**3GPP TSG-RAN WG4 Meeting # 97-e R4-20xxxxx**

**Electronic Meeting, November 2nd – 13th, 2020**

**Agenda item:** 4.2.2

**Source:** Moderator (Apple Inc.)

**Title:** Email discussion summary for [97e][103] NR\_NewRAT\_UE\_RF\_Part\_2

**Document for:** Information

# Introduction

This document summarizes the email discussions for agenda item 4.2.2. The agenda item 4.2.2 is intended for FR2 UE RF requirements maintenance which includes regulatory Tx/Rx spurious emission limits handling (4.2.2.1), maintenance for transmitter characteristics (4.2.2.2), and maintenance for receiver characteristics (4.2.2.3). Most of contributions in this agenda item are CRs where some of them are associated with a discussion paper to justify the CR contents. Contributions which belong to this email thread but originally submitted to other agenda item and which submitted to this agenda item but will be treated in other email threads are summarized below.

**R4-2014404** “CR for TS38.101-2 Rel-15, Correction for definition of P-MPR”, CATT (from AI 4.2.1.1 [102])

**R4-2014405** “CR for TS38.101-2 Rel-16, Correction for definition of P-MPR”, CATT (from AI 4.2.1.1 [102])

**R4-2015332** “Discussion on WRC-19 requirements”, OPPO (from AI 7.19.3 [116])

**R4-2015336** “CR on FR2 equal PSD in UL CA”, CAT A CR, OPPO (from AI 7.19.3 [116])

**R4-2015978** “Modification of FR2 MOP verification with account of the 38.213 scaling rule”, Ericsson (from AI 7.19.3 [116])

**R4-2015979** “Correction to Pcmax: account of power prioritization rules for secondary cells”, Ericsson (from AI 7.19.3 [116])

**R4-2016520** “CR on FR2 intra-band NC DL CA refsens” CAT A CR, Huawei, HiSilicon (from AI 7.12.1.2 [113])

**R4-2016590** “CR on FR2 intra-band NC DL CA refsens” CAT F CR, Huawei, HiSilicon (from AI 7.12.1.2 [113])

**R4-2016053** “Frequency separation class alignment”, Ericsson (to AI 7.12.1 [113])

The discussions of this email thread are divided into the following four topics, EESS protection requirements after WRC-19, NR SCC power drop behavior in FR2, CRs for 38.101-2 on Tx characteristics, and CRs for 38.101-2 on general/Rx characteristics which also includes one LS to RAN2.

