**3GPP TSG-RAN4 WG4 Meeting#112 *Rev R4-2412623***

**Maastricht, Netherlands, 19th – 23rd May 2024**

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| --- |
| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.101-1** | **CR** | **2457** | **rev** | 1 | **Current version:** | **18.6.0** |  |
|  |
| *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 |  | Core Network |  |

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|  |
| ***Title:***  | CR for NR CA Harmonic Mixing clean-up PC3 PC5 |
|  |  |
| ***Source to WG:*** | Qualcomm France |
| ***Source to TSG:*** | RAN4 |
|  |  |
| ***Work item code:*** | NR\_CADC\_R18\_2BDL\_xBUL-Core  |  | ***Date:*** | 2024-08-06 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-18 |
|  | *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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | R4-2405453 was agreed in RAN4#110bis, which proposed a set of principles to clean-up RX mixing specification |
|  |  |
| ***Summary of change:*** | PC3, and PC5 Harmonic mixing MSD tables are modified according to principles agreed in R4-2405453 and in R4-2410651. SCS, and respective BW for some aggressors is corrected to 15kHz. Additionally, RBstart for each combination is now described in Note. UL BW for CA\_n7-n26A is corrected to be same as in EN-DC.  |
|  |  |
| ***Consequences if not approved:*** | Harmonic mixing tables remain erroneous and inconsistent |
|  |  |
| ***Clauses affected:*** | 7.3A.4 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **X** |  |  Test specifications | TS38.521-1  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | Changes to UL harmonic and Rx harmonic MSD tables are applicable only from Rel-18 and onward to subsequent Releases |
|  |  |
| ***This CR's revision history:*** |  |

**---Start of changes---**

**Table 7.3A.4-4: Reference sensitivity exceptions and uplink/downlink configurations due to harmonic mixing from a PC3 aggressor NR UL band for DL NR CA FR1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL BW** | **MSD** | **UL/DL fc condition** | **UL/DL harmonic order** |
| **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(dB)** |
| n1 | n1053 | 5 | 15 | 25 | 5 | 26.8 | NOTE 4 | UL1/DL3 |
| n2 | n713 | 5 | 15 | 25 | 5 | 26.8 | NOTE 4 | UL1/DL3 |
| n2 | n713 | 5 | 15 | 25 | 20 | 15.6 | NOTE 4 | UL1/DL3 |
| n3 | n5 | 5 | 15 | 25 | 5 | 4 | NOTE 7 | UL1/DL2 |
| n3 | n26 | 5 | 15 | 25 | 5 | 3.7 | NOTE 7  | UL1/DL2 |
| n7 | n263 | 5 | 15 | 25 | 5 | 2.0 | NOTE 10 | UL1/DL3Near miss |
| n7 | n71 | 5 | 15 | 25 | 5 | 5.7 | NOTE 8 | UL1/DL4 |
| n25 | n41 | 5 | 15 | 25 | 10 | 1.3 | NOTE 11 | UL4/DL3 |
| n25 | n713 | 5 | 15 | 25 | 5 | 26.8 | NOTE 4 | UL1/DL3 |
