**3GPP TSG-RAN WG4 Meeting # 106 R4-2302798**

**Athens, Greece, 27 February –03 March, 2023**

**Agenda item:** 8.1 Issues arising from basket WIs but not subject to block approval

**Source:** Dominique Brunel (Skyworks Solutions Inc.)

**Title:** Initial Summary for [106][105] NR\_Baskets\_Part\_1

**Document for:** Information

# Introduction

This Topic covers band combinations issues that cannot be treated within the block approval process, this includes:

* Topic #1: UL Intra-band CA/DC MSD and A-MPR
* Topic #2: Inter band combinations including intra-band ULCA in their UL configurations
* Topic #3: 1UL LB-LB combinations
* Topic #4: Band combinations requiring experts’ review
* Topic #5: NR-U ULCA NS and A-MPR requirements

# Topic #1: UL Intra-band CA/DC MSD and A-MPR

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2301073**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2301073.zip)  TP for 38.718-01-01 to include CA\_n26(2A) | Ericsson, Telstra | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | CA configuration | SCS  (PCC/SCC)  (kHz) | Aggregated channel bandwidth (PCC+SCC) | Wgap / [MHz] | UL PCC allocation  (LCRB) | ΔRIBNC (dB) | Duplex mode | | CA\_n26(2A) | 15/15 | 15MHz + 10MHz | Wgap = 10.0 | 5 (RBstart = 74) | 23.5 | FDD | |
| [**R4-2300938**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2300938.zip)  CA\_n26(2A) MSD analysis for TR 38.718-01-01 | Skyworks Solutions Inc. | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | CA configuration | SCS  (PCC/SCC)  (kHz) | Aggregated channel bandwidth (PCC+SCC) | Wgap / [MHz] | UL PCC allocation  (LCRB) | MSD  (dB) | Duplex mode | | CA\_n26(2A) | 15/15 | 15MHz + 10MHz | Wgap = 10.0 | 5 (RBstart = 74) | 28.4 | FDD | |
| [**R4-2302616**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2302616.zip)  CA\_n26(2A) ?RIBNC | Murata Manufacturing Co Ltd. | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | CA configuration | SCS  (PCC/SCC)  (kHz) | Aggregated channel bandwidth (PCC+SCC) | Wgap / [MHz] | UL PCC allocation  (LCRB) | ΔRIBNC (dB) | Duplex mode | | CA\_n26(2A) | 15/15 | 5MHz + 5MHz | Wgap = 25.0 | 5 (RBstart = 74) | 4.0 | FDD | |  | Wgap = 5.0 | 20 (RBstart = 59) | 0.0 | | 10MHz + 5MHz | Wgap = 20.0 | 5 (RBstart = 9) | 4.6 | |  | Wgap = 5.0 | 20 (RBstart = 9) | 2.3 | | 15MHz + 10MHz | Wgap = 10.0 | 5 (RBstart = 70) | 22.2 | |  | Wgap = 5.0 | 20 (RBstart = 19) | 5.2 | |
| [**R4-2300413**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2300413.zip)  IMD analysis of NC intra-band CA in uplink | Nokia | **Proposal 1**: Table 2 is to serve as agreed range checks moving forward in RAN4 for studies of IMD in non-contiguous intra-band in uplink. Moderator (Table not added here but is in open issue part)  **Proposal 2**: Add the analysis step in the UE co-existence studies of “Intra-Band Non-Contiguous Carrier Aggregation FR1: Specific Band Combination Part” in TR 38.718-01-01 and state that this is only needed for FDD. See Annex A.  **Proposal 3**: Add the analysis step in the UE coexistence studies in the “Common for 1 band UL and 2 bands UL CA” section of TR 38.718-02-01 for Inter-band CA with Non-contiguous Intra-band in the uplink and state that this is only needed for analysis of the impact in the other receiver band of operation when there is Non-contiguous Intra-band CA in the uplink. See Annex B.  Since this type of MSD, in our view, is different than what currently is defined in the TS we suggest that further discussion is needed on how it shall be captured. There are multiple options/approaches to take, and we list some here for further discussion.   1. Add a new “sub-clause” under Clause 7.3A.5 Reference sensitivity exceptions due to intermodulation interference due to 2UL CA in 38.101-1 to capture the MSD when there is intermodulation interference due to intra-band CA 2. Add additional MSD values in the existing Tables (e.g.7.3A.5-1) under Clause 7.3A.5 Reference sensitivity exceptions due to intermodulation interference due to 2UL CA in 38.101-1 to capture the MSD when there is intermodulation interference due to intra-band CA. These additional MSD values will be marked with a note referring to the specific intra-band configuration where they are applicable 3. Other solutions not precluded.   **Proposal 4**: Discuss how to modify Clause 7.3A.5 *Reference sensitivity exceptions due to intermodulation interference due to 2UL CA* in 38.101-1 to also include exceptions (i.e. MSD) for clause for intermodulation interference due to intra-band CA. |
| [**R4-2302526**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2302526.zip)  Discussion on the configured output power requirement for intra-band contiguous NE-DC in Rel.18 | CHTTL | **Proposal 1: Consider both PC3 and PC2 in the configured output power requirement for intra-band contiguous NE-DC that ΔPPowerClass,NE-DC, ΔPPowerClass,NR, ΔPPowerClass,E-UTRA are included in the PCMAX equations.**  **Proposal 2: The case for overlapped UL transmissions between E-UTRA and NR is also considered in the configured output power requirement for intra-band contiguous NE-DC, following the general principle from the inter-band NE-DC that NR can be scaled even down to zero when PLTE + P NR > Ptotal.**  **Proposal 3: Agree the draft CR in R4-2302528** |
| **[R4-2302528](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2302528.zip)**  draft CR for configured output power requirement for intra-band contiguous NE-DC | CHTTL, SGS Wireless | Moderator: CR based om above discussion paper |

## Open issues summary

### Sub-topic 1-1

*Sub-topic description:* CA\_n26(2A) MSD

*Open issues and candidate options before meeting:*

**Issue 1-1a: Number of MSD test points**

* Proposals
  + Option 1: Only worst case (Ericsson,Telstra, Skyworks)
  + Option 2: All BW and gaps (Murata)
* Recommended WF
  + Rd1: Is there an issue with worst case only?
  + Rd2: settle on test points

**Issue 1-1b: MSD value (baseline for worst case)**

* Proposals
  + Option 1: RBstart=74, 23.5dB Ericsson , Telstra
  + Option 2: RBstart=70, 22.2dB Murata
  + Option 3: RBstart=74, 28.4dB Skyworks
* Recommended WF
  + First settle on RBstart then find compromise on MSD values

### Sub-topic 1-2

*Sub-topic description:* IMD analysis of NC intra-band CA in uplink

*Open issues and candidate options before meeting:* Use of a Table (see below) and new sections in band combination TRs.

