**3GPP TSG-RAN WG4 Meeting #98-e *R4-2103923***

**Electronic Meeting, 25 January – 5 February, 2020**

**Agenda item:** 4.4, 5.1, 7.19.4

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for [98e Bis][301] BS RF Maintenance

**Document for:** Information

# Introduction

The e-mail discussion covers Rel-15 and Rel-16 BS RF Core maintenance for NR, LTE and MS BS, i.e. Agenda items 4.4, 5.1 and 7.19.4.

The BS RF core spec TS 38.104 is very stable in Rel-15 and Rel-16 and there are few contributions in this area. Contributions were submitted within the following Topics:

1. Japanese regulation for 2.5GHz (BWA)
2. AAS capability set and support for NR+UTRA
3. Other maintenance

All topics include CRs for corrections.

# Topic #1: Japanese regulation for 2.5GHz (BWA)

The background for the Japanese regulation is given in an information paper in R4-2101016, accompanied with a set of CRs for NR and LTE specs (core + conformance) in R4-2101082 to R4-2101090.

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2101016 | SoftBank Corp., KDDI Corporation, NEC Corporation | **Support of Japan regulation for 2.5GHz(BWA) in NR BS**  Information and background. |

(Cat A CRs are not listed)

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2101082 | NEC, SoftBank, KDDI | **CR to TS 36.104: Additions of regional requirements for band 41 in Japan, Rel-15**  Summary of change:  Updated list of regional requirements. Modified additional requirement for BS output power. Updated spurious emissions requirement. Added text for ACLR, OBUE, tx spurious, rx spurious requirements to indicate regional regulation may specify them differently. |
| R4-2101085 | NEC, SoftBank, KDDI | **CR to TS 36.141: Additions of regional requirements for band 41 in Japan, Rel-15**  Summary of change:  Updated list of regional requirements. Modified additional requirement for BS output power. Updated spurious emissions requirement. Added text for ACLR, OBUE, tx spurious, rx spurious requirements to indicate regional regulation may specify them differently. |
| R4-2101088 | NEC, SoftBank, KDDI | **CR to TS 38.104: Additions of regional requirements for n41 in Japan, Rel-15**  Summary of change:  Updated list of regional requirements. Added additional requirement for BS output power. Added additional spurious emissions requirement. Added text for ACLR, OBUE, tx spurious, rx spurious requirements to indicate regional regulation may specify them differently for BS type 1-C. |
| R4-2101089 | NEC, SoftBank, KDDI | **CR to TS 38.104: Additions of regional requirements for n41 and n90 in Japan, Rel-16**  Summary of change:  Updated list of regional requirements. Added additional requirement for BS output power. Added additional spurious emissions requirement. Added text for ACLR, OBUE, tx spurious, rx spurious requirements to indicate regional regulation may specify them differently for BS type 1-C. |
| R4-2101091 | NEC, SoftBank, KDDI | **CR to TS 38.141-1: Additions of regional requirements for n41 in Japan, Rel-15**  Summary of change:  Updated list of regional requirements. Added additional requirement for BS output power. Added additional spurious emissions requirement. Added text for ACLR, OBUE, tx spurious, rx spurious requirements to indicate regional regulation may specify them differently for BS type 1-C. |
| R4-2101092 | NEC, SoftBank, KDDI | **CR to TS 38.141-1: Additions of regional requirements for n41 and n90 in Japan, Rel-16**  Summary of change:  Updated list of regional requirements. Added additional requirement for BS output power. Added additional spurious emissions requirement. Added text for ACLR, OBUE, tx spurious, rx spurious requirements to indicate regional regulation may specify them differently for BS type 1-C. |
| R4-2101094 | NEC, SoftBank, KDDI | **CR to TS 38.141-2: Additions of regional requirements for n41 in Japan, Rel-15**  Summary of change:  Updated list of regional requirements. Added additional requirement for BS output power. Added additional spurious emissions requirement. |
| R4-2101095 | NEC, SoftBank, KDDI | **CR to TS 38.141-2: Additions of regional requirements for n41 and n90 in Japan, Rel-16**  Summary of change:  Updated list of regional requirements. Added additional requirement for BS output power. Added additional spurious emissions requirement. |

## Companies views’ collection for 1st round

### Open issues

Please submit any questions or comments on the information provided about Japanese regulation for 2.5 GHz (BWA).

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| **Company** | **Comments** |
| Nokia | Is there any benefit to include the text “unless stated differently in regional regulation” in 3GPP spec, if no requirement is specified? We suggest removing such phrase from all the CRs.  For CRs to 36.xxx, only required change is to take away -22dBm/MHz in 2535-2655 MHz from additional spurious emissions limits for band 41. No other proposed modification is needed.  For CRs to 38.xxx, do you need to include the upper limit of rated output power. Normally, we do not include such information in BS spec unlike UE spec (where a global limit exists). |
| Samsung | Would like to clarify the regulation on Tx max power limitation for NR. In LTE spec limitation on both 10MHz and 20MHz defined, but for NR only 20W/10MHz considered in CR while the CBW stated as 10/20/30/40/50MHz in background slide. It seems 20W/10MHz is considered as PSD limitation applicable for 20/30/40/50MHz CBW rather than the limitation which is only applied for CBW of 20MHz. If so it may be more straightforward to capture a table with this limitation for all applicable CBW for NR as well. |
| Ericsson | Question on Mask: The mask described is carrier-centric with two breakpoints at 150% and 250% of CBW, which is different from the 3GPP OBUE masks. Is the understanding that this is to be handled through a reference to “regional regulation” instead of a detailed description? |
| NEC | To Nokia: We agree to avoid “unless stated differently in regional regulation” and add “In certain region, the requirements may (for BS type 1-C) may be specified for sum of the emission at each antenna connector”. Please see NEC reply to CR comments in the next section.  We do not have a limitation on BS declared rated output power as a general requirement in 3GPP specs, but we have in Japan regulation. We need to mention it. We can see similar regional requirements text in TS36.104.  To Samsung: The text we can see in Japan regulation is “Maximum output power shall be equal to or less than 20W per 10MHz bandwidth”. As Samsung stated it is the PSD applicable for all CBWs, we think it is beneficial to make the text similar to the original one.  To Ericsson: Thanks for spotting out an issue. In 36.xxx, we have additional OBUE limits for band 41. They shall be updated. In 38.xxx, we do not have additional OBUE limits for n41 (and n90). We shall have them. CRs need to be updated. |
| Huawei | We agree with Nokia that the text “unless stated differently in regional regulation …..” should not be added. We think the regional requirement should not be put at the clause for general requirements. |
| ZTE | The original sentence in section 6.2.4 and 9.2.4 in TS 38.104 should not be deleted. This sentence is a generic description, and the added text is just one specific regional example in Japan. If we keep this sentence, there is no need for the text “unless stated differently in regional regulation”, which is already covered by the original sentence in section 6.2.4 and 9.2.4 |

