**3GPP TSG-RAN WG4 Meeting # 101b-e draftR4-2202305**

**Electronic Meeting, 17 – 25 January, 2022**

**Agenda item:** 5.6 and a few Items in 10

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

**Title:** Email Rd2 discussion summary for [101-bis-e][105] NR\_Baskets\_Part\_1

**Document for:** Information

# Introduction

Email discussion for contributions submitted under agenda item 5.7 “Issues arising from basket WIs but not subject to block approval” for UE RF and NR-U intra-band contiguous ULCA, and additional documents submitted to NR band related band combination baskets that require discussion.

List of candidate target of email discussion for 1st round and 2nd round

* 1st round: Discussion and potential approval of CRs. Proposals for way forward.
* 2nd round: Finalization of CRs and way forwards.

Topics:

1. CA\_n5B and CA\_n7B MSD (AI 5.6.1)
2. LB-LB cases (AI 5.6.1)
3. UL configuration including intra-band ULCA (AI 5.6.1)
4. NR-U contiguous UL CA (AI 5.6.2)
5. Discussions on release independence and R17 specs (AI 10)
6. Documents moved from basket approval (AI 5.6.1)

# Topic #1: CA\_n5B and CA\_n7B

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2202039**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202039.zip)Intra-band CA REFSENS Ambiguity | Qualcomm Incorporated | **Proposal 1:** Remove contiguous CA\_n7B MSD test points in Table 7.3A.2.1-1 and remove Note 2.  **Proposal 2**: For CA\_n5B, remove non-contiguous 5MHz+15MHz MSD test point and only keep the 10MHz+10MHz MSD test point with MSD carrier change due to symmetry as shown and highlighted in Table 2.1-1.  Table 2.1-1: Potential changes to Table 7.3A.2.1-1 to capture CA\_n5B MSD.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | CA configuration | SCS  (PCC/SCC)  (kHz) | Aggregated channel bandwidth (PCC+SCC) | UL PCC allocation  (LCRB) | UL SCC allocation  (LCRB) | PCC ΔRIBNC (dB) | SCC ΔRIBNC (dB) | Duplex mode | | ~~CA\_n5B~~ | ~~15/15~~ | ~~15MHz + 5MHz~~ | ~~15 (RBstart = 64)~~ | ~~5 (RBstart = 0)~~ | ~~29.7~~ | ~~23.6~~ |  | | ~~10MHz + 10MHz~~ | ~~10 (RBstart = 42)~~ | ~~10 (RBstart = 0)~~ | ~~26.1~~ | ~~30.8~~ | | CA\_n5B | 15/15 | 10MHz + 10MHz | 10 (RBstart = 0) | 10 (RBstart = 42) | 30.8 | 26.1 |  | | NOTE 1: All combinations of channel bandwidths defined in Table 5.5A.1-1.  ~~NOTE 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.~~  NOTE 3: The transmitted power over both PCC and SCC shall be set to PUMAX as defined in subclause 6.2A.4. | | | | | | | |   **Proposal 3**: For CA\_n7B, choose MSD test point with no change in MSD value as shown highlighted in Table 2.1-2.  Table 2.1-2: Potential changes to Table 7.3A.2.1-1 to capture CA\_n7B MSD.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | CA configuration | SCS  (PCC/SCC)  (kHz) | Aggregated channel bandwidth (PCC+SCC) | UL PCC allocation  (LCRB) | UL SCC allocation  (LCRB) | PCC ΔRIBNC (dB) | SCC ΔRIBNC (dB) | Duplex mode | | ~~CA\_n7B~~ | ~~15/15~~ | ~~40MHz + 10MHz~~ | ~~25 (RBstart = 191)~~ | ~~20 (RBstart = 132)~~ | ~~25~~ | ~~34~~ |  | | CA\_n7B | 15/15 | 10MHz + 40MHz | 9 (RBstart = 26) | 36 (RBstart = 180) | 34 | 25 |  | | NOTE 1: All combinations of channel bandwidths defined in Table 5.5A.1-1.  NOTE 3: The transmitted power over both PCC and SCC shall be set to PUMAX as defined in subclause 6.2A.4. | | | | | | | | |
| [**R4-2202028**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202028.zip)Corrections to Intra-band CA MSD for CA\_n5B and CA\_n7B | Skyworks Solutions Inc. | **Proposal:** For NR intra-band uplink CA MSD core requirements and MSD specifications, adopt the yellow highlighted text and Table 7.3A.2.1-1 changes.  **7.3A.2 Reference sensitivity power level for CA**  **7.3A.2.1 Reference sensitivity power level for Intra-band contiguous CA**  For intra-band contiguous carrier aggregation, the throughput of each component carrier shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.2-1, Table 7.3.2-2, and Table 7.3.2-3.  For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.2-3 and the downlink PCC carrier center frequency shall be configured closer to uplink operating band than any of the downlink SCC center frequency.  For aggregation of two or more downlink FDD carriers with **~~one or~~** two uplink carriers, the reference sensitivity is defined only for the specific uplink and downlink test points which are specified in Table 7.3A.2.1-1. 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.  Table 7.3A.2.1-1: Intra-band contiguous CA uplink configuration for reference sensitivity   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | CA configuration | SCS  (PCC/SCC)  (kHz) | Aggregated channel bandwidth (PCC+SCC) | UL PCC allocation  (LCRB) | UL SCC allocation  (LCRB) | PCC ΔRIBNC (dB) | SCC ΔRIBNC (dB) | Duplex mode | | CA\_n5B | 15/15 | 10MHz + 10MHz | **10 (RBstart = 0)** | **10 (RBstart = 42)** | **30.8** | **26.1** | FDD | | CA\_n7B | 15/15 | **10MHz + 40MHz** | **9 (RBstart = 26)** | **36 (RBstart = 180)** | **34** | **25** | FDD | | NOTE 1: All combinations of channel bandwidths defined in Table 5.5A.1-1.  NOTE 2: The carrier centre frequency of ~~P~~**SCC** in the UL operating band is configured closer to the DL operating band.  NOTE 3: The transmitted power over both PCC and SCC shall be set to PUMAX as defined in subclause 6.2A.4.  NOTE 4: The PCC allocation is same as Transmission bandwidth configuration NRB as defined in Table 5.3.2-1. | | | | | | | | |

## Open issues summary

### Sub-topic 1-1: 1 UL test points

**Issue 1-1: Removing 1UL test points**

Proposals

* Both contributions are in agreement that 1UL test point is redundant to 1CC case and can be removed if PCC and SCC are swapped.

Recommended WF

* Adopt text in R4-2202028 copied below and generate CR in round 2 if agreed

“**7.3A.2.1 Reference sensitivity power level for Intra-band contiguous CA**

For intra-band contiguous carrier aggregation, the throughput of each component carrier shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.2-1, Table 7.3.2-2, and Table 7.3.2-3.

For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.2-3 and the downlink PCC carrier center frequency shall be configured closer to uplink operating band than any of the downlink SCC center frequency.

For aggregation of two or more downlink FDD carriers with **~~one or~~** two uplink carriers, the reference sensitivity is defined only for the specific uplink and downlink test points which are specified in Table 7.3A.2.1-1. 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.”

### Sub-topic 1-2: 2UL test points and PCC/SCC position and CA\_n5B and CA\_n7B MSD

**Issue 1-2a: Swapping of PCC and SCC for intra-band contiguous UL CA**

Proposals

* Both contributions are in agreement that 2 UL test point should swap SCC and PCC positions which is consistent with LTE and allows 1UL case to be equivalent to 1CC REFSENS

Recommended WF

* Adopt “The carrier centre frequency of ~~P~~**SCC** in the UL operating band is configured closer to the DL operating band.” In NOTE 2

**Issue 1-2b: Modification of MSD test points for n5B and n7B**

* Proposals
  + Both contributions agree that swapping PCC/SCC does not change MSD value and only allocation changes is needed due to PCC/SCC swap. The only difference being the modification of NOTE 2.
* Recommended WF
  + Merged table from R4-2202039 and R4-2202028 copied below is adopted with modified NOTE 2 and can be captured in CR in round 2 if agreed:

Table 7.3A.2.1-1: Intra-band contiguous CA uplink configuration for reference sensitivity

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| CA configuration | SCS  (PCC/SCC)  (kHz) | Aggregated channel bandwidth (PCC+SCC) | UL PCC allocation  (LCRB) | UL SCC allocation  (LCRB) | PCC ΔRIBNC (dB) | SCC ΔRIBNC (dB) | Duplex mode |
| CA\_n5B | 15/15 | 10MHz + 10MHz | **10 (RBstart = 0)** | **10 (RBstart = 42)** | **30.8** | **26.1** | FDD |
| CA\_n7B | 15/15 | **10MHz + 40MHz** | **9 (RBstart = 26)** | **36 (RBstart = 180)** | **34** | **25** | FDD |
| NOTE 1: All combinations of channel bandwidths defined in Table 5.5A.1-1.  NOTE 2: The carrier centre frequency of ~~P~~**SCC** in the UL operating band is configured closer to the DL operating band.  NOTE 3: The transmitted power over both PCC and SCC shall be set to PUMAX as defined in subclause 6.2A.4.  NOTE 4: The PCC allocation is same as Transmission bandwidth configuration NRB as defined in Table 5.3.2-1. | | | | | | | |