Table 2: Proposed analysis template for non-contiguous intra-band uplink studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Configuration | Channel BW | Minimum channel  separation | Maximum channel  separation | Minimum  frequency | Maximum  frequency |  |
| Data | 10 | 10 | 600 | 3300 | 4200 | - |
| CC location | fU1L | fU2L | fU3L | fU1H | fU2H | fU3H |
| Frequency | 3300 | 3320 | 3900 | 4200 | 4180 | 3600 |
| 2nd | I fU1L-fU2L I | I fU1L-fU3L I | fU1L + fU2L | fU1H+fU2H | - | - |
| Interference ranges | 20 | 600 | 6620 | 8380 | - | - |
| 3rd | 2\*fU1L-fU3L | 2\*fU1H-fU3H | 2\*fU1L + fU2L | 2\*fU1H + fU2H | - | - |
| Interference ranges | 2700 | 4800 | 9920 | 12580 | - | - |
| 4th | I 2\*fU1L - 2\*fU2L I | I 2\*fU1H - 2\*fU3H I | 3\*fU1L - fU3L | 3\*fU1H - fU3H | 3\*fU1L + fU2L | 3\*fU1H + fU2H |
| Interference ranges | 40 | 1200 | 6000 | 9000 | 13220 | 16780 |
| 5th | I 3\*fUL1-2\*fU3L I | I 3\*fUH1-2\*fU3H I | 4\*fUL1-fU3L | 4\*fUH1-fU3H | 4\*fUL1+fU2L | 4\*fUH1+fU2H |
| Interference ranges | 2100 | 5400 | 9300 | 13200 | 16520 | 20980 |
| 6th | I 3\*fUL1-3\*fU2L I | I 3\*fUH1-3\*fU3H I | 4\*fUL1-2\*fU3L | 4\*fUH1-2\*fU3H | 5\*fUL1-fU3L | 5\*fUH1-fU3H |
| Interference ranges | 60 | 1800 | 5400 | 9600 | 12600 | 17400 |
| 7th | I 4\*fUL1-3\*fU3L I | I 4\*fUH1-3\*fU3H I | 5\*fUL1-2\*fU3L | 5\*fUH1-2\*fU3H | 6\*fUL1-fU3L | 6\*fUH1-fU3H |
| Interference ranges | 1500 | 6000 | 8700 | 13800 | 15900 | 21600 |

**Issue 1-2a: IMD analysis of NC intra-band ULCA in intra-band band combinations**

* Proposals
  + Option 1: Add the analysis step in the UE co-existence studies of “Intra-Band Non-Contiguous Carrier Aggregation FR1: Specific Band Combination Part” in TR 38.718-01-01 and state that this is only needed for FDD. See Annex A.
  + Option 2: Other
* Recommended WF
  + Discuss proposed table above and its addition in template for intra-band TR template for FDD bands

**Issue 1-2b: IMD analysis of NC intra-band ULCA in inter-band band combinations**

* Proposals
  + Option 1: Add the analysis step in the UE coexistence studies in the “Common for 1 band UL and 2 bands UL CA” section of TR 38.718-02-01 for Inter-band CA with Non-contiguous Intra-band in the uplink and state that this is only needed for analysis of the impact in the other receiver band of operation when there is Non-contiguous Intra-band CA in the uplink. See Annex B.
  + Option 2: Other
* Recommended WF
  + Discuss proposed table above and its addition in template for inter-band TR template including the MSD test point and added clauses

**Issue 1-2c: Capturing MSDs due to IMD of NC intra-band ULCA in 38.101-1**

* Proposals
  + Option 1: Discuss how to modify Clause 7.3A.5 Reference sensitivity exceptions due to intermodulation interference due to 2UL CA in 38.101-1 to also include exceptions (i.e. MSD) for clause for intermodulation interference due to intra-band CA.
  + Option 2: Other
* Recommended WF
  + Discuss MSD test point template and clause for these cases

### Sub-topic 1-3

*Sub-topic description:* Configured output power requirement for intra-band contiguous NE-DC

*Open issues and candidate options before meeting:*

**Issue 1-3a: Configured output power requirement for intra-band contiguous NE-DC**

* Proposals
  + Option 1: Proposal 1: Consider both PC3 and PC2 in the configured output power requirement for intra-band contiguous NE-DC that ΔPPowerClass,NE-DC, ΔPPowerClass,NR, ΔPPowerClass,E-UTRA are included in the PCMAX equations.
  + Option 2: other
* Recommended WF
  + Discuss PCmax equations for ENDC to support PC3 and PC2 cases.