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2101082, R4-2101085, R4-2101088, R4-2101089, R4-2101091, R4-2101092, R4-2101094, R4-2101095 | Nokia: See comments above. |
| Ericsson: A few comments and questions:   1. Limits in the CRs are in several places defined “per cell”. This is not a concept that we have used previously in 3GPP specifications and it is not defined anywhere. All limits are related to the antenna connector, so it would not be possible to declare conformance to a limit “per cell”.  Would it be possible to consistently use e.g. “sum over antenna connectors”, as is done for BS power in the proposed test spec CRs? 2. The CR in R4-2101082 (36.104) has a statement added of “applying regionally” for the generic Category A limit. This is very unfortunate since limits are copied from ITU-R regulation, and the text is not added in R4-2101085 (36.141). What is the reason? 3. The CRs do in several places refer to limits “unless stated differently in regional regulation”. This could be avoided, since exceptions in regional regulation always exists and do not always have to be stated, unless there are specific regional limits added. |
| NEC: To Ericsson. Thanks for the comments and questions.   1. Agree the idea to change “per cell” to “sum over antenna connectors”. 2. The statement for spurious emission (category A) is missing in R4-2101085. Even it is a category A limit, we need a statement (according to the reply to 3.). 3. We found the difference between 3GPP spec for 1-C and Japan regulation is the reference point, not the limits. We also see the text in 6.1 (38.104),   “Unless otherwise stated, the conducted transmitter characteristics are specified at the antenna connector for BS type 1-C and at the TAB connector for BS type 1-H, with a full complement of transceiver units for the configuration in normal operating conditions.”  Therefore, we would like to propose to avoid “unless stated differently in regional regulation” and add a new text “In certain region, the requirements for BS type 1-C may be specified for sum of the emission power at each antenna connector” |
| Ericsson: To NEC, regarding point 2: Ericsson cannot agree to add such a statement in any specification to the general spurious emissions. The general Category A (or B) limits are globally applicable based on an ITU-R recommendation. We are obliged to follow those and if you state that they may not apply regionally, it basically means that any general limits can be applied.  If (as in this case) the regional difference is in the reference point, not the limits, then you should add such a statement where the reference point is stated in the specs, and it should be consistent across specs.  ZTE: As commented above, the sentence “In certain regions, additional regional requirements may apply” should be kept as it is now. |

## Summary for 1st round

### Open issues

There were no objections to the overall proposal to introduce the Japanese regulation in LTE and NR specs.

On the specific CRs, several issues were raised in discussions:

1. The definition of limits “per cell”, which is not a concept defined in 3GPP. Proposed to consider the use of “sum over antenna connectors”.
2. The use of “unless stated differently in regional regulations”, which should be avoided. It was argued that it is better to state specific exceptions.
3. Specifically, the general spurious emission limits (Category A) should be left unchanged and should not be regional. Exceptions could be added in relation to the reference point, since it is now 250% of NB.
4. Keeping the sentence “In certain regions, additional regional requirements may apply, since it is general and concerns not only Japan.

All CRs need to be revised and the detailed text is for further discussion.

The information paper in **R4-2101016** can be **noted**.

### CRs/TPs

(Cat A CRs not listed)

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2101082 R4-2101085 R4-2101088 R4-2101089 R4-2101091 R4-2101092 R4-2101094 R4-2101095 | To be **revised to R4-2103775,  R4-2103776,  R4-2103777,  R4-2103958,  R4-2103778,  R4-2103779,  R4-2103780,  R4-2103781**. |

