**3GPP TSG-RAN WG4 Meeting #111 *R4-2410646***

**Fukuoka City, Fukuoka, Japan, 20th – 24th May, 2024**

|  |
| --- |
| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** | 0001 | **rev** | 1 | **Current version:** | **18.0.0** |  |
|  |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

|  |
| --- |
|  |
| ***Title:***  | CR for TS 38.846: Corrections on UL triple beat analysis table |
|  |  |
| ***Source to WG:*** | CHTTL, Samsung, Skyworks |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | FS\_SimBC |  | ***Date:*** | 2024-05-20 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | Some errors and misalignments are found in the uplink triple beat IMD products table.Currently the first row for the 1st order TB in Table 6.5.3-1:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1st order TB | IfU3L -fU1L- fSCCL| | IfU2L -fU1L + fSCCL| | IfU2L -fU1L- fSCCH| | IfU3L -fU1L + fSCCH| |

However, if these equation are mapped to the TB1, TB2 in the WF R4-2220556.- TB1 = |f1+f2-f3|- TB2 = |f1-f2+f3| (f1 is the fSCC, and assume f2 > f3)Then table above will become:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1st order TB | minimum TB2 | minimum TB1 | maximum TB2 | maximum TB1 |

It should be corrected to the following table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1st order TB | minimum TB2 | maximum TB2 | minimum TB1 | maximum TB1 |

So the middle two cells need to be swapped, so that the impacted range can displayed correctly.And some errors are found.Comments received during the meeting to add clarifications for consistency between clause 7.4 and 6.5.3. |
|  |  |
| ***Summary of change:*** | Swap the cell of |fU2L-fU1L-fSCCH| with |fU2L-fU1L+fSCCL|, and correcting the left I (it’s a big i) to the mathematical Symbols for the absolute value (| |).Fix the descriptions of the abbreviations for Table 6.5.3-1.Adding clarification sentence for consistency between clause 7.4 and 6.5.3. |
|  |  |
| ***Consequences if not approved:*** | Some errors and misalignment remain. |
|  |  |
| ***Clauses affected:*** | 6.5.3 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

## << Start of changes >>

### 6.5.3 Uplink triple beat

When adding a band combination including three uplink transmission - one with UL intra-band carrier aggregation, which makes two tones and a third in the form of a single uplink component carrier this study is needed regardless if the intra-band CA is non-contiguous or contiguous intra-band uplink CA.

Table 6.5.3-1: Band nX and Band nY triple beat IMD products

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CC location | fU1L | fU2L | fU3L | fU1H |  | CBW |
| Frequency | - | - | - | - |  | . |
| CC location | fSCCL | fSCCH | fU2H | fU3H |  | Min ch. separation |
| Frequency | - | - | - | - |  | - |
| 1st order TB | |fU3L-fU1L-fSCCL| | |fU2L-fU1L-fSCCH| | |fU2L-fU1L+fSCCL| | |fU3L-fU1L+fSCCH| |  | Max ch. separation |
| Ranges | - | - | - | - |  | - |
| 1st order TB | |fU2L+fU1L-fSCCH| | |fU1H+fU2H-fSCCL| | |fU2L+fU1L+fSCCL| | |fU1H+fU2H+fSCCH| |  |  |
| Ranges | - | - | - | - |  |  |

If any issues are identified via the calculations presented in Table 6.5.3-1 additional REFSENS requirements may be needed.

In the Table 6.5.3-1 the following abbreviations is used:

fU1L = minimum frequency of TX aggressor band of ULCC1 lower band range (i.e. Minimum frequency edge of the band)

fU2L = minimum frequency of TX aggressor band of ULCC2 lower band range (i.e. Minimum frequency edge of the band)

fU3L = maximum frequency of TX aggressor band of ULCC2 lower band range (i.e. Minimum frequency edge of the band + Maximum Instantaneous UL BW)

fU1H= maximum frequency of TX aggressor band of ULCC1 higher band range (i.e. Maximum frequency edge of the band)

fU2H= minimum frequency of TX aggressor band of ULCC2 higher band range

fU3H= maximum frequency of TX aggressor band of ULCC2 higher band range (i.e. Minimum frequency edge of the band - Maximum Instantaneous UL BW)

fSCCL = minimum frequency in single CC band

fSCCH = maximum frequency in single CC band

CBW = Channel BW = Channel bandwidth of the component carrier

Min ch. separation = Minimum frequency separation between the two component carriers or the inter CC GB

Max ch. separation = Maximum frequency separation between the two CCs or aggregated uplink BW



Figure 6.5.3-1: Co-existence studies triple beat

For two-band inter-band CA or DC combinations, the precondition is that:

– The 2 UL bands are part of the same band group or belong to adjacent band groups as defined in Table 6.5.3-2.

For three-band inter-band CA or DC combinations and triple beat in third band, the precondition is that:

– The 3rd DL band belongs to the same band group or belongs to a band group which is adjacent to either one of the UL bands, where band groups are defined in Table 6.5.3-2.

For the case when the victim band may be affected by a 1st order triple-beat product, proponents should systematically check if the downlink band may be affected by dual uplink IMD3 interference. If the test point is missing, a dual UL IMD3 MSD test point should be specified.

If the triple beat frequency is composed of the frequency sum of the 2 discrete RBs in the contiguous UL CA (e.g. |fU2L+fU1L-fSCCH|~|fU1H+fU2H-fSCCL|, |fU2L+fU1L+fSCCL|~|fU1H+fU2H+fSCCH| in Table 6.5.3-1), there is no need to specify the TB test configuration as the requirement can already be verified by the fallback 2UL IMD3, as referenced in WF R4-2220556 [9], only the TB1 product |f1+f2-f3| and TB2 product |f1-f2+f3| should be considered – refer to TB landscape example of Figure 7.4-1. The generic guidelines can be found in clause 7.4 for type 3 UL configurations.

Table 6.5.3-2: Band group definition for adjacent band-group criterion

|  |
| --- |
| **FR1 band group range** |
| **Name** | **FR1-1 (LB)** | **FR1-2 (MB)** | **FR1-3 (HB)** | **FR1-4 (VHB)** | **FR1-5 (UHB)** |
| Range (MHz) | 600-1000 | 1400-2200 | 2300-2700 | 3300-5000 | 5150-7125 |
| Duplex mode | Mostly FDD | Mostly FDD | FDD and TDD | TDD only | TDD only |

## << End of changes >>