively, that is not before the beginning of the slot on the active DL BWP of the first serving cell where is a number of slots for the SCS of the active DL BWP of the first serving cell in Table 11.5-1.  <unchanged parts are omitted>  ------------ end of TP for TS 38.213 ----------------------- |

### Summary of Issues

OPPO has suggested to capture the monitoring of DCI format 2-0, 2-1, 2-2, 2-3, 2-4, and 2-5 that was agreed in previous RAN1 meeting into the RAN1 specification.

##### TP#9-1.

**Reason of change**: the agreement in RAN1#114 on UE monitoring behavior for DCI 2\_0 to DCI 2\_5 during non-active periods of cell DTX is not captured in the specification.

**Summary of change**: add UE monitoring behavior for DCI 2\_0 to DCI 2\_5 during non-active periods of cell DTX

**Consequences if not approved**: the UE behavior is completely different from the agreement

------------ start of TP for TS 38.213-----------------------

**11 UE-group common signaling**

**11.5 Adaptation of cell operation**

<unchanged parts are omitted>

A UE does not expect to monitor PDCCH for detection of DCI format 2\_9 on more than one serving cells of one cell group.

A UE does not expect to monitor PDCCH for detection of DCI format 2\_0, DCI format 2\_1, DCI format 2\_2, DCI format 2\_3, DCI format 2\_4 or DCI format 2\_5 if configured, and if cell DTX operation is activated and the Serving Cell is not in the cell DTX Active Period.

When a UE receives in slot on the active DL BWP of a first serving cell a PDCCH providing DCI format 2\_9 that indicates a change in activation or deactivation of a current cell DTX operation or cell DRX operation for a second serving cell, the UE operates on the second serving cell according to the indicated cell DTX operation or cell DRX operation starting from a slot on the active DL BWP or on the active UL BWP of the second serving cell, respectively, that is not before the beginning of the slot on the active DL BWP of the first serving cell where is a number of slots for the SCS of the active DL BWP of the first serving cell in Table 11.5-1.

<unchanged parts are omitted>

------------ end of TP for TS 38.213 -----------------------

### Round 1 - Discussion

Moderator suggests discussion on proposal #9-1.

|  |  |
| --- | --- |
| Company | Comments |
| Samsung | The issue is under discussion of RAN2, no need to repeat the discussion in RAN1. |
| Xiaomi | support |
| Huawei, HiSilicon | ok |

## 4.10 CSI-RS/SRS handling during cell DTX/DRX

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [10] Samsung | **Proposal 6:** Adopt the following TP for TS 38.214.  **Reason for change:** The UE behaviour of receiving/transmitting a channel partially overlaps with non-active period of cell DTX/DRX is not clear.  **Summary of change:** Clarify that a UE is not expected to receive the periodic CSI-RS and semi-persistent CSI-RS configured in CSI report configuration in CSI-*ReportConfig* associated with the higher layer parameter *reportQuantity* comprising at least ‘RI’ if all the symbols of the CSI-RS overlap with non-active periods of cell DTX. A UE configured with cell DRX is not expected to transmit the periodic SRS, or semi-persistent SRS for channel acquisition if all the symbols of the periodic SRS, or semi-persistent SRS for channel acquisition overlap with non-active periods of cell DRX, respectively.  **Consequences if not approved:**gNB and UE may have different understanding regarding whether a channel is received/transmitted if the channel partially overlaps with non-active period of cell DTX/DRX.   |  | | --- | | 5.1.6.1 CSI-RS reception procedure \*\*\* Unchanged text is omitted \*\*\*  ~~During non-active periods of cell DTX, the~~ A UE configured with cell DTX is not expected to receive the periodic CSI-RS and semi-persistent CSI-RS configured in CSI report configuration in CSI-*ReportConfig* associated with the higher layer parameter *reportQuantity* comprising at least ‘RI’ if all the symbols of the CSI-RS overlap with non-active periods of cell DTX.  \*\*\* Unchanged text is omitted \*\*\* 6.2.1 UE sounding procedure \*\*\* Unchanged text is omitted \*\*\*  ~~During non-active periods of cell DRX, the~~ A UE configured with cell DRX is not expected to transmit the periodic SRS, or semi-persistent SRS for channel acquisition if all the symbols of the periodic SRS, or semi-persistent SRS for channel acquisition overlap with non-active periods of cell DRX, respectively. SRS for positioning is not impacted by cell DRX operation. |   **Proposal 14: For *CSI-ReportConfig* configured with time restriction, when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*, adopt the following TP for TS 38.214.**  **Reason for change**: The UE behavior is not defined for *CSI-ReportConfig* configured with time restriction set to "*Configured*", when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.  **Summary of change:** Defines the UE behavior for *CSI-ReportConfig* configured with time restriction set to "*Configured*", when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.  **Consequences if not approved:**Undefined UE behavior on performing CSI report corresponding to *CSI-ReportConfig* configured with time restriction, when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.   |  | | --- | | 5.2.2.1 Channel quality indicator (CQI) \*\*\* Unchanged text is omitted \*\*\*  If the higher layer parameter *timeRestrictionForChannelMeasurements* in*CSI-ReportConfig* is set to "*Configured*", the UE shall derive the channel measurements for computing CSI reported in uplink slot *n* based on only the most recent, no later than the CSI reference resource, in cell DTX active time of a serving cell if cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*, occasion of NZP CSI-RS (defined in [4, TS 38.211]) associated with the CSI resource setting.  \*\*\* Unchanged text is omitted \*\*\*  If the higher layer parameter *timeRestrictionForInterferenceMeasurements* in *CSI-ReportConfig* is set to "*Configured*", the UE shall derive the interference measurements for computing the CSI value reported in uplink slot *n* based on the most recent, no later than the CSI reference resource, in cell DTX active time of a serving cell if cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*, occasion of CSI-IM and/or NZP CSI-RS for interference measurement (defined in [4, TS 38.211]) associated with the CSI resource setting.  \*\*\* Unchanged text is omitted \*\*\* |   **Proposal 15:** For *CSI-ReportConfig* configured with the higher layer parameter *reportQuantity* comprising at least 'RI', when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*, adopt the following TP for TS 38.214.  **Reason for change**: The UE behavior is not defined for *CSI-ReportConfig* configured with the higher layer parameter *reportQuantity* comprising at least 'RI', when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.  **Summary of change:** Defines the UE behavior for *CSI-ReportConfig* configured with the higher layer parameter *reportQuantity* comprising at least 'RI', when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.  **Consequences if not approved:**Undefined UE behavior on performing CSI report or receiving CSI-RS corresponding to *CSI-ReportConfig* configured with the higher layer parameter *reportQuantity* comprising at least 'RI', when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.   |  | | --- | | 5.1.6.1 CSI-RS reception procedure \*\*\* Unchanged text is omitted \*\*\*  If the CSI resource Setting linked to *CSI-ReportConfig* is located on a serving cell with cell DTX activated [10, TS 38.321], d~~D~~uring non-active periods of cell DTX of the serving cell, the UE ~~configured with cell DTX~~ is not expected to receive the periodic CSI-RS and semi-persistent CSI-RS configured in CSI report configuration in the CSI-*ReportConfig* associated with the higher layer parameter *reportQuantity* comprising at least 'RI'. If the cell DTX is activated for a serving cell [10, TS 38.321] with the CSI resource Setting linked to the *CSI-ReportConfig*, the most recent CSI measurement occasion of semi-persistent CSI-RS resource or periodic CSI-RS resource occurs in active periods of cell DTX of the serving cell for CSI report configured by *CSI-ReportConfig* associated with the higher layer parameter *reportQuantity* comprising at least 'RI'.  \*\*\* Unchanged text is omitted \*\*\* 5.2.2.5 CSI reference resource definition \*\*\* Unchanged text is omitted \*\*\*  For the CSI report configuration in CSI-*ReportConfig* associated with the higher layer parameter *reportQuantity* comprising at least 'RI' and the CSI resource Setting linked to the *CSI-ReportConfig* is located on a serving cell with cell DTX activated [10, TS 38.321], the UE reports a CSI report only if receiving at least one CSI-RS transmission occasion of each periodic CSI-RS resource or semi-persistent CSI-RS resource for channel measurement and/or interference measurement in active periods of cell DTX of the serving cell no later than CSI reference resource, and the UE drops the CSI report otherwise.  \*\*\* Unchanged text is omitted \*\*\* |   **Proposal 16:** For *CSI-ReportConfig* configured with *codebookType* set to 'typeII-Doppler-r18' or 'typeII-Doppler-PortSelection-r18' when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*, adopt the following TP for TS 38.214.  **Reason for change:** The UE behavior is not defined for *CSI-ReportConfig* configured with *codebookType* set to 'typeII-Doppler-r18' or 'typeII-Doppler-PortSelection-r18' when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.  **Summary of change:** Defines the UE behavior for *CSI-ReportConfig* configured with *codebookType* set to 'typeII-Doppler-r18' or 'typeII-Doppler-PortSelection-r18' when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.  **Consequences if not approved:**Undefined UE behavior on performing CSI report corresponding to *CSI-ReportConfig* configured with *codebookType* set to 'typeII-Doppler-r18' or 'typeII-Doppler-PortSelection-r18' when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.   |  | | --- | | 5.2.2.5 CSI reference resource definition \*\*\* Unchanged text is omitted \*\*\*  For a *CSI-ReportConfig* configured with *codebookType* set to 'typeII-Doppler-r18' or 'typeII-Doppler-PortSelection-r18', after the CSI report (re)configuration, serving cell activation, BWP change, or activation of SP-CSI, the UE reports a CSI report only if receiving at least one aperiodic or 𝐾𝑝 periodic or semipersistent consecutive CSI-RS transmission occasions for each CSI-RS resource in the corresponding CSI-RS Resource Set for channel measurement and one CSI-RS and/or CSI-IM resource transmission occasion for the CSI-RS and/or CSI-IM resource in the corresponding Resource Set for interference measurement no later than the CSI reference resource and within the same active period of cell DTX, cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*, and drops the report otherwise. The value of 𝐾𝑝∈{1,2,4} is indicated by UE capability, as defined in clause 5.2.1.6.  When deriving CSI feedback, the UE is not expected that a NZP CSI-RS resource for channel measurement overlaps with CSI-IM resource for interference measurement or NZP CSI -RS resource for interference measurement.  \*\*\* Unchanged text is omitted \*\*\* | |

### Summary of Issues

Samsung has provided set of TPs correct or update CSI-RS resource handling for CSI when CSI-RS is impacted by cell DTX.