## Companies views’ collection for 1st round

### Open issues

Sub topic 1-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | **Issue 1-1 Removing 1UL test points** Agree with recommended WF. |
| Skyworks | **Issue 1-1 Removing 1UL test points** Agree with recommendation of WF and drafting CR in round 2 if contents are agreeable |
| Huawei | Thanks for the contribution. We are OK to remove 1UL test points. Not sure if this reference sensitivity for FDD intra-band contiguous CA can be modified as reference sensitivity “exception”. I think the first paragraph in this clause is the general requirements. |

Sub topic 1-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | **Issue 1-2a Swapping of PCC and SCC for intra-band contiguous UL CA** Agree with recommended WF.  **Issue 1-2b Modification of MSD test points for n5B and n7B** Agree with recommended WF. |
| Skyworks | **Issue 1-2a Swapping of PCC and SCC for intra-band contiguous UL CA** Same position as issue 1-1.  **Issue 1-2b Modification of MSD test points for n5B and n7B** Same position as issue 1-1. |
| Huawei | **Issue 1-2a Swapping of PCC and SCC for intra-band contiguous UL CA** OK with this modification.  **Issue 1-2b Modification of MSD test points for n5B and n7B** No comments on these values.  But I think ΔRIBNC should be further clarified in general section due to the lack of definition in both 36.101 and 38.101-1. Generally, ΔRIBNC is used for intra-band non-contiguous CA. That’s why we use “NC” for this symbol. Maybe we can use ΔRIBCon for intra-band contiguous CA. |
| Apple | We have a few questions for clarification: For the UL configuration, should it be equal PSD or equal power? It seems like equal power has been adopted at PUMAX for both CCs. What would be the expected PUMAX power level and how would it be configured? Was MPR/A-MPR taken into account when deriving the MSD requirements? |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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| --- | --- |
|  | **Status summary** |
| **Sub-topic #1.1** | *Tentative agreements:* There is agreement about removing 1UL test point  *Candidate options:* Generate a CR to update the specification in R17 and account for Huawei comment for the text.  *Recommendations for 2nd round:*Discuss CR directly |
| **Sub-topic #1.2** | *Tentative agreements:*  **Issue 1-2a Swapping of PCC and SCC for intra-band contiguous UL CA** all companies agree  **Issue 1-2b Modification of MSD test points for n5B and n7B:** Merged table from R4-2202039 and R4-2202028 copied below is adopted with modified NOTE 2 and can be captured in CR in round 2 if agreed:  Table 7.3A.2.1-1: Intra-band contiguous CA uplink configuration for reference sensitivity   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | CA configuration | SCS  (PCC/SCC)  (kHz) | Aggregated channel bandwidth (PCC+SCC) | UL PCC allocation  (LCRB) | UL SCC allocation  (LCRB) | PCC ΔRIBNC (dB) | SCC ΔRIBNC (dB) | Duplex mode | | CA\_n5B | 15/15 | 10MHz + 10MHz | **10 (RBstart = 0)** | **10 (RBstart = 42)** | **30.8** | **26.1** | FDD | | CA\_n7B | 15/15 | **10MHz + 40MHz** | **9 (RBstart = 26)** | **36 (RBstart = 180)** | **34** | **25** | FDD | | NOTE 1: All combinations of channel bandwidths defined in Table 5.5A.1-1.  NOTE 2: The carrier centre frequency of ~~P~~**SCC** in the UL operating band is configured closer to the DL operating band.  NOTE 3: The transmitted power over both PCC and SCC shall be set to PUMAX as defined in subclause 6.2A.4.  NOTE 4: The PCC allocation is same as Transmission bandwidth configuration NRB as defined in Table 5.3.2-1. | | | | | | | |   *Candidate options:* Generate CR for topics 1.1 and 1.2 and account for Huawei comment on ΔRIBNC by using a different symbol (ΔRIBCon ?) and add it to the general section  *Recommendations for 2nd round:* Discuss CR directly and address Apple’s question. Our understanding is that equal PSD is used but this may also be clarified in the CR. |

## Discussion on 2nd round

### Open issues

#### Sub-topic 1-1: Equal PSD

Issue 1-1: address question from Apple and confirm that equal PSD is used.

### Companies views’ collection for 2nd round

#### Open issues

Sub topic 1-1

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| --- | --- |
| **Company** | **Comments** |
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#### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2202274 draftCR to R17 38-101-1 to correct intra-band CA REFSENS MSD test points | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |
| *Nokia: Agree with the CR.* |
| *Huawei: Support this CR.* |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| R4-2200xxxx | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: LB-LB and LB-LB-LB cases

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2202035**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202035.zip)  Measurements for CA\_n29-n71 MSD | Skyworks Solutions Inc. | **Proposal 1**: For FDD-FDD, LB/LB CA combinations, cross-band isolation MSD should be evaluated assuming co-located gNB radio units. This implies that both the aggressor and the victim are operated at their respective REFSENS levels. This means that the aggressor UL RB configuration LCRB shall be configured according to the Table 7.3.2-3 specifications.  **Proposal 2:** For NR intra-band uplink CA MSD core requirements and MSD specifications, adopt the yellow highlighted text and Table 7.3A.2.1-1 changes.  Table 6.x.1.5-1: Reference sensitivity exceptions (MSD) due to cross band isolation for NR CA FR1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR Band / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | | UL band | DL band | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 70  MHz  (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) | | n71 | n29 | 19.0 | 16.7 |  |  |  |  |  |  |  |  |  |  |  |   Table 6.x.1.5-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation for NR CA FR1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR Band / SCS / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | | | | UL band | DL band | SCS of UL band (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | | 40 MHz | 50 MHz | 60 MHz | 70  MHz | 80 MHz | 90 MHz | 100 MHz | | n71 | n29 | 15 | 201 | 201 |  |  |  |  |  | |  |  |  |  |  |  | | NOTE 1: UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.3.2-1). The UL carrier shall be as close as possible to the downlink operating band. | | | | | | | | | | | | | | | | | |
| [**R4-2200706**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200706.zip)n29 MSD in CA\_n29-n71 | Nokia, Dish | Simulation input vs UL configuration |
| [**R4-2202037**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202037.zip)CA\_n29A-n71A MSD | Qualcomm Incorporated | **Observation 1**: As much as degradation of VSWR of 6:1 can be observed in band n29 with practical single band tuning optimized for band n71. Impact of TIS will be observed and could prevent device certification.  **Observation 2**: The ANT-TX attenuation is barely sufficient to meet the UE-UE coexistence TX emission requirement of -38dBm/MHz in 29DL especially for UEs implementing the 600M+ band, even though such a level degrades the secondary RX path from an MSD standpoint.  **Proposal 1**: Use crossband noise MSD and UL configuration as shown in Table 2.3-1 and 2.3-2.  Table 2.3-1: Reference sensitivity exceptions (MSD) due to cross band isolation for NR CA FR1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR Band / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | | UL band | DL band | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 70  MHz  (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) | | n71 | n29 | [15.2] | [15.2] |  |  |  |  |  |  |  |  |  |  |  |   Table 2.3-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation for NR CA FR1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR Band / SCS / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | | | UL band | DL band | SCS of UL band (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 70  MHz | 80 MHz | 90 MHz | 100 MHz | | n71 | n29 | 15 | 20 | 20 |  |  |  |  |  |  |  |  |  |  |  | |
| [**R4-2202036**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202036.zip)  Measurements for CA\_n5-n28 MSD | Skyworks Solutions Inc. | **Proposal 1**: For FDD-FDD, LB/LB CA combination, cross-band isolation MSD should be evaluated assuming co-located gNB radio units. This implies that both the aggressor and the victim are operated at their respective REFSENS levels. This means that the aggressor UL RB configuration LCRB shall be configured according to the Table 7.3.2-3 specifications.  **Proposal 2:** For NR intra-band uplink CA MSD core requirements and MSD specifications, adopt the yellow highlighted text and Table 7.3A.2.1-1 changes.  Table 6.x.1.5-1: Reference sensitivity exceptions (MSD) due to cross band isolation for NR CA FR1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR Band / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | | UL band | DL band | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 70  MHz  (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) | | n5 | n28 | 17.5 | 15.8 | 14.0 | 11.7 |  | 2.9 |  |  |  |  |  |  |  |   Table 6.x.1.5-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation for NR CA FR1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR Band / SCS / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | | | UL band | DL band | SCS of UL band (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 70  MHz | 80 MHz | 90 MHz | 100 MHz | | n5 | n28 | 15 | 201 | 201 | 201 | 201 |  | 201 |  |  |  |  |  |  |  | | NOTE 1: UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.3.2-1). The UL carrier shall be as close as possible to the downlink operating band. | | | | | | | | | | | | | | | | |
| [**R4-2202038**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202038.zip)  MSD for DC\_20A-38A\_n8A | Skyworks Solutions Inc. | **Proposal:** Adopt the following MSD test points for DC\_20-38\_n8   | NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | --- | --- | --- | --- | --- | --- | --- | --- | | EN-DC  Configuration | EUTRA or NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | IMD order | | DC\_20A-38\_n8A | n8 | 885 | 5 | 25 | 930 | N/A | N/A | | 20 | 846 | 5 | 25 | 805 | 17.4 | IMD3 | | 38 | 2575 | 5 | 25 | 2575 | N/A | N/A | | DC\_20A-38\_n8A | n8 | 885 | 5 | 25 | 930 | N/A | N/A | | 20 | 840 | 5 | 25 | 799 | N/A | N/A | | 38 | 2610 | 5 | 25 | 2610 | 21.1 | IMD3 | |
| [**R4-2201565**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201565.zip) TP for TR 38.717-02-01 to include CA\_n20-n67 | Ericsson, BT plc | Moderator Note: not for block approval, moved from #107, No cross band MSD is assessed  R4-2201566 TP for TR 38.717-03-01 to include CA\_n1-n20-n67 Ericsson, BT plc  R4-2201568 TP for TR 38.717-03-01 to include CA\_n3-n20-n67 Ericsson, BT plc  R4-2201567 TP for TR 38.717-03-02 to include CA\_n1-n20-n67 Ericsson, BT plc  R4-2201569 TP for TR 38.717-03-02 to include CA\_n3-n20-n67 Ericsson, BT plc  Are pending the 2 band fallback agreement |

