**3GPP TSG-RAN WG4 Meeting # 99-e R4-211XXXX**

**Electronic Meeting, 19 May – 27 May, 2021**

**Agenda item:** 4.2.2, 5.2.2.2

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

**Title:** Draft Round 1 Email discussion summary for [99e][104] LTE\_Maintenance

**Document for:** Information

# Introduction

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

* 4.2.2 UE RF requirements up to Rel-15
* 5.2.2.2 UE RF requirements Rel-16

List of topics:

* Topic 1: Band specific aspects
* CR on CA configuration corrections
* CR on MSD configurations for dual uplink
  + Sub-topic 1-1: NS\_04 256QAM A-MPR, MPR for Power Class 2,
* Topic 2: Spurious emission clean-up for UE coexistence tables
* Topic 3: NB-IoT:
  + Wording alignment 36.213
    - Sub-topic 3-1: NB-IoT FCC emission requirements
* Topic 4: Other Maintenance
  + CR on EVM requirements
  + CR on additional requirements when NS is indicated
  + REFSENS exception specifications simplification

# Topic #1: Band specific aspects

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

## Companies’ contributions summary

(Cat A CRs are not listed)

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2108916**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108916.zip) | Nokia | **Rel-16 CR LTE CA corrections R16 CAT F**  Summary of change:  CA\_18C-41C is removed as CA\_18C does not exist.  Ca\_26A-66A acronym corrected  CA\_2A-5A-48C and CA\_2A-5A-48D CA BW Class is corrected.  Moderator: please comment directly in CR section 1.3.2 |
| [**R4-2108917**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108917.zip) | Nokia | **Rel-17 CR LTE CA corrections R17 CAT F**  Summary of change:  CA\_18C-41C is removed as CA\_18C does not exist.  Ca\_26A-66A acronymn corrected  CA\_2A-5A-48C and CA\_2A-5A-48D CA configuration reference is corrected  CA\_7A-7A-25A-25A-66A CA configuration reference is corrected  CA\_46A\_53X acronymns are corrected  CA\_2A-5A-7A-7A-66A aggregated BW and BCS information is added  Moderator: please comment directly in CR section 1.3.2 |
| [**R4-2109838**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109838.zip) | LG Electronics France | **Correction of MSD test configuration for LTE-A inter-band CA for x bands (x=3,4,5) DL with 2 bands UL in TS36.101**  Summary of change:  In RAN4 #98 meeting, the typos were fixed for TS36.101 v17.1.0 by R4-2100270.  But the correction did not provided in the previous specifictaion for TS36.101 v16.9.0.  Hence, correct some typos in the MSD requirements for CA\_2A-5A-48A in Table 7.3.1A-0g.  Moderator: please comment directly in CR section 1.3.2 |
| [**R4-2111294**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111294.zip) | Huawei,  HiSilicon | **MPR and A-MPR for LTE CA 256QAM PC2**  **Proposal 1: Set the MPR for 256QAM PC2 CA as in Table 2.1.