# Topic #1: EESS protection requirements after WRC-19

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2014258**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014258.zip)  Type: Discussion  For: Approval | Qualcomm Incorporated | **Title:** On introduction of new emissions requirements to existing bands  **Observation 1**:Existing 3GPP processes cause undue reduction in UL performance of legacy UEs when faced with new emissions regulations, despite any exemptions for legacy UE.  **Observation 2**: There is no RAN2 impact from introducing new NS to existing bands due to available NS slots and existing framework.  **Observation 3**: To incorporate a new emissions requirement, RAN4 cannot wait to insert NS framework just prior to an emissions requirement applicability date.  **Observation 4**: A RAN4 solution that allows completion of requirements well in advance of applicability dates is much more practical than one involving long-term calendar-monitoring.  **Proposal 1**:RAN4 to introduce NS\_203 immediately. Applicability date information is not necessary to be captured.  **Proposal 2a**:RAN4 to implement new NS per Option 3 described in Table 2.3-1 => introduce new NS into standard immediately with applicability (‘mandatory from’) date as a normative element.  **Proposal 2b**: RAN4 to implement new NS per Option 4 described in Table 2.3-1 => introduce new NS into standard immediately with applicability (‘mandatory from’) dates in Editor’s Notes. |
| R4-2014925  Type: Other  For: Approval | NTT DOCOMO, INC. | **Title:** Further consideration on EESS protection  **Note:** Document not available |
| [**R4-2014926**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014926.zip)  Type: Other  For: Approval | NTT DOCOMO, INC. | **Title:** Further consideration on EESS protection  **Observation 1**: NS\_203 for NS\_205 should be introduced in RAN4#97 since it will apply after January 2021 according to WRC-19 decision.  **Observation 2**: It was agreed that explicit indication of supportiveness of newly introduced NS using modified MPR behavior is applied to solve the connectivity issue when new NS(s) are introduced to existing band(s).  **Observation 3**: For EESS protection applied before changeover date, it would be better to use the same framework with EESS protection applied after changeover date if the framework can be fixed in RAN4#97.  **Observation 4**: Even if US regulatory does not have EESS protection at this time, US operator can avoid A-MPR since they can decide not to signal the new NS.  **Proposal 1**: NS\_203 and NS\_205 shall be introduced in RAN4#97 by agreeing CR[x].  **NOTE**: the CR uses NS\_204 instead of NS\_205 since our CR focus on the EESS protection applied before changeover date (NS\_204 is originally used for EESS protection applied after changeover date in the approved WF [2], but is not included in CR [8]).  **Proposal 2**: For NS\_203 and NS\_205, use the same framework with EESS protection applied after changeover date if the framework can be approved in RAN4#97. If not, introduce NS\_203 and NS\_205 with NOTE describing effective date.  **Proposal 3**: Before agreeing option 2, an appropriate period to make chipset, UE, NW, and TE compatible with new NS(s) should be investigated.  **Proposal 4**: Take option 3: Introduce all foreseen NS into all releases of standard now, but use ‘applicable from <calendar date>’ to only enforce when time comes |
| [**R4-2015211**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015211.zip)  Type: Other  For: Approval | Nokia, Nokia Shanghai Bell | **Title:** Remaining issues on WRC-19  Proposal 1: Make NS\_201/CA\_NS\_201 not applicable in the following ways.  - Add a NOTE such that “the NS(s) is not applicable in the present release of specifications” to NS mapping tables.  - Replace the relevant subclauses on the NS(s) with “void”.  **Proposal 2**: Introduce NS\_203/CA\_NS\_203 with a bit for modifiedMPR for the NS(s) as mandatory  **Observation**: Since it is challenging for 3GPP to uniquely define “UE brought into use” as a single 3GPP phrase applicable all over the world, regardless of whatever options RAN4 takes, ambiguity still remains.  **Proposal 3**: Consider a following possible compromised alternative as one of the options  - Capture the new NS(s), but make them not available by making A-MPR TBD  - Capture an informative NOTE outside the relevant table to explain the situation  - Specific examples are captured in Annex |
| [**R4-2015255**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015255.zip)  Type: Discussion  For: Approval | Xiaomi | **Title:** on FR2 spurious emission NS handling  **Observation 1**: More stringent requirement after the change-over date apply to UE/chipset who went on the market before the change-over date is the main problem on introducing the EESS protection into specification.  **Observation 2**: The requirements applicable after 2024/2027 are part of current requirements so UE need to have the capability with these requirements.  **Observation 3**: We have no clue weather a UE will be used after change-over date, so the capability should be added before the change-over date  **Proposal**: Choose option 2 above for introducing the all foreseen NS values. |
| [**R4-2015332**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015332.zip)  Type: Discussion  For: Approval | OPPO | **Title:** Discussion on WRC-19 requirements  **Observation 1**: Usually RAN4 only refer to present regulatory requirements.  **Observation 2**: The applicable time shall be clearly specified in the spec if requirements defined in spec but for future use.  **Observation 3**: Option 2 (specify before the changeover date) is much closer to what RAN4 have done in the past and is a clean solution.  **Observation 4**: Option 3 (specify now and introduce the enforcing date) is irregular handling of specs and might set a precedent for introducing future possible requirements in RAN4 specs.  **Observation 5**: Similar statements can be used in UE specs as BS for Option 3, i.e. “This limit applies to BS brought into use after 1 September 2027”.  **Observation 6**: Specifying applicable date for test cases has already been done in RAN5 specs.  **Proposal 1**:Take either option 2 (specify before the changeover date) or option 3 (specify now and introduce the enforcing date) for WRC-19 requirements in RAN4. |
| [**R4-2016532**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016532.zip)  Type: Other  For: Approval | Huawei, HiSilicon | **Title:** On FR2 EESS protection emission requirement  **Observation 1**: even UE is mandatory to support newly introduced NS after change over date, UE is not mandatory to behave with newly NS.  **Observation 2**: From “2 stage emission requirement” and “NS signalling”, even we push it as mandatory to support, the tight NS may only a requirement shown up in verification test but never implemented by UE in real network.  **Observation 3**: Modified MPR solution actually equals to: directly specify UE is mandatory to support 1dBm/200MHz on n258 from Rel-15.  **Proposal 1**: Do not introduce modified MPR solution for indicating on NS support.  **Proposal 2**: For 1dBm/200MHz for n258, UE is mandatory to support it from Rel-15, regardless of the “brought into use” date.  **Proposal 3**: Leave -5dBm/200MHz requirement for the future work of RAN4. |
| [**R4-2014054**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014054.zip)  Type: CR  For: Agreement  CAT: F | Nokia, Nokia Shanghai Bell | **Title:** EESS protection related requirements for FR2 bands  **Reason for change:**  Introduction of EESS protection based on WRC-19.  **Summary of change:**  Introduction of NS\_203 and CA\_NS\_203 and relevant requirements.   * Additional spurious emission * A-MPR by referring to R4-2000216. * ModifiedMPR.   In addition, in order to make NS\_201 and CA\_NS\_201 not applicable by adding a NOTE. |
| R4-2014055  Type: CR  For: Agreement  CAT: A | Nokia, Nokia Shanghai Bell | **Title:** EESS protection related requirements for FR2 bands  **Note**: This is the mirror CR of R4-2014054 |
| [**R4-2014259**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014259.zip)  Type: CR  For: Agreement  CAT: F | Qualcomm Incorporated | **Title:** CR to 38.101-2: Introduction of NS\_203  **Reason for change:**  Some WRC19 emissions resolutions become applicable 1/1/2021. For 3GPP to pro-actively incorporate the new requirements, new NS framework is needed in standard.  **Summary of change:**  Introduce NS\_203:   1. Introduce NS\_203 framework 2. Introduce +1 dBm/ 200 MHz requirement in EESS protected band |
| R4-2014260  Type: CR  For: Agreement  CAT: A | Qualcomm Incorporated | **Title:** CR to 38.101-2: Introduction of NS\_203  **Note**: This is the mirror CR of R4-2014259 |
| [**R4-2014885**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014885.zip)  Type: CR  For: Agreement  CAT: F | NTT DOCOMO, INC. | **Title:** CR for introduction of EESS protection applied after 2021  **Reason for change:**  1dBm/200MHz EESS protection for n258 and 7dBm/GHz and -13dBm/MHz for n260 will apply from 1 January 2021 according to WRC-19 decision  Reflect the following agreements in R4-2009141:  • 1dBm/200MHz protection requirements is specified with NS\_203 for n258  • 7dBm/1GHz and -13dBm/MHz are specified with NS\_205 for n260.  • Explicit signaling for a UE to report newly supported NS value(s) for a legacy band to the network (reuse modifiedMPR bits)  • A-MPR values proposed in R4-2006788 apply  **Summary of change:**   * Introduce EESS protection with new NS and A-MPR approved in R4-2009141.   NOTE: This CR uses NS\_204 (not NS\_205) for n260 since NS\_204 is originally used for EESS protection applied after changeover date in R4-2009144, but this CR does not include the protection.  NOTE: We adopted 0.5dB granularity to derive A-MPR from R4-2000216 so that in some case, the required A-MPR has 0.5dB difference.   * Add description so that modified MPR can be used to explicit signaling for a UE to report newly supported NS value(s) for a legacy band * For enforcement of the time of "UE brought into use", put NOTE describing supportiveness of relevant NS. This CR use same wording of "UE brought into use" as WRC-19 decision. |
| R4-2014886  Type: CR  For: Agreement  CAT: A | NTT DOCOMO, INC. | **Title:** CR for introduction of EESS protection applied after 2021  **Note**: This is the mirror CR of R4-2014885 |
| [**R4-2014257**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014257.zip)  Type: LS out  For: Approval | Qualcomm Incorporated | **Title:** draft LS to RAN5 on new emissions requirements  **For:** Editor’s note captures applicability (emissions changeover) date for a new NS flag. The intent is to convey to RAN5 that the recommended date for introduction of requirement in RAN5 spec |

