**3GPP TSG-RAN2 Meeting #115 electronic R2-2109064**(Rev of R2-2108039)

**Online, Aug 16th - Aug 27th, 2021**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **38.306** | **CR** | **0****518** | **rev** | **4** | **Current** **version:** | **16.5.0** |  |
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| *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 | **X** | Core Network |  |

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| ***Title:***  | CR on the Intra-band and Inter-band EN-DC Capabilities -R16 |
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| ***Source to WG:*** | ZTE Corporation, Sanechips |
| ***Source to TSG:*** | RAN2 |
|  |  |
| ***Work item code:*** | NR\_newRAT-Core |  | ***Date:*** | 2021-8-5 |
|  |  |  |  |  |
| ***Category:*** | **A**  |  | ***Release:*** | Rel-16 |
|  | *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)* |
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| ***Reason for change:*** | In the #113bis meeting, the the below 5 (NG)EN-DC/NE-DC BC types were identified for the purpose of analyzing the applicability of the UE capability parameters : (the **bolder** part denotes UL)* Type 1: Intra-band (NG)EN-DC/NE-DC combination without additional inter-band NR and LTE CA component, e.g. DC **41A\_n41A**
* Type 2: Intra-band (NG)EN-DC/NE-DC combination supporting both UL and DL intra-band (NG)EN-DC/NE-DC parts with additional inter-band NR/LTE CA component, e.g. *DC\_25A\_****41A\_n41A***
* Type 3: Intra-band (NG)EN-DC/NE-DC combination without supporting UL in both the bands of the intra-band (NG)EN-DC/NE-DC UL part, e.g. DC\_**25A**\_41A\_**n41A**
* Type 4: Inter-band (NG)EN-DC/NE-DC combination without Intra-band component, in short we call it as Inter-band (NG)EN-DC/NE-DC combination.
* Type 5: Inter-band (NG)EN-DC combination configurations where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band, e.g., DC\_B42\_n77 and DC\_B42\_n78.

However, the current terminologies of the (NG)EN-DC/NE-DC BC type in *dualPA-Architecture/ul-TimingAlignmentEUTRA-NR/pa-PhaseDiscontinuityImpacts/asyncIntraBandENDC/simultaneousRxTxInterBandENDC*  are inconsistent and it’s not clear for which (NG)EN-DC/NE-DC BC types the above capabilities are applicable.Thus, a LS (R2-2104550) was sent to RAN1/4 and RAN1/4 have been approved the reply LS R1-2108378/R4-2107907, in these two reply LSs, it has been confirmed that 1. The *dualPA-Architecture/ul-TimingAlignmentEUTRA-NR/pa-PhaseDiscontinuityImpacts* are applicalble to the Type1/2/5 BC;
2. The *asyncIntraBandENDC* is applicable to the Type 1/2/3/5 BC;
3. The *simultaneousRxTxInterBandENDC* is applicable to the Type 2/3/4 BC;
4. The *ul-TimingAlignmentEUTRA-NR/pa-PhaseDiscontinuityImpacts/dualPA-Architecture/ asyncIntraBandENDC* are used to indicate the restriction to the intra-band (NG)EN-DC/NE-DC BC part.
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| ***Summary of change:*** | 1. Add notes to the filed description of “*dualPA-Architecture/**ul-TimingAlignmentEUTRA-NR/pa-PhaseDiscontinuityImpacts/**asyncIntraBandENDC/ simultaneousRxTxInterBandENDC”*to clarify which (NG)EN-DC/NE-DC BC types the above capabilitiesare applicable.
2. For *the ul-dualPA-Architecture/ pa-PhaseDiscontinuityImpact/ul-TimingAlignmentEUTRA-NR,* clarify that if this capability is included in an “Intra-band (NG)EN-DC/NE-DC combination supporting both UL and DL intra-band (NG)EN-DC/NE-DC parts with additional inter-band NR/LTE CA component”, this capability is used to indicate the restriction to the intra-band (NG)EN-DC/NE-DC BC part.
3. For *asyncIntraBandENDC,* clarify that If this capability is included in an “Intra-band contiguous (NG)EN-DC combination supporting both UL and DL intra-band (NG)EN-DC parts with additional inter-band NR/LTE CA component” or in an ““ Intra-band (NG)EN-DC/NE-DC combination without supporting UL in both the bands of the intra-band (NG)EN-DC/NE-DC UL part”, this capability is used to indicate the restriction to the intra-band (NG)EN-DC BC part.

