**3GPP TSG RAN WG1 #108-e** **R1-22xxxxx**

**e-Meeting, February 21st – March 3rd, 2022**

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| *CR-Form-v12.0* | | | | | | | | |
| **DRAFT CHANGE REQUEST** | | | | | | | | |
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|  | **38.213** | **CR** |  | **rev** |  | **Current version:** | **17.0.0** |  |
|  | | | | | | | | |
| *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:*** | Corrections on the introduction of UEs with reduced capabilities in NR | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Samsung | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | | 2022-03-07 |
|  |  | | | |  | |  | | |  |
| ***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 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | Corrections on UEs with reduced capabilities in NR. | | | | | | | | |
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| ***Summary of change:*** | | 1. Add reference to clause 17.2 in clause 9 to clarify that DL-UL collision handling for HD-FDD is after intra-UE multiplexing/prioritization 2. Capture cyclic shift and PRB index determination when a PUCCH transmission is without frequency hopping in clause 17.1 3. Restrict conditions for SS/PBCH block and CORESET 0 presence in initial DL BWP provided by “RedCap SIB” to UEs in RRC\_CONNECTED state in clause 17.1 4. Capture that if the initial DL BWP does not include a first SS/PBCH block a UE used to obtain cell\_ID and includes a second SS/PBCH block, the UE uses the second SS/PBCH block for all Layer-1 UE features that are mandatory without capability signalling in clause 17.1 5. Capture that for HD-FDD, SS/PBCH reception is prioritized over all transmissions when there is time overlapping in clause 17.2 6. Miscellaneous corrections in clause 17.2 | | | | | | | | |
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| ***Consequences if not approved:*** | | Incomplete support for UEs with reduced capabilities in NR. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 9, 17.1, 17.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 38.211, TS 38.212, TS 38.214 | | |
| ***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 text is omitted \*\*\*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications"

[2] 3GPP TS 38.201: "NR; Physical Layer – General Description"

[3] 3GPP TS 38.202: "NR; Services provided by the physical layer"

[4] 3GPP TS 38.211: "NR; Physical channels and modulation"

[5] 3GPP TS 38.212: "NR; Multiplexing and channel coding"

[6] 3GPP TS 38.214: "NR; Physical layer procedures for data"

[7] 3GPP TS 38.215: "NR; Physical layer measurements"

[8-1] 3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone"

[8-2] 3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone"

[8-3] 3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios"

[8-4] 3GPP TS 38.101-4: "NR; User Equipment (UE) radio transmission and reception; Part 4: Performance requirements"

[9] 3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception"

[10] 3GPP TS 38.133: "NR; Requirements for support of radio resource management"

[11] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification"

[12] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification"

[13] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures"

[14] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification"

[15] 3GPP TS 37.213: "Physical layer procedures for shared spectrum channel access"

[16] 3GPP TS 38.473: "F1 application protocol (F1AP)"

[17] 3GPP TS 38.304: "NR; User Equipment (UE) procedures in Idle mode and RRC Inactive state"

[18] 3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities"

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

# 9 UE procedure for reporting control information

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

A UE does not expect to be scheduled to transmit a PUCCH or a PUSCH with smaller priority index that would overlap in time with a PUCCH of larger priority index with HARQ-ACK information only in response to a PDSCH reception without a corresponding PDCCH. A UE does not expect to be scheduled to transmit a PUCCH of smaller priority index that would overlap in time with a PUSCH of larger priority index with SP-CSI report(s) without a corresponding PDCCH.

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 as described in clause 11.1, clause 11.1.1, and clause 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.

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

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

# 17 UE with reduced capabilities

A UE with reduced capabilities (RedCap UE) supports all Layer-1 UE features that are mandatory without capability signalling as described in [18, TS 38.306].

## 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* in *DownlinkConfigCommonRedCapSIB*, and an UL BWP by *initialUplinkBWP* in *UplinkConfigCommonRedCapSIB*. 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* in *UplinkConfigCommonRedCapSIB*.

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 *RACH-ConfigCommon-RedCap* or *RACH-ConfigCommonTwoStepRA-RedCap*, 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 *RACH-ConfigCommonTwoStepRA*.

If a UE is provided *initialUplinkBWP* in *UplinkConfigCommonRedCapSIB* 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 *disable-FH-PUCCH* is provided in *PUCCH-ConfigCommonRedCap*. 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 and determines the PRB index as

- , if *BWP-part* = ‘*FromLowerEdge*’

- , otherwise

where is provided by *additional-RB-Offset*, if provided; otherwise,

For an initial DL BWP provided by *initialDownlinkBWP* in *DownlinkConfigCommonRedCapSIB*, if a UE monitors PDCCH according to a Type1-PDCCH CSS set and does not monitor PDCCH according to Type2-PDCCH CSS set and if the initial DL BWP does not include an SS/PBCH block the UE used to obtain *physCellId* in *ServingCellConfigCommon* and, for operation in FR1 does not include the CORESET with index 0, the UE assumes that the initial DL BWP does not include SS/PBCH blocks or the CORESET with index 0.

