**3GPP TSG-RAN WG1 Meeting #112bis-e *R1-23xxxxx***

**e-Meeting, 17th – 26th April 2023**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **38.213** | **CR** | **draft** | **rev** | **-** | **Current version:** | **17.5.0** |  |
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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 | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  | Clarifications of CG/RA-SDT operation for RedCap UEs |
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| ***Source to WG:*** | Moderator (Ericsson) |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | NR\_redcap-Core, NR\_SmallData\_INACTIVE-Core |  | ***Date:*** | 2023-04-25 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-17 |
|  | *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 canbe 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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | RAN1#112bis-e discussed CG/RA-SDT operation for RedCap UEs and the discussion is captured as Issue #3 and Issue #6 in the feature lead summary in [R1-2303929](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_112b-e/Docs/R1-2303929.zip).For Issue #3: For RedCap UEs supporting CG/RA-SDT, RAN2#121 agreed to introduce optional UE support for CG/RA-SDT in an initial DL BWP that does not include the CD-SSB but an NCD-SSB.For Issue #6: RedCap TDD UEs supporting CG/RA-SDT should be able to expect the initial DL and UL BWPs to have their center frequencies aligned, similarly as in the normal random access case. |
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| ***Summary of change:*** | For Issue #3: For RedCap UEs that support CG/RA-SDT with NCD-SSB instead of CD-SSB in the initial BWP, it is clarified that NCD-SSB is used instead and it has the same QCL properties as the CD-SSB with the same index.For Issue #6: For RedCap TDD UEs that support CG/RA-SDT, it is clarified that the center frequencies are aligned for the initial DL and UL BWPs used for CG/RA-SDT. |
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| ***Consequences if not approved:*** | For Issue #3: If the CR is not approved, it is not clear that NCD-SSB can be used instead of CD-SSB for CG/RA-SDT and that the NCD-SSB has the same QCL properties as the CD-SSB.For Issue #6: If the CR is not approved, it is not clear that the UE can expect the initial DL and UL BWPs used for CG/RA-SDT to have their center frequencies aligned. |
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| ***Clauses affected:*** | 17.1 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  |  |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

## 17.1 RedCap UE procedures

Procedures for a RedCap UE are same as described for a UE in all other clauses of this document unless stated otherwise. In this clause, the term 'UE' refers to a RedCap UE.

A UE expects the initial DL BWP and the active DL BWP after the UE (re)establishes dedicated RRC connection to be smaller than or equal to the maximum DL bandwidth that the UE supports. A UE can be provided a DL BWP by *initialDownlinkBWP-RedCap* in *DownlinkConfigCommonSIB*, and an UL BWP by *initialUplinkBWP-RedCap* in *UplinkConfigCommonSIB*. If *initialUplinkBWP* in *UplinkConfigCommonSIB* indicates an UL BWP that is larger than a maximum UL BWP that a UE supports, the UE expects to be provided an UL BWP by *initialUplinkBWP-RedCap* in *UplinkConfigCommonSIB* that is smaller than or equal to the maximum UL bandwidth that the UE supports.

For unpaired spectrum operation, a RedCap UE does not expect to receive a configuration where the center frequency for an initial DL BWP in which the UE is configured to monitor Type1-PDCCH CSS set, or a CSS set provided by *sdt-SearchSpace* for random-access based PUSCH transmission as described in clause 19.2, is different than the center frequency for an initial UL BWP in which the RedCap UE may transmit Msg1/Msg3 or MsgA.

For unpaired spectrum operation, for configured-grant based PUSCH transmission as described in clause 19.1, a RedCap UE does not expect to receive a configuration where the center frequency for an initial DL BWP in which the UE is configured to monitor a USS set by *SearchSpace* or a CSS set by *sdt-SearchSpace* is different than the center frequency for an initial UL BWP in which the RedCap UE may transmit a PUSCH (re)transmission.

A UE can be provided by *BWP-DownlinkDedicated* a DL BWP, other than the initial DL BWP. A UE can be provided by *BWP-UplinkDedicated* an UL BWP, other than the initial UL BWP, that is smaller than or equal to the maximum UL bandwidth that the UE supports.

If a UE is provided an UL BWP by *initialUplinkBWP-RedCap* in *UplinkConfigCommonSIB* and is provided *rach-ConfigCommon* or *msgA-ConfigCommon* in *BWP-UplinkCommon* for the UL BWP, the UE uses corresponding parameters to perform the procedures in clauses 8.1, 8.1A, and 8.3; otherwise, the UE uses corresponding parameters from *rach-ConfigCommon* or *msgA-ConfigCommon* in *BWP-UplinkCommon* for the UL BWP provided by *initialUplinkBWP*.

