**3GPP TSG-RAN WG4 Meeting # 104-e R4-2214237**

**Electronic Meeting, August 15 – August 26, 2022**

**Agenda item:** 12.2.2

**Source:** Moderator (CMCC)

**Title:** Email discussion summary for [104-e][126] LTE\_intraBandCA\_n8

**Document for:** Information

# Introduction

In RAN#96 meeting, a new WID on LTE intra-band contiguous CA for band 8 was approved. The scope of this email discussion focuses on specific RF requirements for BCS1 of band 8 intra-band CA, the same as the agenda 12.2.2 for current meeting.

List of candidate target of email discussion for 1st round and 2nd round

* 1st round: discuss the open issues, strive to finish all the open issues and collect comment for draft CRs
* 2nd round: strive to approve all draft CRs.

# Topic #1: UE RF requirements

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2212304**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212304.zip) | CMCC | Draft CR for 36.101: UE RF requirements for band 8 intra-band contiguous CA |
| [**R4-2212305**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212305.zip) | CMCC | Proposal 1: the specified MPR requirements for smallest 15PRB per CC is suggested as below in the TDoc table 2.  Proposal 2: add 2.7MHz measurement bandwidth for 3MHz CC for minimum output power and OFF level requirements.  Proposal 3: SEM requirements for 10+3MHz contiguous CA are listed in the TDoc table 3.  Proposal 4: only UL PCC is configured for reference sensitivity as in the TDoc table 4. |
| [**R4-2212716**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212716.zip) | ZTE Corporation | Proposal 1: To define the spectrum emission mask for 15RB+50RB (i.e. 3MHz+10MHz) as the TDoc table.  Proposal 2: To define the UL configuration for reference sensitivity for 15RB+50RB (i.e. 3MHz+10MHz) as the TDoc table.  Proposal 3: To define the MPR requirements for 15RB+50RB (i.e. 3MHz+10MHz) as the TDoc table. |
| [**R4-2213164**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213164.zip) | Huawei, HiSilison | Proposal 1: In order to introduce CA\_8B\_BCS1, the RF requirements in clause 5.6A.1, 6.2.3A, 6.3.2A.1, 6.3.3A.1, 6.6.2.1A and 7.3.1A need to be updated as the TDoc appendix. |

## Open issues summary

Agenda 12.2.2

The BCS1 configurations for band 8 intra-band contiguous CA is provided as below as in the WID

**Table 1: BCS1 for band 8 intra-band contiguous CA configurations**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **E-UTRA CA configuration / Bandwidth combination set** | | | | | | |
| **E-UTRA CA configuration** | **Uplink CA configurations**  **(NOTE 3)** | **Component carriers in order of increasing carrier frequency** | | | | | **Maximum aggregated  bandwidth [MHz]** | **Bandwidth combination set** |
| **Channel bandwidths for carrier [MHz]** | **Channel bandwidths for carrier [MHz]** | **Channel bandwidths for carrier [MHz]** | **Channel bandwidths for carrier [MHz]** | **Channel bandwidths for carrier [MHz]** |
| CA\_8B | CA\_8B | 10 | 3, 5 |  |  |  | 15 | 1 |
| 3, 5 | 10 |  |  |  |

* + 1. Sub-topic 1-1 MPR

**Issue 1-1: MPR for 10+3MHz combination**

* Proposals
  + Option 1: use 15PRB as stop point to differentiate MPR requirements. (CMCC, Huawei)

Table 2: Maximum Power Reduction (MPR) for Power Class 3

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Modulation | CA bandwidth Class B and C / Smallest Component Carrier Transmission Bandwidth Configuration | | | | | MPR (dB) |
| 15 RB | 25 RB | 50 RB | 75 RB | 100 RB |
| QPSK | > 4 and ≤ 15 | > 8 and ≤ 25 | > 12 and ≤ 50 | > 16 and ≤ 75 | > 18 and ≤ 100 | ≤ 1 |
| QPSK | >15 | > 25 | > 50 | > 75 | > 100 | ≤ 2 |
| 16 QAM | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 1 |
| 16 QAM | > 4 and ≤ 15 | > 8 and ≤ 25 | > 12 and ≤ 50 | > 16 and ≤ 75 | > 18 and ≤ 100 | ≤ 2 |
| 16 QAM | >15 | > 25 | > 50 | > 75 | > 100 | ≤ 3 |
| 64 QAM | ≤ 4 and allocation wholly contained within a single CC | ≤ 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 | > 4 or allocation extends across two CC's | > 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 | | | | | ≤ 5 |

