**3GPP TSG-RAN WG4 Meeting # 98-bis-e R4-210XXXX**

**Electronic Meeting, 12th – 20th April, 2021**

**Agenda item:** 8.2.1

**Source:** Moderator (Huawei, HiSilicon)

**Title:** Email discussion summary for [98-bis-e][128]NR\_RF\_FR1\_enh\_Part\_1

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion (e.g. list of treated agenda items) and provide some guidelines for email discussion if necessary.*

Thread [128] includes following topics:

1. Topic #1: UL MIMO configuration for SUL band configurations as in 8.2.2.1
2. Topic #2: intra-band contiguous UL CA for FR1 power class 2 which is for agenda 8.2.2.4
3. Topic #3: intra-band NC UL CA for FR1 power class 2 which is for agenda 8.2.2.5
4. Topic #4: Intra-band UL contiguous CA for UL MIMO which is for agenda 8.2.2.6

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

* 1st round:
* Align the MPR values of PC2 intra-band UL contiguous CA for 1PA architecture
* Discuss on different views of MPR for 2\*23dBm PA architecture, to get some initial consensus
* Decide on the RF architecture options for intra-band UL NC CA
* Agree on some other RF requirements, and signalling issue for intra-band UL NC CA
* Agree on the RF requirement items for UL CA+UL MIMO
* 2nd round: TBA
* Try to have some initial agreements for MPR of contiguous UL CA
* Reach agreement on RF architecture for intra-band UL NC CA
* Agree on the baseline on evaluating the MPR/AMPR for intra-band UL NC CA
* Try to agree on draft CR for PC3 intra-band UL CA+UL MIMO
* Get consensus on the SUL and UL switching time left issue

# Topic #1: UL MIMO configuration for SUL band configurations

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2104637 | ZTE | Draft CR:  Reason for change: The switching time between SUL and NUL cannot be 0us if enabling UL-MIMO for SUL  Summary of change: Change Note 1 in Table 5.3C-1/2/3/4 |

## 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 1-1

*Sub-topic description:*

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

**Issue 1-1: Whether 0µs switching time is feasible between SUL and NUL when SUL is MIMO enabled?**

* Proposals
  + Not feasible
* Recommended WF
  + TBA

**Issue 1-2: Note 1 of Table 5.2C-1, 5.2C-2, 5.2C-3 and 5.2C-4 in TS 38.101-1**

* Proposals
  + Change Note1 as in R4-2104637
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

Sub topic 1-1

**Issue 1-1: Whether 0µs switching time is feasible between SUL and NUL when SUL is MIMO enabled?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Sub topic 1-2

**Issue 1-2: Note 1 of Table 5.2C-1, 5.2C-2, 5.2C-3 and 5.2C-4 in TS 38.101-1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | 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:* |