**Issue 1-3b: Overlapped UL transmissions between E-UTRA and NR**

* Proposals
  + Option 1: The case for overlapped UL transmissions between E-UTRA and NR is also considered in the configured output power requirement for intra-band contiguous NE-DC, following the general principle from the inter-band NE-DC that NR can be scaled even down to zero when PLTE + P NR > Ptotal.
  + Option 2: Other
* Recommended WF
  + First settle on RBstart then find compromise on MSD values (potentially averaging)

**Issue 1-3c: Review and agreement on associated CR**

* Proposals
  + Option 1: Agree R4-2302528 draft CR for configured output power requirement for intra-band contiguous NE-DC as is
  + Option 2: amend/correct/postpone CR
* Recommended WF
  + Review CR for agreement

# Topic #2: Inter band combinations including intra-band ULCA in their UL configurations

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2302043**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2302043.zip)  Discussion on Band combinations related to UL configuration DC\_3C\_n28A | Huawei, HiSilicon DT | **Observation 1: the triple beat of DC\_3C\_n28A may fall into Rx band n28, n71, n105 and n77 based on the Unified Triple Beat Detection Equations in the WF R4-2220556.**  **Proposal 1**: it’s proposed to add the following band combinations back with UL configuration UL\_3C\_n28A: DC\_1A-3C\_n28A, DC\_1A-1A-3C\_n28A, DC\_3C\_n1A-n28A  DC\_3C-7A\_n28A, DC\_3C-7C\_n28A, DC\_3C\_n7A-n28A, DC\_3C-20A\_n28A, DC\_3C\_n28A-n75A, DC\_3C\_n28A-n78A, DC\_3C\_n28A-n78(2A), DC\_3C-32A\_n28A, DC\_3C-38A\_n28A, DC\_1A-3C-7A\_n28A, DC\_1A-3C-7C\_n28A, DC\_1A-1A-3C-7A\_n28A, DC\_1A-3C-20A\_n28A,  DC\_1A-3C\_n28A-n75A, DC\_1A-3C\_n28A-n78A, DC\_1A-3C-32A\_n28A, DC\_1A-3C-38A\_n28A, DC\_3C-7A-20A\_n28A, DC\_3C-7A\_n28A-n78A, DC\_3C-7C\_n28A-n78A, DC\_3C-7A-32A\_n28A, DC\_3C-7A-38A\_n28A, DC\_3C-20A\_n1A-n28A, DC\_3C-20A\_n28A-n75A,  DC\_3C-20A-32A\_n28A, DC\_3C-32A\_n1A-n28A, DC\_1A-3C-7A\_n28A-n78A, DC\_1A-3C-7C\_n28A-n78A, DC\_1A-3C-7A-32A\_n28A, DC\_1A-3C-7A-38A\_n28A, DC\_1A-3C-20A\_n28A-n75A, DC\_1A-3C-20A-32A\_n28A, DC\_3C-7A-20A\_n28A-n78A, DC\_3C-20A-32A\_n1A-n28A |
| [**R4-2302338**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2302338.zip)  CR for TS 38.101-3 to introduce band combinations back with UL configuration DC\_3C\_n28A | Huawei, HiSilicon, DT | Associated CR with discussion paper [**R4-2302043**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2302043.zip) |
| [**R4-2300364**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2300364.zip)  MSD requirements for n5\_n77 (2A) | Apple | **Proposal:** Table 3-1 shows our proposed value for the n5 MSD for CA\_n5-n77 (2A) combination. (Moderator: Table is copied in issue section) |
| [**R4-2300537**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F106_Docs_R4-2D2300537.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=l8SBLJqa9IuUcNLR3098quNgjhyFw3dlySDemwcqTkZjmKn5ecutwpH4oS-E2ZCU&s=ckQ4JFSZbhbHBlgb7CO283RLzPS9i9D7P-sWZjQQZD4&e=)  Draft CR 38.101-1 to add CA\_n3B-n7B, CA\_n1A/n3A/n3B/n7A-n26(2A), CA\_n26A/n26(2A)-n78A/n78(2A) and CA\_n26A-n28A | Ericsson, Telstra | Moderator: Moved from #108 to #105 to solve issues with CA\_n7B-n26A triple beat issues. All UL configurations including n3B should be removed in a revision (CA\_n3B UL fallback not requested). |
| [**R4-2300648**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F106_Docs_R4-2D2300648.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=l8SBLJqa9IuUcNLR3098quNgjhyFw3dlySDemwcqTkZjmKn5ecutwpH4oS-E2ZCU&s=Dzi9bjNQKH-rukweBz_eU9EBSPAw7aZQW1QhVcITl2k&e=)  DraftCR for 38.101-1: NR inter-band CA DC combinations for 2 bands DL with single band UL | Verizon, Ericsson, Samsung | Moderator: Moved from #108 to #105 to review potential n66 MSD issue with CA\_n48B UL configuration |

## Open issues summary

### Sub-topic 2-1

*Sub-topic description:* DC\_3C\_n28A triple beat MSD to third band

*Open issues and candidate options before meeting:*

**Issue 2-1: Re-introduce higher order combinations based on DC\_3C\_n28A**

* Proposals
  + Option 1: add the following band combinations back with UL configuration UL\_3C\_n28A: DC\_1A-3C\_n28A, DC\_1A-1A-3C\_n28A, DC\_3C\_n1A-n28A, DC\_3C-7A\_n28A, DC\_3C-7C\_n28A, DC\_3C\_n7A-n28A, DC\_3C-20A\_n28A, DC\_3C\_n28A-n75A, DC\_3C\_n28A-n78A, DC\_3C\_n28A-n78(2A), DC\_3C-32A\_n28A, DC\_3C-38A\_n28A, DC\_1A-3C-7A\_n28A, DC\_1A-3C-7C\_n28A, DC\_1A-1A-3C-7A\_n28A, DC\_1A-3C-20A\_n28A, DC\_1A-3C\_n28A-n75A, DC\_1A-3C\_n28A-n78A, DC\_1A-3C-32A\_n28A, DC\_1A-3C-38A\_n28A, DC\_3C-7A-20A\_n28A, DC\_3C-7A\_n28A-n78A, DC\_3C-7C\_n28A-n78A, DC\_3C-7A-32A\_n28A, DC\_3C-7A-38A\_n28A, DC\_3C-20A\_n1A-n28A, DC\_3C-20A\_n28A-n75A, DC\_3C-20A-32A\_n28A, DC\_3C-32A\_n1A-n28A, DC\_1A-3C-7A\_n28A-n78A, DC\_1A-3C-7C\_n28A-n78A, DC\_1A-3C-7A-32A\_n28A, DC\_1A-3C-7A-38A\_n28A, DC\_1A-3C-20A\_n28A-n75A, DC\_1A-3C-20A-32A\_n28A, DC\_3C-7A-20A\_n28A-n78A, DC\_3C-20A-32A\_n1A-n28A
  + Option 2: other
* Recommended WF
  + Recheck triple beat to third band conclusion and review/agree CR R4-2302338

