**3GPP TSG-RAN WG4 Meeting #104bis-e R4-22xxxxx**

**Electronic Meeting, 10–19 October 2022**

**Agenda item:** 9.3, 9.4

**Source:** Moderator (OPPO)

**Title:** Email discussion summary for [104-bis-e][146] RAN\_task\_UERF\_part2

**Document for:** Information

# Introduction

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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)

# Topic #1: Inconsistency issue for intra-band EN-DC band combinations

*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** |
| **R4-2215668** | Apple | ***Observation 1****: The validity of Case 3 and Case 4 configurations can be interpreted differently, depending on which aspect is being used for judgement.*  ***Observation 2****: In a band combination, the UL configuration is either the same as DL configuration or belongs to the DL fallback configurations.*  ***Observation 3****: 3GPP has never allowed a contiguous configuration to fall back to a non-contiguous configuration.*  ***Observation 4****: Despite the existing signaling design for CA would allow UE to signal DL configuration and UL configuration separately, there has never been any intra-band CA combination specified with contiguous DL configuration paired with a non-contiguous UL configuration.*  ***Observation 5****: Since the validity of the concerned configurations can be interpreted differently, it may not be so meaningful to continue the long debate in RAN4 which may just render the issue unresolved.*  ***Observation 6****: Non-contiguous UL configuration in general would be much less efficient than contiguous UL configuration due to the potential higher MPR or A-MPR.*  ***Observation 7****: If reconfiguration by the network is always needed when certain part of the spectrum is occupied by the other network, it seems to make more sense to always configure the 2 UL carriers as contiguous when the 3 DL carriers are contiguous.*  ***Observation 8****: CA\_n48A(A-B) has been specified only with CA\_n48B as UL CA, but not CA\_n48A-n48A. It is unclear why DC\_48A\_n48A is needed for DC\_48A\_(n)48AA.*  ***Observation 9****: For B41/n41 EN-DC combination without the concern of spectrum sharing, it is unclear what motivates the network to configure non-contiguous UL configuration when all the DL carriers are contiguous.*  ***Observation 10****: The Case 3 and Case 4 configurations cannot be supported on the UE side based on the existing signaling design. The scope to enable these configurations is much wider than a TEI can handle as it may involve the whole concept change in intra-band configuration fallback.*  ***Proposal 1****: The Case 3 and Case 4 proponent companies to reconsider whether there would be any merit to operate those configurations if reconfiguration by the network is always needed when certain part of the spectrum is occupied by the other network.*  ***Proposal 2****: Remove Case 3 and Case 4 configurations from current RAN4 specifications to close the issue.*  ***Proposal 3****: If the proponent companies still see the demand for Case 3 and Case 4 configurations, it is proposed to start a new study item or work item to seek for the solution.* |
| **R4-2215933** | Nokia, Nokia Shanghai Bell | ***Observation 1: Case 3 and Case 4 are needed for the flexibility of CBRS GAA operation.***  ***Proposal 1: Consider removing Case 3 for band 41 and n41 if no use case is identified.***  ***Observation 2: Fallback is defined to support reduced UE capability signalling for lower order CA/DC and is not restricting Case 3 or Case 4 configuration if there is a demand to support them.***  ***Observation 3: The existing signalling can be reused if EN-DC config including a (n) sub-block in both DL and UL is categorized to “contiguous”, EN-DC config without any (n) sub-block is categorized to “non-contiguous”, “EN-DC config including a (n) sub-block in DL and without it in UL is categorized to “both”***  ***Proposal 2: It is further discussed if we wait for RAN2 to provide a flexible signalling or indicate RAN2 to implement a CR according to Observation 3.*** |
| **R4-2215956** | Ericsson | **Observation 1: existing intra-band EN-DC configurations specified in Rel-17 can be indicated by existing signaling (with suitable restrictions for Case 4).**  and propose  **Proposal 1: for case 3, remove non-contigous UL configurations that are paired with contigousn DL configurations**   * **The UE must support non-contiguous EN-DC also in the DL, the combinations discussed already exist except DC\_41A-n41B** * **Case 3 ‘amended’ can then be indicated by a single BC entry e.g. {41C, n41A} (DL) and {41A, n41A} (UL) and intraBandENDC-Support = ‘both’**   **Proposal 2: for Case 4, Rel-17 combinations of contiguous and non-contigous intra-band EN-DC should be limited to two sub-blocks one of which consists of a contiguous CA configurations in table Table 5.3B.0-1 in 38.101-3. For these the UE must support both contigous and non-contigous EN-DC in the UL.**  **Proposal 3: changes of signaling can be made for combinations specified in Rel-18, if needed, but configurations should still comply with the existing fallback rules.** |
| **R4-2216356** | Xiaomi | **Proposal 1: According to previous common understanding, intra-band contiguous ENDC should have contiguous ENDC configurations both for UL and DL, case3 is invalid.**  **Proposal 2: If RAN4 tries to make case 3 is valid, RAN4 need first discuss whether the rule in section 4.2 of Spec 38.101-3 applies to case3, or whether case3 means a new UE capability.**  **Proposal 3: According to previous common understanding, case 4 is valid.** |
| **R4-2216412** | Google Inc., Comcast, CableLabs | **Proposal 1: The following intra-band EN-DC DL/UL configurations are valid configurations.**   * **DL DC\_(n)48CA with UL DC\_48A\_n48A** * **DL DC\_(n)48DA with UL DC\_48A\_n48A** * **DL DC\_48A\_(n)48AA with UL DC\_48A\_n48A** * **DL DC\_48A\_(n)48AA with UL DC\_(n)48AA**   **Observation 1: The intra-band EN-DC combination to support contiguous DL EN-DC configuration with non-contiguous UL EN-DC configurations by reporting an additional band combination does not violate the fallback band combination rule.**  **Observation 2: An intra-band contiguous band combination is considered to be a fallback band combination of an intra-band non-contiguous band combination. Hence, there is no issue for the band combination DC\_48A\_(n)48AA to have the configuration DL DC\_48A\_(n)48AA with UL DC\_(n)48AA and UL DC\_48A\_n48A.**  **Proposal 2: For Case 3, we propose the following compromise solutions.**   * **In Rel-16 and Rel-17, report an additional band combination to support the Case 3 configurations.** * **In Rel-18, introduce a UE capability signaling to support the Case 3 configurations.** |
| **R4-2216421** | Google Inc., Comcast, CableLabs | Draft CR for 38.101-3 Rel-16 intra-band contiguous EN-DC band combination |
| **R4-2216427** | Google Inc., Comcast, CableLabs | Draft CR for 38.101-3 Rel-17 intra-band contiguous EN-DC band combination |
| **R4-2216443** | OPPO | **Observation 1: Case 4 has been solved in RAN4 by moving this kind of band combination to a separate table, and if UE support this band combination should indicate “both” for*****IntrabandENDC-Support* capability.**  **Observation 2: The fallback band combination restriction in RAN2 is not between UL and DL, but for either UL fallbacks or DL fallbacks. This should not be used to preclude UE having contiguous DL but non-contiguous UL.**  **Observation 3: UE with separate PAs can support UL non-contiguous EN-DC with each PA per CC. And usually DL is not the bottle neck and can be supported easily by Rx paths.**  **Observation 4: UL and DL actually have different restrictions and can be considered independently on the supporting of contiguous and non-contiguous.**  **Proposal 1: UL and DL considered independently on the supporting of contiguous and non-contiguous capability, due to different restrictions on UL and DL.**  **Proposal 2: Check with RAN4 group whether there is clear demand from operators on the non-contiguous UL but contiguous DL configurations, and then consider the following options:**   * **Option 1: if no clear demands, then RAN4 consider to remove these configurations.** * **Option 2: if there is clear demand, then RAN4 inform RAN2 to consider support these different UL and DL configurations from signaling and detailed signaling design is up to RAN2.** |
| **R4-2216617** | ZTE | **Observation 1: Whether the E-UTRA band or NR band with the same band number are regarded as the same band, it has different understanding for EN-DC intra-band configuration and EN-DC inter-band configuration in current RAN4 spec.**  **Proposal 1: A note to inform that “intra-band” EN-DC configurations are considered as the same frequency spectrum in E-UTRA and NR band which should be added to TS 38.101-3.**  **Observation 2: The aspects of contiguous or non-contiguous EN-DC configurations are currently only categorized by DL in RAN4.**  **Observation 3: The main confusion of intra-band contiguous or non-contiguous EN-DC configurations comes from the scenarios (b) and (c) which need to be further confirmed from the operators.**  **Proposal 2: Further confirmation of the requirements from the operator with the scenarios of DL contiguous and UL Non-contiguous (or UL both) is recommended. If no such requirements, then no ambiguity any more, otherwise, further distinguish the continuousness from UL and DL may be required.** |
| **R4-2216656** | Huawei, HiSilicon | ***Observation 1: Case 3 and Case 4 are valid band combinations from the perspective of operators.***  ***Observation 2: Case 3 and Case 4 are valid band combinations from the perspective of specifications.***  ***Proposal 1: The configurations in Case 3 and Case 4 are valid from RAN4 and RAN2 point of view.***  ***Proposal 2: A solution is necessary in RAN2 to address the ambiguity issue for configurations on some intra-band EN-DC band combinations with more than 2 carriers from Rel-15*** |
| **R4-2216657** | Huawei, HiSilicon | ***[DRAFT] LS on intra-band EN-DC combination*** |