**  Table 2.1: Maximum Power Reduction (MPR) for Power Class 2   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Modulation | CA bandwidth Class C / Smallest Component Carrier Transmission Bandwidth Configuration | | | | MPR (dB) | | 25 RB | 50 RB | 75 RB | 100 RB | | QPSK | > 6 and ≤ 25 | > 6 and ≤ 50 | > 6 and ≤ 75 | > 6 and ≤ 100 | ≤ 1 | | QPSK | > 25 | > 50 | > 75 | > 100 | ≤ 2 | | 16 QAM | ≤ 6 | ≤ 8 | ≤ 16 | ≤ 18 | ≤ 1.5 | | 16 QAM | > 6 and ≤ 25 | > 8 and ≤ 50 | > 16 and ≤ 75 | > 18 and ≤ 100 | ≤ 2 | | 16 QAM | > 25 | > 50 | > 75 | > 100 | ≤ 3 | | 64 QAM | ≤ 8 and allocation wholly contained within a single CC | ≤ 12 and allocation wholly contained within a single CC | ≤ 16 and allocation wholly contained within a single CC | ≤ 18 and allocation wholly contained within a single CC | ≤ 2 | | 64 QAM | > 8 or allocation extends across two CC's | > 12 or allocation extends across two CC's | > 16 or allocation extends across two CC's | > 18 or allocation extends across two CC's | ≤ 3 | | 256 QAM | ≥ 1 | | | | ≤ 6 |   **Proposal 2: Set the A-MPR for 256QAM CA\_NS\_04 (power class 2) as in Table 2.2.**  Table 2.2: 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 | 5.5 | | 43 – 81 | N/A | >82 | ≤1 | ≤1.5 | ≤1.5 | 4.5 | | 82 – 124 | >0 | N/A | ≤1 | ≤1.5 | ≤1.5 | 4 | | 50 RB / 100 RB | 2518.4 | 0 – 52 | >0 | N/A | ≤5 | ≤5 | ≤5 | 5.5 | | 53 – 94 | N/A | >95 | ≤1 | ≤1.5 | ≤1.5 | 4.5 | | 95 – 149 | >0 | N/A | ≤1 | ≤1.5 | ≤1.5 | 4 | | 75 RB / 75 RB | 2519.0 | 0 – 54 | >0 | N/A | ≤5 | ≤5 | ≤5 | 5.5 | | 55 – 94 | N/A | >95 | ≤2 | ≤2.5 | ≤2.5 | 5 | | 95 – 149 | >0 | N/A | ≤1.5 | ≤2 | ≤2 | 4.5 | | 75 RB / 100 RB | 2523.4 | 0 – 64 | >0 | N/A | ≤5 | ≤5 | ≤5 | 5.5 | | 65 – 114 | N/A | >115 | ≤2 | ≤2.5 | ≤2.5 | 5 | | 115 – 174 | >0 | N/A | ≤1 | ≤1.5 | ≤2 | 4.5 | | 100 RB / 100 RB | 2528.3 | 0 – 69 | >0 | N/A | ≤5 | ≤5 | ≤5 | 5.5 | | 70 – 129 | N/A | >130 | ≤2 | ≤2.5 | ≤2.5 | 5 | | 130 – 199 | >0 | N/A | ≤1.5 | ≤1.5 | ≤2 | 4.5 | | 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. | | | | | | | | | |
| [**R4-2111293**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111293.zip) | Huawei, HiSilicon | **CR MPR and AMPR for LTE CA 256QAM PC2**  Summary of change:  The MPR/A-MPR values are fulfilled based on simulation results and meeting discussions.  Moderator: please comment directly in CR section 1.3.2. |
| [**R4-2111421**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111421.zip) | Qualcomm Incorporated | **n41 CA\_NS\_04 AMPR for 256QAM**  **Proposal 1:** Use CA\_NS\_04 A-MPR for 256QAM as shown in section 4.  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 | [2] | | 82 – 124 | >0 | N/A | ≤1 | ≤1.5 | ≤1.5 | [2] | | 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 | [2] | | 95 – 149 | >0 | N/A | ≤1 | ≤1.5 | ≤1.5 | [2] | | 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 | [3] | | 95 – 149 | >0 | N/A | ≤1.5 | ≤2 | ≤2 | [3] | | 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 | [3] | | 115 – 174 | >0 | N/A | ≤1 | ≤1.5 | ≤2 | [3] | | 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 | 3 | | 130 – 199 | >0 | N/A | ≤1.5 | ≤1.5 | ≤2 | 3 | | 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. | | | | | | | | |   **Proposal 2**: Use 256QAM CA MPR of [5] dB. |

## 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:* NS\_04 256QAM A-MPR, MPR for Power Class 2

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

**Issue 1-1-1: MPR for 256QAM PC2 CA**

* Proposals summary
* *R4-2111294: the MPR for 256QAM PC2 CA is proposed to be 6 dB.*
* *R4-2111421: Use 256QAM CA MPR of [5] dB.*
* Recommended WF
* Moderator: TBA after 1st round discussions.