### 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)

# Topic #2: PC2 intra-band contiguous UL CA

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2104655 | Nokia | 1PA architecture is assumed, MPR simulation results are provided on following configurations:   * 20MHz+20MHz 15kHz SCS and 50MHz+50MHz 15kHz SCS (class B), and * 60MHz+100MHz 30kHz SCS and 100MHz+100MHz 30kHz SCS (class C).   No IBE or EVM was evaluated. |
| R4-2104994 | LGE | **Proposal 1: Based on the MPR results, we propose following MPR Table for PC2 NR intra-band contiguous CA UE with contiguous RB allocation.**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Modulation | | MPR for bandwidth class B(dB) | | MPR for bandwidth class C(dB) | | |  | | inner | outer | inner | outer | | DFT-s-OFDM | Pi/2 BPSK | 1.0 | 3.5 | 2.5 | 7 | | QPSK | 1.0 | 3.5 | 2.5 | 7 | | 16QAM | 1.5 | 3.5 | 2.5 | 7 | | 64QAM | 3.0 | 4.0 | 5 | 7 | | 256QAM | 5.5 | 6.0 | 7 | 7.5 | | CP-OFDM | QPSK | 2.0 | 4.0 🡪4.5 | 3.5 | 8 | | 16QAM | 2.5 | 4.0 🡪4.5 | 3.5 | 8 | | 64QAM | 3.5 | 4.0 🡪4.5 | 5 | 8 | | 256QAM | 6.5 | 6.5 | 7 | 8 |   **Proposal 2. We propose MPR Table for PC2 NR intra-band contiguous CA UE with non-contiguous RB allocation.**   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Modulation | | MPR for bandwidth class B(dB) | | | MPR for bandwidth class C(dB) | | | | inner | Outer11 | Outer22 | inner | Outer11 | Outer22 | | DFT-s-OFDM | Pi/2 BPSK | 2 🡪3 | 5.5 🡪 6.5 | 11.5 🡪 13.0 | 2.5🡪3 | 6🡪 6.5 | 13 | | QPSK | 2🡪3 | 5.5 🡪 6.5 | 2.5🡪3 | 6🡪 6.5 | | 16QAM | 2.5🡪3 | 5.5 🡪 6.5 | 3 | 6🡪 6.5 | | 64QAM | 4.5 | 6 🡪 6.5 | 5 | 6🡪 6.5 | | 256QAM | 6 | 6.5 | 6.5 | 6.5 | | CP-OFDM | QPSK | 2.5 🡪3 | 6.5 🡪 7.0 | 12 🡪14.0 | 3.5 | 7 | 14 | | 16QAM | 3 | 7 | 3.5 | 7 | | 64QAM | 5 | 7 | 5 | 7 | | 256QAM | 7.5 | 7.5 | 7.5 | 7.5 | | NOTE 1: Outer 1 MPR for Pi/2 BPSK and QPSK is reduced by 2dB for aggregated allocation bandwidth > 10MHz  NOTE 2: Outer 2 MPR is reduced by 4.5dB for aggregated allocation bandwidth > 10MHz | | | | | | | | |
| R4-2106304 | Skyworks | **Proposal 1 on MPR requirements:**   * **The 2x100MHz PC2 PA+ 2LO architecture uses the same MPR than the baseline 200MHz single PC2 PA + 1LO case, is limited to bandwidth class D and should not drive higher MPR/A-MPR values.** * **The 2x200MHz PC3 PA+1LO case has a dedicated MPR table covering both TxDiv and UL MIMO operation and should be treated under the intra-band UL contiguous CA for UL MIMO objective.**   **Proposal 2 on contiguous allocations PC2 class B and C UL CA MPR:**   * **The following MPR table is adopted for PC2 contiguous allocation MPR (changes from PC3 highlighted in yellow)**  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Modulation | | MPR for bandwidth class B(dB) | | MPR for bandwidth class C(dB) | | | inner | outer | inner | outer | | DFT-s-OFDM | Pi/2 BPSK | 2.5 | 3.5 | 2.5 | 7 | | QPSK | 2.5 | 3.5 | 2.5 | 7 | | 16QAM | 2.5 | 3.5 | 2.5 | 7 | | 64QAM | 3.0 | 4.0 | 5 | 7 | | 256QAM | 5.5 | 6.0 | 7 | 7.5 | | CP-OFDM | QPSK | 3 | 5 | 3.5 | 8 | | 16QAM | 3 | 5 | 3.5 | 8 | | 64QAM | 3.5 | 5 | 5 | 8 | | 256QAM | 6.5 | 6.5 | 7 | 8 |   **Proposal 3 on contiguous allocations NS04 PC2 class C A-MPR:**   * **NS04 A-MPR = MPR for outer class C PC2** * **NS04 A-MPR = MPR+0.5dB for inner class C PC2 when RBstart ≤ 0.33\*BWchannel\_CA/0.18MHz** * **NS04 A-MPR = MPR for inner class C PC2 when RBstart > 0.33\*BWchannel\_CA/0.18MHz**   **Proposal 4 on non-contiguous allocations MPR:**   * **PC3 QPSK MPR is adopted for PC2 (1Tx) with additional back-off as in Table 6.2A.2.1-3 below (yellow highlight)**   Table 6.2A.2.1-3: non-contiguous RB allocation for Power Class 2   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Modulation | | MPR for bandwidth class B(dB) | | | MPR for bandwidth class C(dB) | | | | inner | Outer11 | Outer22 | inner | Outer11 | Outer22 | | DFT-s-OFDM | Pi/2 BPSK | 3 | 6.5 | 13 | 3 | 6.5 | 13 | | QPSK | 3 | 6.5 | 3 | 6.5 | | 16QAM | 3 | 6.5 | 3 | 6.5 | | 64QAM | 4.5 | 6.5 | 5 | 6.5 | | 256QAM | 6 | 6.5 | 6.5 | 6.5 | | CP-OFDM | QPSK | 3 | 7 | 14 | 3.5 | 7 | 14 | | 16QAM | 3 | 7 | 3.5 | 7 | | 64QAM | 5 | 7 | 5 | 7 | | 256QAM | 7.5 | 7.5 | 7.5 | 7.5 | | NOTE 1: Outer 1 MPR for Pi/2 BPSK and QPSK is reduced by 2dB for aggregated allocation bandwidth > 10MHz  NOTE 2: Outer 2 MPR is reduced by 4.5dB for aggregated allocation bandwidth > 10MHz | | | | | | | |   **Proposal 5 on non-contiguous allocations NS04 A-MPR:**   * **For channels and allocations where IM3 is within the -13dBm/MHz NS04 region, the PC2 MPR is sufficient** * **PC2 (1Tx) NS04 A-MPR for outer 1 and outer 2 with IM3 in -25dBm/MHz region is 15.5 for B<2.16** * **All SEM limited allocations will see the back-off increase for PC2 vs PC3 but ACLR limited region will stay the same thus the following AMPR curve are proposed: AMPRIM3 to meet -25dBm/MHz**   **MA = 15.5; 0 ≤ B < 2.16**  **14; 2.16 ≤ B < 3.24**  **13; 3.24 ≤ B < 5.04**  **11.5; 5.04 ≤ B < 10.08**  **10; 10.08 ≤ B < 16.56**  **8; 16.56 ≤ B < 21.96**  **6; 21.96 ≤ B**  **Proposal 6 on removal of inner for non-contiguous allocation and addition of edge contiguous allocation for Class B MPR:**   * **The 2x26dBm 2LO architecture should not drive the bandwidth class B MPR nor the baseline MPR for bandwidth class B.** * **Inner allocation should not be removed from BW Class B non-contiguous allocation** * **Edge allocation addition to BW class B contiguous allocation should be further justified and if introduced restricted to the relevant cases.** |
| R4-2107260 | Huawei, HiSilicon | ***Proposal 1: Define MPR for PC2 contiguous CA as in table 1 for contiguous RB allocation.***   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Modulation | | MPR for bandwidth class B(dB) | | MPR for bandwidth class C(dB) | | |  | | inner | outer | inner | outer | | DFT-s-OFDM | Pi/2 BPSK |  |  |  |  | |  | QPSK | 2.5 | 5.5 | 3 | 7 | |  | 16QAM | 3 | 5.5 | 3 | 7 | |  | 64QAM | 3.0 | 5.5 | 5 | 7 | |  | 256QAM | 5.5 | 6.0 | 7 | 7.5 | | CP-OFDM | QPSK | 3.0 | 6.5 | 4 | 8 | |  | 16QAM | 3.5 | 6.5 | 4 | 8 | |  | 64QAM | 3.5 | 6.5 | 5 | 8 | |  | 256QAM | TBD | TBD | TBD | TBD |   ***Proposal 2: Define MPR for PC2 contiguous CA as in table 2 for non-contiguous RB allocation.***   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Modulation | | MPR for bandwidth class B(dB) | | | MPR for bandwidth class C(dB) | | | |  | | inner | Outer11 | Outer22 | inner | Outer11 | Outer22 | | DFT-s-OFDM | Pi/2 BPSK | 3 | 7 | 13 | 3.5 | 8 | 15 | |  | QPSK | 3 | 7 |  | 3.5 | 8 |  | |  | 16QAM | 3 | 7 |  | 3.5 | 8 |  | |  | 64QAM | 4.5 | 7 |  | 5 | 8 |  | |  | 256QAM | 6 | 7 |  | 6.5 | 8 |  | | CP-OFDM | QPSK | 4 | 7.5 | 14 | 3.5 | 8.5 | 15 | |  | 16QAM | 4 | 7.5 |  | 3.5 | 8.5 |  | |  | 64QAM | 5 | 7.5 |  | 5 | 8.5 |  | |  | 256QAM | 7.5 | 7.5 |  | 7.5 | 8.5 |  | | NOTE 1: Outer 1 MPR for Pi/2 BPSK and QPSK is reduced by 2dB for aggregated allocation bandwidth > 10MHz  NOTE 2: Outer 2 MPR is reduced by 4.5dB for aggregated allocation bandwidth > 10MHz | | | | | | | |   ***Proposal 3: introduce edge RB case for contiguous allocation. MPR for edge RB is FFS.*** |
| R4-2107370 | Qualcomm | **Proposal 1: Use contiguous ULCA MPR for contiguous allocations for PC2 as shown in Table 2.2.1-1 based on 1PA reference architecture.**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Modulation | | MPR for bandwidth class B(dB) | | | MPR for bandwidth class C(dB) (IE declare2A absent) | | | inner | outer | edge | inner | outer | | DFT-s-OFDM | Pi/2 BPSK | 1.0 | 3.5 | [5.5] | 2.0 | 4.0 | | QPSK | 1.0 | 3.5 | [5.5] | 2.0 | 4.0 | | 16QAM | 1.5 | 3.5 | [5.5] | 3.0 | 4.5 | | 64QAM | 3.0 | 4.0 | [5.5] | 4.0 | 4.5 | | 256QAM | 5.5 | 6.0 | | [FFS] | [FFS] | | CP-OFDM | QPSK | 2.0 | 4.0 | [5.5] | 3.0 | 5.5 | | 16QAM | 2.5 | 4.0 | [5.5] | 3.5 | 5.5 | | 64QAM | 3.5 | 4.0 | [5.5] | 5.5 | 5.5 | | 256QAM | 6.5 | 6.5 | | [FFS] | [FFS] |   **Proposal 2: Use contiguous ULCA MPR for non-contiguous allocations for PC2 as shown in Table 2.2.2-1 regardless of PA architecture.**   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Modulation | | MPR for bandwidth class B(dB) | | | MPR for bandwidth class C(dB) (IE declare2A absent or not absent) | | | |  | inner/ Outer11 | Outer22 | inner | Outer11 | Outer22 | | DFT-s-OFDM | Pi/2 BPSK |  | 5.5 | 11.5 | 5.5 | 8.5 | 13 | | QPSK |  | 5.5 | 5.5 | | 16QAM |  | 5.5 | 5.5 | | 64QAM |  | 6 | 5.5 | | 256QAM |  | 6.5 | 6.5 | | CP-OFDM | QPSK |  | 6.5 | 12 | 5.5 | 8.5 | 14 | | 16QAM |  | 7 | 5.5 | | 64QAM |  | 7 | 5.5 | | 256QAM |  | 7.5 | 7.5 | | NOTE 1: Outer 1 MPR for Pi/2 BPSK and QPSK is reduced by 2dB for aggregated allocation bandwidth > 10MHz  NOTE 2: Outer 2 MPR is reduced by 4.5dB for aggregated allocation bandwidth > 10MHz. 256QAM MPR reduction is [FFS]. | | | | | | | | |

