**3GPP TSG-RAN WG4 Meeting # 97-e R4-2016947**

**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

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  | Issue 1.2-1:  Issue 1.2-2:  …. |
| Verizon | Issue 1.2-2:  First, this NTT DoCoMo’s proposal is misleading the RAN4 decision and provides wrong information!  First, the WRC established a required protection for the 37-43.5 GHz band and a "recommended" (but not mandatory) level that was more stringent to provide guidance for countries to impose more restrictive measures if they choose. The detailed WRC Final Acts requirement from Resolution 243 can be referred on the Page 355 of the Final Acts ([https://www.itu.int/dms\_pub/itu-r/opb/act/R-ACT-WRC.14-2019-PDF-E.pdf](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.itu.int_dms-5Fpub_itu-2Dr_opb_act_R-2DACT-2DWRC.14-2D2019-2DPDF-2DE.pdf&d=DwMFaQ&c=y0h0omCe0jAUGr4gAQ02Fw&r=azZyh39xBNBFKEEDKJFtwxxOkvdAO9tnr4Iay4bjUmw&m=mYeXsTny4VDmbezt6mHVGN9_SWI4En8HnCl0f6-L3FQ&s=RxypDOeh-7qyt7B4lsInnopq6DVOVwomCD7FEVu4YHQ&e=" \t "_blank)).  Clearly, NTT DoCoMo’s proposals are wrong for the band n260 and they don’t correctly reflect the WRC established the protection requirements because the WRC-19 recommendations are not mandatory.  Thus, we cannot agree the NTT DoCoMo’s proposal. |
| OPPO | **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*?**  [OPPO] Option 1, Yes, considering this is the end of 2020 and requirements will be applied in 2021. This is the exception case and should not be referred as example for other future requirements.  **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?**  [OPPO] ok with Option 1, yes.  **Issue 1.2-6: How to handle EESS protection requirements with change-over dates after 2024?**  [OPPO] Either Option 1(introduce right before changeover date) or Option 3 (introduce now with applicability in normative way). If group decide to introduce now, then our preference is Option3 compare to other options, since this can make it clear to the other groups and also to the industry.  **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?**  [OPPO] Option1 (AMPR defined), the spec should be in a defined as a package and make it clear, otherwise, lost the meaning of this requirement.  **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.?**  [OPPO] Not necessary as long as RAN4 spec is clear, but no harm to inform them. |
| NTT DOCOMO, INC | **For Verizon**  Thank you for your comments. I saw the following link you shared.  [https://www.itu.int/dms\_pub/itu-r/opb/act/R-ACT-WRC.14-2019-PDF-E.pdf](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.itu.int_dms-5Fpub_itu-2Dr_opb_act_R-2DACT-2DWRC.14-2D2019-2DPDF-2DE.pdf&d=DwMFaQ&c=y0h0omCe0jAUGr4gAQ02Fw&r=azZyh39xBNBFKEEDKJFtwxxOkvdAO9tnr4Iay4bjUmw&m=mYeXsTny4VDmbezt6mHVGN9_SWI4En8HnCl0f6-L3FQ&s=RxypDOeh-7qyt7B4lsInnopq6DVOVwomCD7FEVu4YHQ&e=" \t "_blank)  There are two requirements in page 355: one is “Unwanted emission mean power for IMT station” and the other is “Recommended limits for IMT station”.  Is your objection about the latter one?  Our contribution is to introduce the former one, but not the latter.  **Issue 1.2-1:**  1 dBm/200 MHz for n258 should be immediately defined as NS\_203 in Rel-15 specifications with associated A-MPR requirements, and made mandatory with a bit for modifiedMPR. For with or without explicitly stating the applicability date, we are OK with both ways for NS\_203 although we proposed a way with NOTE on the applicability date in our CR.  **Issue 1.2-2:**  Option 1 (Yes). But we would like to discuss with Verizon further.  **Issue 1.2-6**  Option 3 as discussed in R4-2014926.  **Issue 1.2-7:**  We think If we take option 3 with normative note, A-MPR can be specified. But if we take option 4 with informative note, A-MPR is TBD since in our understanding, the motivation of using TBD is not to apply A-MPR before changeover date even if we have informative note. |
| Nokia | Issue 1.2-1: Option 1  Issue 1.2-3: Option 1  Issue 1.2-4: Option 2  The lower edge of n258 stats from 24.25GHz. In addition, mobile in Active service frequency band region of 24.25 – 27.5 GHz shall protect EESS (passive) frequency band of 23.6-24GHz according to WRC19 conclusion.  Issue 1.2-5: Either option is fine.  Issue 1.2-6: It depends on the exact spec to reflect each of the options…  At least we cannot agree with option 1 and 2 as it is due to the following reasons.  Option 1: “right before” is not clear.  Option 2: Essentially release is not connected with effective date. In our understanding, the introduction would be necessary at least 3Q before the changeover date.  Ex: the changeover date is 2024. Jan 1st  Apr or May 2023 RAN4 meeting shall agree with CRs.  June 2023 RAN approves the CRs.  Aug 2023 RAN5 agree with CRs reflecting RAN4 agreements.  Sep RAN approves the CRs.  Oct RAN5 spec is issues.  TE vendors implement the contents of the approved CRs. And necessary tests and certification process are made by the changeover date.  Thus, if we go with option 1 or 2, an alternative is Introduce new NS into all releases of standard before changeover dates (they become effective immediately). Exactly when is not determined at this moment (on the shelf). This will be discussed based on contributions to be submitted into RAN4.  The above should be captured somewhere in 3GPP TR or WF.  For Option 3 and 4, it depends on how the relevant spec is written. But at least modifiedMPR applicability should be clarified.  For Option 5, we provided this option as middle way.  Issue 1.2-7:  Option 3 and 4 in Issue 1.2-6 must have A-MPR. Otherwise, essentially, they become similar to Option 5 in Issue 1.2-6.  Issue 1.2-8:  Option 2  If the intent of the LS is “recommendation”, the LS is not necessary, since RAN5 spec will be created based on RAN4 spec anyway. But if we share the intent of the unusual RAN4 decision, it is ok to send an LS to RAN5. |