## Open issues comment collection

### Sub-topic 1-1: Case 3 and case 4 demands

#### Issue 1-1-1: Whether Operator has demands for Case 3 in the fields

*Moderator note: There are proposals to clarify whether case 3 and 4 are real demands in the NW, and if no then remove it, and if yes then consider how to accommodate it in the spec.*

* Option 1: Yes, scenario and benefits are…
  + Option 1a: Case 3 is **valid** scenario (HW)
  + Option 1b: Case 3 for band 48 and n48 are **valid** scenario (Google Inc., Comcast, CableLabs)
  + Option 1c: Case 3 for band 41 and n41 are **invalid** scenario according to R4-2114890 (WF on intraBandENDC-support) (Nokia)
* Option 2: No

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| **Company** | **Comments** |
| Ericsson | Option 1c. The combination is not valid if case 3 is indicated as a BC without support if non-contiguous in the DL as shown in the figure below.    The UE must also indicate support for non-contiguous in the DL; a restriction to non-contiguous in the UL for any carrier separation in the band is not valid, there must be a corresponding DL for the carrier unless a SUL.  If there are demands for Case 3, the most straightforward would be a configuration    with a BCS that works for all configurations, or indicate two separate BCs, one contiguous and one non-contiguous, if DC\_41C-n41A is not supported. |
| Xiaomi | Option 1c |
| Nokia(HO) | Option 1b and 1c. We think supporting Case 3 would benefit GAA scenarios for band n48 due to dynamic channel allocation. We’d like to hear from band n41 operators if Case 3 is needed. |
| Apple | The validity of Case 3 configurations can be interpreted differently, depending on which aspect is being used for judgement. We would like to know how dynamic the spectrum availability may vary in Band n48 and how much efficiency is gained with only DL reconfiguration as compared to both DL and UL reconfiguration and whether such efficiency gain is sufficient to justify the UL performance loss due to higher MPR/A-MPR for non-contiguous UL configuration as compared to contiguous UL configuration. |
| Meta | It is dependent on how to define the MPR/A-MPR requirements for UL configuration in DC\_41A\_n41A. In TS38.101-3, RAN4 already define MPR/A-MPR to support the non-contiguous DC band combinations. So we think option 1a is feasible when UE indicate to support non-contiguous UL/DL DC combos. But we also think that the smallest MPR/A-MPR is more beneficial to operate these specific operations. |
| Samsung | Made aware by RAN2 colleague that below fallback rule captured in 38.306 exists date back to LTE and it appears imposed by RAN4(due to different architectures and requirements between contiguous and non-contiguous), Ericsson also mentioned it in their paper, hence essentially it is still RAN4 fallback rule(Name it RAN4 fallback rule#1)  *“An intra-band non-contiguous band combination is not considered to be a fallback band combination of an intra-band contiguous band combination”*  We think below inter-band EN-DC RAN4 fallback rule is also applicable to intra-band EN-DC (Name it fallback rule#2)  *“A terminal which supports an inter-band EN-DC or NE-DC configuration with a certain UL configuration shall support the all lower order DL configurations of the lower order EN-DC or NE-DC combinations, which have this certain UL configuration and the fallbacks of this UL configuration.”*  If we deem Case 3 as contiguous band combination and we say they are valid. Situation becomes RAN4 fallback rule#1 is contradict with RAN4 fallback rule#2. However as clarified by operators the 48 related combos in case 3 indeed has special deployment need, to satisfy their request we think a joint solution between RAN2 and RAN4 is needed to address the RAN4 fallback rule confliction, along with the new signalling.  For 41 related combos in Case 3, if no operators clarify the motivation, we suggest to remove them.  For 48 related combos in Case 3, we propose to add note into the configuration table, as below, further modification is welcome. In addition, the applicability of the note should be determined, and clearly recorded into FS\_BC\_simlication TR(ZTE) to forbid other combos flexibility adding this note.  With this note, we agree Case 3 for 48 is valid.   |  |  | | --- | --- | | DC\_(n)48CAx | DC\_48A\_n48A | | DC\_(n)48DAx | DC\_48A\_n48A | | Note X: The fallback rule in 38.306 “ An intra-band non-contiguous band combination is not considered to be a fallback band combination of an intra-band contiguous band combination” is not applicable. | | |
| Huawei | Based on the input from RAN#97e, the scenario of band 48 and n48 is valid, which means Case3 is valid. Whether band 41 and n41 is supported depends on the proponent’s confirmation. |
| Google | Option 1b and 1a. Agree with Case 3 would benefit GAA scenarios for band n48 due to dynamic channel allocation. The dynamic channel allocation may be frequently happened around US Naval Base such as San Diego and Norfolk. |
| OPPO | Option 1c was already confirmed for Rel-15, i.e. Case 3 for b41+n41 is no demands. If no clear demands now, they can be removed also from Rel-16 onwards.  Option 1b no strong view, but seems is needed from operator inputs. |
| ZTE | Whether case 3 is valid or not should be decided by operators’ requirements. We would like to hear the feedback from operators who are deploying or ready to deploy the network on band 41/n41 or 48/n48. |