## 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 2-1: MPR for contiguous RB allocation

*Sub-topic description:*

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

**Issue 2-1-1: inner and outer MPR for Bandwidth class B**

*Moderator note：All proposed values are not less than the MPR defined for PC3*

* Proposals：Green coloured number seems aligned among companies

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BW class B | | Inner | | | | | | Outer | | | | | |
| Modulation | | PC3 in R16 | Skws | QC | HW | LGE | Nokia  (In figure) | PC3 in R16 | Skws | QC(no edge) | HW | LGE | Nokia  (In figure) |
| DFT | QPSK | 1 | 2.5 | 1 | 2.5 | 1 |  | 3.5 | 3.5 | 3.5 | 5.5 | 3.5 |  |
| 16QAM | 1.5 | 2.5 | 1.5 | 3 | 1.5 |  | 3.5 | 3.5 | 3.5 | 5.5 | 3.5 |  |
| 64QAM | 3 | 3 | 3 | 3 | 3 |  | 4 | 4 | 4 | 5.5 | 4 |  |
| 256QAM | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |  | 6 | 6 | 6 | 6 | 6 |  |
| CP | QPSK | 2 | 3 | 2 | 3 | 2 |  | 4 | 5 | 4 | 6.5 | 4.5 |  |
| 16QAM | 2.5 | 3 | 2.5 | 3.5 | 2.5 |  | 4 | 5 | 4 | 6.5 | 4.5 |  |
| 64QAM | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 4 | 5 | 4 | 6.5 | 4.5 |  |
| 256QAM | 6.5 | 6.5 | 6.5 | TBD | 6.5 |  | 6 | 6.5 | 6.5 | TBD | 6.5 |  |

