**3GPP T****SG-RAN WG4 Meeting#111 draftR4-2408916**

**Fukuoka, Japan, 20 – 24 May 2024**

**Agenda item:** 6.1 and 12.3

**Source:** Moderator (Skyworks Solution Inc.)

**Title:** Topic summary for [110][105] NR\_Baskets\_Part\_1

**Document for:** Information

# Introduction

AI 6.1 Issues arising from basket WIs but not subject to block approval

* AI 6.1 Topic 1: MSD proposal for band combination with intra-band ULCA
* AI 6.1 Topic 2: Discussion on MSD test point for band combination with intra-band ULCA
* AI 6.1 Topic 3: Band combination with close proximity issues
* AI 6.1 Topic 4: Harmonic mixing
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* AI 6.1 Topic 6: Place holder: contributions transferred from block approval.

AI 12.3 RAN4 basket WI work plan (according to WF R4-2403721)

* AI 12.3 Topic 1: Templates and guidelines
* AI 12.3 Topic 2: work plan and baskets

# AI 6.1 Topic #1: Band combination with intra-band ULCA

## Companies’ contributions summary

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2407072**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407072.zip) | MSD Analysis for CA\_n40A-n41C | Apple | **Proposal:** Adopt CA\_n25A-n77A MSD Levels proposed in Table 3-1 shown below.

|  |  |
| --- | --- |
| **Band / Channel bandwidth / NRB / Duplex mode** | **Source of IMD** |
| NR CA band combination | NR band | UL Fc (MHz) | UL/DL BW (MHz) | UL LCRB | DL Fc (MHz) | MSD (dB) | Duplex mode |  |
| CA\_n40-n41 | n40 | N/A | 5 | N/A | 2358.5 | **55** | TDD | IMD3 |
|  | n41 | 2545 | 60 | 1 (RBSTART= 0) | 2545 | N/A | TDD | N/A |
|  |  | 2625 | 100 | 1 (RBSTART= 272) | 2625 |  |  |  |

**Table 3.1**: IMD3 MSD proposal for CA\_n40A\_41C |
| [**R4-2407073**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407073.zip) | MSD Analysis for CA\_n41C-n79A | Apple | **Proposal:** Adopt CA\_n25A-n77A MSD Levels proposed in Table 3-1 shown below.

|  |  |
| --- | --- |
| **Band / Channel bandwidth / NRB / Duplex mode** | **Source of IMD** |
| NR CA band combination | NR band | UL Fc (MHz) | UL/DL BW (MHz) | UL LCRB | DL Fc (MHz) | MSD (dB) | Duplex mode |  |
| CA\_n41-n79 | n41 | 2545 | 60 | 1 (RBSTART= 0) | 2545 | N/A | TDD | N/A |
|  |  | 2625 | 100 | 1 (RBSTART= 272) | 2625 |  |  |  |
|  | n79 | N/A | 40 | N/A | 4872.5 | **8.415** | TDD | IMD4 |
| NOTE 15: This band is subject to IMD6 also which MSD is not specified |

**Table 3.1**: IIMD4 MSD proposal for CA\_n41C\_n79A |
| [**R4-2407154**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407154.zip) | CA\_n41C-n79 MSD | Skyworks Solutions Inc. | **Proposal:** Consider adopting the PC3 CA\_n41C-n79A MSD/REFSENS test point captured in the table below.

|  |
| --- |
| **Band / Channel Bandwidth / NRB / Duplex mode** |
| **NR CA Band combination** | **NR Band** | **UL Fc (MHz)** | **UL/DL BW (MHz)** | **UL LCRB** | **DL Fc (MHz)** | **MSD (dB)** | **Duplex mode** | **Source of IMD** |
| CA\_n41-n79 | n41 | 2545 | 60 | 1 (RBSTART= 0) | 2545 | N/A | TDD | N/A |
|  |  | 2625 | 100 | 1 (RBSTART= 272) | 2625 |  |  |  |
|  | n79 | N/A | 40 | N/A | 4872.5 | 4.215 | TDD | IMD4 |
| NOTE 15: This band is subject to IMD6 also which MSD is not specified. |

 |
| [**R4-2407155**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407155.zip) | CA\_n40A-n41C MSD | Skyworks Solutions Inc., ZTE Corporation | **Proposal:** Consider adopting the power class 3 CA\_n40A-n41C MSD/REFSENS test point captured in Table 3.**Table 3:** PC3 Band n40 MSD/REFSENS for CA\_n40A-n41C.

|  |
| --- |
| **Band / Channel Bandwidth / NRB / Duplex mode** |
| **NR CA Band combination** | **NR Band** | **UL Fc (MHz)** | **UL/DL BW (MHz)** | **UL LCRB** | **DL Fc (MHz)** | **MSD (dB)** | **Duplex mode** | **Source of IMD** |
| CA\_n40-n41 | n40 | N/A | 5 | N/A | **2358.5** | **42.5** | TDD | IMD3 |
|  | n41 | 2545 | 60 | 1 (RBSTART= 0) | 2545 | N/A | TDD | N/A |
|  |  | 2625 | 100 | 1 (RBSTART= 272) | 2625 |  |  |  |

 |
| [**R4-2407172**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407172.zip) | Discussion on IMD4 MSD for CA\_n41A-n79C and CA\_n41C-n79A | MediaTek Inc. | **Proposal 1: IMD4 MSD due to UL\_CA\_n41C in n79 DL as the value below,**

|  |  |
| --- | --- |
| **Band / Channel bandwidth / NRB / Duplex mode** | **Source of IMD** |
| NR CA band combination | NR band | UL Fc (MHz) | UL/DL BW (MHz) | UL LCRB | DL Fc (MHz) | MSD (dB) | Duplex mode |  |
| **CA\_n41-n79** | **n41** | **2545** | **60** | **1 (RBSTART= 0)** | **2545** | **N/A** | **TDD** | **N/A** |
|  |  | **2625** | **100** | **1 (RBSTART= 272)** | **2625** |  |  |  |
|  | **n79** | **N/A** | **40** | **N/A** | **4872.5** | **12.615** | **TDD** | **IMD4** |
| **NOTE 15: This band is subject to IMD6 also which MSD is not specified** |

 |
| [**R4-2407578**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407578.zip) | CA\_n71B BCS4/5 PC3, PC2 1TX, PC2 2TX | Murata Manufacturing Co Ltd. | **Proposal 1**: Use PC3, 1TX PC2, and 2TX PC2 REFSENS relaxation values as shown in Table 2-3 and 2-4.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CA configuration** | **SCS****(PCC/SCC)****(kHz)** | **Aggregated channel bandwidth (PCC+SCC)** | **UL PCC allocation****(LCRB)** | **ΔRIBC (dB)** | **Duplex mode** |
| CA\_n71B | 15/15 | 30MHz + 5MHz | 20 (RBSTART = 0) | [4.9] | FDD |

**Tabe 2-3:** **ΔRIBC** for PC3

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CA configuration** | **SCS****(kHz)** | **Aggregated channel bandwidth (PCC+SCC)** | **UL PCC allocation** | **ΔRIBNCX (dB)** | **ΔRIBNCY (dB)** | **Duplex mode** |
| CA\_n71B**Z** | 15/15 | 30 MHz + 5 MHz | 20 (RBstart = 0) | [7.0] | [8.4] | FDD |
| NOTE X: Applicable to UE supporting PC2 with single Tx. NOTE Y: Applicable to UE supporting PC2 with dual Tx.NOTE Z: Applicable only to BCS 4 and 5 and UEs supporting the optional symmetrical UL/DL bandwidths. |

**Tabe 2-4:** **ΔRIBC** for PC2 |
| **[R4-2408380](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408380.zip)** | TP for TR38.718-02-01\_CA\_n40A-n41C | ZTE Corporation, Skyworks Solutions, Inc. | Moderator: TP according to MSD proposals in [**R4-2407155**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407155.zip) |
| **[R4-2408381](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408381.zip)** | TP for TR38.718-02-01\_CA\_n41A-n79C and CA\_n41C-n79A | ZTE Corporation, Mediatek,Sanechips | Moderator: TP according to MSD proposals in [**R4-2407172**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407172.zip) |
| [**R4-2408858**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408858.zip) | Missing MSD for PC3 CA\_n71B BCS4/5 | Qualcomm France | **Proposal 1**: Add the following MSD test point for PC3 n71B:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CA configuration** | **SCS****(PCC/SCC)****(kHz)** | **Aggregated channel bandwidth (PCC+SCC)** | **UL PCC allocation****(LCRB)** | **ΔRIBC (dB)** | **Duplex mode** |
| CA\_n71B | 15/15 | 30MHz + 5MHz | 20 (RBSTART = 0)  | 4.5 | FDD |