**Impact analysis**Impacted 5G architecture options:(NG)EN-DC, NE-DCImpacted functionality:(NG)EN-DC/NE-DC ConfigurationInter-operability:1. If UE implements according to the CR and the network does not, the network may misunderstand or ignore the capability provided by UE for some specific BC type and give the wrong configuration.
2. If the network implements according to the CR and the UE does not, the UE may not report the capability for some specific BC type, which leads misunderstanding and wrong configuration.
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| ***Consequences if not approved:*** | The network may misunderstand or ignore the capability provided by UE for some specific BC type and give the wrong configuration to the UE. |
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| ***Clauses affected:*** | 4.2.7.7/4.2.7.9 |
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|  | **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 ...  |
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| ***Other comments:*** |  |
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| ***This CR's revision history:*** | R2-2108039, R2-2105183, R2-2101564 |

First change

#### 4.2.7.7 *FeatureSetUplink* parameters

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* omitted unchanged parts \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

| Definitions for parameters | Per | M | FDD-TDDDIFF | FR1-FR2DIFF |
| --- | --- | --- | --- | --- |
| ***pa-PhaseDiscontinuityImpacts***Indicates incapability motivated by impacts of PA phase discontinuity with overlapping transmissions with non-aligned starting or ending times or hop boundaries across carriers for intra-band (NG)EN-DC/NE-DC, intra-band CA and FDM based ULSUP. Note 1: For this capability, the “intra-band (NG)EN-DC/NE-DC” includes the “Intra-band (NG)EN-DC/NE-DC combination without additional inter-band NR and LTE CA component” and the “Intra-band (NG)EN-DC/NE-DC combination supporting both UL and DL intra-band (NG)EN-DC/NE-DC parts with additional inter-band NR/LTE CA component”.  This capability is also applicable to the inter-band (NG)EN-DC/NE-DC combination, where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [4]).Note 2: If this capability is included in an “Intra-band (NG)EN-DC/NE-DC combination supporting both UL and DL intra-band (NG)EN-DC/NE-DC parts with additional inter-band NR/LTE CA component”, this capability is used to indicate the restriction to the intra-band (NG)EN-DC/NE-DC BC part. | FS | No | N/A | N/A |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* omitted unchanged parts \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Second change