## Open issues summary

### Sub-topic 2-1: CA\_n29-n71

**Issue 2-1a: Co-location assumption for LB-LB cases**

Proposals

* R4-2202035 proposes that co-location is assumed for LB-LB cases and thus UL allocation should be similar to REFSENS case. It should be noted that MSD vs UL allocation are in agreement between the 3 contributions and that R4-2202037 and R4-2202035 use the same UL allocation

Recommended WF

* Discuss proposal and provide as guideline for LB-LB cases if agreed

**Issue 2-1b: MSD for CA\_n29-n71**

Proposals

* R4-2202037 and R4-2202035 use the same UL allocation but have slightly different MSD values
* R4-2202037 points at antenna tuning issues already discussed in the past but that should be fully understood by proponents of LB-LB cases.

Recommended WF

* Discuss MSD values based on R4-2202037 and R4-2202035

### Sub-topic 2-2: CA\_n5-n28

**Issue 2-2: MSD for CA\_n5-n28**

Proposals

* R4-2202036 proposes new MSD values based on measurement compared to assessment done during last meeting.

Recommended WF

* Discuss MSD values based on R4-2202037 and last meeting values

### Sub-topic 2-3: CA\_n20-n67

**Issue 2-3: MSD for CA\_n20-n67**

Proposals

* The current TP does not assess the LB-LB cross band isolation MSD.

Recommended WF

* Based on expert experience and existing LB-LB evaluations, tentative MSD is assessed

### Sub-topic 2-4: CA\_n18-n28 and DC CA\_n18-n28

**Issue 2-4: MSD for CA\_n18-n28 and DC\_18\_n28**

Proposals

* Current LB-LB cross band MSD in [] in the spec seems optimistic when compared to similar IMD cases (for example CA\_n29-n71)

Recommended WF

* Based on expert experience and existing LB-LB evaluations, tentative corrected MSD is assessed

### Sub-topic 2-5: DC\_20A-38A\_n8A

**Issue 2-5: MSD for DC\_20A-38A\_n8A**

Proposals

* IMD3 test points and MSD are proposed based on reusing DC\_7A-20A\_n8A

Recommended WF

* Agree MSD and generate TP/CR if agreed

## Companies views’ collection for 1st round

### Open issues

Sub topic 2-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | **Issue 2-1a Co-location assumption for LB-LB cases** Co-location can be assumed  **Issue 2-1b MSD for CA\_n29-n71** Take average between measurement results from R4-2202035 and R4-2202037 |
| Skyworks | **Issue 2-1a Co-location assumption for LB-LB cases** We assume co-located radio units for band n29 and band 71.  **Issue 2-1b MSD for CA\_n29-n71**. Agree with Nokia, We propose averaging the R4-2202035 and R4-2202037 n29 REFSENS levels and rounding up MSDs as in table below:  Table 6.x.1.5-1: Reference sensitivity exceptions (MSD) due to cross band isolation for NR CA FR1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR Band / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | | UL band | DL band | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 70  MHz  (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) | | n71 | n29 | 17.5 | 16.0 |  |  |  |  |  |  |  |  |  |  |  |   n71 UL RB configuration: identical proposal is made in R4-2202035 and R4-2202037, adopt the table below:  Table 6.x.1.5-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation for NR CA FR1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR Band / SCS / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | | | | UL band | DL band | SCS of UL band (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | | 40 MHz | 50 MHz | 60 MHz | 70  MHz | 80 MHz | 90 MHz | 100 MHz | | n71 | n29 | 15 | 201 | 201 |  |  |  |  |  | |  |  |  |  |  |  | | NOTE 1: UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.3.2-1). The UL carrier shall be as close as possible to the downlink operating band. | | | | | | | | | | | | | | | | | |
| Qualcomm | **Issue 2-1b MSD for CA\_n29-n71** We are ok with the average |
| Apple | **Issue 2-1b MSD for CA\_n29-n71** We are also ok with the average |

Sub topic 2-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | It seems the MSD is significantly more that what was proposed in the last meeting. Further verification is required by 2nd round. |

Sub topic 2-3

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | We suppose CA\_n20-n67 is meant (and not n29-n67). To us it is not clear if there is a cross-band issue at all between aggressor in form of UL n20 into victim DL n67 since that gap is 74 MHz and the max channel BW is 20 MHz. Would it be possible to have clear guidance and rules when MSD for cross-band isolation need to be defined? |
| Skyworks | **Issue 2-3: MSD for CA\_n20-n67** Quick IMD analysis indicates that n67 upper 5MHz DL channel MSD is driven by IM11 overlap and partial IM9 overlap for n20 UL 20MHz CBW at lowest carrier frequency (closest to band n67) and UL Lcrb=20RB at RBstart=0. So MSD may be small or neglected. See sketch below. |
| Qualcomm | **Issue 2-3: MSD for CA\_n20-n67** Frequency separation is quite large for any MSD |
| Apple | **Issue 2-3: MSD for CA\_n20-n67** Should we take a look of the impact from n20 20MHz full UL allocation? Or collocation is considered and n20 UL allocation should be restricted? |

Sub topic 2-4

|  |  |
| --- | --- |
| **Company** | **Comments** |
| KDDI | **Issue 2-2 MSD for CA\_n18-n28 and DC\_18\_n28** We agree with recommended WF. |
| Skyworks | **Issue 2-4: MSD for CA\_n18-n28 and DC\_18\_n28** Quick IMD landscape analysis indicates that n28B upper 5MHz DL channel MSD is driven by:   * IM5 overlap and partial IM3 overlap for n18 UL 15MHz channel with UL RB configuration Lcrb=25 RBstart=0. Like for CA\_n29-n71, we assume co-located radio units for n18 and n28, so we assume n18 UL configuration that corresponds to the n18 REFSENS, but with RB positioned closest to n28DL band; See IMD landscape sketch.      * IM5 overlap for n18 UL 10MHz Lcrb=25RB at RBstart=0 and lowest UL carrier frequency.   n28B MSD may be evaluated using the following test points:  Config 1: n18 UL 15MHz CBW SCS15, Lcrb=25RBstart0. This is similar landscape than CA-n29-n71, MSD in the range of 17 to 20dB is expected.  Config 2: n18 UL 10MHz CBW SCS15 lowest channel (closest to n28DL band). Lcrb=25RBstart0. This situation is similar to CA-n5A-n28A, MSD is expected in the range of 12-15dB. |
| Qualcomm | **Issue 2-4: MSD for CA\_n18-n28 and DC\_18\_n28:** WF is required for MSD calculation. Similar to CA\_n29-n71 |
| Apple | **Issue 2-4: MSD for CA\_n18-n28 and DC\_18\_n28:** The intention of using 25 RBs for n18 UL configuration is understandable. A WF would help facilitate the MSD evaluation. |