**Proposal 2**: Add the following text into 7.3A.2.1:For specific uplink and downlink test points which are specified in Table 7.3A.2.X-Y and the reference sensitivity power level increased by ΔRIBC. The requirements apply with all downlink carriers active. Unless given by Table 7.3.2-4, the reference sensitivity requirements shall be verified with the network signaling value NS\_01 (Table 6.2.3.1-1) configured. |
| [**R4-2409317**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409317.zip) | Discussion on MSD for CA\_n41C-n79A with intra-band UL CA\_n41C | Huawei, HiSilicon | Proposal 1: The REFSENS degradation will not be higher than 1dB for CA\_n41C-n79A with UL intra-band CA\_n41C for 1RB+1RB allocations.Proposal 2: There is no need to specify MSD with fully allocated maximum aggregated BW for CA\_n41C-n79A with UL intra-band CA\_n41C. |

## Open issues summary

### Sub-topic 1-1 CA\_n40-n41C

**Issue 1-1:**

* Proposals:
* Proposal: the following table summarizes the inputs from all companies proposing MSD

|  |  |
| --- | --- |
| **Band / Channel bandwidth / NRB / Duplex mode** |  |
| NR CA band combination | NR band | UL Fc (MHz) | UL/DL BW (MHz) | UL LCRB | DL Fc (MHz) | MSD (dB) | Duplex mode | Source of IMD |
| CA\_n40-n41 | n40 | N/A | 5 | N/A | 2358.5 | **Apple: 55****Skyworks, ZTE: 42.5** | TDD | IMD3 |
|  | n41 | 2545 | 60 | 1 (RBSTART= 0) | 2545 | N/A | TDD | N/A |
|  |  | 2625 | 100 | 1 (RBSTART= 272) | 2625 |  |  |  |

* Note a different proposal in Topic 2 for allocation in : R4-2409316 Discussion on MSD for CA\_n40A-n41C with intra-band UL CA\_n41C Huawei, HiSilicon
	+ Proposal 1: As RAN4 has specified the MSD due to cross band isolation from ACLR2 for the fallback CA\_n40A-n41A, RAN4 can consider the similar method to specify the MSD due to cross band isolation from ACLR1 for CA\_n40A-n41C with UL intra-band CA\_n41C instead of 1RB+1RB allocations.
* Note that MSD differences vs Allocation is discussed in Topic 2 in Document: R4-2407372 On UL configuration for intra-band ULCA IMDs Skyworks Solutions Inc. and shows with measurements that once MPR is accounted for (which is the guideline) the MSDs are similar for different allocations and 1RB+1RB enables direct estimation of IMDs and ease the test point. Also 1RB+1RB conforms to current guidelines.
* Recommended WF
* Discuss if RB allocation should be revisited?
* MSD Values are discussed amongst experts.
* Agreements are captured in revision of with potential co-signees: TP for TR38.718-02-01\_CA\_n40A-n41C ZTE Corporation, Skyworks Solutions, Inc.
* If no agreement based on current guidelines, the band combination is postponed to R19.

### Sub-topic 1-2 CA\_n41C-n79

**Issue 1-2:**

* Proposals:
* Proposal: the following table summarizes the inputs from all companies proposing MSD

|  |
| --- |
| **Band / Channel Bandwidth / NRB / Duplex mode** |
| **NR CA Band combination** | **NR Band** | **UL Fc (MHz)** | **UL/DL BW (MHz)** | **UL LCRB** | **DL Fc (MHz)** | **MSD (dB)** | **Duplex mode** | **Source of IMD** |
| CA\_n41-n79 | n41 | 2545 | 60 | 1 (RBSTART= 0) | 2545 | N/A | TDD | N/A |
|  |  | 2625 | 100 | 1 (RBSTART= 272) | 2625 |  |  |  |
|  | n79 | N/A | 40 | N/A | 4872.5 | **Apple: 8.415****MediaTek: 12.615****Skyworks: 4.215** | TDD | IMD4 |
| NOTE 15: This band is subject to IMD6 also which MSD is not specified. |

* Proposal from Huawei:
	+ Proposal 1: The REFSENS degradation will not be higher than 1dB for CA\_n41C-n79A with UL intra-band CA\_n41C for 1RB+1RB allocations.
	+ Proposal 2: There is no need to specify MSD with fully allocated maximum aggregated BW for CA\_n41C-n79A with UL intra-band CA\_n41C.
* Note that IMD4 measurements vs allocations are in Topic 2 in Document: R4-2407372 On UL configuration for intra-band ULCA IMDs Skyworks Solutions Inc. and shows with measurements that once IMD4 of any allocation are not negligible.
* Recommended WF:
* Discuss if RB allocation should be revisited?
* MSD Values are discussed amongst experts.
* Agreements are captured in revision of with potential co-signees: R4-2408381 TP for TR38.718-02-01\_CA\_n41A-n79C and CA\_n41C-n79A ZTE Corporation, Mediatek, Sanechips
* If no agreement based on current guidelines, the band combination is postponed to R19.

### Sub-topic 1-3 CA\_n71B

**Issue 1-3:**

* Proposals: from Qualcomm on CA\_n71B
	+ Proposal 1: Add the following MSD test point for PC3 n71B:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  **CA configuration** | **SCS****(PCC/SCC)****(kHz)** | **Aggregated channel bandwidth (PCC+SCC)** | **UL PCC allocation****(LCRB)** | **ΔRIBC (dB)** | **Duplex mode** |
| CA\_n71B | 15/15 | 30MHz + 5MHz | 20 (RBSTART = 0)  | 4.5 | FDD |

* + Proposal 2: Add the following text into 7.3A.2.1:

For specific uplink and downlink test points which are specified in Table 7.3A.2.X-Y and the reference sensitivity power level increased by ΔRIBC. The requirements apply with all downlink carriers active. Unless given by Table 7.3.2-4, the reference sensitivity requirements shall be verified with the network signaling value NS\_01 (Table 6.2.3.1-1) configured.

* Recommended WF: Discuss proposals amongst experts. If agreeable see if this should be captured in a CR