##### TP #10-1

**Reason for change:** The UE behaviour of receiving/transmitting a channel partially overlaps with non-active period of cell DTX/DRX is not clear.

**Summary of change:** Clarify that a UE is not expected to receive the periodic CSI-RS and semi-persistent CSI-RS configured in CSI report configuration in CSI-*ReportConfig* associated with the higher layer parameter *reportQuantity* comprising at least ‘RI’ if all the symbols of the CSI-RS overlap with non-active periods of cell DTX. A UE configured with cell DRX is not expected to transmit the periodic SRS, or semi-persistent SRS for channel acquisition if all the symbols of the periodic SRS, or semi-persistent SRS for channel acquisition overlap with non-active periods of cell DRX, respectively.

**Consequences if not approved:**gNB and UE may have different understanding regarding whether a channel is received/transmitted if the channel partially overlaps with non-active period of cell DTX/DRX.

|  |
| --- |
| 5.1.6.1 CSI-RS reception procedure \*\*\* Unchanged text is omitted \*\*\*  ~~During non-active periods of cell DTX, the~~ A UE configured with cell DTX is not expected to receive the periodic CSI-RS and semi-persistent CSI-RS configured in CSI report configuration in CSI-*ReportConfig* associated with the higher layer parameter *reportQuantity* comprising at least ‘RI’ if all the symbols of the CSI-RS overlap with non-active periods of cell DTX.  \*\*\* Unchanged text is omitted \*\*\* 6.2.1 UE sounding procedure \*\*\* Unchanged text is omitted \*\*\*  ~~During non-active periods of cell DRX, the~~ A UE configured with cell DRX is not expected to transmit the periodic SRS, or semi-persistent SRS for channel acquisition if all the symbols of the periodic SRS, or semi-persistent SRS for channel acquisition overlap with non-active periods of cell DRX, respectively. SRS for positioning is not impacted by cell DRX operation. |

##### TP#10-2

**Reason for change**: The UE behavior is not defined for *CSI-ReportConfig* configured with time restriction set to "*Configured*", when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.

**Summary of change:** Defines the UE behavior for *CSI-ReportConfig* configured with time restriction set to "*Configured*", when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.

**Consequences if not approved:**Undefined UE behavior on performing CSI report corresponding to *CSI-ReportConfig* configured with time restriction, when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.

|  |
| --- |
| 5.2.2.1 Channel quality indicator (CQI) \*\*\* Unchanged text is omitted \*\*\*  If the higher layer parameter *timeRestrictionForChannelMeasurements* in *CSI-ReportConfig* is set to "*Configured*", the UE shall derive the channel measurements for computing CSI reported in uplink slot *n* based on only the most recent, no later than the CSI reference resource, in cell DTX active time of a serving cell if cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*, occasion of NZP CSI-RS (defined in [4, TS 38.211]) associated with the CSI resource setting.  \*\*\* Unchanged text is omitted \*\*\*  If the higher layer parameter *timeRestrictionForInterferenceMeasurements* in *CSI-ReportConfig* is set to "*Configured*", the UE shall derive the interference measurements for computing the CSI value reported in uplink slot *n* based on the most recent, no later than the CSI reference resource, in cell DTX active time of a serving cell if cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*, occasion of CSI-IM and/or NZP CSI-RS for interference measurement (defined in [4, TS 38.211]) associated with the CSI resource setting.  \*\*\* Unchanged text is omitted \*\*\* |

##### TP#10-3

**Reason for change**: The UE behavior is not defined for *CSI-ReportConfig* configured with the higher layer parameter *reportQuantity* comprising at least 'RI', when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.

**Summary of change:** Defines the UE behavior for *CSI-ReportConfig* configured with the higher layer parameter *reportQuantity* comprising at least 'RI', when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.

**Consequences if not approved:**Undefined UE behavior on performing CSI report or receiving CSI-RS corresponding to *CSI-ReportConfig* configured with the higher layer parameter *reportQuantity* comprising at least 'RI', when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.

|  |
| --- |
| 5.1.6.1 CSI-RS reception procedure \*\*\* Unchanged text is omitted \*\*\*  If the CSI resource Setting linked to *CSI-ReportConfig* is located on a serving cell with cell DTX activated [10, TS 38.321], d~~D~~uring non-active periods of cell DTX of the serving cell, the UE ~~configured with cell DTX~~ is not expected to receive the periodic CSI-RS and semi-persistent CSI-RS configured in CSI report configuration in the CSI-*ReportConfig* associated with the higher layer parameter *reportQuantity* comprising at least 'RI'. If the cell DTX is activated for a serving cell [10, TS 38.321] with the CSI resource Setting linked to the *CSI-ReportConfig*, the most recent CSI measurement occasion of semi-persistent CSI-RS resource or periodic CSI-RS resource occurs in active periods of cell DTX of the serving cell for CSI report configured by *CSI-ReportConfig* associated with the higher layer parameter *reportQuantity* comprising at least 'RI'.  \*\*\* Unchanged text is omitted \*\*\* 5.2.2.5 CSI reference resource definition \*\*\* Unchanged text is omitted \*\*\*  For the CSI report configuration in CSI-*ReportConfig* associated with the higher layer parameter *reportQuantity* comprising at least 'RI' and the CSI resource Setting linked to the *CSI-ReportConfig* is located on a serving cell with cell DTX activated [10, TS 38.321], the UE reports a CSI report only if receiving at least one CSI-RS transmission occasion of each periodic CSI-RS resource or semi-persistent CSI-RS resource for channel measurement and/or interference measurement in active periods of cell DTX of the serving cell no later than CSI reference resource, and the UE drops the CSI report otherwise.  \*\*\* Unchanged text is omitted \*\*\* |

##### TP#10-4

**Reason for change:** The UE behavior is not defined for *CSI-ReportConfig* configured with *codebookType* set to 'typeII-Doppler-r18' or 'typeII-Doppler-PortSelection-r18' when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.

**Summary of change:** Defines the UE behavior for *CSI-ReportConfig* configured with *codebookType* set to 'typeII-Doppler-r18' or 'typeII-Doppler-PortSelection-r18' when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.

**Consequences if not approved:**Undefined UE behavior on performing CSI report corresponding to *CSI-ReportConfig* configured with *codebookType* set to 'typeII-Doppler-r18' or 'typeII-Doppler-PortSelection-r18' when cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*.

|  |
| --- |
| 5.2.2.5 CSI reference resource definition \*\*\* Unchanged text is omitted \*\*\*  For a *CSI-ReportConfig* configured with *codebookType* set to 'typeII-Doppler-r18' or 'typeII-Doppler-PortSelection-r18', after the CSI report (re)configuration, serving cell activation, BWP change, or activation of SP-CSI, the UE reports a CSI report only if receiving at least one aperiodic or 𝐾𝑝 periodic or semipersistent consecutive CSI-RS transmission occasions for each CSI-RS resource in the corresponding CSI-RS Resource Set for channel measurement and one CSI-RS and/or CSI-IM resource transmission occasion for the CSI-RS and/or CSI-IM resource in the corresponding Resource Set for interference measurement no later than the CSI reference resource and within the same active period of cell DTX, cell DTX is activated on the serving cell with the CSI resource Setting linked to the *CSI-ReportConfig*, and drops the report otherwise. The value of 𝐾𝑝∈{1,2,4} is indicated by UE capability, as defined in clause 5.2.1.6.  When deriving CSI feedback, the UE is not expected that a NZP CSI-RS resource for channel measurement overlaps with CSI-IM resource for interference measurement or NZP CSI -RS resource for interference measurement.  \*\*\* Unchanged text is omitted \*\*\* |

### Round 1 - Discussion

Moderator suggests discussion on proposals #10-1, #10-2, #10-3, and #10-4.

|  |  |
| --- | --- |
| Company | Comments |
| Samsung | Support |
| Xiaomi | TP 1 seems not necessary. Since we have already agreed that CSI-RS overlapped with cell DTX non-active period is not transmitted. |
| Huawei, HiSilicon | OK to discuss. |

## 4.11 Handling of signal/channel repetition during cell DTX/DRX

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [17] LGE | **Proposal #11:** For signals/channels (e.g., PDCCH/PDSCH/CSI-RS/PUCCH/PUSCH/SRS) configured with repeated transmission, if the resources of signals/channels are included in or partially overlapped with the Cell DTX/DRX non-active period, the resource may skip transmission or reception until the end of the non-active period. |

### Summary of Issues

LGE has proposed proposal on handling of repeated transmissions when it partially overlaps with non-active periods of cell DTX/DRX.

##### Proposal #11-1

* For signals/channels (e.g., PDCCH/PDSCH/CSI-RS/PUCCH/PUSCH/SRS) configured with repeated transmission, if the resources of signals/channels are included in or partially overlapped with the Cell DTX/DRX non-active period, the resource may skip transmission or reception until the end of the non-active period.

### Round 1 - Discussion

Moderator suggests discussion on proposals #11-1.

Moderator would like to ask LGE to provide the text changes required for Proposal #11-1. Otherwise editors will have put lot of effort tracking down all relevant sections that require changes.