* Recommended WF
  + TBA

**Issue 2-1-2: inner and outer MPR for Bandwidth class C**

*Moderator note：one set of proposed values is less than current PC3 MPR.*

* Proposals：

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BW class C | | Inner | | | | | | Outer | | | | | |
| Modulation | | PC3 in R16 | Skws | QC | HW | LGE | Nokia  (In figure) | PC3 in R16 | Skws | QC | HW | LGE | Nokia  (In figure) |
| DFT | QPSK | 2.5 | 2.5 | 2 | 3 | 2.5 |  | 7 | 7 | 4 | 7 | 7 |  |
| 16QAM | 2.5 | 2.5 | 3 | 3 | 2.5 |  | 7 | 7 | 4.5 | 7 | 7 |  |
| 64QAM | 5 | 5 | 4 | 5 | 5 |  | 7 | 7 | 4.5 | 7 | 7 |  |
| 256QAM | 7 | 7 | TBD | 7 | 7 |  | 7.5 | 7.5 | FFS | 7.5 | 7.5 |  |
| CP | QPSK | 3.5 | 3.5 | 3 | 4 | 3.5 |  | 8 | 8 | 5.5 | 8 | 8 |  |
| 16QAM | 3.5 | 3.5 | 3.5 | 4 | 3.5 |  | 8 | 8 | 5.5 | 8 | 8 |  |
| 64QAM | 5 | 5 | 5.5 | 5 | 5 |  | 8 | 8 | 5.5 | 8 | 8 |  |
| 256QAM | 7 | 7 | TBD | TBD | 7 |  | 8 | 8 | TBD | TBD | 8 |  |

* Recommended WF
  + TBA

**Issue 2-1-3: Edge RB**

* Proposals：
  + Option 1: Define edge RB for Bandwidth class B
  + Option 2: Define edge RB for Bandwidth class B and class C
  + Option 2: no need to define edge RB, it can be combined with outer allocation
  + Option 3: need further justified and if introduced restricted to the relevant cases
* Recommended WF
  + TBA

### Sub-topic 2-2: MPR for non-contiguous RB allocation

*Sub-topic description*

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

**Issue 2-2-1: MPR for Bandwidth class B**

*Moderator note：All proposed values are not less than the MPR defined for PC3*

* Proposals

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BW class B | | **Inner** | | | | | | **Outer1** | | | | | |
| Modulation | | PC3 | Skws | QC | HW | LGE | Nokia | PC3 | Skws | QC | HW | LGE | Nokia |
| DFT | QPSK | 2 | 3 | 5.5 | 3 | 3 |  | 5.5 | 6.5 | 5.5 | 7 | 6.5 |  |
| 16QAM | 2.5 | 3 | 5.5 | 3 | 3 |  | 5.5 | 6.5 | 5.5 | 7 | 6.5 |  |
| 64QAM | 4.5 | 4.5 | 6 | 4.5 | 4.5 |  | 6 | 6.5 | 6 | 7 | 6.5 |  |
| 256QAM | 6 | 6 | 6.5 | 6 | 6 |  | 6.5 | 6.5 | 6.5 | 7 | 6.5 |  |
| CP | QPSK | 2.5 | 3 | 6.5 | 4 | 3 |  | 6.5 | 7 | 6.5 | 7.5 | 7 |  |
| 16QAM | 3 | 3 | 7 | 4 | 3 |  | 7 | 7 | 7 | 7.5 | 7 |  |
| 64QAM | 5 | 5 | 7 | 5 | 5 |  | 7 | 7 | 7 | 7.5 | 7 |  |
| 256QAM | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |  | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |  |
| BW class B | | **Outer2** | | | | | |
| Modulation | | PC3 | Skws | QC | HW | LGE | Nokia |
| DFT | QPSK | 11.5 | 13 | 11.5 | 13 | 13 |  |
| 16QAM |  |
| 64QAM |  |
| 256QAM |  |
| CP | QPSK | 12 | 14 | 12 | 14 | 14 |  |
| 16QAM |  |
| 64QAM |  |
| 256QAM |  |