| Ericsson | Issue 1.2-1: Option 1. The modifiedMPRbehavior is necessary in case there are legacy UEs in the field.  Issue 1.2-2: Option 2. We do not agree with inclusion of the EESS limits for n260.  Issue 1.2-3: Option 1. The NS\_201 is obsolete.  Issue 1.2-6: Option 1 (except for NS\_204) or Option 2. The important matter is that NS values with their emission limits indicated are included (hence mandatory) in a release early enough such that any harmonised standard can include these before the changeover date (at least for EU). This is essentially Option 2. Including the NS values immediately (Option 1) would avoid issues with the changeover dates and handling of legacy UEs (multiple NS values must be indicated in a cell after the changeover dates).  Issue 1.2-7: Aside from the fact that changeover dates in 3GPP specifications are not feasible, what is the point of introducing an A-MPR as TBD for an NS value that is mandatory from the release it is specified (early UE implementations in the field can be waived)?  Issue 1.2-8: Option 2, RAN5 should introduce conformance requirements once the NS values are specified in RAN4 specifications. |
| Qualcomm | Issue 1.2-1: Yes  Issue 1.2-2: No. The emissions recommendations referenced in this issue (1.2-2) apply to n260 and n259. The n259 band has been addressed by including the limits as general requirements for that band. The n260 band is only deployed in the US currently and there is no movement by FCC to create new regulation consistent with WRC19 recommendation. Consequently, there is no motivation to create NS framework for n260. We can reconsider if n260 will be deployed in places other than those under FCC jurisdiction.  Issue 1.2-3: Yes. There is no geographical region that has the emissions requirements associated with NS\_201. It currently represents unnecessary testing of UEs  Issue 1.2-4: Option 2 (24.25 GHz). AMPR values and structure was based on R4-2000219, which used 24.25 GHz as a reference point. The WF uses 24.0 GHz which appears to be a typo.  Issue 1.2-5: Option 1 (3.0 dB). The contribution referenced by proponents of 2.5 dB also proposes 3.0 dB.  Issue 1.2-6: Option 4 or option 5. (They seem equivalent)  Issue 1.2-7: Option 1 if there is agreement in RAN4 with A-MPR values.  Issue 1.2-8: Yes  …. |
| Samsung | Issue 1.2-1: Option 1 (Yes)  Issue 1.2-3: Option 1 (Yes)  Issue 1.2-6: Option 1/4/5. We have supported Option 1 because it is a clearer way to reflect two different levels with time gap. However, if it is not easy for the group to set up the right timing for the change, we are also fine with Option 4 or 5  Issue 1.2-7: Option 1  Issue 1.2-8: It depends on the issue 1.2-6. It seems the LS is meaningful for the option 1 or 2. |
| Apple | Issue 1.2-1: Option 1: Yes  Issue 1.2-2: Option 2: No  As commented by Verizon in last RAN4 meeting, FCC does not have the EESS protection included in regulation at this point in time.  Issue 1.2-3: Option 1: Yes  Issue 1.2-4: Option 1: 24.0 GHz  24.25 GHz is the lower band edge of n258. Does the reference frequency happen to coincide with the n258 band edge? Otherwise 24GHz makes more sense as it determines the frequency offset from the aggressor channel edge to the victim band edge.  Issue 1.2-5: Option 1: 3 dB  Issue 1.2-6: Option 1  Issue 1.2-7: Option 1 |
| Xiaomi | **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. Actually we think this is common understanding that was agreed last meeting.  **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. As it has been agreed with CR of TR to void NS 201, there should be similar approach to the TS.  **Issue 1.2-6: How to handle EESS protection requirements with change-over dates after 2024?**  Option 2 as stated in our discussion paper. The foreseen requirements is part of current regulatory requirement and UE should make sure it can fulfill the requirement after the change over date.  **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. The A-MPR should be defined first and the UE at current stage should guarantee that they can meet the specific protection requirement at this stage with defined A-MPR however, these NS values and corresponding A-MPR should not be used before the hand-over date. |
| Huawei | Issue 1.2-1:  1dBm/200MHz should be defined and mandatory required in Rel-15 spec without explicitly stating the applicability date. But modified MPR is not used to indicate.  Issue 1.2-2: such requirement is not used by American network, but it is mandatory for UE to support? Seems unfair. But we don’t have a strong view.  Issue 1.2-3:  Issue 1.2-4:  Issue 1.2-5:  Issue 1.2-6: Option 1. We’d better to wait for a while since -5dBm/200MHz is not so urgent. We don’t want a discussion in the future on the spec revision before year 2027.  Issue 1.2-7: we don’t agree with option 3 4 5 in 1.2-6.  Issue 1.2-8: No, it is too early to recommend anything to RAN5. Look at NS\_201, we spend much time on defining AMPR, and discuss how to void it. |

