**3GPP TSG-RAN WG4 Meeting # 98-e R4-200XXXX**

**Electronic Meeting, 25 Jan. – 05 Feb., 2021**

**Agenda item:** 5.2 and 6.4.2

**Source:** Moderator (Skyworks Solutions Inc).

**Title:** Draft Round 1 Email discussion summary for [98e][105] LTE\_Maintenance

**Document for:** Information

# Introduction

This Email thread cover LTE maintenance for UE RF requirements with agenda item:

* 5.2 UE RF requirements up to R15
* 6.4.2 UE RF requirements R16

List of topics:

* Topic 1: band specific aspects
* B48 UL configuration and notes
* Addition of Band 40 in Japan and UE-UE coexistence
* Band 38 UE Coex (should have been Agenda 6.4.2)
* NS\_04 256QAM A-MPR
* Topic 2: Spurious emission clean-up for UE coexistence tables
* Topic 3: NB-IoT

# Topic #1: band specific aspects

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2100053**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100053.zip) | C Spire Wireless | **Rel-14 CR for missing B48 references in a table and note**  Adds UL configuration to Table 7.3.1-2 and add B48 to Note 5 in Table 7.6.2.1A-0  R15/16/17 Mirror CRs R4-2100645, R4-2100648 and R4-2100651  Moderator: please comment directly in CR section |
| [**R4-2101197**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101197.zip) | NTT DOCOMO, INC., SoftBank Corp., KDDI Corporation, Rakuten Mobile, Inc | **Addition of UE co-existence requirements for 40 and n40**  Discussion on introduction of band 40 in Japan:  ***Observation 1: It can be expected that modification on UE to UE co-existence to reuse B40/n40 in Japan will not have a significant impact on UE implementation since UEs that meet the current co-existence requirements could meet the modified requirements.***  ***Proposal 1: Co-existence requirements from B40/n40 to Japan bands and PHS should be specified.***  ***Proposal 2: Co-existence requirements from Japan bands to B40 should be specified.***  ***Proposal 3: Co-existence requirements for CAs and DCs should be modified according to modification on co-existence requirements of single band to reuse B40/n40 in Japan.***  ***Observation 2: If the modification on UE to UE co-existence applies from Rel-X (not Rel-8), Japanese regulation would be a blocker for UE being compliant with earlier release than Rel-X to enter in Japanese market.***  ***Proposal 4: Modification on co-existence requirements to reuse B40/n40 in Japan should apply from Rel-8.*** |
| [**R4-2101802**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101802.zip) | Huawei, HiSilicon, DT | **CR for 36.101 to add missing spurious emissions for band 38 UE co-existence (Rel-16)**  adds n79/n78/n77 spurious emissions for band 38 UEco-existence  R17 Mirror CR R4-2101803  Moderator: please comment directly in CR section |
| [**R4-2102437**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102437.zip) | Huawei, HiSilicon | **A-MPR for LTE CA\_NS\_04 256QAM PC2**  **Proposal 1: Modify the A-MPR for CA\_NS\_04 (power class 2) as in Table 2.1**  Table 2.1: Contiguous Allocation A-MPR for CA\_NS\_04 (power class 2)   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | CA Bandwidth Class C | Lower edge cutoff frequency [MHz]5 | RBStart | LCRB [RBs] | RBstart + LCRB [RBs] | A-MPR per modulation [dB] | | | | |  | QPSK | 16QAM | 64QAM | 256QAM | | 25 RB / 100 RB | 2513.5 | 0 – 42 | >0 | N/A | ≤5 | ≤5 | ≤5 | 6.5 | | 43 – 81 | N/A | >82 | ≤1 | ≤1.5 | ≤1.5 | 6 | | 82 – 124 | >0 | N/A | ≤1 | ≤1.5 | ≤1.5 | 5 | | 50 RB / 100 RB | 2518.4 | 0 – 52 | >0 | N/A | ≤5 | ≤5 | ≤5 | 6.5 | | 53 – 94 | N/A | >95 | ≤1 | ≤1.5 | ≤1.5 | 6 | | 95 – 149 | >0 | N/A | ≤1 | ≤1.5 | ≤1.5 | 5 | | 75 RB / 75 RB | 2519.0 | 0 – 54 | >0 | N/A | ≤5 | ≤5 | ≤5 | 6.5 | | 55 – 94 | N/A | >95 | ≤2 | ≤2.5 | ≤2.5 | 6 | | 95 – 149 | >0 | N/A | ≤1.5 | ≤2 | ≤2 | 5 | | 75 RB / 100 RB | 2523.4 | 0 – 64 | >0 | N/A | ≤5 | ≤5 | ≤5 | 6.5 | | 65 – 114 | N/A | >115 | ≤2 | ≤2.5 | ≤2.5 | 6 | | 115 – 174 | >0 | N/A | ≤1 | ≤1.5 | ≤2 | 5 | | 100 RB / 100 RB | 2528.3 | 0 – 69 | >0 | N/A | ≤5 | ≤5 | ≤5 | 6.5 | | 70 – 129 | N/A | >130 | ≤2 | ≤2.5 | ≤2.5 | 6 | | 130 – 199 | >0 | N/A | ≤1.5 | ≤1.5 | ≤2 | 5 | | NOTE 1: RBstart indicates the lowest RB index of transmitted resource blocks  NOTE 2: LCRB is the length of a contiguous resource block allocation  NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis  NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe  NOTE 5: The A-MPR values in this table shall apply when the lower edge of the aggregated channel bandwidth (Figure 5.6A-1) is less than or equal to the lower edge cutoff frequency specified in this table for the corresponding CA bandwidth combination. When the lower edge of the aggregated channel bandwidth exceeds the lower edge cutoff frequency, then the A-MPR shall be equal to the MPR specified in Table 6.2.3A-1a. | | | | | | | | | |