| n25 | n713 | 5 | 15 | 25 | 20 | 15.6 | NOTE 4 | UL1/DL3 |
| n39 | n41 | 5 | 15 | 6 | 10 | [9.3] | NOTE 11 | UL4/DL3 |
| n39 | n41 | 5 | 15 | 6 | 100 | [2.3] | NOTE 11 | UL4/DL3 |
| n40 | n203 | 10 | 15 | 25 | 5 | 27.8 | NOTE 4 | UL1/DL3 |
| n40 | n203 | 10 | 15 | 25 | 20 | 20.6 | NOTE 4 | UL1/DL3 |
| n40 | n283 | 10 | 15 | 25 | 5 | 37.8 | NOTE 4 | UL1/DL3 |
| n40 | n283 | 10 | 15 | 25 | 20 | 30.1 | NOTE 4 | UL1/DL3 |
| n41 | n53 | 10 | 15 | 25 | 5 | 24.3 | NOTE 4 | UL1/DL3 |
| n41 | n183 | 10 | 15 | 25 | 5 | 26.3 | NOTE 4 | UL1/DL3 |
| n41 | n183 | 10 | 15 | 25 | 15 | 21.3 | NOTE 4 | UL1/DL3 |
| n41 | n39 | 10 | 15 | 8 | 5 | 4.3 | NOTE 12 | UL3/DL4 |
| n41 | n39 | 10 | 15 | 8 | 40 | 0.8 | NOTE 12 | UL3/DL4 |
| n41 | n48 | 10 | 15 | 6 | 5 | 12.3 | NOTE 9 | UL4/DL3 |
| n41 | n48 | 10 | 15 | 6 | 100 | 2.3 | NOTE 9 | UL4/DL3 |
| n41 | n77 | 10 | 15 | 6 | 10 | 8.9 | NOTE 9 | UL4/DL3 |
| n41 | n77 | 10 | 15 | 6 | 100 | 2.1 | NOTE 9 | UL4/DL3 |
| n41 | n78 | 10 | 15 | 6 | 10 | 9.3 | NOTE 9 | UL4/DL3 |
| n41 | n78 | 10 | 15 | 6 | 100 | 2.3 | NOTE 9 | UL4/DL3 |
| n46 | n7 | 20 | 15 | 25 | 5 | 10.9 | NOTE 7 | UL1/DL2 |
| n46 | n7 | 20 | 15 | 25 | 50 | 1 | NOTE 7 | UL1/DL2 |
| n46 | n48 | 20 | 15 | 12 | 5 | 26.8 | NOTE 2 | UL2/DL3 |
| n46 | n48 | 20 | 15 | 12 | 100 | 13.5 | NOTE 2 | UL2/DL3 |
| n46 | n77 | 20 | 15 | 25 | 10 | 20.6 | NOTE 2 | UL2/DL3 |
| n46 | n77 | 20 | 15 | 25 | 100 | 10.6 | NOTE 2 | UL2/DL3 |
| n46 | n78 | 20 | 15 | 25 | 10 | 21.1 | NOTE 2 | UL2/DL3 |
| n46 | n78 | 20 | 15 | 25 | 100 | 11.1 | NOTE 2 | UL2/DL3 |
| n48 | n12 | 10 | 15 | 25 | 5 | 31 | NOTE 5 | UL1/DL5 |
| n48 | n12 | 10 | 15 | 25 | 15 | 18 | NOTE 5 | UL1/DL5 |
| n48 | n26 | 10 | 15 | 25 | 5 | 5.4 | NOTE 8 | UL1/DL4 |
| n48 | n26 | 10 | 15 | 25 | 20 | 1 | NOTE 8 | UL1/DL4 |
| n48 | n29 | 10 | 15 | 25 | 5 | 31 | NOTE 5 | UL1/DL5 |
| n48 | n29 | 10 | 15 | 25 | 10 | 27.8 | NOTE 5 | UL1/DL5 |
| n77 | n2 | 10 | 15 | 25 | 5 | 6.7 | NOTE 7 | UL1/DL2 |
| n77 | n2 | 10 | 15 | 25 | 20 | 2.8 | NOTE 7 | UL1/DL2 |
| n77 | n3 | 10 | 15 | 25 | 5 | 5.7 | NOTE 7 | UL1/DL2 |
| n77 | n3 | 10 | 15 | 25 | 20 | 2.2 | NOTE 7 | UL1/DL2 |
| n77 | n5 | 10  | 15 | 25 | 5 | [5.7] | NOTE 8 | UL1/DL4 |
| n77 | n5 | 10 | 15 | 25 | 20 | [0.8] | NOTE 8 | UL1/DL4 |
| n77 | n7 | 10 | 15 | 12 | 5 | 14.7 | NOTE 2 | UL2/DL3 |
| n77 | n7 | 10 | 15 | 12 | 50 | 2.2 | NOTE 2 | UL2/DL3 |
| n77 | n8 | 10 | 15 | 25 | 5 | [5.7] | NOTE 8 | UL1/DL4 |
| n77 | n8 | 10 | 15 | 25 | 20 | [0.8] | NOTE 8 | UL1/DL4 |
| n77 | n12 | 10 | 15 | 25 | 5 | 31 | NOTE 5 | UL1/DL5 |
| n77 | n12 | 10 | 15 | 25 | 15 | 18 | NOTE 5 | UL1/DL5 |
| n77 | n13 | 10 | 15 | 25 | 5 | 31 | NOTE 5 | UL1/DL5 |
| n77 | n13 | 10 | 15 | 25 | 10 | 27.8 | NOTE 5 | UL1/DL5 |
| n77 | n14 | 10 | 15 | 25 | 5 | 31 | NOTE 5 | UL1/DL5 |