#### Issue 1-1-2: Whether Operator has demands for Case 4 in the fields

* Option 1: Yes, scenario and benefits are…
  + Option 1a: Case 4 for band 48 and n48 are **valid** scenario (Google Inc., Comcast, CableLabs, Xiaomi)
  + Option 1b: Case 4 is **valid** scenario (HW)
  + Option 1c: Case 4 **has been solved** in RAN4 by moving this kind of band combination to a separate table, and if UE support this band combination should indicate “both” for *IntrabandENDC-Support* capability. (OPPO)
* Option 2: No

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| **Company** | **Comments** |
| Ericsson | Option 1c (not answering if there are further operator requests). The case 4 (as specified) can be supported using existing signaling, this with the understanding that new band combinations of this type are specified in a similar way: support of both contiguous and non-contiguous and up to two sub-blocks if one consists of both LTE and NR carriers. |
| Xiaomi | Option 1c |
| Nokia(HO) | We think supporting Case 4 would benefit GAA scenarios for band n48 due to dynamic channel allocation. |
| Apple | For Case 4, our understanding is that only the configuration DL DC\_48A\_(n)48AA with UL DC\_(n)48AA can be supported by the existing signaling. For DL DC\_48A\_(n)48AA with UL DC\_48A\_n48A, if *intraBandENDC-Support* = ‘both’, that means UE should also be capable of supporting DL DC\_48A-48A\_n48A. However, this may not be true as UE’s implementation may only be able to support one sub-block gap. Therefore, we do not agree that the Case 4 with non-contiguous UL configuration can be supported using existing signaling. |
| Meta | Agree with option 1c. |
| Huawei | The contiguity of intra-band combination is up to UE implementation. It is possible that the UE supports ‘both’ in DL, but only supports ‘contiguous’ in UL. Currently, RAN2 signaling cannot report such scenario. |
| Google | Support Option 1a, 1b and 1c. For Option 1c, there could be a compromised solution to specify “both” for DC\_48A\_(n)48AA with UL DC\_48A\_n48A and UL DC\_(n)48AA and to specify “non-contiguous” for DC\_48A-48A\_n48A with UL DC\_48A\_n48A. |
| OPPO | Option 1c. But the demands from operators may still be valuable here.  The meaning of intrabandENDC-support IE in RAN2 pointing to RAN4 spec where the band combinations are defined in table with contiguous/non-congituous/both definitions. This means the interpretation of this IE is depends on how RAN4 spec classify these band combinations. Putting Case 4 band combinations to the table with “both” capability can solve the problem.  “*Indicates whether the UE supports intra-band (NG)EN-DC with only non-contiguous spectrum, or with both contiguous and non-contiguous spectrum* ***for the (NG)EN-DC combination as specified in TS 38.101-3***” |
| ZTE | Same comments as Case 3. We would like to hear the feedback from operators. To our understanding there is no inconsistent issue in Case 4, our preference is 1c. |
| Huawei | Option 1a and Option 1b are same since Case4 only includes band 48 and n48 for the moment. Case 4 is a valid scenario and the problem is unsolved by Option 1c UE reporting ‘both’ with intrabandENDC-Support. The solution is not only related to signaling, but also the UE implementation architecture.  For example, to support DL non-contiguous CA is to implement separate chains. But the requirements of dual PA in UL to support NC was just specified in Rel-17. Most UEs may not support NC CA in UL considering the cost and implementation complexity.  According to the endorsed CR R4-2214967, the intra-band EN-DC configuration of DC\_48A-(n)48AA is moved to the table for mixed intra-band contiguous and non-contiguous EN-DC. For a UE only support ‘contiguous’ in UL, when gNB configures UL DC\_48A\_n48A after receiving the UE capability of ‘both’, UE is not able to perform the configuration. It would be a typical UE implementation for Case 4 with the ambiguity issue. |

### Sub-topic 1-2: Case 3 and case 4 fallback rules

#### Issue 1-2-1: Whether contiguous or non-contiguous EN-DC configurations are only categorized by DL in RAN4?

* Option 1: Yes (ZTE)
* Option 2: No

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| **Company** | **Comments** |
| Ericsson | Option 2. An intra-band EN-DC configuration part of an inter-band BC can be non-contiguous in the DL within the band but not in the UL (when there is only one UL in this band). |
| Xiaomi | Option2, pure intra-band contiguous EN-DC configuration for aggregated CCs larger than 2CCs should be categorized by both of DL and UL. |
| Nokia(HO) | We need an overall consensus/agreement how to sort out this issue.  At least, when non-contiguous UL for DL contiguous EN-DC was first introduced into the spec, Option 1 was the intention of the proponent of such EN-DC. That is why non-contiguous UL was included in the table of the contiguous EN-DC. However, the issue was overlooked at that time and thus we have had a long discussion on this issue. |
| Apple | Option 2  Clarification is needed for this question. Is the question based on RAN4’s agreement or based on what is being defined in the current RAN4 specifications? If it is based on RAN4’s agreement, our answer is Option 2. |
| Meta | Option 2 |
| Samsung | Option 2, share similar view with Apple, based on current RAN’4 agreement, it is No.  In addition, maybe we do not need to argue on this. It is also ok to classify case 3 as contiguous ENDC, judge contiguous/non-contiguous is mainly for the purpose to judge whether case 3 violates the fallback rule, by adding the note suggested in Issue 1-1-1, there would be no problem from fallback rule perspective. |
| Huawei | In the current spec 38.101-3, the contiguity of EN-DC configurations are only categorized by DL in RAN4. When it comes to the inconsistency of DL and UL configurations in contiguity, the UE capability follows that of DL configurations. We share the similar view with Nokia for the background of introduction on the band combination configuration in Case 3 and Case 4. |
| OPPO | Option 2. |
| ZTE | Option 1. Currently in RAN4 spec it is categorized by DL, if not, further clarification may be needed. |

#### Issue 1-2-2: How to interpretate the fallback rule in RAN2 38.306

* Option 1: In a band combination, the UL configuration is either the same as DL configuration or belongs to the DL fallback configurations. (Apple)
* Option 2: Fallback is defined to support reduced UE capability signalling for lower order CA/DC and is not restricting Case 3 or Case 4 configuration if there is a demand to support them. (Nokia)
* Option 3: UL and DL considered independently on the supporting of contiguous and non-contiguous capability, due to different restrictions on UL and DL. (OPPO)