## Open issues summary

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

## Sub-topic 1-1

*Sub-topic description:* R4-2101197 Introduction of Band 40/n40 for Japan

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

**Issue 1-1-1: Coexistence tables update**

* Proposals
* ***Proposal 1: Co-existence requirements from B40/n40 to Japan bands and PHS should be specified.***
* ***Proposal 2: Co-existence requirements from Japan bands to B40 should be specified.***
* ***Proposal 3: Co-existence requirements for CAs and DCs should be modified***
* Recommended WF
* Unless a specific issue is identified above proposals are acceptable based on the analysis presented

**Issue 1-1-2: Release independence**

* Proposals
* ***Proposal 4: Modification on co-existence requirements to reuse B40/n40 in Japan should apply from Rel-8.***
* Recommended WF
* Moderator: assuming that for n40 it means Rel.15 the proposal seems acceptable

## Sub-topic 1-2

*Sub-topic description:* R4-2102437A-MPR for LTE CA\_NS\_04 256QAM PC2

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

**Issue 1-2:** AMPR values for 256 QAM

* Proposals
  + 256 QAM AMPR is 6.5 dB for lower region of RBstart
  + 256 QAM AMPR is 6 dB for middle region of RBstart
  + 256 QAM AMPR is 5 dB for upper region of RBstart
* Recommended WF
  + Confirm values in the discussion

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| T-Mobile USA | Sub topic 1-1-1:  Sub topic 1-1-2:  Sub topic 1-2: We don’t agree with the proposed A-MPR values. R4- 2102437 says that A-MPR needs to consider EVM, but EVM should be accounted for under MPR, right? The NS\_04 A-MPR is the Max of MPR and A-MPR, so there is no need to account for EVM under A-MPR. From 36.101, 6.24A, “For uplink 64 QAM and 256 QAM, the applied maximum output power reduction is obtained by taking the maximum value of MPR requirements specified in Table 6.2.3A-1 and A-MPR requirements specified in Table 6.2.4A-1.” |
| XXX | Sub topic 1-1-1:  Sub topic 1-1-2:  Sub topic 1-2: |

### 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** |
| [**R4-2100053**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100053.zip) | Company A |
| Company B |
|  |
| [**R4-2101802**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101802.zip) | Company A |
| Company B |
|  |

## 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:* |

*Recommendations on WF/LS assignment*

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

### CRs/TPs

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

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## 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/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: Spurious emission clean-up for UE coexistence tables