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Not necessary. It is up to gNB implementation |
| Samsung | Clarification is necessary for the UE behaviour. |
|  |  |

## 4.12 Power/Phase Continuity of PUSCH/PUCCH during cell DRX

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [18] Qualcomm | **Observation:** If UE drops a PUCCH/PUSCH repetition overlapping with the non-active periods of Cell DTX, the UE is not able to maintain power consistency and phase continuity across PUSCH transmissions of PUSCH repetition type A scheduled by DCI format 0\_1 or 0\_2, or PUSCH repetition Type A with a configured grant, or PUSCH repetition type B or TB processing over multiple slots, or PUCCH transmissions of PUCCH repetition, within the nominal TDW.  **Proposal**: RAN1 adopts the following TP to TS 38.214   |  | | --- | | 6.1.7 UE procedure for determining time domain windows for bundling DM-RS  <unchanged text is omitted>  Events which cause power consistency and phase continuity not to be maintained across PUSCH transmissions of PUSCH repetition type A scheduled by DCI format 0\_1 or 0\_2, or PUSCH repetition Type A with a configured grant, or PUSCH repetition type B or TB processing over multiple slots, or PUCCH transmissions of PUCCH repetition, within the nominal TDW, are:  - A downlink slot or downlink reception or downlink monitoring based on *tdd-UL-DL-ConfigurationCommon* and *tdd-UL-DL-ConfigurationDedicated* for unpaired spectrum.  - The gap between any two consecutive PUSCH transmissions, or the gap between any two consecutive PUCCH transmissions, exceeds 13 symbols for normal cyclic prefix or exceeds 11 symbols for extended cyclic prefix.  - The gap between any two consecutive PUSCH transmissions, or the gap between any two consecutive PUCCH transmissions, does not exceed 13 symbols but other uplink transmissions are scheduled between the two consecutive PUSCH transmissions or the two consecutive PUCCH transmissions.  - For PUSCH transmissions of PUSCH repetition type A, or PUSCH repetition type B or TB processing over multiple slots, a dropping or cancellation of a PUSCH transmission according to clause 9, clause 11.1, ~~and~~ clause 11.2A of [6, TS 38.213], and clause 5.34.3 of TS 38.321.  - For PUCCH transmissions of PUCCH repetition, a dropping or cancellation of a PUCCH transmission according to clause 9, clause 9.2.6, ~~and~~ clause 11.1 of [6, TS 38.213], and clause 5.34.3 of TS 38.321.  - For any two consecutive PUSCH transmissions of PUSCH repetition type A, or PUSCH repetition type B, and when two SRS resource sets are configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* in *SRS-ResourceSet* set to 'codebook' or 'noncodebook', a different SRS resource set association is used for the two PUSCH transmissions of PUSCH repetition type A, or PUSCH repetition type B, according to Clause 6.1.2.1.  - For any two consecutive PUCCH transmissions of PUCCH repetition, and when a PUCCH resource used for repetitions of a PUCCH transmission by a UE includes first and second spatial relations or first and second sets of power control parameters, as described in [10, TS 38.321] and in clause 7.2.1 of [6, TS 38.213], different spatial relations or different power control parameters are used for the two PUCCH transmissions of PUCCH repetition, according to Clause 9.2.6 of [6, TS 38.213].  - Uplink timing adjustment in response to a timing advance command according to clause 4.2 of [6, TS 38.213].  - Frequency hopping.  - For reduced capability half-duplex UEs,  - a dropping or cancellation of a PUSCH or PUCCH transmission according to clause 17.2 of [6, TS 38.213] or  - an overlapping of the gap between two consecutive PUSCH or two consecutive PUCCH transmissions and any symbol of downlink reception or downlink monitoring  <unchanged text is omitted> | |

### Summary of Issues

Qualcomm has brought the issue on power consistency and phase continuity when UE drops PUSCH due to cell DRX.

##### TP #12-1

**Reasons for change:**

If UE drops a PUCCH/PUSCH repetition overlapping with the non-active periods of Cell DTX, the UE is not able to maintain power consistency and phase continuity across PUSCH transmissions of PUSCH repetition type A scheduled by DCI format 0\_1 or 0\_2, or PUSCH repetition Type A with a configured grant, or PUSCH repetition type B or TB processing over multiple slots, or PUCCH transmissions of PUCCH repetition, within the nominal TDW.

**Summary of change:**

Add cell DRX as events for not maintaining power consistency and phase continuity for PUSCH and PUCCH repetition.

**Consequences if not approved:**

UE may not be able to support PUSCH dropping from cell DRX due to power consistency/phase continuity constraints.

========= Start of TP for TS38.214 ===========

**6.1.7 UE procedure for determining time domain windows for bundling DM-RS**

<unchanged text is omitted>

Events which cause power consistency and phase continuity not to be maintained across PUSCH transmissions of PUSCH repetition type A scheduled by DCI format 0\_1 or 0\_2, or PUSCH repetition Type A with a configured grant, or PUSCH repetition type B or TB processing over multiple slots, or PUCCH transmissions of PUCCH repetition, within the nominal TDW, are:

- A downlink slot or downlink reception or downlink monitoring based on *tdd-UL-DL-ConfigurationCommon* and *tdd-UL-DL-ConfigurationDedicated* for unpaired spectrum.

- The gap between any two consecutive PUSCH transmissions, or the gap between any two consecutive PUCCH transmissions, exceeds 13 symbols for normal cyclic prefix or exceeds 11 symbols for extended cyclic prefix.

- The gap between any two consecutive PUSCH transmissions, or the gap between any two consecutive PUCCH transmissions, does not exceed 13 symbols but other uplink transmissions are scheduled between the two consecutive PUSCH transmissions or the two consecutive PUCCH transmissions.

- For PUSCH transmissions of PUSCH repetition type A, or PUSCH repetition type B or TB processing over multiple slots, a dropping or cancellation of a PUSCH transmission according to clause 9, clause 11.1, ~~and~~ clause 11.2A of [6, TS 38.213], and clause 5.34.3 of TS 38.321.

- For PUCCH transmissions of PUCCH repetition, a dropping or cancellation of a PUCCH transmission according to clause 9, clause 9.2.6, ~~and~~ clause 11.1 of [6, TS 38.213], and clause 5.34.3 of TS 38.321.

<unchanged text is omitted>

========= End of TP for TS38.214 ===========

### Round 1 - Discussion

Moderator suggests discussion on proposals #12-1.

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Not necessary. It is up to gNB implementation |
| Huawei, HiSilicon | This is also discussed in our TP (captured as TP #3-1). It is hard for gNB to avoid the overlapping between PUCCH/PUSCH repetitions and non-active periods of Cell DTX. In such case, UE is not required to maintain power consistency/phase continuity. |

## 4.13 Editorial Changes

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [9] OPPO | **Reason of change**: the parameter name in RAN1 specification is different from that of in RAN2 specification, while they are assumed to be the same parameter.  **Summary of change**: align the parameter name between RAN1 and RAN2 by replacing NES-RNTI with cellDTRX-RNT  **Consequences if not approved**: A same parameter being represented by different names in RAN1 and RAN2 specification may cause confusing.  ------------ start of TP for TS 38.213----------------------- 10.1 UE procedure for determining physical downlink control channel assignment <unchanged parts are omitted>  - a Type3-PDCCH CSS set configured by  - *SearchSpace* in *PDCCH-Config* with *searchSpaceType* = *common* for DCI formats with CRC scrambled by INT-RNTI, SFI-RNTI, TPC-PUSCH-RNTI, TPC-PUCCH-RNTI, TPC-SRS-RNTI, CI-RNTI, or ~~NES-RNTI~~ cellDTRX-RNTI and, only for the primary cell, C-RNTI, MCS-C-RNTI, CS-RNTI(s), or PS-RNTI, or  <unchanged parts are omitted>  ------------ end of TP for TS 38.213 ----------------------- |
| [15] ITRI | ***Proposal:***  ***Update NES-RNTI as cellDTRX-RNTI***  ***Reason for change:***  For consistency purposes, RRC parameter name should be updated in the specification.  ***Summary of change:***  Update RRC parameter *‘NES-RNTI’* as *‘cellDTRX-RNTI’* in Section 10.1 in TS 38.213.  ***Consequence if not approved:***  RRC parameter name is not consistent. 10.1 UE procedure for determining physical downlink control channel assignment \*\*\* Unchanged parts are omitted \*\*\*  - a Type3-PDCCH CSS set configured by  - SearchSpace in PDCCH-Config with searchSpaceType = common for DCI formats with CRC scrambled by INT-RNTI, SFI-RNTI, TPC-PUSCH-RNTI, TPC-PUCCH-RNTI, TPC-SRS-RNTI, CI-RNTI, or ~~NES-RNTI~~ cellDTRX-RNTI and, only for the primary cell, C-RNTI, MCS-C-RNTI, CS-RNTI(s), or PS-RNTI, or  - SearchSpace in pdcch-ConfigMulticast for DCI formats with CRC scrambled by G-RNTI, or G-CS-RNTI, or  - searchSpaceMCCH and searchSpaceMTCH on a secondary cell for a DCI format 4\_0 with CRC scrambled by a MCCH-RNTI or a G-RNTI for broadcast, and  \*\*\* Unchanged parts are omitted \*\*\* |

### Summary of Issues

Two companies suggested the same editorial changes required to align the RRC parameter naming. Moderator assumes the changes are essential but editorial in nature.

##### TP #13-1

**Reason of change**: the parameter name in RAN1 specification is different from that of in RAN2 specification, while they are assumed to be the same parameter.

**Summary of change**: align the parameter name between RAN1 and RAN2 by replacing NES-RNTI with cellDTRX-RNT

**Consequences if not approved**: A same parameter being represented by different names in RAN1 and RAN2 specification may cause confusing.

------------ start of TP for TS 38.213-----------------------

**10.1 UE procedure for determining physical downlink control channel assignment**

<unchanged parts are omitted>

- a Type3-PDCCH CSS set configured by

- *SearchSpace* in *PDCCH-Config* with *searchSpaceType* = *common* for DCI formats with CRC scrambled by INT-RNTI, SFI-RNTI, TPC-PUSCH-RNTI, TPC-PUCCH-RNTI, TPC-SRS-RNTI, CI-RNTI, or ~~NES-RNTI~~ cellDTRX-RNTI and, only for the primary cell, C-RNTI, MCS-C-RNTI, CS-RNTI(s), or PS-RNTI, or

<unchanged parts are omitted>

------------ end of TP for TS 38.213 -----------------------

### Round 1 - Discussion

Moderator suggests discussion on the proposal #13-1.

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | OK |
| Xiaomi | OK |
| Huawei, HiSilicon | OK |

## 4.14 Others

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [6] CATT | **Proposal 4:** Rel-18 UE supporting cell DTX does not expect to receive and/or process the following signals/channels from the gNB except to DCI format 2\_6, during non-active time of cell DTX.   * CSI-RS configured by *measObjectNR* (for RRM) * CSI-RS associated with *RadioLinkMonitoringConfig* and *BeamFailureDectection* (for RLM and BFD) * Periodic CSI-RS configured with *trs-Info* ‘true’ (for tracking) * Periodic/Semi-persistent CSI-RS (for BM)   **Proposal 5:** The activation and deactivation of cell DTX/DRX by DCI format 2\_9 should consider the following aspects:   * The cell DTX/DRX is a semi-static procedure and is not activated or deactivated frequently. * The activation and deactivation of cell DTX/DRX should reduce the impact to the UE power consumption. |
| [10] Samsung | **Proposal 3:** RAN1 conclude that TRS is not impacted by cell DTX.   * Note: The above has no RAN1 specification impact.   **Proposal 4:** RAN1 conclude that UE transmits PUSCH with AP-CSI during non-active periods of cell DRX if a PDCCH providing a DCI format triggering AP-CSI is received.   * Note: The above has no RAN1 specification impact.   **Proposal 5:** UE receives/transmits the following channels overlapping with both active and non-active periods of cell DTX/DRX, respectively.   * SPS PDSCH * PDCCH that are not monitoring during non-active periods of cell DTX * P/SP-CSI-RS for CSI * P/SP CSI report * P/SP SRS * SR * CG PUSCH   Send LS to RAN2 to ask to consider the above.  **Proposal 7:** The reception/transmission of the following channels when overlapping with non-active period of cell DTX/DRX is determined per slot/sub-slot.   * SPS PDSCH * PDCCH that are not monitoring during non-active periods of cell DTX * P/SP CSI report * SR   Send LS to RAN2 to ask to consider the above. |

### Summary of Issues

Companies has provides set of proposal that seem to conclude observations of the state of signals and channel that get impacted from cell DTX/DRX. Companies also proposed to send the information to RAN2 as a LS.

