**3GPP TSG-RAN2 WG2 Meeting #118 electronic *R2-220xxxx***

**Online, May 9 – 20, 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **38.331** | **CR** | **3020** | **rev** | **-** | **Current version:** | **17.0.0** |  |
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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:***  | CR to TS 38.331 on UE capability for Rel-17 CRS interference mitigation |
|  |  |
| ***Source to WG:*** | China Telecom, Huawei, HiSilicon |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_demod\_enh2-Core |  | ***Date:*** | 2022-04-22 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***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:*** | In RAN4#102-e meeting, RAN4 discussed UE capability and network assistant signalling for CRS interference mitigation(CRS-IM) in scenarios with overlapping spectrum for LTE and NR. Based on that, RAN4 sent an LS (R2-2204489\_R4-2207238) and asked RAN2 to take the related agreements into account and design the corresponding UE capability and network assistance signalling. The following new NR UE capabilities are agreed to be defined for CRS-IM.

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| * Capability #1: NR UE capable of performing CRS-IM in scenario 1 with 15 kHz SCS, UE can support Capability #1 on the CC(s) in a band only if the UE indicates support of *rateMatchingLTE-CRS* on that band.
* Capability #2: NR UE capable of performing CRS-IM in scenario 2 with 15 kHz SCS without Rel-17 new network assistant signalling on LTE channel bandwidth.
* Capability #3: NR UE capable of performing CRS-IM in scenario 2 with 15 kHz SCS with Rel-17 new network assistant signalling on LTE channel bandwidth.
* The granularity of the above capabilities is Per Feature Set per CC.
* The above capabilities are applicable for FR1 only without FDD/TDD difference.
* The above capabilities are optional for UE to report.
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In RAN4#103-e meeting, the following new NR UE capabilities are agreed to be defined for CRS-IM.

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| * Capability #4: NR UE capable of performing CRS-IM in scenario 2 with 30kHz SCS without Rel-17 new network assistant signalling on LTE channel bandwidth.
* Capability #5: NR UE capable of performing CRS-IM in scenario 2 with 30kHz SCS with Rel-17 new network assistant signalling on LTE channel bandwidth.
* The granularity of the above capabilities is Per Feature Set per CC.
* The above capabilities are applicable for FR1 only without FDD/TDD difference.
* The above capabilities are optional for UE to report.
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| ***Summary of change:*** | * *CRS-InterfMitigation-r17* is introduced in IE *FeatureSetDownlinkPerCC* to indicate whether the UE supports CRS interference mitigation in different scenarios with overlapping spectrum for LTE and NR.
* *CRS-IM-DSS-15kHzSCS-r17* is introduced in *CRS-InterfMitigation-r17* to indicate whether the UE is capable of performing CRS-IM in DSS scenario with 15 kHz SCS.
* *CRS-IM-nonDSS-15kHzSCS-r17* is introduced in *CRS-InterfMitigation-r17* to indicate whether the UE is capable of performing CRS-IM in non-DSS scenario with 15 kHz SCS without Rel-17 new network assistant signalling on LTE channel bandwidth.
* *CRS-IM-nonDSS-NWA-15kHzSCS-r17* is introduced in *CRS-InterfMitigation-r17* to indicate whether the UE is capable of performing CRS-IM in non-DSS scenario with 15 kHz SCS with Rel-17 new network assistant signalling on LTE channel bandwidth.
* *CRS-IM-nonDSS-30kHzSCS-r17* is introduced in *CRS-InterfMitigation-r17* to indicate whether the UE is capable of performing CRS-IM in non-DSS scenario with 30 kHz SCS without Rel-17 new network assistant signalling on LTE channel bandwidth.
* *CRS-IM-nonDSS-NWA-30kHzSCS-r17* is introduced in *CRS-InterfMitigation-r17* to indicate whether the UE is capable of performing CRS-IM in non-DSS scenario with 30 kHz SCS with Rel-17 new network assistant signalling on LTE channel bandwidth.
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| ***Consequences if not approved:*** | R17 CRS interference mitigation (CRS-IM) in scenarios with overlapping spectrum for LTE and NR is not supported by the standard. |
|  |  |
| ***Clauses affected:*** | 6.3.3 UE capability information elements, FeatureSetDownlinkPerCC, FeatureSets |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **x** |  |  Other core specifications  | TS 38.306 ... CR 0706 |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

*START OF CHANGE*

### 6.3.3 UE capability information elements

**< unchanged text omitted>**

– *FeatureSetDownlinkPerCC*

The IE *FeatureSetDownlinkPerCC* indicates a set of features that the UE supports on the corresponding carrier of one band entry of a band combination.

