**3GPP TSG-RAN WG4 Meeting # 109 R4-2318116**

**Chicago, US, November 13 – 17, 2023**

**Agenda item:** 7.18,7.19

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

**Title:** Topic summary for [109][110] HPUE\_Basket\_Intra-CA\_TDD

**Document for:** Information

# Introduction

*Thread [110] includes following HPUE topics:*

*1. Topic #1: Issues for HPUE\_NR\_FR1\_TDD\_intra\_CA\_R18 (Agenda 7.18)*

*2. Topic #2: Issues for HPUE\_NR\_FR1\_TDD\_R18 (Agenda 7.19)*

# Topic #1: HPUE\_NR\_FR1\_TDD\_ intra\_CA\_R18 (7.18)

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2320407**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320407.zip) | Huawei,  HiSilicon | WID on HPUE\_NR\_FR1\_TDD\_intra\_CA\_R18 |

## Open issues summary

**Issue 1-2-1: WID revised (move** [**R4-2320407**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320407.zip) **from 7.19 to 7.18)**

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| [**R4-2320407**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320407.zip) | Huawei,  HiSilicon | Title: WID on HPUE\_NR\_FR1\_TDD\_intra\_CA\_R18  ***Summary of change:*** Inclusion of requests from CMCC |

* **Recommended WF:**
  + **Endorsed**

# Topic #2: HPUE\_NR\_FR1\_TDD\_R18 (7.19)

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2318914**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318914.zip) | CMCC | CR for TS 38.101-1 to introduce indication of modified MPR behaviour for band n34 and n40 |
| **R4-2318751** | Apple | On A-MPR for NS\_50 with PC1.5  **Observation**: Similar to 50MHz channel no additional RB allocation regions are required to cover the increase power back-off need. The A-MPR table proposed in [5] seems to be sufficient.  **Proposal**: Consider the proposals for regions and A-MPR from [5] when specifying the PC1.5 requirements. |

## Open issues summary

*PC 1.5 for n34 and n40 was agreed to be introduced in R18, and the remaining band n39 has been discussed and postponed in many meetings due to the lack of complete measurement results on PC1.5 A-MPR. There are three main issues including whether A-MPR is required for 5 MHz CBW for PC1.5, A-MPR region and values. R4-2219981,* *R4-2305505 and R4-2308744 provided measurement results previously.*

*In RAN4#108, No PC1.5 A-MPR is required for CBW=5MHz. Apple provides simulations results based on 2xPC2 without considering RIMD in R4-2311248, which it was agreed that* “*Use the numbers as candidate values and further check them in next meeting”.*

*In RAN4#108bis, Apple provided technical information and documentation in R4-2315376 on how the proposals were derived and the same conclusions as initially provided in RAN4#108. It is a good foundation for future meeting.*

*In RAN4#109, Apple further adds results for 35MHz in R4-2318751. From moderator’s perspective. This is a great addition to PC1.5 n39. Due to the time limit of R18, moderator combine R4-2315376 and R4-2318751 as one package and try to drive the discussion to agreement.*

**Issue 2-2-1: NS\_50 A-MPR for band n39**

* Proposal: Approve A-MPR regions and values listed below for NS\_50.

Note: 35 MHz in Table 1 same as PC2 is from R4-2318751and the rest is from R4-2315376

* Table 1: A-MPR regions for NS\_50 (Power Class 1.5)

|  |  |  |  |
| --- | --- | --- | --- |
| Channel Bandwidth (MHz) | RBstart\*12\*SCS (MHz) | LCRB\*12\*SCS (MHz) | A-MPR |
| 10 MHz | ≤ 1.44 | < 1.44 | A5 |
| ≤ 1.8 | ≥ 2.7+2\* RBstart\*12\*SCS | A4 |
| >1.8 | ≥ 8.1- RBstart\*12\*SCS | A4 |
| 15 MHz | ≤ 2.88 | < 2.7 | A5 |
| ≤ 3.24 | ≥ 2.7+2\* RBstart\*12\*SCS | A3 |
| >3.24 | ≥ 12.42- RBstart\*12\*SCS | A4 |
|  | < 12.42- LCRB\*12\*SCS | ≥ 2.7  < 2.7+2\* RBstart\*12\*SCS  ≥ 2\* RBstart\*12\*SCS-1.08 | A6 |
| 20 MHz | ≤ 4.32 | < 3.6 | A5 |
| ≤ 4.5 | ≥ 3.6+2\* RBstart\*12\*SCS | A3 |
| >4.5 | ≥ 17.1- RBstart\*12\*SCS | A4 |
|  | < 17.1- LCRB\*12\*SCS | ≥ 3.6  < 3.6+2\* RBstart\*12\*SCS  ≥ 2\* RBstart\*12\*SCS-3.6 | A6 |
| 25 MHz | ≤ LCRB\*12\*SCS – 5 | > 5 | A2 |
| ≤ 6.48 | ≤ 1.44 | A5 |
| > 8.28 | > max (21.6 – RBstart\*12\*SCS, 0), <RBstart\*12\*SCS+5 | A4 |
| >1.8, ≤6.48 | > 1.44, ≤ 3.6 | A6 |
| > LCRB \*12\*SCS – 5, ≤ 1.8 | > 1.44 | A4 |
|  | > 1.8, ≤ 6.48  > LCRB \*12\*SCS -5 | > 3.6 | A6 |
| 30 MHz | ≤ LCRB\*12\*SCS – 5 | >5 | A2 |
| ≤ 7.56 | ≤ 1.44 | A5 |
| >1.8, ≤7.56 | > 1.44, ≤ 3.6 | A6 |
| ≤ 1.8 | >1.44, <RBstart\*12\*SCS+5 | A4 |
| > 10.8 | > max (26.64 – RBstart\*12\*SCS, 0), <RBstart\*12\*SCS+5 | A4 |
|  | > 1.8, ≤ 7.56  > LCRB \*12\*SCS -5 | > 3.6 | A6 |
| 35 MHz | ≤ 1.62 | > 0 | A1 |
| > 1.62, ≤ 9.36 | ≤ 9.0 | A3 |
| > 1.62, ≤ 13.68 | > 9.0 | A8 |
| > 13.68, ≤ 30.6 | > max (29.7 –RBstart \*12\*SCS, 0) | A4 |
| > 30.6 | > 0 | A9 |
| 40 MHz | ≤ 4.32 | > 0 | A1 |
| > 4.32 | > RBstart\*12\*SCS + 11.88 | A8 |
| > 4.32, ≤ 12.96 | ≤ 10.8 | A3 |
| > 4.32, ≤ 18 | > 10.8, <= RBstart\*12\*SCS + 11.88 | A7 |
| > 18, ≤ 31.68 | > max (31.68 – RBstart\*12\*SCS, 0) | A4 |
| > 31.68 | > 0 | A9 |
| NOTE 1: The A-MPR values are specified in Table 6.2.3.19-4. | | | |