* Recommended WF
  + TBA

**Issue 2-2-2: MPR for Bandwidth class C**

* Proposals

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BW class C | | Inner | | | | | | Outer1 | | | | | |
| Modulation | | PC3 | Skws | QC | HW | LGE | Nokia | PC3 | Skws | QC | HW | LGE | Nokia |
| DFT | QPSK | 2.5 | 3 | 5.5 | 3.5 | 3 |  | 6 | 6.5 | 8.5 | 8 | 6.5 |  |
| 16QAM | 3 | 3 | 5.5 | 3.5 | 3 |  | 6 | 6.5 | 8 | 6.5 |  |
| 64QAM | 5 | 5 | 5.5 | 5 | 5 |  | 6 | 6.5 | 8 | 6.5 |  |
| 256QAM | 6.5 | 6 | 6.5 | 6.5 | 6.5 |  | 6.5 | 6.5 | 8 | 6.5 |  |
| CP | QPSK | 3.5 | 3.5 | 5.5 | 3.5 | 3.5 |  | 7 | 7 | 8.5 | 8.5 | 7 |  |
| 16QAM | 3.5 | 3.5 | 5.5 | 3.5 | 3.5 |  | 7 | 7 | 7 |  |
| 64QAM | 5 | 5 | 5.5 | 5 | 5 |  | 7 | 7 | 7 |  |
| 256QAM | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |  | 7.5 | 7.5 | 7.5 |  |
| BW class B | | Outer2 | | | | | |
| Modulation | | PC3 | Skws | QC | HW | LGE | Nokia |
| DFT | QPSK | 13 | 13 | 13 | 15 | 13 |  |
| 16QAM |  |
| 64QAM |  |
| 256QAM |  |
| CP | QPSK | 14 | 14 | 14 | 15 | 14 |  |
| 16QAM |  |
| 64QAM |  |
| 256QAM |  |

* Recommended WF
  + TBA

**Issue 2-2-3: Combine inner and outer 1 for Bandwidth class B?**

* Proposals
  + Option 1: Yes
  + Option 2: No
* Recommended WF
  + TBA, companies please provide the reason for choosing the option.

### Sub-topic 2-3: MPR for 2\*23dBm 200MHz PA

**Issue 2-3-1: MPR for 2\*23dBm 200MHz PA and 1LO**

* Proposals
  + Option 1: Define the MPR under intra-band UL contiguous CA for UL MIMO objective, and a dedicated MPR table is defined
  + Option 2: BW class C MPR is independent of PA architecture.
* Recommended WF
  + TBA

**Issue 2-3-2: MPR for 2\*23dBm 100MHz PA and 2LO**

* Proposals
  + Option 1: The 2x100MHz PC2 PA+ 2LO architecture uses the same MPR than the baseline 200MHz single PC2 PA + 1LO case, is limited to bandwidth class D and should not drive higher MPR/A-MPR values.
* Recommended WF
  + TBA

### Sub-topic 2-4: AMPR for NS\_04

**Issue 2-4-1: Contiguous allocation**

* Proposals
  + From R4- R4-2106304:
* **NS04 A-MPR = MPR for outer class C PC2**
* **NS04 A-MPR = MPR+0.5dB for inner class C PC2 when RBstart ≤ 0.33\*BWchannel\_CA/0.18MHz**
* **NS04 A-MPR = MPR for inner class C PC2 when RBstart > 0.33\*BWchannel\_CA/0.18MHz**
* Recommended WF
  + TBA

**Issue 2-4-2: Non-Contiguous allocation**

* Proposals
  + From R4- R4-2106304:
* **For channels and allocations where IM3 is within the -13dBm/MHz NS04 region, the PC2 MPR is sufficient**
* **PC2 (1Tx) NS04 A-MPR for outer 1 and outer 2 with IM3 in -25dBm/MHz region is 15.5 for B<2.16**
* **All SEM limited allocations will see the back-off increase for PC2 vs PC3 but ACLR limited region will stay the same thus the following AMPR curve are proposed: AMPRIM3 to meet -25dBm/MHz**

**MA = 15.5; 0 ≤ B < 2.16**

**14; 2.16 ≤ B < 3.24**

**13; 3.24 ≤ B < 5.04**

**11.5; 5.04 ≤ B < 10.08**

**10; 10.08 ≤ B < 16.56**

**8; 16.56 ≤ B < 21.96**

**6; 21.96 ≤ B**

* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

Sub-topic 2-1

**Issue 2-1-1: inner and outer MPR for Bandwidth class B**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | LGE can acceptable for the revised MPR table with green color by Moderator |

**Issue 2-1-2: inner and outer MPR for Bandwidth class C**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | The worst MPR value can be define the MPR requirement among interested companies’ results |

**Issue 2-1-3: Edge RB**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Prefer option 2 or option 3. |

Sub-topic 2-2

**Issue 2-2-1: MPR for Bandwidth class B**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | LGE can acceptable for the revised MPR table with green color by Moderator. Other MPR value can be consider with worst MPR values among interested companies’ results |

**Issue 2-2-2: MPR for Bandwidth class C**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | LGE can acceptable for the revised MPR table with green color by Moderator. Other MPR value can be consider with worst MPR values among interested companies’ results |

**Issue 2-2-3: Combine inner and outer 1 for Bandwidth class B?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Prefer option 2 to keep the existing PC3 MPR table format. |

Sub-topic 2-3

**Issue 2-3-1: MPR for 2\*23dBm 200MHz PA and 1LO**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Prefer option 2. Need more discussion to decide more detail RF architecture |

**Issue 2-3-2: MPR for 2\*23dBm 100MHz PA and 2LO**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Sub-topic 2-4

**Issue 2-4-1: Contiguous allocation**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Need more A-MPR results from companies |

**Issue 2-4-2: Non-Contiguous allocation**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Need more A-MPR results from companies |

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | 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:* |

### 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)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #3: PC2 intra-band NC UL CA

