**3GPP TSG-RAN WG4 Meeting #98eR4-2101746**

**Electronic Meeting, Jan. 25-Feb. 5, 2021**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.101-3** | **CR** | **0464** | **rev** | **-** | **Current version:** | **15.12.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](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)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

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| ***Title:*** | CR on simultaneous Tx-Rx for EN-DC | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | OPPO | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_newRAT-Core | | | | |  | ***Date:*** | | | 2021-01-14 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-15 |
|  | *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 can be 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:*** | | 1. In RAN4#96e, the discussion of simultaneous Tx/Rx in EN-DC band combination DC\_42\_n79 happens and it was recognoized that it is unclear whether a band combination is mandatory or optional to support simultaneous Tx/Rx.  In current spec, for example in Table 5.5B.4.1-1(Inter-band EN-DC configurations within FR1 (two bands)), following two notes are defined for simultaneous Tx/Rx. In which NOTE3 means non-simultaneous Tx/Rx is only supported for the band combination, and NOTE7 means simultaneous Rx/Tx is only supported for the band combination.   * NOTE 3: The minimum requirements apply only when there is non-simultaneous Tx/Rx operation between E-UTRA and NR carriers. This restriction applies also for these carriers when applicable EN-DC configuration is part of a higher order EN-DC configuration. * NOTE 7: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability.   However, it is not clear for band combinations which neither have NOTE3 nor NOTE7 for example in Table 5.5B.4.1-1. For these band combinations it should be interpretated as the simultaneous Rx/Tx is optionally supported. This is also aligned with the UE capability below in 38.306.    More discussions can be found in paper R4-2101742  2. The LTE MPR reference in section 6.2B.2.1.2 and 6.2B.2.2.2 are wrong which refer to AMPR section. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Add clarification sentence in section 5.5B.1 to clarify that the simultaneous Tx/Rx for TDD-TDD and TDD-FDD band combinations are optionally supported unless otherwise stated.  2. Corrected the LTE reference section. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | It is still unclear whether a band combinations is mandatory or optional support simultaneous Tx/Rx for band combinations without like NOTE3 or NOTE7 above. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.5B.1; 6.2B.2.1.2; 6.2B.2.2.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | | **X** |  | Test specifications | | | | 38.521-3 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

---Start of changes---

## 5.5B Configuration for DC

### 5.5B.1 General

The operating bands and bandwidth classes are specified for operation with EN-DC, NGEN-DC, NE-DC or NR-DC configured. The EN-DC, NGEN-DC or NE-DC band combinations include at least one E-UTRA operating band.

For EN-DC or NE-DC configurations indicated by column "Single Uplink allowed" (e.g., problematic band combinations as defined in TS 38.306 [11]) in tables in this clause the UE may indicate capability of not supporting simultaneous dual and triple uplink operation due to possible intermodulation interference to its own primary downlink channel bandwidth of PCell or PSCell if the intermodulation order is 2 or if the intermodulation order is 3 for the combinations when both operating bands are between 450 MHz – 960 MHz or between 1427 MHz – 2690 MHz.

In the case for EN-DC or NE-DC configurations listed in tables in this clause for which the intermodulation products caused by the dual and triple uplink operation fall into the receive band but do not interfere with its own primary downlink channel bandwidth of PCell or PSCell as defined in Annex I the UE is mandated to operate in dual and triple uplink mode. Single Uplink is also allowed for certain band combinations where intermodulation or reverse intermodulation products could create difficulty for meeting emission requirements.

For EN-DC combinations of order 3 or higher, "Single Uplink allowed" UL configurations captured in Table 5.5B.2-1, Table 5.5B.3-1, and Table 5.5B.4-1 apply.Unless otherwise stated, the requirements for FDD-TDD or TDD-TDD EN-DC band combinations specified in current release apply for non-simultaneous RxTx between cell groups and the *simultaneousRxTxInterBandENDC* capability for EN-DC applies between cell groups.

If multiple UL DC configurations are listed for multiple DL DC configurations, valid uplink configurations are such that uplink does not have more carriers than downlink.