# Topic #2: Discussion on MSD test point for band combination with intra-band ULCA

## Companies’ contributions summary

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| **[R4-2407082](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407082.zip)** | On MSD requirements with intra-band contiguous UL CA | Apple | **Proposal 1:** For NR FDD band intra-band contiguous UL CA, REFSENS requirement does not need to be specified.**Proposal 2:** Remove NR FDD band intra-band contiguous UL CA REFSENS requirements from the earliest release of the specifications (Rel-16).**Proposal 3:** There is no need to introduce cross-band MSD requirements resulting from intra-band contiguous UL CA configured with fully allocated maximum aggregated BW if the cross-band MSD requirement has been specified with single carrier UL aggressor at maximum channel BW.**Proposal 4:** Remove the MSD requirements for both inter-band CA/EN-DC with cross-band DL interference and triple-beat issue from the earliest release of specifications (Rel-17) to avoid the unnecessary RAN4 workload in future and reduce the already heavily loaded UE test burden. |
| [**R4-2407083**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407083.zip) | CR to 38.101-1 on removing MSD requirements with intra-band contiguous UL CA | Apple | Moderator: CR according to [**R4-2407082**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407082.zip) |
| [**R4-2407084**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407084.zip) | CR to 38.101-1 on removing MSD requirements with intra-band contiguous UL CA | Apple | Moderator: CR according to [**R4-2407082**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407082.zip) |
| [**R4-2407085**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407085.zip) | CR to 38.101-1 on removing MSD requirements with intra-band contiguous UL CA | Apple | Moderator: CR according to [**R4-2407082**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407082.zip) |
| [**R4-2407086**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407086.zip) | CR to 38.101-3 on removing MSD requirements with intra-band contiguous UL CA in EN-DC | Apple | Moderator: CR according to [**R4-2407082**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407082.zip) |
| [**R4-2407087**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407087.zip) | CR to 38.101-3 on removing MSD requirements with intra-band contiguous UL CA in EN-DC | Apple | Moderator: CR according to [**R4-2407082**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407082.zip) |
| **[R4-2407372](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407372.zip)** | On UL configuration for intra-band ULCA IMDs | Skyworks Solutions Inc. | **Proposal 1:** If RB allocation (1RB+1RB) is re-considered for intra-band ULCA within an inter-band DL CA, it should be for intra-band TDD ULCA only.**Proposal for TDD:** MPR0 is not used for MSD evaluation of TDD intra-band contiguous and non-contiguous ULCA due to IMD or triple beat. IMD order with up to IMD7 is analyzed but IMD9 may require expert attention especially in the NS\_04 case.**Proposal for FDD:** According to current guidelines MPR0 is used for MSD evaluation of FDD intra-band ULCA due to IMD or triple beat. IMD order with up to IMD13 is analyzed, but IMD15/17 may require expert attention.**Proposal for band coexistence with intra-band ULCA:** MPR is allowed to meet general emission (SEM) and only IMD3 need evaluation whether -50dBm/MHz can be achieved. With this approach, band coexistence can be made independent of from the intra-band ULCA band and inter-band power class.**Proposal for TDD RB allocation for ULCA IMD MSD test point:** • The 1RB+1RB allocation is retained as per current guidelines and assuming MPR is applied, is consistent with the IMD orders that are requested for analysis.• This approach results in the MSD being independent from the TDD intra-band ULCA band and inter-band power class• This is valid for Release 18 and the start of Release 19. • If other approaches are to be evaluated for Release 19, this should be part of a specific WI as it will require extensive studies including measurements and simulations that is not compatible with block approval and will result in re-evaluating all currently specified intra-band ULCA related IMD and triple beat cases. |
| **[R4-2407622](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407622.zip)** | Discussion on the MSD requirements of intra-band contiguous UL CA with non-contiguous RB allocation | Huawei, HiSilicon | *Observation 1: In TS 38.101-1, the triple beat is specified with the UL configuration of only one RB in each of the intra-band carriers.**Observation 2: As network vendor, we don't see the scheduling strategy that leads to triple beat, is typical.****Proposal 1:*** ***F****urther justify the necessity of specifying triple beat is required based on the commercial value.* |
| [**R4-2408731**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408731.zip) | Discussion on MSD requirements with intra-band contiguous UL CA | CMCC | Observation 1: The test case that 1 RB is specified for each carrier of the intra-band CA will not appear in realistic network resource allocations, because one single carrier could achieve the throughput.Observation 2: The test case that 1 RB is specified for each carrier of the intra-band CA is an extreme scenario that doesn't occur in operators’ networks.**Proposal 1:** Do not consider only the MSD requirements resulting from intra-band contiguous UL CA configured with 1RB+1RB allocations, and cross-band MSD requirements resulting from intra-band contiguous UL CA configured with fully allocated maximum aggregated BW should be introduced.**Proposal 2:** Discuss the above test configuration first before the MSD value discussion. |
| [**R4-2409319**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409319.zip) | Discussion on MSD test point trade-off for intra-band UL CA | Huawei, HiSilicon | **Proposal 1:** from RF and scheduling perspective, it’s encouraged for RAN4 to further discuss how to specify MSD test configuration due to IMD from intra-band UL CA. **Proposal 2:** If RAN4 need to specify some requirements to guarantee the IIP2/ IIP3/ IIP4 of PA performance, maybe RAN4 can further discuss the other methodology instead of leveraging REFSENS degradation. |
| [R4-2408357](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408357.zip) | On MSD requirements with intra-band contiguous UL CA | ZTE Corporation, Sanechips | **Proposal 1:** No change from TR 38.862 guidelines unless there are updates for the existing guidelines in the WF. **Proposal 2:** MSD in the spec should be defined for practical scenarios, we slight prefer not to consider the MSD for intra-band contiguous UL CA configured with non-contiguous allocations.**Proposal 3:** Rel-19 seems to be more safe way to remove all the MSD for intra-band contiguous UL CA configured with non-contiguous allocations.**Proposal 4:** Technical speaking, there is a need to define the cross-band MSD requirements resulting from intra-band contiguous UL CA configured with fully allocated maximum aggregated BW.- Only to define new cross band isolation MSD for ACLR1/ACLR2 interference source- To reuse cross band isolation MSD of single carrier for >ACLR2 interference source |
| [**R4-2408853**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408853.zip) | MSD requirements with intra-band contiguous CA | Qualcomm France | Proposal 1: Keep current practices in MSD test points for Intra-band contiguous UL CAProposal 3: Option 2 (moderator: no need to introduce cross-band MSD requirements resulting from intra-band contiguous UL CA configured with fully allocated maximum aggregated BW) |
| **[R4-2409316](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409316.zip)** | Discussion on MSD for CA\_n40A-n41C with intra-band UL CA\_n41C | Huawei, HiSilicon | **Proposal 1:** As RAN4 has specified the MSD due to cross band isolation from ACLR2 for the fallback CA\_n40A-n41A, RAN4 can consider the similar method to specify the he MSD due to cross band isolation from ACLR1 for CA\_n40A-n41C with UL intra-band CA\_n41C instead of 1RB+1RB allocations. |

## Open issues summary

### Sub-topic 2-1 Need for specifying MSD for intra-band ULCA

**Issue 2-1:**

* Proposals: **Apple**:
	+ **Proposal 1:** For NR FDD band intra-band contiguous UL CA, REFSENS requirement does not need to be specified.
	+ **Proposal 2:** Remove NR FDD band intra-band contiguous UL CA REFSENS requirements from the earliest release of the specifications (Rel-16).
	+ Note from moderator: the related requirements have been discussed, and WF approved on how to specify these cases (RB allocation) in recent meetings. A few cases have already been specified.
* Recommended WF
* Discuss whether guidelines should be changed in R18
* Discuss proposal and depending on agreement, agree, revise, postpone, not pursue related part of the Apple CRs: R4-2407082, R4-2407083, R4-2407084, R4-2407085, R4-2407086, R4-2407087
	+ Check impact on on-going CRs, TPs
	+ If not agreeable the discussion may be continued in R19.

### Sub-topic 2-2 Need for specifying MSD, applicable test points for inter-band BC with intra-band ULCA in one band.

**Issue 2-2:**

* Proposals 1: No need to specify MSD **Apple**:
	+ **Proposal 1:** There is no need to introduce cross-band MSD requirements resulting from intra-band contiguous UL CA configured with fully allocated maximum aggregated BW if the cross-band MSD requirement has been specified with single carrier UL aggressor at maximum channel BW.
	+ **Proposal 2:** Remove the MSD requirements for both inter-band CA/EN-DC with cross-band DL interference and triple-beat issue from the earliest release of specifications (Rel-17) to avoid the unnecessary RAN4 workload in future and reduce the already heavily loaded UE test burden.
* Proposals 2: Proposing fully allocated CCs **CMCC**
	+ **Proposal 1**: Do not consider only the MSD requirements resulting from intra-band contiguous UL CA configured with 1RB+1RB allocations, and cross-band MSD requirements resulting from intra-band contiguous UL CA configured with fully allocated maximum aggregated BW should be introduced.
	+ **Proposal 2**: Discuss the above test configuration first before the MSD value discussion.
* Proposals 3: Find ways to avoid REFSENS related requirement **Huawei**
	+ **Proposal 1:** from RF and scheduling perspective, it’s encouraged for RAN4 to further discuss how to specify MSD test configuration due to IMD from intra-band UL CA.
	+ **Proposal 2:** If RAN4 need to specify some requirements to guarantee the IIP2/ IIP3/ IIP4 of PA performance, maybe RAN4 can further discuss the other methodology instead of leveraging REFSENS degradation.
	+ **additional input on CA\_n40-n41C: Proposal 1:** As RAN4 has specified the MSD due to cross band isolation from ACLR2 for the fallback CA\_n40A-n41A, RAN4 can consider the similar method to specify the he MSD due to cross band isolation from ACLR1 for CA\_n40A-n41C with UL intra-band CA\_n41C instead of 1RB+1RB allocations.
* Proposals 4: NO change to TDD guidelines, Keep 1RB+1RB for case with TDD intra-band **Qualcomm, Skyworks. Skyworks:** additional input on FDD and others
	+ **QCOM Proposal 1:** Keep current practices in MSD test points for Intra-band contiguous UL CA
	+ **QCOM Proposal 3:** Option 2 (moderator: no need to introduce cross-band MSD requirementsresulting from intra-band contiguous UL CA configured with fully allocated maximum aggregated BW)
	+ **SKW Proposal 1:** If RB allocation (1RB+1RB) is re-considered for intra-band ULCA within an inter-band DL CA, it should be for intra-band TDD ULCA only.
	+ **SKW Proposal for TDD:** MPR0 is not used for MSD evaluation of TDD intra-band contiguous and non-contiguous ULCA due to IMD or triple beat. IMD order with up to IMD7 is analyzed but IMD9 may require expert attention especially in the NS\_04 case.
	+ **SKW Proposal for FDD:** According to current guidelines MPR0 is used for MSD evaluation of FDD intra-band ULCA due to IMD or triple beat. IMD order with up to IMD13 is analyzed, but IMD15/17 may require expert attention.
	+ **SKW Proposal for band coexistence with intra-band ULCA:** MPR is allowed to meet general emission and only IMD3 need evaluation whether -50dBm/MHz can be achieved. With this approach, band coexistence can be made independent of from the intra-band ULCA band and inter-band power class.
	+ **SKW Proposal for TDD RB allocation for ULCA IMD MSD test point:**

• The 1RB+1RB allocation is retained as per current guidelines and assuming MPR is applied, is consistent with the IMD orders that are requested for analysis.

• This approach results in the MSD being independent from the TDD intra-band ULCA band and inter-band power class

• This is valid for Release 18 and the start of Release 19.

• If other approaches are to be evaluated for Release 19, this should be part of a specific WI as it will require extensive studies including measurements and simulations that is not compatible with block approval and will result in re-evaluating all currently specified intra-band ULCA related IMD and triple beat cases.