### 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**:  NTT DOCOMO, INC:  For clarification, option 4 means that we introduce new NS with informative note, so if we take option 4, we have core requirements now but UE(s) are not tested before close of release closest to and before changeover date. Is this correct understanding? Does Option 4 mandate UE to support new NS before changeover date?  Ericsson:  Dates in the specification are not feasible, cannot be used when standards are transcribed into a harmonised standard. The changeover dates can be included for information. The NS must be included and supported in a release early enough to be used in a harmonised standard that can be published in the EU Official Journal (i.e. applicable) at the transition date 2027. The NS is mandatory from the release in which it is specified. Network impact in the table: there is no impact of A-MPR in the network as long as the NW does not indicate the new NS value. |
| [**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:**  Verizon:  We oppose this NTT DoCoMo’s contribution as the major statements for the EESS protection in the range 37-43.5 GHz are wrong and don’t correctly reflect the WRC established the protection requirement.  First, the WRC established a required protection for the 37-43.5 GHz band and a "recommended" (but not mandatory) level that was more stringent to provide guidance for countries to impose more restrictive measures if they choose. The detailed WRC Final Acts requirement from Resolution 243 could be referred on the Page 355 of the Final Acts ([https://www.itu.int/dms\_pub/itu-r/opb/act/R-ACT-WRC.14-2019-PDF-E.pdf](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.itu.int_dms-5Fpub_itu-2Dr_opb_act_R-2DACT-2DWRC.14-2D2019-2DPDF-2DE.pdf&d=DwMFaQ&c=y0h0omCe0jAUGr4gAQ02Fw&r=azZyh39xBNBFKEEDKJFtwxxOkvdAO9tnr4Iay4bjUmw&m=mYeXsTny4VDmbezt6mHVGN9_SWI4En8HnCl0f6-L3FQ&s=RxypDOeh-7qyt7B4lsInnopq6DVOVwomCD7FEVu4YHQ&e=" \t "_blank)).  Because the WRC-19 recommendations are not mandatory, we cannot agree the NTT DoCoMo’s Proposal 1 and Proposal 2. The mandated “NS\_205” (or change to “NS\_204”) is NOT acceptable.  NTT DOCOMO, INC:  **For Verizon**  Please see our comments in R4-2014885  Ericsson: enforcing the NS values after a changeover date specified in the 3GPP specification is not feasible.  **Qualcomm: It would be helpful to know if there is expectation that n260 will be deployed outside FCC jurisdiction** |
| [**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:**  Ericsson: why introduce "placeholders" for the new NS with A-MPR TBD? NS values are mandatory from the release in which they are specified. The important matter is that the NS values are included in a release early enough such that any harmonised standard (or equivalent) can include these before the changeover date. |
| [**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:**  **NTT DOCOMO, INC:**  As discussed in R4-2014926, we think we need some investigation when we should introduce new NS before taking 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)) |
| [**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:**  **NTT DOCOMO, INC:**  We have objection on proposal 1 since it is not aligned with the previous agreement in R4-2009141. And without this indication of new NS, we cannot avoid connectivity issues since NW cannot decide which NS should be indicated in Scell addition and handover.  Nokia: We don’t agree with Proposal 1 and 2. We have already discussed and the approved WF says that modifiedMPR is applied for network to distinguish UE with NS\_203 from UE without NS\_203. For proposal 3, we are open to discuss it.  **Qualcomm:**  **On Obs1: In 3GPP, we hope to provide a consistent framework for UEs and networks so they can comply with regulations. It cannot always prevent cheating by UEs or networks not acting in good faith. For example, the UE may use more MPR in real deployment than during the compliance verfication step, which is analogous to a UE that supports an NS during compliance verification, but only supports NS\_200 in deployment (i.e it pretends to be a legacy UE)**  **On proposal 2: We do not think the general requirements for an existing band can be changed if compliance implies new back off behavior by the UE. It can be accommodated using NS signaling however, which is what many companies have proposed for n258.** |