It is not clear to the moderator, whether making conclusions during maintanence is the best approach to crystalize the specification. It would be preferred that companies provide proposals that provide information on what changes are needed for the specification, even if it is not in the form of text proposals. This would be beneficial for companies to better understand the required changes for the specifications.

### Round 1 - Discussion

Moderator asks companies to further provide proposals that explain changes required to the specifications or issues identified with the specifications.

|  |  |
| --- | --- |
| Company | Comments |
|  |  |

## 4.15 RRC Parameters

|  |  |
| --- | --- |
| **Company** | **Proposals & Observations** |
| [4] Intel | **Proposal 1:**   * Inform RAN2 of new RRC parameter, *cellDTXDRX-L1activation*, that enable activation/deactivation of cell DTX/DRX configurations via DCI 2-9. The parameter should be configured for each serving cell. |
| [13] Ericsson | Observation 1 The RRC parameter description for cellDTXDRXL1activation as referenced in post-RAN1#115 RRC parameter email discussion summary (R1-2312716), section 2.1.8 is clear.  Proposal 2 Confirm the row#16 for NES (i.e. for parameter cellDTXDRXL1activation as described in R1-2312716) as stable and include it into the next update for NES higher layer parameters list. |
| [10] Samsung | **Proposal 8:** [cellDTXDRX-L1activation] configures the serving cell index corresponding to each block in DCI format 2\_9. |

### Summary of Issues

Three companies provided inputs to add the RRC parameter for L1 signaling enablement. Two companies proposed that it is enable/disable, and one company is proposing to indicate serving cell index. Please note that based on latest approved RRC specification CR, the cell DRX/DTX configuration is provided per serving cell and positionInDCI-cellDTRX signaling is also provided per serving cell.

The actual signal design should be left up to RAN2, and as such moderator suggests to simply provide information that [cellDTXDRX-L1activation] indicates enablement of activation/deactivation of cell DTX/DRX and let RAN2 define the signaling as needed.

##### Proposal #15-1:

* Include cellDTXDRX-L1activation to the updated RRC parameter list to be shared with RAN2.
  + Description for parameter: Configure L1 signaling based on DCI 2\_9 to enable dynamic activation/deactivation of cell DTX/DRX configuration per serving cell. Note: cellDTXDRX-L1activation can be configured individually per cell for subset of serving cells.
  + Signaling to be provided per serving cell.

### Round 1 - Discussion

Moderator suggests discussion on proposal #15-1.

|  |  |
| --- | --- |
| Company | Comments |
|  |  |

# Summary of Agreements/Conclusions from RAN1 #116

To be filled by moderator.

# Reference

1. R1-2400122, “Maintenance of Rel-18 NES,” Huawei, HiSilicon
2. R1-2400183, “Maintenance on Network Energy Savings for NR,” Nokia, Nokia Shanghai Bell
3. R1-2400220, “Maintenance on Rel-18 network energy saving,” vivo
4. R1-2400372, “Maintanence issues on NES,” Intel Corporation
5. R1-2400391, “Maintenance on NES,” Google
6. R1-2400410, “Remaining Issues in Rel-18 Network Energy Saving,” CATT
7. R1-2400485, “Remaining issues on Rel-18 NES techniques,” ZTE, Sanechips
8. R1-2400540, “Remaining issues on network energy saving,” xiaomi
9. R1-2400588, “Discussion on maintenance on network energy saving for NR,” OPPO
10. R1-2400709, “Remaining issues on network energy saving,” Samsung
11. R1-2400900, “Remaining issues of Rel-18 network energy saving,” Panasonic
12. R1-2400990, “Maintenance of Network Energy Savings for NR,” Apple
13. R1-2401139, “Maintenance for Rel-18 network energy savings,” Ericsson
14. R1-2401185, “Correction on cell DTX DRX,” ASUSTeK
15. R1-2401186, “Maintenance of UE procedure for determining physical downlink control channel assignment,” ITRI
16. R1-2401316, “Maintenance on Network Energy Savings for NR,” MediaTek Inc.
17. R1-2401322, “Remaining issues on NES,” LG Electronics
18. R1-2401419, “Maintenance on cell DTX and DRX,” Qualcomm Incorporated

# Appendix A: RAN1 Agreements

## RAN1 #112 (Feb-2023)

**Agreement**

* RAN1 continues discussion on the at least following physical layer related aspects of cell DTX/DRX aspects
  + physical layer signals/channels and procedures expected to be impacted during non-active periods of cell DTX/DRX
    - consider impact to at least KPIs from the SI when physical layers/signals/channels are impacted by cell DTX/DRX
* Further discussions on other aspects are not precluded

**Agreement**

At least the following candidate signals/channels for connected mode UEs, which the UE may be expected to not transmit or receive during non-active periods of cell DTX/DRX, are considered from RAN1 perspective for further discussion. The exact set of signals/channels that the UE may be expected to not transmit or receive is FFS.

* DL
  + Periodic/Semi-persistent CSI-RS (including TRS)
  + PRS
  + PDCCH scrambled with UE specific RNTI
  + PDCCH in Type-3 CSS
  + SPS-PDSCH
* UL
  + SR
  + Periodic/Semi-persistent CSI report
  + Periodic/Semi-persistent SRS
  + CG-PUSCH

Other signals/channels are not precluded

## RAN1 #112bis (Apr-2023)

**Agreement**

From RAN1 point of view, Rel-18 UE supporting cell DTX does not expect to receive and/or process the following signals/channels from the gNB, during non-active periods of cell DTX. The list of signals/channels may be updated based on RAN2/RAN4 input and other signals/channels are not precluded from further discussions.

* Periodic/Semi-persistent CSI-RS configured in CSI report configuration in CSI-ReportConfig with reportQuantity including RI (for CSI reporting)
* FFS:
  + PDCCH in USS
    - UE behavior for retransmission
    - if some specific RNTI scrambled PDCCH in USS will be excluded from cell DTX operation
  + PDCCH in Type-3 CSS
    - UE behavior for retransmission
    - if some specific RNTI scrambled PDCCH in Type-3 CSS will be excluded from cell DTX operation
  + PRS
  + CSI-RS configured by measObjectNR (for RRM)
  + CSI-RS associated with RadioLinkMonitoringConfig and BeamFailureDectection (for RLM and BFD)
  + Periodic CSI-RS configured with trs-Info ‘true’ (for tracking)
  + Periodic/Semi-persistent CSI-RS (for BM)
    - FFS on how to differentiate (if needed) with other CSI-RS used for CSI reports for BM
* FFS: Whether the same or different UE behavior is applicable with or without C-DRX
* FFS: Whether the list of impacted signals/channels can be configurable
* FFS: Whether there will be exception case(s) for UE receiving and/or processing listed signals/channels during non-active periods of DTX
* FFS: RAN1 to consider impact on system if the channels/signals are not transmitted during non-active period

**Agreement**

Study L1 signalling for enhancing cell DTX/DRX including activation/deactivation for a single configuration which will have the following characteristics:

* PDCCH based signaling
  + FFS: Whether enhancing legacy DCI or introducing new DCI
  + FFS: DCI content
  + FFS: Whether L1 signaling is UE specific DCI or group common DCI
  + FFS: Timer or validity duration based activation/deactivation of cell DTX/DRX
  + FFS: whether to specify a reference time for activation/deactivation of cell DTX/DRX
  + FFS: If multiple Cell DTX/DRX patterns are to be supported
* FFS on detailed UE behavior upon reception of L1 signaling at least including application delay
* FFS how to guarantee reliability of the L1 signaling
* FFS whether the L1 signal can be monitored in non-active periods.

**Agreement**

From RAN1 point of view, Rel-18 UE supporting cell DRX is not expected to transmit the following signals/channels to the gNB during non-active periods of cell DRX. The list of signals/channels may be updated based on RAN2/RAN4 input and other signals/channels are not precluded from further discussions.

* Periodic/Semi-persistent CSI report
* Periodic/Semi-persistent SRS
  + FFS: SRS for positioning
* FFS:
  + HARQ feedback for SPS PDSCH
* FFS whether there will be exception case(s) for UE transmitting listed signals/channels during non-active periods of DRX
* FFS Whether the listed signals/channels can be configurable by gNB
* FFS: Whether the same or different UE behavior is applicable with or without C-DRX
* FFS: RAN1 to consider impact on system if the channels/signals are not transmitted during non-active period

**Further study the following in RAN1:**

* Handling of HARQ-ACK codebook generation when configured with cell DTX/DRX
* Handling of PUCCH deferral operation during non-active periods of cell DRX
* Handling of overlapping channels where a least a channel overlaps with non-active periods of cell DTX/DRX
* Handling of signals/channels that can be received/transmitted repeatedly during non-active periods of cell DTX/DRX
* Handling of PUCCH switching during non-active period to an active cell
* Other enhancements are not precluded.

**Agreement**

For PDDCH monitoring, further work on Rel-18 NES in RAN1 is to follow the RAN2 agreement below:

*10. The understanding for the gNB scheduling behaviour for new transmissions during Cell DTX non-active period is that the gNB does not schedule UE-specific dynamic grants/assignments, even if the UE is in C-DRX Active Time. UE doesn’t monitor PDCCH for dynamic grants/assignments for new transmissions during Cell DTX non-active period, even if the UE is in C-DRX Active time. FFS how to deal with any exceptions (e.g. SR if agreed and RACH).*

**Working Assumption**

* Support of L1 signaling at least for activation/deactivation of a cell DTX and/or DRX configuration is feasible (e.g., in terms of enabling/disenabling the feature) from RAN1 perspective.
  + This does not imply that L1 activation/deactivation is supported in Rel-18\
  + Note: Reliability, overhead, and benefits are FFS

## RAN1 #113 (May-2023)

**Agreement**

RAN1 supports the group common L1 signaling using PDCCH for cell DTX/DRX activation and deactivation without HARQ feedback

* Send an LS to RAN2 to consider the additional support of a MAC CE based indication
* Subject to UE capability

**Agreement**

Confirmation of WA from previous meeting with removal of the two sub-bullets.