## Open issues summary

**Issue 1.2-1: Should 1 dBm/200 MHz for n258 be immediately defined as NS\_203 in Rel-15 specifications with associated A-MPR requirements without explicitly stating the applicability date and made mandatory with a bit for *modifiedMPR*?**

### Option 1: Yes

### Option 2: No

**Issue 1.2-2: Should 7 dBm/1 GHz and -13 dBm/MHz for n260 be immediately defined as NS\_20X in Rel-15 specifications?**

### Option 1: Yes

### Option 2: No

**Issue 1.2-3: Should NS\_201 be indicated as not applicable in the present release of specifications and NS\_201 A-MPR requirements be voided?**

### Option 1: Yes

### Option 2: No

**Issue 1.2-4: For 23.6 GHz – 24.0 GHz EESS protection, what offset frequency reference should be used for A-MPR requirements? (offset frequency is the frequency from offset frequency reference to the lower edge of the channel bandwidth)**

### Option 1: 24.0 GHz (R4-2009141 (WF), R4-2014885)

### Option 2: 24.25 GHz (R4-2014259, R4-2014054)

**Issue 1.2-5: What PC1 A-MPR requirement for NS\_203 should be when offset frequency < BWchannel?**

### Option 1: 3 dB (R4-2009141 (WF), R4-2014259, R4-2014054)

* Option 2: 2.5 dB (R4-2014885)

**Issue 1.2-6: How to handle EESS protection requirements with change-over dates after 2024?**

### Option 1: Introduce new NS into all releases of standard right before changeover dates (they become effective immediately)