### 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.*

|  |  |
| --- | --- |
| **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 |
| Ericsson: may require revision. Overlaps partly with R4-2014259, but also introduces a modified MPR behavior relevant if there are legacy UEs in the field. Then the BS would have to include NS\_201 that is made obsolete with this CR (sic). UE compliant with the latest Rel-15 specification shall set the bit to 1, only waived for legacy UEs in the field.  Huawei: we do not agree on modified MPR part. After this introduced, any NS can be inserted at any time of the early release. NS\_203 can be defined as mandatory from Rel-15 with a note. |
| [**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 |
| NTT DOCOMO, INC:  CR should be revised: Indication of supporting new NS by using modified MPR is needed to avoid the connectivity issue.  Ericsson: see comments to R4-2014054.  Qualcomm: Our CR needs to be revised to add missing treatment of *modifiedMPRbehaviour*.  Huawei: we do not agree on modified MPR, mandatory to support NS 203 can be added as a note. |
| [**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 |
| Verizon:  No, we oppose this NTT DoCoMo’s draft CR as information is incorrect and the proposals don’t correctly reflect the WRC established the protection requirement in.  First, the WRC established a required protection for the 37-43.5 GHz band and a "recommended" (but not mandatory) level that was more stringent to provide guidance for countries to impose more restrictive measures if they choose. The detailed WRC Final Acts requirement from Resolution 243 can be referred on the Page 355 of the Final Acts ([https://www.itu.int/dms\_pub/itu-r/opb/act/R-ACT-WRC.14-2019-PDF-E.pdf](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.itu.int_dms-5Fpub_itu-2Dr_opb_act_R-2DACT-2DWRC.14-2D2019-2DPDF-2DE.pdf&d=DwMFaQ&c=y0h0omCe0jAUGr4gAQ02Fw&r=azZyh39xBNBFKEEDKJFtwxxOkvdAO9tnr4Iay4bjUmw&m=mYeXsTny4VDmbezt6mHVGN9_SWI4En8HnCl0f6-L3FQ&s=RxypDOeh-7qyt7B4lsInnopq6DVOVwomCD7FEVu4YHQ&e=" \t "_blank)).  Because the WRC-19 recommendations are not mandatory, we oppose the NTT DoCoMo proposed “NS\_204” and the related requirements.  NTT DOCOMO, INC:  **For Verizon**  Thank you for your comments. I saw the following link you shared.  [https://www.itu.int/dms\_pub/itu-r/opb/act/R-ACT-WRC.14-2019-PDF-E.pdf](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.itu.int_dms-5Fpub_itu-2Dr_opb_act_R-2DACT-2DWRC.14-2D2019-2DPDF-2DE.pdf&d=DwMFaQ&c=y0h0omCe0jAUGr4gAQ02Fw&r=azZyh39xBNBFKEEDKJFtwxxOkvdAO9tnr4Iay4bjUmw&m=mYeXsTny4VDmbezt6mHVGN9_SWI4En8HnCl0f6-L3FQ&s=RxypDOeh-7qyt7B4lsInnopq6DVOVwomCD7FEVu4YHQ&e=" \t "_blank)  There are two requirements in page 355: one is “Unwanted emission mean power for IMT station” and the other is “Recommended limits for IMT station”.  Is your objection about the latter one?  Our contribution is to introduce the former one, but not the latter.  Ericsson: not agreed. NS\_204 should not be introduced at this point. The changeover dates in the modifiedMPRbehavior are not feasible (and this standard will most likely be published after the 2021 date). |
| [**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 |
| Nokia:  We need to understand the intention. QC’s intention is RAN4 specify all the necessary requirements but RAN5 should suspend the introduction of corresponding RAN5 requirements until a certain date comes? If this is the case, the LS is not needed. As far as we leave editor’s note or whatever, in the end, the note must be deleted. That work happens in RAN4 as well. Then, RAN5 just follows the change to be made in the future.  Huawei:  We don’t agree to introduce applicability date of each NS in editor’s note. And RAN5 can not monitor this by the wording “UE brought into use” |

## 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** |
| **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 (OPPO, NTT Docomo, Nokia, Ericsson, Qualcomm, Samsung, Apple, Xiaomi, Huawei)Option 2: No () Note: Huawei agreed to introduce the requirement, but not using modifiedMPR  **Status**: Option 1 is agreed. |
| **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 (NTT Docomo)Option 2: No (Verizon, Ericsson, Qualcomm, Apple) **Status:** No agreement, but more companies supported Option 2. |
| **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 (OPPO, Nokia, Ericsson, Qualcomm, Samsung, Apple, Xiaomi)Option 2: No () **Status:** Option 1 is agreed. |
| **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 (Apple)  * Option 2: 24.25 GHz (Nokia, Qualcomm)   **Status:** No agreement. More clarifications are needed as R4-2000219 (RAN4 #94-e) and R4-2006788 (RAN4 #95-e) from the same company proposed two different reference points in two different meetings. |
| **Issue 1.2-5** | **What PC1 A-MPR requirement for NS\_203 should be when offset frequency < BWchannel?** Option 1: 3 dB (Nokia, Qualcomm, Apple)  * Option 2: 2.5 dB (NTT Docomo, Nokia)   **Status:** No agreement. Is NTT Docomo okay with 3 dB according to Qualcomm’s comment? |
| **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) (**OPPO, Ericsson, Samsung,** **Apple, Huawei**)  * 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) (**Xiaomi**) * Option 3: Introduce new NS into standard immediately with applicability (‘mandatory from’) date as a normative element (**OPPO, NTT Docomo**) * Option 4: Introduce new NS into standard immediately with applicability (‘mandatory from’) dates in Editor’s Notes (**Qualcomm, Samsung**) * Option 5: Introduce only new NS into standard immediately with applicability dates in informative Notes (**Nokia, Qualcomm, Samsung**)   **Status:** No agreement |
| **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 (**OPPO, Nokia, Qualcomm, Samsung, Apple, Xiaomi**)Option 2: Left as TBD (**Nokia**) **Status:** Agreeable if Option 3 or Option 4 in Issue 1.2-6 is chosen |
| **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 (**Qualcomm**)Option 2: No (**OPPO, Nokia, Ericsson, Huawei**) **Status:** No agreement but more companies preferred not sending LS to RAN5. |

*Recommendations on WF/LS assignment*

**Moderator’s recommendation**: Focus on introducing 1 dBm/200 MHz requirement for n258 in this meeting. Requirements with change-over dates after 2024 can be discussed in later meetings. Concerned companies may volunteer to lead a WF on how to proceed with the future requirements in this meeting.

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

### CRs/TPs/LS

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

**Moderator’s recommendation:** There are 3 CRs with similar contents to introduce 1 dBm/200 MHz requirement for n258. One CR further proposes to introduce EESS protection requirements for n260 which however cannot be agreed. It is suggested to use R4-2014054 as the CR baseline with a revision for 2nd round review. All other CRs and one LS are suggested to be noted.