**Working Assumption**

* + Support of L1 signaling at least for activation/deactivation of a cell DTX and/or DRX configuration is feasible (e.g., in terms of enabling/disenabling the feature) from RAN1 perspective.
    - ~~This does not imply that L1 activation/deactivation is supported in Rel-18\~~
    - ~~Note: Reliability, overhead, and benefits are FFS~~

**Agreement**

DCI format for group common L1 signaling using PDCCH for cell DTX/DRX activation and deactivation (downselect just one among alternatives)

* Alt 1) DCI Format 2\_6 (power saving information outside DRX Active Time)
  + FFS: Monitoring within DRX active time
  + FFS: Field content
* Alt 2) Based on new DCI format 2\_X
  + Field content format
    - Block number 1, block number 2, …, block number N
    - For each block should at least support the following:
      * DTX configuration activation/deactivation
      * DRX configuration activation/deactivation
    - FFS: other field details, mapping of UE and each blocks
  + DCI size indicated by higher layers
  + FFS: RNTI
* FFS: application delay, timers for activation/deactivation
* FFS: handling of multiple cells including when UE supports different number of cells
* FFS: details on PDCCH monitoring aspects, including but not limited to:
  + Search Space
  + PDCCH monitoring occasion
  + slots to monitor (during cell DTX/DRX non-active periods, and active periods)
  + BD/CE aspects
* FFS: UE behavior upon reception of the group common PDCCH (during cell DTX/DRX non-active periods, and active periods), including fallback behavior (if any)

. **Agreement**

For the group common L1 signaling using PDCCH for cell DTX/DRX activation and deactivation

* Alt 2) Based on new DCI format 2\_X
  + DCI size budget is not increased
  + Number of required BDs is not increased
  + FFS: PDCCH monitoring configuration for the new DCI format is identical to PDCCH monitoring configuration for DCI format 2\_6 if the UE monitors both DCI formats
    - FFS: New RNTI is used

## RAN1 #114 (August-2023)

**Agreement**

DCI format 2\_X, for activation and deactivation of cell DTX and DRX configuration,

* at least includes following fields,
  + N information block field(s),
  + Spare/reserved padding bits to match the size configured for DCI 2\_X (if needed)
* payload size is configurable and within the bounds set by existing RAN1 specification
* an information block field contains signaling of activation or deactivation of ‘a configuration of cell DTX and/or DRX’ of ‘a serving cell’
* for serving cell configured with SUL, the same bit is applicable for both NUL and SUL

Above applies at least for sTRP case.

**Agreement**

For at least the case where one cell DTX/DRX pattern is configured, an information block field of DCI format 2\_X for activation and deactivation of cell DTX and DRX configuration supports the following:

* Separate (activation/deactivation) signaling for cell DTX and cell DRX, i.e. one activation/deactivation signaling sub-field for cell DTX configuration and one activation/deactivation signaling sub-field for cell DRX configuration
  + Separate 1 bit indication for each of activation/deactivation for one cell DTX and one cell DRX

Above does not imply that multiple DTX/DRX patterns is not supported.

**Agreement**

Support new RNTI (e.g. nes-RNTI) which is configured by higher layer, for scrambling of DCI format 2\_X

**Agreement**

From RAN1 point of view, DCI format 2\_X supports activation/deactivation of cell DTX/DRX configuration of multiple serving cells and support activation/deactivation per cell

* UE monitor DCI format 2\_X in one serving cell

**Agreement**

Delay that is applied after DCI Format 2\_X reception that activate/deactivate cell DTX/DRX configuration is introduced in Rel-18.

**Agreement**

DCI format 2\_X is monitored in the common search space

Note: Search space set configuration for DCI format 2\_X is separately provided by higher layers

**Agreement**

The following high layer signaling are to be included to the RRC parameter list for new DCI format 2\_X for activation and deactivation of cell DTX/DRX

* search space set configuration with new DCI format 2\_X
* DCI size for new DCI format 2\_X

**Agreement**

* An information block field of DCI format 2\_X is variable size either 1 or 2 bits.
  + Higher layer signaling configures whether the activation/deactivation of cell DTX and/or cell DRX is indicated in DCI format 2\_X for a serving cell.
    - If both cell DTX and cell DRX are configured for a serving cell,
      * 1st bit corresponds to activation/deactivation of cell DTX configuration, and
      * 2nd bit corresponds to activation/deactivation of cell DRX configuration,
    - otherwise, the 1 bit corresponds to the configured cell DTX or cell DRX configuration.
  + Note: this does not imply there may be separate higher layer signaling to enable L1 signaling based activation/deactivation for a cell DTX and/or cell DRX configuration. Signaling design is up to RAN2.

**Agreement**

For each serving cell configured with L1 signaling based activation/deactivation of cell DTX and/or cell DRX configuration, starting bit position of an information block of DCI format 2\_X is provided by UE specific higher layer signaling.

**Agreement**

* UE is expected to apply cell DTX or DRX activation/deactivation change at beginning of the slot X where the SCS of slot X is with respect to the active DL or UL BWP of the serving cell, respectively.
* Slot X is the first slot whose beginning is no earlier than (i.e., same or after) beginning of slot n + D, where D is the delay and n is the slot containing the PDCCH of DCI format 2\_X based on SCS of PDCCH.

|  |  |
| --- | --- |
| SCS of PDCCH (kHz) | Value of D (in unit of slot) |
| 15 | 3 |
| 30 | 6 |
| 60 | 12 |
| 120 | 24 |
| 480 | 96 |
| 960 | 192 |

**Agreement**

Rel-18 UE supporting cell DTX is not required to monitor the following signals/channels from the gNB, during non-active periods of cell DTX

* PDCCHs associated with DCI format 2\_0 – DCI Format 2\_5

**Agreement**

For the FFS from agreement from RAN1 #112bis

* SRS for positioning is not impacted by cell DRX operation.

**Conclusion**

* The following channels are not impacted by non-active period of cell DRX
  + HARQ-ACK of a DCI format without scheduling a PDSCH

## RAN1 #114-bis (October-2023)

**Agreement**

Send LS to RAN2 to ask to consider the following RAN1 agreements and ask RAN2 to capture them in RAN2 specification appropriately.

* Agreement (from RAN1 #114)
  + Rel-18 UE supporting cell DTX is not required to monitor the following signals/channels from the gNB, during non-active periods of cell DTX
    - PDCCHs associated with DCI format 2\_0 – DCI Format 2\_5
* Conclusion:
  + HARQ-ACK of SPS PDSCH transmitted is not impacted by non-active period of cell DRX.
* Conclusion
  + The following channels are not impacted by non-active period of cell DRX
    - HARQ-ACK of a DCI format without scheduling a PDSCH
* Part of the Agreement (from RAN1 #112-bis-e)
  + From RAN1 point of view, Rel-18 UE supporting cell DRX is not expected to transmit the following signals/channels to the gNB during non-active periods of cell DRX.
    - Periodic/Semi-persistent CSI report

Include a note saying that for the conclusions, RAN1 does not expect any specification impact.

Final LS is endorsed in R1-2310476.

**Agreement**

The following TP is endorsed for TS38.212.

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| ***Reason for change****: The current wording doesn’t clearly capture the cases where both cell DTX and cell DRX are configured or only cell DTX or cell DTX is configured .* |
| ***Summary of change****: Replace “*Activating or de-activating the cell DTX/DRX configuration of one or multiple serving cells for one or more UEs.” by “Activating or de-activating the cell DTX and/or DRX configuration of one or multiple serving cells for one or more UEs.” |
| ***Consequences if not approved:*** *unclear specification* |
| **\*\*\* Unchanged parts are omitted \*\*\***  Table 7.3.1-1: DCI formats   |  |  | | --- | --- | | **DCI format** | **Usage** | | 0\_0 | Scheduling of PUSCH in one cell | | 0\_1 | Scheduling of one or multiple PUSCH in one cell, or indicating downlink feedback information for configured grant PUSCH (CG-DFI) | | 0\_2 | Scheduling of PUSCH in one cell | | 1\_0 | Scheduling of PDSCH in one cell | | 1\_1 | Scheduling of one or multiple PDSCH in one cell, and/or triggering one shot HARQ-ACK codebook feedback | | 1\_2 | Scheduling of PDSCH in one cell | | 2\_0 | Notifying a group of UEs of the slot format, available RB sets, COT duration and search space set group switching | | 2\_1 | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE | | 2\_2 | Transmission of TPC commands for PUCCH and PUSCH | | 2\_3 | Transmission of a group of TPC commands for SRS transmissions by one or more UEs | | 2\_4 | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE cancels the corresponding UL transmission from the UE | | 2\_5 | Notifying the availability of soft resources as defined in Clause 9.3.1 of [10, TS 38.473] | | 2\_6 | Notifying the power saving information outside DRX Active Time for one or more UEs | | 2\_7 | Notifying paging early indication and TRS availability indication for one or more UEs. | | 2\_9 | Activating or de-activating the cell DTX~~/DRX~~ and/or DRX configuration of one or multiple serving cells for one or more UEs. | | 3\_0 | Scheduling of NR sidelink in one cell | | 3\_1 | Scheduling of LTE sidelink in one cell | | 4\_0 | Schedulng of PDSCH with CRC scrambled by MCCH-RNTI/G-RNTI for broadcast | | 4\_1 | Schedulng of PDSCH with CRC scrambled by G-RNTI/G-CS-RNTI for multicast | | 4\_2 | Schedulng of PDSCH with CRC scrambled by G-RNTI/G-CS-RNTI for multicast |   **\*\*\* Unchanged parts are omitted \*\*\*** |

**Agreement**

For CSI report associated with P/SP CSI-RS resource and configured with reportQuantity including RI, when cell DTX is configured

* the UE reports a CSI report only if receiving at least one CSI-RS transmission occasion of each P/SP CSI-RS resource for channel measurement and/or interference measurement for the CSI report in cell DTX active period no later than CSI reference resource and drops the report otherwise.