* Option 2: Introduce all foreseen NS into all releases of standard before close of release closest to and before changeover date (they become effective immediately after insertion)
* Option 3: Introduce new NS into standard immediately with applicability (‘mandatory from’) date as a normative element
* Option 4: Introduce new NS into standard immediately with applicability (‘mandatory from’) dates in Editor’s Notes
* Option 5: Introduce only new NS into standard immediately with applicability dates in informative Notes

**Issue 1.2-7: For Option 3, Option 4, and Option 5 in Issue 1.2-6, should the corresponding A-MPR requirements be defined accordingly or left as TBD?**

### Option 1: A-MPR requirements should be defined

### Option 2: Left as TBD

**Issue 1.2-8: For Option 3, Option 4, and Option 5 in Issue 1.2-6, should RAN4 send an LS to RAN5 to convey to RAN5 that the recommended date for introduction of requirements in RAN5 spec.?**

### Option 1: Yes

### Option 2: No

## Companies views’ collection for 1st round

### Open issues

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| **Company** | **Comments** |
|  | Issue 1.2-1:  Issue 1.2-2:  …. |
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### Comment collection for discussion papers

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| **Tdoc number** | **Comments** |
| [**R4-2014258**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014258.zip) | **Title**: On introduction of new emissions requirements to existing bands  **Comments**: |
| [**R4-2014926**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014926.zip) | **Title:** Further consideration on EESS protection  **Comments:** |
| [**R4-2015211**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015211.zip) | **Title:** Remaining issues on WRC-19  **Comments:** |
| [**R4-2015255**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015255.zip) | **Title:** on FR2 spurious emission NS handling  **Comments:** |
| [**R4-2015332**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015332.zip) | **Title:** Discussion on WRC-19 requirements  **Comments:** |
| [**R4-2016532**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016532.zip) | **Title:** On FR2 EESS protection emission requirement  **Comments:** |

### CRs/TPs/LSs 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.*

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| **CR/TP number** | **Comments collection** |
| [**R4-2014054**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014054.zip) | **Title:** EESS protection related requirements for FR2 bands |
|  |
| [**R4-2014259**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014259.zip) | **Title:** CR to 38.101-2: Introduction of NS\_203 |
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| [**R4-2014885**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014885.zip) | **Title:** CR for introduction of EESS protection applied after 2021 |
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| [**R4-2014257**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014257.zip) | **Title:** draft LS to RAN5 on new emissions requirements |
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## 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:* |

*Recommendations on WF/LS assignment*

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| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

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

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
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## Discussion on 2nd round (if applicable)

The following CRs are returned to 2nd round to see if agreement can be reached with further clarifications or revisions.

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|  | **Title:** |
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|  | **Title:** |
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## Summary on 2nd round (if applicable)

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

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
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# Topic #2: NR SCC power drop behavior in FR2