* + Option 2: use 50PRB as stop point to differentiate MPR requirements as follow. (ZTE)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Modulation** | **CA bandwidth Class B and C / Smallest Component Carrier Transmission Bandwidth Configuration** | | | | | **MPR (dB)** |
| **15RB** | **25 RB** | **50 RB** | **75 RB** | **100 RB** |
| QPSK | >4 and ≤ 50 | > 8 and ≤ 25 | > 12 and ≤ 50 | > 16 and ≤ 75 | > 18 and ≤ 100 | ≤ 1 |
| QPSK | >50 | > 25 | > 50 | > 75 | > 100 | ≤ 2 |
| 16 QAM | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 1 |
| 16 QAM | >4 and ≤ 50 | > 8 and ≤ 25 | > 12 and ≤ 50 | > 16 and ≤ 75 | > 18 and ≤ 100 | ≤ 2 |
| 16 QAM | >50 | > 25 | > 50 | > 75 | > 100 | ≤ 3 |
| 64 QAM | ≤ 4 and allocation wholly contained within a single CC | ≤ 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 | > 4 or allocation extends across two CC's | > 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 | | | | | ≤ 5 |

* Recommended WF
  + Option 1.
    1. Sub-topic 1-2 SEM

**Issue 1-2: SEM for 10+3MHz combination**

* Proposals
  + Option 1: SEM requirements for 10+3MHz contiguous CA are listed as below Table 3. (CMCC, ZTE, Huawei)

**Table 3: General E-UTRA CA spectrum emission mask for Bandwidth Class B**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ΔfOOB**  **(MHz)** | **25RB+25RB**  **(9.8MHz)** | **15RB+50RB**  **(12.85 MHz)** | **25RB+50RB**  **(14.95 MHz)** | **25RB+75RB**  **(19.8MHz)** | **50RB+50RB**  **(19.9 MHz)** | **Measurement bandwidth** |
| ± 0-1 | -18 | -19 | -20 | -21 | -21 | 30 kHz |
| ± 1-5 | -10 | -10 | -10 | -10 | -10 | 1 MHz |
| ± 5-9.8 | -13 | -13 | -13 | -13 | -13 | 1 MHz |
| ± 9.8-12.85 | -25 | -13 | -13 | -13 | -13 | 1 MHz |
| ± 12.85-14.8 | -25 | -25 | -13 | -13 | -13 | 1 MHz |
| ± 14.8-14.95 |  | -25 | -13 | -13 | -13 | 1 MHz |
| ± 14.95-17.85 |  | -25 | -25 | -13 | -13 | 1 MHz |
| ± 17.85-19.80 |  |  | -25 | -13 | -13 | 1 MHz |
| ± 19.80-19.90 |  |  | -25 | -25 | -13 | 1 MHz |
| ± 19.90-19.95 |  |  | -25 | -25 | -25 | 1 MHz |
| ± 19.95-24.80 |  |  |  | -25 | -25 | 1 MHz |
| ± 24.80-24.90 |  |  |  |  | -25 | 1 MHz |

* Recommended WF
  + Option 1.
    1. Sub-topic 1-3 UL configuraiton for REFSENSE

**Issue 1-3: UL configuration for 10+3MHz REFSENSE**

* Proposals
  + Option 1: only UL PCC is configured with 50 PRB for reference sensitivity. (CMCC)
  + Option 2: only UL PCC is configured with 25 PRB for reference sensitivity. (ZTE, Huawei)
* Recommended WF
  + Option 2.