**Agreement**

Cell DTX/DRX operation is only supported for sTRP.

**Agreement**

TP #22-4 (old #16-1) (TS38.214)

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| **Reasons for change:**  For a CSI reporting configured with *reportQuantity* comprising at least ‘RI’, if the time domain restriction for channel measurements or interference measurements is enabled and the most recent CSI-RS associated with the CSI resource setting occurs during non-active periods of cell DTX, UE has to skip this CSI reporting, which may impact the system performance. |
| **Summary of change:**  When cell DTX operation is configured and the time domain restriction for channel measurements or interference measurements is enabled, the CSI-RS used for the corresponding measurements can be redefined as the most recent CSI-RS within the active periods of cell DTX. |
| **Consequences if not approved:**  For a CSI reporting, if the time domain restriction for channel measurements or interference measurements is enabled and the most recent CSI-RS associated with the CSI resource setting occurs during non-active periods of cell DTX, UE has to skip this CSI reporting, which may impact the system performance. |
| ---------------------------- Start of Text Proposal for TS 38.214 -----------------------------  **5.2.2.1 Channel quality indicator (CQI)**  < Unchanged parts are omitted >  If the higher layer parameter *timeRestrictionForChannelMeasurements* is set to "*notConfigured*", the UE shall derive the channel measurements for computing CSI value reported in uplink slot *n* based on only the NZP CSI-RS, no later than the CSI reference resource, (defined in TS 38.211[4]) associated with the CSI resource setting.  If the higher layer parameter *timeRestrictionForChannelMeasurements* in *CSI-ReportConfig* is set to "*Configured*", the UE shall derive the channel measurements for computing CSI reported in uplink slot *n* based on only the most recent, no later than the CSI reference resource, in cell DTX active time if cell DTX is activated, occasion of NZP CSI-RS (defined in [4, TS 38.211]) associated with the CSI resource setting.  If the higher layer parameter *timeRestrictionForInterferenceMeasurements* is set to "*notConfigured*", the UE shall derive the interference measurements for computing CSI value reported in uplink slot *n* based on only the CSI-IM and/or NZP CSI-RS for interference measurement no later than the CSI reference resource associated with the CSI resource setting.  If the higher layer parameter *timeRestrictionForInterferenceMeasurements* in *CSI-ReportConfig* is set to "*Configured*", the UE shall derive the interference measurements for computing the CSI value reported in uplink slot *n* based on the most recent, no later than the CSI reference resource, in cell DTX active time if cell DTX is activated, occasion of CSI-IM and/or NZP CSI-RS for interference measurement (defined in [4, TS 38.211]) associated with the CSI resource setting.  < Unchanged parts are omitted >  --------------------------------------- End of Text Proposal ---------------------------------- |

**Agreement**

TP #6-1 (TS38.213)

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| **Reasons for change:**  There are multiple types of CSS, and specification unclear which CSS could be applicable for DCI format 2-9. |
| **Summary of change:**  Specify DCI format 2-9 uses Type 3 CSS. |
| **Consequences if not adopted:**  Ambiguous specification. |
| **11.5 Adaptation of cell operation**  A UE configured for operation on a serving cell according to one or both of a cell DTX operation by *cellDTXConfig* and a cell DRX operation by *cellDRXConfig* for the serving cell [11, TS 38.331], can be additionally provided by *dci-Format2-9* a search space set to monitor PDCCH for detection of DCI format 2\_9 according to a Type3-PDCCH common search space as described in clause 10.1, and a location in DCI format 2\_9 by *position-inDCI-NES* of a cell DTX/DRX indicator field for the serving cell  \*\*\* Unchanged parts are omitted \*\*\* |

## RAN1 #115 (November-2023)

**Agreement**

* In DCI format 2-9, add NES-mode indication in block for Pcell.
  + NES-mode indication may be 0 or 1 bit for Pcell depending on the indication for CHO is configured.
  + Number of bits for cell DTX/DRX (de)activation between 0, 1, and 2 bits and number of bits for NES-mode between 0 and 1 bit is determined by RRC parameters.

**Agreement**

* Adopt the follow TP for TS38.213

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| **Reason for change:** The parameter that defines cell DTX/DRX patterns in RAN1 spec does not align with RAN2 running CR. |
| **Summary of change:** Align parameter name with RAN2 . |
| **Consequences if not approved:** Unmatched specs. |
| \*\*\* Unchanged parts are omitted \*\*\* 11.5 Adaptation of cell operation A UE configured for operation on a serving cell according to one or both of a cell DTX operation ~~by~~ *~~cellDTXConfig~~*and a cell DRX operation by c*ellDTXDRX-Config* *~~cellDRXConfig~~*for the serving cell [11, TS 38.331], can be additionally provided by *dci-Format2-9* a Type3-PDCCH search spaceCSS set to monitor PDCCH for detection of DCI format 2\_9 according to a common search space as described in clause 10.1, and a location in DCI format 2\_9 by *position-inDCI-NES* of a cell DTX/DRX indicator field for the serving cell  - if the UE is configured with both cell DTX operation and cell DRX operation for the serving cell, the cell DTX/DRX indicator field includes two bits where the first bit indicates the cell DTX operation and the second bit indicates the cell DRX operation  - if the UE is configured with only one of the cell DTX operation and cell DRX operation for the serving cell, the cell DTX/DRX indicator field includes one bit indicating one of the cell DTX operation and cell DRX operation, respectively, for the serving cell  - a '0' value for a bit of the cell DTX/DRX indicator field indicates deactivation of cell DTX or of cell DRX  - a '1' value for a bit of the cell DTX/DRX indicator field indicates activation of cell DTX or of cell DRX  - if the serving cell is configured with a SUL carrier, the cell DTX/DRX indicator field indication for activation or deactivation of cell DRX applies to both the UL carrier and the SUL carrier  A UE does not expect to monitor PDCCH for detection of DCI format 2\_9 on more than one serving cells.  \*\*\* Unchanged parts are omitted \*\*\* |

**Agreement**

UE transmits a subset of the repetitions in a CG bundle that do not overlap with the cell DRX non-active period

**Agreement**

Send an LS to RAN2 to ask RAN2 to decide whether/how to capture the following agreement. Final LS in [R1-2312409](file:///C:\Users\daewonle\OneDrive%20-%20Intel%20Corporation\Documents\ngs\3gpp\Docs\R1-2312409.zip).

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| **Agreement**  Cell DTX/DRX operation is only supported for sTRP. |

**Agreement**

UE is expected to monitor DCI format 2\_9 during active periods of C-DRX

**Conclusion**

There is no consensus in RAN1 on whether or not the UE is expected to monitor DCI format 2\_9 during non-active periods on C-DRX

**Agreement**

Adopt the following specification change in TS38.213

11.5 Adaptation of cell operation

A UE does not expect to monitor PDCCH for detection of DCI format 2\_9 on more than one serving cells in one cell group.

\*\*\* Unchanged parts are omitted \*\*\*

**Agreement**

* For Cell DTX/DRX indication of a block in DCI format 2\_9
  + if [cellDTXDRX-L1activation] is configured,
    - 2 bits if c*ellDTXDRXconfigType* is configured to *dtxdrx* for the serving cell;
    - 1 bit if *cellDTXDRXconfigType* is configured to either *dtx* or *drx* for the serving cell*;*
  + otherwise 0 bit.
  + [cellDTXDRX-L1activation] is a new RRC parameter

**Agreement**

* Introduce a new RRC parameter [cellDTXDRX-L1activation], that indicates configuration of L1 based cell DTX/DRX activation/deactivation for each serving cell.
* Adopt the follow TP for TS38.212

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| **Reason for change**:  Clarify that 2 bits are needed if both cell DTX and cell DRX are configured for a serving cell; otherwise (i.e. only one cell DTX or cell DRX is configured), 1 bit is needed which corresponds to cell DTX or cell DRX configuration activation/deactivation and if not cell DTX and DRX is not configured 0 bits.  Clarify that 1 bit for NES mode indication if configured by higher layers.  Update RRC parameter names in the specification. |
| **Summary of change**:   * update NES-RNTI as cellDTRX-RNTI. * Associate the starting position of a block in DCI format 2\_9 with a serving cell. * clarify the bitwidth of dynamic cell DTX/DRX information field in DCI format 2\_9. * add NES-mode indication to block definition. |
| **Consequences if not approved:**  The starting position and bitwidth of dynamic cell DTX/DRX information field in DCI format 2\_9 is unclear.  NES-mode indication associated with nesEvent configuration is missing from specification. |
| 7.3.1.3.10 Format 2\_9 DCI format 2\_9 is used for activating or de-activating the cell DTX and/or DRX configuration of one or multiple serving cells for one or more UEs and/or to provide NES-mode indication.  The following information is transmitted by means of the DCI format 2\_9 with CRC scrambled by ~~NES~~cellDTRX-RNTI:  - block number 1, block number 2,…, block number *N*  where the starting position of a block associated with a serving cell is determined by the parameter *positionInDCI-cellDTRX* provided by higher layers for the UE.  If the UE is configured *~~with higher layer parameter~~* to monitor DCI 2\_9 with CRC scrambled by *~~XYZ~~* cellDTRX-RNTI, one or more blocks are configured for the UE by higher layers, with the following field defined in the following order for each block:  - Cell DTX/DRX indication –  - if [*cellDTXDRX-L1activation*] is configured, 2 bits if *~~XYZ~~cellDTXDRXconfigType* is configured to *dtxdrx* for the serving cell, with the MSB corresponding to cell DTX configuration and the LSB corresponding to cell DRX configuration; 1 bit if *cellDTXDRXconfigType* is configured to either *dtx* or *drx* for the serving cell*;*  - otherwise 0~~1~~ bit.  - NES-mode indication – 1 bit if *nesEvent* is configured and the serving cell is Pcell; otherwise, 0 bit.  The size of DCI format 2\_9 is indicated by the higher layer parameter *sizeDCI-2-9*.  \*\*\* Unchanged parts are omitted \*\*\* |