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2102596**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102596.zip) | Apple | **R15 CR for TS 36.101: Cleanup for spurious emissions for UE co-existence table**   1. In Table 6.6.3.2-1, for band 28, move protected band 52 to the row without NOTE.   In Table 6.6.3.2A-0,   1. CA\_1-5, band n77, n78 and n79 are missing harmonic exception as found in single band 1 and 5 2. CA\_1-11, band n77 is missing harmonic exception as found in single band 1 3. CA\_1-20, band 42 is missing harmonic exception as found in single band 20 4. CA\_1-21, band n77 band n77 is missing harmonic exception as found in single band 1 5. CA\_1-26, band n77 band n77 is missing harmonic exception as found in single band 1 6. CA\_1-28, bands 32, 50, 51 ,74 are missing harmonic exception as found in single band 28 7. CA\_2-4, band 22 is missing harmonic exception 8. CA\_3-5, bands 22 and 42 are missing harmonic exception as found in single band 3 9. CA\_3-18, band n77 and n78 are missing harmonic exception as found in single band 18 and 3 10. CA\_3-21 band n77 and n78 are missing harmonic exception as found in single band 3 11. CA\_3-41 band n77, n78 and n79 are missing harmonic exception as found in single band 3 and 41 12. CA\_4-12 band 22 is missing harmonic exception 13. CA\_4-13 band 22 is missing harmonic exception 14. CA\_4-17 band 22 is missing harmonic exception 15. CA\_5-12 band 22 and 42 are missing harmonic exception 16. CA\_5-17 band 22 and 42 are missing harmonic exception 17. CA\_11-26 band n77, n78 and n79 are missing harmonic exception as found in single band 11 18. CA\_26-46 band 41 is missing harmonic exception as found in single band 26 19. CA\_26-48 band 41 is missing harmonic exception as found in single band 26 20. CA\_28-41 band 32, 45, 48 are missing harmonic exception   Moderator: please comment directly in CR section |
| [**R4-2102604**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102604.zip) | Apple | **R16 CR for TS 36.101: Cleanup for spurious emissions for UE co-existence table**  In Table 6.6.3.2-1,   1. For Band 5, move protected Band 53 to the row with NOTE 2. 2. For Band 28, move protected Band 52 to the row without NOTE.   In Table 6.6.3.2A-0,   1. CA\_1-5, band n77, n78 and n79 are missing harmonic exception as found in single band 1 and 5 2. CA\_1-11, band n77 is missing harmonic exception as found in single band 1 3. CA\_1-20, band 42 is missing harmonic exception as found in single band 20 4. CA\_1-21, band n77 band n77 is missing harmonic exception as found in single band 1 5. CA\_1-26, band n77 band n77 is missing harmonic exception as found in single band 1 6. CA\_1-28, bands 32, 50, 51 ,74 are missing harmonic exception as found in single band 28 7. CA\_2-4, band 22 is missing harmonic exception 8. CA\_3-5, bands 22 and 42 are missing harmonic exception as found in single band 3 9. CA\_3-18, band n77 and n78 are missing harmonic exception as found in single band 18 and 3 10. CA\_3-21 band n77 and n78 are missing harmonic exception as found in single band 3 11. CA\_3-41 band n77, n78 and n79 are missing harmonic exception as found in single band 3 and 41 12. CA\_4-12 band 22 is missing harmonic exception 13. CA\_4-13 band 22 is missing harmonic exception 14. CA\_4-17 band 22 is missing harmonic exception 15. CA\_5-12 band 22 and 42 are missing harmonic exception 16. CA\_5-17 band 22 and 42 are missing harmonic exception 17. CA\_11-26 band n77, n78 and n79 are missing harmonic exception as found in single band 11 18. CA\_26-46 band 41, 53 and 77 are missing harmonic exception as found in single band 26 19. CA\_26-48 band 41 is missing harmonic exception as found in single band 26 20. CA\_28-41 band 32, 45, 48 are missing harmonic exception   Moderator: please comment directly in CR section  R17 Mirror CR R4-2102605 |

## Open issues summary

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

### 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** |
| [**R4-2102596**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102596.zip) | Huawei: Thanks for the cleanup work. On the change for CA\_1-26, should n78 be moved to the same row as n77? This looks similar to the case of CA\_1-28. |
| Apple: Good catch. We agree that n78 should also have the harmonic exception. |
|  |
| [**R4-2102604**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102604.zip) | Company A |
| Company B |
|  |

