**3GPP TSG-RAN WG2 Meeting #121bis-e *\_R2-2304437***

**Online, 17th – 26th April, 2023 *Revision of R2-2303134***

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **38.331** | **CR** | **3989** | **rev** | **1** | **Current version:** | **17.4.0** |  |
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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:***  | Corrections on NCD-SSB for RedCap |
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| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | R2 |
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| ***Work item code:*** | NR\_redcap-Core |  | ***Date:*** | 2023-04-17 |
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| ***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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | 1. In the field descriptions of *nonCellDefiningSSB-r17*, it is specified that the NCD-SSB has the same values for the properties (e.g., ssb-PositionsInBurst, PCI, ssb-periodicity, ssb-PBCH-BlockPower) of the corresponding CD-SSB.

However, based one RAN2#116bis agreements, ssb-periodicity is only the same property rather than same value:“*For connected mode operation NCD-SSB has the same properties (e.g., ssb-PositionsInBurst, PCI, ssb-periodicity, ssb-PBCH-BlockPower) as the corresponding CD-SSB. FFS if an additional property needs to be specified.**The network may provide absoluteFrequencySSB and ssb-periodicity explicitly for NCD-SSB, i.e., other properties such as PCI, ssb-PBCH-BlockPower, ssb-PositionsInBurst are configured with the same values from serving cell's CD-SSB*.”The SSB periodicity of NCD-SSB can be re-configured in *NonCellDefiningSSB-r17* IE (i.e. *ssb-Periodicity-r17*). Therefore, ssb-periodicity should be removed from the field descriptions of *nonCellDefiningSSB-r17*, to avoid the confusion1. In field descriptions of *ssb-Periodicity-r17*, it is specified that if the field is absent in the *NonCellDefiningSSB* IE, the UE applies the SSB periodicity of the CD-SSB (*ssb-periodicityServingCell* configured in *ServingCellConfigCommon*). The *ssb-periodicityServingCell* field can be provided in either *ServingCellConfigCommon* IE or *ServingCellConfigCommonSIB* IE to configure CD-SSB*.* To address the case that the UE is not provided with *ServingCellConfigCommon* yet(e.g. the UE does not switch to any other cell via handover), the UE should be allowed to also obtain *ssb-periodicityServingCell* field in *ServingCellConfigCommonSIB* IE.
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| ***Summary of change:*** | 1. Remove “ssb-periodicity” in field descriptions of nonCellDefiningSSB-r17.
2. Add “or ServingCellConfigCommonSIB” in field descriptions of *ssb-Periodicity-r17* to allow the UE to use the SSB periodicity of the CD-SSB configured in SIB1.

**Impact analysis**Impacted 5G architecture options:NR StandaloneImpacted functionality:NCD-SSB configurationInter-operability: 1. If the UE is implemented according to this CR while the network is not, there is no inter-operability issue. If the network is implemented according to this CR while the UE is not, there is no inter-operability issue.
2. If the UE is implemented according to this CR while the network is not, there is no inter-operability issue. If the network is implemented according to this CR while the UE is not, the UE may not find the available SSB periodicity of NCD-SSB.
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| ***Consequences if not approved:*** | 1. There may be ambiguity on the configuration of SSB periodicity of NCD-SSB.
2. The UE may not able to find the available SSB periodicity configuration of NCD-SSB.
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| ***Clauses affected:*** | 6.3.2 |
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|  | **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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

*START OF CHANGE*

### 6.3.2 Radio resource control information elements

<Omitted text>

– *BWP-DownlinkDedicated*

The IE *BWP-DownlinkDedicated* is used to configure the dedicated (UE specific) parameters of a downlink BWP.

