**3GPP TSG RAN WG1 #114** **R1-230xxxx**

**Toulouse, France, August 21st – 25th, 2023**

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| *CR-Form-v12.2* | | | | | | | | |
| **DRAFT CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.213** | **CR** |  | **rev** |  | **Current version:** | **17.6.0** |  |
|  | | | | | | | | |
| *For* [***HELP***](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 | **x** | Radio Access Network | **x** | Core Network |  |

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| ***Title:*** | Introduction of network energy savings for NR | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Samsung | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_Netw\_Energy\_NR-Core | | | | |  | ***Date:*** | | | 2023-09-01 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduction of network energy savings for NR. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce support of network energy savings for NR. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | No support of network energy savings for NR. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 10.1, 11.5 (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **x** |  | Other core specifications | | | | TS 38.214, TS 38.331 | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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

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

A set of PDCCH candidates for a UE to monitor is defined in terms of PDCCH search space sets. A search space set can be a CSS set or a USS set. A UE monitors PDCCH candidates in one or more of the following search spaces sets

- a Type0-PDCCH CSS set on the primary cell of the MCG configured by

- *pdcch-ConfigSIB1* in MIB or by *searchSpaceSIB1* in *PDCCH-ConfigCommon* or by *searchSpaceZero* in *PDCCH-ConfigCommon* for a DCI format 1\_0 with CRC scrambled by a SI-RNTI, or

- *searchSpaceZero* by providing *searchSpaceID*=0 for *searchSpaceMCCH* or *searchSpaceMTCH* for a DCI format 4\_0 with CRC scrambled by a MCCH-RNTI or a G-RNTI for broadcast

- a Type0A-PDCCH CSS set configured by *searchSpaceOtherSystemInformation* in *PDCCH-ConfigCommon* for a DCI format 1\_0 with CRC scrambled by a SI-RNTI on the primary cell of the MCG

- a Type0B-PDCCH CSS set configured by *searchSpaceMCCH* and *searchSpaceMTCH* for a DCI format 4\_0 with CRC scrambled by a MCCH-RNTI or a G-RNTI for broadcast, on the primary cell of the MCG

- a Type1-PDCCH CSS set configured by *ra-SearchSpace* in *PDCCH-ConfigCommon* for a DCI format with CRC scrambled by a RA-RNTI, a MsgB-RNTI, or a TC-RNTI on the primary cell

- a Type1A-PDCCH CSS set configured by *sdt-SearchSpace* in *PDCCH-ConfigCommon* for a DCI format with CRC scrambled by a C-RNTI or a CS-RNTI on the primary cell as described in clause 19.1

- a Type2-PDCCH CSS set configured by *pagingSearchSpace* in *PDCCH-ConfigCommon* for a DCI format 1\_0 with CRC scrambled by a P-RNTI on the primary cell of the MCG

- a Type2A-PDCCH CSS set configured by *pei-SearchSpace* in *pei-ConfigBWP* for a DCI format 2\_7 with CRC scrambled by a PEI-RNTI on the primary cell of the MCG

- 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, or CI-RNTI and, only for the primary cell, C-RNTI, MCS-C-RNTI, CS-RNTI(s), or NES-RNTI, 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

- a USS set configured by

- *SearchSpace* in *PDCCH-Config* with *searchSpaceType* = *ue-Specific* for DCI formats with CRC scrambled by C-RNTI, MCS-C-RNTI, SP-CSI-RNTI, CS-RNTI(s), SL-RNTI, SL-CS-RNTI, or SL Semi-Persistent Scheduling V-RNTI

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

If a UE is provided

- one or more search space sets by corresponding one or more of *searchSpaceZero, searchSpaceSIB1*, *searchSpaceOtherSystemInformation*, *pagingSearchSpace*, *pei-SearchSpace, ra-SearchSpace*, or a CSS set by *PDCCH-Config*, and

- a SI-RNTI, a P-RNTI, a PEI-RNTI, a RA-RNTI, a MsgB-RNTI, a SFI-RNTI, an INT-RNTI, a TPC-PUSCH-RNTI, a TPC-PUCCH-RNTI, or a TPC-SRS-RNTI

then, for a RNTI from any of these RNTIs, the UE does not expect to process information from more than one DCI format with CRC scrambled with the RNTI per slot.