## Discussion on 2nd round (if applicable)

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2103775 R4-2103776 R4-2103777 R4-2103958 R4-2103778 R4-2103779 R4-2103780 R4-2103781 | Nokia:  Regarding CR to 38.104 clause 6.7.3.3, our understanding is that the same scaling as 1-H is used instead of the simple sum.  The same applies to 38.141-1 CRs. Can you confirm if our understanding is correct? We have also some editorial comments.  In 38.104 clause 9.3.4, “In certain regions, additional regional requirements may apply.” should be deleted. “2545-2645MHz” should be changed to “2545-2645 MHz” in all CRs. (with a space between the number and unit).  We are ok with CR to 36.104 and 36.141. We’d like to co-source these CRs. |
| NEC: @Nokia: For 38.104 clause 6.7.3.3, tx intermodulation for 1-H,  You are correct. The limits are applied to each TABC with appropriate scaling.  We have corrected the text as below. The same applies to 38.141-1 CRs.  6.7.2.2 (Tx intermodulation for 1-C)  For Band n41 operation in Japan, the sum of transmitter intermodulation level over all antenna connectors shall not exceed the unwanted emission limits in clauses 6.6.3, 6.6.4 and 6.6.5 in the presence of an NR interfering signal according to table 6.7.2.2-1.  6.7.3.3 (Tx intermodulation for 1-H)  For Band n41 operation in Japan, the transmitter intermodulation level shall not exceed the unwanted emission limits in clauses 6.6.3, 6.6.4 and 6.6.5 in the presence of an NR interfering signal according to table 6.7.3.3-1.  For “In certain regions, additional regional requirements may apply” in 38.104 clause 9.3.4:  We received a comment from ZTE in the first round. It is a general statement. There may be additional regional requirements other than Japanese requirements. Therefore, it is proposed to keep the text.  We have changed “2545-2645MHz” to “2545-2645 MHz” and updated the cover pages for 36.104 and 36.141 to include Nokia as a source company. |
| SoftBank: On 6.7.3.3 of 38.104r15(1-H inter-mod) and relevant 38.141-1, I think Nokia's comment seem right because this is for 1-H but please feel free to correct me if I am wrong. In addition, the table here still includes 2545-2655. The upper bound should be 2645 (This is fixed in 141) if we keep it. (If the section can be deleted, we do not have to mind...)  On the same section of 38.104r16, the range starts from 2345. This should be 2545 if we decide to keep it. In addition, the document No on the cover should be 3958 instead of 1089. |
| Ericsson: In several cases, the notion that “limits shall be applied to the sum of the absolute ACLR power over all *antenna connectors*” is added as an additional requirement. This is very unclear, since it would mean that it should first be applied as stated, then be additionally applied as sum over antennas. It is also not completely clear what limits that would apply as sum over antennas.  It is therefore better to write this statement in conjunction with the original limit, as is done for the CRs for 38.141-1 for OBUE and Rx spurious.  You should do the same for the following and move the text to where the actual requirement is and not have it as “additional limit”:   * 38.104 CRs, clause 6.6.3.5, 6.6.4.5, 7.6.5 * 38.104 CRs, clause 9.3.4 (This is already radiated, so why is it added? No corresponding addition in 38.141-2) * 38.141-1 CRs, clause 6.6.3.5.5 |
| NEC: For 38.104 and 38.141-1/2, we need to implement regional requirements on   * Output power limits * Spurious emission * Tx intermodulation * Sum over antennas   38.104 9.3.4 is for output power limits which 3GPP spec do not have.  In 38.141-2, you can find the corresponding addition in 6.3.1. |

## Summary on 2nd round (if applicable)

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| R4-2103775 R4-2103776  R4-2101083 R4-2101084 R4-2101086 R4-2101087 | The CRs are agreeable.  The corresponding Cat A CRs are agreeable. |
| R4-2103777 R4-2103958 R4-2103778 R4-2103779 R4-2103780 R4-2103781  R4-2101090 R4-2101093 R4-2101096 | The CRs are agreeable.  The corresponding Cat A CRs are agreeable. |

# Topic #2: AAS capability set and support for NR+UTRA (CRs)

This is a continuing topic from RAN4 #96-e and 97-e. For this meeting, there are two sets of CRs available.

## Companies’ contributions summary

(Cat A CRs are not listed)

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2102563 | Huawei, China Unicom | **CR to TS 37.105: Introduction of new BS capability set for NR+EUTRA+UTRA, Rel-16**  Summary of change:  - 4.1: clarification on the supported RATs - 6.6.5.2.2, 6.6.5.2.3: updates to the OBUE applicability table and related OBUE tables headers corrections - 7.4.2.1: conducted general blocking table updated  - 7.7.2.1: conducted Tx IMD table updated - 10.5.2.1: OTA general blocking table updated - 10.8.2.1: OTA Tx IMD table updated |
| R4-2102565 | Huawei, China Unicom | **CR to TS 37.145-1: Introduction of new BS capability set for NR+EUTRA+UTRA, Rel-16**  Summary of change:  - 4.9: introduction of CSA3B for UTRA, EUTRA, NR multi-RAT case. - 4.11.2.8.1.2 (ATC5a): applicabiltiy table updated with new CS - 4.11.2.8.2 (ATC5b): MSR changes reflected. Applicabiltiy table updated with new CS - 4.11.2.9, 4.11.2.10 (ATC6, ANTC6): MSR changes reflected. Power allocation section updated.  - 4.11.2.13, 4.11.2.14 (ATC8, ANTC8): new section for UTRA, E-UTRA and NR multi-RAT operation - 5.2: Test configuration applicability table updated with nes CSA3B test case  - 6.6.5.5.2, 6.6.5.5.3: updates to the OBUE applicability table and related OBUE tables headers corrections  - 7.4.5.1.1: general blocking table updated  - 7.7.5.1.1: Tx IMD table updated |
| R4-2102567 | Huawei, China Unicom | **CR to TS 37.145-2: Introduction of new BS capability set for NR+EUTRA+UTRA, Rel-16**  Summary of change: - 4.9: introduction of RCSA3B for UTRA, EUTRA, NR multi-RAT case. - 4.11.2.8.1.2 (ATCR5): applicability table updated with new CS - 4.11.2.8.2 (ATCR5b): MSR changes reflected. Applicabiltiy table updated with new CS - 4.11.2.9, 4.11.2.10 (ATCR7, ANTCR7): MSR changes reflected. Power allocation section updated.  - 4.11.2.13, 4.11.2.14 (ATCR9, ANTCR9): new section for UTRA, E-UTRA and NR multi-RAT operation - 5.2: Test configuration applicability table updated with nes RCSA3B test case  - 6.6.5.5.2, 6.6.5.5.3: conducted OBUE applicability table introduced for Band Category 1, 2, 3; table headers updated - 7.8.5.1.1: Tx IMD table updated |
| R4-2102844 | Ericsson | **CR to 37.105 on NR+UTRA support for AAS**  Summary of change:  It is added explicitly to the General section that for AAS BS, GSM/EDGE operation is not supported and that UTRA operation is only supported as single-RAT or in combination with E-UTRA. |

## Open issues summary

### Sub-topic 2-1

In the work item MSR\_GSM\_UTRA\_LTE\_NR, the MSR BS specification was extended with additional Capability Sets and requirements for NR + UTRA/GSM combinations. These were not reflected in the AAS specifications, which were not part of the work item.