Sub topic 2-5

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Issue 2-3 MSD for DC\_20A-38A\_n8A |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic #2.1**  MSD for CA\_n29-n71 | *Tentative agreements:*  Issue 2-1a: agreement that co-location can be assumed for LB-LB cases  Issue 2-1b: agreement that average can be used as in  Table 6.x.1.5-1: Reference sensitivity exceptions (MSD) due to cross band isolation for NR CA FR1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR Band / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | | UL band | DL band | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 70  MHz  (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) | | n71 | n29 | 17.5 | 16.0 |  |  |  |  |  |  |  |  |  |  |  |   Table 6.x.1.5-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation for NR CA FR1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR Band / SCS / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | | | | UL band | DL band | SCS of UL band (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | | 40 MHz | 50 MHz | 60 MHz | 70  MHz | 80 MHz | 90 MHz | 100 MHz | | n71 | n29 | 15 | 201 | 201 |  |  |  |  |  | |  |  |  |  |  |  | | NOTE 1: UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.3.2-1). The UL carrier shall be as close as possible to the downlink operating band. | | | | | | | | | | | | | | | | |   *Candidate options:* Capture agreement in WF on LB-LB and generate CR  *Recommendations for 2nd round:* Comment CR directly |
| **Sub-topic #2.2**  MSD for CA\_n5-n28 | *Tentative agreements:* MSD needs further discussion in round2 to understand difference with last meeting assessment (which was not based on measurements)  *Candidate options:* discuss in WF on LB-LB and generate CR if agreement is found  *Recommendations for 2nd round:* Issue is discussed further and captured in WF on LB-LB, CR is generated based on R4-2202036 but values are in brackets and amended based on the discussion |
| **Sub-topic #2.3**  MSD for CA\_n20-n67 | *Tentative agreements:* The large frequency gap means that there is only partial overlap with IMD9 and full overlap in IMD11. This is independent of UL allocation and full allocation will only result in same overlap but with lower PSD. It seems that not cross band MSD is needed.  R4-2201565 TP for TR 38.717-02-01 to include CA\_n20-n67 can be approved as is with  R4-2201566 TP for TR 38.717-03-01 to include CA\_n1-n20-n67 Ericsson, BT plc  R4-2201568 TP for TR 38.717-03-01 to include CA\_n3-n20-n67 Ericsson, BT plc  R4-2201567 TP for TR 38.717-03-02 to include CA\_n1-n20-n67 Ericsson, BT plc  R4-2201569 TP for TR 38.717-03-02 to include CA\_n3-n20-n67 Ericsson, BT plc  *Candidate options:* the IMD behavior is captured in the WF on LB-LB and some guidance on how to treat corss band MSD for that case can be added but LB-LB combination still need discussion in the “not for block approval” AI  *Recommendations for 2nd round:* no need for second round |
| **Sub-topic #2.4**  MSD for n18-n28 | *Tentative agreements:* There is agreement that IMD3/5 related MSD is larger than the currently captured value in specification in [] also both UL can generate MSD and should be specified. Test points have been proposed:  Config 1: n18 UL 15MHz CBW SCS15, Lcrb=25RBstart0. This is similar landscape than CA-n29-n71, MSD in the range of 17 to 20dB is expected.  Config 2: n18 UL 10MHz CBW SCS15 lowest channel (closest to n28DL band). Lcrb=25RBstart0. This situation is similar to CA-n5A-n28A, MSD is expected in the range of 12-15dB.  *Candidate options:* Include Skyworks analysis in LB-LB WF and agree on next steps need for next meeting MSD assessment. In the meantime a draftCR could capture the test points with [TBD] [20]/[15] and could be revised in next meeting. Feedback from company early in Rd2 needed to request draftCR before friday  *Recommendations for 2nd round:* WF is commented directly |
| **Sub-topic #2.5**  MSD for DC\_20A-38A\_n8A | *Tentative agreements:*there is no comment so we can assume that proposed values in R4-2202036 are acceptable  Table 6.x.1.5-1: Reference sensitivity exceptions (MSD) due to cross band isolation for NR CA FR1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR Band / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | | UL band | DL band | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 70  MHz  (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) | | n5 | n28 | 17.5 | 15.8 | 14.0 | 11.7 |  | 2.9 |  |  |  |  |  |  |  |   Table 6.x.1.5-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation for NR CA FR1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR Band / SCS / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | | | UL band | DL band | SCS of UL band (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 70  MHz | 80 MHz | 90 MHz | 100 MHz | | n5 | n28 | 15 | 201 | 201 | 201 | 201 |  | 201 |  |  |  |  |  |  |  | | NOTE 1: UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.3.2-1). The UL carrier shall be as close as possible to the downlink operating band. | | | | | | | | | | | | | | | |   *Candidate options:* CR is generated  *Recommendations for 2nd round:* CR is reviewed |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round

### Companies views’ collection for 2nd round

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **CRs/TPs Status update recommendation** |
| R4-2202275  WF on LB-LB MSDs | Company - comment |
|  |
|  |
| R4-2202276  draftCR on MSD for CA\_n29-n71 | –Nokia We support the CR. |
|  |
|  |
| R4-2202277  draftCR on MSD for CA\_n5-n28 | Company - comment |
|  |
|  |
| R4-2202278  draftCR on MSD for DC\_20A-38A\_n8A | Company - comment |
|  |
|  |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #3: UL configuration including intra-band ULCA

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2202034**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202034.zip)Triple beat B3 MSD evaluation for DC\_3A\_n41C | Skyworks Solutions Inc. | Moderator Note: based on draft revision in #105 folder (link below), official Tdoc will be given at start of the meeting, I will update when available  [R4-22xxxxx rev of R4-2202034 Triple beat B3 MSD evaluation for DC\_3A\_n41C.docx](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Inbox/Drafts/%5B101-bis-e%5D%5B105%5D%20NR_Baskets_Part_1/Round%201/R4-22xxxxx%20rev%20of%20R4-2202034%20Triple%20beat%20B3%20MSD%20evaluation%20for%20DC_3A_n41C.docx)  **Observation**:   * **For PC3 operation, forward TB IMD dominates over the reverse TB IMD for PCB isolations <= 70dB;** * **The worst case PC3 B3 5MHz MSD is approximately 12dB for 32dB rejection of the TB product by n41 BPF. In previous work [1], the same level of MSD was found, but the MSD was dominated by the LNA contribution, not by the PA.** * **The reverse TB IMD may reach the same level as the FWD TB at 65dB PCB isolation when n41 Tx power level is increased from 20dBm to approximately 21.5dBm. For PC2 operation, it is therefore expected that the PA reverse IMD may become an important MSD contributor; In [1], MSD for PC2 DC\_3A\_n41C is estimated at close to 20dB and is dominated by LNA contribution.**   **Proposal: Interested companies are encouraged to further study the FDD band MSD due to triple beat IMD vs PCB isolation and TDD band filter rejection, in particular:**   * **Further study both the FDD and the TDD PAs forward and reverse TB IMD contribution;** * **Further study the LNA TB IMD contribution;** * **Further study the FDD band MSD for PC3 and PC2 EN-DC operation.** |

## Open issues summary

### Sub-topic 3-1

**Issue 3-1:**

Proposals

* Interested companies are encouraged to further study the FDD band MSD due to triple beat IMD vs PCB isolation and TDD band filter rejection, in particular:
  + Further study both the FDD and the TDD PAs forward and reverse TB IMD contribution;
  + Further study the LNA TB IMD contribution;
  + Further study the FDD band MSD for PC3 and PC2 EN-DC operation.

Recommended WF

* Discuss provided results and assumptions in order to build a plan (in a WF) to create a stable framework for triple beat MSD in R17. Alternatively we may have to discuss having such framework in the scope of RAN4 R18 topics (associated to 3Tx)

## Companies views’ collection for 1st round

### Open issues

Sub topic 3-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Skyworks | The revision of R4-2202034 has been posted in the inbox and can be found at the following link:  [R4-2202154 rev of R4-2202034 Triple beat B3 MSD evaluation for DC\_3A\_n41C](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_101-bis-e/Inbox/R4-2202154.zip). |
| Qualcomm | The findings in Skyworks measurements are very similar to Qualcomm’s findings.  We agree that more clarification of the framework could be required from the previous WF. For example, no 2nd order triple beat should be necessary. Also, in light of 3TX, frequency conditions need to be discussed.  We also need to revisit the previously proposed MSD of DC\_25\_n41C in the last WF because the power back-off conditions need to be revisited to account for the worst case scenario where a filter is possible to reduce the amount of back off for NS requirement. |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic #3.1** | *Tentative agreements:* Skyworks’ and Qualcomm’s triple beat assessments are in agreement but there are still some paths that are not assessed (LNA, other PA path, RIMD vs FIMD) that are required for a complete specification framework for triple beat cases in R17.  *Candidate options:* “WF on triple beat evaluation and specification framework” is developed based on an example band combination, provides all the evaluations needed and if possible some time plan.  *Recommendations for 2nd round:* Discuss in WF |

## Discussion on 2nd round

### Open issues

Remaining work and specification framework are captured in a WF, which is commented directly

### Companies views’ collection for 2nd round

#### WF comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2202279 WF on triple beat evaluation and specification framework | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |
|  |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #4: NR-U contiguous ULCA

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2202022**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202022.zip)  NR-U Contiguous UL-CA Measurements | Skyworks Solutions Inc. | **Proposal: Based on these observations, we propose to adopt:**   * **3.0dB MPR for all QPSK DFT-s-OFDM waveforms except for WB configuration [1111]+[1000] with full RB allocation for which [4.0]dB MPR is proposed; and** * **4.0 MPR for all QPSK CP-OFDM waveforms except for WB configuration [1111]+[1000] with full RB allocation for which [5.5]dB MPR is proposed.** |

## Open issues summary

### Sub-topic 4-1

**Issue 4-1: MPR for NRU contiguous UL CA**

Proposals

* 3.0dB MPR for all QPSK DFT-s-OFDM waveforms except for WB configuration [1111]+[1000] with full RB allocation for which [4.0]dB MPR is proposed; and
* 4.0 MPR for all QPSK CP-OFDM waveforms except for WB configuration [1111]+[1000] with full RB allocation for which [5.5]dB MPR is proposed.