Table 10.1-1: CCE aggregation levels and maximum number of PDCCH candidates per CCE aggregation level for CSS sets configured by *searchSpaceSIB1*

|  |  |
| --- | --- |
| CCE Aggregation Level | Number of Candidates |
| 4 | 4 |
| 8 | 2 |
| 16 | 1 |

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

- if search space set is a CSS set

- an indication by *dci-Format0-0-AndFormat1-0* to monitor PDCCH candidates for DCI format 0\_0 and DCI format 1\_0

- an indication by *dci-Format2-0* to monitor one or two PDCCH candidates, or to monitor one PDCCH candidate per RB set if the UE is provided *freqMonitorLocations* for the search space set, for DCI format 2\_0 and a corresponding CCE aggregation level

- an indication by *dci-Format2-1* to monitor PDCCH candidates for DCI format 2\_1

- an indication by *dci-Format2-2* to monitor PDCCH candidates for DCI format 2\_2

- an indication by *dci-Format2-3* to monitor PDCCH candidates for DCI format 2\_3

- an indication by *dci-Format2-4* to monitor PDCCH candidates for DCI format 2\_4

- an indication by *dci-Format2-6* to monitor PDCCH candidates for DCI format 2\_6

- an indication by *dci-Format2-9* to monitor PDCCH candidates for DCI format 2\_9

- an indication by *dci-Format4-0* to monitor PDCCH candidates for DCI format 4\_0

- an indication by *dci-Format4-1*, or *dci-Format4-2*, or *dci-Format4-1-AndFormat4-2* to monitor PDCCH candidates for DCI format 4\_1, or DCI format 4\_2, or for both DCI format 4\_1 and DCI format 4\_2, respectively

- an indication by *searchSpaceLinkingId* that search space set is linked to another search space set for which is provided a same value for *searchSpaceLinkingId*

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

## 11.5 Adaptation of cell operation states

A UE configured for operation on a serving cell according to one or both of a DTX mode operation state by *cellDTXConfig* and a DRX mode operation state 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* of a cell operation state indicator field for the serving cell

- if the UE is configured with both DTX mode and DRX mode operation states for the serving cell, the cell operation state indicator field includes two bits where the first bit indicates the DTX mode operation state and the second bit indicates the DRX mode operation state

- if the UE is configured with only one of the DTX mode and DRX mode operation states for the serving cell, the cell operation state indicator field includes one bit indicating one of the DTX mode and DRX mode operation states, respectively, for the serving cell

- a '0' value for a bit of the cell operation state indicator field indicates a start of DTX Active Time or of DRX Active Time

- a '1' value for a bit of the cell operation state indicator field indicates an end of DTX Active Time or of DRX Active Time

- if the serving cell is configured with a SUL carrier, the cell operation state indicator field indication for start/end of DRX Active Time applies to both the UL carrier and the SUL carrier

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 a current start/end state of DTX Active Time or DRX Active Time for a second serving cell, the UE operates on the second serving cell according to the indicated state of DTX Active Time or of DRX Active Time 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 number of slots for adaptation of an operation state on a serving cell

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

Outside DTX Active Time of a serving cell, the UE does not receive on the serving cell

- PDCCH candidates for search space sets associated with detection of DCI format 2\_0, DCI format 2\_1, DCI format 2\_2, DCI format 2\_3, DCI format 2\_4, and DCI format 2\_5

- CSI-RS in resources provided by *CSI-ReportConfig* with *reportQuantity* that includes rank indication

Outside DRX Active Time of a serving cell, the UE does not transmit on the serving cell

- periodic or semi-persistent PUCCH or PUSCH

- periodic or semi-persistent SRS except for SRS in resources provided by *SRS-posResourceSet*

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