**3GPP T****SG-RAN WG2 Meeting #121bis-e R2-230xxxx**

**Electronic, April 17 – 26, 2023**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **38.331** | **CR** | **4001** | **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 refServCellIndicator |
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| ***Source to WG:*** | ZTE Corporation, Sanechips, Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | R2 |
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| ***Work item code:*** | NR\_newRAT-Core |  | ***Date:*** | 2023-04-07 |
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| ***Category:*** | **A** |  | ***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:*** | For *refServCellIndicator* field in *MeasGapConfig*, the condition of the presence of the field is defined as: refServCellIndicator ENUMERATED {pCell, pSCell, mcg-FR2} OPTIONAL -- Cond NEDCorNRDC

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| Conditional Presence | Explanation |
| *NEDCorNRDC* | This field is mandatory present when configuring gap pattern to UE in NE-DC or NR-DC. In case the gap pattern to UE in NE-DC and NR-DC is already configured, then the field is absent, need M. Otherwise, it is absent. |

The first sentence means the field must be provided when configuring a new gap to NE-DC or NR-DC. While the second green sentence causes confusion when the UE is switching from SA to NE-DC/NR-DC and gap pattern is already configured before SN addition. It seems the network cannot include the field, but indeed there is no stored value and “Need M” does not work.In addition, because of the conflict wordings “is absent, Need M”, it is unclear whether the network can update the value when UE is in NE-DC and NR-DC. After checking the history, the second green sentence was added based on the following RIL comment.The original intention is to support releasing the field when UE is switching from DC to non-DC. However, this intention was not reflected by current sentences. Based on the discussion in RAN2#121bis-e, considering the existing UE implementation may firstly release the old gap configuration upon gap reconfiguration according to the procedure text, to avoid inter-operability issue, we suggest to clarify:1. Upon SN addition in NE-DC or NR-DC, network should always set the field refServCellIndicator, if the gap pattern is already configured;
2. When UE in NE-DC or NR-DC is already configured with gap pattern together with refServCellIndicator, the network is allowed to update the refServCellIndicator, if needed. But delta configuration is not supported, the network should include refServCellIndicator field when reconfiguring the gap pattern;
3. Allow the network to release the field when releasing the SN and keeping the gap pattern unchanged.

In addition, the explanation of condition AsyncCA is also updated to disallow delta configuration. |
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| ***Summary of change:*** | 1. Update the explanation of Cond *NEDCorNRDC* as below:

This field is mandatory present when configuring and reconfiguring gap pattern to UE in NE-DC or NR-DC. Otherwise, it is absent, Need R.1. Update the explanation of Cond *AsyncCA* as below:

This field is mandatory present when configuring and reconfiguring FR2 gap pattern to UE in:- (NG)EN-DC or NR SA with asynchronous CA involving FR2 carrier(s);- NE-DC or NR-DC with asynchronous CA involving FR2 carrier(s), if the field refServCellIndicator is set to mcg-FR2.Otherwise, it is absent, Need R.**Impact analysis**Impacted 5G architecture options:NE-DC, NR-DCImpacted functionality:Measurement gap configurationInter-operability:* If the network implements the CR and the UE does not, or if the UE implements the CR and the network does not, it is unclear whether the gNB can include the field upon SN addition, whether the gNB can update the field, and whether the gNB can release the field upon SN release. In case the gNB and UEs have different understandings, it will result in RRC reconfiguration failure.
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| ***Consequences if not approved:*** | It is unclear whether the gNB can include refServCellIndicator field in an already configured gap pattern upon SN addition, whether the gNB can update the refServCellIndicator field when the UE is in NE-DC or NR-DC, and whether the gNB can release the field upon SN release.For refFR2ServCellAsyncCA field, the network assumes the UE supports delta configuration, but the UE may not support, then reconfiguration failure may happen.  |
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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:*** |  |
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| ***This CR's revision history:*** |  |

Start of change

– *MeasGapConfig*

The IE *MeasGapConfig* specifies the measurement gap configuration and controls setup/release of measurement gaps.