Recommended WF

* Discuss measurement results ~~and proposed MSD in terms of allocation types and values~~

## Companies views’ collection for 1st round

### Open issues

Sub topic 4-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | **Issue 4-1: MPR for NRU contiguous UL CA** The recommended WF seems not relevant to the issue. |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic #4.1** | *Tentative agreements:* It seems that typo in recommended WF did not allow for comments. There seem to be little work proposed for NRU ULCA  *Candidate options:* further discuss values and how to organize the requirement vs allocation type, BW, waveforms. At this point it does not look like there is any further agreements feasible beyond last meeting WF  *Recommendations for 2nd round:* The issue is left open for comment, if companies feel that there is scope for progress please comment early in Rd2 so that WF Tdoc can be requested before Friday |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round

### Open issues

**Issue 4-1: MPR for NRU contiguous UL CA**

Proposals

* 3.0dB MPR for all QPSK DFT-s-OFDM waveforms except for WB configuration [1111]+[1000] with full RB allocation for which [4.0]dB MPR is proposed; and
* 4.0 MPR for all QPSK CP-OFDM waveforms except for WB configuration [1111]+[1000] with full RB allocation for which [5.5]dB MPR is proposed.

Recommended WF:

* Discuss measurement results and how to organise MPR requirement in terms of BW, allocation type and waveform type

### Companies views’ collection for 2nd round

#### Open issues

Sub topic 4-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  |  |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #5: Discussions on release independence and R17 specs Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2200698**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200698.zip)Working procedures for updating release independence specification | Nokia, Nokia Shanghai Bell | Proposal: RAN4 selects in RAN4#101-bis-e either option A or option B as a way forward for updating the TS 38.307  Option A: When new feature is introduced only the open release of 38.307 needs an update.  Option B: When new feature is introduced all releases of 38.307 starting from release the feature in question is release independent from are updated. |
| [**R4-2201440**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201440.zip)Discussion on the working procedure for introducing release independent features | CHTTL | Proposal 1: RAN4 to discuss and select one of the options for updating the release independent specifications, TS 36.307 and TS 38.307.  Option A: When a new feature is introduced only the latest release of release independent spec needs to be updated.  Option A-1: In any case, only the open release of release independent spec needs to be updated.  Option A-2: The latest release of release independent spec refers to the release which the new feature is introduced in. (i.e. CR to the frozen release might be needed when the release independent issue is missed to be resolved when the new feature is introduced, or when CR implementation errors occur in the previous release.)  Option B: When a new feature is introduced, all of the releases of release independent spec are updated, starting from the release which the feature is release independent from. |
| [**R4-2201804**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201804.zip)Discussion on the Rel-17 specifications: 25-series and 34-series | Huawei | Proposal 1: mark 25-series specifications as “inhibit upgrade”.  Proposal 2: mark 34-series specifications as “inhibit upgrade”. |

## Open issues summary

### Sub-topic 5-1: Release indenpendent specifications

**Issue 5-1: updating the release independent specifications, TS 36.307 and TS 38.307.**

Proposals

* R4-2200698
  + Option A: When new feature is introduced only the open release of 38.307 needs an update.
  + Option B: When new feature is introduced all releases of 38.307 starting from release the feature in question is release independent from are updated.
* R4-2201440
  + Option A: When a new feature is introduced only the latest release of release independent spec needs to be updated.
    - Option A-1: In any case, only the open release of release independent spec needs to be updated.
    - Option A-2: The latest release of release independent spec refers to the release which the new feature is introduced in.
  + Option B: When a new feature is introduced, all of the releases of release independent spec are updated, starting from the release which the feature is release independent from.

Recommended WF

* Option B is common to both proposals, this is a potential consensus but options should be discussed in round 1

### Sub-topic 5-1: 25-series and 34-series

**Issue 5-2: 25-series and 34-series.**

Proposals

* Mark 25-series and 34-series specifications as “inhibit upgrade”.

Recommended WF

* Given the low or inexistent activity on above specification, let’s try to approve in round 1

## Companies views’ collection for 1st round

### Open issues

Sub topic 5-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | **Issue 5-1 TS 36.307 and TS 38.307** Option A-2: The latest release of release independent spec refers to the release which the new feature is introduced in. |
| ZTE | **Issue 5-1 TS 36.307 and TS 38.307** Option A-2: The latest release of release independent spec refers to the release which the new feature is introduced in.  Besides the procudure, there may another issue, which release of TS38.307 for the related RF requirements table of this new feature included? |
| DOCOMO | Option A-2: The latest release of release independent spec refers to the release which the new feature is introduced in. If the group can reach consensus on the principle, we think it may be better to capture it somewhere, for example, in the general section in TS 36.306/38.306. |
| CHTTL | **Issue 5-1 TS 36.307 and TS 38.307** We slightly prefer Option A-2 based on the discussion in the paper. |

Sub topic 5-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | **Issue 5-2 25-series and 34-series** No need to maintain 25- and 34- specfications. |
| Skyworks | **Issue 5-2 25-series and 34-series** We do not see the need to maintain 25-series and 34-series and thus it should not be promoted to R17 |
| Ericsson | We think this is an issue to be decided at RAN plenary, as cross-dependence with other groups needs to be checked. In general we se no strong reason to maintain 25-series specs in RAN4. |
| Huawei | **Issue 5-2:** It looks that there is no interest in promoting 25- and 34-series to Rel-17, so this aspect seems to be agreeable.  @Ericsson: we are not quite sure what RAN would need to discuss on this matter. The specifications in question are still going to be valid, they are not withdrawn. So any external cross-references are not going to be broken. As this whole topic was triggered by MCC, I would suggest you to clarify any such concerns with MCC. |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic #5.1**  TS 36.307 and TS 38.307 | *Tentative agreements:* All companies agree forOption A-2: “The latest release of release independent spec refers to the release which the new feature is introduced in”. And some companies think this may be captured as a generic approach in the future  *Candidate options:* Unclear if the agreement needs WF or if it can be captured as agreement in chairman/s note  *Recommendations for 2nd round:* Interested companies provide an early comment on how to capture agreement so that Tdoc can be requested by Friday if needed |
| **Sub-topic #5.2** | *Tentative agreements:* Agreement that there is no need to maintain 25- and 34- specfications and thus not promote them to R17  *Candidate options:* Unclear how to capture the agreement and communicate to MCC  *Recommendations for 2nd round:* Interested companies provide an early comment on how to capture agreement so that Tdoc can be requested by Friday if needed |

## Discussion on 2nd round

### Open issues

**Issue 5-1:** Agree onhow to capture agreement that “The latest release of release independent spec refers to the release which the new feature is introduced in” and potentially make this a generic approach for new releases**:**

* Capture in Chairman’s note
* WF (needs request before Friday)
* Other

**Issue 5-2:** Agree onhow to capture agreement and communicate to MCC.

### Companies views’ collection for 2nd round

#### Open issues

Sub topic 5-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CHTTL | We think a WF might be helpful, I capture the Option A-2 and two open issue for next meeting – whether to capture somewhere in the spec and further investigate the procedure of the common RF requirement table based on the comment from NTT Docomo and ZTE.  The draft WF is in the draft folder:  https://www.3gpp.org/ftp/TSG\_RAN/WG4\_Radio/TSGR4\_101-bis-e/Inbox/Drafts/%5B101-bis-e%5D%5B105%5D%20NR\_Baskets\_Part\_1/Round%202/R4-220xxxx%20-%20draft%20WF%20on%20release%20independent%20procedure%20v1.doc  But we are also ok to capture the whole Option A-2 to the chairman note.  When a new feature is introduced only the latest release of release independent spec needs to be updated. The latest release of release independent spec refers to the release which the new feature is introduced in. |
| Nokia | WF is good, easier to reference later if needed. WF is also ok for us. |
| Skyworks (moderator) | Given that all companies are in agreement I will request a Tdoc to the chairman with CHTTL and Nokia as co-source: WF on introducing release independent features for TS 36.307 and TS 38.307 |
| Skyworks (moderator) | WF is allocated please comment in below or directly |
| ZTE | Basically the WF is fine to us.  A minor comment: It may be better to exchange the last bullet. We think the approach for updating the Common RF Requirements table may also need to be captured in the general section, i.e. the whole picture of general approach should be included. |
| CHTTL | Thanks moderator for the handling.  Another version is uploaded based on the moderator’s guidance.  https://www.3gpp.org/ftp/TSG\_RAN/WG4\_Radio/TSGR4\_101-bis-e/Inbox/Drafts/%5B101-bis-e%5D%5B105%5D%20NR\_Baskets\_Part\_1/Round%202/draft%20R4-2202405%20-%20draft%20WF%20on%20release%20independent%20procedure%20v2.doc  Regarding the content, the only change the order of the last two bullets based on the ZTE’s comment. |
| DOCOMO | We support the WF. Thank you very much for this work. |