For an initial DL BWP provided by *initialDownlinkBWP* in *DownlinkConfigCommonRedCapSIB*, if a UE in RRC\_CONNECTED state monitors PDCCH according to Type2-PDCCH CSS set, the UE assumes that the initial DL BWP includes an SS/PBCH block the UE used to obtain *physCellId* in *ServingCellConfigCommon*, and for operation in FR1 includes the CORESET with index 0, unless the UE indicates a capability to operate otherwise

If the initial DL BWP provided by *initialDownlinkBWP* in *DownlinkConfigCommonRedCapSIB* includes the second SS/PBCH block and does not include the first SS/PBCH block, the UE uses the second SS/PBCH block to support all Layer-1 UE features that are mandatory without capability signalling as described in [18, TS 38.306]. When the first SS/PBCH block and the second SS/PBCH block have same index, the first SS/PBCH block and the second SS/PBCH block have same quasi-colocation properties.

For an active DL BWP provided by *BWP-DownlinkDedicated*, a UE assumes that the active DL BWP includes a SS/PBCH block, unless the UE indicates a capability to operate in the DL BWP without receiving an SS/PBCH block, and does not include the CORESET with index 0.

## 17.2 Half-Duplex UE in paired spectrum

A half-duplex UE (HD-UE) in paired spectrum is not capable of simultaneous transmissions and receptions on a serving cell with paired spectrum. This clause is applicable for communication of a HD-UE on a serving cell with paired spectrum.

A HD-UE does not expect to detect a DCI format scheduling a reception in a set of symbols and detect a DCI format scheduling a transmission in any symbol from the set of symbols.

If a HD-UE is configured by higher layers to receive a PDCCH, or PDSCH, or CSI-RS, or DL PRS in a set of symbols, the HD-UE receives the PDCCH, or PDSCH, or CSI-RS, or DL PRS if the HD-UE does not detect a DCI format that indicates to the HD-UE to transmit a PUSCH, or PUCCH, or PRACH, or SRS in at least one symbol of the set of symbols; otherwise, the HD-UE does not receive the PDCCH, or PDSCH, or CSI-RS, or DL PRS in the set of symbols.

If a HD-UE is configured by higher layers to transmit SRS, or PUCCH, or PUSCH in a set of symbols and the UE detects a DCI format indicating to the HD-UE to receive CSI-RS or PDSCH in a subset of symbols from the set of symbols, then

- the HD-UE does not expect to cancel the transmission of the PUCCH or PUSCH in the set of symbols if the first symbol in the set occurs within relative to a last symbol of a CORESET where the HD-UE detects the DCI format; otherwise, the HD-UE cancels the PUCCH, or the PUSCH, or an actual repetition of the PUSCH [6, TS38.214], determined from clauses 9 and 9.2.5 or clause 6.1 of [6, TS38.214].

- the HD-UE does not expect to cancel the transmission of SRS in symbols from the subset of symbols that occur within relative to a last symbol of a CORESET where the HD-UE detects the DCI format. The HD-UE cancels the SRS transmission in remaining symbols from the subset of symbols.

is the PUSCH preparation time for UE processing capability 1 [6, TS 38.214] assuming and corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH carrying the DCI format and the SCS configuration of the SRS, PUCCH, PUSCH.

A HD-UE does not expect to receive both dedicated higher layer parameters configuring transmission in a set of symbols and dedicated higher layer parameters configuring reception in the set of symbols. A HD-UE does not expect to receive both a Type-0/0A/1/2-PDCCH CSS set configuration for PDCCH reception in a set of symbols and dedicated higher layer parameters configuring transmission in the set of symbols.

If a HD-UE would transmit a PUSCH, or PUCCH, or SRS based on a configuration by higher layers and the HD-UE is indicated presence of SS/PBCH blocks by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon*, the HD-UE does not transmit

- PUSCH or PUCCH if a last symbol of the PUSCH or PUCCH transmission would not be at least [4, TS 38.211] prior to a first symbol of the next earliest SS/PBCH block

- PUSCH or PUCCH if a first symbol of the PUSCH or PUCCH transmission would not be at least [4, TS 38.211] after a last symbol of the previous latest SS/PBCH block

- SRS in symbols that would not be at least prior to a first symbol of the next earliest SS/PBCH block

- SRS in symbols that would not be at least after a last symbol of the previous latest SS/PBCH block

If a HD-UE would transmit a PRACH based on a detected DCI format, or PUSCH, or PUCCH, or SRS and the HD-UE is indicated presence of SS/PBCH blocks by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon* in a set of symbols, the HD-UE does not transmit PUSCH or PUCCH or PRACH if a transmission would overlap with any symbol from the set of symbols and the HD-UE does not transmit SRS in the set of symbols.

If a HD-UE would transmit a PRACH or MsgA PUSCH triggered by higher layers in a set of symbols and would receive a PDCCH, or a PDSCH, or a CSI-RS, or a DL PRS, or is indicated presence of SS/PBCH blocks by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon* in symbols that include any symbol from the set of symbols, the HD-UE can select based on its implementation whether to either transmit the PRACH or the MsgA PUSCH or receive the PDSCH, or the CSI-RS, or the PL RS, or the PDCCH, or the SS/PBCH blocks.

If a HD-UE would receive a PDCCH, or a PDSCH, or a CSI-RS, or a DL PRS based on a configuration by higher layers or is indicated presence of SS/PBCH blocks by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon* in a set of symbols, and the HD-UE would transmit PRACH or MsgA PUSCH triggered by higher layers starting or ending at a symbol that is earlier or later than or , respectively, from the last or first symbol in the set of symbols, the HD-UE can select based on its implementation whether to either transmit the PRACH or the MsgA PUSCH or receive the PDSCH, or the CSI-RS, or the DL PRS, or the PDCCH, or the SS/PBCH blocks.

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