***BWP-DownlinkDedicated* information element**

-- ASN1START

-- TAG-BWP-DOWNLINKDEDICATED-START

BWP-DownlinkDedicated ::= SEQUENCE {

 pdcch-Config SetupRelease { PDCCH-Config } OPTIONAL, -- Need M

 pdsch-Config SetupRelease { PDSCH-Config } OPTIONAL, -- Need M

 sps-Config SetupRelease { SPS-Config } OPTIONAL, -- Need M

 radioLinkMonitoringConfig SetupRelease { RadioLinkMonitoringConfig } OPTIONAL, -- Need M

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 sps-ConfigToAddModList-r16 SPS-ConfigToAddModList-r16 OPTIONAL, -- Need N

 sps-ConfigToReleaseList-r16 SPS-ConfigToReleaseList-r16 OPTIONAL, -- Need N

 sps-ConfigDeactivationStateList-r16 SPS-ConfigDeactivationStateList-r16 OPTIONAL, -- Need R

 beamFailureRecoverySCellConfig-r16 SetupRelease {BeamFailureRecoveryRSConfig-r16} OPTIONAL, -- Cond SCellOnly

 sl-PDCCH-Config-r16 SetupRelease { PDCCH-Config } OPTIONAL, -- Need M

 sl-V2X-PDCCH-Config-r16 SetupRelease { PDCCH-Config } OPTIONAL -- Need M

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 preConfGapStatus-r17 BIT STRING (SIZE (maxNrofGapId-r17)) OPTIONAL, -- Cond PreConfigMG

 beamFailureRecoverySpCellConfig-r17 SetupRelease { BeamFailureRecoveryRSConfig-r16} OPTIONAL, -- Cond SpCellOnly

 harq-FeedbackEnablingforSPSactive-r17 BOOLEAN OPTIONAL, -- Need R

 cfr-ConfigMulticast-r17 SetupRelease { CFR-ConfigMulticast-r17 } OPTIONAL, -- Need M

 dl-PPW-PreConfigToAddModList-r17 DL-PPW-PreConfigToAddModList-r17 OPTIONAL, -- Need N

 dl-PPW-PreConfigToReleaseList-r17 DL-PPW-PreConfigToReleaseList-r17 OPTIONAL, -- Need N

 nonCellDefiningSSB-r17 NonCellDefiningSSB-r17 OPTIONAL, -- Need R

 servingCellMO-r17 MeasObjectId OPTIONAL -- Cond MeasObject-NCD-SSB

 ]]

}

SPS-ConfigToAddModList-r16 ::= SEQUENCE (SIZE (1..maxNrofSPS-Config-r16)) OF SPS-Config

SPS-ConfigToReleaseList-r16 ::= SEQUENCE (SIZE (1..maxNrofSPS-Config-r16)) OF SPS-ConfigIndex-r16

SPS-ConfigDeactivationState-r16 ::= SEQUENCE (SIZE (1..maxNrofSPS-Config-r16)) OF SPS-ConfigIndex-r16

SPS-ConfigDeactivationStateList-r16 ::= SEQUENCE (SIZE (1..maxNrofSPS-DeactivationState)) OF SPS-ConfigDeactivationState-r16

DL-PPW-PreConfigToAddModList-r17 ::= SEQUENCE (SIZE (1..maxNrofPPW-Config-r17)) OF DL-PPW-PreConfig-r17

DL-PPW-PreConfigToReleaseList-r17 ::= SEQUENCE (SIZE (1..maxNrofPPW-Config-r17)) OF DL-PPW-ID-r17