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| **Company** | **Comments** |
| Ericsson | Option 1, an Scell must at least have a DL part, and Option 3, band combination fallback applies to release of Scells or an UL part of an Scell. |
| Xiaomi | Option 1, the UL configuration should be either the same as DL configuration or belongs to the DL fallback configurations, even through UL and DL considered independently on the supporting of contiguous and non-contiguous capability. |
| Nokia(HO) | We are open to support Case 3 and 4, rather than forbidding them due to the rules applied to the legacy combinations. |
| Apple | Option 1  The fallback rule was defined for the purpose to minimize the signaling to indicate UE’s capability to support various CA/DC configurations. For UE with the capability to support one highest order band combination, all the lower order configurations by releasing one or more carriers from the highest order configuration which UE is also capable of supporting without additional signaling are viewed as the fallback configurations for this highest order configuration.  Based on this rule, non-contiguous configuration would not be allowed as a fallback configuration from a higher order contiguous configuration as they represent two different UE capability where additional signaling is needed.  Without considering the existing fallback rule, a mixture of contiguous and non-contiguous CA configurations in both UL and DL may already be supported by the signaling as long as UE is capable of supporting it. However, to enable the support of Case 3 configurations and Case 4 with non-contiguous UL configuration, in our view the scope is much wider than a TEI can handle as it may involve in the whole concept change in intra-band configuration fallback. Therefore, if there is still demand for Case 3 and Case 4 configurations, it is proposed to start a new study item or work item to seek for the solution. |
| Meta | Option 1 |
| Samsung | Option 1  Note that it appears this rule is imposed by RAN4 (due to architecture and RF requirement are different between contiguous and non-contiguous) and exists since LTE, essentially it is still RAN4 fallback rule.  *“An intra-band non-contiguous band combination is not considered to be a fallback band combination of an intra-band contiguous band combination”*  From my observation, RAN2 does not care about it since it is RF architecture related. |
| Huawei | We prefer option 3  The fallback rule in RAN2 does not aligned with RAN4 spec. The definition of fallback rule is not for the restriction of scenarios. The fallback rule defined in RAN2 spec should be based on the scenarios in RAN4. If there are un-alignments, the rule needs modification. And since the configurations of DL and UL are configured separately, the contiguity of DL and UL should also be independent. |
| Google | Same view as Nokia. We are also open to support Case 3 and 4 instead of forbidding them due to the rules applied to the legacy combinations. |
| OPPO | Option 1 is ok  Option 2 is also ok since this means if UE with further indication it can also support Case 3/4  **Option 3 is the key in our view, whether we consider the UL and DL separately in the fallback handling.** And this is not contradicting with Option1 since if UE support both contiguous and non-contiguous in DL then this UE can fallback to non-contiguous in DL CA which can be same as non-contiguous UL. Meanwhile, if this UE only support contiguous fallback in DL CA then Case 3 probably is invalid. From this point of view, this Case 3 UE should support both contiguous and non-contiguous capability in DL. |
| ZTE | Option 1. |

#### Issue 1-2-3: Views on the fallback rule in RAN4 38.101-3 section 4.2 below:

“A terminal which supports an inter-band EN-DC or NE-DC configuration with a certain UL configuration shall support the all lower order DL configurations of the lower order EN-DC or NE-DC combinations, which have this certain UL configuration and the fallbacks of this UL configuration.”

* Proposal 1:
  + This rule leads to: UE must support both of DL contiguous configuration and DL non-contiguous configuration with a certain UL non-contiguous configuration. (Xiaomi)
* Proposal 2:
  + If Case 3 is made valid scenario, whether the rule in section 4.2 of Spec 38.101-3 applies to case3, or whether case3 means a new UE capability needs to be discussed. (Xiaomi)

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| **Company** | **Comments** |
| Ericsson | Proposal 2: a similar rule should apply to intra-band EN-DC configurations. |
| Xiaomi | If the fallback rule in RAN4 38.101-3 applies to intra-band EN-DC configuration, it will leads proposal 1, but it will be against RAN2’s fallback rule. So we prefer to discuss the request of CBRS GAA operation separately with general intra-band EN-DC configuration, i.e., band 41 and n41. |
| Nokia(HO) | If Case 3 and 4 are forbidden because of this rule, amendment can be considered. |
| Apple | Our understanding is that this rule for inter-band EN-DC currently also applies for intra-band EN-DC. If we would intend to enable Case 3 configurations, then we may have to revisit the fallback rule as we commented above. |
| Samsung | Agree with Proposal 2, should also applicable to intra-band EN-DC. |
| Huawei | The rule is irrelevant to the topic. The referred rule is for inter-band EN-DC configurations. If the rule is applied to the case of intra-band configuration and not able to solve the problems of Case3 and Case 4, it should be revised. |
| Google | We share the same view as Nokia. |
| OPPO | We are not sure whether this fallback rule defined in 38.101-3 can leads to preclude or include the Case 3/4 discussed in this topic since at least this is for inter-band EN-DC. |
| ZTE | We agree with Proposal 2, a similar rule should be applied to intra-band EN-DC, but detail should be further discussed. |

### Sub-topic 1-3: Case 3 and case 4 Solutions

#### Issue 1-3-1: Solutions for Case 3

* Option 1: Remove Case 3 configurations
  + Option 1a: **Remove** Case 3 configurations from current RAN4 specifications. (Apple, Ericsson, Xiaomi)
  + Option 1c: **Remove** Case 3 if no use case is identified. (OPPO)
  + Option 1b: **Remove** Case 3 for **band 41 and n41** if no use case is identified. (Nokia)
* Option 2: Reuse existing signalling to indicate Case 3
  + Option 2a: EN-DC config including a **(n)** sub-block in both DL and UL is categorized to “contiguous”, EN-DC config without any (n) sub-block is categorized to “non-contiguous”, “EN-DC config including a (n) sub-block in DL and without it in UL is categorized to “both” (Nokia)
  + Option 2b: In Rel-16 and Rel-17, report an additional band combination **DC\_48A\_n48A** to support the Case 3 configurations DL DC\_(n)48CA with UL DC\_48A\_n48A and DL DC\_(n)48DA with UL DC\_48A\_n48A (Google Inc., Comcast, CableLabs)
* Option 3: New signalling
  + Option 3a: Be considered in **Rel-18** to support Case 3 (Ericsson, Google Inc., Comcast, CableLabs)
  + Option 3b: A solution is necessary in RAN2 to address the ambiguity issue for configurations on some intra-band EN-DC band combinations with more than 2 carriers **from Rel-15**. (HW)
  + Option 3c: If there is clear demand for Case 3, then RAN4 inform RAN2 to consider support these different UL and DL configurations from signalling and detailed signalling design is **up to RAN2**. (OPPO)
* Option 4: Wait for RAN2 to provide a flexible signalling (Nokia)
* Option 5: If the proponent companies still see the demand, start a new study item or work item to seek for the solution. (Apple)\
* Option 6: A joint solution between RAN2 and RAN4: Adding note to the configuration table for Case 3, along with the new signalling defined in RAN2 (Samsung)

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| DC\_(n)48CAx | DC\_48A\_n48A |
| DC\_(n)48DAx | DC\_48A\_n48A |
| Note X: The fallback rule in 38.306 “ An intra-band non-contiguous band combination is not considered to be a fallback band combination of an intra-band contiguous band combination” is not applicable. | |