### Sub-topic 2-2

*Sub-topic description:* CA\_n5A-n77(2A) IMD4 MSD

*Open issues and candidate options before meeting:* proposed IMD4 MSD

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **NR CA band combination** | **NR**  **band** | **UL Fc**  **( MHz )** | **UL/DL BW**  **( MHz )** | **UL**  **CLBR** | **UL Fc**  **( MHz )** | **MSD**  **( dB )** | **Duplex mode** |
| CA\_n5-77 (2A) | n5 | N/A | 5 | NA | 880 | **6.8**1 | FDD | IMD4 |
| n77 | 3410 | 10 | 1 RBSTART =25 | 3410 | N/A | TDD | N/A |
| 3850 | 10 | 1 RBSTART =25 | 3850 |

Note 1: Based on the n77 UL dual-PA architecture

**Issue 2-2: IMD4 MSD test point and value**

* Proposals
  + Option 1: Agree MSD test point and value as in table above
  + Option 2: Other
* Recommended WF
  + Review the proposal and if agreed derive TP/CR accordingly

### Sub-topic 2-3

*Sub-topic description:* Evaluation of triple beat MSD for CA\_n7B-n26A

*Open issues and candidate options before meeting:*

**Issue 2-3: Triple beat issue for CA\_n7B-n26A**

* Proposals
  + Option 1: With a duplex distance of 45MHz the DL of n26 is subject to triple beat from n26UL+n7B 2CC UL. Experts are asked to provide input to test point and MSD if it can be done during the meeting
  + Option 2: other
* Recommended WF
  + Experts are asked to provide input to test point and MSD if it can be done during the meeting

### Sub-topic 2-4

*Sub-topic description:* Evaluation of triple beat MSD for CA\_n7B-n26A

*Open issues and candidate options before meeting:*

**Issue 2-4: Potential n48B IMD issue for CA\_n48B-n66A**

* Proposals
  + Option 1: With a gap of 670MHz between band 48 and band 66 IMD order of n48B 2UL is >9 before reaching n66 so MSD should not be an issue
  + Option 2: other
* Recommended WF
  + Experts are asked to confirm if no MSD is needed and agree the CR

# Topic #3: 1UL LB-LB combinations

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2300414**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2300414.zip)  TP to TR 38.717-02-01: Addition of CA\_n71-n85 | Nokia, T-Mobile USA | ∆TIB and ∆RIB values For CA\_n71-n85, the ΔTIB,c and ΔRIB values are based on CA\_n12-n71.  **Table 5.x.1.4-1: ΔTIB,c** **due to NR CA (two bands)**   |  |  |  | | --- | --- | --- | | Inter-band CA combination | ΔTIB,c for NR bands (dB)9 | | | Component band in order of bands in configuration10 | | | CA\_n71-n85 | 1 | 1 | | NOTE 9: “-” denotes ΔTIB,c = 0.  NOTE 10: The component band order in the configuration should be listed by the order of NR bands, such as for CA\_n1-n3 the band order from left to right is n1 and n3. | | |   **Table 5.x.1.4-2: ΔRIB,c due to NR CA (two bands)**   |  |  |  | | --- | --- | --- | | Inter-band CA combination | ΔRIB,c for NR bands (dB)8 | | | Component band in order of bands in configuration9 | | | CA\_n71-n85 | 0.8 | 0.8 | | NOTE 8: “-” denotes ΔRIB,c = 0.  NOTE 9: The component band order in the configuration should be listed by the order of NR bands, such as for CA\_n1-n77 the band order from left to right is n1 and n77. | | |  5.x.1.5 REFSENs requirementsThere are no specific REFSENS requirements for 1 band UL |
| [**R4-2302238**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2302238.zip)  Analysis for CA\_n71A-n85A | Qualcomm Finland RFFE Oy | **Proposal 1**: Use the following analysis results when discussing requirements for CA\_n71A-n85A   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **Cross-band**  **Interference**  **source** | | **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** | | n71 | n85 | 688 | 20 | 15 | 20 (RBstart=86) | 730.5 | 7.6 | TBD | ACLR2 | | n85 | n71 | 705.5 | 15 | 15 | 20 (RBstart=0) | 649.5 | 2.5 | TBD | >ACLR2 |  |  |  |  |  | | --- | --- | --- | --- | | **Inter-band CA combination** | **NR Band** | **ΔRIB,c (dB)** | **ΔTIB,c (dB)** | | CA\_n71-n85 | n71 | 0.8 | 0.8 | | n85 | 0.8 | 0.8 | |
| [**R4-2302631**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2302631.zip)  CA\_n71-n85 LB-LB 1UL/2DLCA MSD | Murata Manufacturing Co Ltd. | **Observation 1:** 2-antenna case for n85 UL has very large TX IM2 making only 1 of the 2 antennas useful, unless filter performance is improved   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | UL band | DL band | UL Fc | UL BW | SCS of UL band | UL RB Allocation | DL Fc | DL BW | MSD | Cross-band  Interference  source | | (MHz) | (MHz) | (kHz) | LCRB | (MHz) | (MHz) | (dB) | | n71 | n85 | 688 | 20 | 15 | 20 (RBstart=86) | 730.5 | 5 | 8.5 | ACLR2 | | n85 | n71 | 705.5 | 20 | 15 | 20 (RBstart=0) | 649.5 | 5 | 4.5 | > ACLR2 |   **Table 2.2.3-3:** Cross-band noise MSD  **Proposal 1:** Use the 2-antenna MSD values as shown in Table 2.2.3-3 |
| [**R4-2300758**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2300758.zip)  1UL cross band MSDs for CA\_n71-n85 and DC\_12\_n71 | Skyworks Solutions Inc. | **Proposal 1: a dual triplexer architecture covering n105 and n85 frequency ranges is used to derive requirements for CA\_n71-n85, CA\_n12-n71 and DC\_12\_n71.**  **Proposal 2:** **CA\_n71-n85 ΔTIB,c/ ΔRIB,c are as proposed in Table 1 and are the same as CA\_n12-n71 and DC\_12-n71 and enable a dual antenna dual triplexer implementation with n105 frequency range support.**  Table 1: ΔTIB,c/ ΔRIB,c for CA\_n71-n85   | **Configuration** | **Component band in order of bands in configuration** | | | | | --- | --- | --- | --- | --- | | ΔTIB,c | | ΔRIB,c | | | CA\_n71-n85 | 1 | 1 | 0.8 | 0.8 |   **Proposal 3: Cross band MSDs for DC\_12-n71 and CA\_n12-n71 should be re-assessed together with CA\_n71-n85 and corrected in all the relevant TS and releases.**  **Proposal 4: CA\_n71 1UL cross band MSDs into band n85 and 12/n12 for CA\_n71-n85, CA\_n12-n71 and DC\_12\_n71 are as proposed in Table 3. No cross band MSD is needed for band 12/n12/n85 UL into band n71 DL.**  Table 3: 1UL cross band MSDs   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **Cross-band**  **Interference**  **source** | | **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** | | n71 | n85 | 688 | 20 | 15 | 25 (RBstart=81) | 730.5 | 5 | [13.6] | ACLR2 | | n71 | 12 | 688 | 20 | 15 | 25 (RBstart=81) | 731.5 | 5 | [12.1] | ACLR2 | | n71 | n12 | 688 | 20 | 15 | 25 (RBstart=81) | 731.5 | 5 | [12.1] | ACLR2 | |
| [**R4-2301505**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F106_Docs_R4-2D2301505.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=aiWRXrMeo5QhCUPSNH0yEYE0UkQ1lJVG9wWalnodcNTpSwSMAGK8SyG_dhJXHIrk&s=gEW6b2w54dxp2LJotbrV2DUBDf2XLS27_18SoEp6yQw&e=)  TP for TR 37.718-11-11 to include DC\_71A-n12A | Ericsson, Rogers | Moderator: moved from block approval to this thread to capture the conclusions and cross band MSDs from the similar CA\_n71-n85, DC\_12-n71 and CA\_12-n71 combinations discussed in this topic. |
| [**R4-2301721**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F106_Docs_R4-2D2301721.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=l8SBLJqa9IuUcNLR3098quNgjhyFw3dlySDemwcqTkZjmKn5ecutwpH4oS-E2ZCU&s=Iyi2fYWOS0CjJHPBE3BVMh1zuL8K-sAYyaAaPcNdFpM&e=)  TP for TR 38.718-02-01 to include CA\_n26-n28 | MediaTek Inc. | Moderator: moved from block approval to this thread to discuss proposals with experts under the LB-LB topic |