* Proposals 5: **ZTE** proposing no change to guidelines, looking for better scenario on allocation (fully allocated) for R19
	+ **Proposal 1:** No change from TR 38.862 guidelines unless there are updates for the existing guidelines in the WF.
	+ **Proposal 2:** MSD in the spec should be defined for practical scenarios, we slight prefer not to consider the MSD for intra-band contiguous UL CA configured with non-contiguous allocations.
	+ **Proposal 3:** Rel-19 seems to be more safe way to remove all the MSD for intra-band contiguous UL CA configured with non-contiguous allocations.
	+ **Proposal 4:** Technical speaking, there is a need to define the cross-band MSD requirements resulting from intra-band contiguous UL CA configured with fully allocated maximum aggregated BW.
		- - Only to define new cross band isolation MSD for ACLR1/ACLR2 interference source
		- - To reuse cross band isolation MSD of single carrier for >ACLR2 interference source
* Note from moderator: Beyond the TDD intra-band ULCA case which has agreed guidelines since R17 using 1RB+1RB with MPR, there is RAN4 agreement to use no MPR and total allocation = REFSENS UL config at same BW for FDD cases. Also agreed templates in R4#110b are based on these guidelines.
* Recommended WF
* Discuss whether guidelines should be changed in R18
* Discuss new proposals for allocations for MSD or no MSD at all and associated timeline: R18 or R19
	+ Depending on agreement, agree, revise, postpone, not pursue related part of the Apple CRs: R4-2407082, R4-2407083, R4-2407084, R4-2407085, R4-2407086, R4-2407087
	+ Check impact on on-going CRs, TPs and related MSDs proposed in Topic 1:
	+ If not agreement the discussion may be continued in R19.

# AI 6.1 Topic 3: Band combination with close proximity issues

## Companies’ contributions summary

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2408849**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408849.zip) | Considerations on CA\_n3A-n39A | Qualcomm France | **Proposal 1**: Use the following analysis results as part of considering MSD for CA\_n3A-n39A

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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)** |
| n3 | n39 | 1770 | 30 | 15 | 50 (RBstart=110) | 1877.5 | 5 | 2.7 | >ACLR2 |

**Proposal 2**: Assume Fdl\_low and Fdl\_high for UE supporting CA\_n3-n39 should be according to n3 Fdl\_low and n39 Fdl\_high |
| [**R4-2409311**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409311.zip) | Discussion and TP for TR 38.718-02-01 to introduce CA\_n3A-n39A | Huawei, HiSilicon | Thus, the following MSD test configuration can be considered.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| UL band | DL band | UL Fc | UL BW | SCS of UL band | UL RB Allocation | DL Fc | DL BW | MSD | Cross-bandInterferencesource |
| (MHz) | (MHz) | (kHz) | LCRB | (MHz) | (MHz) | (dB) |
| n3 | n39 | 1770 | 30 | 15 | 160 (RBstart=0) | 1882.5 | 5 | 1.5 dB | >ACLR2 |

 |

## Open issues summary

### Sub-topic 3-1 CA\_n3-n39 MSD

**Issue 3-1:**

* Proposals 1: **Qualcomm**
* Use the following analysis results as part of considering MSD for CA\_n3A-n39A

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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)** |
| n3 | n39 | 1770 | 30 | 15 | 50 (RBstart=110) | 1877.5 | 5 | 2.7 | >ACLR2 |

* Assume Fdl\_low and Fdl\_high for UE supporting CA\_n3-n39 should be according to n3 Fdl\_low and n39 Fdl\_high
* Proposals 2: **Huawei**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| UL band | DL band | UL Fc | UL BW | SCS of UL band | UL RB Allocation | DL Fc | DL BW | MSD | Cross-bandInterferencesource |
| (MHz) | (MHz) | (kHz) | LCRB | (MHz) | (MHz) | (dB) |
| n3 | n39 | 1770 | 30 | 15 | 160 (RBstart=0) | 1882.5 | 5 | 1.5 dB | >ACLR2 |

* Recommended WF: Discuss test point
* Discuss UL configuration (Note from moderator, usually this is UL REFSENS configuration at test point CBW)
* Discuss MSD value based on aligned UL configuration
* Check id proposal 2 from Qualcomm should be added as a note
* I agreement need to ask for a CR as this is the last meeting for R18 band combination otherwise postpone to R19.

# AI 6.1 Topic 4: Harmonic mixing

## Companies’ contributions summary

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2407577**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407577.zip) | UL(n)/DL3 Harmonic Mixing Considerations | Murata Manufacturing Co Ltd. | **Observation 1**: Harmonic mixing MSD for higher orders > 5 should only be considered when there is sufficient margin to pass the OOB blocking exception level and as well as to pass the general spurious at the emission limit aggressor frequency.**Observation 2**: At least 55dB of RX selectivity is required to pass the OOB blocking exception level with sufficient margin.**Observation 3**:* CA\_n28-n40 UL1/DL3. The MSD is 37.8dB, but the RX selectivity is at least 10dB lower than other comparable low band combinations because the aggressor level is fixed at the fundamental TX power level. Increasing the RX selectivity brings the MSD value within the acceptable range of peers.
* CA\_n46-n48, CA\_n46-n77/n78 UL2/DL3. The MSD is ~22dB, but the RX selectivity is at a value with 0dB margin for OOB to pass the exception level AND there is also no margin to the spurious response limit.
* CA\_n39-n41 UL4/DL3. For the given 8.1dB MSD, the spurious emission is ~4dB below the limit which is unusual for UL4 (-19dBc harmonic level at the PA output). More spurious margin is available if less RX selectivity is assumed, but that would mean less margin to pass the OOB blocking exception level.

**Proposal 1:** Harmonic mixing MSD analysis for orders > 5 is justified if the victim band passes the minimum RX selectivity criteria and the general spurious emission limit for the UL harmonic aggressor is met with sufficient margin. |
| [**R4-2407579**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407579.zip) | CA\_n25-n41 UL n25 harmonic mixing PC3 and PC2 | Murata Manufacturing Co Ltd. | **Proposal 1:** Use CA\_n25-n41 harmonic mixing MSD for PC3, 1TX PC2, and 2TX PC2 as shown in Table 2-2, 2-3, and 2-4.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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)** |
| n25 | n41 | 5 | 15 | 25 (RBstart=0) | 5 | [2.5] | NOTE 11 | UL4/DL3 |

**Table 2-2**: CA\_n25-n41 power class 3 UL4/DL3 Rx harmonic mixing test points

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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)** |
| n25 | n41 | 5 | 15 | 25 (RBstart=0) | 5 | [3.7] | NOTE 11 | UL4/DL3 |

**Table 2-3**: CA\_n25-n41 1TX power class 2 UL4/DL3 Rx harmonic mixing test points

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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)** |
| n25 | n41 | 5 | 15 | 25 (RBstart=0) | 5 | [5.3] | NOTE 11 | UL4/DL3 |

**Table 2-4**: CA\_n25-n41 2TX power class 2 UL4/DL3 Rx harmonic mixing test points |

## Open issues summary

### Sub-topic 4-1 Additional criteria for harmonic mixing

**Issue 4-1:**

* Proposals 1: Harmonic mixing MSD analysis for orders > 5 is justified if the victim band passes the minimum RX selectivity criteria and the general spurious emission limit for the UL harmonic aggressor is met with sufficient margin.
* Recommended WF: Experts discuss whether this proposal should be part of guidelines or note on the harmonic mixing template for orders >5 (Moderator: > 5 means DL+UL order >5)

### Sub-topic 4-2 CA\_n25-n41 UL n25 Harmonic mixing MSD for PC3 and PC2

**Issue 4-2a: PC3 MSD**

* Proposals 1:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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)** |
| n25 | n41 | 5 | 15 | 25 (RBstart=0) | 5 | [2.5] | NOTE 11 | UL4/DL3 |

* Recommended WF: Experts discuss this MSD proposal together with previous inputs if any

**Issue 4-2b: PC2 1Tx MSD**

Moderator: this may have to be coordinated with thread [113]

* Proposals 1:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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)** |
| n25 | n41 | 5 | 15 | 25 (RBstart=0) | 5 | [3.7] | NOTE 11 | UL4/DL3 |

* Recommended WF: Experts discuss this MSD proposal together with previous inputs if any

**Issue 4-2c: PC2 2Tx MSD**

Moderator: this may have to be coordinated with thread [113]

* Proposals 1:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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)** |
| n25 | n41 | 5 | 15 | 25 (RBstart=0) | 5 | [5.3] | NOTE 11 | UL4/DL3 |

* Recommended WF: Experts discuss this MSD proposal together with previous inputs if any