The CRs submitted provides two different solutions for the AAS specifications.

**Issue 2-1: Options for Capability sets including UTRA in AAS specs**

* Proposals
  + **Option 1: (CR in R4-2102844)**Add an explicit statement in the AAS core spec that UTRA operation is only supported as single-RAT or in combination with E-UTRA.
  + **Option 2: (CRs in R4-2102563, R4-2102565, R4-2102567)**Update relevant AAS core and test requirements to cover combined NR & UTRA support, and add a new Capability Set for AAS with NR, E-UTRA and UTRA, plus two new Test Configurations.

Note that the options given above are the same as at RAN4 #97-e.

## Companies views’ collection for 1st round

### Open issues

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| **Company** | **Comments** |
| Ericsson | Sub topic 2-1: If there is operator interest in UTRA+E-UTRA+NR operation, a way forward would be to apply option 1 in Rel-15 and Option 2 in Rel-16 |
| China Unicom | We have spectrum (i.e. n1) deployed for UTRA, EUTRA, and NR in the commercial network. And we need the new AAS supporting for three RATs (UTRA, EUTRA, and NR) to meet the needs, so we suggest to include the support of NR+EUTRA+UTRA from Rel-16 onwards. |
| Huawei | Issue 2-1: the above proposed WF seems a good starting point.  If we follow this approach, it is proposed to use Cat.F CR for Rel-15 (based on Ericsson CR), and separate Cat.F CR for Rel-16 (plus Cat A for Rel-17; based on Huawei CRs). |

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2102563 | Ericsson: For the OBUE tables, some of the updates need clarification: - Introduction of Option 1 and 2 is not motivated. The original AAS specs were developed without using these options – why is it re-introduced? - Many of the OBUE updates are difficult to understand and to see what the consequences are. It is proposed to sort these out one-by-one ion a structured way. The methodology proposed by Ericsson in R4-2102853 could be applied.  For blocking and IM tables: - The updates for General blocking are also difficult to understand. E.g. the updated Note 2 to 5 seems to be in conflict and needs to be sorted out (they are difficult to understand even before updating). - The updates to General IM also has inconsistencies for Notes 2 to 5.  Overall, we need to make sure that the changes do not impact other RATs or RAT combinations. Overlapping CR also needs to be accounted for: R4-2102853 on the OBUE table headings. |
| NEC: We have concern on introducing option 1 and 2 for the OBUE requirement tables. According to the proposal, tables for wide area BS are specified only for category B option 1 or option 2. Category A requirements are removed. |
| Huawei:  @Ericsson:  - Introduction of Option 1 and 2 is following the MSR spec 37.104. Both 37.104 and 37.105 specifications were always aimed to be aligned as much as technically justified. Introduction of the WA BS applicability table for OBUE is to mirror MSR approach.  - OBUE updates: Please be more specific on your concerns. Modifications to the OBUE table headers were to mirror changes in Ericsson CR to 37.104 in R4-1908049. Ericsson proposal to align table headers in R4-2102853 seems good approach – we can follow this in the revision.  - For blocking and IM tables: again, those modification follow Ericsson CR to 37.104 in R4-1908049. We are not against improving readability, but this shall be done for both 37.104 and 37.105 notes (preferably next meeting).  - it is not clear what is inconsistent among note 2 and 5. Note 2 BS class centric. Note 5 is RAT centric.  @NEC: for the OBUE limits for MSR (both 37.104 and 37.105) the Category A limits are not visible in MSR requirements. Those are distinguished in single RAT requirements. We are not removing any requirements in this CR. |
| NEC: We do not agree Huawei comment above. Does Huawei mean there is not OBUE requirements in category A region? Any OBUE emission is allowed in category A region? We agree there is no category A specific OBUE requirements for WA BS. However, current WA BS OBUE requirements are not limited to category B. They could be applied to both category A and B regions. If you state the tables are for category B option 1 or 2, we see category A requirements are removed. |
| Ericsson: @Huawei:  - Regarding use of Option 1 and 2 and the Table headers, we will double-check. This was indeed modified in Release 16 for MSR, we have to be careful that it aligns.  - Regarding blocking tables, we will return for the second round with specifics – there are a lot of notes to compare with MSR. It is important that we get this right. |
| Huawei: @NEC:  I guess what you mean is that if there are not Cat. A limits listed in the applicability table, then you consider this as Cat. A limits being removed.  What I am saying is in TS 37.105 clause 6.6.5.2 (OBUE limits for MSR operation) the Cat A / CatB is not directly mentioned. Cat A and Cat B limits are directly mentioned in the TS 37.105 clause 6.5.5.4 (OBUE limits for SRAT EUTRA). Why this is done this way, I would need to study and check previous discussions – it was that way for a long time anyways.  If there is an issue, then it applies to the existing MSR specifications as well. Let’s try to clarify this during the 2nd round. |
| R4-2102565 | Ericsson: For the new TCs (ATC8 and ANTC8), there are change marks identifying the source, but it is very difficult to follow and understand due to additional changes. An explanation for what TCs are used as source, the reasoning and what has been modified would be very good to have on the cover page.  For the OBUE tables, same comments apply as for R4-2102563, with the following additions: - A new Table 6.6.5.5.2-2c is added, please explain.  For blocking and IM tables same comments apply as for R4-2102563.  Overall, we need to make sure that the changes do not impact other RATs or RAT combinations. Overlapping CR also needs to be accounted for: R4-2102856 on the OBUE table headings. |
| NEC: Same comments as for R4-2102563. |
| Huawei:  - Separate change marks were used on purpose as explained in the cover page. AAS specific delta was indicated by different ID to highlight how this CR differs from the MSR spec.  - For conflicting OBUE table headers, those can be aligned with Rel-15 CR in the revision.  - new table: it was found to be missing in the AAS spec. Therefore it was added.  See more comments to R4-2102563. |
| Ericsson: @Huawei:  - While separate change marks were indeed used, it is still not possible to match the text. It would be good to document on the cover page also what TCs are used as baseline and what general modifications are made, not only what the source spec is. |
| R4-2102567 | Ericsson: For the new TCs (ATCR9 and ANTCR9), there are change marks identifying the source, but it is very difficult to follow and understand due to additional changes. An explanation for what TCs are used as source, the reasoning and what has been modified would be very good to have on the cover page.  For the OBUE tables, same comments apply as for R4-2102563.  For IM table same comments apply as for R4-2102563.  Overall, we need to make sure that the changes do not impact other RATs or RAT combinations. Overlapping CRs also needs to be accounted for: R4-2102859 on the OBUE table headings and R4-2102426 on Conformance corrections. |
| NEC: Same comments as for R4-2102563. |
| Huawei: same comments as to R4-2102565. |
| R4-2102844 | NEC: We are fine to add an explicit statement. However, if it is added the position of the text shall be in “Scope”, clause 1. Proposed text is not on the relationship between the AAS spec and other specs. |
| Huawei:  Scope: tend to agree with NEC. Scope already includes clarification on other the AAS spec exclusions. If we add GSM/EDGE clarification in 4.1, we shall also add it in the scope. For UTRA clarification: the existing text of the Scope requires some refinements (refer to 2nd and 3rd paragraph).  Section 4.1: exclusion of GSM/EDGE can be included in the following existing statement: “*NB-IoT in-band, NB-IoT guard band, or standalone NB-IoT operation is not supported by AAS BS.*”, as it was done in R4-2102563. |
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## Summary for 1st round