**Issue 1-1-2: Contiguous Allocation A-MPR for CA\_NS\_04 (power class 2)**

* Proposals summary

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CA Bandwidth Class C | Lower edge cutoff frequency [MHz]5 | RBStart | LCRB [RBs] | RBstart + LCRB [RBs] | 256QAM A-MPR [dB] | |
|  | R4-2111294 | R4-2111421 |
| 25 RB / 100 RB | 2513.5 | 0 – 42 | >0 | N/A | 5.5 | 6.5 |
| 43 – 81 | N/A | >82 | 4.5 | [2] |
| 82 – 124 | >0 | N/A | 4 | [2] |
| 50 RB / 100 RB | 2518.4 | 0 – 52 | >0 | N/A | 5.5 | 6.5 |
| 53 – 94 | N/A | >95 | 4.5 | [2] |
| 95 – 149 | >0 | N/A | 4 | [2] |
| 75 RB / 75 RB | 2519.0 | 0 – 54 | >0 | N/A | 5.5 | 6.5 |
| 55 – 94 | N/A | >95 | 5 | [3] |
| 95 – 149 | >0 | N/A | 4.5 | [3] |
| 75 RB / 100 RB | 2523.4 | 0 – 64 | >0 | N/A | 5.5 | 6.5 |
| 65 – 114 | N/A | >115 | 5 | [3] |
| 115 – 174 | >0 | N/A | 4.5 | [3] |
| 100 RB / 100 RB | 2528.3 | 0 – 69 | >0 | N/A | 5.5 | 6.5 |
| 70 – 129 | N/A | >130 | 5 | 3 |
| 130 – 199 | >0 | N/A | 4.5 | 3 |

* Recommended WF
* Moderator: TBA after 1st round discussions.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1-1:  Sub topic 1-1-2:  Sub topic 1-2: |
| 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** |
| [**R4-2108916**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108916.zip) | Company A |
| Company B |
|  |
| [**R4-2108917**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108917.zip) | Company A |
| Company B |
|  |
| [**R4-2109838**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109838.zip) | Company A |
| Company B |
|  |
| [**R4-2111293**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111293.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#1-1** | *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

(Cat A CRs are not listed)

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2109451**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109451.zip) | Apple | **Cleanup for UE co-existence 36.101 Rel-15**  Summary of change:   1. Harmonic exceptions for band 48 have been missed for the following bands: 4, 12, 17, 85 2. Band 12: Removed harmonic exception from band 70 as it is not affected by any harmonic. 3. Band 28: Harmonic exceptions are added for band 11 and 21 as they are both affected by second harmonic. Furthermore Band 1 is cleaned up by moving its exception to the dedicated entry line. 4. Band 65: Harmonic exception is added for n77 as it is affected by second harmonic. 5. Band 68: Harmonic excpetions are added for bands 22, 42, 43, 50, 51 and 65 as they are affected by either second, third or fifth harmonic. 6. Band 85: Removed harmonic exception from band 70 as it is not affected by any harmonic. 7. CA\_1-20: Removed duplicate entry for band 42 8. CA\_1-28: Added harmonic exception for bands 1, 11, 21 and 65 as they can be affected by scond and third harmonic 9. CA\_11-26: Added harmonic exception for the second frequency range as it can be affected by third harmonic 10. CA\_18-28: Added harmonic exception for bands 1, 11, 21 and 65 as they can be affected by scond and third harmonic 11. CA\_28-41: Added harmonic exception for bands 11, 21 as they can be affected by scond harmonic 12. CA\_28-42: Added harmonic exception for bands 11, 21 as they can be affected by scond harmonic 13. CA\_4-4: This CA protects band 22 (unlike band 4). As second harmonic can fall into band 22 it requires harmonic exception   Moderator: please comment directly in CR section 2.3.2 |