# AI 6.1 Topic 5: CR requiring attention from experts

## Companies’ contributions summary

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2408039**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408039.zip) | CR for TS 38.307: Updates for new type of NE-DC configurations in Rel.18 | CHTTL | The following new intra-band NE-DC contiguous proposed in Rel.18 baskets will have impact on 38.307 specification if introduced to the 38.101-3 due to the increased number of E-UTRA CCs.- DC\_40(n)AC- DC\_40(n)ADNote that this approach is aligned with the guideline:When a new release independent feature is introduced, only the latest release of release independent specification shall be updated. The latest release of release independent specification refers to "release N", i.e. the release in which a feature is introduced into TS 38.101 or TS 38.133. Update Table 8.2.2-1 NE-DC contiguous intra-band configurations within FR1 to aligned with the new configurations mentioned above.Note that since the above two configurations are on-going before the meeting, the changes are proposed in a square bracket as this is the last meeting for this WI. And it is suggested that if the above two configurations are going to approved in this meeting, the CR can be revised by removing the square bracket can be removed.Moderator: CR is reviewed directly in the CR review section offline before the Adhoc. A special thread will be created. |
| [**R4-2408187**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408187.zip) | CR for TS 38.846: Corrections on UL triple beat analysis table | CHTTL, Samsung | Some errors and misalignments are found in the uplink triple beat IMD products table.Currently the first row for the 1st order TB in Table 6.5.3-1:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1st order TB | IfU3L -fU1L- fSCCL| | IfU2L -fU1L + fSCCL| | IfU2L -fU1L- fSCCH| | IfU3L -fU1L + fSCCH| |

However, if these equation are mapped to the TB1, TB2 in the WF R4-2220556.- TB1 = |f1+f2-f3|- TB2 = |f1-f2+f3| (f1 is the fSCC, and assume f2 > f3)Then table above will become:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1st order TB | minimum TB2 | minimum TB1 | maximum TB2 | maximum TB1 |

It should be corrected to the following table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1st order TB | minimum TB2 | maximum TB2 | minimum TB1 | maximum TB1 |

So the middle two cells need to be swapped, so that the impacted range can displayed correctly.And some errors are found.Moderator: CR is reviewed directly in the CR review section offline before the Adhoc. A special thread will be created. |
| [**R4-2408503**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408503.zip) | CR to TS 38.101-3 Rel18 Removal of Unnecessary NE-DC Requirements | Huawei, HiSilicon | Despite specification in 4.2 which indicates that NE-DC requirements are similar to EN-DC (unless specified otherwise) some unnecessary requirements have been specified. With this CR we plan to remove them and replace some of them with general statements. Some editorial corrections are performed, too.NOTE: This CR is not for block approvalModerator: CR is reviewed directly in the CR review section offline before the Adhoc. A special thread will be created. |
| [**R4-2408477**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408477.zip) | (DC\_R17\_1BLTE\_1BNR\_2DL2UL-Core) CR to TS 38.101-3 Rel17 Removal of Unnecessary NE-DC Requirements | Huawei, HiSilicon | Despite specification in 4.2 which indicates that NE-DC requirements are similar to EN-DC (unless specified otherwise) some unnecessary requirements have been specified. With this CR we plan to remove them and replace some of them with general statements. Some editorial corrections are performed, too.NOTE: This CR is not for block approval Moderator: CR is reviewed directly in the CR review section offline before the Adhoc. A special thread will be created. |
| [**R4-2408490**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408490.zip) |  DC\_R16\_1BLTE\_1BNR\_2DL2UL) CR to TS 38.101-3 Rel16 Removal of Unnecessary NE-DC Requirements | Huawei, HiSilicon | Harmonize the NE-DC requirements in section 4.2 Rel16, as it is the case for Rel17 and 18. Remove the unnecessary NE-DC requirements. Some editorial corrections are performed, too. NOTE: This CR is not for block approvalModerator: CR is reviewed directly in the CR review section offline before the Adhoc. A special thread will be created. |
| [**R4-2409467**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409467.zip) | Draft CR for TS 38101-3 to clarify 1 UL configuration for NR Inter-band CA configurations between FR1 and FR2 | Huawei, Hisilicon | This formal CR is the same with the endorsed draft CR R4-2405300. Its purpose is to clearly specify the single UL configurations in the current specification TS38.101-3.Moderator: CR is reviewed directly in the CR review section offline before the Adhoc. A special thread will be created. Already endorsed in R4#110b |
| [**R4-2409468**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409468.zip) | (NR\_CADC\_R18\_yBDL\_xBUL) CR for TS 38101-2 to clarify 1 UL configuration for CA | Huawei, Hisilicon | This formal CR is the same with the endorsed draft CR R4-2405301 in the RAN4#110bis meeting.Its purpose is to clearly specify the single UL configurations for NR CA in the current specification TS38.101-2.Moderator: CR is reviewed directly in the CR review section offline before the Adhoc. A special thread will be created. Already endorsed in R4#110b |
| [**R4-2409469**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409469.zip) | (NR\_CADC\_R18\_yBDL\_xBUL) CR for TS 38101-1 to clarify 1 UL configuration for NR CA | Huawei, Hisilicon, Skyworks Solutions Inc. | This formal CR is the same with the endorsed draft CR R4-2403714. Its purpose is to clearly specify the single UL configurations for NR CA in the current specification TS38.101-1.Moderator: CR is reviewed directly in the CR review section offline before the Adhoc. A special thread will be created. Already endorsed in R4#110b |

## Open issues summary

Moderator: unless otherwise needed, the draft CRs will not be discussed in details in the Ad-hoc. Companies are

### Sub-topic 5-1 Draft CR review

Recommended WF: The CR should be reviewed offline to preserve ad-hoc time. A separate email thread will be used with below table to review offline and check during Ad-hoc.

|  |  |
| --- | --- |
| **T-doc**  | **Company/Review comment** |
| [**R4-2408039**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408039.zip)CR for TS 38.307: Updates for new type of NE-DC configurations in Rel.18 | Company A |
|  |
|  |
| [**R4-2408187**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408187.zip)CR for TS 38.846: Corrections on UL triple beat analysis table | Company A |
|  |
|  |
| [**R4-2408503**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408503.zip)CR to TS 38.101-3 Rel18 Removal of Unnecessary NE-DC Requirements | Company A |
|  |
|  |
| [**R4-2409467**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409467.zip)Draft CR for TS 38101-3 to clarify 1 UL configuration for NR Inter-band CA configurations between FR1 and FR2 | Company A |
|  |
|  |
| [**R4-2409468**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409468.zip) (NR\_CADC\_R18\_yBDL\_xBUL) CR for TS 38101-2 to clarify 1 UL configuration for CA | Company A |
|  |
|  |
| [**R4-2409469**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409469.zip) (NR\_CADC\_R18\_yBDL\_xBUL) CR for TS 38101-2 to clarify 1 UL configuration for CA | Company A |
|  |
|  |
| [**R4-2408477**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408477.zip) (DC\_R17\_1BLTE\_1BNR\_2DL2UL-Core) CR to TS 38.101-3 Rel17 Removal of Unnecessary NE-DC Requirements | Company A |
|  |
|  |
| [**R4-2408490**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408490.zip)DC\_R16\_1BLTE\_1BNR\_2DL2UL) CR to TS 38.101-3 Rel16 Removal of Unnecessary NE-DC Requirements | Company A |
|  |
|  |

# AI 6.1 Topic 6: Place holder: contributions transferred from block approval.

## Companies’ contributions summary

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
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## Open issues summary

### Sub-topic 6-1

**Issue 6-1:**

* Proposals
	+ Xxxxx
* Recommended WF: XXXX
	+ Xxxxx

Offline discussion comments

|  |  |
| --- | --- |
| **Company/Delegate** | **Comment** |
| XXX/YYY |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# AI 12.3 Topic #1: Templates and guidelines

## Companies’ contributions summary

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| **[R4-2408359](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408359.zip)** | Improved R19 TR templates for PC3 xUL/2DL inter-band NR CA/DC | ZTE Corporation, Sanechips | **Proposal: To approve the** **improved MSD table templates in Table 2.1, Table 2.2, Table 2.3 and Table 2.4 for R19 PC3 TR for 2 bands DL with x bands UL (x=1,2) inter-band NR CA/DC TR.****Proposal 2: To include the band group range table in the Annex part in the TR.**

|  |
| --- |
| FR1 band group range |
| Name | **FR1-a** | **FR1-b** | **FR1-c** | **FR1-d** | **FR1-e** |
| Range (MHz) | 600-1000 | 1400-2200 | 2300-2700 | 3300-5000 | 5150-7125 |
| Duplex mode | Mostly FDD | Mostly FDD | FDD and TDD | TDD only | TDD only |