### Open issues

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|  | **Status summary** |
| **Sub-topic#2-1** | There is no objection to applying Option 2 in Rel-16.  As a Way-Forward, applying Option 1 in Rel-15 and Option 2 in Rel-16 seems to be agreeable. |

On the CRs for “Introduction of new BS capability set for NR+EUTRA+UTRA” (Rel-16), several issues were raised in discussions, with possible solutions in “()”:

1. Introduction of Option 1 and 2 for AAS was questioned. It was questioned how Category A OBUE requirements could be kept in this case.  
   (It will be confirmed that this is properly aligned with MSR specs).
2. Better explanation of the source and reasoning behind the new TCs introduced (ATC8, ANTC8, ATCR9 and ANCTR9).   
   (There are change marks to identify the source, but the exact match is difficult to find)
3. Many OBUE table headings are difficult to understand.   
   (This can be handled by aligning with the CRs proposed for “OBUE table headings and applicability” under Topic #3 (Maintenance). Some CR text may need to be merged.)
4. Many notes for OBUE, Blocking and IM are updated to introduce UTRA support and changes are difficult to follow.   
   (It will be confirmed that this is properly aligned with MSR specs).
5. A new table has been added that was missing for AAS.  
   (Needs to be double-checked)
6. There is an overlapping CR R4-2102426 on Conformance corrections.   
   (Needs to be double-checked with Thread [302])

On the CR for “NR+UTRA support for AAS” (Rel-15), several issues were raised in discussions:

1. The proposed text should be in the Scope (1) and not in “Relationship with other specs”. This may require some refinements.
2. Exclusion of GSM/EDGE can be enhanced in clause 4.1.

### CRs/TPs

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2102563 R4-2102565 R4-2102567 | CRs to be **revised in R4-2103782,**  **R4-2103783**  **R4-2103784**. |
| R4-2102844 | CR to be **revised in R4-2103785**. |
| R4-2102845 R4-2102846 | CRs are **withdrawn**. |

## Discussion on 2nd round (if applicable)

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2103785 | NEC: I feel the meaning of the revised text is somewhat different from the original one.  I have some questions.  For the hybrid AAS BS: “… excluding UTRA FDD operation in combination with NR.”   * Is “UTRA FDD+E-UTRA+NR” excluded? * Is “UTRA TDD+NR” not excluded?   For OTA AAS BS: “ … excluding UTRA FDD operation in combination with NR.”   * Is “UTRA FDD+E-UTRA+NR” excluded? |
| Ericsson: The original text stated that “UTRA operation is only supported as single-RAT or in combination with E-UTRA.”  The existing scope says that “…requirements are specified for E-UTRA AAS Base Station (BS), the FDD mode of UTRA AAS Base Station (BS), the 1,28 Mcps TDD mode of UTRA AAS Base Station (BS) in single RAT and any MSR AAS Base Station (BS) implementation of these RATs (including NR BS type 1-H MSR configurations)”  So NR is only supported as MSR, but it says “Any MSR implementation”. This is not correct since the spec does not cover combinations of NR and UTRA – these must be excluded. We should also exclude UTRA TDD, which  I missed in my revised proposal! 😊  But why should the ones you state below with UTRA FDD not be excluded now? They are combinations of UTRA and NR! |
| NEC: @Ericsson In your original text,  “UTRA operation is only supported as single-RAT or in combination with E-UTRA.”,  I guess UTRA+E-UTRA+NR is supported.  In your updated text,  “… excluding UTRA FDD operation in combination with NR.”,  I guess UTRA FDD+E-UTRA+NR is excluded.  It is confusing for me. |
| Ericsson: @ NEC OK, now I see what you mean. The intention was not to include such a combination. Any combination involving both NR and UTRA should be excluded, so the new text is more precise in that way. |
| R4-2102563 R4-2102565 R4-2102567 | Huawei:  As the discussion on the OBUE table headings keep on going (including Rel-15 AAS spec CRs), I preferred to defer with the final drafting of the related Rel-16/17 revisions.  Basically, the delta among Rel-15 and Rel-16/17 CRs is supposed to be as we discussed:  - Reuse Rel-15 OBUE table heading from R4-2103885-87, plus UTRA+NR CS/TC updates (this includes “option 1/2” updated for OBUE, and more)  - No additional OBUE tables to be added  next meeting  - No modifications to the initial text proposed for blocking and IMD tables  further text improvements possible next meeting  With the above, I suggest to put revisions in R4-2103782, R4-2103783, R4-2103784 for email approval. An alternative approach may be to treat the whole package Ericsson/Huawei next meeting, but it seems that we have progressed quite a lot this meeting so let’s try to finish this. |