| n77 | n14 | 10 | 15 | 25 | 10 | 27.8 | NOTE 5 | UL1/DL5 |
| n77 | n25 | 10 | 15 | 25 | 5 | 5.6 | NOTE 7 | UL1/DL2 |
| n77 | n25 | 10 | 15 | 25 | 40 | 0.3 | NOTE 7 | UL1/DL2 |
| n77 | n26 | 10 | 15 | 25 | 5 | 5.4 | NOTE 8 | UL1/DL4 |
| n77 | n28 | 10 | 15 | 25 | 5 | 31 | NOTE 5 | UL1/DL5 |
| n77 | n28 | 10 | 15 | 25 | 10 | 28 | NOTE 5 | UL1/DL5 |
| n776 | n29 | 10 | 15 | 25 | 5 | 31 | NOTE 5 | UL1/DL5 |
| n776 | n29 | 10 | 15 | 25 | 10 | 27.8 | NOTE 5 | UL1/DL5 |
| n77 | n30 | 10 | 15 | 12 | 5 | 10.4 | NOTE 2 | UL2/DL3 |
| n77 | n30 | 10 | 15 | 12 | 10 | 7.6 | NOTE 2 | UL2/DL3 |
| n77 | n40 | 10 | 15 | 12 | 10 | 11.7 | NOTE 2 | UL2/DL3 |
| n77 | n40 | 10 | 15 | 12 | 100 | 3.6 | NOTE 2 | UL2/DL3 |
| n77 | n41 | 10 | 15 | 12 | 10 | 11.7 | NOTE 2 | UL2/DL3 |
| n77 | n41 | 10 | 15 | 12 | 100 | 3.6 | NOTE 2 | UL2/DL3 |
| n776 | n70 | N/A | N/A | N/A | N/A | N/A | NOTE 7 | UL1/DL2 |
| n77 | n85 | 10 | 15 | 25 | 5 | 31 | NOTE 5 | UL1/DL5 |
| n77 | n85 | 10 | 15 | 25 | 15 | 18 | NOTE 5 | UL1/DL5 |
| n78 | n2 | 10 | 15 | 25 | 5 | 6.7 | NOTE 7 | UL1/DL2 |
| n78 | n2 | 10 | 15 | 25 | 20 | 2.8 | NOTE 7 | UL1/DL2 |
| n78 | n3 | 10 | 15 | 25 | 5 | 5.7 | NOTE 7 | UL1/DL2 |
| n78 | n3 | 10 | 15 | 25 | 20 | 2.2 | NOTE 7 | UL1/DL2 |
| n78 | n5 | 10 | 15 | 25 | 5 | [5.7] | NOTE 8 | UL1/DL4 |
| n78 | n8 | 10 | 15 | 25 | 5 | [5.7] | NOTE 8 | UL1/DL4 |
| n78 | n12 | 10 | 15 | 25 | 5 | 31 | NOTE 5 | UL1/DL5 |
| n78 | n26 | 10 | 15 | 25 | 5 | 5.4 | NOTE 8 | UL1/DL4 |
| n78 | n28 | 10 | 15 | 25 | 5 | 31 | NOTE 5 | UL1/DL5 |
| n78 | n40 | 10 | 15 | 12 | 5 | 14.7 | NOTE 2 | UL2/DL3 |
| n78 | n40 | 10 | 15 | 12 | 100 | 3.6 | NOTE 2 | UL2/DL3 |
| n78 | n41 | 10 | 15 | 12 | 10 | 11.7 | NOTE 2 | UL2/DL3 |
| n78 | n41 | 10 | 15 | 12 | 100 | 3.6 | NOTE 2 | UL2/DL3 |
| n78 | n67 | 10 | 15 | 25 | 5 | 31 | NOTE 5 | UL1/DL5 |
| n78 | n67 | 10 | 15 | 25 | 10 | 27.8 | NOTE 5 | UL1/DL5 |
| n79 | n5 | 10 | 15 | 25 | 5 | 27.5 | NOTE 5 | UL1/DL5 |
| n79 | n8 | 10 | 15 | 25 | 5 | 25 | NOTE 5 | UL1/DL5 |
| n96 | n48 | 20 | 15 | 25 | 5 | [31] | NOTE 7 | UL1/DL2 |
| n96 | n48 | 20 | 15 | 25 | 100 | [17.5] | NOTE 7 | UL1/DL2 |
| n102 | n13 | 20 | 15 | 25 | 5 | 30 | NOTE 4 | UL1/DL3 |
| n104 | n78 | 20 | 15 | 50 | 10 | 29 | NOTE 1 | UL1/DL2 |
| n104 | n78 | 20 | 15 | 50 | 100 | 18.8 | NOTE 1 | UL1/DL2 |
| NOTE 1: Void.NOTE 2: The requirements should be verified for DL NR-ARFCN of the Victim (lower) band (superscript LB) such that $f\_{DL}^{LB}=\left⌊f\_{UL}^{HB}/0.15\right⌋0.1$ and $F\_{UL\\_low}^{HB}+BW\_{Channel}^{HB}/2\leq f\_{UL}^{HB}\leq F\_{UL\\_high}^{HB}-BW\_{Channel}^{HB}/2$ with $f\_{UL}^{HB}$ the UL carrier frequency and $BW\_{Channel}^{HB}$ the channel bandwidth configured in the higher band, both in