**Agreement**

Adopt the following TP for TS38.213

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| **Reasons for change:**  Unclear how HARQ feedback for cancelled SPS PDSCH in cell DRX/DRX operation should be handled by specification.  **Summary of change:**  Clarify that HARQ feedback of cancelled SPS PDSCH by non-active period of cell DTX is not transmitted by UE.  **Consequences if not adopted:**  Incomplete specification |
| **9.1.2 Type-1 HARQ-ACK codebook determination**  \*\*\* Unchanged text omitted \*\*\*  In the following pseudo-code, SPS PDSCH receptions associated with a SPS PDSCH configuration are activated by a DCI format with CRC scrambled by a CS-RNTI or by a DCI format with CRC scrambled by a G-CS-RNTI.  Set to the number of serving cells configured to the UE  Set to the number of SPS PDSCH configurations configured to the UE for serving cell  Set to the number of DL slots for SPS PDSCH receptions on serving cell with HARQ-ACK information multiplexed on the PUCCH  Set – HARQ-ACK information bit index  Set – serving cell index: lower indexes correspond to lower RRC indexes of corresponding cell  while  Set – SPS PDSCH configuration index: lower indexes correspond to lower RRC indexes of corresponding SPS configurations  while  Set – slot index  while  if {  a UE is configured to receive SPS PDSCHs from slot to slot for SPS PDSCH configuration on serving cell , excluding SPS PDSCHs that are not required to be received in any slot among overlapping SPS PDSCHs, if any according to [6, TS 38.214], or based on a UE capability for a number of PDSCH receptions in a slot according to [6, TS 38.214], or due to overlapping with a set of symbols indicated as uplink by *tdd-UL-DL-ConfigurationCommon*, or by *tdd-UL-DL-ConfigurationDedicated*, or due to overlapping with non-active period of cell DTX where, for unicast SPS PDSCHs, is provided by *pdsch-AggregationFactor-r16* in *SPS-Config* or, if *pdsch-AggregationFactor-r16* is not included in *SPS-Config*, by *pdsch-AggregationFactor* in *PDSCH-config* and, for multicast SPS PDSCHs, is provided by if contained in an entry indicated by the time domain resource assignment field in the DCI format scheduling the PDSCH repetition, or provided by *pdsch-AggregationFactor-r16* if included in *SPS-Config* or, otherwise,, and  HARQ-ACK information for the SPS PDSCH is associated with the PUCCH  }  = HARQ-ACK information bit for this SPS PDSCH reception  ;  end if  ;  end while  ;  end while  ;  end while  \*\*\* Unchanged text omitted \*\*\* |

**Agreement**

Adopt the follow TP for TS38.213

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| **Reasons for change:**  TS38.331 specification does not provide the definition of 0 or 1 for NES-mode indication and is current missing from 3GPP specification. Field naming between TS38.212 and TS38.213 is not consistent.  **Summary of change:**  Clarify that 0 refers to NES-specific CHO execution condition is not met, and 1 refers to condition met.  Align the field names between TS38.212 and TS38.213.  **Consequence if not adopted:**  Incomplete specifications. |
| **11.5 Adaptation of cell operation**  A UE configured for operation on a serving cell according to one or both of a cell DTX operation by *cellDTXConfig* and a cell DRX operation by *cellDRXConfig* for the serving cell [11, TS 38.331], can be additionally provided by *dci-Format2-9* a search space set to monitor PDCCH for detection of DCI format 2\_9 according to a common search space as described in clause 10.1, and a location in DCI format 2\_9 by *~~position-inDCI-NES~~positionInDCI-cellDTRX* of a cell DTX/DRX indication~~indicator~~ field for the serving cell and/or a NES-mode indication field for Pcell  - if the UE is configured with both cell DTX operation and cell DRX operation for the serving cell and if [*cellDTXDRX-L1activation*] is configured, the cell DTX/DRX indication~~indicator~~ field includes two bits where the first bit indicates the cell DTX operation and the second bit indicates the cell DRX operation  - if the UE is configured with only one of the cell DTX operation and cell DRX operation for the serving cell, the cell DTX/DRX indication~~indicator~~ field includes one bit indicating one of the cell DTX operation and cell DRX operation, respectively, for the serving cell  - a '0' value for a bit of the cell DTX/DRX indication~~indicator~~ field indicates deactivation of cell DTX or of cell DRX  - a '1' value for a bit of the cell DTX/DRX indication~~indicator~~ field indicates activation of cell DTX or of cell DRX  - if *nesEvent* is configured, the NES-mode indication field includes one bit indicating NES-specific CHO execution condition, as described in [12, TS 38.331]  - a ‘0’ value for a bit of the NES-mode indication field, indicates NES-specific CHO execution condition is disabled [12, TS 38.331]  a '1' value for a bit of the NES-mode indication field, indicates NES-specific CHO execution condition is enabled [12, TS 38.331] |

**Agreement**

Adopt the following TP for TS38.214

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| **Reasons for change:**  For a CSI reporting, the most recent CSI-RS measurement occasion is unclear when cell DTX is activated by RRC or DCI format 2-9.  **Summary of change:**  When cell DTX is activated by RRC or DCI format 2-9, the most recent CSI-RS measurement occasion occurs in active period of cell DTX.  **Consequences if not approved:**  For a CSI reporting, the most recent CSI-RS measurement occasion is unclear when cell DTX is activated. |
| 5.1.6.1 CSI-RS reception procedure < Unchanged parts are omitted >  If the UE is configured with DRX,  - if the UE is configured to monitor DCI format 2\_6 and configured by higher layer parameter *ps-TransmitOtherPeriodicCSI* to report CSI with the higher layer parameter *reportConfigType* set to 'periodic' and *reportQuantity* set to quantities other than 'cri-RSRP' and 'ssb-Index-RSRP' when *drx-onDurationTimer* in *DRX-Config* is not started, the most recent CSI measurement occasion occurs in DRX active time or during the time duration indicated by *drx-onDurationTimer* in *DRX-Config* also outside DRX active time for CSI to be reported;  - if the UE is configured to monitor DCI format 2\_6 and configured by higher layer parameter *ps-TransmitPeriodicL1-RSRP* to report L1-RSRP with the higher layer parameter *reportConfigType* set to 'periodic' and *reportQuantity* set to cri-RSRP when *drx-onDurationTimer* in *DRX-Config* is not started, the most recent CSI measurement occasion occurs in DRX active time or during the time duration indicated by *drx-onDurationTimer* in *DRX-Config* also outside DRX active time for CSI to be reported;  - otherwise, the most recent CSI measurement occasion occurs in active time for CSI to be reported.  During non-active periods of cell DTX, the UE configured with cell DTX is not expected to receive the periodic CSI-RS and semi-persistent CSI-RS configured in CSI report configuration in CSI-*ReportConfig* associated with the higher layer parameter *reportQuantity* comprising at least ‘RI’. If the cell DTX is activated, the most recent CSI measurement occasion of semi-persistent CSI-RS resource or periodic CSI-RS resource occurs in active periods of cell DTX for CSI report configured by *CSI-ReportConfig* associated with the higher layer parameter *reportQuantity* comprising at least ‘RI’.  < Unchanged parts are omitted > |

**Agreement**

If a UE would transmit multiple overlapping PUCCHs in a slot or overlapping PUCCH(s) and PUSCH(s) in a slot, where at least one PUCCH/PUSCH overlaps with non-active periods of cell DRX on the respective serving cell, down-select form the following options for the interaction between the Operation A (Resolve the overlapping among PUCCHs/PUSCHs (TS 38.213 clause 9 including sub-clauses)) and Operation B (Determine whether to transmit a PUCCH/PUSCH overlapping with non-active period of cell DRX.)

* Option 1: UE first performs Operation A and then performs Operation B

**Agreement**

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| **Reason for change:** The order of resolving overlapping PUCCH(s) and/or PUSCH(s) and performing cell DRX operation is not clear in spec.  **Summary of change:** First resolving overlapping PUCCH(s) and/or PUSCH(s) and then performing cell DRX operation  **Consequences if not approved:**The order of resolving overlapping PUCCH(s) and/or PUSCH(s) and performing cell DRX operation is not defined in spec. |
| 9      UE procedure for reporting control information  \*\*\* Unchanged text is omitted \*\*\*  When a UE determines overlapping for PUCCH and/or PUSCH transmissions of the same priority index other than PUCCH transmissions with SL HARQ-ACK reports before considering limitations for UE transmission due to cell DRX operation or as described in clauses 11.1, 11.1.1, 11.2A, 15 and 17.2, including repetitions if any,  -       first, the UE resolves the overlapping for PUCCHs with repetitions as described in clause 9.2.6, if any  -       second, the UE resolves the overlapping for PUCCHs without repetitions as described in clauses 9.2.5  -    third, the UE resolves the overlapping for PUSCHs and PUCCHs with repetitions as described in clause 9.2.6  -    fourth, the UE resolves the overlapping for PUSCHs and PUCCHs without repetitions as is subsequently described in this clause.  If a UE  -    is provided *simultaneousPUCCH-PUSCH* and would transmit a PUCCH with a first priority index and PUSCHs with a second priority index that is different than the first priority index, where the PUCCH and the PUSCHs overlap in time  -    can simultaneously transmit the PUCCH and the PUSCHs [18, TS 38.306],  the UE excludes the PUSCHs for resolving the time overlapping between the PUCCH and PUSCHs, where the timeline conditions are not required for the excluded PUSCHs.  When a UE determines overlapping for PUCCH and/or PUSCH transmissions of different priority indexes, other than PUCCH transmissions with SL HARQ-ACK reports, before considering limitations for transmission due to cell DRX operation or as described in clauses 11.1, 11.1.1, 11.2A, 15 and 17.2, including repetitions if any, if the UE is provided *uci-MuxWithDiffPrio* and the timeline conditions in clause 9.2.5 for multiplexing UCI in a PUCCH or a PUSCH are satisfied  \*\*\* Unchanged text is omitted \*\*\*  When a UE determines overlapping for PUCCH and/or PUSCH transmissions of different priority indexes, other than PUCCH transmissions with SL HARQ-ACK reports, before considering limitations for transmissions including with repetitions, if any, due to cell DRX operation or as described in clauses 11.1, 11.1.1, 11.2A, 15 and 17.2, if the UE is not provided *uci-MuxWithDiffPrio*, the UE first resolves overlapping for PUCCH and/or PUSCH transmissions of smaller priority index as described in clauses 9.2.5 and 9.2.6. Then,  -    if a transmission of a first PUCCH of larger priority index scheduled by a DCI format in a PDCCH reception would overlap in time with a repetition of a transmission of a second PUSCH or a second PUCCH of smaller priority index, the UE cancels the repetition of a transmission of the second PUSCH or the second PUCCH before the first symbol that would overlap with the first PUCCH transmission  -    if a transmission of a first PUSCH of larger priority index scheduled by a DCI format in a PDCCH reception would overlap in time with a repetition of the transmission of a second PUCCH of smaller priority index, the UE cancels the repetition of the transmission of the second PUCCH before the first symbol that would overlap with the first PUSCH transmission  where  -    the overlapping is applicable before or after resolving overlapping among channels of larger priority index, if any, as described in clauses 9.2.5 and 9.2.6  -    any remaining PUCCH and/or PUSCH transmission after overlapping resolution is subjected to the limitations for UE transmission due to cell DRX operation or as described in clauses 11.1, 11.1.1, 11.2A, 15 and 17.2,  -    the UE expects that the transmission of the first PUCCH or the first PUSCH, respectively, would not start before after a last symbol of the corresponding PDCCH reception  -      is the PUSCH preparation time for a corresponding UE processing capability assuming [6, TS 38.214], based on and as subsequently defined in this clause, and is determined by a reported UE capability  \*\*\* Unchanged text is omitted \*\*\*  In the remaining of this clause, a UE multiplexes UCIs with same priority index in a PUCCH or a PUSCH before considering limitations for UE transmission due to cell DRX operation or as described in clauses 11.1, 11.1.1, 11.2A, 15 and 17.2. A PUCCH or a PUSCH is assumed to have a same priority index as a priority index of UCIs a UE multiplexes in the PUCCH or the PUSCH.  \*\*\* Unchanged text is omitted \*\*\* |