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| [**R4-2014054**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014054.zip) | To be revised |
| R4-2014055 | Mirror CR of R4-2014054 |
| [**R4-2014259**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014259.zip) | Noted |
| R4-2014260 | Withdrawn |
| [**R4-2014885**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014885.zip) | Noted |
| R4-2014886 | Withdrawn |
| [**R4-2014257**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014257.zip) | Noted |

### Discussion papers

**Moderator’s recommendation:** All discussion papers are recommended to be noted.

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| **Tdoc number** | **Status update recommendation** |
| [**R4-2014258**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014258.zip) | Noted |
| R4-2014925 | Withdrawn (not available) |
| [**R4-2014926**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014926.zip) | Noted |
| [**R4-2015211**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015211.zip) | Noted |
| [**R4-2015255**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015255.zip) | Noted |
| [**R4-2015332**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015332.zip) | Noted |
| [**R4-2016532**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016532.zip) | Noted |

## 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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| --- | --- |
| R4-2016785  (revision of R4-2014054) | **Title:** EESS protection related requirements for FR2 bands |
| Apple: For A-MPR for CA\_NS\_203 in clause 6.2A.3.4.1 and 6.2A.3.4.3, it is not clear what “frequency separation” means in the following statement:  if Offset frequency < frequency separation or BWChannel\_CA of the UL CA configuration,  For intra-band contiguous CA, BWChannel\_CA itself should be clear enough.  Nokia: To Apple and QC,  Though this came from agreement, the comment from Apple makes sense…I deleted “frequency separation or”. I’d like to ask QC if this change still can keep QC’s original intention or not.  NTT DOCOMO, INC:  Based on 1st round discussion, we are OK not to introduce 7 dBm/1 GHz and -13 dBm/MHz for n260 at this moment, and would like to support this CR to introduce a way of explicitly indication on supportiveness of newly introduced NS(s) which was agreed in R4-2009141.  Ericsson: perhaps use the following for NS\_201 in notes etc: “NS\_201 is obsolete, the associated additional spurious emission requirements are not applicable” [no need to mention “in the present release”, obvious]  The bit indicating modified MPR behavior is presumably intended for early UEs only supporting NS\_202 and implemented before v15.11.0 (the network cannot indicate NS\_201 if marked as obsolete/not applicable) |
|  | **Title:** |
|  |

## Summary on 2nd round (if applicable)

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

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **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:  …. |
| OPPO | **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?**  [OPPO] Option 2, no. No need for such information because the MPR requirement is applicable to all the conditions rather than equal PSD condition. The equal PSD is only the condition to derive this MPR rather restrict MPR usage. Adding this information, in our view, will make it more confused rather than more clear.  **Issue 2.2-2: Should equal PSD restriction be removed from PCMAX requirement?**  [OPPO] Option 1, Yes. This equal PSD doesn’t for Pcmax, and was introduced to 101-2 without much clarification in the past. In addition, no such equal PSD restriction was introduced into other RAN4 specs like FR1 CA or EN-DC. Therefore, in our view, it is redundant and improper information to be defined in spec.  **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?**  [OPPO] Option 1, Rel-15. This is a correction to Rel-15 spec. And RAN5 issue is for Rel-15.  **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?**  [OPPO] Option3, no. There is no need to capture that, and not clear the intention.  **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?**  [OPPO] Option 1, Yes. |
| Nokia | Issue 2.2-1 & 2.2-2:  Whichever is selected, the worst condition for MPR shall be considered in RAN5 test case. If we remove the text, the intention should be shared with RAN5.  Issue 2.2-3: Option 1  Issue 2.2-4: Option 3  Issue 2.2-5: Option 1 |
| Ericsson | Before commenting on the issues listed: the issue of NR SCell power drop behavior in FR2 is only discussed from a conformance test perspective and testability in view of large tolerances. Now, the NR SCell power drop behavior (and possible dropping of SCells when the UE is power limited) will also occur in the field – this should be an issue of at least the same magnitude as that of the test!  The SCell power drop behavior will also occur for FR1. We remark that the behavior specified for LTE is different: once the required power for PUCCH (if scheduled) is allocated, the remaining power is equally split between PUSCH transmissions on all serving cells (PUSCH with UCI prioritized). For LTE, this also motivates equal MPR across all serving cells, the same MPR as that allowed for the total signal.  That the conformance test should verify the actual behavior in the field should be obvious, an artificial test mode wherein the power prioritization (38.213) is disabled should not be used for verification of maximum output power and the associated unwanted emissions requirements (tested simultaneously). The SCell drop behavior for NR can be prevented by e.g. limiting the PCell power as proposed in R4-2015978 (Proposal 5 and Proposal 6) for Rel-16 or later.  Issue 2.2-1: Option 2.  Not necessary, the allowed MPR (total signal) applies also when the UE prioritizes the power according to 38.213 regardless of the derivation of the MPR. However, we also accept including the clarification in the MPR sub-clause (already included in the CR in R4-2015979)  Issue 2.2-2: Option 1 (necessary).  The PCMAX statement on equal PSD contradicts the statement that the PCMAX is determined by the UL grants of serving cells with non-zero transmission grants, which also accounts for the power prioritization rules (e.g. all power can be allocated to the PCell and the PCMAX determined accordingly).  Issue 2.2-3: Option 1.  Issue 2.2-4: Option 2.  If the UE reduces the power of the SCell(s) significantly (below a threshold) or drop the SCell(s) the MOP should be according to the remining PCell as per the non-CA requirements. This change is too late for Rel-15, but RAN5 could verify a similar behavior for Rel-15 (when contiguous RBs are scheduled within one CC) for DFT-s-BPSK or DFT-s-BPSK).  Issue 2.2-5: Option 1.  RAN4 should provide an answer to RAN5 that the MOP requirements should be verified with due account of the 38.213 prioritization rules, which reflect the behavior in the field. Guidance on the priority of the test cases in view of the said prioritization rules and large tolerances (particularly for higher order modulation and larger MPR) should also be given. |
| Qualcomm | Issue 2.2-1: Yes, this helps ran5 issue.  Issue 2.2-2: preference no. In fact, we are adding it elsewhere.  Issue 2.2-3: Rel-15, opt 1  Issue 2.2-4: Not necessary but it may help but the change in **[R4-2015979](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015979.zip)**  is much more than that and we can not agree with the change,  Issue 2.2-5: LS or ran4 spec change will both work but LS might be needed to clarify the spec change in this case since it may not be so clear how it helps ran5.  …. |
| Huawei | Issue 2.2-1: Option2. It is the assumption when we define CA MPR, but when the allocated RBs are different across CC, same MPRCA is used for each CC when calculating Pcmax,c, so power is not decreased with equal spectral density when allocation RB number is different across CC.  Issue 2.2-2: Option 2, but this sentence need a slight revision-> Pcmax,c is calculated under the assumption that PSD for each RB …..  Issue 2.2-3: should not change.  Issue 2.2-4: can be clarified in 38.101, but no MPRCA is changed. We cannot decide MPR value based on power or PSD difference.  Issue 2.2-5: equal PSD assumption do not need to send to RAN5, because for non-equal CBW full-RB allocation case, how could MPR is decreased assuming equal PSD on all the allocated RBs? UE just use the same MPR on each CC, then the 2 CCs are highly possible not within the same PSD after MPR, this is follow the current RAN4 spec. |

