**3GPP TSG- Meeting #**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** |  | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
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| ***Work item code:*** | Netw\_Energy\_NR-Core | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | |  |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | 1. In current specification, when SRS overlaps with PUCCH/PUSCH, SRS or PUCCH is dropped according to rules in clause 6.2.1 of TS 38.214. However, when cell DRX is configured, UE behavious is ambiguous whether to perform the current dropping rule first or perform the determination of PUCCH/PUSCH/SRS transmission within non-active periods of cell DRX first.  To avoid the unnecessary dropping of A-SRS or SRS for positioning, and to minimize the specification changes and minimize the UE implementation impact, we proposed that a UE first performs determination of whether to transmit a PUCCH/PUSCH/SRS within non-active period of cell DRX and then applies dropping rule for resolving overlapping between SRS and PUCCH/PUSCH as in clause 6.2.1 of TS 38.214.  2. In some places, cell DTX active time is incorrectly used instead of cell DTX active period. There is inconsistency in how cell DRX related behavior is captured compared to how cell DTX related behavior is captured.  3. RAN1 has agreed that UE shall omit the transmission occasions in a CG bundle during the non-active periods of cell DRX. RAN1 has further agreed that repetition of PUCCH and SRS that overlap with non-active period of cell DRX would be omitted, and repetitions of SPS PDSCH that overlap with non-active period of cell DTX would be 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**   * UE transmit a subset of the repetitions of a PUCCH with SR and/or P/SP-CSI that do not overlap with the cell DRX non-active period. * UE transmit a subset of the repetitions of a SRS that do not overlap with the cell DRX non-active period.   + Above does not apply for SRS for positioning * UE receives a subset of the repetitions of a SPS PDSCH that do not overlap with the cell DTX non-active period. |   The current specification has yet to capture the RAN1 agreements.  4. Incorrect condition related to cell DRX for UE operation for the overlapped between SRS and other channels/signals (e.g., PUCCH/PUSCH/SRS). | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Clarify that the UE shall first perform determination of whether to transmit a PUCCH/PUSCH/SRS within non-active period of cell DRX and then apply dropping rule for resolving overlapping between SRS and PUCCH/PUSCH as in clause 6.2.1 of TS 38.214.  2. Replace cell DTX active time with cell DTX active period to align with TS 38.321. Clarify the condition for omitting the impacted SRS transmissions during cell DRX non-active periods of a serving cell.  3. Clarify that the UE shall omit transmission occasions in a CG bundle, repetition of PUCCH, and repetitions of SRS during the non-active periods of cell DRX. Clarify that the UE is not expected to receive repeated transmissions of SPS PDSCH during non-active periods of cell DTX.  4. UE handles the overlap between a SRS and other channels/signals (e.g., PUCCH/PUSCH/SRS) if the SRS is transmitted on a serving cell in cell DRX non-active period of the serving cell with cell DRX is activated. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | 1. UE behavious is ambiguous whether to perform the current dropping rule first or perform the determination of PUCCH/PUSCH/SRS transmission within non-active periods of cell DRX first.  2. Confusing specification leading to inconsistent UE behavior.  3. The UE behaviour on during the non-active periods of cell DRX is ambiguous.  4. Incorrect UE behavior to operate the overlapped between SRS and other channels/signals (e.g., PUCCH/PUSCH/SRS) in case of cell DRX. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.1, 5.2.2.1, 6.1.2.1, 6.1.2.3.1, 6.1.2.3.3, 6.2.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | CR0546 in R1-2403611 (issue 1), CR0545 in R1-2403610 (issue 2), and CR0553 in R1-2403735 (issue 3) are merged into this CR along with additional updates (issue 4). | | | | | | | | |

*--- unchanged text omitted ---*

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

*--- unchanged text omitted ---*

The UE is not expected to decode a PDSCH scheduled with C-RNTI, MCS-C-RNTI, G-RNTI for multicast or broadcast, MCCH-RNTI, multicast-MCCH-RNTI, G-CS-RNTI or CS-RNTI if another PDSCH in the same cell scheduled with RA-RNTI or MSGB-RNTI partially or fully overlap in time.

If cell DTX is activated for the serving cell, the UE is not expected to decode a PDSCH scheduled without corresponding PDCCH transmission using SPS-Config that overlap in time with any non-active periods of cell DTX for the serving cell.

*--- unchanged text omitted ---*

#### 5.2.2.1 Channel quality indicator (CQI)

The CQI indices and their interpretations are given in Table 5.2.2.1-2 or Table 5.2.2.1-4 for reporting CQI based on QPSK, 16QAM and 64QAM. The CQI indices and their interpretations are given in Table 5.2.2.1-3 for reporting CQI based on QPSK, 16QAM, 64QAM and 256QAM. The CQI indices and their interpretations are given in Table 5.2.2.1-5 for reporting CQI based on QPSK, 16QAM, 64QAM, 256QAM and 1024 QAM.