If a UE is provided *initialUplinkBWP-RedCap* in *UplinkConfigCommonSIB* and does not have dedicated PUCCH resource configuration, the UE transmits PUCCH with HARQ-ACK information as described in clause 9.2.1 using a PUCCH resource set provided by *pucch-ResourceCommonRedCap*, except that frequency hopping for the PUCCH transmission is disabled if *intra-SlotFH* is present in *PUCCH-ConfigCommon*. If frequency hopping of the PUCCH transmission is disabled then, for the PUCCH transmission, the UE determines the initial cyclic shift index in the set of initial cyclic shift indexes as $r\_{PUCCH}modN\_{CS}$ and determines the PRB index as

- $RB\_{BWP}^{offset}+RB\_{BWP}^{offset-add}+\left⌊{r\_{PUCCH}}/{N\_{CS}}\right⌋$, if *intra-SlotFH* = '*fromLowerEdge*'

- $N\_{BWP}^{size}-RB\_{BWP}^{offset}-RB\_{BWP}^{offset-add}-1-\left⌊{r\_{PUCCH}}/{N\_{CS}}\right⌋$, otherwise

where $RB\_{BWP}^{offset-add}$ is provided by *additionalPRBOffset*, if provided; otherwise, $RB\_{BWP}^{offset-add}=0.$

If a UE is not provided *initialUplinkBWP-RedCap* in *UplinkConfigCommonSIB* and does not have dedicated PUCCH resource configuration, the UE transmits PUCCH with HARQ-ACK information as described in clause 9.2.1 using a PUCCH resource set provided by *pucch-ResourceCommonRedCap* if *pucch-ResourceCommonRedCap* is present or by *pucch-ResourceCommon* if *pucch-ResourceCommonRedCap* is absent. For an initial DL BWP provided by *initialDownlinkBWP-RedCap* in *DownlinkConfigCommonSIB*, if a UE in RRC\_IDLE state or in RRC\_INACTIVE state monitors PDCCH according to Type1-PDCCH CSS set and does not monitor PDCCH according to Type2-PDCCH CSS set, the UE does not expect the initial DL BWP to include SS/PBCH blocks and the CORESET with index 0.

For an active DL BWP not provided by *BWP-DownlinkDedicated*, if a UE does not indicate a capability to operate in the active DL BWP without receiving an SS/PBCH block, the UE in RRC\_CONNECTED state assumes that the active DL BWP includes the SS/PBCH blocks that the UE used to obtain SIB1 and, for SS/PBCH block and CORESET multiplexing pattern 1, the CORESET with index 0.

For an active DL BWP provided by *BWP-DownlinkDedicated*, unless a UE indicates a capability to operate in the active DL BWP without receiving an SS/PBCH block, the UE in RRC\_CONNECTED state assumes that the active DL BWP includes the SS/PBCH blocks that the UE used to obtain SIB1 or the SS/PBCH blocks provided by *NonCellDefiningSSB*. If the active DL BWP includes the SS/PBCH blocks that the UE used to obtain SIB1, for SS/PBCH block and CORESET multiplexing pattern 1, the UE expects the active DL BWP to include the CORESET with index 0.

For a RedCap UE indicating a capability to use an initial DL BWP that includes NCD-SSB for PUSCH transmission in RRC\_INACTIVE state, if the UE is provided *NonCellDefiningSSB* in *ncd-SSB-RedCapInitialBWP-SDT*, then during procedure of PUSCH transmission in RRC\_INACTIVE state (as described in clause 19) the UE uses the SS/PBCH blocks provided by *NonCellDefiningSSB* for the purposes for which it would otherwise have used the SS/PBCH blocks that the UE used to obtain SIB1.

If the active DL BWP provided by *BWP-DownlinkDedicated*, or the initial DL BWP during procedure of PUSCH transmission in RRC\_INACTIVE state (as described in clause 19), includes the SS/PBCH blocks provided by *NonCellDefiningSSB*, these SS/PBCH blocks and the SS/PBCH blocks that the UE used to obtain SIB1 have the same QCL properties, if they have the same index*.*

For a RedCap UE indicated presence of SS/PBCH blocks within an active DL BWP by *NonCellDefiningSSB*, collision handling between downlink receptions or uplink transmissions and the SS/PBCH blocks are same as described for a UE indicated presence of SS/PBCH blocks by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon* described in all other clauses, unless otherwise stated.

For monitoring of a PDCCH candidate by a UE configured with *NonCellDefiningSSB*, if the UE

- does not monitor PDCCH candidates in a Type0-PDCCH CSS set, and

- at least one RE for a PDCCH candidate overlaps with at least one RE of a candidate SS/PBCH block corresponding to a SS/PBCH block index provided by *NonCellDefiningSSB*,

the UE is not required to monitor the PDCCH candidate.