## Summary on 2nd round (if applicable)

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| R4-2103785 | The CR is **agreeable**. (There corresponding Category A CRs are already withdrawn.) |
| R4-2103782 R4-2103783 R4-2103784  R4-2102564 R4-2102566 R4-2102568 | The CRs are proposed for **e-mail approval**.  Corresponding Category A CRs. |

# Topic #3: Other maintenance (CRs)

Five diverse topics are covered by CRs under “Other maintenance”:

* Correction of antenna model in TR 38.820.
* EESS protection requirement correction.
* Correction to ACLR limit in non-contiguous spectrum (CR implementation correction).
* Removal of additional limit for Band 7
* OBUE table headings and applicability in MSRT and AAS specs  
  (NOTE: The CRs for TS 37.105 and TS 37.145-1/2 may partly overlap with CRs for Topic #2: AAS capability set and support for NR+UTRA.)

## Companies’ contributions summary

(Cat A CRs are not listed)

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2101180 | Ericsson | **CR to TR 38.820: Correction of antenna model in subclause 7.2.4**  Summary of change: The parameter definition is aligned with array factor equations given in the array antenna model, captured in Table 7.2.4-2. Currently, the definition of rows and columns are mixed and does not map towards the array factor definition, originally defined in TR 37.840. |
| R4-2101994 | Nokia, Nokia Shanghai Bell | **CR to TS 38.104: EESS protection requirement correction**  Summary of change: The statement that protection limit enters into force in 1 January 2021 is removed. |
| R4-2101997 | Nokia, Nokia Shanghai Bell | **CR to TS 38.141-2: EESS protection requirement correction**  Summary of change: The statement that protection limit enters into force in 1 January 2021 is removed. |
| R4-2102441 | Nokia, Nokia Shanghai Bell | **CR to 37.141: Correction to ACLR limit in non-contiguous spectrum (Rel-15)**  Summary of change: “NR” is removed in NOTE 3 to address E-UTRA carrier transmitted at the other edge of the gap. “NR” is added back in NOTE 4 as in agreed CR in R4-2016186 and R4-2016187. |
| R4-2102841 | Ericsson | **CR to 37.145-1 on Removal of additional limit for Band 7**  Summary of change: The additional limit for Band 7 is removed. |
| R4-2102847 | Ericsson | **CR to 37.104 on OBUE table headings and applicability**  Summary of change: The CR corrects the headings to align with the intended applicability. The revised headings are all written with the same structure: “<BS class> BS operating band unwanted emission mask (UEM) in <BC> bands <f. range> applicable for: <BS type 1>; <BS type 2>; …” Where  <BS class> = “Wide Area”, “Medium range” or “Local Area”  <BC> = BC1, BC2, BC3 or combination thereof  <f range> = Limitation to frequency range for bands, e.g. “below 1 GHz”  <BS type> = A set of conditions on supported RAT(s), specific bands, etc., always starting with “BS…”, separated by “,” and an “and” for the final condition. Condition on max power is always first.  If there are multiple types, they are separated by “;” |
| R4-2102850 | Ericsson | **CR to 37.141 on OBUE table headings and applicability**  Summary of change: Same as for TS 37.104. |
| R4-2102853 | Ericsson | **CR to 37.105 on OBUE table headings and applicability**  Summary of change: Same as for TS 37.104. |
| R4-2102856 | Ericsson | **CR to 37.145-1 on OBUE table headings and applicability**  Summary of change: Same as for TS 37.104. |
| R4-2102859 | Ericsson | **CR to 37.145-2 on OBUE table headings and applicability**  Summary of change: Same as for TS 37.104. |