MHz.NOTE 3: These requirements apply when there is at least one individual RE within the downlink transmission bandwidth of the victim (lower) band for which the 3rd harmonic is within the uplink transmission bandwidth or the uplink adjacent channel's transmission bandwidth of an aggressor (higher) band.NOTE 4: The requirements should be verified for UL NR-ARFCN of the aggressor (higher) band (superscript HB) such that  in MHz and $F\_{UL\\_low}^{HB}+BW\_{Channel}^{HB}/2\leq f\_{UL}^{HB}\leq F\_{UL\\_high}^{HB}-BW\_{Channel}^{HB}/2$ with  the carrier frequency in the victim (lower) band and  the channel bandwidth configured in the higher band.NOTE 5: The requirements should be verified for DL EARFCN of the victim (lower) band (superscript LB) such that  and $F\_{UL\\_low}^{HB}+BW\_{Channel}^{HB}/2\leq f\_{UL}^{HB}\leq F\_{UL\\_high}^{HB}-BW\_{Channel}^{HB}/2$ with $f\_{UL}^{HB}$ the UL carrier frequency and $BW\_{Channel}^{HB}$ the channel bandwidth configured in the higher band, both in MHz.NOTE 6: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped.NOTE 7: The requirements should be verified for UL NR-ARFCN of the aggressor (higher) band (superscript HB) such that  in MHz and $F\_{UL\\_low}^{HB}+BW\_{Channel}^{HB}/2\leq f\_{UL}^{HB}\leq F\_{UL\\_high}^{HB}-BW\_{Channel}^{HB}/2$ with  the carrier frequency in the victim (lower) band and  the channel bandwidth configured in the higher band.NOTE 8: The requirements should be verified for UL NR-ARFCN of the aggressor (higher) band (superscript HB) such that  in MHz and $F\_{UL\\_low}^{HB}+BW\_{Channel}^{HB}/2\leq f\_{UL}^{HB}\leq F\_{UL\\_high}^{HB}-BW\_{Channel}^{HB}/2$ with  the carrier frequency in the victim (lower) band and  the channel bandwidth configured in the higher band.NOTE 9: The requirements should be verified for DL NR-ARFCN of the victim (higher) band (superscript HB) such that $f\_{DL}^{HB}=\left⌊f\_{UL}^{LB}/0.75\right⌋$ and $F\_{UL\\_low}^{LB}+BW\_{Channel}^{LB}/2\leq f\_{UL}^{LB}\leq F\_{UL\\_high}^{LB}-BW\_{Channel}^{LB}/2$ with $f\_{UL}^{LB}$ the UL carrier frequency and $BW\_{Channel}^{LB}$ the channel bandwidth configured in the lower band, both in MHz.NOTE 10: The requirements should be verified for the lowest NR ARFCN of the affected DL (lower) band and for the highest NR ARFCN of the UL (higher) bandNOTE 11: The requirements should be verified for UL NR-ARFCN of the aggressor (lower) band (superscript LB) such that in MHz and  with carrier frequency in the victim (higher) band in MHz and  the channel bandwidth configured in the lower band.NOTE 12: The requirements should be verified for UL NR-ARFCN of the aggressor (lower) band (superscript LB) such that in MHz and  with carrier frequency in the