| [**R4-2109452**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109452.zip) | Apple | **Cleanup for UE co-existence 36.101 Rel-16**  Summary of change:   1. Harmonic exceptions for band 48 have been missed for the following bands: 4, 12, 17 and 85 2. Band 2: Protection for n77 was added in Rel-16 but it requires harmonic exception as it can be affected by second harmonic. 3. Band 12: Removed harmonic exception from band 70 as it is not affected by any harmonic. 4. Band 26: Harmonic exception is added for band 53 as it can be affected by third harmonic. 5. Band 28: Harmonic exceptions are added for band 11 and 21 as they are both affected by second harmonic. 6. Band 65: Harmonic exception is added for band n77 as it can be affected by second harmonic. 7. Band 68: Harmonic excpetions are added for bands 22, 42, 43, 50, 51 and 65 as they are affected by either second, third or fifth harmonic. 8. Band 85: Removed harmonic exception from band 70 as it is not affected by any harmonic. 9. CA\_1-11: Shifted first frequency range one row down. Harmonic exception is added for band n77 as it can be affected by second harmonic. 10. CA\_1-28: Added harmonic exception for bands 1, 11, 21 and 65 as they can be affected by scond and third harmonic 11. CA\_2-5: Harmonic exception is added for band 53 as it can be affected by third harmonic. 12. CA\_4-5: Harmonic exception is added for band 53 as it can be affected by third harmonic. 13. CA\_4-28: Harmonic exception is added for band 48 as it can be affected by second harmonic. 14. CA\_5-17: Harmonic exception is added for band 53 as it can be affected by third harmonic. 15. CA\_7-20: Harmonic excpetions are added for first and second frequency range as they are affected by third harmonic. 16. CA\_11-26: Harmonic exception is added for the second frequency range as it can be affected by third harmonic. 17. CA\_18-28: Added harmonic exception for bands 1, 11, 21 and 65 as they can be affected by scond and third harmonic 18. CA\_25-26: Harmonic exception is added for band 53 as it can be affected by third harmonic. 19. CA\_25-41: Added missing “FDL\_low – FDL\_high” 20. CA\_26-48: Harmonic exception is added for band 41 as it can be affected by third harmonic. 21. CA\_28-41: Added harmonic exception for bands 11 and 21 as they can be affected by scond harmonic 22. CA\_28-42: Added harmonic exception for bands 11 and 21 as they can be affected by scond harmonic 23. CA\_5: Added harmonic exception for band 53 as it can be affected by third harmonic 24. CA\_4-4: This CA protects band 22 (unlike band 4). As second harmonic can fall into band 22 it requires harmonic exception.   Moderator: please comment directly in CR section 2.3.2  R17 Mirror CR R4-2109457 |
| [**R4-2109156**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109156.zip) | NTT DOCOMO, INC. | **CR to TS 36.101[R8]: Addition of UE co-existence requirements for band 40**  Summary of change:  Based on the R4-2103134 agreed in RAN4#98-e, the following requirements will be added.  1. Co-existence requirements from B40 to Japan bands and PHS.  2. Co-existence requirements from Japan bands to B40.  3. Co-existence requirements for CA to be modified according to the above changes. This change is only seen in CAT-A CR.  Moderator: please comment directly in CR section 2.3.2 |