## Companies views’ collection for 1st round

### Open issues

Sub topic 1-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CMCC | Option 1 is preferred and use the minimum RB of any CC to differentiate MPR. |
| ZTE | Our intention is also to use the same approaches as other configuraitons like 5M+10MHz, where the MPR vlaue is same with the smaller CBW when the whole RB are not cross the carriers (using the smaller CBW PRB as break point). So for the break point of 3M+10MHz, it should be 15RB. We just noticed that 50RB is used in our contribution but it was a mistake. So we are fine with Option 1. |
| Huawei | We support option 1. |

Sub topic 1-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CMCC | Option 1 |
| ZTE | Agree with the moderator’s recommended WF |
| Huawei | We support option 1. |

Sub topic 1-3

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CMCC | Option 2 is preferred and it follow the same RB configuration as single CC case. |
| ZTE | Option 2.  UL configuration of 25RB is used for for carrier wider than 5MHz for band 8 REFSEN requirements, so it should keep 25RB. |
| Huawei | We support option 2.  Since the UL configuration is restricted as 25RB for band 8 10MHz single carrier REFSENS requirement, CA case can follow this UL RB restriction. Otherwise, larger RB allocation will result REFSENS degradation. |

### CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [R4-2212304](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212304.zip) | CMCC:  For SEM, there is a typo. it should be -25dBm at offset range ± 9.8-12.85MHz.  RB configuration of REFSENSE will be updated accordingly according to 1st round agreements.  Huawei: To CMCC, yes, the requirements at offset range ± 9.8-12.85MHz for 25RB+25RB case can be modified as -25dBm. |
| At first round, it is suggested to focus on the open issues and this CR will capture all final agreements. | |

## 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 MPR | All companies support option 1.  **Tentative agreement:**  use 15PRB as stop point to differentiate MPR requirements. |
| Sub-topic #1-2 SEM | All companies support option 1.  **Tentative agreement:**  SEM requirements for 10+3MHz contiguous CA are listed as below Table 3.  **Table 3: General E-UTRA CA spectrum emission mask for Bandwidth Class B**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **ΔfOOB**  **(MHz)** | **25RB+25RB**  **(9.8MHz)** | **15RB+50RB**  **(12.85 MHz)** | **25RB+50RB**  **(14.95 MHz)** | **25RB+75RB**  **(19.8MHz)** | **50RB+50RB**  **(19.9 MHz)** | **Measurement bandwidth** | | ± 0-1 | -18 | -19 | -20 | -21 | -21 | 30 kHz | | ± 1-5 | -10 | -10 | -10 | -10 | -10 | 1 MHz | | ± 5-9.8 | -13 | -13 | -13 | -13 | -13 | 1 MHz | | ± 9.8-12.85 | -25 | -13 | -13 | -13 | -13 | 1 MHz | | ± 12.85-14.8 | -25 | -25 | -13 | -13 | -13 | 1 MHz | | ± 14.8-14.95 |  | -25 | -13 | -13 | -13 | 1 MHz | | ± 14.95-17.85 |  | -25 | -25 | -13 | -13 | 1 MHz | | ± 17.85-19.80 |  |  | -25 | -13 | -13 | 1 MHz | | ± 19.80-19.90 |  |  | -25 | -25 | -13 | 1 MHz | | ± 19.90-19.95 |  |  | -25 | -25 | -25 | 1 MHz | | ± 19.95-24.80 |  |  |  | -25 | -25 | 1 MHz | | ± 24.80-24.90 |  |  |  |  | -25 | 1 MHz | |
| Sub-topic #1-3 UL configuration for REFSENSE | All companies support option 1.  **Tentative agreement:**  only UL PCC is configured with 25 PRB for reference sensitivity |

### CRs/TPs

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

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **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)

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
|  | WF on … | YYY |  |
|  | LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-22xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| [**R4-2212304**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212304.zip) |  | Draft CR for 36.101: UE RF requirements for band 8 intra-band contiguous CA | CMCC | Revised |  |
| [**R4-2212305**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212305.zip) |  | UE RF requirements for BCS1 of band 8 | CMCC | Noted |  |
| [**R4-2212716**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212716.zip) |  | Discussion on LTE intra-band CA\_8B | ZTE Corporation | Noted |  |
| [**R4-2213164**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213164.zip) |  | Discussion on LTE intra-band CA\_8\_BCS1 | Huawei, HiSilicon | Noted |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2212304 | R4-2214950 | Draft CR for 36.101: UE RF requirements for band 8 intra-band contiguous CA | CMCC, ZTE, Huawei, HiSilicon, | To be endorsed |  |
| R4-2212305 |  | UE RF requirements for BCS1 of band 8 | CMCC | Noted |  |
| R4-2212716 |  | Discussion on LTE intra-band CA\_8B | ZTE Corporation | Noted |  |
| R4-2213164 |  | Discussion on LTE intra-band CA\_8\_BCS1 | Huawei, HiSilicon | Noted |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
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Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)