## 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*

|  |  |  |
| --- | --- | --- |
|  | **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*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## 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/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #3: NB-IoT

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2102098**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102098.zip) | Sony | **Test frequencies for NB-IOT UE in standalone operation**  It was decided to seek guidance from the FCC on some specific questions which resulted in an LS sent to FCC [2]. In RAN4 #97-e the issue was brought up again [3] and it was decided to wait for the response from FCC [4]. Since no response has been received so far, we bring up this issue again.  **Observation 1: TS 36.104 test conditions (test frequencies) for both stand-alone and guard-band NB-IoT operation may conflict with FCC band-edge spectrum emission requirements.**  **Observation 2: 100 kHz offset for NB-IoT network deployments may solve the violation of the FCC regulation.**  **Proposal 1: Send an LS to RAN5 with proposal to exclude the first and last EARFCNs in TS 36.104 test frequencies for both stand-alone and guard-band IoT operation modes for all frequency bands were FCC regulation applies.** |

## Open issues summary

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

Band-edge emission at stand-alone and guard-band NB-IoT conditions is regulated by FCC OOB emission requirements. How to test the emission according to the FCC requirement was debated in RAN4 #96-e [1]. It was decided to seek guidance from the FCC on some specific questions which resulted in an LS sent to FCC [2]. In RAN4 #97-e the issue was brought up again [3] and it was decided to wait for the response from FCC [4]. Since no response has been received so far, we bring up this issue again.

This document is a resubmission of [3].

### Sub-topic 3-1

*Sub-topic description:* Since FCC has given no answer to the LS should RAN4 decide for a solution in its specification and send LS in RAN5

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

**Issue 3-1: Solution to FCC OOB requirement for NB-IoT**

* Proposals
  + Option 1: Wait for FCC response
  + Option 2: Accept proposals in **R4-2102098**
  + Option 3: Amend solutions proposed in [**R4-2102098**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102098.zip)
* Recommended WF
  + Discuss if solution in [**R4-2102098**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102098.zip) **is acceptable**

### Sub-topic 3-2

*Sub-topic description*

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

**Issue 3-2: TBA**

* Proposals
  + Option 1: TBA
  + Option 2: TBA
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 3-1:  Sub topic 3-2:  ….  Others: |
| Huawei | The existing 3GPP test frequencies are valid in many regions of the world. Excluding them unconditionally could disrupt the conformance tests/certification process in those regions. Furthermore, avoid testing those frequencies would not necessarily guarantee that the UE meets the FCC requirements. Therefore option 2 seems not acceptable. We prefer option 1 for now, but we’re also open to discuss other solutions. |
| T-Mobile USA | We support Option 1. While we would like to close this issue, we think that RAN4 needs to wait for a response from the FCC. The proposal from Sony is to exclude 100 kHz at the edge of the band for UE testing, but the FCC would need to agree to change their testing procedures. Is the idea to use this to force them to make a decision? Another concern is that the edge of the license is where the FCC emission rules apply and the edge of the band is not always the edge of the license. For instance, for Band 12 in the US, the lower edge of the license is 698 MHz not 699 MHz which is the low edge of the band. Band 13 has a similar issue, where the edge of the band doesn’t align with the edge of the license. |
| Sony | Issue 3-1: Option 2: Send an LS to RAN5 to exclude the first and last EARFCNs in TS 36.508 test frequencies for both stand-alone and guard-band IoT operation modes for all frequency bands were FCC regulation applies.  Operating in those frequencies must also be prohibited: Exclude using the first and last EARFCNs in TS 36.104 for both stand-alone and guard-band IoT operation modes for all frequency bands were FCC regulation applies.  The need for clarification from FCC actually refers to bands 12 and 13 only. The FCC requirements in other bands are quite clear. Since no answer from FCC has been received so far, we believe RAN4 has to act with a general decision for all bands where FCC requirements apply. This decision may need to be adjusted regarding bands 12 and 13 after receiving the clarification from FCC. |

## 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*

|  |  |  |
| --- | --- | --- |
|  | **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*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## 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/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |