**3GPP TSG-RAN WG4 Meeting #100-e Revision of R4-2114702**

**Electronic Meeting, 16th – 27th August, 2021**

**Agenda item:** 5.1.2.2, 5.1.2.3

**Source:** Hisashi Onozawa (Nokia)

**Title:** Email discussion summary for [100-e][102] NR\_Maintenance\_R15\_Part\_2

**Document for:** Information

# Introduction

The following three topics are treated in this email discussion thread.

* Topic #1: Rel-15 Maintenance of TS 38.101-2 / TR 38.815 / TR 38.817-01
* Topic #2: Rel-15 Maintenance of TS 38.101-3
* Topic #3: intraBandENDC-support

Agenda changes: the following documents about two LS from RAN5 are moved to the email discussion thread #149.

* R4-2113402
* R4-2113888
* R4-2113889
* R4-2114393

The following documents were discussed in the thread #104 in the first round, but will be treated in Topic #3 of this threat #102 in the 2nd round.

* R4-2112820
* R4-2112821

# Topic #1: Rel-15 Maintenance of TS 38.101-2 / TR 38.815 / TR 38.817-01

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2112734 | NTT DOCOMO INC. | This is a discussion paper for the following CR.  Proposal: Agree CR [R4-2111816] to capture the related agreements and the status of the discussion on NS(s) associated with EESS protection after 2024 and 2027 to provide convenient reference for the future. |
| R4-2111816 | NTT DOCOMO INC. | Summary of change:  1: Capture the background of the issue related to the introduction of new NS(s) into already existing band(s).  2: Capture the agreed solution of explicit signaling for a UE to report newly supported NS value(s) for a legacy band to the network (reuse modifiedMPR bits), and the agreement that newly introduced NS is mandatory for UE brought into use at least after the changeover date.  3: Clarify the status of NSs associated with the requirements applied to UE brought into use after 2024 and 2027 which have not yet introduced in TS 38.101-2. |
| R4-2112025 | Apple, Qualcomm Incorporated, Ericsson | Summary of change:  For FR2 intra-band CA combinations with multiple sub-blocks, where at least one of the sub-blocks consists of a contiguous CA combination, the following two changes are implemented:  1. Remove the requirement of direct fallback to single FR2 carrier  2. Based on UE signaling a capability bit, introduce an applicability rule for Rx requirements (impacting clauses 7.5A, 7.5D, 7.6A, 7.6D) for fallbacks with multiple sub-blocks, where at least one of the sub-blocks consists of a contiguous CA combination  Changes to RAN2 specifications on UE capabilities (38.306) and RRC (38.331) are needed to introduce per-UE capability.  Cat A CR reserved in R4-2112026 and R4-2112027. |
| R4-2112139 | Apple | This is a discussion paper for the following CR.  Proposal: The definition of PPowerclass as minimum peak EIRP. |
| R4-2112140 | Apple | Summary of change:  The definition of PPowerclass as minimum peak EIRP.  Cat A CR reserved in R4-2112141 and R4-2112142. |
| R4-2112219 | Rohde & Schwarz | This is a discussion paper for the following dCR.  Proposal 1: Add clarification that the transmit modulation requirements are defined as directional requirements in the Tx beam peak direction.  Proposal 2: Update the IBE requirements for UL MIMO not be defined on a per layer basis, but in terms of the sum of emissions over both polarizations. |
| R4-2112216 | Rohde & Schwarz | Summary of change:  Change IBE requirements to the same metrics as other emission measurements.  Added statement that defines the requirements in Tx beam peak direction.  Cat A dCR reserved in R4-2112217 and R4-2112218 |
| R4-2112366 | Apple | Summary of change:  The minimum SSB and minimum CSI-RS values in Table 6.6.4.3.1-1 are corrected.  Cat A dCR reserved in R4-2112367 and R4-2112368 |
| R4-2112582 | Qualcomm Incorporated, Apple Inc. | Summary of change:  Change Pmin  1. No suffix requirements: Single CC Pmin scales by BW  2. D-suffix requirements: Pmin scales by BW \* number of layers  3. Modify all subclauses where Pmin is referenced as an absolute number to reference the Pmin requirement subclause instead  4. Editorial changes to move phrases repeated for every power class to the general section.  Extend clarifications to UE configurations made in agreed R4-2011920 to Pmin requirement also. Referenced CR only addressed peak EIRP and MPR requirements, but neglected to address Pmin:  1. Agreed changes in R4-2011920 applied to Pmin section and Tx signal quality section.  Cat A CR reserved in R4-2112583 and R4-2112584 |
| R4-2112968 | Samsung, Verizon | Summary of change:  A revision of the scope to clarify that n261 is not addressed in TR 38.815. |
| R4-2113103 | Xiaomi | Summary of change:  The Minimum SSB\_RP values and Minimum CSI-RS\_RP values are defined per band in the section of side conditions for beam correspondence. Therefore, For UEs that support multiple FR2 bands, the Minimum SSB\_RP values and Minimum CSI-RS\_RP values should be increased by MBS,nnot ΣMBS.  In addition, to resolve the testability concerns for multi-band requirement (MBR) framework provided by RAN5 in R5-199424, in Rel-15, RAN4 has introduced a maximum cap on to the per-band relaxation factors MBP,n and MBS,n in Rel-15 (CR R4-2003652); in Rel-16, RAN4 has obsoleted the definition of MBP and MBS from Rel-16 and beyond (CR R4-2003655) and defined the fixed per-band relaxation factors MBP,n and MBS,n to replace MBP and MBS.  Correspondingly, ΣMBS should be replaced with MBS,n in section of side conditions for beam correspondence  Cat A dCR reserved in R4-2113104 and R4-2113105. |
| R4-2114473 | Keysight Technologies UK Ltd, Qualcomm Incorporated | Summary of change:  Considering the agreement in R4-1816610, *nrofUplinkSymbols* is set to 4.  Cat A dCR reserved in R4-2114388 and R4-2114389  R4-2114387 withdrawn |

## Open issues summary

No open issue is discussed. It is discussed whether each CR/dCR should be approved, revised, or not pursued.

## Companies views’ collection for 1st round

### Open issues

*N/A*

### CRs/TPs comments collection

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

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2112734  R4-2111816 | OPPO: Agree to capture the related agreements and the status of the discussion on NS(s) associated with EESS protection after 2024 and 2027 to TR and provide convenient reference for the future.  Ericsson: agreed. It would be useful to clarify in the TR the relation to the EU harmonized standards and similar certification outside the EU, it is important that the new NS values are introduced in the 3GPP to allow sufficient time for transcription of the requirements to harmonized standards and approval of these before the changeover dates. (Introduce the new NS in the 3GPP specifications as early as possible.)  Qualcomm: Support. Thank you, NTT Docomo, for this important proposal. RAN4 spent a lot of time discussing this tricky subject, and there is no convenient record of the same. While we are dismayed that RAN4 members prefer to mark their calendars to introduce future known NS, this CR helps provide the necessary reference for future activity.  Apple: We support the proposal and the CR. This is a good way to retain all the technical aspects and the agreements on WRC-19 outcome discussions in an easier accessible place such that we can resume the new NS requirements development more efficiently when the time arrives. |
| R4-2112025 | OPPO: FR2 fallback ok  ZTE: A question for clarification, the original sentence seems apply for inter-band CA including intra-band contiguous CA, however the modified sentence seems apply for intra-band contiguous CA only. So not sure why it is not applied to inter-band CA?  Btw, different wordings are used in R4-2112028, i.e. For CA or DC configurations, which include FR2 intra-band CA configurations with multiple FR2 sub-blocks, where at least one of the sub-blocks is a contiguous CA  Nokia: We support the CR. Cover sheet says, “Changes to RAN2 specifications on UE capabilities (38.306) and RRC (38.331) are needed to introduce per-UE capability.” but it is our understanding that RAN2 changes are already implemented which is also hinted in Consequences if not approved-section.  CHTTL: Thanks for the effort.  Apple: Many thanks to companies for the comments! To ZTE: 2025 is a CR to 38.101-2, so the wording is "For FR2 intra-band CA configurations," while 2028 is a CR to 38.101-3, so the wording is "For CA or DC configurations, which include FR2 intra-band CA." To Nokia: thank you for your support. The intention was to minimize changes to the cover sheet from RAN#90, although in the "other specs affected" part the RAN2 CR numbers have been indicated. Since those CRs have already been approved, no other changes in RAN2 specs are needed. |
| R4-2112139  R4-2112140 | Nokia: We support the CR.  Qualcomm: Agree with intent of CR. We however would like to propose wording changes. Please see uploaded ‘revised(CR)’ |
| R4-2112219  R4-2112216 | OPPO: For clarification, the IBE requirement for FR2 proposal here is sum of both polarization, however, in FR1 it is per connector based, why not aligned?  Ericsson: agreed, noting that for FR1 some requirements are also absolute but the requirement nevertheless per connector (while recognizing the difference in the type of measurements between the ranges).  Rohde & Schwarz: For clarification, summing over both polarizations means in our understanding to sum over both measurement polarizations. This is independent of the transmit polarizations of the UE, since typically the UE and measurement polarizations are misaligned. If the group thinks it is better to define the IBE requirement per measurement polarization (similar to FR1), we can adapt the CR to reflect this.  Rohde & Schwarz 2: Thanks to Qualcomm for the revised CR proposal, from our side this is acceptable. However, from the feedback in this thread, RAN4 needs to agree whether to use the total component of EIRP for IBE or per polarization.  Huawei, HiSilicon: where is the revised CR? We need time to check.  Rohde & Schwarz 3: To Huawei: The revised CR was uploaded in the same folder as this summary document.  Apple: We agree with the concept for not using the per layer measurement for IBE. However, there may be a potential concern that if the UE combined UL polarization is aligned with the test equipment either V or H polarization, then the other polarization may have relatively poor SNR. By summing the emissions from both polarizations might impact the IBE performance. |
| R4-2112366 | Nokia: We support the CR |
| R4-2112582 | Nokia: We support the CR.  Qualcomm: If agreeable, we need revision TDOC for all CRs to convert them to dCRs  Huawei, HiSilicon: we think the CR need some revision.   1. For any CBW, the requirement should be tightened. E.g. for 50MHz CBW, all min power is tightened. 2. For full RB allocation, the power can follow scaling method   For the same RB allocation for different CBW, the minimum output power requirement is the same. |
| R4-2112968 |  |
| R4-2113103 | Nokia: We support the CR  NTT DOCOMO, INC: Agree the CR.  Qualcomm: Support  Apple: Agree |
| R4-2114473 | Apple: Agree |

## Summary for 1st round

### Open issues

*N/A*

### CRs/TPs

See clause 4.

## Discussion on 2nd round (if applicable)

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| **CR/TP number** | **Comments collection** |
| R4-2112140 | Moderator: Please indicate if tdoc revision is necessary.  Qualcomm: We erroneously indicated we had a revision for this CR in the first round, that comment was actually meant for R+S R4-2112216 (below). We have no comments on this CR. We apologize for delaying decision on this CR. |
| Revision of R4-2112216 | Moderator: Revised to R4-2114892  Rohde & Schwarz: We have reuploaded the revision made by Qualcomm in the first round to the second round folder. From our side the revised version is ok.  On the discussion of whether to measure the IBE as total component EIRP or per polarization, we still think that the measurement as total component EIRP is the correct approach. This also the way the IBE are measured for the SISO (see 38.521-2) case, so in our understanding there is no need to change the approach for UL MIMO. Since the limits in the requirements are either absolute power or in relation to the transmitted power from the UE, it only makes sense to measure the IBE as total component EIRP (= sum of both measurement polarizations). Also all other emission measurements are performed as total component EIRP as well, so there is no reason to make an exception here.  Qualcomm: Agree with R+S. Since IBE is a measure of in-channel coex with other UEs, it is a limitation on total power transmitted by the UE outside its allocation. For another UE, in the general case, it ought not to matter if the test UE is using one port or 2, one polarization or 2. ‘Total component’ is indeed the correct way to measure EIRP regardless of tested UE UL configuration. |
| Revision of R4-2112582 | Moderator: Revised to R4-2114891 |

# Topic #2: Rel-15 Maintenance of TS 38.101-3

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2112028 | Apple, Qualcomm Incorporated, Ericsson | Summary of change:  For CA or DC configurations, which include FR2 intra-band CA combinations with multiple subblocks, where at least one of the subblocks consists of a contiguous CA combination, the following two changes are implemented:  1. Remove the requirement of direct fallback to single FR2 carrier  2. Based on UE signaling a capability bit, introduce an applicability rule for Rx requirements (impacting clauses 7.5A, 7.5B, 7.6A, 7.6B) for fallbacks with multiple sub-blocks, where at least one of the sub-blocks consists of a contiguous CA combination  Changes to RAN2 specifications on UE capabilities (38.306) and RRC (38.331) are needed to introduce per-UE capability.  Cat A CR reserved in R4-2112029 and R4-2112030 |
| R4-2112580 | SoftBank Corp. | Summary of change:  The new section and table are added to make the requirements clear. |
| R4-2112581 | SoftBank Corp. | This is the Rel-16 CR corresponding to R4-2112580. (it’s not a trivial cat A)  Summary of change:  The new section and table are added to make the requirements clear. |
| R4-2112585 | SoftBank Corp. | This is the Rel-17 CR corresponding to R4-2112580. (it’s not a trivial cat A)  Summary of change:  The new section and table are added to make the requirements clear. |
| R4-2113018 | vivo | Summary of change:  Correct the in correct scaling number of “1,000.000” to “1,000,000” for the MPR and A-MPR equations.  Cat A dCR reserved in R4-2113019 and R4-2113020 |
| R4-2113431 | Huawei, HiSilicon | Summary of change:  1. To impove the wording of MSD due to counter intermodulation interference.  2. The counter intermodulation interference is replaced by PA non-linearities interference in 1st and 2nd adjacent channel of UL band.  Cat A dCR reserved in R4-2113432 and R4-2113433 |
| R4-2113436 | Huawei, HiSilicon | Summary of change:  1. The frequency points for DC\_3A-20A\_n28A and DC\_7A-20A\_n28A are corrected.  2. 52 RB allocations are changed into 50 RB.  Cat A dCR reserved in R4-2113437 and R4-2113438 |
| R4-2114390 | Keysight Technologies UK Ltd, Orange | Summary of change:  As those 3 notes are applicable to other band combos not including band n28, all of them have been duplicated to define similar notes applicable to NR carrier:  • NOTE 20 has been defined equal to NOTE 9 but related to NR carrier and such note has been made applicable to band combos DC\_1\_n28, DC\_3\_n28, DC\_7\_n28.  • NOTE 21 has been defined equal to NOTE 14 but related to NR carrier and such note has been made applicable to band combos DC\_1\_n28, DC\_3\_n28.  • NOTE 22 has been defined equal to NOTE 17 but related to NR carrier and such note is applicable to band combos DC\_1\_n28.  Cat A dCR reserved in R4-2114391 and R4-2114392 |

## Open issues summary

No open issue is discussed. It is discussed whether each CR/dCR should be approved, revised, or not pursued.

## Companies views’ collection for 1st round

### Open issues

**N/A**

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2112028 | ZTE: Comparing with R4-2112025, we see different wordings are used in the beginning of the sentence, which may impact the scope.  Nokia: We support the CR. Cover sheet says, “Changes to RAN2 specifications on UE capabilities (38.306) and RRC (38.331) are needed to introduce per-UE capability.” But it is our understanding that RAN2 changes are already implemented which is also hinted in Consequences if not approved-section.  Apple: Many thanks to companies for the comments! To ZTE: 2025 is a CR to 38.101-2, so the wording is "For FR2 intra-band CA configurations," while 2028 is a CR to 38.101-3, so the wording is "For CA or DC configurations, which include FR2 intra-band CA." To Nokia: thank you for your support. The intention was to minimize changes to the cover sheet from RAN#90, although in the "other specs affected" part the RAN2 CR numbers have been indicated. Since those CRs have already been approved, no other changes in RAN2 specs are needed. |
| R4-2112580  R4-2112581  R4-2112585 | OPPO: These CRs rely on the conclusion of Sub-topic 1-2 in thread [101].  ZTE: We see there are some issues discussed in thread #101 which may impact these CRs.  NTT DOCOMO, INC: Support the intention of these CRs. We have a comment and a question. DC\_1\_n3 seems to be missing from the CR while DC\_1\_n3 is specified in TS 38.101-3 from Rel-16. Question is that, compared to the similar CRs for TS 38.101-1(R4-2112518/R4-2112571/R4-2112578) proposed by SoftBank, the sentence described in 6.5A.3.3.3 in those CR for TS 38.101-1 is different form that described in 6.5B.4.2 in the CRs for TS 38.101-3. The former is clearer description to us. Are there any intention? If not, we prefer to use the same(similar) sentence with that used in the CRs for TS 38.101-1(R4-2112518/R4-2112571/R4-2112578).  Qualcomm: This is related to the same proposal for UL CA in thread 101.  SoftBank: To docomo: I believe DC\_1\_n3 was captured in R16(2581). Please check. The difference of sentences come from that I did copy and modify relevant text in 101-1 for 101-1 and 101-3 for 101-3 independently. As improvement of the content is requested in [101], the content of 101-3 CRs will also be updated accordingly. We are fine to use 101-1 text to 101-3 with necessary changes.  To: modelator: Sorry for overlapping despite this is hard to avoid in current agenda/modelator allocations. Please coordinate with [101] modulator (ZTE) on this issue.  NTT DOCOMO INC 2: To SoftBank, we are so sorry that I had a typo. We wanted to say DC\_3\_n1, not DC\_1\_n3. Sorry for confusion. And thank you for accepting the request to modify the text. |
| R4-2113018 | Qualcomm: Should the SCS be changed to 15,000 Hz instead of 15 kHz since the calculation appears to be in Hz and then converted to MHz by dividing by 1,000,000 |
| R4-2113431 | ZTE: whats the reason to correct ‘fC\_UL – 5(fUL-fC\_UL)’ to ‘fC\_UL + 5(fUL-fC\_UL)’ in the equation?  Ericsson: we appreciate the effort to improve the text, but now unclear: the interference in the DL is due to UL operation at a certain separation (up to two channels). Try revise?  Nokia: The proposed change means that the RB allocation is no more taken into account. This simplifies things. On the other hand, some RB allocations would be granted the MSD even though their CIM does not fall onto the DL. Hence, this is a trade-off between simplicity and performance.  Nokia: On ZTE’s question: The change of the CIM5 center frequency formula is correct. CIM5 is on the same side as the allocation. However, this formula should not be needed as the MSD is now determined from whether an UL adjacent channel overlaps with the DL, regardless of the RB allocation.  Huawei:  To Ericsson, companies comments that the mainly interference is from Tx non-linearity interference. The counter intermodulation interference may not reflect the real situation accurately.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Thank Nokia’s comments and explanation. We can consider to remove the formula. Maybe we can consider Skyworks’ table format to indicate the frequency center as below in thread [118].**UL band** | **DL band** | **UL Fc** | **UL BW** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | | **(MHz)** | **(MHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** | |  |  |  |  |  |  |  |  |   Skyworks: To Huawei. Thank you for bringing these corrections and referring to our table proposal that is discussed for BCS4 [118]. Table 7.3B.2.3.6-1 would benefit from adopting this table format since it allows removing the footnote that contains the equation. It would also align this table with formats/simplifications discussed in BCS4 and with table format already in place for MSD due to dual uplink intermodulation.  We agree with Nokia that C-IM5 is on the same side as the modulated RB. |
| R4-2113436 |  |
| R4-2114390 | ZTE: We prefer to make some modifications on the current notes to include NR carrier, otherswise, it may need to introduce many similar notes in the spec.  Huawei: We can use “E-UTRA or NR” for note 9, 14 and 17 instead of creating new notes.  CHTTL: Same as the above views.  Keysight Technologies: We agree with the proposal. Will the following notes updates work?  NOTE 9: Applicable when the assigned E-UTRA or NR carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.  NOTE 14: This requirement is applicable for 5 and 10 MHz E-UTRA or NR channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart < 48.  NOTE 17: This requirement is applicable in the case of a 10 MHz E-UTRA or NR carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.  We could revise the draft CR to align with this. |

## Summary for 1st round

### Open issues

*N/A*

### CRs/TPs

See clause 4.