Non‑contiguous resource allocation and almost contiguous allocation are not applicable for E‑UTRA or NR carrier part of intra‑band EN‑DC configuration.

### 5.5B.2 Intra-band contiguous EN-DC

Table 5.5B.2-1: Intra-band contiguous EN-DC configurations

|  |  |  |
| --- | --- | --- |
| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | Single UL allowed |
| DC\_(n)41AA5  DC\_(n)41CA5  DC\_(n)41DA5 | DC\_(n)41AA | Yes3 |
| DC\_(n)41CA5  DC\_(n)41DA5 | DC\_41A\_n41A | Yes3 |
| DC\_(n)71AA2 | DC\_(n)71AA | No4 |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.  NOTE 2: Requirements in this specification apply for NR SCS of 15 kHz only.  NOTE 3: Single UL allowed due to potential emission issues, not self-interference.  NOTE 4: For UE(s) supporting dynamic power sharing it is mandatory to do dual simultaneous UL. For UE(s) not supporting dynamic power sharing single UL is allowed.  NOTE 5: The minimum requirements only apply for non-simultaneous Tx/Rx between all carriers. | | |

<<Unchanged sections omitted>>

### 6.2B.2 UE maximum output power reduction for DC

#### 6.2B.2.0 General

The UE maximum output power reduction (MPR) specified in this clause is applicable for UEs configured with EN-DC when NS\_01 is indicated in the MCG and the SCG. The MPR applies subject to indication in the field *modifiedMPRbehavior* for the SCG [2].

#### 6.2B.2.1 Intra-band contiguous EN-DC

##### 6.2B.2.1.1 General

When the UE is configured for intra-band contiguous EN-DC, the UE determines the total allowed maximum output power reduction as specified in this clause.

For UE supporting dynamic power sharing the following:

- for the MCG, MPR*c* in accordance with TS 36.101 [4]

- for the SCG,

MPR'*c* = MPRNR = MAX( MPRsingle,NR, MPRENDC)

- for the total configured transmission power,

MPRtot = PPowerClass,EN-DC – min(PPowerClass,EN-DC ,10\*log10(10^((PPowerClass,E-UTRA - MPRE-UTRA)/10) + 10^((PPowerClass,NR - MPRNR)/10))

where

MPRE-UTRA = MAX(MPRsingle,E-UTRA, MPRENDC )

with

- MPRsingle, E-UTRAis the MPR defined for the E-UTRA transmission in TS 36.101 [4]

- MPRsingle,NR is the MPR defined for the NR transmission in TS 38.101-1 [2]

For UEs not supporting dynamic power sharing the following

- for the MCG,

MPR*c* = MAX(MPRsingle,E-UTRA, MPRENDC )

- for the SCG,

MPR'*c* = MAX( MPRsingle,NR, MPRENDC )

where

- MPRsingle,NR is the MPR defined for the NR transmission in TS 38.101-1 [2]

- MPRsingle,E-UTRA is the MPR defined for the E-UTRA transmission in TS 36.101 [4]

MPRENDC is defined in Clause 6.2B.2.1.2

##### 6.2B.2.1.2 MPR for power class 3 and power class 2

MPR in this clause is applicable for power class 3 and power class 2 UEs indicating IE *dualPA-Architecture* supported with ENDC power class being the same as the E-UTRA and NR power class, otherwise the UE can use as much MPR as needed to fulfil emissions requirements when scheduled with dual uplink transmission. For UEs scheduled with single uplink transmission, MPR in clause 6.2.3 of TS 36.101 [4] and 6.2.2 of TS 38.101-1 [2] apply. For a UE supporting dynamic power sharing for DC\_(n)71AA for which dual simultaneous uplink transmissions are mandatory and A-MPR defined in clause 6.2B.3.1.1 is applied as MPR. The allowed maximum output power reduction applied to transmission on the MCG and the SCG is defined as follows:

MPRENDC = MA

Where MA is defined as follows

MA = 15 ; 0 ≤ B < 0.5

10 ; 0.5 ≤ B < 1.0

8 ; 1.0 ≤ B < 2.0

6 ; 2.0 ≤ B

Where:

For UEs supporting dynamic power sharing,

B = (LCRB\_alloc, E-UTRA \* 12\* SCSE-UTRA + LCRB\_alloc,NR \* 12 \* SCSNR)/1,000,000

For UEs not supporting dynamic power sharing,

For E-UTRA

B = (LCRB\_alloc, E-UTRA \* 12\* SCSE-UTRA + 12 \* SCSNR)/1,000,000

Where SCSNR = 15 kHz is assumed in calculation of B.