## Open issues summary

### Sub-topic 3-1

*Sub-topic description:* CA\_n71-n85 cross band isolation MSD and correction for DC\_12-n71 and CA\_n12-n71

*Open issues and candidate options before meeting:*

**Issue 3-1a: CA\_n71-n85 Delta T/RIB**

* Proposals

|  |  |  |  |
| --- | --- | --- | --- |
| **NR Band** | **ΔRIB,c (dB)** | **ΔTIB,c (dB)** | **Company** |
| n71 | 1 | 1 | **Nokia, TMO** |
| n85 | 0.8 | 0.8 |
| n71 | 0.8 | 0.8 | **Qualcomm** |
| n85 | 0.8 | 0.8 |
| n71 | 1 | 1 | **Skyworks** |
| n85 | 0.8 | 0.8 |

* Recommended WF
  + Discuss and agree n71 delta T/RIB, there is consensus on n85

**Issue 3-1b: CA\_n71-n85 cross band MSD**

* Proposals
  + Option 1: no cross-band MSD for Nokia, TMO
  + Option 2: cross band MSDs for Qualcomm, Murata and Skyworks

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Company** | **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **Cross-band**  **Interference**  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| **Qualcomm** | n71 | n85 | 688 | 20 | 15 | 20 (RBstart=86) | 730.5 | 7.6 | TBD | ACLR2 |
| n85 | n71 | 705.5 | 15 | 15 | 20 (RBstart=0) | 649.5 | 2.5 | TBD | >ACLR2 |
| **Murata** | n71 | n85 | 688 | 20 | 15 | 20 (RBstart=86) | 730.5 | 5 | 8.5 | ACLR2 |
| n85 | n71 | 705.5 | 20 | 15 | 20 (RBstart=0) | 649.5 | 5 | 4.5 | > ACLR2 |
| **Skyworks** | n71 | n85 | 688 | 20 | 15 | 20 (RBstart=86) | 730.5 | 5 | [13.6] | ACLR2 |
| n85 | n71 | 705.5 | 15 | 15 | 20 (RBstart=0) | 649.5 | 5 | none | >ACLR2 |

* Moderator:
  + For Qualcomm: based on the discussion part we assume that the numbers in the DL BW column is actually the MSD and DL BW is 5MHz
  + For Murata: We assume this is 15MHz UL like in the discussion part of the paper (only 15MHz UL feasible in n85)
* Recommended WF
  + Agree that MSD needs to be specified according to cross band MSD rules (highest UL CBW in lowest DL CBW is used
  + MSD for n71 UL in n85 DL: there is agreement on the test point definition but differences in MSD values due to assumptions.
  + MSD for n85 UL in n71 DL: Assuming 15MHz n85 UL there is agreement on the test point definition but differences in MSD values due to assumptions.
  + Test points and values are discussed amongst experts

**Issue 3-1c: CA\_n71-n85 IMD2 issue**

* **Observation 1:** 2-antenna case for n85 UL has very large TX IM2 making only 1 of the 2 antennas useful, unless filter performance is improved (Murata)
* Recommended WF
  + Discuss how to handle IMD2 issue