Based on an unrestricted observation interval in time unless specified otherwise in this Clause, and an unrestricted observation interval in frequency, the UE shall derive for each CQI value reported in uplink slot *n* the highest CQI index which satisfies the following condition:

- A single PDSCH transport block with a combination of modulation scheme, target code rate and transport block size corresponding to the CQI index, and occupying a group of downlink physical resource blocks termed the CSI reference resource, could be received with a transport block error probability not exceeding:

- 0.1, if the higher layer parameter *cqi-Table* in *CSI-ReportConfig* configures 'table1' (corresponding to Table 5.2.2.1-2), or 'table2' (corresponding to Table 5.2.2.1-3), or if the higher layer parameter *cqi-Table* in *CSI-ReportConfig* configures 'table4-r17' (corresponding to Table 5.2.2.1-5), or

- 0.00001, if the higher layer parameter *cqi-Table* in *CSI-ReportConfig* configures 'table3' (corresponding to Table 5.2.2.1-4).

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 period of a serving cell if cell DTX is activated, occasion of NZP CSI-RS (defined in [4, TS 38.211]) associated with the CSI resource setting on the serving cell.

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 period of a serving cell 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 on the serving cell.

If the higher layer parameter *cqi-BitsPerSubband* in *CSI-ReportConfig* is not configured, for each sub-band index *s,* a 2-bit sub-band differential CQI is defined as:

- Sub-band Offset level (*s*) = sub-band CQI index (*s*) - wideband CQI index.

The mapping from the 2-bit sub-band differential CQI values to the offset level is shown in Table 5.2.2.1-1

Table 5.2.2.1-1: Mapping sub-band differential CQI value to offset level

|  |  |
| --- | --- |
| Sub-band differential CQI value | Offset level |
| 0 | 0 |
| 1 | 1 |
| 2 | ≥ 2 |
| 3 | ≤-1 |

*--- unchanged text omitted ---*

#### 6.1.2.1 Resource allocation in time domain

*--- unchanged text 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], and clause 5.34.3 of [10, TS 38.321], the UE counts the slots in the number of slots.

*--- unchanged text 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], and clause 5.34.3 of [10, TS 38.321].

*--- unchanged text 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], and clause 5.34.3 of [10, TS 38.321]. 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], and clause 5.34.3 of [10, TS 38.321].

*--- unchanged text omitted ---*

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

*--- unchanged text 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], and clause 5.34.3 of [10, TS 38.321].

*--- unchanged text omitted ---*

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

*--- unchanged text 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], and clause 5.34.3 of [10, TS 38.321].

*--- unchanged text omitted ---*

### 6.2.1 UE sounding procedure

The UE may be configured with one or more Sounding Reference Signal (SRS) resource sets as configured by the higher layer parameter *SRS-ResourceSet* or *SRS-PosResourceSet*. For each SRS resource set configured by *SRS-ResourceSet*, a UE may be configured with SRS resources (higher layer parameter *SRS-Resource*), where the maximum value of K is indicated by UE capability[13, 38.306]. When SRS resource set is configured with the higher layer parameter *SRS-PosResourceSet,* a UE may be configured with *K* ≥1 SRS resources (higher layer parameter *SRS-PosResource*), where the maximum value of K is 16. The SRS resource set applicability is configured by the higher layer parameter *usage* in *SRS-ResourceSet.* When the higher layer parameter *usage* is set to 'beamManagement'*,* only one SRS resource in each of multiple SRS resource sets may be transmitted at a given time instant, but the SRS resources in different SRS resource sets with the same time domain behaviour in the same BWP may be transmitted simultaneously. For a given CC, multiple SRS resources across multiple sets with usage “beamManagement” are not expected to be partially overlapped in time.

During non-active periods of cell DRX if cell DRX is activated for the serving cell, the UE is not expected to transmit the periodic SRS, or semi-persistent SRS for channel acquisition that overlap in time with any non-active periods of cell DRX on the serving cell. SRS for positioning is not impacted by cell DRX operation.

During non-active periods of cell DRX if cell DRX is activated for a serving cell, the UE applies the procedures described in this clause after it determines PUSCH, SRS, and PUCCH transmission on the serving cell due to cell DRX operations according to clause 5.34.3 of [11, TS 38.321].

For the SRS resource set(s) configured *in srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* set to '*antennaSwitching*' or '*beamManagement*', the UE expects the same SRS resource set(s) with the same *usage* being configured in *srs-ResourceSetToAddModList.*

*--- unchanged text omitted ---*