### 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**:  Ericsson: we do not agree with the proposal, see comments to Issue 2.2-1 and 2.2-2 above. |
| [**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**:  Ericsson: we do not agree with Proposal 2 and Observation 2, using a test mode for creating artificially an equal PSD condition is not relevant for operation on the field and make the MOP test meaningless. We remark that the unwanted emissions requirements are normally verified in conjunction with the maximum output power requirement (the former applies at all power levels). We agree with Proposal 1 (and the accompanying CR). |
| [**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.*

|  |  |
| --- | --- |
| **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 |
| Ericsson: agreed. |
| [**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 |
| [OPPO] The equal PSD information defined in MPR section in our view is not necessary and not see the benefit of it. But no strong view on this.  The additional test case says “Scell transmitted power is at least [6] dB below that of the Pcell, then for DFT-s-BPSK and DFT-s-QPSK the MPR shall be determined from Table 6.2.2.3-1…”. If we understand correctly, it means when Scell Tx power is [6dB] below the Pcell then single CC MPR will apply, however, UE may still keep the Scell connection even the Tx power is [6db] below the Pcell, thus the CA MPR is still apply. Therefore, it needs further clarification and discussion.  Qualcomm: The first change is ok but changing the MPR so dramatically is a big functional non-back ward compatible change since it tightens the MPR’s and would break Rel-15 UE. |

## Summary for 1st round

### Open issues

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

|  |  |
| --- | --- |
|  | **Status summary** |
| **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 (Qualcomm)Option 2: No (OPPO, Ericsson, Huawei) **Status**: No agreement, but more companies supported no need to clarify that MPRs were defined under the assumption of equal PSD across all RBs |
| **Issue 2.2-2** | **Should equal PSD restriction be removed from PCMAX requirement?** Option 1: Yes (OPPO, Ericsson)Option 2: No (Qualcomm, Huawei) **Status:** No agreement |
| **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 (OPPO, Nokia, Ericsson, Qualcomm)Option 2: Rel-16 **Status:** Option 1 is agreeable. |
| **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 (Ericsson, Huawei) * Option 3: No (OPPO, Nokia, Qualcomm)   **Status:** No agreement. |
| **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 (OPPO, Nokia, Ericsson, Qualcomm)  * Option 2: No (Huawei)   **Status:** No agreement, but more companies considered LS to RAN5 is needed. |

*Suggestion on WF/LS assignment*

**Moderator’s recommendation**: It does not look like the proposed CR changes in R4-2015335 and R4-2015979 can be agreed. Therefore, LS to RAN5 is also not necessary. It is recommended to close this issue in RAN4 without further action unless any company considered this an urgent issue and volunteer to lead a WF to proceed to next step.

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

### CRs/TPs/LS

**Moderator’s recommendation:** It is recommended both CRs are noted.

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| [**R4-2015335**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015335.zip) | Noted |
| [**R4-2015336**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015336.zip) | Noted |
| [**R4-2015979**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015979.zip) | Noted |

### Discussion papers

**Moderator’s recommendation:** All discussion papers are recommended to be noted.

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| **Tdoc number** | **Status update recommendation** |
| [**R4-2014711**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014711.zip) | Noted |
| [**R4-2015334**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015334.zip) | Noted |
| [**R4-2015978**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015978.zip) | Noted |

## Discussion on 2nd round (if applicable)

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| --- | --- |
|  | **Title:** |
| NTT DOCOMO, INC:  If RAN5 needs some feedbacks from RAN4, RAN4 should continue to discuss this topic and send LS to RAN5. Based on the 1st round discussion, the following content may be common understanding in RAN4:   * Current UE behavior (i.e. Prioritize PCC and drop the SCC UL power during the CA operation) is not infringing TS 38.213. * RAN4 requirement of configured transmitted power for CA (TS 38.101-2 clause 6.2A) is not mandating UE to transmit UL signals with an equal PSD. * Equal PSD is an assumption when MPR for CA was decided, but MPR requirements is applicable to all transmit condition   It may be helpful for RAN5 to share the above information. |
|  | **Title:** |
| Ericsson: we agree with NTT DOCOMO that RAN4 should continue discussing the SCC dropping behavior and provide guidance to RAN5. The conformance test cases should reflect the behavior in the field, particularly important for the MOP test for the unwanted emissions requirements are also verified in the MOP test.  Equal PSD is neither a prerequisite for PCMAX determination nor a typical case in the field given the prioritization rules in 38.213. |

### Way forward

The following WF will be discussed in second round to seek for approval.