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2104437 | Nokia | **Proposal: In case RAN4 develops PC2 intra band non-contiguous CA requirements, challenges to develop MPR requirements and re-consideration of exception for general spurious emission/SEM should be considered.** |
| R4-2104819 | Skyworks | **Proposal on architecture:**   * **Baseline architecture #1 (2x26dBm x2LO) is used to derive MPR/A-MPR values without accounting for the issues of other architectures and can be started immediately.** * **Architecture #3 (2x23dBm 1LO + TxDiv/UL MIMO) requires additional MPR, further study to handle exceptions and is better pursued in the new WI addressing UL MIMO and TxDiv issues as done for the contiguous UL CA + UL MIMO case. It anyhow deserves a separate MPR/A-MPR specification than baseline.** * **Architecture #2 (1x26dBm 1LO) has similar issues than #3 with slightly lower back-off required and can be covered together with #3 for the MPR table.** * **Architecture #4 (26dBm+23dBm 2LO) has significant drawbacks in terms of switching time and MPR for questionable benefits.it is proposed not to pursue this option.** |
| R4-2106366 | ZTE | Proposal 1: Use the single CC parameter for the capability of MaxUplinkDutyCycle for PC2 intra-band contiguous CA.  Proposal 2: Pcmax: re-use Pcmax from PC3 intra-band NC UL CA:  - Changes to 38.101-1, if any, are FFS  Proposal 3:For PC2 intra-band UL non-contiguous CA with 2PA architecture, the emission requirement is defined as the sum from both UE transmit antenna connectors. |
| R4-2106542 | Xiaomi | Proposal 1: for high power UE TDD intra-band contiguous and non-contiguous CA cases, it is proposed no dedicated signaling is introduced and the reporting value maxUplinkDutyCycle-PC2-FR1 signaling for single carrier can be reused.  Proposal 2: if proposal 1 is agreeable, the LS as attached in the annex is needed to inform RAN2 above agreements. |
| R4-2107261 | Huawei, HiSilicon | Observation 1: #2 and #3 architecture can support UL NC CA, and #3 can support UL MIMO for NC CA in nature. Band limitation of <3.3GHz can be removed.  Proposal 1: for #2 and #3 architecture, reuse the in-gap exception requirement defined for PC3 intra-band UL NC CA.  Observation 2: #4 architecture can support intra-band UL NC CA, it may need Tx swap time when transmission scheduling are switching among 3 cases in fig 1. The switching time can be 0us or 35us or 140us.  Proposal 2: All the 4 architectures should be kept in the WI study, RAN4 should evaluate MPR requirements based on all architectures, and check whether 1 set of MPR can be used for all architectures. |
| R4-2107282 | Qualcomm | Proposal 1: Do not consider 2x23 dBm case for NC UL CA PC2  Proposal 2: 1x26 dBm case for NC UL CA is not considered in MPR evaluation until carrier leakage handling is clarified. |
| R4-2105088 | Ericsson | <this contribution relates to new solution for preventing scell dropping>  **Observation 1: the power prioritization rules in 38.213 imply that the power control for UL CA is similar to that of EN-DC for which the MCG is prioritized subject to a total EN-DC power, the PCMAX for EN-DC. For UL CA, the total SCell power would be capped at 23 dBm and the SCell(s) reduced or dropped for a concurrent PCell transmissions at 23 dBm that is of equal or higher priority. This affects the actual power reductions (back-off) used on the UL serving cells and an MPR specification based on “equal PSD”.**  **Observation 2: preventing SCell power reductions and “equal PSD” in conformance tests can be achieved by specifying limits relative to the configured power for the serving cells. This would account for the *actual* power back-off (up to MPR and same for all serving cells) that is applied by the UE. The UE-specific limits are configured by RRC and could be activated and deactivated by a MAC-CE.** |

## 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 3-1: Architecture options handling

*Sub-topic description:*

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

**Issue 3-1-1: For 1x26dBm PA + 1LO with 200MHz BW and 2x23dBm PA + 1LO with 200MHz BW, how to handle in-gap requirement when LO or image fall inside?**

* Proposals
  + Option 1: Reuse in-gap exception under some conditions(e.g. Sync) as defined for PC3
  + Option 2: use MPR to meet in-gap emission requirement
  + Option 3: other
* Recommended WF
  + TBA

**Issue 3-1-2: For 1x23dBm + 1x26dBm PA + 2LO with 100MHz BW, how to handle the swap time between PAs?**

* Proposals
  + Option 1: define new swap time specifically for this architecture
  + Option 2: swap time is 0us
  + Option 3: 0us or 35us or 140us
* Recommended WF
  + TBA

**Issue 3-1-3: architecture option(s) for intra-band UL NC CA: architecture No. is as in the table**

|  |  |
| --- | --- |
| Arch | description |
| #1 | 2x26dBm PA + 2LO  with 100MHz BW |
| #2 | 1x26dBm PA + 1LO  with 200MHz BW |
| #3 | 2x23dBm PA + 1LO  with 200MHz BW |
| #4 | 1x23dBm+1x26dBm + 2LO  with 100MHz BW |

* Proposals
  + Option 1: All 4 architectures need to be studied on RF requirements
  + Option 2: #1 and #4 are considered
  + Option 3: #1,#2 and #3
  + Option 4: Other
* Recommended WF
  + TBA

### Sub-topic 3-2: MPR

**Issue 3-2-1: MPR comparison among architecture options**

<Recommend discussion on the analysis provided in R4-2104819>

* Proposals
* Compared with MPR based on architecture #1, Architecture #3 (2x23dBm 1LO + TxDiv/UL MIMO) requires additional MPR
* Architecture #2 (1x26dBm 1LO) has similar issues than #3 with slightly lower back-off required
* Compared with MPR based on architecture #1, Architecture #4 requires for higher MPR
* Recommended WF
  + TBA

