**3GPP TSG-RAN WG2 Meeting #112-e *R2-2011260***

**E-meeting, 2nd – 13th November 2020**

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| *CR-Form-v11.2* |
| **CHANGE REQUEST** |
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|  | **38.306** | **CR** | **0418** | **rev** | **2** | **Current version:** | **15.11.0** |  |
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| *For [HELP](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)**on using this form: comprehensive instructions can be found at <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 to clarify UE capability in case of Cross-Carrier operation  |
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| ***Source to WG:*** | ZTE Corporation, Sanechips, Ericsson |
| ***Source to TSG:*** | R2 |
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| ***Work item code:*** | NR\_newRAT-Core |  | ***Date:*** | 2020-11-13 |
|  |  |  |  |  |
| ***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 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:*** | 1. In past RAN2 meeting, companies discussed the ambiguity issue of UE FDD&TDD FR1&FR2 capabilities, and agreed the CR (R2-1916571) to clarify the interpretation of UE capabilities in FDD-TDD or FR1-FR2 CA cases. However, at that time, only the UE capability defined as “per-UE” level with “XDD-Diff” or “FRX-Diff” were taken into account.

On top of this, RAN1 further discussed the ambiguity issue for “per-band” level UE capabilities in case of cross-carrier operation. Because for UE capability associated with cross-carrier operation, if the UE indicates support of this capability only for the band of the scheduled/triggered/indicated cell or only for the band of the schedulign/triggering/indicating cell, it is unclear whether UE supports cross-carrier operation for this capability between the two cells. RAN1 has discussed the issue and approved the LS (R1-2007334) after RAN1 #102e meeting, the main content of the LS is given as below:

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| **Conclusion:**Regarding the interpretation of UE capabilities in case of cross-carrier operation, RAN1 clarifies that support of the following UE capability is based on the support of this capability for the band of the scheduled/triggered/indicated cell only.* *aperiodicTRS*
* *beamSwitchTiming*

Regarding the interpretation of UE capabilities in case of cross-carrier operation, RAN1 clarifies that support of the following UE capability is based on both the support of this capability for the band of the scheduled/triggered/indicated cell and the support of this capability for the band of the scheduling/triggering/indicating cell.* *crossCarrierScheduling-SameSCS*
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In addition, during RAN2#112e, RAN1 approved another LS (R1-2009623) and concluded the interpretation of more UE capabilities, the main content of LS is given as below:

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| **Agreement**Regarding the interpretation of UE capabilities in case of cross-carrier operation, RAN1 clarifies that support of the following UE capability is based on both the support of this capability for the band of the scheduled/triggered/indicated cell and the support of this capability for the band of the scheduling/triggering/indicating cell.*1. ue-SpecificUL-DL-Assignment**2. bwp-DiffNumerology / bwp-SameNumerology*Note: For *bwp-DiffNumerology / bwp-SameNumerology*, the supported number of BWPs for each band is still based on the indicated number for this band regardless of whether it is a scheduling cell or scheduled cell. |

This CR is provided to capture above RAN1 conclusions in TS 38.306. (2) The corrections from offline [AT112-e][012][NR15] UE caps II were also suggested to merge into this CR, including the change in the R2-2009516/ R2-2010541 and the second change in R2-2009162. |
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| ***Summary of change:*** | 1. Add new “Annex A.x General differentiation of capabilities in cross-carrier operation”.
2. Merge thecorrections from offline [AT112-e][012][NR15] UE caps II:

A: Remove mention of "type A/B" BWP switching for the *bwp-sameNumerology*.B: Correct the field definition reference for the field ue-SpecificUL-DL-Assignment to refer to TDD-UL-DL-ConfigDedicated.C: Correct the definition of pdcch-MonitoringSingleOccasion to not refer to the case where PDCCH is scrambled with C-RNTI or CS-RNTI**mpact analysis**Impacted 5G architecture options:NR SA, (NG)EN-DC, NE-DC, NR-DCImpacted functionality:Cross-carrier operationInter-operability: 1. If UE implementates according to the CR and the network is not, or if the network implementates according to the CR and the UE is not, UE and network may have different interpretation of the capability, and may cause undesirable configuration and result in reconfiguration failure.
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| ***Consequences if not approved:*** | In case UE reports different capability values for the band of associated serving cells, it is unclear which capability value should be considered when network wants to enable the functionality in cross-carrier operation. |
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| ***Clauses affected:*** | Annex |
|  |  |
|  | **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 | CR  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | 1. Update based on RAN1 LS (R1-2009623) the comments from offline[012].
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First change

4.2.7.2 *BandNR parameters*

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

| ***Definitions for parameters*** | Per | M | FDD-TDDDIFF | FR1-FR2DIFF |
| --- | --- | --- | --- | --- |
| ***bwp-SameNumerology***Indicates whether UE supports BWP adaptation (up to 2/4 BWPs) with the same numerology, via DCI and timer. For the UE capable of this feature, the bandwidth of a UE-specific RRC configured DL BWP includes the bandwidth of the CORESET#0 (if CORESET#0 is present) and SSB for PCell and PSCell (if configured). For SCell(s), the bandwidth of the UE-specific RRC configured DL BWP includes SSB, if there is SSB on SCell(s). | Band | No | N/A | N/A |

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

Second change

#### **4.2.7.5 *FeatureSetDownlink* parameters**

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

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| ***Definitions for parameters*** | Per | M | FDD-TDDDIFF | FR1-FR2DIFF |
| ***ue-SpecificUL-DL-Assignment***Indicates whether the UE supports dynamic determination of UL and DL link direction and slot format based on Layer 1 scheduling DCI and higher layer configured parameter *TDD-UL-DL-ConfigDedicated* as specified in TS 38.213 [11]. | FS | No | N/A | N/A |

Third change

**4.2.7.10 *Phy-Parameters***

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

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| **Definitions for parameters** | **Per** | **M** | **FDD-TDD****DIFF** | **FR1-FR2****DIFF** |
| ***pdcch-MonitoringSingleOccasion***Indicates whether the UE supports receiving PDCCH in a search space configured to be monitored within a single span of any three contiguous OFDM symbols in a slot with the capability of supporting at least 44 blind decodes in a slot for 15 kHz subcarrier spacing. | UE | No | No | FR1 only |

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

Fourth change

Annex A.x: General differentiation of capabilities in Cross-Carrier operation

Annex A.x specifies for which multiple serving cells a UE supporting cross-carrier operation shall support a feature/capability for which it indicates support within the capability signalling.

A UE that indicates support for cross-carrier operation in CA (e.g. MCG or SCG):

- For the fields for which the UE is allowed to indicate different support for different bands, the UE shall support the feature on the PCell and/or SCell(s) in cross-carrier operation, as specified in tables A.x-1 in accordance to the following rules:

- Triggered serving cell: the UE shall support the feature if the UE indicates support of the feature for the band of the scheduled/triggered/indicated serving cell;

- Triggering&Triggered serving cells: UE shall support the feature if the UE indicates support of the feature for the band of both the scheduling/triggering/indicating serving cell and the scheduled/triggered/indicated serving cell;

**Table A.x-1: General UE capabilities for which differentiation is allowed**

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| **UE-NR-Capability** | **Classification** |
| aperiodicTRS  | Triggered serving cell |
| beamSwitchTiming  | Triggered serving cell |
| bwp-DiffNumerology (Note1) | Triggering&Triggered serving cells |
| bwp-SameNumerology (Note1) | Triggering&Triggered serving cells |
| crossCarrierScheduling-SameSCS | Triggering&Triggered serving cells |
| ue-SpecificUL-DL-Assignment | Triggering&Triggered serving cells |
| NOTE 1: For *bwp-DiffNumerology* and *bwp-SameNumerology*, the supported number of BWPs for each band is still based on the indicated number for this band regardless of whether it is a scheduling cell or scheduled cell. |

End of changes