***MeasGapConfig* information element**

-- ASN1START

-- TAG-MEASGAPCONFIG-START

MeasGapConfig ::= SEQUENCE {

 gapFR2 SetupRelease { GapConfig } OPTIONAL, -- Need M

 ...,

 [[

 gapFR1 SetupRelease { GapConfig } OPTIONAL, -- Need M

 gapUE SetupRelease { GapConfig } OPTIONAL -- Need M

 ]],

 [[

 gapToAddModList-r17 SEQUENCE (SIZE (1..maxNrofGapId-r17)) OF GapConfig-r17 OPTIONAL, -- Need N

 gapToReleaseList-r17 SEQUENCE (SIZE (1..maxNrofGapId-r17)) OF MeasGapId-r17 OPTIONAL, -- Need N

 posMeasGapPreConfigToAddModList-r17 PosMeasGapPreConfigToAddModList-r17 OPTIONAL, -- Need N

 posMeasGapPreConfigToReleaseList-r17 PosMeasGapPreConfigToReleaseList-r17 OPTIONAL -- Need N

 ]]

}

GapConfig ::= SEQUENCE {

 gapOffset INTEGER (0..159),

 mgl ENUMERATED {ms1dot5, ms3, ms3dot5, ms4, ms5dot5, ms6},

 mgrp ENUMERATED {ms20, ms40, ms80, ms160},

 mgta ENUMERATED {ms0, ms0dot25, ms0dot5},

 ...,

 [[

 refServCellIndicator ENUMERATED {pCell, pSCell, mcg-FR2} OPTIONAL -- Cond NEDCorNRDC

 ]],

 [[

 refFR2ServCellAsyncCA-r16 ServCellIndex OPTIONAL, -- Cond AsyncCA

 mgl-r16 ENUMERATED {ms10, ms20} OPTIONAL -- Cond PRS

 ]]

}

GapConfig-r17 ::= SEQUENCE {

 measGapId-r17 MeasGapId-r17,

 gapType-r17 ENUMERATED {perUE, perFR1, perFR2},

 gapOffset-r17 INTEGER (0..159),

 mgl-r17 ENUMERATED {ms1, ms1dot5, ms2, ms3, ms3dot5, ms4, ms5, ms5dot5, ms6, ms10, ms20},

 mgrp-r17 ENUMERATED {ms20, ms40, ms80, ms160},

 mgta-r17 ENUMERATED {ms0, ms0dot25, ms0dot5, ms0dot75},

 refServCellIndicator-r17 ENUMERATED {pCell, pSCell, mcg-FR2} OPTIONAL, -- Cond NEDCorNRDC

 refFR2-ServCellAsyncCA-r17 ServCellIndex OPTIONAL, -- Cond AsyncCA

 preConfigInd-r17 ENUMERATED {true} OPTIONAL, -- Need R

 ncsgInd-r17 ENUMERATED {true} OPTIONAL, -- Need R

 gapAssociationPRS-r17 ENUMERATED {true} OPTIONAL, -- Need R

 gapSharing-r17 MeasGapSharingScheme OPTIONAL, -- Need R

 gapPriority-r17 GapPriority-r17 OPTIONAL, -- Need R

 ...

}

PosMeasGapPreConfigToAddModList-r17 ::= SEQUENCE (SIZE (1..maxNrofPreConfigPosGapId-r17)) OF PosGapConfig-r17

PosMeasGapPreConfigToReleaseList-r17 ::= SEQUENCE (SIZE (1..maxNrofPreConfigPosGapId-r17)) OF MeasPosPreConfigGapId-r17

PosGapConfig-r17 ::= SEQUENCE {

 measPosPreConfigGapId-r17 MeasPosPreConfigGapId-r17,

 gapOffset-r17 INTEGER (0..159),

 mgl-r17 ENUMERATED {ms1dot5, ms3, ms3dot5, ms4, ms5dot5, ms6, ms10, ms20},

 mgrp-r17 ENUMERATED {ms20, ms40, ms80, ms160},

 mgta-r17 ENUMERATED {ms0, ms0dot25, ms0dot5},

 gapType-r17 ENUMERATED {perUE, perFR1, perFR2},

 ...