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| **CR/TP number** | **Comments collection** |
| R4-2016994 | **Title:** WF on NR SCC UL power drop behavior in FR2 |
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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

|  |  |  |
| --- | --- | --- |
| **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.*

|  |  |
| --- | --- |
| **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 |
| Ericsson: for Rel-15 that only includes contiguous intra-band CA, is there a difference between UL BWchannel,CA and cumulative channel BW (CABW) for contiguously aggregated carriers (bidirectional bandwidth)? |
|  | Huawei: for “Spectral emission mask requirements do not apply at any frequency where IBE requirements of clause 6.4A.2.3 apply.” , in 6.4A.2.3, IBE requirement is applied for “Any non-allocated RB in allocated component carrier and not allocated component carriers”, but in UL CA case, the IBE requirement may be applied outside UL CCs. Could we further clarify clearly on the exception? |
| [**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 |
|  |
| [**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 |
| [OPPO] The IE name in 38.331 is *UplinkTxDirectCurrentBWP* rather than *UplinkTxDirectCurrent*.  Ericsson: to be revised, the IE names are not correct.  Samsung: thanks for all the comments. We will correct the IE name from “*UplinkTxDirectCurrent*” to “*uplinkTxDirectCurrentList*” in revised CR |
| [**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 |
| Huawei: For “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.” ASE requirement is generally required from Foob, it is unnecessary to note this for 1dBm/200MHz. |
| [**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 |
|  |
| [**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 |
| [Nokia]  R4-2014684 should be agreed, since that covers single carrier and CA. |
| [**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 |
| Anritsu: We assume the changes in this CR are not necessary and the current requirements should be kept as they are. The parameter is confusing but the term “DFT-s-OFDM Symbols per slot” in Tables A.2.2.1-1 and later do not directly represent the term “*ld* in symbols” in the definitions at Table 6.4.1.1.3-3 in TS 38.211. The actual *ld* in symbols can be found as 14 in TS 38.508-1 Table 4.6.3-122. Thus the DM-RS positions *l* should be chosen from the part for *ld* = 14, i.e. 7, 11.  Extract from TS 38.211 cl.6.4.1.1.3    Extract from TS 36.211 cl.6.4.1.1.3    Similar to this CR, R4-2016578 is not agreeable due to the same reason. (in #102)  Qualcomm: (To the moderator: In case this type of change is agreeable, would it be possible to get TDOC for the mirror CR? Thx)  Qualcomm: Based on the feedback received for R4-2016578 in [102], it is understood that “DFT-s-OFDM symbols per slot” in the tables for “Reference Channels for DFT-s-OFDM” creates unnecessary confusion for spec readers/developers. We want to then propose adding a note clarifying what it represents (e.g. the number of symbols in a slot including both PUSCH and DMRS symbols) somewhere in the spec or under each table so that we can avoid the confusion. Would moderator please allocate a new CR number to this?  Huawei: the current “2,7,11” DMRS position is correct, DFT-s-OFDM symbols in the table means the symbols excluding DMRS symbol. So no need to revise. |