**Proposal 3: Keep delta T/R part in the TR.****Proposal 4: To endorse the proposed R19 TR template in the section 5.****Moderator: some editorial changes to the R4#110b approved templates, changes may be merged with Skyworks, Nokia Templates for 2 bands and 3 bands** |
| **[R4-2407231](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407231.zip)** | Template for 2 band DL 1or2 band UL inter-band combination TR and TP | Skyworks Solutions Inc., Nokia | Proposed enhancements for 2DL/1or2UL bands block approval TP template for Release 19:• Addition at the end of section “5.XX.1.2 Channel bandwidths per operating band for CA” of:o A question related to the support of SimRx/Tx, or otherwise for TDD/TDD cases.o A table that sorts the applicable UL configuration and their related MSD studies• For the 2DL/1UL section:o The addition of a specific section for “Co-existence studies for 1UL band with 1CC” UL harmonic and harmonic mixing tables are updated in a matrix form with additional guidelines as approved in [2] A new calculation table for cross-band isolation MSD is added, as approved in [3]o The addition of a specific section for “Co-existence studies for 1UL band with 2CC intra-band” The IMD range table is updated and simplified as discussed in [4]• For this meeting, the delta T/R, REFSENS and OOB exception sections are not covered. However, these may be part of further guidelines/proposals on how to design MSD test points.• For the 2DL/2UL section:o Slightly updated 2DL 2UL with 1CC/band IMD table, with an analysis and note sectiono Added section “5.XX.2.2.1 Co-existence studies for 2UL band with 3CC (2CC intra-band in one band)”, with a calculation table that includes an analysis and note section, as discussed in [5]• The band group table used in [3] and [5], is added in Annex A (note that the last band group had an error as the starting frequency is 5150MHz and not 5250MHz).• The valid UL configurations up to Release 18 are listed in Annex B.**Moderator: some editorial changes to the R4#110b approved templates, changes may be merged with ZTE input** |
| [**R4-2407232**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407232.zip) | Template for 3 band DL 2 band UL inter-band combination TR and TP | Skyworks Solutions Inc., Nokia | Proposed enhancements for 3DL/2UL bands block approval TP template for Release 19:• Addition at the end of section “5.XX.1.2 Channel bandwidths per operating band for CA” of:o A table that sorts the applicable UL configuration and their related MSD studies• For this meeting, the delta T/R and REFSENS sections are not covered. However, these sections may be part of further guidelines/proposals on how to design MSD test points.• For the 2DL/2UL section:o Slightly updated 3DL 2UL with 1CC/band IMD table, including an analysis and note sectiono Added section “5.XX.2.2.1 Co-existence studies for 2UL band with 3CC (2CC intra-band in one band)”, with a calculation table that includes an analysis and note section, as discussed in [2]• The band group table used in [2], is added in Annex A (note that the highest band group had an error, as the starting frequency is 5150MHz and not 5250MHz).• The valid UL configurations up to Release 18 are listed in Annex B.**Moderator: 3DL band template based on the R4#110b approved templates, changes may be merged with ZTE input** |
| [**R4-2407394**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407394.zip) | On introducing a TP template for FDD intra-band CA with 1-2ULCC | Skyworks Solutions Inc. | Proposal on block approval template for FDD intra-band DLCA with 1 or 2 UL CC MSD:• Specification framework should mature further to enable a template that can be used in the block approval process.o For example, in terms of ACLR or IMD range to be considered, CBW to be used for PCC/SCC and related RB allocation placement.• The development of such template for block approval is however recommended to pursue in Release 19 with the following goals:o Detect potential MSD issues to PCC/SCC for FDD intra-band ULCA with one or two UL CCs. Both contiguous and non-contiguous DLCA are in scope.o The proponent can design the MSD test point to be evaluated based on restricted guidelines on PCC/SCC CBW and RB allocation placement.o The evaluation of the MSD value can then be proposed or evaluated within the “Not for block approval” AI by experts.• It is not proposed that A-MPR issues resulting from intra-band ULCA are treated by block approval and it should be noted that this applies to both FDD and TDD. |
| [**R4-2407443**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407443.zip) | MSD test point guidelines for 2 and 3 band DL TP | Skyworks Solutions Inc. | Proposal for two band DL TP templates to be developed in Release 19:• MSD test point templates are added in the relevant REFSENS sections for one UL band and two UL band of the two band DL TPs based on the specification format. This will cover:o UL harmonic, harmonic mixing and cross-band MSB table templates for 1UL band with one CCo Related IMD MSD table template for 1UL band with two CCo Related IMD MSD table template for 2UL band with one CC/bando Related IMD MSD table template for 2UL band with three CC• MSD test point templates are added in the REFSENS section for two UL band of the three band DL TPs based on the specification format. This will cover third band MSD for:o Related IMD MSD table template for 2UL band with one CC/bando Related IMD MSD table template for 2UL band with three CC• These tables will be followed by notes for the MSD test point design covering:o UL and DL CBWo UL LCRBo UL and DL channel location o UL RBstarto Those notes will not be needed in the submitted TP, but will allow that consistent MSD test points are proposed. |
| [**R4-2409318**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409318.zip) | Discussion on TR template for band combination basket WI | Huawei, HiSilicon | ***Proposal 1: To include RF reference architecture, assumptions for RF components and MSD analysis procedure into Rel-19 basket TR report.******Proposal 2: To introduce the following notes for distinguishing mandatory/non-mandatory cases in order to avoid specifying unnecessary cases.***Table 1: UL/DL harmonics collision table

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **UL/DLharmonics** | **nX** | **UL13** | **UL2** | **UL32** | **UL4** | **UL5** | **MSD type** |
| **fLow** | fULlow | 2\*fULlow | 3\*fULlow | 4\*fULlow | 5\*fULlow |
| **nY** | **fLow** | **fHigh** | fULhigh | 2\*fULhigh | 3\*fULhigh | 4\*fULhigh | 5\*fULhigh |
| **DL1** | fDLlow | fDLhigh | N/A |  |  |  |  | **UL harmonic** |
| **DL22** | 2\*fDLlow | 2\*fDLhigh |  | N/A |  | N/A | N/A | **Harmonic mixing** |
| **DL33** | 3\*fDLlow | 3\*fDLhigh |  |  | N/A |  | N/A |
| **DL4** | 4\*fDLlow | 4\*fDLhigh |  | N/A | N/A | N/A | N/A |
| **DL53** | 5\*fDLlow | 5\*fDLhigh |  |  | N/A | N/A | N/A |
| **Analysis** | text |
| **UL/DLharmonics** | **nY** | **UL13** | **UL2** | **UL32** | **UL4** | **UL5** | **MSD type** |
| **fLow** | fULlow | 2\*fULlow | 3\*fULlow | 4\*fULlow | 5\*fULlow |
| **nX** | **fLow** | **fHigh** | fULhigh | 2\*fULhigh | 3\*fULhigh | 4\*fULhigh | 5\*fULhigh |
| **DL1** | fDLlow | fDLhigh | N/A |  |  |  |  | **UL harmonic** |
| **DL22** | 2\*fDLlow | 2\*fDLhigh |  | N/A |  | N/A | N/A | **Harmonic mixing** |
| **DL33** | 3\*fDLlow | 3\*fDLhigh |  |  | N/A |  | N/A |
| **DL4** | 4\*fDLlow | 4\*fDLhigh |  | N/A | N/A | N/A | N/A |
| **DL53** | 5\*fDLlow | 5\*fDLhigh |  |  | N/A | N/A | N/A |
| **Analysis** | text |
| Note 1: When a collision is detected with an overlap >0Hz between the UL(X) with DL(Y) frequency ranges, the UL(X)/DL(Y) cell is marked “D” for direct hit. When the gap between UL(X) and DL(Y) frequency range is from 0Hz to X\*MinULCBW, the UL(X)/DL(Y) cell is marked “N” for Near miss.Note 2: UL3/DL2 harmonic mixing direct hit case for PC3/5 only apply for DL>3GHzNote 3: For harmonic mixing, near-miss cases only apply for UL1 and odd DL orders.Note 4: For Red parts, it is mandatory to specify MSD test configuration based on the previous practice in RAN4. For Yellow parts, whether to specify MSD test configuration depends on technical analysis and conditions, e.g. UL Power Class, components performance and frequency range. |

Table 3: Cross-band isolation analysis of CA\_nXA-nYA with nX and nY UL

|  |  |  |
| --- | --- | --- |
| **Bands3** | **nX** | **nY** |
| **Frequency limit** | **fx\_low / min** | **fx\_high / max** | **fy\_low / min** | **fy\_high / max** |
| **fUL (MHz)** |  |  |  |  |
| **fDL (MHz)** |  |  |  |  |
| **CBW (MHz)2** |  |  |  |  |
| **ACLR1 range** | fxULlow-maxULCBWx | fxULhigh+maxULCBWx | fyULlow-maxULCBWy | fyULhigh+maxULCBWy |
| **ACLR1 (MHz)** |  |  |  |  |
| **ACLR2 range** | fxULlow-2\*maxULCBWx | fxULhigh+2\*maxULCBWx | fyULlow-2\*maxULCBWy | fyULhigh+2\*maxULCBWy |
| **ACLR2 (MHz)** |  |  |  |  |
| **ACLR3 range** | fxULlow-3\*maxULCBWx | fxULhigh+3\*maxULCBWx | fyULlow-3\*maxULCBWy | fyULhigh+3\*maxULCBWy |
| **ACLR3 (MHz)** |  |  |  |  |
| **ACLR4 range** | fxULlow-4\*maxULCBWx | fxULhigh+4\*maxULCBWx | fyULlow-4\*maxULCBWy | fyULhigh+4\*maxULCBWy |
| **ACLR4 (MHz)** |  |  |  |  |
| **ACLR5 range1** | fxULlow-5\*maxULCBWx | fxULhigh+5\*maxULCBWx | fyULlow-5\*maxULCBWy | fyULhigh+5\*maxULCBWy |
| **ACLR5 (MHz)** |  |  |  |  |
| **Analysis** |  |  |
| NOTE 1: For Red parts, it is mandatory to specify MSD test configuration based on the previous practice in RAN4. For Yellow parts, whether to specify MSD test configuration depends on technical analysis and conditions, e.g. UL Power Class, filter performance and PA linearity performance. |

***Proposal 3: To consider the following template.*****Moderator: some recommendation changes to the R4#110b approved templates, changes may be merged with Skyworks, Nokia , ZTE Templates for 2 bands and 3 bands** |

## Open issues summary

### Sub-topic 7-1 Template for FDD intra-band DL CA with 1 or 2 UL CCs

**Issue 7-1:**

* Proposals: Proposal on block approval template for FDD intra-band DLCA with 1 or 2 UL CC MSD:

• Specification framework should mature further to enable a template that can be used in the block approval process.

o For example, in terms of ACLR or IMD range to be considered, CBW to be used for PCC/SCC and related RB allocation placement.