}

MeasPosPreConfigGapId-r17 ::= INTEGER (1..maxNrofPreConfigPosGapId-r17)

-- TAG-MEASGAPCONFIG-STOP

-- ASN1STOP

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| ***MeasGapConfig* field descriptions** |
| ***gapAssociationPRS***Indicates that PRS measurement is associated with this measurement gap. The network only includes this field for one per UE gap. If concurrent gap (i.e. one of the gap combination as defined in Table 9.1.8-1 in TS 38.133 [14]) is configured and no gap is configured with this field, the PRS measurement is associated with the gap configured via *gapUE*, if available. |
| ***gapFR1***Indicates measurement gap configuration that applies to FR1 only. In (NG)EN-DC, *gapFR1* cannot be set up by NR RRC (i.e. only LTE RRC can configure FR1 measurement gap). In NE-DC, *gapFR1* can only be set up by NR RRC (i.e. LTE RRC cannot configure FR1 gap). In NR-DC, *gapFR1* can only be set up in the *measConfig* associated with MCG. *gapFR1* can not be configured together with *gapUE*. The applicability of the FR1 measurement gap is according to Table 9.1.2-2 and Table 9.1.2-3 in TS 38.133 [14]. |
| ***gapFR2***Indicates measurement gap configuration applies to FR2 only. In (NG)EN-DC or NE-DC, *gapFR2* can only be set up by NR RRC (i.e. LTE RRC cannot configure FR2 gap). In NR-DC, *gapFR2* can only be set up in the *measConfig* associated with MCG. *gapFR2* cannot be configured together with *gapUE*. The applicability of the FR2 measurement gap is according to Table 9.1.2-2 and Table 9.1.2-3 in TS 38.133 [14]. |
| ***gapOffset***Value *gapOffset* is the gap offset of the gap pattern with MGRP indicated in the field *mgrp*. The value range is from 0 to *mgrp*-1. If *ncsgInd-r17* is present, this offset value refers to the starting point of VIL1 (the visible interruption length before the ML). |
| ***gapPriority***Indicates the priority of this measurement gap (see TS 38.133 [14], clause 9.1.8.3). Value *1* indicates highest priority, value 2 indicates second level priority, and so on. |
| ***gapSharing***Indicates the measurement gap sharing scheme that applies to this *GapConfig*. For applicability of the different gap sharing schemes, see TS 38.133 [14]. Value *scheme00* corresponds to scheme "00", value *scheme01* corresponds to scheme "01", and so on. |
| ***gapToAddModList***A list of of measurement gap configuration to be added or modified. If more than one measurement gap is configured (i.e. concurrent measurement gap as specified in TS 38.133[14], clause 9.1.8), the maximum number of configured measurement gap is limited by the gap combinations defined in Table 9.1.8-1 in TS 38.133 [14]. The network configures at most one NCSG or pre-configured measurement gap for a given gap type. In this version of the specification, the network configures this field only in NR standalone. This field is used only for a UE that supports pre-configured measurement gap, concurrent measurement gap, or NCSG. In this version of the specification, the network does not configure concurrent measurement gap together with MUSIM gap or preconfigured measurement gap for positioning. |
| ***gapToReleaseList***A list of measurement gap configuration to be released. |
| ***gapType***Indicates the type of this measurement gap. Value *perUE* indicates that it is a per UE measurement gap, value *perFR1* indicates that it is an FR1 measurement gap, and value *perFR2* indicates that it is an FR2 measurement gap. |
| ***gapUE***Indicates measurement gap configuration that applies to all frequencies (FR1 and FR2). In (NG)EN-DC, *gapUE* cannot be set up by NR RRC (i.e. only LTE RRC can configure per UE measurement gap). In NE-DC, *gapUE* can only be set up by NR RRC (i.e. LTE RRC cannot configure per UE gap). In NR-DC, *gapUE* can only be set up in the *measConfig* associated with MCG. If *gapUE* is configured, then neither *gapFR1* nor *gapFR2* can be configured. The applicability of the per UE measurement gap is according to Table 9.1.2-2 and Table 9.1.2-3 in TS 38.133 [14]. |