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2014711**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014711.zip)  Type: Discussion  For: Approval | Qualcomm Incorporated | **Title:** PCC SCC prioritization issue solution  **Proposal:** Add a note to the TS 38.101-2 that MPR’s were derived with equal PSD in the analysis |
| [**R4-2015334**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015334.zip)  Type: Discussion  For: Approval | OPPO | **Title:** Discussion on FR2 equal PSD in CA and draft LS  **Observation 1:** Equal PSD restriction was introduced into spec without much explanation why this is needed for Pcmax and the comments are from UE implementation rather than from testing point of view.  **Observation 2:** No such equal PSD restriction was introduced into other RAN4 specs like FR1 CA or EN-DC.  **Observation 3:** Usually MPR are derived based on some precondition (the worst case), however, it applies to all the scenarios and there is no need to mention about the precondition in spec.  **Proposal 1:** It is proposed to remove the equal PSD restriction from Pcmax section.  **Observation 4:** Requirements related to max power in CA are also impacted and derive of worst case in testing is this is up to RAN5.  **Observation 5:** RF tests are verifying UE hardware performance, and what matters is the status that is targeted to be verified, therefore there is no need to always follow the UE behavior in the NW.  **Observation 6:** Test mode or test commands can be adopted to derive the equal PSD status from testing point of view.  **Proposal 2:** It is proposed to inform RAN5 about the updates and backgrounds in RAN4 specs to facilitate test case design |
| [**R4-2015335**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015335.zip)  Type: CR  For: Agreement  CAT: F | OPPO | **Title:** CR on FR2 equal PSD in UL CA  **Reason for change:**  As discussed in R4-2015334, the equal PSD restriction in Pcmax is not needed and it has caused confusions in interpretation of requirements.  **Summary of change:**  Remove the equal PSD restriction from CA Pcmax. |
| [**R4-2015336**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015336.zip)  Type: CR  For: Agreement  CAT: A | OPPO | **Title:** CR on FR2 equal PSD in UL CA  **Note**: The is the mirror CR of R4-2015335. A revision is needed to correct the cover sheet if the CAT F CR is agreed. |
| [**R4-2015978**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015978.zip)  Type: Other  For: Approval | Ericsson | **Title:** Modification of FR2 MOP verification with account of the 38.213 scaling rule  Regarding conformance testing with SCell dropping we make the following  **Observation 1:** The problem of verifying maximum output power with SCell power reduction is exacerbated by the allowed MPR values and the large tolerances for the configured maximum output power.  **Observation 2:** given anticipated TE measurement performance, verification of the maximum output power for UL CA appears viable only for BPSK and QPSK.  **Observation 3:** for CABW ≤ 400 MHz, the current output power requirement for aggregated CCs is almost the same as for the case of a single CC, of the order of 2 dB smaller for the non-CA case, whereas for CABW > 400 MHz there is a larger difference. Hence dropping of SCells would not significantly change the PASS/FAIL limit should the remaining PCell be subject to non-CA requirements.  **Observation 4:** for CABW > 400 MHz with a two non-contiguous UL CC, there is a significant difference between the current output power requirement for the single UL CC compared to that of the non-CA case, particularly for channel bandwidths up to 200 MHz.  and propose  **Proposal 1:** verification should be based on “Option 2: Measure the UE as is even SCC output may be scaled down under CA mode” relevant for UE operations in the field.  **Proposal 2:** for a UE significantly reducing (by at least [6] dB) the SCell power or dropping the SCells at maximum output power, the requirements for the total output power shall be in accordance with that for a single carrier (in non-CA operation) of the same bandwidth as the PCell. This applies for DFT-s-BPSK or DFT-s-QPSK (PUSCH transmissions) and CABW < [1400] MHz.  **Proposal 3:** reconsider (reduce) the tolerances for Pcmax to ensure output power performance in general and to enable verification of higher order MCS in particular.  **Proposal 4:** verify the output power by assuming contiguous RB, DFT-s-BPSK or DFT-s-QPSK UL allocation in a single CC (PCell and SCells) of a CA configuration with contiguous CCs, and whose cumulative aggregated BW ≤ 400 MHz, then the MPR for non-CA requirements apply.  For operations in the field (and conformance testing) we propose  **Proposal 5:** to prevent SCell dropping and allow “equal PSD” conditions for operations in the field, specify UE-specific absolute and/or relative power limits (P-Max) modifying the configured maximum output power per serving cell.  **Proposal 6:** the absolute and or relative power limits are set up in an RRC message. Then limit to be used by the UE is determined by a MAC-CE or a PDCCH message based on a DCI format, which enables fast adaptation to changing radio conditions (e.g. temporarily disabling limits). This should be liased with RAN1 and RAN2. |
| [**R4-2015979**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015979.zip)  Type: CR  For: Agreement  CAT: F | Ericsson | **Title:** Correction to Pcmax: account of power prioritization rules for secondary cells  **Reason for change:**  Correct the specification of Pcmax for CA in view of the power prioritization rules of 38.213. Add a test case for verification of the maximum output power when the SCell power is scaled or the SCell(s) is/are dropped. Modify the definition of the (calculated) PCMAX.  The scaling rules for LTE are different when the UE configured with UL CA is power limited. For NR, an assumption that the MPR for each serving cell is the same as the MPR of the total signal could also be the baseline for intra-band CA despite different power prioritization rules; for PUSCH transmissions the SCell power levels may be reduced or SCells dropped at maximum output power. This determination of MPR would be similar to the “total A-MPR” adopted for intra-band contiguous EN-DC still recognizing that the CG powers could be different. However, this should be a prerequisite for the MPR determination for intra-band CA, not the calculation of the PCMAX  **Summary of change:**  Clause 6.2A.4:  The assumption of equal PSD (same MPR on all serving cells) is moved from the specification of the configured maximum power to the determination of the MPR.  Additional test case introduced: for a UE significantly reducing (by at least [6] dB) the SCell power or dropping the SCells at maximum output power, the requirements for the total output power shall be in accordance with that for a single carrier for DFT-s-BPSK or DFT-s-QPSK. |

## Open issues summary

**Issue 2.2-1: Is it necessary to clarify in TS 38.101-2 that MPRs were defined under the assumption of equal PSD across all RBs?**

### Option 1: Yes

### Option 2: No

**Issue 2.2-2: Should equal PSD restriction be removed from PCMAX requirement?**

### Option 1: Yes

### Option 2: No

**Issue 2.2-3: If the changes in Issue 2.2-1 and Issue 2.2-2 to TS 38.101-2 are agreed, which Release should they be started to be incorporated?**

### Option 1: Rel-15

### Option 2: Rel-16

**Issue 2.2-4: Is it necessary to capture the PCell/SCell prioritizing rule of 38.213 in RAN4 spec. and starting from which release if agreed?**