-- TAG-BWP-DOWNLINKDEDICATED-STOP

-- ASN1STOP

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| ***BWP-DownlinkDedicated* field descriptions** |
| ***beamFailureRecoverySCellConfig***Configuration of candidate RS for beam failure recovery on SCells. |
| ***beamFailureRecoverySpCellConfig***Configuration of candidate RS for beam failure recovery on the SpCell. This field can only be configured when *beamFailure-r17* is configured in *RadioLinkMonitoringConfig*. |
| ***cfr-ConfigMulticast***UE specific common frequency resource configuration for MBS multicast for one dedicated BWP. This field can be configured within at most one serving cell. |
| ***dl-PPW-PreConfigToAddModList***Indicates a list of DL-PRS processing window configurations to be added or modified for the dedicated DL BWP. |
| ***dl-PPW-PreConfigToReleaseList***Indicates a list of DL-PRS processing window configurations to be released for the dedicated DL BWP. |
| ***harq-FeedbackEnablingforSPSactive***If enabled, UE reports ACK/NACK for the first SPS PDSCH after activation, regardless of if HARQ feedback is enabled or disabled corresponding to the first SPS PDSCH after activation. Otherwise, UE follows configuration of HARQ feedback enabled/disabled corresponding to the first SPS PDSCH after activation. |
| ***nonCellDefiningSSB***If configured, the RedCap UE operating in this BWP uses this SSB for the purposes for which it would otherwise have used the CD-SSB of the serving cell (e.g. obtaining sync, measurements, RLM). Furthermore, other parts of the BWP configuration that refer to an SSB (e.g. the "SSB" configured in the *QCL-Info* IE; the "ssb-Index" configured in the *RadioLinkMonitoringRS*; *CFRA-SSB-Resource*; *PRACH-ResourceDedicatedBFR*) refer implicitily to this NCD-SSB.The NCD-SSB has the same values for the properties (e.g., *ssb-PositionsInBurst*, *PCI*, *ssb-PBCH-BlockPower*) of the corresponding CD-SSB apart from the values of the properties configured in the *NonCellDefiningSSB-r17* IE. |
| ***pdcch-Config***UE specific PDCCH configuration for one BWP. |
| ***pdsch-Config***UE specific PDSCH configuration for one BWP. |
| ***preConfGapStatus***Indicates whether the pre-configured measurement gaps (i.e. the gaps configured with *preConfigInd*) are activated or deactivated upon the switch to this BWP. If this field is configured, the UE shall apply network-controlled mechanism for activation and deactivation of the pre-configured measurement gaps, otherwise the UE shall apply the autonomous activation/deactivation mechanism, as specified in TS 38.133 [14]. The first/leftmost bit corresponds to the measurement gap with gap ID 1, the second bit corresponds to measurement gap with gap ID 2, and so on. Value 0 indicates that the corresponding pre-configured measurement gap is deactivated while value 1 indicates that the corresponding pre-configured measurement gap is activated. The UE shall ignore the bit if the corresponding measurement gap is not a pre-configured measurement gap. |
| ***servingCellMO****measObjectId* of the *MeasObjectNR* in *MeasConfig* which is associated to the serving cell. For this *MeasObjectNR*, the following relationship applies between this *MeasObjectNR* and *nonCellDefiningSSB* in *BWP-DownlinkDedicated* of the associated downlink BWP: if *ssbFrequency* is configured, its value is the same as the *absoluteFrequencySSB* in the *nonCellDefiningSSB*. If the field is present in a downlink BWP and the BWP is activated, the RedCap UE uses this measurement object for serving cell measurements (e.g., including those used in measurement report triggering events), otherwise, the RedCap UE uses the *servingCellMO* in *ServingCellConfig* IE. |
| ***sps-Config***UE specific SPS (Semi-Persistent Scheduling) configuration for one BWP. Except for reconfiguration with sync, the NW does not reconfigure *sps-Config* when there is an active configured downlink assignment (see TS 38.321 [3]). However, the NW may release the *sps-Config* at any time. Network can only configure SPS in one BWP using either this field or *sps-ConfigToAddModList.* |
| ***sps-ConfigDeactivationStateList***Indicates a list of the deactivation states in which each state can be mapped to a single or multiple SPS configurations to be deactivated, see clause 10.2 in TS 38.213 [13]. If a state is mapped to multiple SPS configurations, each of these SPS configurations is configured with the same *harq-CodebookID*. |
| ***sps-ConfigToAddModList***Indicates a list of one or more DL SPS configurations to be added or modified in one BWP. Except for reconfiguration with sync, the NW does not reconfigure a SPS configuration when it is active (see TS 38.321 [3]). |
| ***sps-ConfigToReleaseList***Indicates a list of one or more DL SPS configurations to be released. The NW may release a SPS configuration at any time. |
| ***radioLinkMonitoringConfig***UE specific configuration of radio link monitoring for detecting cell- and beam radio link failure occasions. The maximum number of failure detection resources should be limited up to 8 for both cell and beam radio link failure detection. For SCells, only periodic 1-port CSI-RS can be configured in IE *RadioLinkMonitoringConfig*. |
| ***sl-PDCCH-Config***Indicates the UE specific PDCCH configurations for receiving the SL grants (via SL-RNTI or SL-CS-RNTI) for NR sidelink communication/discovery***.*** |
| ***sl-V2X-PDCCH-Config***Indicates the UE specific PDCCH configurations for receiving SL grants (i.e. sidelink SPS) for V2X sidelink communication***.*** |