**Issue 3-2-2: baseline architecture to derive MPR/AMPR**

* Proposals
  + Option 1:
* Baseline architecture #1 (2x26dBm x2LO) is used to derive MPR/A-MPR values
* Architecture #3 (2x23dBm 1LO + TxDiv/UL MIMO) is better pursued in the new objective addressing UL MIMO and TxDiv issues as done for the contiguous UL CA + UL MIMO case.
  + Option 2: All architectures need to be considered on MPR/AMPR, and check whether 1 set of MPR can be used for all architectures.
  + Option 3: Other
* Recommended WF
  + TBA

### Sub-topic 3-3: MaxUplinkDutyCycle Signalling

**Issue 3-3-1: MaxUplinkDutyCycle Signalling for intra-band UL NC CA**

* Proposals
  + No dedicated signaling is introduced, the reporting value of maxUplinkDutyCycle-PC2-FR1 signaling for single carrier can be reused.
* Recommended WF
  + TBA

**Issue 3-3-2: LS**

* Proposals
  + Option 1: send the LS with contents in R4-2106542 annex
  + Option 2: send the LS after some revision of R4-2106542 annex
  + Option 3: other
* Recommended WF
  + TBA

### Sub-topic 3-4: RF requirements other than MPR

**Issue 3-4-1: Pcmax**

* Proposals
  + re-use Pcmax from PC3 intra-band NC UL CA:

- Changes to 38.101-1, if any, are FFS

* Recommended WF
  + TBA

**Issue 3-4-2: emission requirement**

* Proposals
  + For PC2 intra-band UL non-contiguous CA with 2PA architecture, the emission requirement is defined as the sum from both UE transmit antenna connectors.
* Recommended WF
  + TBA

### Sub-topic 3-5: other

**Issue 3-5-1: Are discussions of R4-2105088 in the current scope of Rel-17 FR1 RF enh WID?**

* Proposals
  + Option 1: Yes
  + Option 2: No
* Recommended WF
  + TBA

**Issue 3-5-2: If ‘no’ of issue 3-5-1, do we need to add “preventing scell power dropping in conformance test” into the WID?**

* Proposals
  + Option 1: Yes
  + Option 2: No
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

Sub topic 3-1

**Issue 3-1-1: For 1x26dBm PA + 1LO with 200MHz BW and 2x23dBm PA + 1LO with 200MHz BW, how to handle in-gap requirement when LO or image fall inside?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Prefer option 1 to reuse same approach in PC3 |

**Issue 3-1-2: For 1x23dBm + 1x26dBm PA + 2LO with 100MHz BW, how to handle the swap time between PAs?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Prefer option 3 for switching time 0us/35us/140us |

**Issue 3-1-3: architecture option(s) for intra-band UL NC CA: architecture No. is as in the table**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Prefer option 1 to keep all 4 candidate RF architecture for MPR/A-MPR requirements |

Sub topic 3-2

**Issue 3-2-1: MPR comparison among architecture options**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | LGE acceptable Moderator proposal for this issue |

**Issue 3-2-2: baseline architecture to derive MPR/AMPR**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Prefer option 2 to consider all RF architectures |

Sub topic 3-3

**Issue 3-3-1: MaxUplinkDutyCycle Signalling for intra-band UL NC CA**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Acceptable moderator proposal |

**Issue 3-3-2: LS**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Sub topic 3-4

**Issue 3-4-1: Pcmax**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Acceptable moderator proposal |

**Issue 3-4-2: emission requirement**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Acceptable moderator proposal |

Sub topic 3-5

**Issue 3-5-1: Are discussions of R4-2105088 in the current scope of Rel-17 FR1 RF enh WID?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

**Issue 3-5-2: If ‘no’ of issue 3-5-1, do we need to add “preventing scell power dropping in conformance test” into the WID?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | 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:* |

### 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)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #4: Intra-band UL contiguous CA for UL MIMO