**Issue 3-1d: CA\_n12-n71 and DC\_12\_n71 and DC\_71\_n12 MSD**

* Proposals: correct MSD for band combinations CA\_n12-n71 and DC\_12-n71 MSD according to max UL CBW into lowest DL CBW (Skyworks)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **Cross-band**  **Interference**  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n71 | 12 | 688 | 20 | 15 | 25 (RBstart=81) | 731.5 | 5 | [12.1] | ACLR2 |
| n71 | n12 | 688 | 20 | 15 | 25 (RBstart=81) | 731.5 | 5 | [12.1] | ACLR2 |

* Recommended WF
  + Discuss the need to correct CA\_n12-n71 and DC\_12-n71 MSD in coherence with CA\_n71-n85 findings. MSD test points and values may be revised according to agreements on CA\_n71-n85 MSDs of n71 UL into n85 (12/n12) and n85 (12/n12) UL into n71
  + Proposed MSDs for DC\_12\_n71 are applicable to DC\_71\_n12 and captured in a revision of R4-2301505

### Sub-topic 3-2

*Sub-topic description:* CA\_n71-n85 cross band isolation MSD and correction for DC\_12-n71 and CA\_n12-n71

*Open issues and candidate options before meeting:*

**Issue 3-2: CA\_n26-n28 UL configuration**

* Proposals
  + To avoid up >45dB MSD in band 28 due to ACLR1 interference from 20MHz band n26 UL, it is proposed to allow UL in n28 only.
* Recommended WF
  + Discuss and agree if UL only in band n28 is appropriate including for n26 CBW<20MHz

# Topic #4: Band combinations requiring experts’ review

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2302739**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2302739.zip)  CA\_n8-n3 and related combination n8 H2 MSD in n3 | Skyworks Solutions Inc. | **Proposal:**   * **The CA\_n3-n8 exception to harmonic 2 MSD is not justified in regard of similar band combinations that have significant MSD specified.** * **Given similar cases the MSD in table 2 is proposed and should apply to all related LTE, ENDC and SUL related combinations.** * **Note 13 is voided.**   Table 2: CA\_n3-n8 UL2/DL1 MSD   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 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) | | n8 | n3 | 5 | 15 | 25 (RBstart=0) | 5 | [20] | NOTE 2 | UL2/DL1 direct-hit | |
| [**R4-2300936**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2300936.zip)  Further Corrections to NR-CA Cross-band Isolation MSD | Skyworks Solutions Inc. | **Proposal 1: For CA\_n41A-n66A, adopt the MSD test points of Table 2 for PC2 operation.**  **Table 2**: PC2 MSD requirements for CA\_n41A-n66A.   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **X band interference source** | | **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** | | n41 | n66 | 2546 | 100 | 30 | 270 (RBstart=0) | 2197.5 | 5 | 12.5 | >ACLR2 |   **Table 3**: PC1.5 MSD requirements for CA\_n41A-n66A.   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL Band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **X band interference source** | | **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** | | n41 | n66 | 2546 | 100 | 30 | 270 (RBstart=0) | 2197.5 | 5 | 15.6 | >ACLR2 |   **Proposal 2: For SUL\_n41A-n97A, adopt the MSD test points of Table 5 for PC3 operation.**  **Table 5**: PC3 MSD requirements for SUL\_n41A-n97A.   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **X band interference source** | | **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** | | n97 | n41 | 2350 | 100 | 30 | 270 (RBstart=3) | 2505 | 10 | 25.8 | ACLR2 | | n97 | n41 | 2350 | 100 | 30 | 270 (RBstart=3) | 2550 | 100 | 22.0 | ACLR2 |   **Proposal 3: Adopt the Table 10 PC3 NR-CA cross-band isolation MSD test points.**  **Table 10**: missing NR-CA PC3 cross-band isolation MSD requirements.   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **X band interference source** | | **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** | | n30 | n66 | 2310 | 10 | 15 | 20 (RBstart=0) | 2197.5 | 5 | 8.3 | >ACLR2 | | n38 | n2 | 2590 | 40 | 15 | 216 (RBstart=0) | 1987.5 | 5 | 0.6 | >ACLR2 | | n38 | n66 | 2590 | 40 | 15 | 216 (RBstart=0) | 2197.5 | 5 | 1.9 | >ACLR2 | | n41 | n2 | 2546 | 100 | 30 | 270 (RBstart=0) | 1987.5 | 5 | 0.6 | >ACLR2 | | n77 | n7 | 3350 | 100 | 30 | 270 (RBstart=0) | 2687.5 | 5 | 4.5 | >ACLR2 | |
| [**R4-2300664**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F106_Docs_R4-2D2300664.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=aiWRXrMeo5QhCUPSNH0yEYE0UkQ1lJVG9wWalnodcNTpSwSMAGK8SyG_dhJXHIrk&s=0wXCXEdEeIitBV4DtG_2sLwm5A9TPwHKKG4G-6dJ6iE&e=)  draft CR to TS38.101-3: clarify the difference between section 5.5b.5 and 5.5b.6 | Huawei Technologies France | Moderator: moved from block approval for discussion in this thread:  Sections 5.5b.5 and 5.5b.6 correspond to DC configurations of inter-band EN-DC including FR1 and FR2. In the current specification sections 5.5b.5 and 5.5b.6 can be easily misunderstood, as there is no explanation of their difference |

## Open issues summary

### Sub-topic 4-1

*Sub-topic description:* CA\_n3-n8 harmonic 2 MSD exception

*Open issues and candidate options before meeting:*

**Issue 4-1: Specifying MSD for H2 of n8 into n3 (and associated combination)**

* Proposals
* Option 1:
  + **The CA\_n3-n8 exception to harmonic 2 MSD is not justified in regard of similar band combinations that have significant MSD specified.**
  + **Given similar cases the MSD in table 2 is proposed and should apply to all related LTE, ENDC and SUL related combinations.**
  + **Note 13 is voided.**

Table 2: CA\_n3-n8 UL2/DL1 MSD

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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) |
| n8 | n3 | 5 | 15 | 25 (RBstart=0) | 5 | [20] | NOTE 2 | UL2/DL1 direct-hit |