## Companies views’ collection for 1st round

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2101180 | Nokia: In TR 38.803, M denotes the number of rows and N denotes the number of columns, these were copied from RAN1 TR 38.900 and have since been copied to many other RAN4 TRs, hence it is better to swap the m and n indexes in the formula instead of swapping M and N to avoid confusion. |
| Ericsson: The intension with the update is to align all information in the LS to ITU-R. There are more issues to resolve, but those we need to take separately. The alignment between RAN1 and RAN4 is such an issue. The intension is to align parameters so we in RAN4 understands the model and corresponding parameters.  In addition, we may need to also update TR 38.803 if necessary. The error we have actually flip the antenna 90 degrees, so it is quite important to fix as soon as possible. Reviewing the TR affected, we draw the conclusion that this is the most effective change. As long as RAN4 and RAN1 defined the parameters, it is not an issue. |
| Nokia2: The issue is not only between RAN4 and RAN1 TR, other RAN4 TRs (e.g. IAB TR 38.809) have M denotes the number of rows and N denotes the number of columns, so this CR will create confusion among RAN4 TRs. |
| NEC: We have same concern as Nokia. |
| Huawei: In general we support alignment among TRs, but we tend to agree with Nokia and NEC as the original proposal does seem to introduce further confusions.  Secondly. As rapporteur of this TR we need to raise one formal issue related to the handling of the CR to TR 38.820 in R4-2015966 last meeting, where CR with the technical correction was blocked by one company who raised sustained objection.  If we are going for approval/revision of the CR in R4-2101180, we would request to extend it with the technical correction which was proposed last meeting in R4-2015966. |
| ZTE: The alignment among TRs are needed, but also better to follow “common convention” outside the group. (M,N) denotes M rows and N columns, which are widely used in the industry, e.g., in Matlab. |
| R4-2102847; R4-2102850; R4-2102853; R4-2102856; R4-2102859 | Nokia: Not all changes are consistent with previously agreed text, e.g. not clear if ';' means 'or' in the table headings. |
| Ericsson: Please identify which changes are not consistent with previously agreed text.  Regarding use of “,”, it is used to separate multiple conditions that need to be met and the final separation is always “and”. That should be consistent since “A, B, C and D” means that you need to fulfil all four conditions A to D. |
| Nokia2: It seems that the semicolon “;” is used to replace “or” (but not “and”) in the original headings, e.g. in Table 6.6.2.1-1: Wide Area BS operating band unwanted emission mask (UEM) in BC1 and BC3 bands applicable for: BS not supporting NR; BS operating NR in Band 1, 7 and/or 38 in Europe; BS with standalone NB-IoT at the BS RF bandwidth edge (irrespective of NR support). Moreover, BC3 is not included in the existing headings for Table 6.6.2.1-1c, Table 6.6.2.1-2, Table 6.6.2.1-2b, Table 6.6.2.1-3b, Table 6.6.2.2-2a, Table 6.6.2.2-2b, but it is included in the proposed CR. |
| NEC: Table 6.6.2.1-1, 6.6.2.1-1c, 6.6.2.2-2a, 6.6.2.2-2b, NR band numbers shall be nXX, not XX. |
| Ericsson:  - Since the headings in Rel-16 are a bit different than in Rel-15 for 37.104 and 37.141 (See discussion on Topic #2), we should probably make the Rel-16 CRs for those specs into Category F CRs.  @Nokia: As explained on the cover page, the semicolon is used to separate BS “types” that the limits apply to, so it always says “…applicable to: <BS type 1>; <BS type 2>; …”.  That means that the semicolon is basically an “and”. However, saying “and” in this case could cause confusion, since we use “and” to separate the different conditions for each BS type.  If you have an alternative approach that could work better, please give an example. |
| R4-2102441 | Huawei: related correction needed for AAS specs as well, e.g. refer to 37.145-1, Table 6.6.3.5.3.1A-2 |

## Summary for 1st round

### Open issues

The following Open issues were identified for Maintenance CRs. Those will need further discussions:

* **Correction of antenna model in TR 38.820.**
  + Commented that (M,N) has been used like this in many TRs (e.g. IAB 38.809), would be better to swap in formula.
  + Noted that the reason for swapping is to align wit the LS response to ITU-R and that the error flips the antenna 90 degrees.
  + Proposed that CR could be extended with technical correction in R4-2015966, which was not pursued.
  + Proposal that general convention to use is (M,N) denotes M rows and N columns.
* **Correction to ACLR limit in non-contiguous spectrum (CR implementation correction).**
  + CRs may be needed also for AAS specs TS 37.145-1.  
    (These CRs could however be approved)
* **OBUE table headings and applicability in MSR and AAS specs**
  + Wording and use of “.” and “;” is under discussion.
  + BC3 is not included in the existing headings for Table 6.6.2.1-1c, Table 6.6.2.1-2, Table 6.6.2.1-2b, Table 6.6.2.1-3b, Table 6.6.2.2-2a, Table 6.6.2.2-2b, but it is included in the proposed CR.  
    (This needs to be double-checked to identify the source of the discrepancies.)
  + NOTE: The CRs for TS 37.105 and TS 37.145-1/2 may partly overlap with CRs for Topic #2: AAS capability set and support for NR+UTRA. If text is merged, some CRs under Topic #3 may be *not pursued*.

CRs where there were no comments are proposed to be agreeable.

### CRs/TPs

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| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2101994 R4-2101997  R4-2101995 R4-2101996 R4-2101998 R4-2101999 | The CRs are agreeable.  The corresponding Cat A CRs are agreeable. |
| R4-2102441  R4-2102442 R4-2102443 | The CRs are agreeable.  The corresponding Cat A CRs are agreeable. |
| R4-2102841  R4-2102842 R4-2102843 | The CRs are agreeable.  The corresponding Cat A CRs are agreeable. |

Additional CR handling after GTW session 29 January:

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| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2101180 | Proposed to be **revised** in R4-2103786. |
| R4-2102847  R4-2102848 | Proposed to be **revised** (Rel-15) in R4-2103883.  Need to be changed **to Category F** (Rel-16). |
| R4-2102850  R4-2102851 | Proposed to be **revised** (Rel-15) in R4-2103884.  Need to be changed **to Category F** (Rel-16). |
| R4-2102853  R4-2102854 R4-2102855 | Proposed to be **revised** (Rel-15) in R4-2103885.  Proposed to be **withdrawn** (Rel-16,17). |
| R4-2102856  R4-2102857 R4-2102858 | Proposed to be **revised** (Rel-15) in R4-2103886.  Proposed to be **withdrawn** (Rel-16,17). |
| R4-2102859  R4-2102860 R4-2102861 | Proposed to be **revised** (Rel-15) in R4-2103887.  Proposed to be **withdrawn** (Rel-16,17). |