## Discussion on 2nd round (if applicable)

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| **CR/TP number** | **Comments collection** |
| R4-2112580  R4-2112581  R4-2112585 | Moderator: Once the dCRs to TS 38.101-1 in thread #101 gets stable, please share revised dCRs for TS 38.101-3.  Revisions for all three CRs can be found in Subfolder “draftCR\_additional\_spurious\_emission\_for\_CA in\_Japan” of Round 2. |
| Revision of R4-2113431 | Moderator: Revised to R4-2114893 |
| Revision of R4-2114390 | Moderator: Revised to R4-2114894 |
| Revision of R4-2113018 |  |

# Topic #3: intraBandENDC-support

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2112373 | Apple | Observation 1: Irrespective of how many CCs are configured in each cell group, each cell group should always allow its own configuration to fall back to its primary cell only.  Observation 2: RAN2 signalling design for intra-band EN-DC combinations includes LTE DL CA configuration, LTE UL CA configuration, NR DL CA configuration, NR UL CA configuration, and the EN-DC part of the configuration is signalled by the parameter intraBandENDC-support.  Observation 3: If a UE is capable of supporting non-contiguous configuration in either DL or UL, it should also be able to support contiguous configuration in the corresponding DL or UL, but not the other way around.  Proposal 1: For intra-band EN-DC, contiguous or non-contiguous is determined by the configuration between the primary cells from each cell group.  Proposal 2: Only the configuration between LTE and NR sub-blocks are relevant to the contiguous or non-contiguous definition of the intra-band EN-DC combinations.  Proposal 3: The existing RAN2 signalling design is sufficient to indicate UE’s support for different intra-band EN-DC configurations. There is no need to introduce new signalling to differentiate intra-band DL and UL EN-DC configurations separately. |
| R4-2112374 | Apple | Summary of change:  1. Move EN-DC combinations with non-contiguous UL configuration from Table 5.3B.1.2-1 (contiguous EN-DC) to Table 5.3B.1.3-1 (non-contiguous EN-DC) and Table 5.5B.2-1 (contiguous EN-DC) to Table 5.5B.3-1 (non-contiguous EN-DC).  2. Add a note to clarify that “contiguous or non-contiguous is determined by the configuration between the primary cells from each cell group”.  3. No need for a mirror CR for Rel-16 as the same change can be included in a separate Rel-16 Cat F CR where the same error for other Rel-16 EN-DC combinations are corrected together. |
| R4-2112375 | Apple | Summary of change:  1. Move EN-DC combinations with non-contiguous UL configuration from Table 5.3B.1.2-1 (contiguous EN-DC) to Table 5.3B.1.3-1 (non-contiguous EN-DC) and Table 5.5B.2-1 (contiguous EN-DC) to Table 5.5B.3-1 (non-contiguous EN-DC).  2. Move EN-DC combinations with contiguous UL configuration from Table 5.3B.1.3-1 (non-contiguous EN-DC) to Table 5.3B.1.2-1 (contiguous EN-DC) and Table 5.5B.3-1 (non-contiguous EN-DC) to Table 5.5B.3-1 (contiguous EN-DC).  3. Add a note to clarify that “contiguous or non-contiguous is determined by the configuration between the primary cells from each cell group”.  Cat A dCR reserved in R4-2112376 |
| R4-2114062 | Nokia, Nokia Shanghai Bell | Proposal 1: For UE supporting the intra-band non-contiguous EN-DC for the number of carriers (combined both LTE and NR) more than two shall support the contiguous EN-DC as well.  Proposal 2: UE is not allowed to signal only the support of the intra-band non-contiguous EN-DC if the number of carriers (combined both LTE and NR) are more than two.  Proposal 3: All carriers (between LTE carrier and NR carrier, within LTE carriers or within NR carriers, both UL and DL) shall be contiguous, if UE indicates only the support of intra-band contiguous EN-DC, without the support of non-contiguous EN-DC.  Proposal 4: The same BCS shall be applied between contiguous and non-contiguous EN-DC.  Proposal 5: For mixed intra-band and inter-band EN-DC (for example DC\_48A\_n48A-n71), the UE capability definition is applied to the intra-band part (DC\_48A\_n48A) of the carriers.  Proposal 6: The multiple intra-band EN-DC components (for example, DC\_48A-71A\_n48A\_n71A) shall not be allowed (at least by this 3GPP release (Rel-17)).  Proposal 7: Inform RAN2 about RAN4 understanding of this UE capability. |
| R4-2114495 | Huawei, HiSilicon | Observation 1: In TS 38.101-3, contiguous or non-contiguous EN-DC is defined only based on DL configuration.  Observation 2: UE is not allowed to indicate intra-band EN-DC contiguous/non-contiguous capability in UL or DL separately.  Proposal 1: IntraBandENDC-Support IE should be indicated in UL and DL separately per band combination. Send LS to RAN2 to introduce new UE capability on distinguish intra-band ENDC UL and DL contiguous/non-contiguous support.  Proposal 2: Ask RAN2 to early implement intraBandENDC-Support IE in UL and DL separately per band combination in Rel-15 spec. |
| R4-2114539 | Google Inc. | Proposal 1: It is proposed that the contiguous or non-contiguous intra-band EN-DC is determined by the configuration between primary cell in each cell group  - Redefine the following intra-band EN-DC combinations  o DC\_(n)48CA and DC\_(n)48DA with UL DC\_48A\_n48A are intra-band non-contiguous EN-DC combination  o DC\_48A\_(n)48AA with UL DC\_(n)48AA is intra-band contiguous EN-DC combination  Proposal 2: If proposal 1 is not agreed, the compromised solution can be to introduce the new UE capability signaling from Rel-16 for intra-band EN-DC UL and DL configuration. |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 3-1 Definition of contiguous/non-contiguous EN-DC and RAN2 impact