Table 3: A-MPR for NS\_50 (Power Class 1.5)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Modulation/Waveform | | A1 (dB) | A2 (dB) | A3 (dB) | A4 (dB) | A5 (dB) | A6 (dB) | A7 (dB) | A8 (dB) | A9 (dB) |
| Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM | Pi/2 BPSK | ≤ 11.5+3 | ≤4.5 + 3 | ≤ 4 + 2.5 | ≤ 2.5 + 2.5 | ≤ 4 + 1 | ≤ 1 + 2.5 | ≤ 3.5 + 2 | ≤ 10+2.5 | ≤ 8+2.5 |
| QPSK | ≤ 11.5+3 | ≤ 5.5 + 3 | ≤ 4 + 2.5 | ≤ 2.5 + 2.5 | ≤ 4 + 1 | ≤ 1 + 2.5 | ≤ 3.5 + 2 | ≤ 10+2.5 | ≤ 8+2.5 |
| 16 QAM | ≤ 11.5+3 | ≤ 5.5 + 3 | ≤ 4 + 2.5 | ≤ 2.5 + 2.5 | ≤ 4 + 1 | ≤ 1.5 + 2.5 | ≤ 3.5 + 2 | ≤ 10+2.5 | ≤ 8+2.5 |
| 64 QAM | ≤ 11.5+3 | ≤ 5.5 + 3 | ≤ 4 + 2.5 | ≤ 5.0 | ≤ 4 + 1 |  | ≤ 5.5 | ≤ 10+2.5 | ≤ 8+2.5 |
| 256 QAM | ≤ 11.5+3 | ≤ 5.5 + 3 |  |  |  |  |  | ≤ 10+2.5 | ≤ 8+2.5 |
| CP-OFDM | QPSK | ≤ 12.5+3 | ≤ 7 + 3 | ≤ 5.5 + 3 | ≤ 4 + 3 | ≤ 4 + 2.5 | ≤ 2 + 3 | ≤ 5 + 2 | ≤ 11+2.5 | ≤ 8+2.5 |
| 16 QAM | ≤ 12.5+3 | ≤ 7 + 3 | ≤ 5.5 + 3 | ≤ 4 + 3 | ≤ 4 + 2.5 | ≤ 5 | ≤ 5 + 2 | ≤ 11+2.5 | ≤ 8+2.5 |
| 64 QAM | ≤ 12.5+3 | ≤ 7 + 3 | ≤ 5.5 + 3 | ≤ 4 + 3 | ≤ 4 + 2.5 |  | ≤ 5 + 2 | ≤ 11+2.5 | ≤ 8+2.5 |
| 256 QAM | ≤ 12.5+3 | ≤ 7 + 3 |  |  |  |  |  | ≤ 11+2.5 | ≤ 8+2.5 |

* **Recommended WF:**
  + **Agree this proposal.**

Huawei: split to inner and outer and have different values for the values highlighted by red.

Apple: We are fine to have A10 and define the A-MPR accordingly.

Agreement:

* Use the table 1 and table 2 as the baseline
  + Further split the requirements for A6 highlighted by red to inner and outer regions
    - FFS to introduce A10

**Issue 2-2-2: CR**

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| --- | --- | --- |
| [**R4-2318914**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318914.zip) | CMCC | Title: Draft CR for TS 38.101-1 to introduce indication of modified MPR behaviour for band n34 and n40  ***Summary of change:*** To add the indication of modified MPR behaviour for band n34 and n40. |

* **Recommended WF:**
  + **Endorsed**