### Option 1: Yes, Rel-15

### Option 2: Yes, Rel-16

### Option 3: No

**Issue 2.2-5: Is it necessary to send an LS to inform RAN5 on the updates in RAN4 spec. for UL CA to facilitate test case design?**

### Option 1: Yes

### Option 2: No

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  | Issue 2.2-1:  Issue 2.2-2:  …. |
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### Comment collection for discussion papers

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| **Tdoc number** | **Comments** |
| [**R4-2014711**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014711.zip) | **Title:** PCC SCC prioritization issue solution  **Comments**: |
| [**R4-2015334**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015334.zip) | **Title:** Discussion on FR2 equal PSD in CA and draft LS  **Comments**: |
| [**R4-2015978**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015978.zip) | **Title:** Modification of FR2 MOP verification with account of the 38.213 scaling rule  **Comments**: |

### 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.*

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| **CR/TP number** | **Comments collection** |
| [**R4-2015335**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015335.zip) | **Title:** CR on FR2 equal PSD in UL CA |
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| [**R4-2015979**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015979.zip) | **Title:** Correction to Pcmax: account of power prioritization rules for secondary cells |
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## 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:* |

*Suggestion on WF/LS assignment*

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|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

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

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
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## Discussion on 2nd round (if applicable)

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|  | **Title:** |
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## Summary on 2nd round (if applicable)

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

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| **CR/TP/WF number** | **CRs/TPs/WFs Status update recommendation** |
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# Topic #3: CRs for 38.101-2 on Tx characteristics