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 3-1: Definition of contiguous/non-contiguous EN-DC**

* Proposals
  + Option 1 (Apple, Google): For intra-band EN-DC, contiguous or non-contiguous is determined by the configuration between the primary cells from each cell group.
  + Option 2 (Huawei): IntraBandENDC-Support IE should be indicated in UL and DL separately per band combination. Send LS to RAN2 to introduce new UE capability on distinguish intra-band ENDC UL and DL contiguous/non-contiguous support.
  + Option 3 (Nokia): For UE supporting the intra-band non-contiguous EN-DC for the number of carriers (combined both LTE and NR) more than two shall support the contiguous EN-DC as well. UE is not allowed to signal only the support of the intra-band non-contiguous EN-DC if the number of carriers (combined both LTE and NR) are more than two. All carriers (between LTE carrier and NR carrier, within LTE carriers or within NR carriers, both UL and DL) shall be contiguous, if UE indicates only the support of intra-band contiguous EN-DC, without the support of non-contiguous EN-DC.
  + Option 4: Others

**Issue 3-2: Impacts to signaling**

* + Option 1: No change to RAN2
  + Option 2: Ask RAN2 to introduce/change signaling.
  + Option 3: Others

## Companies views’ collection for 1st round

### Open issues

Sub topic 3-1 Definition of contiguous/non-contiguous EN-DC and RAN2 impact

|  |  |
| --- | --- |
| **Company** | **Comments** |
| OPPO | **Issue 3-1: Definition of contiguous/non-contiguous EN-DC**  Option 1. However, in previous meeting there is a question need to be further clarified, i.e. If UE indicate *intrabandENDC-support* as non-contiguous with LTE CA\_48A-48A and NR band n48A, does UE support both DC\_48A\_(n)48AA and DC\_48A-48A\_n48A? If not, how to distinguish DC\_48A\_(n)48AA and DC\_48A-48A\_n48A capability.  If classify the intra-band contiguous or non-contiguous EN-DC only based on the PCC and PSCC, then no new capability signaling is needed to differentiate UL and DL.  **Issue 3-2: Impacts to signaling**  Rely on the outcome of issue 3-1. |
| Ericsson | **Issue 3-1: Definition of contiguous/non-contiguous EN-DC**  Option 4: band combinations can be indicated using the existing band-combination capability signaling and without violating the fallback rules in 38.306 if   * combinations of intra-band contiguous and non-contiguous EN-DC, requirements are specified for two sub-blocks one of which is of a contiguous EN-DC band class as specified in Table5.3B.0-1 (the existing contiguous EN-DC band classes)   An arbitrary number of non-contiguous sub-blocks can be specified for cases in which the sub-block only contains carriers of a single RAT (either a contiguous E-UTRA configuration or a contiguous NR configuration).  Moreover, non-contiguous UL configurations should be removed from band combinations only supporting contiguous DL configurations. These UL configurations must be indicated separately in the list of band combinations supported by the UE.  Example of incompatible DL/UL combinations: DC\_(n)48CA is contiguous in the DL with two possible UL configurations, DC\_(n)48AA and DC\_48A-n48A in the UL. This DL configuration must also support fallback to DC\_48A-n48A in the DL since this is a valid UL configuration (general rule in clause 4.2). The DC\_48A-n48A has to be indicated separately in the list of supported band combinations by the UE.  Then the definition of the *intraBandENDC-Support* and the definition of contiguous/non-contiguous sub-blocks need not be changed.  Ericsson has provided a CR to 38.101-3 Rel-16 implementing the above in R4-2112820, treated in #104. Part of the changes would also apply to Rel-15, we did not observe that incompatible DL/UL combinations are also specified in Rel-15.  **Issue 3-2: Impacts to signaling**  Option 1: no change of RAN2 signaling needed if the Option 4 above is adopted. |
| Nokia | Issue 3-1: We support option 3, as we should not request any change in RAN 2 any more for Rel-15. Unclear definition should be clarified only in RAN4 spec.  A proposal from Ericsson to remove the non-configurations UL configurations from contiguous EN-DC is also fine to us in order to close this open issue in Rel-15. Then, there is no ambiguity left in Rel-15.  Issue 3-2: Option 1. It is too late to do anything for Rel-15. |
| NTT DOCOMO, INC. | **Issue 3-1: Definition of contiguous/non-contiguous EN-DC**  Option 4: Others  We prefer the direction of Ericsson’s CR(R4-2112820).  Question for option 1 is that if we consider a band combination including another LTE anchor band such as DL\_1A\_48A\_n48A\_UL\_1A\_n48A, intra-band EN-DC exists in only DL but LTE Pcell is not a part of intra-band EN-DC, then how does option 1 work?  For Option 3, our concern is that InterbandContiguousMRDC which is similar capability to IntraBandENDCSupport was introduced for UE supporting non-contiguous only. UE can indicate its supportiveness of “both contiguous and non-contiguous” or “non-contiguous only” thorough InterbandContiguousMRDC. So, if we take option 3, we need to consider different assumption between IntraBandENDCSupport and InterbandContiguousMRDC.  **Issue 3-2: Impacts to signaling**  Option 1: No change to RAN2 |
| Qualcomm | Issue 3-1: Option 2, separate signaling for UL and DL seems to be the cleanest solution that offers the greatest flexibility. Some aspects of Option 3 should also be taken into consideration.  Issue 3-2: Option 2, but the details on which release this is introduced to should be left to RAN2. |
