**3GPP TSG-RAN2 Meeting #109e *R2-200xxxx***

**24 Feb – 6 Mar 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **38.306** | **CR** | **0258** | **rev** | **1** | **Current version:** | **15.8.0** |  |
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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:***  | Introduction of downgraded configuration for SRS antenna switching |
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| ***Source to WG:*** | OPPO, Intel (?) |
| ***Source to TSG:*** | R2 |
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| ***Work item code:*** | TEI16 |  | ***Date:*** | 2020-2-8 |
|  |  |  |  |  |
| ***Category:*** | **C** |  | ***Release:*** | Rel-16 |
|  | *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-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:*** | In LS from RAN1, R1-1913580, RAN1 indicate the following agreement:RAN1 discussed on a TEI proposal regarding downgrading configuration of SRS for antenna switching, and RAN1 made following agreements.*Agreement:**Regarding TEI “Enable gNB to configure downgrading configuration of SRS for antenna switching”**• Rel-16 UE capability design for SRS antenna switching in conjunction with the existing Rel-15 UE capability should allow UE to indicate support of one of the following combinations* *o {t1r1, t1r2}**o {t1r1, t1r2, t1r4}**o {t1r1, t1r2, t2r2, t2r4}**o {t1r1, t2r2}**o {t1r1, t2r2, t4r4}**o {t1r1, t1r2, t2r2, t1r4, t2r4}**o Note: Detailed signaling design is up to RAN2**• The TP in R1-1913445 is endorsed in principle**o Note: RAN1 spec can be further updated depending on the final RAN2 signalling design*Such agreement has been captured in RAN1 spec in R1-1913677. In order to capture the capability design agreed in RAN2, related capabilty bits have to be added into RRC signaling.In 38.306, the related field decription for the newly added capabiilty bits are added, together with illustration on the necessity of alignment between the pattern reported in R15, and the applicability of R15 field of *txSwitchImpactToRx* and *txSwitchWithAnotherBand* for down-grading patterns. |
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| ***Summary of change:*** | 1. In 4.2.7.1, the additional field for downgrading SRS switching pattern are added into the field description, with illustration that the reported pattern should align with the non-downgrading pattern reported in R15 field of *supportedSRS-TxPortSwitch*.
2. In 4.2.7.1, it clarifies that since the additional capability for downgrading SRS swtiching pattern is not mandatory, the mandatory field is changed to FD, and detailed description is added.
3. In 4.2.7.1, it is clarified that the field of *txSwitchImpactToRx* and *txSwitchWithAnotherBand* are also applicable to the additional capabilty if it is reported.
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| ***Consequences if not approved:*** | The agreed downgrading configuration of SRS for antenna switching is not supported in 38.331. |
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| ***Clauses affected:*** | 4.2.7.1 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS/TR 38.331 CR 1433  |
| ***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:*** |  |