## Open issues summary

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

## Companies views’ collection for 1st round

### Open issues

|  |  |  |
| --- | --- | --- |
| **Company** |  | **Comments** |
| XXX |  | Sub topic 2-1:  ….  Others: |

### 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** |
| [**R4-2109451**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109451.zip) | Company A |
| Company B |
|  |
| [**R4-2109452**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109452.zip) | Company A |
| Company B |
|  |
| [**R4-2109156**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109156.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#2-1** | *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

(Cat A CRs are not listed)

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2108892**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108892.zip) | Rohde & Schwarz | **Correction to NB-IoT TDD RMCs**  Summary of change:  Aligned wording on number of repetitions for NPDSCH and NPUSCH.  Add reference to 36.213.  Moderator: please comment directly in CR section 3.3.2  R16 Mirror Cat-A CR R4-2108893  R17 Mirror Cat-A CR R4-2108894 |
| [**R4-2108895**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108895.zip) | Rohde & Schwarz | **Correction to NB-IoT HD-FDD RMCs**  Summary of change:  Aligned wording on number of repetitions for NPDSCH and NPUSCH.  Add reference to 36.213.  Moderator: please comment directly in CR section 3.3.2  R14 Mirror Cat-A CR R4-2108896  R15 Mirror Cat-A CR R4-2108897  R16 Mirror Cat-A CR R4-2108898  R17 Mirror Cat-A CR R4-2108899 |
| [**R4-2109005**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109005.zip) | Sony | **NB-IOT frequencies in stand-alone and guard-band operation**  Observation 1: The FCC requirements for some frequency bands (bands 12 and 13) are currently under clarification with FCC. If no relaxation is allowed for these frequency bands, changes in the 3GPP specifications are required in these bands in order to avoid violation of FCC requirements.  Observation 2: TS 36.508 for UE test conditions (test frequencies) for both stand-alone and guard-band NB-IoT operation are conflicting with FCC band-edge spectrum emission requirements and the current FCC Labs test practice.  Observation 3: TS 36.104 for BS allows 200 kHz frequency offset from the operating band edges for NB-IoT standalone operation only.  Proposal 1: Exclude the first and last EARFCNs in TS 36.508 test frequencies for both stand-alone and guard-band IoT operation modes in order to match 3GPP spectrum emission requirements with FCC regulation for all frequency bands were FCC regulation applies. The changes for bands 12 and 13 are pending final clarification with FCC.  Proposal 2: Exclude using the first and the last EARFCNs in TS 36.104 for both stand-alone and guard-band IoT operation modes in order to avoid violation of FCC spectrum emission requirements at 3GPP band edges. The changes in bands 12 and 13 are pending final clarification with FCC. |
| [**R4-2110795**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110795.zip) | Qualcomm Incorporated | **NB-IoT FCC emission requirements**  **Observation 1: The FCC emission requirements are applicable on the edge of license blocks in the FCC bands. If operator has continuous license blocks, the FCC emission requirements are applicable on the edge of combined blocks.**  **Observation 2: FCC emission requirements are not applicable on the 3GPP band edges if they don’t alight with the FCC license edges.**  **Observation 3: The additional spurious emission at FCC license block edges per the FCC specification #27.53 part (c), FCC #27.53(g), FCC #27.53(h), FCC #24.238 and FCC #22.917 shall be reflected in 3GPP spec.**  **Proposal 1: RAN4 to define NS signalling to inform the additional requirements to NB-IoT devices.**  **Proposal 2: To modify the NS\_04 to inform the additional requirements and to exclude 100KHz for the related E-UTRA bands.**  **Proposal 3: Introduce the change on network signalling NS\_04 from Rel-14.** |
| [**R4-2111022**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111022.zip) | Qualcomm Incorporated | **CR to TS36.101: NB-IoT FCC emission requirements (Rel-14)**  Summary of change:   1. Introuduce the additional requiremtens in section 6.6.2F.2.3 2. Modify definition of NS\_04 in section 6.2.4F   Moderator: please comment directly in CR section 3.3.2  R15 Mirror Cat-A CR R4-2110995  R16 Mirror Cat-A CR R4-2110996  R17 Mirror Cat-A CR R4-2110997 |
| [**R4-2111483**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111483.zip) | T-Mobile USA | **CR for 36.101: Introduction of NS Signalling for NB-IoT in the USA**  Summary of change:  Similar to what was previously done at the low end of Band 26, the 100 kHz at the edge of the US bands are being excluded from NB-IoT operation when NS\_04 is signalled. Where the FCC license edge does not align with the band edge (Band 12 and Band 13), the emissions apply at the license edge, as described in R4-2107330.  Moderator: please comment directly in CR section 3.3.2  R15 Mirror Cat-A CR R4-2111484  R16 Mirror Cat-A CR R4-2111485  R17 Mirror Cat-A CR R4-2111486 |

## 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] and RAN4 decided to send an LS to the FCC asking for clarification on testing issues related to NB-IoT device certification and devices that have been failing certification testing. This section summarizes proposals made to solve the open issues. One company brings proposals claiming no response has been received from FCC so far. Two companies have presented unofficial responses obtained during a call with FCC at RAN4 #98bis-e and make proposals.

### Sub-topic 3-1

*Sub-topic description:* Based on understanding of FCC requirements, RAN4 to decide for a solution in its specifications.

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

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

* Proposals
  + Option 1: Accept proposals in R4-2109005
  + Option 2: Accept proposals in R4-2111483
  + Option 3: Accept proposals in R4-2111022
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 3-1:  ….  Others: |

### 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** |
| [**R4-2108892**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108892.zip) | Company A |
| Company B |
|  |
| [**R4-2108895**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108895.zip) | Company A |
| Company B |
|  |
| [**R4-2111022**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111022.zip) | Company A |
| Company B |
|  |
| [**R4-2111483**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111483.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#3-1** | *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 #4: Other Maintenance

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

## Companies’ contributions summary

(Cat A CRs are not listed)