* + Option 2: Other
* Recommended WF
  + Discuss validity of exception when compared to other simal combinations and correct combinations accordingly

### Sub-topic 4-2

*Sub-topic description:* Cross band MSD corrections according to CBW rule: max CBW in UL and min CBW in DL

*Open issues and candidate options before meeting:*

**Issue 4-2a: cross band MSD for PC2/PC1.5 CA\_n41A-n66A**

* Proposals: **For CA\_n41A-n66A, adopt the MSD test points of Table 2 for PC2 operation.**
* **Table 2**: PC2 MSD requirements for CA\_n41A-n66A.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **X band interference source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n41 | n66 | 2546 | 100 | 30 | 270 (RBstart=0) | 2197.5 | 5 | 12.5 | >ACLR2 |

**Table 3**: PC1.5 MSD requirements for CA\_n41A-n66A.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL Band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **X band interference source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n41 | n66 | 2546 | 100 | 30 | 270 (RBstart=0) | 2197.5 | 5 | 15.6 | >ACLR2 |

* Recommended WF
  + Discuss MSD test point and values and add in 38.101-1 accordingly

**Issue 4-2b: cross band MSD for PC3 SUL\_n41A-n97A**

* Proposals: **For** **SUL\_n41A-n97A, adopt the MSD test points of Table 5 for PC3 operation.**

**Table 5**: PC3 MSD requirements for SUL\_n41A-n97A.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **X band interference source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n97 | n41 | 2350 | 100 | 30 | 270 (RBstart=3) | 2505 | 10 | 25.8 | ACLR2 |
| n97 | n41 | 2350 | 100 | 30 | 270 (RBstart=3) | 2550 | 100 | 22.0 | ACLR2 |

* Recommended WF
  + Discuss MSD test point and values and add in 38.101-1 accordingly

**Issue 4-2c: correcting cross band MSD for PC3**

* Proposals: **Adopt the Table 10 PC3 NR-CA cross-band isolation MSD test points.**

**Table 10: missing NR-CA PC3 cross-band isolation MSD requirements.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **X band interference source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n30 | n66 | 2310 | 10 | 15 | 20 (RBstart=0) | 2197.5 | 5 | 8.3 | >ACLR2 |
| n38 | n2 | 2590 | 40 | 15 | 216 (RBstart=0) | 1987.5 | 5 | 0.6 | >ACLR2 |
| n38 | n66 | 2590 | 40 | 15 | 216 (RBstart=0) | 2197.5 | 5 | 1.9 | >ACLR2 |
| n41 | n2 | 2546 | 100 | 30 | 270 (RBstart=0) | 1987.5 | 5 | 0.6 | >ACLR2 |
| n77 | n7 | 3350 | 100 | 30 | 270 (RBstart=0) | 2687.5 | 5 | 4.5 | >ACLR2 |

* Recommended WF
  + Discuss MSD test point and values and correct 38.101-1 accordingly

### Sub-topic 4-3

*Sub-topic description:* renaming EN-DC with FR2 sections in 38.101-3

*Open issues and candidate options before meeting:*

**Issue 4-3: name of EN-DC including FR2 section**

* Proposals
* Option 1: Agree the additions below

5.5B.5 Inter-band EN-DC with 1 NR band including FR1 and FR2

5.5B.6 Inter-band EN-DC with more than 1 NR band including FR1 and FR2

* + Option 2: Other
* Recommended WF
  + Change seems agreeable, to be confirmed in the meeting