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| **Conditional Presence** | **Explanation** |
| *MeasObject-NCD-SSB* | This field is optionally present Need S if the UE is a RedCap UE and *nonCellDefiningSSB* is configured in this DL BWP. It is absent otherwise. |
| *PreConfigMG* | The field is optionally present, Need R, if there is at least one per UE gap configured with *preConfigInd* or there is at least one per FR gap of the same FR which the BWP belongs to and configured with *preConfigInd*. It is absent, Need R, otherwise. |
| *ScellOnly* | The field is optionally present, Need M, in the *BWP-DownlinkDedicated* of an Scell. It is absent otherwise. |
| *SpCellOnly* | The field is optionally present, Need M, in the *BWP-DownlinkDedicated* of an Spcell. It is absent otherwise. |

*Next CHANGE*

– *NonCellDefiningSSB*

The IE *NonCellDefiningSSB* is used to configure a NCD-SSB to be used while the UE operates in a RedCap-specific initial BWP or dedicated BWP.

***NonCellDefiningSSB* information element**

-- ASN1START

-- TAG-NONCELLDEFININGSSB-START

NonCellDefiningSSB-r17 ::= SEQUENCE {

 absoluteFrequencySSB-r17 ARFCN-ValueNR,

 ssb-Periodicity-r17 ENUMERATED { ms5, ms10, ms20, ms40, ms80, ms160, spare2, spare1 } OPTIONAL, -- Need S

 ssb-TimeOffset-r17 ENUMERATED { ms5, ms10, ms15, ms20, ms40, ms80, spare2, spare1 } OPTIONAL, -- Need S

 ...

}

-- TAG-NONCELLDEFININGSSB-STOP

-- ASN1STOP

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| ***NonCellDefiningSSB* field descriptions** |
| ***absoluteFrequencySSB***Frequency of the NCD-SSB. The network configures this field so that the SSB is within the bandwidth of the BWP configured in *BWP-DownlinkCommon*. |
| ***ssb-Periodicity***The periodicity of this NCD-SSB. The network configures only periodicities that are larger than the periodicity of serving cell's CD-SSB. If the field is absent, the UE applies the SSB periodicity of the CD-SSB (*ssb-periodicityServingCell* configured in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*). |
| ***ssb-TimeOffset***The time offset between CD-SSB of the serving cell and this NCD-SSB. Value *ms5* means the first burst of NCD-SSB is transmitted 5ms later than the first burst of CD-SSB transmitted after the first symbol of SFN=0 of the serving cell, value *ms10* means the first burst of NCD-SSB is transmitted 10ms later than the first burst of CD-SSB transmitted after the first symbol in SFN=0 of the serving cell, and so on. If the field is absent, RedCap UE considers that the time offset between the first burst of CD-SSB transmitted in the serving cell and the first burst of this NCD-SSB transmitted is zero. |

END OF CHANGE