| Huawei, HiSilicon | **Issue 3-1: Definition of contiguous/non-contiguous EN-DC**  **Option 2, agree with QC comment, it is cleanest without any ambiguity we may ignore.**  For option1, it is far from clearly indicating UE capability to the network. For DC\_(n)48CA, contiguous or non-contiguous would be decided by network Pcell configuration. For this configuration, if UE indicate contiguous support, option 1 means only DC\_(n)48AA can be configured to the UE, but UE may support DC\_48A\_n48A in UL. UE capability can not transferred to the network, and UE RF ability is just wasted, and NB configuration is obviously limited.  For option 3, UL and DL is not same for UE implementation. And currently, most Band combinations has more than 2 DLs with only 2UL CCs.  **For Ericsson’s CR, should it be treated in one thread?**  **Issue 3-2: Impacts to signaling**  Option 2. In RAN2, there is still feature under discussion whether can be early implemented into Rel-15. We can leave this to RAN2. |
| Google | Issue 3-1: Option 1. Option 4 is also aligned with our proposal in the previous meeting offline e-mail discussion. From our understanding, it seems that every combo has it own DL and UL configuration. We are not sure whether the extra reported combo DC\_48A\_n48A can be recognized by the network to apply DC\_48CA with UL DC\_48A\_n48. We think that it needs RAN2 expert to clarify. If DC\_48A\_n48A can be recognized by the network for DC\_48CA, we can support Option4. If the UE capability signaling is the majority view, we can support to introduce from Rel-16. Since the market plan for Rel-16 would be in the beginning of 2022 from our understanding, it is the good timing to introduce it.  Issue 3-2: Depends on Issue 3-1 decision. |
| Apple | Issue 3-1: Definition of contiguous/non-contiguous EN-DC: Option 1  In our view, since the contiguous or non-contiguous definition is associated with the “EN-DC” configuration, not the “LTE CA” configuration nor “NR CA” configuration (where both are signaled separately), therefore, it makes more sense the definition is based on the configuration between the primary cells from each cell group. This definition also ensures that when either LTE CA or NR CA falls back to single CC, the lower order EN-DC combination can still be supported.  As UE capability signaling is meant to inform the network what configurations can be supported, it is up to UE’s choice which capability would be signaled, but not mandated by certain rule, though in our view if a UE is able to support a non-contiguous configuration (either in DL or UL), it should also be able to support the corresponding contiguous configuration. With that said, UE should be allowed to signal CA\_41A-41A with single UL in LTE and single CC in NR, and IE *intraBandENDC-support* as “contiguous” in order to support DL DC\_41A\_(n)41AA with UL DC\_(n)41AA. In this case, the EN-DC combination should be defined as “contiguous” as the *intraBandENDC-support* is signaled as “contiguous”. If the UE can only support contiguous configurations in both DL and UL, it should signal to the network as CA\_41C with single UL in LTE and single CC in NR, and IE *intraBandENDC-support* as “contiguous” in order to support DL DC\_(n)41CA with UL DC\_(n)41AA. And again this EN-DC configuration is also defined as “contiguous”.  Issue 3-2: Impacts to signaling: Option 1 |

### 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** |
| R4-2112374 | Ericsson: not agreed, we prefer not to change the definitions of contiguous/non-contiguous (signaling changes not needed unless there are requests combinations of contiguous and non-contiguous intra-band EN-DC combinations more complex than two sub-blocks one of which is of a contiguous EN-DC band class). |
| R4-2112375 |  |

## 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: None*  *Candidate option for the issue 3-1s:*   * + Option 1 (Apple, Google, OPPO): For intra-band EN-DC, contiguous or non-contiguous is determined by the configuration between the primary cells from each cell group.   + Option 2 (Huawei, Qualcomm): IntraBandENDC-Support IE should be indicated in UL and DL separately per band combination. Send LS to RAN2 to introduce new UE capability on distinguish intra-band ENDC UL and DL contiguous/non-contiguous support.   + Option 3 (Nokia): For UE supporting the intra-band non-contiguous EN-DC for the number of carriers (combined both LTE and NR) more than two shall support the contiguous EN-DC as well. UE is not allowed to signal only the support of the intra-band non-contiguous EN-DC if the number of carriers (combined both LTE and NR) are more than two. All carriers (between LTE carrier and NR carrier, within LTE carriers or within NR carriers, both UL and DL) shall be contiguous, if UE indicates only the support of intra-band contiguous EN-DC, without the support of non-contiguous EN-DC.   + Option 4 (Ericsson, Docomo, Google, Nokia): band combinations can be indicated using the existing band-combination capability signaling and without violating the fallback rules in 38.306 if     - combinations of intra-band contiguous and non-contiguous EN-DC, requirements are specified for two sub-blocks one of which is of a contiguous EN-DC band class as specified in Table5.3B.0-1 (the existing contiguous EN-DC band classes)   *Recommendations for 2nd round: WF is assigned.* |

### CRs/TPs

See clause 4.