# Topic #5: NR-U ULCA NS and A-MPR requirements

Moderator: In this meeting a number of combinations have been requested that include CA\_n46C and CA\_n102B/C ULCA while the corresponding A-MPR are not been studied and specified. Beyond that some configuration are subject to triple beat MSD and thus cannot be added with a CR. Note that separatelly there is a discussion in thread #118 on how the continuation of the ULCA A-MPR for NRU bands should be handled.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2301692](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2301692.zip)  TP to TR 38.718.01-01 addition of CA\_n102B and CA\_n102C uplink | Nokia, BT | Moderator, moved from #107 to #105: CA\_n102B/C need A-MPR specification for all related NS. Especially NS\_58. An alternative is to clarify that this combination is only applicable to countries/regions where only NS\_01 applies. Actualy, it is not clear whether OOB emissions still apply below 5925MHz in the UK. |
| [R4-2301693](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_106/Docs/R4-2301693.zip)  TP to TR 38.718.01-01 addition of CA\_n46C uplink | Nokia, BT | Moderator, moved from #106 to #105: CA\_n46C need A-MPR specification for all related NS. Especially NS\_30. |
| [**R4-2300721**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F106_Docs_R4-2D2300721.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=l8SBLJqa9IuUcNLR3098quNgjhyFw3dlySDemwcqTkZjmKn5ecutwpH4oS-E2ZCU&s=AjlEcuaUa2xZI605dWUSWj0_YsxVUE2he66kiOEoo40&e=) DraftCR Add intraband CA to the existing two bands DL CA combinations | Huawei, HiSilicon, BT plc | Moderator, moved from #108 to #105: contains n46C ULCA configuration that requires A-MPR for n46C ULCA fallback in R4-2301693. Also contains potential triple beat issues: CA\_n7A-n46C, CA\_n28A-n46C. |
| [**R4-2300722**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F106_Docs_R4-2D2300722.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=l8SBLJqa9IuUcNLR3098quNgjhyFw3dlySDemwcqTkZjmKn5ecutwpH4oS-E2ZCU&s=9svwXXHA_U-mpSgHp3bzyKtJIp8X-MRuxlUzZA0AVXI&e=) TP to TR 38.718-02-01 for CA\_n46-n78 and DC\_n46-n78 | Huawei, HiSilicon, BT plc | Moderator, moved from #108 to #105: contains n46C-n78 ULCA configuration that requires A-MPR for n46C ULCA fallback in R4-2301693. Also needs clarification for sim Tx/Rx with n78 and if so potential MSD issues with IMDs of n46C (seem the case since IMDs of n78(2A) are considered). But, given the distance this should not be an issue. |
| [**R4-2300723**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F106_Docs_R4-2D2300723.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=l8SBLJqa9IuUcNLR3098quNgjhyFw3dlySDemwcqTkZjmKn5ecutwpH4oS-E2ZCU&s=66eGs23iYZsqVbEDpDlv-Z1FQbFs1JpyhbkVTb4EgLc&e=) TP to TR 38.718-02-01 for CA\_n1-n46 and DC\_n1-n46 | Huawei, HiSilicon, BT plc | Moderator, moved from #108 to #105: contains n46C-n78 ULCA configuration that requires A-MPR for n46C ULCA fallback in R4-2301693. Also contains CA\_n1A-n46C that need to be checked for triple beat. |
| [**R4-2301689**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F106_Docs_R4-2D2301689.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=l8SBLJqa9IuUcNLR3098quNgjhyFw3dlySDemwcqTkZjmKn5ecutwpH4oS-E2ZCU&s=C7FVouq86Wo4UrcmP6UbJ2DfNB0doqchGc6UMVrFbVU&e=) TP to TR 38.718-02-01 Addition of CA\_n7-n102 and DC\_n7-n102 | Nokia, BT | Moderator, moved from #108 to #105: contains n7A-n102B/C ULCA configuration that requires A-MPR of CA\_n102B/C fallback in R4-2301692. n7A-n102B/C triple beat also needs to be considered. Note that there could be issues with IMDs of n102C falling in n7 DL but given the distance this should not be an issue |
| [**R4-2301690**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F106_Docs_R4-2D2301690.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=l8SBLJqa9IuUcNLR3098quNgjhyFw3dlySDemwcqTkZjmKn5ecutwpH4oS-E2ZCU&s=FdQh0vOTFqb9m2x1dZRFW1MJQk1F5oSl9RpgL0dkCPA&e=) TP to TR 38.718-02-01 Addition of CA\_n28-n102 and DC\_n28-n102 | Nokia, BT | Moderator, moved from #108 to #105: contains n28A-n102B/C ULCA configuration that requires A-MPR of CA\_n102B/C fallback in R4-2301692. n28A-n102B/C triple beat also needs to be considered. |
| [**R4-2301691**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F106_Docs_R4-2D2301691.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=l8SBLJqa9IuUcNLR3098quNgjhyFw3dlySDemwcqTkZjmKn5ecutwpH4oS-E2ZCU&s=vwD95vmN1eqxh_PxvqL3QUc62SfLwzHbfHmeqmqtVpU&e=) TP to TR 38.718-02-01 Addition of CA\_n1-n102 and DC\_n1-n102 | Nokia, BT | Moderator, moved from #108 to #105: contains n1A-n102B/C ULCA configuration that requires A-MPR of CA\_n102B/C fallback in R4-2301692. n1A-n102C triple beat also needs to be considered. |
| [**R4-2301694**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F106_Docs_R4-2D2301694.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=l8SBLJqa9IuUcNLR3098quNgjhyFw3dlySDemwcqTkZjmKn5ecutwpH4oS-E2ZCU&s=FpFy74ES7PpXDhGU9LEzfo5woxpQ1hlh1Y0rQPCZElA&e=) TP to TR 38.718-02-01 Addition of CA\_n78-n102 and DC\_n78-n102 | Nokia, BT | Moderator, moved from #108 to #105: contains n78A-n102B/C ULCA configuration that requires A-MPR of CA\_n102B/C fallback in R4-2301692. |

## Open issues summary

### Sub-topic 5-1

*Sub-topic description:* Handling of A-MPR for NRU intra-band contiguous ULCA.

*Open issues and candidate options before meeting:*

**Issue 5-1: Specifying A-MPR for n46, n96B/C, n102B/C intra-band ULCA**

* Proposals
* Option 1:
  + Option 1: Specify intra-band contiguous ULCA A-MPR for all NS and all bands (n46/n96/n102) in a continuation of the NR-U enh WI to support all incoming regulations and cover PC5 and PC3.
  + Option 2: Specify intra-band contiguous ULCA A-MPR on a case by case with requests the intra-band basket and technical discussions within the “not for block approval AI” and restrict related combinations to the covered NS.
* Recommended WF
  + Discuss options and consequences for existing (n96B/C) and requested (n46C, n102B/C) intra-band UL cases
  + Capture agreement in a way forwards proposal towards RAN

### Sub-topic 5-2

*Sub-topic description:* Solving NR-U intra-band ULCA issues for requested region only.

*Open issues and candidate options before meeting:*

**Issue 5-2a: n102B/C A-MPR**

* Proposals:
  + Option 1: specify A-MPR for all applicable UL CA\_n102B/C regions (NS\_58)
  + Option 2: agree UL CA\_n102B/C only for the regions where only NS\_01 applies and add notes to clarify this to the related band combinations.
* Recommended WF
  + Discuss options and way forward on establishing all CA\_n102B/C A-MPR for applicable NS. May depend on agreements in 5-1

**Issue 5-2b: n46C A-MPR**

* Proposals:
  + Option 1: specify A-MPR for all applicable UL CA\_n46C regions (NS\_58)
  + Option 2: specify UL CA\_46C only for NS\_30 and add notes to clarify this to the related band combinations.
* Recommended WF
  + Discuss options and way forward on establishing all CA\_n46C A-MPR for applicable NS. May depend on agreements in 5-1

### Sub-topic 5-3

*Sub-topic description:* triple beat issue with nXXA-n46C or n102B/C

*Open issues and candidate options before meeting:*

**Issue 5-3: triple beat issues with CA\_n7A-n46C, CA\_n28A-n46C, CA\_n1A-n46C, CA\_n7A-n102B/C, CA\_n28A-n102B/C, CA\_n1A-n102C.**

* Proposals
  + Option 1: Postpone study of triple beat to meetings after CA\_n46C and n102B/C A-MPR are solved
  + Option 2: Agree triple beat MSD test points in this meeting (with tentative values if possible)
* Recommended WF: Discuss options and technical solutions