| ***measGapId***The ID of this measurement gap configuration. |
| ***mgl***Value *mgl* is the measurement gap length in ms of the measurement gap. If *ncsgInd-r17* is not present, the measurement gap length is according to in Table 9.1.2-1 in TS 38.133 [14]. If *ncsgInd-r17* is present, this field indicates the measurement length (ML) in NCSG pattern and is configured according to Table 9.1.9.3-1 in TS 38.133 [14]. Value *ms1dot5* corresponds to 1.5 ms, *ms3* corresponds to 3 ms and so on. If *mgl-r16* is present, UE shall ignore the *mgl* (without suffix). Value *ms1*, *ms2*, and *ms5* can only be configured if *ncsgInd* is present. |
| ***mgrp***If *ncsgInd-r17* is not present, the *mgrp* field indicates the measurement gap repetition period in (ms) of the measurement gap according to Table 9.1.2-1 in TS 38.133 [14]. If *ncsgInd-r17* is present, the *mgrp* field indicates the Visible Interruption Repetition Period (VIRP) of NCSG pattern and is configured according to Table 9.1.9.3-1 in TS 38.133 [14]. |
| ***mgta***Value *mgta* is the measurement gap timing advance in ms. The applicability of the measurement gap timing advance is according to clause 9.1.2 of TS 38.133 [14], or according to clause 9.1.9 of TS 38.133 [14] if *ncsgInd* is present. Value *ms0* corresponds to 0 ms, *ms0dot25* corresponds to 0.25 ms, *ms0dot5* corresponds to 0.5 ms and *ms0dot75* corresponds to 0.75 ms. For FR2, the network only configures 0 ms and 0.25 ms if *ncsgInd* is not present. If *ncsgInd* is present, the network only configures 0ms for per-UE NCSG and FR1 NCSG and only configures 0ms or 0.75ms for FR2 NCSG. Value *ms0dot75* can only be configured if *ncsgInd* is present. |
| ***ncsgInd***Indicates that the measurement gap is a NCSG as specified in 38.133 [14]. |
| ***posMeasGapPreConfigToAddModList***List of preconfigured measurement gap for positioning to add and/or modify. All the gaps configured are associated with the measurement of PRS for RSTD, UE-RxTx Time Difference, PRS-RSRP and PRS-RSRPP as defined in TS 38.215 [9]. In this version of the specification, the network does not configure preconfigured measurement gap for positioning together with concurrent measurement gap or MUSIM gap. |
| ***posMeasGapPreConfigToReleaseList***List of preconfigured measurement gap for positioning to release. |
| ***preConfigInd***Indicates whether the measurement gap is a pre-configured measurement gap. |
| ***refFR2ServCellAsyncCA***Indicates the FR2 serving cell identifier whose SFN and subframe is used for FR2 gap calculation for this gap pattern with asynchronous CA involving FR2 carrier(s). |
| ***refServCellIndicator***Indicates the serving cell whose SFN and subframe are used for gap calculation for this gap pattern. Value pCell corresponds to the PCell, pSCell corresponds to the PSCell, and mcg-FR2 corresponds to a serving cell on FR2 frequency in MCG. |

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| **Conditional Presence** | **Explanation** |
| *AsyncCA* | This field is mandatory present when configuring and reconfiguring FR2 gap pattern to UE in:- (NG)EN-DC or NR SA with asynchronous CA involving FR2 carrier(s);- NE-DC or NR-DC with asynchronous CA involving FR2 carrier(s), if the field *refServCellIndicator* is set to *mcg-FR2*.Otherwise, it is absent, Need R. |
| *NEDCorNRDC* | This field is mandatory present when configuring and reconfiguring gap pattern to UE in NE-DC or NR-DC. Otherwise, it is absent, Need R. |
| *PRS* | This field is optionally present, Need R, when configuring gap pattern to UE for measurements of DL-PRS configured via LPP (TS 37.355 [49]). Otherwise, it is absent. |

End of change