Sub topic 5-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Skyworks (moderator) | Unless there are view against this approach I will suggest to capture the agreement in the meeting notes which should be thus visible to MCC |

#### WF comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2202405 WF on introducing release independent features for TS 36.307 and TS 38.307 |  |
|  |
|  |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #6: Documents moved from basket approval

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2200176**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200176.zip) TP to TR TR38.717-03-01 for CA\_n46-n48-n96 | Charter Communications, Inc | Moderator note: two band CA\_n46-n96 missing, Note needs revision if CA\_n46-n96 is agreed. Comment in CR/TP directly |
| [**R4-2200059**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200059.zip) TP to TR 38.717.02-01 for CA\_n46-n48--n96 | Charter Communications, Inc | Moderator note: two band CA\_n46-n96 missing, Note needs revision if CA\_n46-n96 is agreed. Comment in CR/TP directly |
| **Draft R4-220XXXX** TP to TR 38.717.02-01 for CA\_n46-n96 | Charter Communications, Inc | Moderator note: missing fall-back CA\_n46-n96 TP to be agreed, draft should be put in [101-bis-e][105] NR\_Baskets\_Part\_1/Round1 by proponent. Comment in CR/TP directly.Technical note: this should be PC5 not PC3 |
| [**R4-2201573**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F101-2Dbis-2De_Docs_R4-2D2201573.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=lZYh7X5C3VEBC_bXAlEcsZVeenoey814xn5tZUn5x7YhnBAcE7sSHh_y-tHiwLMV&s=fWfU_W9JdbO990m0I6BR0XZKVcBXRFojpaNIzaiyKyI&e=) TP for TR 37.717-21-11 to include DC\_2-7\_n25 | Ericsson, Bell Mobility | Moderator :Moved from 106: how can FDD band 2 and band 25 be supported and simulataneous Tx/RX aspects |
| [**R4-2201574**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F101-2Dbis-2De_Docs_R4-2D2201574.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=lZYh7X5C3VEBC_bXAlEcsZVeenoey814xn5tZUn5x7YhnBAcE7sSHh_y-tHiwLMV&s=7C_g774ugTMsY09TTp9fPPa2X_Gi7jnE41NchP7vWqc&e=) TP for TR 37.717-31-11 to include DC\_2-7-66\_n25 | Ericsson, Bell Mobility | Moderator: Moved from 106: how can FDD band 2 and band 25 be supported and simulataneous Tx/RX aspects |
| [**R4-2201575**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F101-2Dbis-2De_Docs_R4-2D2201575.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=lZYh7X5C3VEBC_bXAlEcsZVeenoey814xn5tZUn5x7YhnBAcE7sSHh_y-tHiwLMV&s=m7VA0R_J15k88l6fCwNNYdlnA31IgjohQaf1IhhbphM&e=) TP for TR 37.717-31-11 to include DC\_2-7-13\_n25 | Ericsson, Bell Mobility | Moderator: Moved from 106: how can FDD band 2 and band 25 be supported and simulataneous Tx/RX aspects |

## Open issues summary

### Sub-topic 6-1: TP to TR 38.717.02-01 for CA\_n46-n96

### Sub-topic 6-2: co-banding 2 and n25

**Issue 6-2: co-banding 2 and n25**

Flag from #105 (Apple)

* “Unfortunately, I am afraid that the notes for the overlapping bands between 42 and n77/n78 may not be sufficient for B2 and n25. The reason is B42 and n77/n78 are both TDD bands and can only support non-simultaneous Rx/Tx operation. However, B2 and n25 are both FDD bands where REFSENS impact is anticipated. NOTE 7 refers to intra-band contiguous or non-contiguous EN-DC applicability for B2 and n25. But currently we only have DC\_2A-n2A specified (DC\_(n)2AA, DC\_(n)25AA, DC\_25A\_n25A have not been specified). I do not think the requirement for DC\_2A-n2A can be directly applied to the combination of B2 and n25. That is the reason why I suggest to move these special combinations to email thread [105] for further discussions.”

Recommended WF

* Resolve flag for co-banding band 2 and band n25: both on PSD in DL and simultaneous Tx/Rx

## Companies views’ collection for 1st round

### Open issues

Sub topic 6-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Skyworks | Issue 6-2 co-banding 2 and n25: it seems the intention is that there is no UL in band 2 but:  DC\_2\_n25 should still be added with no UL in band 2, the channel configurations and similar notes than DC\_42\_n77 but as Apple pointed out, this is co-banding of an FDD band thus the UL in n25 will generate de-sense in band 2, also here it is unclear if the band 2 DL channel and n25 DL channel are contiguous or non contiguous. We should determine what is the worst band 2 DL channel position and derive MSD which may need dedicated measurements thus is seems unlikely to finalize this meeting but we could have a WF describing the issue and agree on MSD test point and how to reflect in the specification.  At a first glance since band 2 starts at the bottom of n25 the worst case is when band 2 is at lowest channel and n25 at the highest channel, in that case, the gap between n25 UL and band 2 DL is 15MHz thus a worst case configuration could be 5MHz band 2 + 20MHz band 25 and IMD3/CIM3 related MSD which can be in the > 30dB based on similar IMD3 cases for 1UL non-contiguous intra-band CA. |
| Ericsson | We suggest to use DC\_2A\_n2A values |
| Qualcomm | The fall-back combination DC\_2\_n25 needs to be added with only n25 has the uplink, with the same notes as DC\_20\_n28 because of overlapping or adjacent DL spectrum. Then, the crossband noise of the inter-band combination needs to be defined with a specified UL configuration. MSD should be evaluated to see if same REFSENS relaxation of DC\_2\_n2 could be applied. |
| Apple | We agree with Skyworks on the worst-case configuration which is expected to be worse than DC\_2\_n2. |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| **R4-2202281** TP to TR 38.717.02-01 for CA\_n46-n96 | ZTE: For this combs, due to band n46 is immediately adjacent to band n96, so some Rx requirements of inter-band CA, such as in-band blocking cannot be applied. So this TP said ‘The minimum requirements for intra-band non-contiguous CA/DC apply for CA\_n46-n96 and related higher order CA/DC configurations.’.  Due to only single carrier is supported in UL, therefore there is no need to analysis the 2UL issues, i.e. all of the contents in clause 6.x.2 should be removed. |
| Skyworks: Agree with ZTE that 2UL section is not needed since only 1UL will exist in the higher order combos.  The note “Note: CA\_n46-n96 with UL is not specified and it is only used on higher order BC’s.” is unclear since 2UL does not exist but 1UL will exist in higher order combos. I understand that the n48-n46 and n48-n96 2UL are defined in the respective 2 band combinations but the note could clarify that only 1UL in n46 or n96 will be allowed in higher order combos.  Now the main issue is that there is no gap between n46 and n96, thus some blocking aspects cannot apply, furthermore because of this, there are solutions that have a single WB receiver from 5150 to 7125MHz and thus colocation of n46 and n96 should be assumed and balanced per band PSD should be assumed. For this the Note 3, 4 and 11 from Table 5.5B.4.1-1 in 38.101-3 can be adapted to NR CA.  It should also be noted that higher order cases use CA\_n46X-n96X DL cases. These needs to be added too |
| Charter Communications Inc. Thanks for the feedback. I will add a new revision removing 6.x.2 I will also add to the note, “CA\_n46-n96 with UL is not specified and it is only used on higher order BC’s.” is unclear since 2UL does not exist but 1UL will exist in higher order combos.” That, “only 1UL in n46 or n96 will be allowed in higher order combos”. Thanks for the feedback. With regards to the comment regarding note 3, 4 and 11 from table 5.5B.4.1-1 in 38.101-3 is the suggestion is to create a CR to 38.101-3 to add to this note? |
|  | Charter Communications Inc Latest Revision R4-XXXXXXX\_n46-n96\_rev4 has latest changes |
|  | Qualcomm: There is a note NOTE X:   Simultaneous Rx/Tx capability does not apply for UEs supporting CA\_n46-n96. Same restrictions are applied to related higher order configurations. The minimum requirements for intra-band non-contiguous CA/DC apply for CA\_n46-n96 and related higher order CA/DC configurations.  So the note is saying that the two bands are synchronized Tx to Tx and Rx to Rx. But since these are bands for shared spectrum with each band subject to its own LBT, then how can you ensure synchronization? |
| [**R4-2200176**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200176.zip) TP to TR TR38.717-03-01 for CA\_n46-n48-n96 | Skyworks: assuming proper notes are agreed in the CA\_n46-n96 TP, the note in Table 6.X.1-1 can be removed from the table. It is Ok to add a note outside the table to refer to the 2 band TP for the n46-n96 co-banding aspects. Since our understanding is that all 3 bands do not have simultaneous Tx/Rx, the harmonic study is not needed and a simple note could point at that but it is OK. delta T and delta R on n46 and n96 should account for the fact that co-banding is used so it is unclear why it is 0 for n46.  BCS issue: 1UL config in 176 and 2UL in 059 are both BCS0, how do we distinguish? |
| Charter Communications Inc Latest revision in Rev of R4-2200176. Similar revisions were made on Rev2 of R4-2200059 |
| Charter Communications Inc. I will add the notes in n46-n96 and remove note in table 6.x.101. Clarification on this input, “It is Ok to add a note outside the table to refer to the 2 band TP for the n46-n96 co-banding aspects”, what would you suggest the note to be? |
| Qualcomm: Similar comment as above. The REFSENS requirement states n46-n96 shall be synchronized in UL/DL configuration and frame boundary/timing but due to the uncertainty in LBT timing, how to you ensure that you remain synchronized? |
| [**R4-2200059**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200059.zip) TP to TR 38.717.02-01 for CA\_n46-n48--n96 | Skyworks: assuming proper notes are agreed in the CA\_n46-n96 TP, the note in Table 6.X.1-1 can be removed from the table. It is Ok to add a note outside the table to refer to the 2 band TP for the n46-n96 co-banding aspects. delta T and delta R on n46 and n96 should account for the fact that co-banding is used so it is unclear why it is 0 for n46.  Typo “CA\_n48A-n96Bb”  BCS issue: 1UL config in 176 and 2UL in 059 are both BCS0, how do we distinguish? |
| Charter Communications inc. . I will add a new revision removing 6.x.2 I will also add to the note, “CA\_n46-n96 with UL is not specified and it is only used on higher order BC’s.” is unclear since 2UL does not exist but 1UL will exist in higher order combos.” That, “only 1UL in n46 or n96 will be allowed in higher order combos”.  With regards to, “delta T and delta R on n46 and n96 should account for the fact that co-banding is used so it is unclear why it is 0 for n46.” I was reconsidering. “0” was assumed from other studies made on n46 but to your point, I believe from other studies 0.5 dB should be added. Agree? Once I get confirmation of all of this I will provide revisions to check. |
| Qualcomm: Same question as above |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic #6.1**  DC\_2\_n25 | *Tentative agreements:* There is agreement that n25 UL MSD to band 2 is an issue and is more stringent than DC\_2\_n2 due to smaller gap. MSD is anticipated to be important due to IMD3 relation. A DC\_2\_n25 combinations is needed to be introduced with only UL in n25 and co-banding/higher order combination notes  *Candidate options:*A TP can be generated that at least captures the combination, the MSD test point and MSD values further discussed in Rd2  *Recommendations for 2nd round:*Rd2 discuss TP content directly |
| **Sub-topic #6.2** | *Tentative agreements:* There is agreement that CA\_n46-n96 is needed and should be based on co-banding with associated notes. However there is questions about the feasibility of non-simultaneous Tx/Rx between n46 and n96 with the LBT process, this question would also apply to 3 band cases n46-n48-n96  *Candidate options:* TP for CA\_n46-n96 is generated but simultaneous TX/RX or not should be further discussed and implications assessed  *Recommendations for 2nd round:* Further discuss simultaneous Tx/Rx and comment on TP directly |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round