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| **Company** | **Comments** |
| Ericsson | Option 1a: remove the non-contiguous UL for the configurations with only contiguous in the DL.  Option 2b: then also remove the non-contiguous UL for the configurations with only contiguous in the DL hoping that the BCS would consistent between the two BC entries indicated  The most straightforward would be a configuration that can be indicated as a single BC (with intraBandENDC-Support = ‘both’)    with a BCS that works for all configurations.  Option 3a: no new signaling earlier than Rel-18.  Option 4: anything expected from RAN2? |
| Xiaomi | Support Option 1a and Option 1c, if most companies want to keep the flexibility of CBRS GAA operation, we prefer to first agree Option 1c. |
| Nokia(HO) | Support Option 1b, 2a, 3a, 3c 4, and/or 5.  Not support Option 1a, and 1c.  3b would be NBC so maybe it is not possible.  2b is not clear to us. Does it mean if both DL DC\_(n)48CA and DL DC\_48A\_n48A are supported by UE through UE capability signalling, UL DC\_48A\_n48A is supported for DL DC\_(n)48CA? Why is (Rel-18 signalling) simultaneously proposed, if the issue can be solved in Rel-16/17 by reporting an additional band combination? Or is it ok as compromise only to support from Rel-18? |
| Apple | Option 1a (including removing DL DC\_48A\_(n)48AA with UL DC\_40A\_n48A in Case 4)  Option 2b is possible using the implied capability signaling which is without the consideration of the fallback rule.  Option 5: A designated SI or WI may be better to revisit the fallback rule and seek for a more well-thought signaling solution. |
| Meta | Option 1b, 1c, 2a, 3c and option 5 are acceptable. |
| Samsung | At least Option 1b is acceptable.  Regarding Option 3: Support Option 3c and 3a. About release independence, there might be some informal signaling already exists to implement these configuration, as operator request to be Release independent from 18.  We support Option 6 as proponent. (Sorry, Jinqiang, I add it without your permission) |
| Huawei | We prefer Option 3b and we are open to Option 3a. |
| Google | Not Support Option 1a and 1c. Support Option 2b, 3a and 3c.  To Nokia, According to previous meeting controversial discussion, Option 2b and Option 3a are our compromised proposal. |
| OPPO | For remove Case 3 option, we would like to respect operator inputs, if no inputs then we can go with Option 1c (remove whole Case 3). If there is demands, then we can go with Option 1b (remove b41+n41)  For reuse existing signalling to support Case 3, we are ok with Option 2b (report an additional band combination DC\_48A\_n48A).  If new signalling is needed, then Option 3a (define in Rel-18), and 3c (different UL/DL configuration and up to RAN2 design signalling) is ok.  And from RAN2 conclusion in this meeting seems new signalling design is possible and even for the frozen release. Then among the above different approaches, the most efficient and future proof approach is introducing new signalling to support different UL/DL continuity capability as long as there is Operator demands on this.   * RAN2 concludes that the discussed cases are not currently supported by signalling and new signalling is needed. * Case validity is up to RAN4, and if RAN4 concludes they are valid, RAN2 can then attempt to find a signalling solution. RAN4 can also develop a preference as to what release should be applicable. |
| ZTE | We support Option 1c: **Remove** Case 3 if no use case is identified.  Option 3c: If there is clear demand for Case 3, then RAN4 inform RAN2 to consider support these different UL and DL configurations from signalling and detailed signalling design is **up to RAN2**. |

#### Issue 1-3-2: Solutions for Case 4

* Option 1: Remove Case 4 configurations (Apple)
* Option 2: Reuse existing signalling to indicate Case 4
  + Option 2a: EN-DC config including a **(n)** sub-block in both DL and UL is categorized to “contiguous”, EN-DC config without any (n) sub-block is categorized to “non-contiguous”, “EN-DC config including a (n) sub-block in DL and without it in UL is categorized to “both” (Nokia)
  + Option 2b: Rel-17 combinations of contiguous and non-contiguous intra-band EN-DC should be limited to two sub-blocks one of which consists of a contiguous CA configuration in table Table 5.3B.0-1 in 38.101-3. For these the **UE must support both contiguous and non-contiguous EN-DC in the UL**. (Ericsson)
* Option 3: New signalling
  + A solution is necessary in RAN2 to address the ambiguity issue for configurations on some intra-band EN-DC band combinations with more than 2 carriers from Rel-15. (HW)
* Option 4: Wait for RAN2 to provide a flexible signalling (Nokia)
* Option 5: If the proponent companies still see the demand, start a new study item or work item to seek for the solution. (Apple)
* Option 6: Case 4 **has been solved** in RAN4 by moving this kind of band combination to a separate table, and if UE support this band combination should indicate “both” for *IntrabandENDC-Support* capability. (OPPO)

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| **Company** | **Comments** |
| Ericsson | Option 2b: support as proponent, Case 4 can be kept as specified if similar (new) combinations are restricted as proposed.  Option 3: not agreeable.  Option 4: anything expected from RAN2?  Option 6: we propose to combine this with Option 2b (add to the new table) |
| Xiaomi | Support Option 2b and Option 6, at least for current existing band combinations the new signaling is not needed. |
| Nokia(HO) | Support 2a, 2b, 3, 4, or 5.  Not support 1 and 6, because Case 4 would be useful for GAA use cases. Option 6 cannot solve Case 3 (unless Case 3 are deleted). |
| Apple | Our proposal in Option 1 is to only remove UL DC\_48A-n48A, but still keeping DL DC\_48A\_(n)48AA with UL DC\_(n)48AA as this configuration can be supported by the existing signaling. It is also consistent with DL CA\_n48(A-B) where we only have UL CA\_48B specified, but not CA\_48A-48A.  We do not think the existing signaling can be used to indicate to only support DC\_48A\_(n)48AA with UL DC\_48A\_n48A. As we commented above, if intraBandENDC-Support = ‘both’, that means UE should also be capable of supporting DL DC\_48A-48A\_n48A. However, this may not be true as UE’s implementation may only be able to support one sub-block gap. |
| Meta | Support Option 2a, 2b and Option 5 |
| Samsung | Support Option 2b and Option 6. |
| Huawei | Option 1: disagree  Option 2: existing signalling cannot fully solve the problem.  Option 3: support  Option 4: RAN2 has drawn a conclusion to wait for RAN4’s input.  Option 5: RAN has already tasked RAN4 and RAN2 for possible solution.  Option 6: It is clearer to move this kind of band combinations to a separate table. However, the problem still unsolved. |
| Google | Option 6 is our preference as a compromised solution to specify “both” for DC\_48A\_(n)48AA with UL DC\_48A\_n48A and UL DC\_(n)48AA and to specify “non-contiguous” for DC\_48A-48A\_n48A with UL DC\_48A\_n48A. We are also fine with Option 2a and 2b. |
| OPPO | Option 2b and Option 3.  Based on RAN2 conclusion that new signaling can be designed in RAN2 even for the frozen release, then the most simple approach is to design new signaling for UL and DL separately, and allow UE to indicate its capability. |
| ZTE | Support Option 1 and Option 6. |

### Sub-topic 1-4: ”intra-band” EN-DC Notes

#### Issue 1-4-1: Note for “intra-band” EN-DC configurations

* Proposal: A note to inform that “intra-band” EN-DC configurations are considered as the same frequency spectrum in E-UTRA and NR band which should be added to TS 38.101-3. (ZTE)

