**3GPP TSG-WG4 Meeting #116bis *rev1\_R4-2514498***

**Prague, Czech Republic, 13 - 17 Oct 2025**

**Title:** TP for PRD 01 to introduce HPUE MSD requirements using look-up tables

**Agenda Item:** 5.2.6

**Source:** Skyworks Solutions, Inc., Qualcomm France, Nokia, Samsung, Murata Manufacturing Co Ltd, T-Mobile USA, ZTE, Apple, [Oppo, MediaTek, Vivo, Huawei]

**Document for:** Approval

1. **Introduction**

RAN4 accomplished a major milestone at meeting #116 by endorsing the simplification of HPUE inter-band CA MSD requirements using Look-Up Tables (LUTs) [1]. At this meeting, it is expected that these simplified requirements will be proposed for porting into TS 38.101-3 for inter-band HPUE EN-DC combinations, and in TS 38.101-1 for HPUE SUL configurations of SUL with downlink CA.

This text proposal (TP) updates the RAN4 PRD guidelines on MSD to reflect these new requirements. Two options are considered to capture these changes:

* Option 1:
	+ Capture the HPUE MSD guidelines due to 1UL band 1UL CC for 2DL band CA with a new section added to sub-clause 5.5.2.1.1.1.
	+ Capture the HPUE MSD guidelines due to 2UL band 1UL CC per band for 2DL band CA or 3DL band CA, with a new section added to sub-clause 5.5.2.2.1.1 or 5.5.2.1.2.1.
* Option 2: Capture both 1UL band and 2UL band HPUE MSD guidelines into a new sub-clause 5.5.2.3

We propose adopting option 2. It has the benefit of capturing all HPUE MSD simplification guidelines into a single clause, making it easier to access for those outsider of RAN4.

**References**

1. R4-2511752, [NR\_ENDC\_RF\_Ph4-Core] Draft CR to 38101-1-j20 on introducing the HPUE MSD requirements simplification, 3GPP TSG-RAN WG4 Meeting # 116, Bengaluru, India, Skyworks Solutions, Inc., , T-Mobile USA, ZTE, Oppo, Samsung, Murata Manufacturing Co Ltd., MediaTek, Vivo, Huawei, Apple, Qualcomm France.
2. Permanent Reference Document (PRD); Rules, guidelines and ways of working for introduction of band combinations in NR and LTE, v0.4.0

Text Proposal

**----- Start of TP -----**

5.5.2 Inter-band CA/DC

**----- Unchanged sections are skipped -----**

5.5.2.3 Guidelines on HPUE MSD Requirements Using Look-Up Tables

For MSD due to UL harmonics, harmonic mixing, or cross-band isolation interference, the 1UL band 1UL CC HPUE MSD requirements for inter-band two-band DL NR-CA, EN-DC, or SUL with DL CA can be calculated according to the eligibility criteria and the summary requirements of Table 5.5.2.3-1.

**Table 5.5.2.3-1: 1UL Band 1UL CC HPUE MSD Requirements Using Look-Up Tables for Inter-Band Two-Band DL NR CA, EN DC and SUL with Downlink CA.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Case / Eligibility / MSD requirements** | **NR-CA****TS 38.101-1** | **EN-DC****TS 38.101-3** | **SUL****TS 38.101-1** |
| **Case 1** | **Eligibility** | 1. **The PC3 MSD requirement is specified** in the following respective sub-clauses, ***and,***
2. **The PC2 and/or the PC1.5 MSD requirements are not specified**.
 | 7.3A.4, or 7.3A.6 | 7.3B.2.3.1, or 7.3B.2.3.2, or 7.3B.2.3.4 | 7.3C.2 |
| A valid 1UL PC21Tx, or PC22Tx, or PC1.52Tx configuration is specified in the following respective sub-clauses. | 5.5A.3.1 | 6.2B.1.3 or 6.2H.1.3 | 6.2.1 |
| Exclusion criteria: the following UL bands are not eligible. | n46, n96, n102 | B46, n46, n96, n102 | n/a |
| **HPUE MSD requirement****using Look-Up Tables** | HPUE MSD requirements | **PCx MSD = PC3 MSD + ΔMSD1** |
| Applicable HPUE power class “PCx” | PC21Tx, PC22Tx, or PC1.52Tx |
| ΔMSD requirements specified in the following respective Tables. | Table 7.3A.2.3.1-1 output columns denoted “ΔMSDmax 3, 6, 9”. | Table 7.3B.2.3.0.1-1 output columns denoted “ΔMSDmax 3, 6, 9”.  | Table 7.3C.2.1- output columns denoted “ΔMSDmax 3, 6, 9”.  |
| Correspondence between the specified ΔMSDmax and the source of interference and PCx is specified in the respective following tables. | Table 7.3A.2.3.1-2. | Table 7.3B.2.3.0.1-2. | Table 7.3C.2.1-2 |
| **Case 2** | **Eligibility** | 1. **The PC2 MSD requirement is specified** in the following respective sub-clauses, ***and,***
2. **The PC3 and the PC1.5 MSD requirements are not specified**.
 | 7.3A.4, or 7.3A.6 | 7.3B.2.3.1, or 7.3B.2.3.2, or 7.3B.2.3.4 | 7.3C.2 |
| A valid 1UL PC1.52Tx configuration is specified in the following respective sub-clauses. | 5.5A.3.1 | 6.2B.1.3 or 6.2H.1.3 | 6.2.1 |
| Exclusion criteria: the following UL bands are not eligible. | n46, n96, n102 | B46, n46, n96, n102 | n/a |
| **HPUE MSD requirement****using Look-Up Tables** | HPUE MSD requirements | **PC1.52Tx MSD = PC21Tx MSD + ΔMSD2** |
| ΔMSD requirements specified in the following respective Tables and the input column uses the specified “PC21Tx MSD” instead of “PC3 MSD”. | Table 7.3A.2.3.1-1 with output column denoted “ΔMSDmax 6”. | Table 7.3B.2.3.0.1-1 with output column denoted “ΔMSDmax 6”.  | Table 7.3C.2.1- output column denoted “ΔMSDmax 6”.  |
| Note 1: The PCx MSD requirements apply to the same uplink/downlink configurations as those specified for the minimum PC3 MSD requirements.Note 2: The PC1.52Tx MSD requirements apply to the same uplink/downlink configurations as those specified for the minimum PC2 MSD requirements. |