For NR

B = (12\* SCSE-UTRA + LCRB\_alloc,NR \* 12 \* SCSNR)/1,000,000

Where SCSE-UTRA = 15 kHz is assumed in calculation of B.

and MA is reduced by 1 dB for B < 2.

#### 6.2B.2.2 Intra-band non-contiguous EN-DC

##### 6.2B.2.2.1 General

When the UE is configured for intra-band non-contiguous EN-DC, the UE determines the total allowed maximum output power reduction as specified in this clause.

For UE supporting dynamic power sharing the following:

- for the MCG, MPR*c* in accordance with TS 36.101 [4]

- for the SCG,

MPR'*c* = MPRNR = MAX( MPRsingle,NR, MPRENDC)

- for the total configured transmission power,

MPRtot = PPowerClass,EN-DC – min(PPowerClass,EN-DC ,10\*log10(10^((PPowerClass,E-UTRA - MPRE-UTRA)/10) + 10^((PPowerClass,NR - MPRNR)/10))

where

MPRE-UTRA = MAX(MPRsingle,E-UTRA, MPRENDC )

with

- MPRsingle, E-UTRAis the MPR defined for the E-UTRA transmission in TS 36.101 [4]

- MPRsingle,NR is the MPR defined for the NR transmission in TS 38.101-1 [2]

For UEs not supporting dynamic power sharing the following

- for the MCG,

MPR*c* = MAX(MPRsingle,E-UTRA, MPRENDC )

- for the SCG,

MPR'*c* = MAX( MPRsingle,NR, MPRENDC )

where

- MPRsingle,NR is the MPR defined for the NR transmission in TS 38.101-1 [2]

- MPRsingle,E-UTRA is the MPR defined for the E-UTRA transmission in TS 36.101 [4]

MPRENDC is defined in Clause 6.2B.2.2.2

##### 6.2B.2.2.2 MPR for power class 3 and power class 2

MPR in this clause is applicable for power class 3 and power class 2 UEs indicating IE *dualPA-Architecture* supported with ENDC power class being the same as the E-UTRA and NR power class, otherwise the UE can use as much MPR as needed to fulfil emissions requirements when scheduled with dual uplink transmission. For UEs scheduled with single uplink transmission, MPR in clause 6.2.3 of TS 36.101 [4] and 6.2.2 of TS 38.101-1 [2] apply. The allowed maximum output power reduction for IM3 related emissions applied to transmission on the MCG and the SCG is defined as follows:

MPRENDC = MA

Where MA is defined as follows

MA = 18 ; 0 ≤ B < 1.0

17 ; 1.0 ≤ B < 2.0

16 ; 2.0 ≤ B < 5.0

15 ; 5.0 ≤ B

Where:

For UEs supporting dynamic power sharing,

B = (LCRB\_alloc, E-UTRA \* 12\* SCSE-UTRA + LCRB\_alloc,NR \* 12 \* SCSNR)/1,000.000

For UEs not supporting dynamic power sharing,

For E-UTRA

B= (LCRB\_alloc, E-UTRA \* 12\* SCSE-UTRA + 12 \* SCSNR)/1,000.000

Where SCSNR = 15 kHz is assumed in calculation of B.

For NR

B = (12 \* SCSE-UTRA + LCRB\_alloc,NR \* 12 \* SCSNR)/1,000.000

Where SCSE-UTRA = 15 kHz is assumed in calculation of B.

and MA is reduced by 1 dB for B < 2.

<<End of change>>