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2014261**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014261.zip)  Type: CR  For: Agreement  CAT: F | Qualcomm Incorporated | **Title:** CR to 38.101-2: ULCA clarifications  **Reason for change:**  During the work phase for the Rel-16 FR2 intra-band non-contiguous UL CA feature, R4-2011511 identified some conflicts, need for clarifications and editorial reorganization in TS38.101-2. These changes were adopted for Rel-16 in the feature CR for FR2 NC UL CA. This CR is a ‘reverse mirror’ to back-port those changes to Rel-15.  Also included are some editorial changes  **Summary of change:**  Back-port agreed changes from feature CR R4-2011744 into Rel-15 spec:  1. Resolve IBE/SEM conflict  2. Clarify special handling of MPR (from Rel-15) for CA operation for CA is applicable for contiguous CCs  3. Clarify requirement for 1UL+nDL CA case  4. Align CA MPR table headings between PC1 and PC3  Further clarifications and corrections that require mirror CR for Rel-16:  1. BWchannel\_CA is defined incorrectly in section 6.2A.2. Remove incorrect definition and retain definition listed in section 3.  2. Definition of NRB\_agg\_C does not specify what SCS must be chosen to calculate ‘number of the aggregated RBs within the fully allocated cumulative aggregated channel bandwidth’. Include SCS info.  3. Minor editorial, add ‘UL’ clarification when CA is referenced in UL requirement sub clauses |
| R4-2014262  Type: CR  For: Agreement  CAT: A | Qualcomm Incorporated | **Title:** CR to 38.101-2: ULCA clarifications  **Note:** The is the mirror CR of R4-2014261 |
| [**R4-2014404**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014404.zip)  Type: CR  For: Agreement  CAT: F | CATT | **Title:** CR for TS38.101-2 Rel-15, Correction for definition of P-MPR  **Reason for change:**  In clause 6.2.4, the definitions of P-MPR are incorrect.  **Summary of change:**  The definitions of P-MPR are modified from “allowed maximum output power reduction” to “power management maximum power reduction”. |
| R4-2014405  Type: CR  For: Agreement  CAT: A | CATT | **Title:** CR for TS38.101-2 Rel-16, Correction for definition of P-MPR  **Note:** The is the mirror CR of R4-2014404 |
| [**R4-2014684**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014684.zip)  Type: CR  For: Agreement  CAT: F | Anritsu corporation | **Title:** Transmission gap for relative power tolerance in FR2  **Reason for change:**  In sub-clause 6.3.4.3, definition of transmission gap for relative power tolerance is not aligned with the associated requirement for FR1 nor E-UTRA requirement.  In 6.3A.4.3, expression of transmission gap is not aligned with 6.3.4.3.  **Summary of change:**  Add “less than or equal to” at the definition of transmission gap in 6.3.4.3. Align the expression of transmission gap in 6.3A.4.3 with 6.3.4.3. |
| R4-2014685  Type: CR  For: Agreement  CAT: A | Anritsu corporation | **Title:** Transmission gap for relative power tolerance in FR2  **Note:** The is the mirror CR of R4-2014684 |
| [**R4-2014720**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014720.zip)  Type: CR  For: Agreement  CAT: F | Samsung | **Title:** CR to TS38.101-2 on DC location correction  **Reason for change:**  *txDirectCurrentLocation* is a parameter of UplinkTxDirectCurrent IE. But *txDirectCurrentLocation* is mistakenly used as IE  **Summary of change:**  Change “*txDirectCurrentLocation* IE” to “the parameter *txDirectCurrentLocation* in *UplinkTxDirectCurrent IE*” |
| R4-2014721  Type: CR  For: Agreement  CAT: A | Samsung | **Title:** CR to TS38.101-2 on DC location correction  **Note:** The is the mirror CR of R4-2014720 |
| [**R4-2014907**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014907.zip)  Type: CR  For: Agreement  CAT: F | Apple Inc. | **Title:** CR for TS 38.101-2: Clarification for NS\_202  **Reason for change:**  NS\_202 contains two emission requirements, one is for additional spurious emission requirement at -10 dBm/100 MHz, the other at 1 dBm/200 MHz is meant for protection of satellite passive services. Since the former requirement is tighter and also covers the frequency range of the latter requirement, without clarification on the purpose of the latter requirement, it would look to be redundant for the latter requirement in NS\_202.  **Summary of change:**  Add NOTE 1 to Table 6.5.3.2.3-1 (NS\_202) for the emission requirement at 1 dBm/200 MHz for protection frequency range 23600 MHz – 24000 MHz to clarifiy that “This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.5.3-1 from the edge of the channel bandwidth. The protection of frequency range 23600 – 24000 MHz is meant for protection of satellite passive services.” |
| R4-2014908  Type: CR  For: Agreement  CAT: A | Apple Inc. | **Title:** CR for TS 38.101-2: Clarification for NS\_202  **Note:** The is the mirror CR of R4-2014907 |
| [**R4-2015970**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015970.zip)  Type: CR  For: Agreement  CAT: F | Ericsson | **Title:** Correction to Pcmax: total radiated power  **Reason for change:**  The total radiated power for CA is undefined. The definition of the index i of the active serving cells c(i) is missing.  **Summary of change:**  Sub-clause 6.2A.4: the total radiated power is defined with the applicable requirements.  The index i of the active serving cells c(i) is removed, the text reformulated to avoid a definition (note that all cells with UL grants with non-zero granted power are included). |
| R4-2015971  Type: CR  For: Agreement  CAT: A | Ericsson | **Title:** Correction to Pcmax: total radiated power  **Note:** The is the mirror CR of R4-2015970 |
| [**R4-2016057**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016057.zip)  Type: CR  For: Agreement  CAT: F | Ericsson | **Title:** Correction of transmission gap definition for Relative power tolerance  **Reason for change:**  The defined transmission gap between sub-frames for relative power tolerance is not correctly defined. It is set to 20ms, correct definition should be “less than or equal to 20ms”  **Summary of change:**  The transmission gap definition is changed to “less than or equal to 20ms”  **Moderator’s note**: This CR can be merged into the similar CR R4-2014684 which also includes the correction for CA. |
| R4-2016056  Type: CR  For: Agreement  CAT: A | Ericsson | **Title:** Correction of transmission gap definition for Relative power tolerance  **Note:** The is the mirror CR of R4-2016057 |
| [**R4-2016579**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016579.zip)  Type: CR  For: Agreement  CAT: F | Qualcomm Incorporated | **Title:** CR to DMRS position in UL RMC for FR2  **Reason for change:**  DM-RS symbol positions for 11 UL OFDM symbols in UL RMC tables are not consistent with RAN1 spec of TS38.211.  **Summary of change:**  Updated DM-RS symbol positions in UL RMC Tables.  **Moderator’s Note:** CAT A CR is missing |
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## Open issues summary

## Companies views’ collection for 1st round

### Open issues

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| **Company** | **Comments** |
| XXX |  |

### Comment collection for discussion papers

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| **Tdoc number** | **Comments** |
|  | **Title:**  **Comments**: |

### 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.*

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| **CR/TP number** | **Comments collection** |
| [**R4-2014261**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014261.zip) | **Title:** CR to 38.101-2: ULCA clarifications |
|  |
| [**R4-2014684**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014684.zip) | **Title:** Transmission gap for relative power tolerance in FR2 |
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| [**R4-2014720**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014720.zip) | **Title:** CR to TS38.101-2 on DC location correction |
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| [**R4-2014907**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014907.zip) | **Title:** CR for TS 38.101-2: Clarification for NS\_202 |
|  |
| [**R4-2015970**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015970.zip) | **Title:** Correction to Pcmax: total radiated power |
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| [**R4-2016057**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016057.zip) | **Title:** Correction of transmission gap definition for Relative power tolerance |
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| [**R4-2016579**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016579.zip) | **Title:** CR to DMRS position in UL RMC for FR2 |
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## 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:* |

*Suggestion on WF/LS assignment*

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|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
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### CRs/TPs

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

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
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## Discussion on 2nd round (if applicable)

The following CRs are returned to 2nd round to see if agreement can be reached with further clarifications or revisions.