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| **Company** | **Comments** |
| Ericsson | The proposal is somewhat unclear, does it refer to a range within a given operating band (the NR band a migrated LTE band with the same range)? |
| Nokia(HO) | We do not understand where this note is proposed to be added. As we have tables for intra-band EN-DC, it is clear which is supposed to be intra-band EN-DC in our view.  The combinations in Table 5.5B.4.2-1 which ZTE pointed out are the inter-band EN-DC; however, precisely speaking it is mixed intra- and inter-band EN-DC.  We understand that *IntrabandENDC-Support* is applicable to the intra-band component of the mixed intra- and inter-band EN-DC.  As only one *IntrabandENDC-Support* can be signaled per BC,you cannot have multiple intra-band components.  We can request RAN2 to clarify this more because this is not clear enough in RAN2 spec today. |
| Apple | We can more or less understand why this note is proposed as currently DC\_1A-3A\_n3A and other similar combinations are defined as 3-band combinations. But spectrum wise, there are only two bands. This may imply that DC\_3A\_n3A is equivalent to inter-band EN-DC combination where the fallback rule defined for inter-band EN-DC/NE-DC would also apply for intra-band EN-DC. In our view, DC\_1A-3A\_n3A should be defined as 2-band combination. The fallback rule currently should be applicable to both inter-band and intra-band configurations. With that said, we do not think this note is necessary as the definition of intra-band is already very clear. |
| ZTE | The question we raised in our proposal is what Apple explained above. The concept of “intra-band” for E-UTRA band and NR band with the same frequency range is inconsistent in TS 38.101-3. In the inter-band EN-DC configuration table having the same frequency range E-UTRA/NR bands, we consider E-UTRA band and NR band are different bands, for example in Table 5.5B.4.2-1, band 3 and band n3 are different bands since they are in the configuration table of three bands.    However, in the section of “intra-band contiguous EN-DC” or “intra-band non-contiguous EN-DC”, the E-UTRA band and NR band are considered as the same band, otherwise why we call them “intra-band”? Here, we think the “intra-band” actually means the same frequency range, not the same band number. We did not find a formal definition for “intra-band EN-DC” in TS 38.101-3 in clause 3.1 of Definitions. We only find a definition for “intra-band CA” in TS 38.101-1.    In this proposal, we suggest to add a definition of what is intra-band contiguous/non-contiguous EN-DC in section 3.1 of Definitions in TS 38.101-3 to mention that the intra-band actually refers to E-UTRA band and NR band having the same frequency range. By this, we can understand correctly why inter-band EN-DC configuration DC\_1A-3A\_n3A is categorized as “three bands”. |

## 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** |
| R4-2216421 | Draft CR for 38.101-3 Rel-16 intra-band contiguous EN-DC band combination  *Moderator Note: depends on outcome of Option 2b in Issue 1-3-1.* |
| Xiaomi: at least, for band 41 and band n41, disagree the note. |
|  |
| R4-2216427 | Draft CR for 38.101-3 Rel-17 intra-band contiguous EN-DC band combination  *Moderator Note: depends on outcome of Option 2b in Issue 1-3-1.* |
| Xiaomi: at least, for band 41 and band n41, disagree the note. |
|  |

## 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** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

### 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.*

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| **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 (if applicable)

# Topic #2: CRs for Canada and US band n77

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| **R4-2215334** | Nokia, Nokia Shanghai Bell | **Observation 1:** In LTE RRC, the NS-value for PCell which is obtained in single carrier or after HO is not used when UL CA is configured and the NS-value is configured only for Scell ~~value~~ and the NS-value for Scell is applicable to Pcell instead. In other words, an NS-value for Pcell follows an NS-value configured for Scells when UL CA is configured.  **Observation 2:** NS value handling in NR specifications should follow the same way as LTE spec  And proposed the following:  **Proposal 1:** Adopt option 2 and send an LS to RAN2 to share RAN4’s preference.  **Proposal 2**: Clarify that RAN4 has no intention to turn over the agreement on n77 US and Canada issues made in RAN2 in RAN2#119-e in the LS.  **Proposal 3**: No RAN4 spec changes are needed due to RAN2 spec changes to fix NS mapping issue. |
| **R4-2215527** | Nokia, Nokia Shanghai Bell | **CR: Introduction of intra band NC UL CA in the n77 frequency range in Canada [n77 Canada]** |
| **R4-2215794** | Mediatek | **Observation 1: Regarding intra-band UL CA for band n77 in US or Canada, the operation of NS\_55, NS\_57, CA\_NC\_NS\_01, and CA\_NS\_01 with *additionalSpectrumEmission* and signalling is clearly indicated in RP-222682, RP-222683, R2-2209137 and R2-2209139. Additionally, the RP-222682 and RP-222683 CRs’ new added texts also follow the agreed RAN2 CRs R2-2209137 and R2-2209139, respectively.**  **Observation 2: Regarding NS mapping from RAN2 and RAN4, the RAN2 agreements (i.e., CRs of R2-2209137 and R2-2209139) can be accommodated by either option 1 or option 2 in [3] although the implementation may slightly differ.**  **Option 1: The *additionalSpectrumEmission* associated with PCC applies for NS, CA\_NS, and CA\_NC\_NS. RAN4 specification update needed.**  **Option 2: The *additionalSpectrumEmission* associated with configuration/activation of the SCC applies (analogous to LTE with a separate parameter) for CA\_NS and CA\_NC\_NS. RAN2 specification update needed.**  **Proposal 1: Based on the agreed intra-band UL CA CRs (i.e., RP-222682 and RP-222683)** **associated with Canada and US band n77, the RAN4 specification update and NS mapping in TS 38.101-1 is already applicable. As for NS (i.e., NS, CA\_NS, and CA\_NC\_NS) mapping issue associated with *additionalSpectrumEmission*, it can be solved by either option 1 or option 2 from R4-2214409. As for *additionalSpectrumEmission*** **NS mapping on n77 or other bands, option according to RAN4 solution below is recommended as it is straightforward and updated directly in RAN4 specification if needed.**  **Option: For intra-band UL CA on band n77 or other bands, the *additionalSpectrumEmission* associated with PCC applies for NS, CA\_NS, and CA\_NC\_NS. RAN4 specification update if needed.** |
| **R4-2216063** | Huawei, HiSilicon | **Observation 1: since “NS\_XX, CA\_NS\_XX, CA\_NC\_NS\_XX” represent the RF requirements, RAN4 still need to associate the specific RF requirements “NS\_XX, CA\_NS\_XX, CA\_NC\_NS\_XX” to the network signalling label. Otherwise, UE may not know what the accurate RF requirements are for a specific network work signalling lable.**  **Observation 2: As Rel-17 has been finalized, it’s too late to introduce a new IE which is analogous to LTE with a separate parameter due to NBC issue. Option 2 in WF R4-2214409 is not preferred.**  **Observation 3: The reason why RAN2 stress “Network configures the same value in additionalSpectrumEmission for all uplink carrier(s) of the same band with UL configured” is that specification or network can’t require or configure two different sets of RF requirements to UE for intra-band UL CA. Otherwise, UE may be confused and doesn’t know which set of RF requirements need to be met.**  **Observation 4:** **the demands for NS\_47 are only applicable to single carrier instead of intra-band UL CA. That’s why CA\_NS\_47 wasn’t specified. If we remove CA\_NS and CA\_NC\_NS as suggested in WF R4-2214409, it will cause some ambiguity.**  **Proposal 1: introducing a new IE which is analogous to LTE with a separate parameter will cause NBC issue, so option 2 in WF R4-2214409 is not preferred.**  **Proposal 2: “CA\_NS\_XX and CA\_NC\_NS\_XX” should be kept to indicate the specific RF requirements, which is used in RAN4 specification. In addition, “CA\_NS\_XX and CA\_NC\_NS\_XX” need to be associated to network signalling label *additionalSpectrumEmission.***  **Proposal 3: In order to indicate the same RF requirements for all uplink carrier(s) of the same band, Network is required to configure the same value in *additionalSpectrumEmission* for all uplink carrier(s) of the same band with UL configured. However, some exceptions are allowed as below. With these exceptions, the same RF requirements for all uplink carrier(s) of the same band are also applicable.**  **Proposal 4: in order to reflect the proposals above, the specification can be further improved as Annex.** |
| **R4-2216649**  **R4-2216650** | Qualcomm | **CR: Remove network signalling labels for CA\_NS and CA\_NC\_NS** |

