**3GPP TSG-RAN WG1 #110R1-22xxxxx**

**Toulouse, France, August 22nd - 26th, 2022**

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| *CR-Form-v12.2* |
| **DRAFT CHANGE REQUEST** |
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|  | **38.213** | **CR** | **-** | **rev** | **-** | **Current version:** | **17.2.0** |  |
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| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)******[LP](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:***  | Corrections of random-access based small data transmission |
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| ***Source to WG:*** | Moderator(ZTE), vivo |
| ***Source to TSG:*** | R1 |
|  |  |
| ***Work item code:*** | NR\_SmallData\_INACTIVE-Core |  | ***Date:*** | 2022-08-25 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-17 |
|  | *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-16 (Release 16)**Rel-17 (Release 17)**Rel-18 (Release 18)**Rel-19 (Release 19)* |
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| ***Reason for change:*** | 1. In 38.331 v17.1.0, “*FeatureCombinationPreambles*” is used to indicate the preamble allocation for indicating SDT/RedCap/Msg3-repetition features which is not captured in section 8.1 of 38.213. Furthermore, section 19.2 of 38.213 still assumes “ *sdt-CB-PreamblesPerSSB-PerSharedRO* or *sdt-msgA-CB-PreamblesPerSSB-PerSharedRO*” are used to configure preambles for indicating RA SDT feature, which is wrong.

RO mask determination for RA-SDT in RRC is also based on feature combination signaling “*ssb-SharedRO-MaskIndex*” instead of using “*sdt-SSB-SharedRO-MaskIndex* or *sdt-msgA-SSB-SharedRO-MaskIndex*”.1. “*separateMsgA-PUSCH-Config*” may be configured for SDT based on 2-step RACH, which should be captured in 38.213 on top of “*MsgA-PUSCH-Config*” introduced in Rel-16.
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| ***Summary of change:*** | 1. Capture the preamble allocation with “*FeatureCombinationPreambles*” for indicating SDT/RedCap/Msg3-repetition features in section 8.1 of 38.213, update section 19.2 for SDT preamble allocation as well.
2. Add the signaling of “*separateMsgA-PUSCH-Config*” used for SDT based on 2-step RACH.
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| ***Consequences if not approved:*** | The preamble allocation based on feature combination is not captured in RAN1 spec. and preamble allocation for SDT specified in RAN1 will be wrong. The MsgA PUSCH configuration signaling for SDT will be wrong. |
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| ***Clauses affected:*** | 8.1, 8.1a, 19.2 |
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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:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

## 8.1 Random access preamble

Physical random access procedure is triggered upon request of a PRACH transmission by higher layers or by a PDCCH order. A configuration by higher layers for a PRACH transmission includes the following:

- A configuration for PRACH transmission [4, TS 38.211].

- A preamble index, a preamble SCS, $P\_{PRACH,target}$, a corresponding RA-RNTI, and a PRACH resource.

A PRACH is transmitted using the selected PRACH format with transmission power $P\_{PRACH,b,f,c}(i)$,as described in clause 7.4, on the indicated PRACH resource.

For Type-1 random access procedure, a UE is provided a number $N$ of SS/PBCH block indexes associated with one PRACH occasion and a number $R$ of contention based preambles per SS/PBCH block index per valid PRACH occasion by *ssb-perRACH-OccasionAndCB-PreamblesPerSSB*.

For Type-2 random access procedure with common configuration of PRACH occasions with Type-1 random access procedure, a UE is provided a number $N$ of SS/PBCH block indexes associated with one PRACH occasion by *ssb-perRACH-OccasionAndCB-PreamblesPerSSB* and a number $Q$ of contention based preambles per SS/PBCH block index per valid PRACH occasion by *msgA-CB-PreamblesPerSSB-PerSharedRO*. The PRACH transmission can be on a subset of PRACH occasions associated with a same SS/PBCH block index within an SSB-RO mapping cycle for a UE provided with a PRACH mask index by *msgA-SSB-SharedRO-MaskIndex* according to [11, TS 38.321].

For Type-2 random access procedure with separate configuration of PRACH occasions with Type-1 random access procedure, a UE is provided a number $N$ of SS/PBCH block indexes associated with one PRACH occasion and a number $R$ of contention based preambles per SS/PBCH block index per valid PRACH occasion by *msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB* when provided; otherwise, by *ssb-perRACH-OccasionAndCB-PreamblesPerSSB*.

For a random access procedure associated with a feature combination indicated by *FeatureCombinationPreambles*, a UE is provided a number $N$ of SS/PBCH block indexes associated with one PRACH occasion by *ssb-perRACH-OccasionAndCB-PreamblesPerSSB* or *msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB* when provided and a number $S$ of contention based preambles per SS/PBCH block index per valid PRACH occasion by *startPreambleForThisPartition* and *numberOfPreamblesPerSSB-ForThisPartition*. The PRACH transmission can be on a subset of PRACH occasions associated with a same SS/PBCH block index within an SSB-RO mapping cycle for a UE provided with a PRACH mask index by *ssb-SharedRO-MaskIndex* according to [11, TS 38.321].

<Unchanged text omitted>

## 8.1A PUSCH for Type-2 random access procedure

For a Type-2 random access procedure, a UE transmits a PUSCH, when applicable, after transmitting a PRACH. The UE encodes a transport block provided for the PUSCH transmission using redundancy version number 0. The PUSCH transmission is after the PRACH transmission by at least $N$ symbols where $N=2$ for $μ=0$ or $μ=1$, $N=4$ for $μ=2$ or $μ=3$, $N=16$ for $μ=5$, $N=32$ for $μ=6$, and $μ$ is the SCS configuration for the active UL BWP.

A UE does not transmit a PUSCH in a PUSCH occasion if the PUSCH occasion associated with a DMRS resource is not mapped to a preamble of valid PRACH occasions or if the associated PRACH preamble is not transmitted as described in clause 7.5 or clause 11.1. A UE can transmit a PRACH preamble in a valid PRACH occasion if the PRACH preamble is not mapped to a valid PUSCH occasion.

A mapping between one or multiple PRACH preambles and a PUSCH occasion associated with a DMRS resource is per PUSCH configuration.

A UE determines time resources and frequency resources for PUSCH occasions in an active UL BWP from *msgA-PUSCH-Config* or *separateMsgA-PUSCH-Config* for the active UL BWP. If the active UL BWP is not the initial UL BWP and *msgA-PUSCH-Config* or *separateMsgA-PUSCH-Config* is not provided for the active UL BWP, the UE uses the *msgA-PUSCH-Config* or *separateMsgA-PUSCH-Config* provided for the initial UL BWP.

<Unchanged text omitted>

## 19.2 Random-access based PUSCH transmission

A UE indicated to release a dedicated RRC connection can be provided a configuration for a Type-1 and/or a Type-2 random access procedure on the initial UL BWP [12, TS 38.331]. PRACH occasions can have either a common configuration as, or a separate configuration from, PRACH occasions for Type-1 or Type-2 random access procedure as described in clause 8.1. The UE procedure is as described in clause 8, including clauses 8.1 through 8.4. The UE transmits a PRACH preamble with a power determined as described in clause 7.4.

For a common configuration of PRACH occasions and a Type-1 or a Type-2 random access procedure, a UE can be provided a number of contention based preambles per SS/PBCH block index per valid PRACH occasion by *startPreambleForThisPartition* and *numberOfPreamblesPerSSB-ForThisPartition* when *smallData* is present in corresponding *FeatureCombination ~~sdt-CB-PreamblesPerSSB-PerSharedRO~~* ~~or~~ *~~sdt-msgA-CB-PreamblesPerSSB-PerSharedRO~~*~~, respectively~~. A PRACH transmission can be on a subset of PRACH occasions associated with a same SS/PBCH block index within an SSB-RO mapping cycle as determined by a PRACH mask index provided by *~~sdt-SSB~~ssb-SharedRO-MaskIndex* ~~or~~ *~~sdt-msgA-SSB-SharedRO-MaskIndex~~*according to [11, TS 38.321].