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| **CR/TP number** | **Comments collection** |
|  | **Title:** |
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## Summary on 2nd round (if applicable)

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

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
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# Topic #4: CRs for 38.101-2 on general/Rx characteristics

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2016459**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016459.zip)  Type: CR  For: Agreement  CAT: F | T-Mobile USA | **Title:** CR for 38.101-2: IBB and ACS corrections  **Reason for change:**  There is an error in the symbols for channel bandwidths of carrier k for IBB and ACS.  **Summary of change:**  Change the symbol for channel bandwidths of carrier k from BWk/2 to BWk |
| R4-2016460  Type: CR  For: Agreement  CAT: A | T-Mobile USA | **Title:** Mirror CR for 38.101-2: IBB and ACS corrections  **Note:** The is the mirror CR of R4-2016459 |
| [**R4-2016031**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016031.zip)  Type: CR  For: Agreement  CAT: F | Rohde & Schwarz | **Title:** Correction to EIS definition  **Reason for change:**  The abbreviation for EIS is explained inconsistently in the specification. In chapter 3.3 and throughout chapter 7 it is defined as “effective isotropic sensitivity”, but in chapter 3.1 it is mentioned as “equivalent isotropic sensitivity”. The definition in chapter 3.1 needs to be aligned with the other usages of the term in the specification.  **Summary of change:**  Update definition of EIS in chapter 3.1. |
| R4-2016032  Type: CR  For: Agreement  CAT: A | Rohde & Schwarz | **Title:** Correction to EIS definition  **Note:** The is the mirror CR of R4-2016031 |
| [**R4-2016499**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016499.zip)  Type: CR  For: Agreement  CAT: F | Qualcomm Incorporated | **Title:** CR to 38.101-2: Frequency separation class update  **Reason for change:**  During the Rel-16 FR2 RF enhancement work item, two categories of new frequency separation classes were introduced:  1. Rel-16 enhancement, FS>1400 MHz  2. Rel-15 compliant FS = 1000 MHz  Unfortunately, both categories were implemented by RAN2 exclusively as a Rel-16 enhancement due to lack of clarity in LS from RAN4 on this aspect.  FS = 1000 MHz is contained inside the range of FS that is supportable by Rel-15 infra hardware (800 to 1400 MHz). Consequently there would be network benefit to enhancing the Rel-15 list of FS class for UEs by introduction of FS = 1000 MHz  Cat A (mirror) CR not required because this is a case of Rel-15 catching up to Rel-16  **Summary of change:**  Add 1000 MHz to list of frequency separation classes |
| [**R4-2016545**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016545.zip)  Type: LS out  For: Approval | Qualcomm Incorporated | **Title:** draft LS to RAN2 on Rel-15 frequency separation class update  **For:** Introduce intermediate value of FS class |
| [**R4-2016590**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016590.zip)  Type: CR  For: Agreement  CAT: F | Huawei, HiSilicon | **Title:** CR on FR2 intra-band NC DL CA refsens  **Reason for change:**  For UE supporting CA configuration, ΔRIB is also applied for Single carrier requirement. There is no clarification in the spec.  **Summary of change:**  Adding sentence: For a UE supporting a intra-band CA configuration, the ΔRIB applies for both SC and CA operation. |
| R4-2016520  Type: CR  For: Agreement  CAT: A | Huawei, HiSilicon | **Title:** CR on FR2 intra-band NC DL CA refsens  **Note:** The is the mirror CR of R4-2016590 |

## Open issues summary

## Companies views’ collection for 1st round

### Open issues

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| **Company** | **Comments** |
| XXX |  |

### Comment collection for discussion papers

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| **Tdoc number** | **Comments** |
|  | **Title:**  **Comments**: |

### CRs/TPs/LSs 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.*

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| **CR/TP number** | **Comments collection** |
| [**R4-2016459**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016459.zip) | **Title:** CR for 38.101-2: IBB and ACS corrections |
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| [**R4-2016031**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016031.zip) | **Title:** Correction to EIS definition |
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| [**R4-2016499**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016499.zip) | **Title:** CR to 38.101-2: Frequency separation class update |
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| [**R4-2016545**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016545.zip) | **Title:** draft LS to RAN2 on Rel-15 frequency separation class update |
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| [**R4-2016590**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016590.zip) | **Title:** CR on FR2 intra-band NC DL CA refsens |
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## 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:* |

*Suggestion on WF/LS assignment*

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|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
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### CRs/TPs

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

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
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## Discussion on 2nd round (if applicable)

The following CRs are returned to 2nd round to see if agreement can be reached with further clarifications or revisions.

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| **CR/TP number** | **Comments collection** |
|  | **Title:** |
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## Summary on 2nd round (if applicable)

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

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| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
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