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2109150**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109150.zip) | SoftBank Corp. | **Clarification on additional emission requirements to 2 bandUL CA/DC (R15)**  Summary of change:  The following sentence is added in sub-clause 6.2.4A:  Unless otherwise stated, if an NS value is indicated in a band, the additional requirement shall be met regardless if the UE has uplink configured in the other bands.  Moderator: please comment directly in CR section 4.3.2.  R16 Mirror Cat-A CR R4-2109151  R17 Mirror Cat-A CR R4-2109152 |
| [**R4-2111357**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111357.zip) | Huawei, HiSilicon | **CR on EVM requirement for TS 36.101**  Summary of change:  Add clairification to reduce the off-on transient for EVM measurement  Moderator: please comment directly in CR section 4.3.2.  R17 Mirror CR R4-2109457 |
| [**R4-2110817**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110817.zip) | Skyworks Solutions Inc., Nokia | **LTE Rel-17 REFSENS Exception Simplification**  **Observation 1: Based on WF [1] agreements:**   * For new REL-17 combinations: the reduction of the number of test points in TS 36.101 is small due to the small number of new combinations being introduced. The implementation of WF [1] agreements only requires a small CR. The benefits in TPs for TR remain advantageous. * For legacy LTE CA combinations: it is possible to reduce slightly the table size by grouping combinations which have identical REFSENS exception test points. This does not reduce the number of test points and yet this approach comes at the expense of a major table reshuffling.   **Observation 2:**   * Adopting option 2 may bring a high reduction of REFSENS exception test points while minimizing the impact on tables and document structure. * We would like to bring to the attention of RAN4 that the level of urgency is medium since it is our understanding that RAN5 will be impacted only when RAN5 Rel-16 is closed.   **Proposal: Send an LS to inform RAN5 about the new way of working RAN4 has adopted in Rel-17 and request feedback on either of the following proposal options:**  **Starting from Rel-17:**  **Option 1:**   * **For new Rel-17 band combinations:** * **For TPs for TR: According to the agreed WF [1], do not specify higher order REFSENS test points if already covered by a fall-back combination,** * **For 36.101: Remove REFSENS test points if already covered by fall-back combination via small CR.** * **For legacy combinations:** * **Do not bring any change to TS 36.101.**   **Option 2:**   * **For new Rel-17 band combinations:** * **For TPs for TR: According to the agreed WF [1], do not specify higher order REFSENS test points if already covered by a fall-back combination,** * **For 36.101: Remove REFSENS test points if already covered by fall-back combination via small CR.** * **For legacy combinations:**   + **Keep only the lowest order fall-back test points and remove all redundant REFSENS test points in TS 36.101.** |
| [**R4-2109739**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109739.zip) | Nokia | **LS to RAN5 on LTE REFSENS Exceptions Simplification**  RAN4 has now done more work on the topic and observed that due to the small number of new LTE combinations introduced in REL-17 the agreed method for only changing MSD test point scheme for new REL-17 LTE CA combinations does not really have much impact on RAN4 specification simplification or amount of RAN5 MSD test cases [2].  RAN4 would like to hear RAN5 opinion if LTE REFSENS exceptions simplification should be limited only to new REL17 CA configurations (Option 1) as was already communicated in [1] or if the simplification can be also applied to CA configurations in earlier releases (Option 2).  Moderator: Option 1 and Option 2 summarized in R4-2110817 above. |

## Open issues summary

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

*Sub-topic description:* It is observed that due to the small number of new LTE combinations introduced in REL-17 the agreed method for only changing MSD test point scheme for new REL-17 LTE CA combinations does not really have much impact on RAN4 specification simplification or amount of RAN5 MSD test cases. RAN4 would like to collect RAN5 opinion if LTE REFSENS exceptions simplification should be limited only to new REL17 CA configurations (Option 1) as was already communicated in [1] or if the simplification can be also applied to CA configurations in earlier releases (Option 2) [ R4-2110817, R4-2109739]. Considering RAN5 way of working, it is believed that the level of urgency is medium.

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

**Issue 4-1: Solutions to reduce the number of REFSENS exception test points**

* Proposals: Send LS to RAN5 on LTE REFSENS Exceptions Simplification.
* Recommended WF

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 4-1:  ….  Others: |

### 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** |
| [**R4-2109150**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109150.zip) | Company A |
| Company B |
|  |
| [**R4-2111357**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111357.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#4-1** | *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”* |