victim (higher) band in MHz and  the channel bandwidth configured in the lower band.NOTE 13: The requirements should be verified using RBstart = floor((NRB-LCRB)/2), where floor(x) is the greatest integer less than or equal to x, and where the UL parameters NRB and LCRB are respectively, the transmission bandwidth configuration and the number of RB’s for the specified UL band channel bandwidth and the UL band subcarrier spacing. |

**---Unchanged sections omitted---**

**Table 7.3A.4-4d: Reference sensitivity exceptions and uplink/downlink configurations due to harmonic mixing from a power class 5 aggressor NR UL band for NR DL CA FR1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL BW** | **MSD** | **UL/DL fc condition** | **UL/DL harmonic order** |
| **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(dB)** |
| n46 | n7 | 20 | 15 | 25 | 5 | 8.3 | NOTE 7 | UL1/DL2 |
| n46 | n7 | 20 | 15 | 25 | 30 | 2.8 | NOTE 7 | UL1/DL2 |
| n46 | n48 | 20 | 15 | 12 | 5 | 23.8 | NOTE 2 | UL2/DL3 |
| n46 | n48 | 20 | 15 | 12 | 100 | 10.7 | NOTE 2 | UL2/DL3 |
| n46 | n78 | 20 | 15 | 12 | 10 | 18.1 | NOTE 2 | UL2/DL3 |
| n46 | n78 | 20 | 15 | 12 | 100 | 8.4 | NOTE 2 | UL2/DL3 |
| n96 | n48 | 20 | 15 | 25 | 5 |  [28] | NOTE 2 | UL1/DL2 |
| n96 | n48 | 20 | 15 | 25 | 15 |  [23] | NOTE 2 | UL1/DL2 |
| NOTE 1: Void.NOTE 2: The requirements should be verified for UL NR-ARFCN of the aggressor (high) band (superscript HB) such that in MHz and $F\_{UL\\_low}^{LB}+BW\_{Channel}^{LB}/2\leq f\_{UL}^{LB}\leq F\_{UL\\_high}^{LB}-BW\_{Channel}^{LB}/2$ with carrier frequency in the victim (lower) band in MHz and  the channel bandwidth configured in the higher band.NOTE 3: These requirements apply when there is at least one individual RE within the downlink transmission bandwidth of the victim (lower) band for which the 3rd harmonic is within the uplink transmission bandwidth or the uplink adjacent channel’s transmission bandwidth of an aggressor (higher) band.NOTE 4: Void.NOTE 5: Void.NOTE 6: Void.NOTE 7: The requirements should be verified for UL NR-ARFCN of the aggressor (higher) band (superscript HB) such that  in MHz and $F\_{UL\\_low}^{HB}+BW\_{Channel}^{HB}/2\leq f\_{UL}^{HB}\leq F\_{UL\\_high}^{HB}-BW\_{Channel}^{HB}/2$ with  the carrier frequency in the victim (lower) band and  the channel bandwidth configured in the higher band.NOTE 8: The requirements should be verified using RBstart = floor((NRB-LCRB)/2), where floor(x) is the greatest integer less than or equal to x, and where the UL parameters NRB and LCRB are respectively, the transmission bandwidth configuration and the number of RB’s for the specified UL band channel bandwidth and the UL band subcarrier spacing. |

**---End of changes---**