## Open issues comment collection

### Sub-topic 2-1:

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| Moderator Note: In RAN4#104e two options are given for the mapping of RAN2 signaling to RAN4 NSs [R4-2214409].  Option 1: The *additionalSpectrumEmission* associated with PCC applies for NS, CA\_NS, and CA\_NC\_NS. RAN4 specification update needed.  Option 2: The *additionalSpectrumEmission* associated with configuration/activation of the SCC applies (analogous to LTE with a separate parameter) for CA\_NS and CA\_NC\_NS. RAN2 specification update needed. |

#### Issue 2-1-1: Whether Option 2 in R4-2214409 (as below) means new signaling is designed?

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| Option 2: The *additionalSpectrumEmission* associated with configuration/activation of the SCC applies (analogous to LTE with a separate parameter) for CA\_NS and CA\_NC\_NS. RAN2 specification update needed. |

* Yes
* No

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| **Company** | **Comments** |
| Huawei | Since this option 2 is analogous to LTE with a separate parameter, in my understanding, a new signaling (e.g. *additionalSpectrumEmissionScell*) is needed as what we did in LTE phase. However, it’s too late to introduce a new signaling which will cause NBC issue. But proponent can further clarify this option and its intention. |
| Ericsson | Yes. For LTE a separate indication additionalSpectrumEmissionScell was needed since the MPR specification is different for LTE, the A-MPR is added to the MPR for the non-CA case while for LTE CA the total back-off is set by A-MPR (and MPR = 0 dB). This is not a problem for NR, the same value of additionalSpuriousEmission can be indicated on all uplink serving cells (with exceptions). |
| Qualcomm | New signaling would be needed if separate indexing is required for CA compared to single carrier, as we had it for LTE. However, aside from the consistency with LTE, no such need has been identified for NR as far as we understand it. But if there is a need identified, we would be willing to consider it. |
| Apple | Yes |
| Meta | Yes, need to update RAN2 specification with new signaling |
| OPPO | Yes |
| MediaTek | Yes |
| Nokia(HU) | No, why do we need new signalling? Only what we need to do is *additionalSpuriousEmission* follows SCell value. Even now, the same name of *additionalSpuriousEmission* is indicated in different containers, and *additionalSpuriousEmission* in *FrequencyInfoUL* corresponds to that in *additionalSpectrumEmissionSCell* in LTE. In LTE, the spec just split *additionalSpectrumEmission* into *additionalSpectrumEmissionSCell* and *additionalSpectrumEmissionPCell.* But the latter was not actuall used at all. Would companies that said “Yes” explain why new signalling is needed? Only what we need to do is just clarify that *additionalSpuriousEmission* in *FrequencyInfoUL* in SCell determines the value that UE shall follow. |
| Intel | Yes, our understanding is that new signaling would need to be added to RRC in order to configure a CA\_NS or CA\_NC\_NS value for intra-band uplink CA operation, where the values are able to be configured independently from the cell specific NS values that are used for the signal UL carrier (per band) case.  It is not yet clear to us whether there is a need for independent configuration of the CA\_NS/CA\_NC\_NS for intra-band UL CA and the NS value for single UL carrier case. So far no company has identified a strong need for this. Whether this needs to be supported by the specs is probably the first question that needs to be answered before debating details of the CRs.  To respond to the Nokia question, the additionalSpectrumEmission for both PCell and SCells are provided in the ServingCellConfigCommon/ServingCellConfigCommonSIB. These contain common configuration for the cell and are expected be configured in the same way whether provided via SIB or dedicated signaling. These are not UE specific configurations. Consequently if additionalSpectrumEmission=n is set in the SIB of a cell, then the same value n should be provided for that cell when UL CA is configured. If I remember correctly this was pointed out by an earlier Nokia RAN plenary paper on the n77 specific issue. To provide a different additionalSpectrumEmission value to be applied when UL CA is configured then additional signalling would be required. |
| AT&T | We would not want to see any NBC change introduced at this time. |

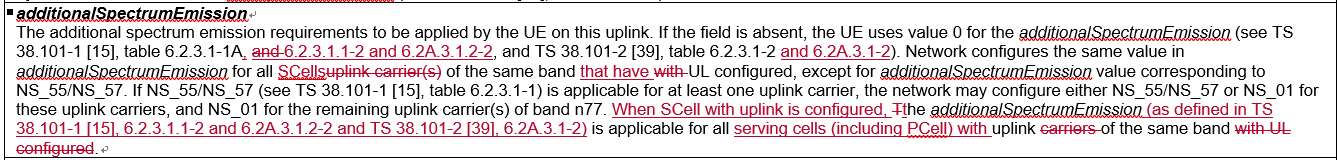
#### Issue 2-1-2: Whether CA\_NS\_XX and CA\_NC\_NS\_XX should be kept in RAN4 spec to indicate the specific RF requirements?

* Option 1: Yes (HW)
* Option 2: No

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| **Company** | **Comments** |
| Huawei | Option 1. As we explained in our contribution R4-2216063, CA\_NS\_XX and CA\_NC\_NS\_XX represent RF requirements including not only general SE/SEM or ASE/ASEM requirements, but also MPR or AMPR requirements. If we remove them as QC proposed in R4-2216649, we will have three different RF requirements sets for one label NS\_04, i.e. UL single carrier, intra-band UL contiguous and intra-band UL non-contiguous. It will cause some confusion and ambiguities for readers. |
| Ericsson | Option 1: CA\_NS\_xy (NS\_xy indicated/configured for both the Pcell and Scell) does not indicate the same additional emission requirement as NS\_xy indicated on the Pcell only. |
| Qualcomm | Option 2. If it is agreed that separate indexing and separate signaling is not needed for CA, then it would be better to remove the CA\_NS and CA\_NC\_NS indexing since a common indexing with single carrier is used. Leaving the indexing separate implies that they can be independently indexed. Of course, the requirements and A-MPR if needed for CA\_NS and CA\_NC\_NS could differ, but these requirements would be indexed by the common additionalSpectrumEmissions IE. |
| Apple | Option 1 |
| Meta | Option 1 |
| OPPO | If different additional requirements are indicated by CA\_NS comparing to single band NS, then probably they should be kept. But the problem might be how to signal it. |
| Nokia(HU) | As commented in the previous enquiry, we are ok with Option 2b and SCell/PCell discussion should leave to RAN2. |
| Intel | If independent configuration of the CA\_NS/CA\_NC\_NS for intra-band UL CA and the NS value for single UL carrier case is needed then CA\_NS\_XX and CA\_NC\_NS\_XX must remain in the specs.  If such independent configuration flexibility is not needed then it would be possible to remove CA\_NS\_XX and CA\_NC\_NS\_XX as suggested by the Qualcomm CRs. However, this will likely cause a larger specification change then necessary with an approach that keeps CA\_NS\_XX and CA\_NC\_NS\_XX. Our (mild) preference is to minimise specification changes and keep CA\_NS\_XX and CA\_NC\_NS\_XX. |
| AT&T | We do not have a strong view as long as there is a way for RAN4 to clearly define the RF requirements for the n77 case when different NS values are signalled but the alternate NS value(s) is(are) used for barring purposes only. |

#### Issue 2-1-3: Which solution is preferred

* Option 1: Solve the NS mapping issue in RAN2, and change 38.331 as below.
  + The *additionalSpectrumEmission* associated with configuration/activation of the SCC applies (analogous to LTE with a separate parameter) for CA\_NS and CA\_NC\_NS. (Nokia)
    - Note: Proposed RAN2 changes in R4-2215334 Annex.