***FeatureSetDownlinkPerCC* information element**

-- ASN1START

-- TAG-FEATURESETDOWNLINKPERCC-START

FeatureSetDownlinkPerCC ::= SEQUENCE {

 supportedSubcarrierSpacingDL SubcarrierSpacing,

 supportedBandwidthDL SupportedBandwidth,

 channelBW-90mhz ENUMERATED {supported} OPTIONAL,

 maxNumberMIMO-LayersPDSCH MIMO-LayersDL OPTIONAL,

 supportedModulationOrderDL ModulationOrder OPTIONAL

}

FeatureSetDownlinkPerCC-v1620 ::= SEQUENCE {

 -- R1 16-2a: Mulit-DCI based multi-TRP

 multiDCI-MultiTRP-r16 MultiDCI-MultiTRP-r16 OPTIONAL,

 -- R1 16-2b-3: Support of single-DCI based FDMSchemeB

 supportFDM-SchemeB-r16 ENUMERATED {supported} OPTIONAL

}

FeatureSetDownlinkPerCC-v1700 ::= SEQUENCE {

 supportedMinBandwidthDL-r17 SupportedBandwidth-v1700 OPTIONAL,

 broadcast-SCell-r17 ENUMERATED {supported} OPTIONAL

}

FeatureSetDownlinkPerCC-v17xx ::= SEQUENCE {

 supportedCRS-InterfMitigation-r17 CRS-InterfMitigation-r17 OPTIONAL

}

MultiDCI-MultiTRP-r16 ::= SEQUENCE {

 maxNumberCORESET-r16 ENUMERATED {n2, n3, n4, n5},

 maxNumberCORESETPerPoolIndex-r16 INTEGER (1..3),

 maxNumberUnicastPDSCH-PerPool-r16 ENUMERATED {n1, n2, n3, n4, n7}

}

CRS-InterfMitigation-r17 ::= SEQUENCE {

CRS-IM-DSS-15kHzSCS-r17 ENUMERATED {supported} OPTIONAL,

CRS-IM-nonDSS-15kHzSCS-r17 ENUMERATED {supported} OPTIONAL,

CRS-IM-nonDSS-NWA-15kHzSCS-r17 ENUMERATED {supported} OPTIONAL,

CRS-IM-nonDSS-30kHzSCS-r17 ENUMERATED {supported} OPTIONAL,

 CRS-IM-nonDSS-NWA-30kHzSCS-r17 ENUMERATED {supported} OPTIONAL

}

-- TAG-FEATURESETDOWNLINKPERCC-STOP

-- ASN1STOP

*NEXT CHANGE*

– *FeatureSets*

The IE *FeatureSets* is used to provide pools of downlink and uplink features sets. A *FeatureSetCombination* refers to the IDs of the feature set(s) that the UE supports in that *FeatureSetCombination*. The *BandCombination* entries in the *BandCombinationList* then indicate the ID of the *FeatureSetCombination* that the UE supports for that band combination.

The entries in the lists in this IE are identified by their index position. For example, the *FeatureSetUplinkPerCC-Id* = 4 identifies the 4th element in the *featureSetsUplinkPerCC* list.

NOTE: When feature sets (per CC) IEs require extension in future versions of the specification, new versions of the *FeatureSetDownlink*, *FeatureSetUplink*, *FeatureSets*, *FeatureSetDownlinkPerCC* and/or *FeatureSetUplinkPerCC* will be created and instantiated in corresponding new lists in the *FeatureSets* IE. For example, if new capability bits are to be added to the *FeatureSetDownlink*, they will instead be defined in a new *FeatureSetDownlink-rxy* which will be instantiated in a new *featureSetDownlinkList-rxy* list. If a UE indicates in a *FeatureSetCombination* that it supports the *FeatureSetDownlink* with ID #5, it implies that it supports both the features in *FeatureSetDownlink* #5 and *FeatureSetDownlink-rxy* #5 (if present). The number of entries in the new list(s) shall be the same as in the original list(s).

***FeatureSets* information element**

-- ASN1START

-- TAG-FEATURESETS-START

FeatureSets ::= SEQUENCE {

 featureSetsDownlink SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink OPTIONAL,

 featureSetsDownlinkPerCC SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC OPTIONAL,

 featureSetsUplink SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink OPTIONAL,

 featureSetsUplinkPerCC SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC OPTIONAL,

 ...,

 [[

 featureSetsDownlink-v1540 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1540 OPTIONAL,

 featureSetsUplink-v1540 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1540 OPTIONAL,

 featureSetsUplinkPerCC-v1540 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC-v1540 OPTIONAL

 ]],

 [[

 featureSetsDownlink-v15a0 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v15a0 OPTIONAL

 ]],

 [[

 featureSetsDownlink-v1610 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1610 OPTIONAL,

 featureSetsUplink-v1610 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1610 OPTIONAL,

 featureSetDownlinkPerCC-v1620 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1620 OPTIONAL

 ]],

 [[

 featureSetsUplink-v1630 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1630 OPTIONAL

 ]],

 [[

 featureSetsUplink-v1640 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1640 OPTIONAL

 ]],

 [[

 featureSetsDownlink-v1700 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1700 OPTIONAL,

 featureSetsDownlinkPerCC-v1700 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1700 OPTIONAL,

 featureSetsUplinkPerCC-v1700 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC-v1700 OPTIONAL

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 featureSetsDownlinkPerCC-v17xx SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v17xx OPTIONAL

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}

-- TAG-FEATURESETS-STOP

-- ASN1STOP

*END OF CHANGE*