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2104956 | vivo | **Proposal 1:** Extend most of the requirements of UL-MIMO + Intra-band C CA based on current configuration and basic requirements.  **Proposal 2**: For MPR and Transmit modulation quality requirements, special attention and some study is needed for UL-MIMO + Intra-band C CA.  **Proposal 3**: The detailed case-by-case requirements analysis in Table 1be used as a basis for the requirments definition.  Table 1. Tx Characteristics Background and analysis for UL-MIMO + Intra-band UL C CA   |  |  |  |  | | --- | --- | --- | --- | | **Tx characteristics** | **UL-MIMO** | **Intra-band UL C CA** | **UL-MIMO +**  **Intra-band UL C CA** | | UE maximum output power | 6.2D.1  Per-UE (Sum of each Tx) | 6.2A.1.1  Per-UE (Sum of each CC) | Per-UE  (Sum of all Tx and CC) | | UE maximum output power reduction | 6.2D.2  Per-UE  [Requirements under discussion] | 6.2A.2.1  Per-UE | [FFS, Per-UE but requirements need study] | | UE addition maximum output power reduction | 6.2D.3  Per-UE | 6.2A.3.1.1  Per-UE | Per-UE | | Configured transmitted power | 6.2D.4  Per-UE, defined for one CC | 6.2A.4.1.1  Per-UE | Per-UE | | Minimum output power | 6.3D.1  Per-UE | 6.3A.1.1  Per-carrier | Per-carrier, sum of 2Tx | | Transmit OFF power | 6.3D.2  Per connector | 6.3A.2.1  Per-carrier | Per-carrier per connector | | Transmit ON/OFF time mask | 6.3D.3  Per connector | 6.3A.3.1  Per-carrier | Per-carrier per connector | | Power control | 6.3D.4  Per-UE | 6.3A.4.1  Per-carrier | Per-carrier, sum of 2Tx | | Frequency error | 6.4D.1  Per connector | 6.4A.1.1  Per-carrier | Per-carrier per connector | | Transmit modulation quality (EVM, Carrier leakage, IBE and EVM spectrum flatness) | 6.4D.2  [Per antenna connector. Under discussion] | 6.4A.2.1  Both active and RB allocation in one carrier | [FFS] | | Time alignment error | 6.4D.3  Difference between 2Tx | N/A | [N/A] | | Requirements for coherent | 6.4D.4  Difference between 2Tx | N/A | [N/A] | | Occupied bandwidth | 6.5D.1  Per-UE | 6.5A.1.1a  Per-UE | Per-UE | | Out of band emission | 6.5D.2  Per-UE | 6.5A.2.2.1  Per-UE | Per-UE | | Spurious emission | 6.5D.3  Per-UE | 6.5A.3  Per-UE | Per-UE | | Transmit intermodulation | 6.5D.4  Per connector | 6.5A.4.2.1  Per-UE | Per connector, 2carreirs active | |
| R4-2106562 | OPPO | ***Observation 1: For UL CA+UL MIMO, the potential UE architecture is two PAs with each PA supporting the aggregated CBW.***  ***Proposal 1: Take the two PAs architecture with each PA supporting the aggregated CBW as baseline to define requirements.***  ***Observation 2: When UE indicates it supports UL CA+UL MIMO feature, the supported aggregated CBW shall also be clear to NW.***  ***Proposal 2: Consider reporting the supported aggregated CBW within UL CA+UL MIMO feature to NW.***  ***Observation 3: Requirements for UL MIMO only considered 100MHz, requirements for UL CA only considered single layer transmission, both may not be applicable directly to UL CA+UL MIMO.*** |
| R4-2107274 | Huawei, HiSilicon | **Proposal 1: For intra-band contiguous UL CA with MIMO, RF requirements with following configuration is defined:**   * **2 layer configuration with codebook TPMI index 0.** * **1 layer 2 port configuration with full power transmission: mode 0/1/2** * **Tx diversity**   **Proposal 2: For power class3, intra-band UL contiguous CA in MIMO** **RF requirements are defined as in [1]. ->** draft CR R4-2107278  **Proposal 3: RAN4 Evaluate PC2 intra-band UL contiguous CA in MIMO from the start of PC3 MPR requirement.** |
| R4-2107278 | Huawei, HiSilicon | Provide draft CR for power class 3 intra-band UL contiguous CA for UL MIMO |

## 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 4-1: RF requirements framework

*Sub-topic description:*

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

**Issue 4-1-1: Configurations for CA+UL MIMO requirements**

* Proposals
  + RF requirements with following configuration is defined:
* 2 layer configuration with codebook TPMI index 0.
* 1 layer 2 port configuration with full power transmission: mode 0/1/2
* Tx diversity
* Recommended WF
  + TBA

**Issue 4-1-2: RF requirement items to be defined for CA+UL MIMO requirements**

* Proposals

|  |  |
| --- | --- |
| **Tx characteristics** | **UL-MIMO +**  **Intra-band UL C CA** |
| UE maximum output power | Per-UE  (Sum of all Tx and CC) |
| UE maximum output power reduction | [FFS, Per-UE but requirements need study] |
| UE addition maximum output power reduction | Per-UE |
| Configured transmitted power | Per-UE |
| Minimum output power | Per-carrier, sum of 2Tx |
| Transmit OFF power | Per-carrier per connector |
| Transmit ON/OFF time mask | Per-carrier per connector |
| Power control | Per-carrier, sum of 2Tx |
| Frequency error | Per-carrier per connector |
| Transmit modulation quality (EVM, Carrier leakage, IBE and EVM spectrum flatness) | [FFS] |
| Occupied bandwidth | Per-UE |
| Out of band emission | Per-UE |
| Spurious emission | Per-UE |
| Transmit intermodulation | Per connector, 2carreirs active |

* Recommended WF
  + TBA

**Issue 4-1-3: Baseline RF architecture**

* Proposals
  + Two PAs architecture with each PA supporting the aggregated CBW
* Recommended WF
  + TBA

### Sub-topic 4-2: MPR

**Issue 4-2: MPR**

* Proposals
  + PC3 intra-band UL contiguous CA in MIMO reuse the MPR defined for PC3 contiguous CA
  + For PC2 intra-band UL contiguous CA in MIMO, Evaluate value of delta MPR needed from the start of PC3 MPR requirement.
* Recommended WF
  + TBA

### Sub-topic 4-3 signalling

*Sub-topic description*

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

**Issue 4-3: Signalling**

* Proposals
* Report the supported aggregated CBW within UL CA+UL MIMO feature to NW(R4-2106562)
* Recommended WF
  + TBA

### Sub-topic 4-4 Draft CR

*Sub-topic description*

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

**Issue 4-4: Draft CR for PC3 intra-band UL contiguous CA for UL MIMO**

* Proposals
* Option 1: Endorse draft CR R4-2107278
* Option 2: Endorse the draft CR after revision
* Option 3: other
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

Sub topic 4-1

**Issue 4-1-1: Configurations for CA+UL MIMO requirements**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

**Issue 4-1-2: RF requirement items to be defined for CA+UL MIMO requirements**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

**Issue 4-1-3: Baseline RF architecture**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Sub topic 4-2

**Issue 4-2: MPR**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Sub topic 4-3

**Issue 4-3: Signalling**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Sub topic 4-4

**Issue 4-4: Draft CR for PC3 intra-band UL contiguous CA for UL MIMO**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | 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:* |

### 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)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Recommendations for Tdocs

## 1st round

**New tdocs**

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

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

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

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| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, 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