* Option 2: Solve the NS mapping issue in RAN4 (MTK, HW, QC)
  + Option 2a: In order to indicate the same RF requirements for all uplink carrier(s) of the same band, Network is required to configure the same value in *additionalSpectrumEmission* for all uplink carrier(s) of the same band with UL configured. However, some exceptions are allowed as below. With these exceptions, the same RF requirements for all uplink carrier(s) of the same band are also applicable. (HW)
    - Note: Proposed RAN4 changes in R4-2216063 Annex.
  + Option 2b: Instances of CA\_NS and CA\_NC\_NS are removed but pointed to the NS signaled in the band. (QC)
    - Note: Proposed RAN4 changes in CR R4-2216649

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| **Company** | **Comments** |
| Huawei | We prefer option 2a.  Comments on option 1. Why are “uplink carrier(s)” replaced by “SCell”? For RAN4 spec and table’s reference, generally I’m fine with them. But editorial errors can be corrected, e.g. 6.2A.3.1.1-2. However, it’s better to discuss this RAN2 CR in RAN2’s maintenance agenda which is covered by RAN2 experts.  Comments on option 2b.  Firstly, the demands for NS\_47 are only applicable to single carrier (30MHz) instead of intra-band UL CA. That’s why CA\_NS\_47 wasn’t specified. If we remove CA\_NS and CA\_NC\_NS as suggested in WF R4-2214409 and add them into CA clauses proposed in R4-2216649, it will cause some ambiguities and UE vendors have to take the additional costs/test/requirements, which are not necessary.  Secondly, as we commented above, CA\_NS\_XX and CA\_NC\_NS\_XX represent RF requirements including not only general SE/SEM or ASE/ASEM requirements, but also MPR or AMPR requirements. If we remove them as QC proposed in R4-2216649, we will have three different RF requirements sets for one label NS\_04, i.e. UL single carrier, intra-band UL contiguous and intra-band UL non-contiguous. It will cause some confusion and ambiguities for readers. |
| Ericsson | Option 2a: the CA\_NS could be clarified but the RAN4 specifications should not set any requirements on the configuration by the network (RAN2). The case with more than one NS value indicated in the SI (and obtained by the Pcell) and one of these configured for the Scell could also be covered (not an issue for the current n77 cases). |
| Qualcomm | Option 2b. The CA\_NS and CA\_NC\_NS are referred to as “network signaling label”. Since a common signaling label or indexing is used between single carrier and CA, then there is no separate network signaling label for CA. Keeping it in the RAN4 spec is at best redundant and possibly confusing. In fact, having it separate is what caused the confusion in the first place from last meeting. We don’t understand the point from Huawei, but the requirements are listed as “N/A” so there shouldn’t be any ambiguity or burden on the UE. In fact, not having the “N/A” suggests that there might be a requirement specified or that it was simply overlooked. |
| Apple | Option 2a  RAN2 signaling is used to indicate the emission requirement for the band. Therefore, there is no need to introduce another emission requirement index for SCell.  RAN4 NS index mapping includes the information of emission requirement and A-MPR requirements where A-MPR can be different among single carrier, contiguous UL, and non-contiguous UL. Therefore, we prefer to keep the existing NS index mapping. For n77, we may need to include the following mappings in the table:   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR CA band | Value of additionalSpectrumEmission | | | | | | | | |  | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | | CA\_n41 | CA\_NS\_01 | CA\_NS\_04 |  |  |  |  |  |  | | CA\_n48 | CA\_NS\_01 | CA\_NS\_27 |  |  |  |  |  |  | | CA\_n7 | CA\_NS\_01 | CA\_NS\_46 |  |  |  |  |  |  | | CA\_n77 | CA\_NS\_01 | CA\_NS\_01 | CA\_NS\_01 |  |  |  |  |  | | NOTE: *additionalSpectrumEmission* corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 [7]. | | | | | | | | |      |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR CA band | Value of additionalSpectrumEmission | | | | | | | | |  | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | | CA\_n41 | CA\_NC\_NS\_01 | CA\_NC\_NS\_04 |  |  |  |  |  |  | | CA\_n77 | CA\_NC\_NS\_01 | CA\_NC\_NS\_01 | CA\_NC\_NS\_01 |  |  |  |  |  | | NOTE: *additionalSpectrumEmission* corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 [7]. | | | | | | | | | |
| Meta | Firstly, we prefer to solve this issues in RAN4. And the option 2a is our preference. |
| MediaTek | We can understand the intention of Option 2a and 2b. Both options have the point. Currently, we slightly prefer Option 2a. |
| Nokia | Option 1 and Option 2b. What is the point to compare Option 1 and Option 2b? Option 2b and Option 1 are not exclusive. |
| Intel | We think the issue can be addressed mainly in RAN4 specs and the CR associated with option 2a provides the best starting point. We are not certain at this stage that no change in the RAN2 specs will be needed but we can progress the RAN4 CRs and later consider if any RAN2 alignment is needed.  Furthermore, we think that both options 2a and 2b have a deficiency, which is best explained by an example. Selecting a random example of band n5 for which 2 NS values are defined, NS\_01 and NS\_100, and consider the case that all cells in the band set additionalSpectrumEmission to 1 (which is interpreted as NS\_100). Now if uplink intra-band contiguous CA is configured, with the additionalSpectrumEmission value for both the PCell and SCell set to 1, neither the 2a or 2b CRs explain how to map additionalSpectrumEmission=1 to an CA\_NS value (CA\_NS\_0 corresponding to additionalSpectrumEmission=0 is the only value defined for band n5). This can easily be addressed by stating that the UE applies CA\_NS\_0 for all bands not listed in the table.  Finally band n41 has 3 possible NS values so the additionalSpectrumEmission value can be 0,1,2. the current 2a CRs do not explain how to map additionalSpectrumEmission=2 to an CA\_NS value. This should be added to the table (not sure if CA\_NS\_01 or CA\_NS\_04 is the correct requirement to apply for this case). The 2b CRs do address this case. |
| AT&T | We do not have a strong view as long as we do not introduce NBC changes at this stage and there is a way for RAN4 to clearly define the RF requirements for the n77 case when different NS values are signalled but the alternate NS value(s) is(are) used for barring purposes only. |

## 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.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2215527 | Introduction of intra band NC UL CA in the n77 frequency range in Canada [n77 Canada]  *Moderator Note:* *CR is created based on the approved Rel-17 CR of RP-222686 for US.* |
| Huawei: see comments above |
| Meta: These contents will be updated based on issue 2-1-3 |
| Intel: Please see comments above |
| AT&T: We are OK with the content of the CR since it follows the agreed text utilized for the NS55 case. It should be revised as noted on the coversheet to take the official 38.101-1 v17.7.0 content as the baseline. We would prefer to provisionally agree to the revision and address any modifications necessary once RAN4 concludes on the generic mapping issue. |
| R4-2216649  R4-2216650 (CAT-A) | Remove network signalling labels for CA\_NS and CA\_NC\_NS  *Moderator Note: depends on outcome of Option 2b in issue 2-1-3.* |
| Huawei: see comments above |
| Meta: These contents will be updated based on issue 2-1-3 |
| Intel: Please see comments above |

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
|  | WF on … | YYY |  |
|  | LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-22xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

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** | **Revised to** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-22xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-22xxxxx |  | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-22xxxxx |  | 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