For MSD due to dual-UL interference, the 2UL band with 1UL CC per UL band HPUE MSD requirements for inter-band two-band or three-band DL NR CA or EN-DC can be calculated according to the eligibility criteria and the summary requirements of Table 5.5.2.3-2. In all cases, these MSD requirements do not apply to 2UL band EN-DC / NR CA configurations with 3UL CCs (e.g., a combination of intra-band and inter-band dual connectivity/carrier-aggregation).

**Table 5.5.2.3-2: 2UL Band with 1UL CC per UL Band HPUE MSD Requirements Using Look-Up Tables for Inter-Band Two-Band or Three-Band DL NR CA or EN DC.**

|  |  |  |
| --- | --- | --- |
| **Case / Eligibility / MSD requirements** | **NR-CA****TS 38.101-1** | **EN-DC****TS 38.101-3** |
| **Case 1** | **Eligibility** | 1. **The PC3 MSD requirement is specified** in the following respective sub-clauses, ***and,***
2. **The PC2 and/or the PC1.5 MSD requirements are not specified**.
 | 7.3A.5 | Table 7.3B.2.3.5.1, or Table 7.3B.2.3.5.2 |
| A valid two-band UL CA PC2 or PC1.5 configuration is specified for a total of 2Tx or 3Tx and 1CC in each UL band in the following respective sub-clauses. | 5.5A.3.1 or 5.5A.3.2 | 6.2B.1.3 or 6.2H.1.3 |
| Exclusion criteria: the following UL bands are not eligible. | n46, n96, n102 | B46, n46, n96, n102 |
| **HPUE MSD requirement****using Look-Up Tables** | HPUE MSD requirements | **PCx MSD = PC3 MSD + ΔMSD1** |
| Applicable HPUE power class “PCx” | PC2 or PC1.5 |
| ΔMSD requirements specified in the following respective Tables. | Table 7.3A.2.3.2-1 output columns denoted “ΔMSDmax 6, 9, 12, 15, 18, 24, 30”. | Table 7.3B.2.3.0.2-1 output columns denoted “ΔMSDmax 6, 9, 12, 15, 18, 24, 30”. |
| Correspondence between the specified ΔMSDmax and the IMD order and PCx is specified in the respective following tables. | Table 7.3A.2.3.2-2. | Table 7.3B.2.3.0.2-2. |
| **Case 2** | **Eligibility** | 1. **The PC2 MSD requirement is specified** in the following respective sub-clauses, ***and,***
2. **The PC3 and the PC1.5 MSD requirements are not specified**.
 | 7.3A.4, or 7.3A.6 | 7.3B.2.3.1, or 7.3B.2.3.2, or 7.3B.2.3.4 |
| A valid two-band UL CA PC2 or PC1.5 configuration is specified for a total of 2Tx or 3Tx and 1CC in each UL band in the following respective sub-clauses. | 5.5A.3.1 or 5.5A.3.2 | 6.2B.1.3 or 6.2H.1.3 |
| Exclusion criteria: the following UL bands are not eligible. | n46, n96, n102 | B46, n46, n96, n102 |
| **HPUE MSD requirement****using Look-Up Tables** | HPUE MSD requirements | **PC1.5 MSD = PC2 MSD + ΔMSD2** |
| ΔMSD requirements specified in the following respective Tables and the input column uses the specified “PC21Tx MSD” instead of “PC3 MSD”. | Table 7.3A.2.3.1-1 with output column denoted “ΔMSDmax 6,9,12,15”. | Table 7.3B.2.3.0.1-1 with output column denoted “ΔMSDmax 6,9,12,15”.  |
|  | Correspondence between the specified ΔMSDmax and the IMD order is specified in the respective following tables. | Table 7.3A.2.3.2-2: the IMD order is specified with column specified for “PC2 MSD”. | Table 7.3B.2.3.0.2-2: the IMD order is specified with column specified for “PC2 MSD”. |
| Note 1: The PCx MSD requirements apply to the same uplink/downlink configurations as those specified for the minimum PC3 MSD requirements.Note 2: The PC1.52Tx MSD requirements apply to the same uplink/downlink configurations as those specified for the minimum PC2 MSD requirements. |

**----- End of TP -----**