#### 4.2.7.9 *MRDC-Parameters*

| Definitions for parameters | Per | M | FDD-TDDDIFF | FR1-FR2DIFF |
| --- | --- | --- | --- | --- |
| ***asyncIntraBandENDC***Indicates whether the UE supports asynchronous FDD-FDD intra-band (NG)EN-DC with MRTD and MTTD as specified in clause 7.5 and 7.6 of TS 38.133 [5]. If asynchronous FDD-FDD intra-band (NG)EN-DC is not supported, the UE supports only synchronous FDD-FDD intra-band (NG)EN-DC.Note: For this capability, the “intra-band (NG)EN-DC” includes the “Intra-band (NG)EN-DC combination without additional inter-band NR and LTE CA component” ,the “Intra-band (NG)EN-DC combination supporting both UL and DL intra-band (NG)EN-DC parts with additional inter-band NR/LTE CA component” and the “ Intra-band (NG)EN-DC combination without supporting UL in both the bands of the intra-band (NG)EN-DC UL part”. This capability is also applicable to the inter-band (NG)EN-DC combination, where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [4]).Note 2: If this capability is included in an “Intra-band contiguous (NG)EN-DC combination supporting both UL and DL intra-band (NG)EN-DC parts with additional inter-band NR/LTE CA component” or in an “Intra-band (NG)EN-DC combination without supporting UL in both the bands of the intra-band (NG)EN-DC UL part”, this capability is used to indicate the restriction to the intra-band (NG)EN-DC BC part. | BC | No | FDD only | FR1 only |
| ***dualPA-Architecture***For an intra-band band combination, this field indicates the support of dual PAs. If absent in an intra-band band combination, the UE supports single PA for all the ULs in the intra-band band combination. For other band combinations, this field is not applicable.Note 1: With this capability, for the (NG)EN-DC/NE-DC, the “ intra-band band combination” includes the “Intra-band (NG)EN-DC/NE-DC combination without additional inter-band NR and LTE CA component” and the “Intra-band (NG)EN-DC/NE-DC combination supporting both UL and DL intra-band (NG)EN-DC/NE-DC parts with additional inter-band NR/LTE CA component”. This capability is also applicable to the inter-band (NG)EN-DC/NE-DC combination, where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [4]).Note 2: If this capability is included in an “Intra-band (NG)EN-DC/NE-DC combination supporting both UL and DL intra-band (NG)EN-DC/NE-DC parts with additional inter-band NR/LTE CA component”, this capability is used to indicate the restriction to the intra-band (NG)EN-DC/NE-DC BC part. | BC | No | N/A | N/A |
| ***dynamicPowerSharingENDC***Indicates whether the UE supports dynamic (NG)EN-DC power sharing between NR FR1 carriers and the LTE carriers. If the UE supports this capability the UE supports the dynamic power sharing behaviour as specified in clause 7 of TS 38.213 [11]. | BC | Yes | N/A | FR1 only |
| ***dynamicPowerSharingNEDC***Indicates whether the UE supports dynamic NE-DC power sharing between NR FR1 carriers and the LTE carriers. If the UE supports this capability, the UE supports the dynamic power sharing behavior as specified in clause 7 of TS 38.213 [11]. | BC | Yes | N/A | FR1 only |
| ***interBandContiguousMRDC***Indicates for an inter-band (NG)EN-DC/NE-DC combination, where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [4]), that the UE supports intra-band contiguous (NG)EN-DC/NE-DC requirements (see TS 38.101-3 [4]). If the field is absent for such an inter-band (NG)EN-DC/NE-DC combination, the UE supports intra-band non-contiguous (NG)EN-DC/NE-DC requirements. | BC | CY | N/A | N/A |
| ***simultaneousRxTxInterBandENDC***Indicates whether the UE supports simultaneous transmission and reception in TDD-TDD and TDD-FDD inter-band (NG)EN-DC/NE-DC and TDD-TDD and TDD-FDD intra-band(NG)EN-DC/NE-DC with inter-band component. It is mandatory for certain TDD-FDD and TDD-TDD band combinations defined in TS 38.101-3 [4]. | BC | CY | N/A | N/A |
| ***singleUL-Transmission***Indicates that the UE does not support simultaneous UL transmissions as defined in TS 38.101-3 [4]. The UE may only include this field for certain band combinations defined in TS 38.101-3 [4]. If included for a particular band combination, the field applies to all fallback band combinations of this band combination that are defined in TS 38.101-3 [4] as being allowed to include this field and does not apply to any other fallback band combinations defined in TS 38.101-3 [4]. | BC | No | N/A | N/A |
| ***spCellPlacement***Indicates whether the UE supports a SpCell on FR1-FDD, FR1-TDD and/or FR2-TDD depending on which additional SCells of other frequency range(s) / duplex mode(s) are configured. It is applicable to SCG of (NG)EN-DC and MCG of NE-DC, where UL is configured on more than one of FR1-FDD, FR1-TDD and FR2-TDD in a cell group. If not included, the UE supports SpCell on any serving cell with UL in supported band combinations. | UE | No | N/A | N/A |
| ***tdm-Pattern***Indicates whether the UE supports the *tdm-PatternConfig* for *single UL-transmission* associated functionality, as specified in TS 36.331 [17]. Support is conditionally mandatory in (NG)EN-DC for UEs that do not support dynamicPowerSharingENDC and for UEs that indicate single UL transmission for any (NG)EN-DC BC. Support is conditionally mandatory in NE-DC for UEs that do not support dynamicPowerSharingNEDC and for UEs that indicate single UL transmission for any NE-DC BC. The feature is optional otherwise. | BC | CY | N/A | FR1 only |
| ***ul-SharingEUTRA-NR***Indicates whether the UE supports (NG)EN-DC/NE-DC with EUTRA-NR coexistence in UL sharing via TDM only, FDM only, or both TDM and FDM from UE perspective as specified in TS 38.101-3 [4]. | BC | No | N/A | FR1 only |
| ***ul-SwitchingTimeEUTRA-NR***Indicates support of switching type between LTE UL and NR UL for (NG)EN-DC/NE-DC with LTE-NR coexistence in UL sharing from UE perspective as defined in clause 6.3B of TS 38.101-3 [4]. It is mandatory to report switching time type 1 or type 2 if UE reports *ul-SharingEUTRA-NR* is *tdm* or *both*. | BC | CY | N/A | FR1 only |
| ***ul-TimingAlignmentEUTRA-NR***Indicates whether to apply the same UL timing between NR and LTE for dynamic power sharing capable UE operating in a synchronous intra-band contiguous (NG)EN-DC. If this field is absent, UE shall be capable of handling a timing difference up to applicable MTTD requirements when operating in a synchronous intra-band contiguous (NG)EN-DC network, as specified in TS 38.133 [5].Note 1: For this capability, the “intra-band contiguous (NG)EN-DC” includes the “Intra-band contiguous (NG)EN-DC combination without additional inter-band NR and LTE CA component” and the “Intra-band contiguous (NG)EN-DC combination supporting both UL and DL intra-band (NG)EN-DC parts with additional inter-band NR/LTE CA component”.This capability is also applicable to the inter-band (NG)EN-DC/NE-DC combination, where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [4]).Note 2: If this capability is included in an “Intra-band contiguous (NG)EN-DC combination supporting both UL and DL intra-band (NG)EN-DC parts with additional inter-band NR/LTE CA component”, this capability is used to indicate the restriction to the intra-band (NG)EN-DC BC part. | BC | No | N/A | N/A |

End of change