## Discussion on 2nd round (if applicable)

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| WF on intraBandENDC-support |  |
| R4-2112820  R4-2112821 | Moderator: Two contributions by Ericsson were submitted to Rel-16 maintenance in the email discussion thread #104. Option 4 is based on these contribution, 2820 and 2821. If you have any comment specific to option 4, you can place comments here. |
| R4-2112374  R4-2112375 | Moderator: This is just a place holder for further comments specific to Option 1 CRs. |

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on intraBandENDC-support | Nokia |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2112734 | Discussion on EESS protection requirements after 2024/2027 | NTT DOCOMO INC. | noted |  |
| R4-2111816 | draft CR for EESS protection for FR2 NR bands in TR 38.817-01 | NTT DOCOMO INC. | Agreeable | Cat A dCR reserved in R4-2112731 |
| R4-2112025 | CR to 38.101-2 on handling of fallbacks for FR2 CA | Apple, Qualcomm Incorporated, Ericsson | Agreeable | A formal CR  Cat A CR reserved in R4-2112026 and R4-2112027  (Merged to a big CR?) |
| R4-2112139 | Clarification of FR2 UE configured transmitted power | Apple | noted |  |
| R4-2112140 | Correction of FR2 UE configured transmitted power | Apple | - | 2nd round |
| R4-2112219 | Discussion on FR2 transmit signal quality for UL MIMO | Rohde & Schwarz | noted |  |
| R4-2112216 | Update of FR2 UL MIMO transmit signal quality requirements | Rohde & Schwarz | Revised | 2nd round |
| R4-2112366 | draftCR to 38.101-2 on side conditions for beam correspondence based on SSB and CSI-RS for n257, n258, n260, n261 | Apple | Agreeable | Cat A dCR reserved in R4-2112367 and R4-2112368 |
| R4-2112582 | CR to 38.101-2: P\_min requirements update | Qualcomm Incorporated, Apple Inc. | Revised | 2nd round |
| R4-2112968 | CR to TR 38.815: Adding n261 to TR scope | Samsung, Verizon | Agreeable | A formal CR  (no need of a big CR) |
| R4-2113103 | Draft CR for Rel-15 38.101-2 to replace SMBS with Delta MBS,n in section 6.6.4.3.1 of side conditions for beam correspondence | Xiaomi | Agreeable | Cat A dCR reserved in R4-2113104 and R4-2113105. |
| R4-2114473 | Draft CR on Minor correction on UL additional reference channels parameters for TDD 60kHz SCS | Keysight Technologies UK Ltd, Qualcomm Incorporated | Agreeable | Cat A dCR reserved in R4-2114388 and R4-2114389 |
| R4-2112028 | CR to 38.101-3 on handling of fallbacks for FR2 CA | Apple, Qualcomm Incorporated, Ericsson | Agreeable | Cat A CR reserved in R4-2112029 and R4-2112030  (Merged to a big CR?) |
| R4-2112580 | Clarifications on additional UE co-ex requirements for 2 Band UL CA/DC for Japan(R15) | SoftBank Corp. | - | 2nd round |
| R4-2112581 | Clarifications on additional UE co-ex requirements for 2 Band UL CA/DC for Japan(R16) | SoftBank Corp. | - | 2nd round |
| R4-2112585 | Clarifications on additional UE co-ex requirements for 2 Band UL CA/DC for Japan(R17) | SoftBank Corp. | - | 2nd round |
| R4-2113018 | Correction on scaling number for EN-DC MPR and A-MPR | vivo | Revised | Cat A dCR reserved in R4-2113019 and R4-2113020 |
| R4-2113431 | Draft CR for 38.101-3 to correct the MSD due to PA non-linearities interference in 1st and 2nd adjacent channel of UL band (Rel-15) | Huawei, HiSilicon | Revised |  |
| R4-2113436 | Draft CR for 38.101-3 to correct the MSD test points(Rel-15) | Huawei, HiSilicon | Agreeable | Cat A dCR reserved in R4-2113437 and R4-2113438 |
| R4-2114390 | Draft CR on Spurious co-existence corrections for Dual connectivity including band n28 | Keysight Technologies UK Ltd, Orange | Revised |  |
| R4-2112373 | Clarifications on intra-band EN-DC combinations | Apple | noted |  |
| R4-2112374 | Draft CR for TS 38.101-3: Corrections for intra-band EN-DC configurations | Apple | - | 2nd round |
| R4-2112375 | Draft CR for TS 38.101-3: Corrections for intra-band EN-DC configurations | Apple | - | 2nd round |
| R4-2114062 | Clarification of intra-bandENDC-Support | Nokia, Nokia Shanghai Bell | noted |  |
| R4-2114495 | on intrabandENDC-support IE | Huawei, HiSilicon | noted |  |
| R4-2114539 | Discussion on Intra-Band EN-DC support | Google Inc. | noted |  |

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** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

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

Contact information

|  |  |  |
| --- | --- | --- |
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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)