### Open issues

#### Sub-topic 1-1: Equal PSD

Issue 6-1: DC\_2\_n25 MSD, comment in TP directly and provide input to 1UL in n25 MSD test point an value (>DC\_2\_n2)

Issue 6-1: CA\_n46-n96 simultaneous Tx RX feasibility and impact on co-banding, higher order cases and potential MSD.

Way forward: TP can be started ion the assumption of non-simultaneous Tx/Rx and need to capture outcome of the discussion on simultaneous Tx/Rx

### Companies views’ collection for 2nd round

#### Open issues

Sub topic 6-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Skyworks | CA\_n46-n96 non-simultaneous Tx/Rx assumption seems very restrictive for DL opportunities given that each band is subject to LBT with other technologies that are not synchronized in the two bands but there may be options for LBT in each band and it should be OK with co-banding as long as interfering power in one band is within +/-6dB of the wanted signal (i.e. can use the same front end gain setting). It should be noted that for the higher CA\_n46-n48-n96 supporting non-simulatneous Tx/Rx may be even further restrictive as there is no synchronization between interference in n46 and n96 DL/UL and band n48 DL/UL. |
| Qualcomm | We also think that non-simultaneous transmission between an LBT-based carrier and any other carrier (either LBT-based or not) is going to be very restrictive on scheduling such that the performance would not be satisfactory and depending on network congestion may not even be usable. We suggest that a filtering solution whereby cross-band isolation (if possible) can be provided would be far superior. Anyways, a UE that supports simultaneous Tx/Rx is a superset so would work well even if the network could schedule so that there is no Tx/Rx conflict, but would not require such intricate scheduling. |
| Charter Communications Inc. | Question for clarification. How about adding MSD to address any possible synchronization issues as a result of LBT? |
| Skyworks | (not as moderator) Given the situation we suggest that we agree the combinations with the the non-simultaneous Tx/Rx assumption for n46, n48 and n96 but that potential issues with such solutions are further discussed in next meeting. If it is found that it is beneficial that some of the restrictions can be lifted we can then discuss the architecture and MSD impacts. |

#### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2202280 TP to TR on DC\_2\_n25 | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |
|  |
| R4-2202281 TP to TR on CA\_n46-n96 | Charter Communications Inc.: To Qualcomm’s comment in round 1: As the note implies simultaneous Rx/Tx does not apply for UE’s supporting CA\_n46-n96. This is no difference than already approved combinations with n46-n48 and n48-n96. This combo is to address needed fallback. With regards to LBT timing, it is our understanding that once the LBT is clear, the transmissions will be synchronized.  Furthermore, It'd be after LBT on both channels and establishing a COT in each that gNB can make sure about a sync transmission on both. If LBT fails entirely in one of them, then sync not needed. If LBT fails partially in one, then there is still a COT, with narrower band, and the gNB can have a sync transmission on both. My understanding is that, if there is a partial LBT failure on each of channels, there would be a short period where transmission is not sync at the beginning of the COTs, after which the gNB can make it sync.  The latest revision of this TP (Latest Revision R4-XXXXXXX\_n46-n96\_rev4) contains all of the flags addressed and this comment should address Qualcomm’s concern. We kindly request for a new T-doc number for draft and ultimately TP approval. |
| Qualcomm: See comment above |
| Skyworks: draft Rev4 has still some errors: the Notes should be separate:  NOTE X:   Simultaneous Rx/Tx capability does not apply for UEs supporting CA\_n46-n96. Same restrictions are applied to related higher order configurations  NOTE Y: The minimum requirements for intra-band non-contiguous CA/DC apply for CA\_n46-n96 and related higher order CA/DC configurations.  NOTE Z: The combination is not used alone as fall back mode of other band combinations in which UL in Band 48 is not used.  NOTE ZZ: The minimum requirements for inter-band CA apply when the maximum power spectral density imbalance between downlink carriers is within 6 dB. The power spectral density imbalance condition also applies for these carriers when applicable CA configuration is a subset of a higher order CA configuration  **After looking at Rev5, this one is OK provided we have agreements for non-simultaneous Tx/Rx** |
| Charter Communications Inc. I will add a new revision to address the errors.  Charter Communications Inc R4-XXXXXXX\_n46-n96\_rev5 has been uploaded |
| R4-2202282 Rev of R4-2200176 TP to TR TR38.717-03-01 for CA\_n46-n48-n96 | Charter Communications Inc.: To Qualcomm’s comment in round 1: As the note implies simultaneous Rx/Tx does not apply for UE’s supporting CA\_n46-n96. This is no difference than already approved combinations with n46-n48 and n48-n96. This combo is to address needed fallback. With regards to LBT timing, it is our understanding that once the LBT is clear, the transmissions will be synchronized.  Furthermore, It'd be after LBT on both channels and establishing a COT in each that gNB can make sure about a sync transmission on both. If LBT fails entirely in one of them, then sync not needed. If LBT fails partially in one, then there is still a COT, with narrower band, and the gNB can have a sync transmission on both. My understanding is that, if there is a partial LBT failure on each of channels, there would be a short period where transmission is not sync at the beginning of the COTs, after which the gNB can make it sync.  The latest revision of this TP (Rev of R4-220176) contains all of the flags addressed and this comment should address Qualcomm’s concern. We kindly request for a new T-doc number for draft and ultimately TP approval. |
| . Charter Communications Inc Draft revisions of R4-2202282 and draft revision of R4-2202283 have been uploaded for approval |
| Qualcomm: See comment above |
| Skyworks: provided that non-simultaneous Tx/Rx for n46, n48 and n96 is agreed, revision is OK |
| R4-22202283 Rev of R4-2200059 TP to TR 38.717.02-01 for CA\_n46-n48--n96 | Charter Communications Inc.: To Qualcomm’s comment in round 1: As the note implies simultaneous Rx/Tx does not apply for UE’s supporting CA\_n46-n96. This is no difference than already approved combinations with n46-n48 and n48-n96. This combo is to address needed fallback. With regards to LBT timing, it is our understanding that once the LBT is clear, the transmissions will be synchronized.  Furthermore, It'd be after LBT on both channels and establishing a COT in each that gNB can make sure about a sync transmission on both. If LBT fails entirely in one of them, then sync not needed. If LBT fails partially in one, then there is still a COT, with narrower band, and the gNB can have a sync transmission on both. My understanding is that, if there is a partial LBT failure on each of channels, there would be a short period where transmission is not sync at the beginning of the COTs, after which the gNB can make it sync.  The latest revision of this TP (Rev2 of R4-2200059) contains all of the flags addressed and this comment should address Qualcomm’s concern. We kindly request for a new T-doc number for draft and ultimately TP approval. |
|  |
| Qualcomm: See comment above. |
| Charter Communications Inc Draft revisions of R4-2202282 and draft revision of R4-2202283 have been uploaded for approval |
| Skyworks: provided that non-simultaneous Tx/Rx for n46, n48 and n96 is agreed, revision is OK |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| R4-220xxxx draftCR to R17 38-101-1 to correct intra-band CA REFSENS MSD test points | Skyworks, Qualcomm | As agreed: removes 1UL test points and changes 2UL test points with swapped PCC/SCC. |
| R4-220xxxx WF on LB-LB MSDs | Skyworks, Qualcomm | Captures MSD agreements on CA\_n29-n71, CA\_n5-n28, CA\_n18-n28, CA\_n20-n67 and DC\_n20-n67 |
| R4-220xxxx draftCR to R17 38-101-1 on MSD for CA\_n29-n71 | Dish, Nokia, Qualcomm, Skyworks | Captures averaged values from Qualcomm and Skyworks |
| R4-220xxxx draftCR to R17 38-101-1 on MSD for CA\_n5-n28 | Skyworks | CR is generated based on R4-2202036 but values are in brackets and amended based on the discussion |
| R4-220xxxx draftCR to R17 38-101-3 on MSD for DC\_20A-38A\_n8A | Skyworks | Captures proposed values in R4-2202036 |
| R4-220xxxx WF on triple beat evaluation and specification framework | Qualcomm, Skyworks | Based on an example band combination, provides all the evaluations needed, specification framework agreements and if possible some time plan. |
| R4-220xxxx TP to TR for DC\_2\_n25 with 1UL | Ericsson, Bell Mobility | DC\_2\_n25 is introduced with only UL in n25 and co-banding/higher order combination notes, the MSD test point and MSD values further discussed in Rd2 |
| R4-220xxxx TP to TR for CA\_n46-n96 | Charter Communications, Inc | Need to capture notes for co-banding and agree whether non-simultaneous Tx/Rx is feasible |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| [**R4-2202039**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202039.zip) | Intra-band CA REFSENS Ambiguity | Qualcomm Incorporated | Noted | merged in CR to correct intra-band CA REFSENS MSD test points |
| [**R4-2202028**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202028.zip) | Corrections to Intra-band CA MSD for CA\_n5B and CA\_n7B | Skyworks Solutions Inc. | Noted |
| [**R4-2202035**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202035.zip) | Measurements for CA\_n29-n71 MSD | Skyworks Solutions Inc. | noted | Values averaged in WF on LB-LB MSDs and CR on MSD for CA\_n29-n71 |
| [**R4-2200706**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200706.zip) | n29 MSD in CA\_n29-n71 | Nokia, Dish | Noted |
| [**R4-2202037**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202037.zip) | CA\_n29A-n71A MSD | Qualcomm Incorporated | Noted |
| [**R4-2202036**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202036.zip) | Measurements for CA\_n5-n28 MSD | Skyworks Solutions Inc. | Noted | Values are in brackets and amended based on the discussion and captured in CR on MSD for CA\_n5-n28 |
| [**R4-2202038**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202038.zip) | MSD for DC\_20A-38A\_n8A | Skyworks Solutions Inc. | Noted | Proposal captured in CR on MSD for DC\_20A-38A\_n8A |
| [**R4-2202034**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202034.zip) | Triple beat B3 MSD evaluation for DC\_3A\_n41C (revision pending) | Skyworks Solutions Inc. | Was revised | Input to WF on triple beat evaluation and specification framework |
| [**R4-2202154**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_101-bis-e/Inbox/R4-2202154.zip) | Rev of R4-2202034 Triple beat B3 MSD evaluation for DC\_3A\_n41C | Skyworks Solutions Inc. | Noted |
| [**R4-2202022**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202022.zip) | NR-U Contiguous UL-CA Measurements | Skyworks Solutions Inc. | Noted | Further discussed in Rd2 and if more feedback WF may be requested before Friday |
| [**R4-2200698**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200698.zip) | Working procedures for updating release independence specification | Nokia, Nokia Shanghai Bell | Noted | There is agreement to use A-2 from R4-2201440 but unclear how to capture. Will be discussed in Rd2 and if needed TDoc requested before Friday |
| [**R4-2201440**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201440.zip) | Discussion on the working procedure for introducing release independent features | CHTTL | Noted |
| [**R4-2201804**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201804.zip) | Discussion on the Rel-17 specifications: 25-series and 34-series | Huawei | Noted | Proposals are agreed and see how to capture and communicate to MCC |
| [**R4-2201565**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201565.zip) | TP for TR 38.717-02-01 to include CA\_n20-n67 | Ericsson, BT plc | Approved | After careful checking, no MSD for cross band due to large frequency gap vs channel BW  Higher order TPs can be approved too in #107: R4-2201566, R4-2201568, R4-2201567, R4-2201569, R4-2201570, R4-2201571, R4-2201572 |
| [**R4-2200176**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200176.zip) | TP to TR TR38.717-03-01 for CA\_n46-n48-n96 | Charter Communications, Inc | To be Revised | Revision needed for typo and NOTE modification based on agreements on CA\_n46-n96 but also discussion on simultaneous Tx/Rx |
| [**R4-2200059**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200059.zip) | TP to TR 38.717.02-01 for CA\_n46-n48--n96 | Charter Communications, Inc | To be Revised |
| [**R4-2201573**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F101-2Dbis-2De_Docs_R4-2D2201573.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=lZYh7X5C3VEBC_bXAlEcsZVeenoey814xn5tZUn5x7YhnBAcE7sSHh_y-tHiwLMV&s=fWfU_W9JdbO990m0I6BR0XZKVcBXRFojpaNIzaiyKyI&e=) | TP for TR 37.717-21-11 to include DC\_2-7\_n25 | Ericsson, Bell Mobility | Agreeable, pending fall back | Pending agreement on R4-220xxxx TP to TR for DC\_2\_n25 with 1UL |
| [**R4-2201574**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F101-2Dbis-2De_Docs_R4-2D2201574.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=lZYh7X5C3VEBC_bXAlEcsZVeenoey814xn5tZUn5x7YhnBAcE7sSHh_y-tHiwLMV&s=7C_g774ugTMsY09TTp9fPPa2X_Gi7jnE41NchP7vWqc&e=) | TP for TR 37.717-31-11 to include DC\_2-7-66\_n25 | Ericsson, Bell Mobility | Agreeable, pending fall back |
| [**R4-2201575**](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_TSG-5FRAN_WG4-5FRadio_TSGR4-5F101-2Dbis-2De_Docs_R4-2D2201575.zip&d=DwMFAg&c=VYRDWu-sKuQrybEAJ2u-dYX_FK6X1lTrDf-PKXUa2P4&r=pRthG0xxDB77vg4aSNBQn5JOtJLs0OZjgw-oylT0McK0oow-yPNwujyHTOyyY1lN&m=lZYh7X5C3VEBC_bXAlEcsZVeenoey814xn5tZUn5x7YhnBAcE7sSHh_y-tHiwLMV&s=m7VA0R_J15k88l6fCwNNYdlnA31IgjohQaf1IhhbphM&e=) | TP for TR 37.717-31-11 to include DC\_2-7-13\_n25 | Ericsson, Bell Mobility | Agreeable, pending fall back |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2202405 | WF on introducing release independent features for TS 36.307 and TS 38.307 | CHTTL, Nokia | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-2202274 | draftCR to R17 38-101-1 to correct intra-band CA REFSENS MSD test points | Skyworks, Qualcomm | Agreeable, Revised, Noted |  |
| R4-2202275 | WF on LB-LB MSDs | Skyworks, Qualcomm | Agreeable, Revised, Noted |  |
| R4-2202276 | draftCR to R17 38-101-1 on MSD for CA\_n29-n71 | Dish, Nokia, Qualcomm, Skyworks |  |  |
| R4-2202277 | draftCR to R17 38-101-1 on MSD for CA\_n5-n28 | Skyworks |  |  |
| R4-2202278 | draftCR to R17 38-101-3 on MSD for DC\_20A-38A\_n8A | Skyworks |  |  |
| R4-2202279 | WF on triple beat evaluation and specification framework | Qualcomm, Skyworks |  |  |
| R4-2202280 | TP to TR for DC\_2\_n25 with 1UL | Ericsson, Bell Mobility |  |  |
| R4-2202281 | TP to TR for CA\_n46-n96 | Charter Communications, Inc |  |  |
| R4-2202282 | Rev of R4-2200176 TP to TR TR38.717-03-01 for CA\_n46-n48-n96 | Charter Communications, Inc |  |  |
| R4-2202283 | Rev of R4-2200176 TP to TR TR38.717-03-01 for CA\_n46-n48-n96 | Charter Communications, Inc |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents

# Annex

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|  |  |  |
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Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)