• The development of such template for block approval is however recommended to pursue in Release 19 with the following goals:

o Detect potential MSD issues to PCC/SCC for FDD intra-band ULCA with one or two UL CCs. Both contiguous and non-contiguous DLCA are in scope.

o The proponent can design the MSD test point to be evaluated based on restricted guidelines on PCC/SCC CBW and RB allocation placement.

o The evaluation of the MSD value can then be proposed or evaluated within the “Not for block approval” AI by experts.

* Recommended WF: Companies discuss whether intra-band FDD combination could be subject to block approval at least up to test point proposal and then MSD values may be discussed in not for block approval AI to get experts inputs.
	+ Discuss if template should be developed in R19
	+ Discussion is done offline and companies can provide their input in table below

Offline discussion comments

|  |  |
| --- | --- |
| **Company/Delegate** | **Comment** |
| XXX/YYY |  |
|  |  |
|  |  |
|  |  |
|  |  |

### Sub-topic 7-2 Template for 2DL band inter-band DL CA with 1 or 2 UL bands and up to 3CCs

**Issue7-2:**

* Proposals:

• **Skyworks Solutions Inc., Nokia.** Proposes in R4-2407231 a slightly updated (editorial only) TP template based on per MSD type templates approved in R4#110b

• **ZTE Corporation, Sanechips** proposes in R4-2408359 some editorial improvements to the per MSD type templates approved in R4#110b

• **Huawei, HiSilicon,** proposes in R4-2409318 some improvement to the per MSD type templates approved in R4#110b by adding mandatory/optional on harmonic and cross band related MSD orders

* Recommended WF:
* Inputs are very similar and does not revisit the technical aspects so it should be feasible to merge inputs after discussion,
* agreement can be captured captured in a revision of the overall template for 2 band DL from Skyworks, Nokia and co-signing as wished.
* Alternatively some agreements can be captured in a way forward
* Companies discuss the notion of MSD orders mandatory/optional to specify versus MSD orders to be considered (means needs to be analyzed and if necessary specified)
* Discussion is done offline and companies can provide their input in table below

Offline discussion comments

|  |  |
| --- | --- |
| **Company/Delegate** | **Comment** |
| XXX/YYY |  |
|  |  |
|  |  |
|  |  |
|  |  |

### Sub-topic 7-3 Template for 3DL band inter-band DL CA with 2 UL bands and up to 3CCs

**Issue7-3:**

* Proposals:

• **Skyworks Solutions Inc., Nokia.** Proposes in R4-2407232 a 3 band TP template based on relevant 2 band per MSD type templates approved in R4#110b

• Some proposals from **ZTE Corporation, Sanechips** **may be relevant for 3 band DL**

* Recommended WF:
* After discussion, agreement can be captured in a revision of the overall template for 3 band DL from Skyworks, Nokia and co-signing as wished.
* Alternatively some agreements can be captured in a way forward
* Discussion is done offline and companies can provide their input in table below

Offline discussion comments

|  |  |
| --- | --- |
| **Company/Delegate** | **Comment** |
| XXX/YYY |  |
|  |  |
|  |  |
|  |  |
|  |  |

### Sub-topic 7-4 Addition of guidelines on MSD test points for 2 and 3 DL band TPs.

**Issue 7-4:**

* Proposals: Proposal for two band DL TP templates to be developed in Release 19:

• MSD test point templates are added in the relevant REFSENS sections for one UL band and two UL band of the two band DL TPs based on the specification format. This will cover:

o UL harmonic, harmonic mixing and cross-band MSB table templates for 1UL band with one CC

o Related IMD MSD table template for 1UL band with two CC

o Related IMD MSD table template for 2UL band with one CC/band

o Related IMD MSD table template for 2UL band with three CC

• MSD test point templates are added in the REFSENS section for two UL band of the three band DL TPs based on the specification format. This will cover third band MSD for:

o Related IMD MSD table template for 2UL band with one CC/band

o Related IMD MSD table template for 2UL band with three CC

• These tables will be followed by notes for the MSD test point design covering:

o UL and DL CBW

o UL LCRB

o UL and DL channel location

o UL RBstart

o Those notes will not be needed in the submitted TP, but will allow that consistent MSD test points are proposed.

.

* Recommended WF: Companies discuss whether MSD guidelines and templates should be added to 2 and 3 DL band TPs.
	+ Discuss if template should be developed in R19
	+ Discussion is done offline and companies can provide their input in table below

Offline discussion comments

|  |  |
| --- | --- |
| **Company/Delegate** | **Comment** |
| XXX/YYY |  |
|  |  |
|  |  |
|  |  |
|  |  |

# Topic #2: work plan and baskets

## Companies’ contributions summary

Moderator: the detailled work plan for R19 can only be decided in next RAN plenary. The below documents are thus for discussion on whether RAN4 may have recommendations on the work plan. It is poroposed to discuss these offline between interested companies in a specific thread and check with Chiarman on how to capture potential RAN4 recommendations.

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **Title** | **Company** | **Proposals / Observations** |
| [**R4-2407545**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407545.zip) | Further discussion on RAN4 basket WI work plan | CATT | **Proposal 1: RAN4 to separate work items (WIs) that require non-block approval and those necessitating block approval. For instance,** **establish a dedicated low-low band combination, which falls under the non-block approval process.****Proposal 2: RAN4 to arrange a preliminary preparation teleconference just before RAN#104, specifically focused on the spectrum-related work items for Rel-19.** |
| [**R4-2407707**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407707.zip) | Proposal for FDD+FDD Inter-band PC2 | T-Mobile USA | Proposal: Include FDD+FDD PC2 inter-band UL CA for FDD in the Release-19 inter-band CA-DC WID. |
| [**R4-2408450**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408450.zip) | Rel-19 WID Intra-band | Ericsson | Moderator: propose a WI for intra-band DL/UL CA for LTE with up to 3CC UL but say NRCA. Scope should be better clarified: Intra-band CA for NR or LTE? Number of DL and UL CCs in each case. |
| [**R4-2408451**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408451.zip) | Rel-19 WID HPUE EN-DC | Ericsson | Moderator: propose a WI for HPUE\_FR1\_DC\_LTE\_NR\_R19 High power UE (power class m with 1<m<3) for a single FR1 band in UL of Dual Connectivity (DC) combinations of x bands (x=1,2,3, 4 for y=1 or x=1, 2 for y=2) LTE inter-band CA (xDL/1UL) and y bands NR inter-band CA (yDL/1UL)May need to clarify if intra-band ULCA is allowed as on of UL band UL configuration or not, also which BC and per band power class are covered |
| [**R4-2409191**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409191.zip) | On RAN4 basket WI work planning | Nokia | Proposal 1: The current LTE basket which contains all types of band combinations with only LTE bands should continue in Rel-19.Proposal 2: RAN4 shall consider the proposal for Rel-19 MR-DC baskets presented in Table 2.

|  |  |  |
| --- | --- | --- |
| **Current Rel-18 MR-DC Baskets:** | **New Rel-19 MR-DC Baskets:** | **TR?** |
| DC\_R18\_1BLTE\_1BNR\_2DL2UL | **DC\_1BLTE\_1BNR\_2DL2UL\_R19** | Yes |
| DC\_R18\_2BLTE\_1BNR\_3DL2ULDC\_R18\_xBLTE\_2BNR\_yDL2UL | **DC\_xBLTE\_yBNR\_3DL2UL\_R19**x + y = 3 | Yes |
| DC\_R18\_xBLTE\_1BNR\_yDL2ULDC\_R18\_xBLTE\_2BNR\_yDL2ULDC\_R18\_xBLTE\_yBNR\_zDL2ULDC\_R18\_xBLTE\_yBNR\_zDL3UL | **DC\_xBLTE\_yBNR\_zDLqUL\_R19**x + y > 33 ≤ z ≤ 62 ≤ q ≤ 3 (1BLTE\_1or2BNR) | No |

Proposal 3: RAN4 shall consider the NR CA/DC baskets as shown in Table 3.