## Discussion on 2nd round (if applicable)

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2102848 R4-2102851 R4-2103883 R4-2103884 R4-2103885 R4-2103886 R4-2103887 | Huawei:   1. One issue spotted in 2848: in the OBUE applicability table we refer to Options 1/2. I noticed that this “Option 1”, “Option 2” text is missing in some table headings, e.g. in case of 2848 we shall have those text additions for the following OBUE tables:  * 6.6.2.1-1 (Option 2) - missing * 6.6.2.1-1b (Option 1) – ok * 6.6.2.1-1c (Option 1) – ok  1. Comparing 2848 and 3885 I have noticed certain differences among the approaches, i.e.    1. 2848 (37.104): please note that table 6.6.2.2-1 does NOT mention NR nor band 3 and 8 (as done in 3885). It only refers to option    2. 3885 (37.105): please note that the heading of table 6.6.5.2.3-1 mentions both NR as well as bands 3 and 8 (this is different to 2848). In Rel-16 of mine there will be also “option 2” added to that heading – I would suggest to follow this approach (option as well as details of it) also in 37.104.     Having said that I would suggest the following arrangement of the work on OBUE improvements:   * We may need to consider email approval process due to many inter-related corrections * I would suggest to take out corrections on the missing OBUE tables in AAS specifications and come back next meeting   For other topics (e.g. blocking and IMD table notes improvements): the understanding is that we follow the GTW discussion and possibly come back next meeting (if someone dares to touch that topic) |
| Ericsson: @Huawei 1. Regarding missing “Option 2”: Yes, I noticed it was missing. This is a CR implementation error, the text was in the original CR – I just copied what was in the previous spec version. The questions is: Do we fix such errors now, or in the next meeting? There are more things to fix, I would like to clarify Option 1 and 2 a bit in general.  2. Regarding reference to n3 and n8, which is not mentioned in Rel-16: I noticed this and just copied what was in the previous spec version. Stating “Option 2” seems to imply a lot of things, including that it only applies in bands 3 and 8. That is probably better clarified in connection with the table and the Note explaining the options. Again, maybe something to fix in the next meeting?  Regarding e-mail approval: It is quite a large package to go for e-mail approval – should I check with Haijie? The CRs on headings could probably be approved now, but at least the NR+UTRA CRs may need e-mail approval.  Regarding aligning blocking and IMD tables: Let’s for now copy what was there in the previous version, take note of any ambiguities/errors and fix those in the next meeting. |
| Nokia: Nokia would have some wording proposals as follows:  Rel’15 CR:  Table 6.6.2.1-1c: “not operating in Band 1, 7 and/or 38 in Europe” -> “not operating NR in Band 1, 7 and/or 38 in Europe”  Table 6.6.2.2-1: “BS operating in Band 3 or 8 in Europe” -> “BS operating NR in Band 3 or 8 in Europe”  Table 6.6.2.2-2a: “not operating in Band 8 in Europe” -> “not operating NR in Band 8 in Europe”, “not supporting UTRA or GSM” -> “neither supporting UTRA nor GSM”  Table 6.6.2.2-2b: “not operating in Band 3 in Europe” -> “not operating NR in Band 3 in Europe”, “not supporting UTRA or GSM” -> “neither supporting UTRA nor GSM”  Table 6.6.2.2-3a, Table 6.6.2.2-4a: “not supporting UTRA or GSM” -> “neither supporting UTRA nor GSM”  Rel’16 CR:  Table 6.6.2.2-3a, Table 6.6.2.2-4a (as above): “not supporting UTRA or GSM” -> “neither supporting UTRA nor GSM” |
| Ericsson: @Nokia Regarding the addition of ”NR” to the band support: This is correct and was overlooked in the original versions. The original statements were all made in connection with NR operation.  Regarding proposed use of “neither… nor”. The words “either”, “neither” and “nor” are not consistently used in the specs and may cause confusion. I have therefore chosen to only use the words “or” and “not”, which are sufficient to explain the applicability.  These CRs are planned for e-mail approval together with the CRs for the new AAC CS, in order to make sure all headings are aligned. |
| Nokia: @Ericsson Regarding the following:  Regarding proposed use of “neither… nor”. The words “either”, “neither” and “nor” are not consistently used in the specs and may cause confusion. I have therefore chosen to only use the words “or” and “not”, which are sufficient to explain the applicability.  Let me take as an example Table 6.6.2.2-3a (Rel’16 CR to 37.104) with previously agreed text “Medium Range BS operating band unwanted emission mask (UEM) for BS supporting NR and neither supporting UTRA nor GSM in BC2 bands, BS maximum output power 31 < PRated,c £ 38 dBm”  New proposed text is not aligned with text above and need to be changed: “Medium Range BS operating band unwanted emission mask (UEM) in BC2 bands applicable for: BS with maximum output power 31 < PRated,c £ 38 dBm, supporting NR and not supporting UTRA or GSM” If neither/nor is not preferred then it should be corrected accordingly with “and”  Similar comment applies to other tables mentioned below. Note comments were provided to 37.104 CRs but apply to other CRs as well. |
| Ericsson: @Nokia Maybe we need to look at this further. You are correct that there is a slight language difference here, and we want to make sure that the case this applies to is when both are not supported.  Let’s update all related CRs during e-mail approval and ensure we all agree in the end. I will also consult the drafting rules. |

## Summary on 2nd round (if applicable)

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| R4-2103786 | The CR is agreeable. |
| R4-2103883 R4-2102848 R4-2103884 R4-2102851  R4-2102849 R4-2102852 | The CRs are proposed for **e-mail approval**.  Corresponding Category A CRs. |
| R4-2103885 R4-2103886 R4-2103887 | The CRs are proposed for **e-mail approval**.  (There corresponding Category A CRs are already withdrawn.) |