**3GPP TSG-RAN2 Meeting # 124**

**Chicago, USA, November 13 – 17, 2023**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.300** | **CR** | **0733** | **rev** | **-** | **Current version:** | **17.6.0** |  |
|  | | | | | | | | |
| *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 | **X** | Core Network |  |

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| ***Title:*** | Introduction of Further NR coverage enhancements to 38.300 | | | | | | | | | |
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| ***Source to WG:*** | China Telecom | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_cov\_enh2-Core | | | | |  | ***Date:*** | | | 2023-11-03 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | The new WID on Further NR coverage enhancements was approved in RP-221858.  This CR is to add the support of PRACH coverage, power domain and dynamic waveform switching enhancements. | | | | | | | | |
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| ***Summary of change:*** | | 1. Clarify the repetition of PRACH with same beams for 4-step RACH procedure can be supported. 2. Clarify the dynamic switching between DFT-S-OFDM and CP-OFDM can be supported. 3. Clarify the power domain enhancements of power class and MPR/PAR reduction. | | | | | | | | |
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| ***Consequences if not approved:*** | | Further NR coverage enhancements is not supported in 38.300. | | | | | | | | |
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| ***Clauses affected:*** | | 19 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 38.321 CR 1711  TS 38.331 CR 4433 | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | 1. R2-2312732 Introduction of Further NR coverage enhancements to 38.300 | | | | | | | | |

*First Modified Subclause*

# 19 Support for NR coverage enhancements

To improve NR uplink coverage for both FR1 and FR2, the following enhancements on PUSCH, PUCCH and MSG3 PUSCH are supported:

- Enhanced aggregation of multiple slots with TB repetition is supported for both PUSCH transmission with dynamic and configured grant. In addition, counting based on available slots is supported. The maximum number of aggregated slots for counting based on available slots and counting based on physical slots are both 32.

- TB processing over multiple slots with and without repetition is supported for both PUSCH transmission with dynamic grant and configured grant. For a single transmission of TB processing over multiple slots PUSCH, the TB size is determined based on multiple slots.

- DMRS bundling where the UE maintains phase continuity and power consistency across PUSCH transmissions or PUCCH repetitions to enable improved channel estimation is supported. Inter-slot frequency hopping with DMRS bundling is supported.

- Dynamic PUCCH repetition factor indication configured per PUCCH resource is introduced, applicable to all PUCCH formats.

- Aggregation of multiple slots with TB repetition for MSG3 transmission is supported on both NUL and SUL, applicable to CBRA with 4-step RA type. If configured, the UE requests MSG3 repetition via separate RACH resources when the RSRP of DL path-loss reference is lower than a configured threshold. BWP configured with RACH resources solely for MSG3 repetition is also supported without the need to consider the RSRP of DL path-loss reference by the UE.

- MSG1 repetition with same beam is supported on both NUL and SUL for 4-step RA type. For CBRA, network broadcasts multiple RSRP thresholds for different repetition numbers. UE performs MSG1 repetition via RACH resources that are different from RACH resources without MSG1 repetition. CFRA for MSG1 repetition for *ReconfigurationWithSync* is supported and the network signals the MSG1 repetition number explicitly in case of CFRA. Fallback from lower number to higher number of MSG1 repetition is supported within the selected set of RACH resources. Fallback from lower number to higher number of MSG1 repetition is not supported if UE has performed fallback from CFRA to CBRA or for MSG1-based SI request. Fallback from CFRA with MSG1 repetition to 4-step CBRA with MSG1 repetition using the same MSG1 repetition number as the one used for CFRA is supported.

- Dynamic switching between DFT-S-OFDM and CP-OFDM for PUSCH is supported. The indication for switching between DFT-S-OFDM and CP-OFDM for PUSCH is contained in DCI format 0\_1/0\_2, which is configured separately for each BWP. PHR can be reported for current transmission of PUSCH using one of the DFT-S-OFDM or CP-OFDM waveform and an assumed transmission of PUSCH using the other waveform than the current one.

- Frequency domain spectrum shaping without frequency extension is supported for MPR/PAR reduction on the PUSCH transmission, and the change value of UE power class is reported in the PHR.

*End of Changes*