|  |  |  |
| --- | --- | --- |
| **Current Rel-18 NR CA/DC Baskets:** | **New Rel-19 NR CA/DC Baskets:** | **TR?** |
| NR\_CA\_R18\_intra | **CA\_NR\_intra\_R19** | Yes |
| NR\_CADC\_R18\_2BDL\_xBUL | **CADC\_NR\_ 2BDL\_xBUL\_R19** | Yes |
| NR\_CADC\_R18\_3BDL\_xBUL | **CADC\_NR\_ 3BDL\_xBUL\_R19** | Yes |
| NR\_CADC\_R18\_yBDL\_xBUL | **CADC\_NR\_ yBDL\_xBUL\_R19**y > 3 | No |

Proposal 4: Rel-19 basket WIs should be power class agnostic.Proposal 5: RAN4 shall consider the HPUE baskets as shown in Table 4 as new and merge the remaining HPUE combinations into the other Rel-19 baskets.

|  |  |  |  |
| --- | --- | --- | --- |
| **Current Rel-18 HPUE Baskets:** | **New Rel-19 Baskets:** | **PC added to Rel-19 Basket(s)** | **PCs** |
| LTE\_NR\_HPUE\_FWVM\_REL18 | **HPUE\_FWVM\_LTE\_NR\_R19** |  | PC1 |
| HPUE\_NR\_FR1\_TDD\_R18 HPUE\_NR\_FR1\_FDD\_R18 | **HPUE\_FR1\_NR\_R19** |  | PC2 and PC1.5 |
| HPUE\_FR1\_TDD\_DC\_LTE\_NR\_R18 | No independent basket | **DC\_1BLTE\_1BNR\_2DL2UL\_R19****DC\_xBLTE\_yBNR\_3DL2UL\_R19****DC\_xBLTE\_yBNR\_zDLqUL\_R19** | PC2 and PC1.5 |
| HPUE\_NR\_FR1\_TDD\_intra\_CA\_R18 | No independent basket | **CA\_NR\_intra\_R19** | PC2 and PC1.5 |
| HPUE\_FR1\_TDD\_NR\_CADC\_SUL\_R18 HPUE\_FR1\_FDD\_NR\_CADC\_R18 | No independent basket | **CADC\_NR\_ 2BDL\_xBUL\_R19****CADC\_NR\_ 3BDL\_xBUL\_R19****CADC\_NR\_ yBDL\_xBUL\_R19** | PC2 and PC1.5 |

Table 4 – HPUE Basket Rel-19 proposal |
| [**R4-2409364**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409364.zip) | Rel-19 WID NR Inter-band CA/DC for y bands DL with x bands UL (y=4,5,6, x=1,2) | Ericsson | Moderator: propose a WI for Rel-19 NR Inter-band CADC for y bands DL with x bands UL (y=4,5,6, x=1,2). The new part is 6 bands DL? |

## Open issues summary

### Sub-topic 8-1 need for baskets or combination types ”not for block approval”

**Issue 8-1:**

* Proposals 1: **CATT**:
* establish a dedicated low-low band combination, which falls under the non-block approval process.
* RAN4 to arrange a preliminary preparation teleconference just before RAN#104, specifically focused on the spectrum-related work items for Rel-19.
* Recommended WF
* Discuss if some combination types (including LBLB) need a separate WI with a “not for block approval” process.
	+ LBLB
	+ Others…?
	+ Uses block approval instead?

### Sub-topic 8-2 power class agnostic baslkets

**Issue 8-1:**

* Proposals 1: **Nokia**: Rel-19 basket WIs should be power class agnostic.
* Proposals 2: **Ericsson**: WI for HPUE\_FR1\_DC\_LTE\_NR\_R19
* High power UE (power class m with 1<m<3) for a single FR1 band in UL of Dual Connectivity (DC) combinations of x bands (x=1,2,3, 4 for y=1 or x=1, 2 for y=2) LTE inter-band CA (xDL/1UL) and y bands NR inter-band CA (yDL/1UL).
	+ Moderator: May need to clarify if intra-band ULCA is allowed as one of UL band UL configuration or not, also which BC and per band power class are covered
* Proposals 3: **TMO US**:
* Include FDD+FDD PC2 inter-band UL CA for FDD in the Release-19 inter-band CA-DC WID.
* Recommended WF
* Discuss if HPUE band combinations can be power class agnostic or have dedicated baskets
	+ Which cases are covered for HPUE? Which cases have general requirements covered?
	+ How are power class requested? Per BC + per band per BC?
	+ How is the sequence done and enforced?

### Sub-topic 8-3 baskets for R19

**Issue 8-1:**

* Proposals 1: **Ericsson**:
* WI for intra-band DL/UL CA for LTE with up to 3CC UL. Also include NRCA
	+ Moderator: Scope should be better clarified: Intra-band CA for NR or LTE? Number of DL and UL CCs in each case.
* WI for Rel-19 NR Inter-band CADC for y bands DL with x bands UL (y=4,5,6, x=1,2).
	+ Moderator: The new part is 6 bands DL?
* Proposals 2: **Nokia**:
* Proposal 1: The current LTE basket which contains all types of band combinations with only LTE bands should continue in Rel-19.
* Proposal 2: RAN4 shall consider the proposal for Rel-19 MR-DC baskets presented in Table 2.

|  |  |  |
| --- | --- | --- |
| **Current Rel-18 MR-DC Baskets:** | **New Rel-19 MR-DC Baskets:** | **TR?** |
| DC\_R18\_1BLTE\_1BNR\_2DL2UL | **DC\_1BLTE\_1BNR\_2DL2UL\_R19** | Yes |
| DC\_R18\_2BLTE\_1BNR\_3DL2ULDC\_R18\_xBLTE\_2BNR\_yDL2UL | **DC\_xBLTE\_yBNR\_3DL2UL\_R19**x + y = 3 | Yes |
| DC\_R18\_xBLTE\_1BNR\_yDL2ULDC\_R18\_xBLTE\_2BNR\_yDL2ULDC\_R18\_xBLTE\_yBNR\_zDL2ULDC\_R18\_xBLTE\_yBNR\_zDL3UL | **DC\_xBLTE\_yBNR\_zDLqUL\_R19**x + y > 33 ≤ z ≤ 62 ≤ q ≤ 3 (1BLTE\_1or2BNR) | No |

* Proposal 3: RAN4 shall consider the NR CA/DC baskets as shown in Table 3.

|  |  |  |
| --- | --- | --- |
| **Current Rel-18 NR CA/DC Baskets:** | **New Rel-19 NR CA/DC Baskets:** | **TR?** |
| NR\_CA\_R18\_intra | **CA\_NR\_intra\_R19** | Yes |
| NR\_CADC\_R18\_2BDL\_xBUL | **CADC\_NR\_ 2BDL\_xBUL\_R19** | Yes |
| NR\_CADC\_R18\_3BDL\_xBUL | **CADC\_NR\_ 3BDL\_xBUL\_R19** | Yes |
| NR\_CADC\_R18\_yBDL\_xBUL | **CADC\_NR\_ yBDL\_xBUL\_R19**y > 3 | No |

* Proposal 5: RAN4 shall consider the HPUE baskets as shown in Table 4 as new and merge the remaining HPUE combinations into the other Rel-19 baskets.

|  |  |  |  |
| --- | --- | --- | --- |
| **Current Rel-18 HPUE Baskets:** | **New Rel-19 Baskets:** | **PC added to Rel-19 Basket(s)** | **PCs** |
| LTE\_NR\_HPUE\_FWVM\_REL18 | **HPUE\_FWVM\_LTE\_NR\_R19** |  | PC1 |
| HPUE\_NR\_FR1\_TDD\_R18 HPUE\_NR\_FR1\_FDD\_R18 | **HPUE\_FR1\_NR\_R19** |  | PC2 and PC1.5 |
| HPUE\_FR1\_TDD\_DC\_LTE\_NR\_R18 | No independent basket | **DC\_1BLTE\_1BNR\_2DL2UL\_R19****DC\_xBLTE\_yBNR\_3DL2UL\_R19****DC\_xBLTE\_yBNR\_zDLqUL\_R19** | PC2 and PC1.5 |
| HPUE\_NR\_FR1\_TDD\_intra\_CA\_R18 | No independent basket | **CA\_NR\_intra\_R19** | PC2 and PC1.5 |
| HPUE\_FR1\_TDD\_NR\_CADC\_SUL\_R18 HPUE\_FR1\_FDD\_NR\_CADC\_R18 | No independent basket | **CADC\_NR\_ 2BDL\_xBUL\_R19****CADC\_NR\_ 3BDL\_xBUL\_R19****CADC\_NR\_ yBDL\_xBUL\_R19** | PC2 and PC1.5 |

* Recommended WF
* Discuss WI types and number with an overall list first
	+ Should clarify number of DL bands for HPUE
		- only 1, 2 and 3? How many UL bands, how many UL CCs….
		- higher order covered by default?
		- Which sequence
	+ Which HPUE cases are ready for R19 in terms of general requirement?
	+ Are they all for block approval
	+ Which needs TR
	+ LTE as in R18
* Capture the overall RAN4 recommendation in a WF if agreeable