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| CHANGE START |

#### 4.2.7.1 *BandCombinationList* parameters

| Definitions for parameters | Per | M | FDD-TDDDIFF | FR1-FR2DIFF |
| --- | --- | --- | --- | --- |
| ***bandEUTRA***Defines supported EUTRA frequency band by NR frequency band number, as specified in TS 36.101. | Band | Yes | No | No |
| ***bandList***Each entry of the list should include at least one bandwidth class for UL or DL. | BC | Yes | No | No |
| ***bandNR***Defines supported NR frequency band by NR frequency band number, as specified in TS 38.101-1 [2] and TS 38.101-2 [3]. | Band | Yes | No | No |
| ***ca-BandwidthClassDL-EUTRA***Defines for DL, the class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by the UE, as specified in TS 36.101. When all FeatureSetEUTRA-DownlinkId:s in the corresponding FeatureSetsPerBand are zero, this field is absent. | Band | No | No | No |
| ***ca-BandwidthClassDL-NR***Defines for DL, the class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by the UE, as specified in TS 38.101-1 [2] and TS 38.101-2 [3]. When all FeatureSetDownlinkId:s in the corresponding FeatureSetsPerBand are zero, this field is absent. | Band | No | No | No |
| ***ca-BandwidthClassUL-EUTRA***Defines for UL, the class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by the UE, as specified in TS 36.101. When all FeatureSetEUTRA-UplinkId:s in the corresponding FeatureSetsPerBand are zero, this field is absent. | Band | No | No | No |
| ***ca-BandwidthClassUL-NR***Defines for UL, the class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by the UE, as specified in TS 38.101-1 [2] and TS 38.101-2 [3]. When all FeatureSetUplinkId:s in the corresponding FeatureSetsPerBand are zero, this field is absent. | Band | No | No | No |
| ***ca-ParametersEUTRA***Contains the EUTRA part of band combination parameters for a given EN-DC band combination. | BC | No | No | No |
| ***ca-ParametersNR***Contains the NR band combination parameters for a given EN-DC and/or NR CA band combination. | BC | No | No | No |
| ***ca-ParametersNRDC***Indicates whether the UE supports NR-DC for the band combination. It contains the NR band combination parameters applicable across MCG and SCG. | BC | No | No | No |
| ***featureSetCombination***Indicates the feature set that the UE supports on the NR and/or MR-DC band combination by FeatureSetCombinationId. | BC | N/A | No | No |
| ***mrdc-Parameters***Contains the band combination parameters for a given EN-DC band combination. | BC | No | No | No |
| ***ne-DC-BC***Indicates whether the UE supports NE-DC for the band combination. | BC | No | No | No |
| ***powerClass***Indicates power class the UE supports when operating according to this band combination. If the field is absent, the UE supports the default power class. If this power class is higher than the power class that the UE supports on the individual bands of this band combination (*ue-PowerClass* in *BandNR*), the latter determines maximum TX power available in each band. The UE sets the power class parameter only in band combinations with two FR1 uplink serving cells. | BC | No | No | FR1 only |
| ***srs-SwitchingTimeNR***Indicates the interruption time on DL/UL reception within a NR band pair during the RF retuning for switching between a carrier on one band and another (PUSCH-less) carrier on the other band to transmit SRS. *switchingTimeDL/ switchingTimeUL :* n0 represents 0 us, n30us represents 30us, and so on. *switchingTimeDL/ switchingTimeDL* is mandatory present if switching between the NR band pair is supported, otherwise the field is absent. It is signalled per pair of bands per band combination. | FD | No | No | No |
| ***srs-SwitchingTimeEUTRA***indicates the interruption time on DL/UL reception within a EUTRA band pair during the RF retuning for switching between a carrier on one band and another (PUSCH-less) carrier on the other band to transmit SRS. *switchingTimeDL/ switchingTimeUL:* n0 represents 0 OFDM symbols, n0dot5 represents 0.5 OFDM symbols, n1 represents 1 OFDM symbol and so on. *switchingTimeDL/ switchingTimeUL* is mandatory present if switching between the EUTRA band pair is supported, otherwise the field is absent. It is signalled per pair of bands per band combination. | FD | No | No | No |
| ***SRS-TxSwitch***Defines whether UE supports SRS for DL CSI acquisition as defined in clause 6.2.1.2 of TS 38.214 [12]. The capability signalling comprises of the following parameters:- *supportedSRS-TxPortSwitch* indicates SRS Tx port switching pattern supported by the UE, which is mandatory to report. The indicated UE antenna switching capability of ′xTyR′ corresponds to a UE, capable of SRS transmission on ′x′ antenna ports over total of ′y′ antennas, where ′y′ corresponds to all or subset of UE receive antennas, where 2T4R is two pairs of antennas.*supportedSRS-TxPortSwitch-r16*, which is optional to report, indicates downgrading configuration of SRS Tx port switching pattern. If the UE indicates the support of downgrading configuration of SRS Tx port switching pattern using *supportedSRS-TxPortSwitch-r16*, the UE shall report the values for this as below, based on what is reported in *supportedSRS-TxPortSwitch*.

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| *supportedSRS-TxPortSwitch* | *supportedSRS-TxPortSwitch-r16* |
| *t1r2* | *t1r1-t1r2* |
| *t1r4* | *t1r1-t1r2-t1r4* |
| *t2r4* | *t1r1-t1r2-t2r2-t2r4* |
| *t2r2* | *t1r1-t2r2* |
| *t4r4* | *t1r1-t2r2-t4r4* |
| *t1r4-t2r4* | *t1r1-t1r2-t2r2-t1r4-t2r4* |

- *txSwitchImpactToRx* indicates the entry number of the first-listed band with UL in the band combination that affects this DL, which is mandatory to report. It applies to SRS Tx port switching pattern reported in both *supportedSRS-TxPortSwitch* and *supportedSRS-TxPortSwitch-r16* if reported.- *txSwitchWithAnotherBand* indicates the entry number of the first-listed band with UL in the band combination that switches together with this UL, which is optional to report. It applies to SRS Tx port switching pattern reported in both *supportedSRS-TxPortSwitch* and *supportedSRS-TxPortSwitch-r16* if reported.For *txSwitchImpactToRx* and *txSwitchWithAnotherBand*, value 1 means first entry, value 2 means second entry and so on. All DL and UL that switch together indicate the same entry number.The UE is restricted not to include fallback band combinations for the purpose of indicating different SRS antenna switching capabilities. | BC | FD | No | No |
| ***supportedBandwidthCombinationSet***Defines the supported bandwidth combination for the band combination set as defined in the TS 38.101-1 [2], TS 38.101-2 [3] and TS 38.101-3 [4]. Field encoded as a bit map, where bit N is set to "1" if UE support Bandwidth Combination Set N for this band combination as defined in the TS 38.101-1 [2], TS 38.101-2 [3] and TS 38.101-3 [4]. The leading / leftmost bit (bit 0) corresponds to the Bandwidth Combination Set 0, the next bit corresponds to the Bandwidth Combination Set 1 and so on. It is mandatory if the band combination has more than one NR carrier (at least one SCell in an NR cell group) or is an intra-band EN-DC combination or both. | BC | CY | No | No |

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| CHANGE END |