# Appendix B: RAN2 Agreements

## RAN2 #121 (Feb-2023)

Agreements

1. There will be no impact to RACH, paging, and SIBs in idle/inactive for both gNB and Rel-18 and legacy UEs

2. Rel-18 NES capable CONNECTED UE(s) can perform RACH and receive SIBs in non-active duration of cell DTX and/or DRX (i.e., same behavior for cell DTX and cell DRX). No further enhancements for CBRA and CFRA will be pursued.

3. Pattern configuration for cell DRX/DTX is common for Rel-18 UEs in the cell. FFS whether we have DTX UE specific inactivity timer . FFS on configuration signaling and stage 3.

4. Confirm study item agreement that we can have separate DTX and DRX configuration. We will focus on designing DTX/DRX for at least single configuration. FFS whether multiple configuration of cell DTX or DRX will be supported.

Agreements:

1. RAN2 confirms that non-NES UEs can access to NES cells if NES solution is backwards compatible

## RAN2 #121-bis-e (April-2023)

Agreements

1. A periodic cell DTX/DRX configuration is explicitly signalled to the UEs.

2. A periodic cell DTX/DRX pattern is configured by UE specific RRC signalling.

3. The Cell DTX/DRX configuration contains at least: periodicity, start slot/offset, on duration.

4. As a baseline Cell DTX/DRX is activated/deactivated implicitly by RRC signalling, i.e. activated immediately once configured by RRC and deactivated once the RRC configuration is released.

5. From RAN2 point of view, majority companies see a benefit with L1 signalling for Cell DTX/DRX activation/deactivation, send a LS to RAN1 (email 308) with our preference and ask about feasibility and design details. Ask about feasibility and reliability of using L1 signaling. Clarify that the question is about activation/deactivation copy the agreement from last meeting that we are focusing on single configuration. Extract a few key benefits of dynamic signaling from email discussion and online discussions

6. As baseline, UE doesn’t monitor SPS occasions during Cell DTX non-active period. As baseline, gNB is assumed to be not transmitting PDSCH to that UE on such SPS occasions during the Cell DTX non-active period

7. As baseline, UE does not transmit on CG occasions during Cell DRX non-active periods

8. As baseline, UE does not transmit SR occasions overlapping with Cell DRX non-active periods, e.g. SR transmissions are dropped during the non-active period

FFS: whether we will allow to configure the UE per SR configuration with whether SR can be transmitted during Cell DRX non-active period to to support high priority traffic

9. (for the SRs that will be dropped) If SR is not to be transmitted on an PUCCH occasion during Cell DRX non-active time, the UE keep the SR pending, i.e., the UE delays the SR transmission till the Cell DRX active period without triggering RACH. For the FFS case there may be some exceptions.

10. The understanding for the gNB scheduling behaviour for new transmissions during Cell DTX non-active period is that the gNB does not schedule UE-specific dynamic grants/assignments, even if the UE is in C-DRX Active Time. UE doesn’t monitor PDCCH for dynamic grants/assignments for new transmissions during Cell DTX non-active period, even if the UE is in C-DRX Active time. FFS how to deal with any exceptions (e.g. SR if agreed and RACH).

FFS how to deal with retransmissions

## RAN2 #122 (May-2023)

Agreements:

1 UE monitors PDCCH for RAR during Cell DTX non-active time. The ra-ResponseWindow could be started as legacy.

2 UE monitors PDCCH for msg4 during Cell DTX non-active time. The ra-ContentionResolutionTimer could be started as legacy.

3 Working assumption: When the retransmission timer is running (if C-DRX is configured), the UE is expected to monitor PDCCH, like in legacy. It is up to the network whether it schedules retransmissions out of the Cell DTX active period, i.e., when the DRX retransmission timer is running, the UE should monitor PDCCH regardless of the Cell DTX.

4 Once gNB recognizes there is an emergency call or public safety related service (e.g. MPS/MCS), the NW should ensure there is no impact to the emergency call (e.g. may deactivate Cell DTX/DRX). The behavior is captured in stage 2 spec

5 When an DG grant is received, by the gNB during cell DRX/DTX, the UE follows the grant assignment (i.e. like in legacy). This includes DL HARQ feedback.

## RAN2 #123 (August-2023)

**Agreements:**

1 Activation/deactivation is per serving cell. FFS if the configuration is per cell or per MAC entity

2 RAN2 will reuse the start timer formula of the onDurationTimer from UE C-DRX (including SlotOffset) to specify the start of cellDTX-onDurationTimer (and cellDRX-onDurationTimer) in 38.321.

3 The gNB should ensures that there is at least partial overlapping between UE C-DRX on-duration and cell DTX/DRX on-duration. It is up to network implementation to ensure the alignment. We will capture this in stage 2 specification.

Understanding is that alignment means that the cell DTX/DRX and C-DRX periodicity should be multiple of each other. FFS if we anything needs to be specified in stage 3 (i.e. in IE description)

4 As a baseline legacy C-DRX reconfiguration is used to change UE C-DRX configuration once Cell DTX/DRX is activated/deactivated.

5 RAN2 specifies cellDTX-onDurationTimer (and cellDRX-onDurationTimer) to have the same value range as UE C-DRX on-duration timer.

6 RAN2 specifies cellDTX-Cycle (and cellDRX-Cycle) to have the same value range as UE C-DRX Long cycle.

7 Separate DTX and DRX configuration means that the features can be enabled separately (i.e. Cell DTX can be configured without Cell DRX)

8 On-duration and Cycle parameters are common between cell DTX and DRX, when both are configured. FFS if we have different start offset configuration for cell DTX and cell DRX

9 RAN2 will not introduce a MAC CE for cell DTX/DRX (de)activation.

10 Confirm working assumption, when the retransmission timer is running (if C-DRX is configured), the UE is expected to monitor PDCCH, like in legacy. It is up to the network whether it schedules retransmissions out of the Cell DTX active period, i.e., when the DRX retransmission timer is running, the UE should monitor PDCCH regardless of the Cell DTX.

11 We focus on the case where DTX in RRC can only be configured when C-DRX is configured. We will not optimize for the case where C-DRX is not configured.

## RAN2 #123-bis (October-2023)

**Agreements**

1. Cell DTX/DRX configuration is provided per Serving Cell with the following restrictions:

* A maximum of two cell DTX/DRX patterns can be configured per MAC entity
* The two configured patterns are aligned,
  + The start and slot offset are common for the two patterns.
  + one periodicity is an integer multiple of the other.

2. Working assumption: UE triggers RACH upon determining that an emergency call is initiated during the cell DTX/DRX non active period. We rely on the UE implementation to determine whether an emergency call is initiated. We will take time to check until next meeting to confirm the WA.

**Agreements on CP open issues:**

1. Introduce explicit activation/deactivation in RRC once DTX/DRX is configured (i.e. not for dynamic activation/deactivation). This reverses previous agreement on implicit activation.

2. Start offset and slot offset configuration is also common between Cell DTX and Cell DRX when both are configured

3. Standalone cell DRX configuration is possible to configure

4. Multiple configurations of Cell DTX/DRX are not pursued in Rel-18 for serving cell.

**Agreements for MAC open issues:**

1. The case that Cell DRX activation is received between delivering a configured grant to the HARQ entity and HARQ processing for the CGO will not be addressed by RAN2, as it is not valid for the MAC model.

**Agreements for CHO**

Group common DCI format 2-X is reused to notify the UE that source cell is entering NES mode.

• add one bit of DCI 2-X to trigger both use cases of Cell DTX/DRX activation and cell turning off. RAN2 send LS to RAN1 to request this signaling change.

## RAN2 #124 (November-2023)

**Agreements:**

1. RAN2 will capture the NES-RNTI monitoring behavior in February meeting (once discussion is finalized)

**Agreements**

1. Confirm WA emergency call: UE triggers RACH upon determining that an emergency call is initiated during the cell DTX/DRX non active period

2. In running MAC CR, capture a NOTE similar to section 5.3.13.2 of TS 38.331 (i.e., “NOTE: How the MAC layer in the UE is aware of an ongoing emergency service is up to UE implementation.”)

3. No need to explicitly specify that the UE keeps monitoring PDCCH for followed transmission after successful completion of RA, i.e., it is left to NW implementation to complete followed transmission (e.g., emergency call) after RA (e.g., initiate followed transmission when the retransmission timer is running)

4. No need to restrict that the cell DRX is only configured when C-DRX is configured

5. Adopt the TP to capture the RAN2 requirement “UE doesn’t monitor PDCCH for dynamic grants/assignments for new transmissions during Cell DTX non-active period, even if the UE is in C-DRX Active time”.

For each Serving Cell configured with cell DTX and each configured downlink assignment, the MAC entity may:

1> if cell DTX operation is activated and the Serving Cell is not in the cell DTX Active Period:

2> not monitor PDCCH irrespective of the requirements of clause 5.7, unless explicitly stated otherwise in this clause;

**Agreements**

1. We will not optimize for the case where DTX/DRX is activated simultaneously with multicast/broadcast

**Agreements on CHO:**

1. Proposal 2 If one condReconfigId is configured with one legacy and one NES-specific CHO execution events, the UE triggers CHO execution as long as one of the events is fulfilled.