## Summary for 1st round

### Open issues

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

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#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** |
| [**R4-2014261**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014261.zip) | Return to 2nd round (clarifications to Ericsson and Huawei’s comments) |
| R4-2014262 | Return to 2nd round (mirror CR of R4-2014261) |
| [**R4-2014404**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014404.zip) | Return to 2nd round (moderator missed to include this CR for comments in first round) |
| R4-2014405 | Return to 2nd round (mirror CR of R4-2014404) |
| [**R4-2014684**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014684.zip) | Agreeable |
| R4-2014685 | Agreeable (mirror CR of R4-2014684) |
| [**R4-2014720**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014720.zip) | To be revised |
| R4-2014721 | Return to 2nd round |
| [**R4-2014907**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014907.zip) | Return to 2nd round (to reply to Huawei’s comment) |
| R4-2014908 | Return to 2nd round (mirror CR of R4-2014907) |
| [**R4-2015970**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015970.zip) | Agreeable |
| R4-2015971 | Agreeable (mirror CR of R4-2015970) |
| [**R4-2016057**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016057.zip) | Noted (this CR can be covered by CR R4-2014684) |
| R4-2016056 | Withdrawn |
| [**R4-2016579**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016579.zip) | To be revised |
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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** |
| [**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 |
| Qualcomm: |
| [**R4-2014404**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014404.zip) | **Title:** CR for TS38.101-2 Rel-15, Correction for definition of P-MPR |
| **Moderator’s note**: This CR was not reviewed during 1st round discussions. |
| R4-2016786  (revision of R4-2014720) | **Title:** CR to TS38.101-2 on DC location correction |
|  |
| [**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 |
| Apple: Thanks for Huawei’s comment in first round and Nokia’s comment below. We have the same understanding with Nokia that this text is needed as the ASE for EESS protection includes the range between FOOB and channel edge, while the other ASE requirement in NS\_202 at -10 dBm/100 MHz is for range outside the FOOB.  For Nokia, the reason we proposed not to write the text on FOOB in the main body as NS\_201 is that NS\_202 includes two ASE requirements, but the text applies only to the requirement for EESS protection, not for both. As for the question on why we need to write victim radio system name, we do not have a strong opinion on this. We simply followed what was defined for NS\_201. We would not mind being explicit on this requirement, especially for NS\_202 where we have two ASE requirements. Explicit note is better to differentiate the two requirements. For NS\_203 to be introduced, since there is only one ASE requirement, we are fine to not have this explicit note.  Nokia:  Though Huawei commented that “ASE requirement is generally required from Foob, it is unnecessary to note this for 1dBm/200MHz.”, our understanding is at least for this ASE, no matter where the edge of FOOB (MHz) is, UE using frequency inside 24.25-27.5GHz needs to protect EESS so that the text is necessary.  If we add a text on FOOB (MHz), we can write it in the main body as NS\_201.  One question for Apple is that why we need write victim radio system name like satellite passive services for this particular case? If we keep consistency in the spec, we need to write every single victim radio system name for each NS in the spec.  Nokia2: To Apple,  We think that even if the FOOB (MHz) is written in main body, it is ok. The reason is that n258 and EESS has 250MHz gap at minimum. So, in some cases like 50MHz CBW usage, EESS protection is outside FOOB (MHz) region. So the note does not always apply. In any case, we are ok, since this discussion may not be specific to this CR…  Ericsson: for ASE indicated by NS values there is normally a normative statement that these requirements also apply in the OBE domain in case this falls in the protected range, should be done also for the second requirement (not to the first). No need the mention the victim service, WRC-19 limits with changeover dates could perhaps be mentioned for information (with reference to the RR). |
| R4-2016787  (revision of R4-2016579) | **Title:** CR to DMRS position in UL RMC for FR2 |
| Anritsu: We agree to add notes for the clarification of the term “DFT-s-OFDM Symbols per slot”. |
| Qualcomm: A [draft version](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_97_e/Inbox/Drafts/%5B97e%5D%5B103%5D%20NR_NewRAT_UE_RF_Part_2/2nd%20Round/(Draft)%20R4-2016787%20Rev%20of%20R4-2016579%20CR%20to%20DMRS%20position%20in%20UL%20RMC%20for%20FR2%20%5B103%5D%20r1.docx) is uploaded, which includes this note in NOTE 1 under all relevant Tables. To moderator, would you also help us get Tdoc/CR number for Rel-16 Cat-A CR?  NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted. |
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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 |
|  |
| [**R4-2016031**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016031.zip) | **Title:** Correction to EIS definition |
| Huawei: should revise into “effective” other than just remove? |
| [**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 |
| [Nokia]  Wec annnot agree with the CR. The content of the LS(R4-2016545) to RAN2 was clear and it was for Rel16.  Huawei: in RAN4 #87 meeting(May,2018), we submitted R4-1807404 to add 1000MHz into separation class, the reason is similar as R4-2016499. At that time, we still have chance to revise on Rel-15 capability definition. However, R4-1807404 is not approved because one company insist not to introduce 1000MHz is very important to their network:  **Discussion:**  Verizon: We do not see any use case for this new class in US bands  Huawei: Standard is not only for one operator. We also need to consider the future proof. We cannot restrict the standard only at current situation.  Verizon: It can be introduced in the future. We agree that there is a potential use case but we do not see any operators will use this. If there is any operators want to use this, we are fine.  Huawei: We do not see any confusion. We equally divid the UE capability  Verizon: Freqeucy span concept is clear understood. We do not want to introduce different UE capability. UE has to support the freqeucny span within the 1.4GHz bandwidth in 39GHz band.  Huawei: We are exactly targeting the use case for Verizon bands. We will have the same UE capability within certain BW.  However, it is too late add new UE capability into Rel-15 spec, there would be unavoidable compatibility problem. We just missed the chance to correct on the spec. Using high-end UE capability to support lower separation configuration is UE vendor’s have to face today. |
| [**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 |
| [Nokia]  The same comment on R4-2016499 is applicable to this LS.  Huawei: we provide comments in R4-2016499, it is too late add new UE capability into Rel-15 spec, there would be unavoidable compatibility problem. |
| [**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 |
| NTT DOCOMO, INC:  We have concern on this change.  This is because we think ΔRIB for FR2 NCCA is caused by supporting large frequency range of CA operation. This is a different reason from FR1 where ΔRIB is caused by insertion loss of additional filter to support CA.  [Nokia]  We cannot agree with the CR. Applying ΔRIB to single CC anywhere in the band is an inappropriate use of ΔRIB.  Qualcomm: Some clarification requested from proponent. Delta(R\_IB) applies per CC. Would you explain what specific scenario the addition is meant to address?  Apple: It is not clear how to apply RIB for single carrier as RIB is dependent on either the aggregated channel BW (for contiguous CA) or cumulative aggregated channel BW (for NC CA). Does it mean if a UE signals supporting CA BW class C, or frequency separation class 1200 MHz/1400 MHz, 0.5dB relaxation is always applied no matter it is under single carrier or CA operation?  Huawei: we introduce DL only separation class for DL NC CA, 2 separate chain is introduced actually, we can see there could be some loss in the front end, similar as insertion loss. |

## 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/LS

*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** |
| [**R4-2016459**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016459.zip) | Agreeable |
| R4-2016460 | Agreeable (mirror CR of R4-2016460) |
| [**R4-2016031**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016031.zip) | To be revised (please refer to Huawei’s comment) |
| R4-2016032 | Return to 2nd round (mirror CR of R4-2016031) |
| [**R4-2016499**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016499.zip) | Noted |
| [**R4-2016545**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016545.zip) | Noted (CR was not agreed, no need to send LS to RAN2) |
| [**R4-2016590**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016590.zip) | Noted |
| R4-2016520 | Withdrawn |

## 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** |
| R4-2016788  (revision of R4-2016031) | **Title:** Correction to EIS definition |
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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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