**3GPP TSG-RAN WG1 Meeting #118 *R1-240xxxx***

 **Maastricht, Netherlands, August 19 – 23, 2024**

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| *CR-Form-v12.2* |
| **DRAFT CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  |
| *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 |  | Radio Access Network |  | Core Network |  |

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| ***Title:***  | Draft CR on MBS broadcast PDSCH configuration |
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| ***Source to WG:*** | Moderator (), ZTE |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | NR\_MBS\_enh-Core |  | ***Date:*** | 2024-08-19 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***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 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:*** | For MBS PDSCH DMRS sequence generation, the configured ID used for initializing the sequence generator is the same one for MBS broadcast and multicast, which is not aligned with the agreement. In addition, the parameter connfigured for PDSCH scrambling is not clear whether it is for broadcast or for multicast. |
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| ***Summary of change:*** | Differentiate the ID used for initializing PDSCH DMRS sequence generator for MBS broadcast from that for multicast.Differentiate the ID used for PDSCH scrambling for MBS broadcast from that for multicast. |
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| ***Consequences if not approved:*** | gNB may have different interpretations with UEs regarding which ID is used for the multicast or for the broadcast.  |
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| ***Clauses affected:*** | 7.3.1.1, 7.4.1.1.1 |
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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:*** |  |

7.3 Physical channels

7.3.1 Physical downlink shared channel

7.3.1.1 Scrambling

Up to two codewords  can be transmitted. In case of single-codeword transmission, .

For each codeword , the UE shall assume the block of bits $b^{\left(q\right)}\left(0\right), …, b^{\left(q\right)}(M\_{bit}^{\left(q\right)}-1)$, where $M\_{bit}^{(q)}$ is the number of bits in codeword  transmitted on the physical channel, are scrambled prior to modulation, resulting in a block of scrambled bits $\tilde{b}^{\left(q\right)}\left(0\right), …, \tilde{b}^{\left(q\right)}(M\_{bit}^{\left(q\right)}-1)$according to

 $\tilde{b}^{(q)}\left(i\right)=\left(b^{(q)}\left(i\right)+c^{(q)}(i)\right) mod 2$

where the scrambling sequence $c^{\left(q\right)}(i)$ is given by clause 5.2.1. The scrambling sequence generator shall be initialized with

$$c\_{init}=n\_{RNTI}⋅2^{15}+q⋅2^{14}+n\_{ID}$$

where

-  equals the higher-layer parameter *dataScramblingIdentityPDSCH* if configured and the RNTI equals the C-RNTI, MCS-C-RNTI, or CS-RNTI, and the transmission is not scheduled using DCI format 1\_0 in a common search space;

- $n\_{ID}\in \left\{0,1,…,1023\right\}$ equals the higher-layer parameter *dataScramblingIdentityPDSCH* in *pdsch-ConfigMulticast* if configured in a common MBS frequency resource for multicast in RRC\_CONNECTED state and the RNTI equals the G-RNTI or G-CS-RNTI;

- $n\_{ID}\in \left\{0,1,…,1023\right\}$ equals the higher-layer parameter *dataScramblingIdentityPDSCH* in *pdsch-ConfigMCCH* or *pdsch-ConfigMTCH* if configured in a common MBS frequency resource for broadcast and the RNTI equals the MCCH-RNTI or G-RNTI, respectively;

- $n\_{ID}\in \left\{0,1,…,1023\right\}$ equals the higher-layer parameter *dataScramblingIdentityPDSCH* in *pdsch-ConfigMCCH* or *pdsch-ConfigMTCH* if configured in a common MBS frequency resource for multicast in RRC\_INACTIVE state and the RNTI equals the Multicast MCCH-RNTI or G-RNTI, respectively;

- $n\_{ID}\in \left\{0,1,…,1023\right\}$ equals

- the higher-layer parameter *dataScramblingIdentityPDSCH* if the codeword is scheduled using a CORESET with *CORESETPoolIndex* equal to 0;

- the higher-layer parameter *dataScramblingIdentityPDSCH2* if the codeword is scheduled using a CORESET with *CORESETPoolIndex* equal to 1;

 if the higher-layer parameters *dataScramblingIdentityPDSCH* and *dataScramblingIdentityPDSCH2* are configured together with the higher-layer parameter *CORESETPoolIndex* containing two different values, and the RNTI equals the C-RNTI, MCS-C-RNTI, or CS-RNTI, and the transmission is not scheduled using DCI format 1\_0 in a common search space;

- $n\_{ID}=N\_{ID}^{cell}$ otherwise

and where  corresponds to the RNTI associated with the PDSCH transmission as described in clause 5.1 of [6, TS 38.214].

**<Unchanged parts are omitted>**

7.4 Physical signals

7.4.1 Reference signals

7.4.1.1 Demodulation reference signals for PDSCH

7.4.1.1.1 Sequence generation

The UE shall assume the sequence $r\left(n\right)$ is defined by

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where the pseudo-random sequence $c\left(i\right)$ is defined in clause 5.2.1. The pseudo-random sequence generator shall be initialized with

$$c\_{init}=\left(2^{17}\left(N\_{symb}^{slot}n\_{s,f}^{μ}+l+1\right)\left(2N\_{ID}^{\overbar{n}\_{SCID}^{\overbar{λ}}}+1\right)+2^{17}\left⌊\frac{\overbar{λ}}{2}\right⌋+2N\_{ID}^{\overbar{n}\_{SCID}^{\overbar{λ}}}+\overbar{n}\_{SCID}^{\overbar{λ}}\right)mod 2^{31}$$

where $l$ is the OFDM symbol number within the slot, $n\_{s,f}^{μ}$ is the slot number within a frame, and

- $N\_{ID}^{0},N\_{ID}^{1}\in \left\{0,1,…,65535\right\}$ are given by the higher-layer parameters *scramblingID0* and *scramblingID1*, respectively, in the *DMRS-DownlinkConfig* IE if provided and the PDSCH is scheduled by PDCCH using DCI format 1\_1 or 1\_2 with the CRC scrambled by C-RNTI, MCS-C-RNTI, or CS-RNTI;

- $N\_{ID}^{0}\in \left\{0,1,…,65535\right\}$ is given by the higher-layer parameter *scramblingID0* in the *DMRS-DownlinkConfig* IE if provided and the PDSCH is scheduled by PDCCH using DCI format 1\_0 with the CRC scrambled by C-RNTI, MCS-C-RNTI, or CS-RNTI;

- $N\_{ID}^{0},N\_{ID}^{1}\in \left\{0,1,…,65535\right\}$ are given by the higher-layer parameters *scramblingID0* and *scramblingID1*, respectively, in the *DMRS-DownlinkConfig* IE in *pdsch-ConfigMulticast* if provided in a common MBS frequency resource for multicast in RRC\_CONNECTED state and the PDSCH is scheduled by PDCCH using DCI format 4\_2 with the CRC scrambled by G-RNTI or G-CS-RNTI;

- $N\_{ID}^{0}\in \left\{0,1,…,65535\right\}$ is given by the higher-layer parameter *scramblingID0* in the *DMRS-DownlinkConfig* IE in *pdsch-ConfigMulticast* if provided in a common MBS frequency resource for multicast in RRC\_CONNECTED state and the PDSCH is scheduled by PDCCH using DCI format 4\_1 with the CRC scrambled by G-RNTI or G-CS-RNTI;

- $N\_{ID}^{0}\in \left\{0,1,…,65535\right\}$ is given by the higher-layer parameter *scramblingID0* in *pdsch-ConfigMCCH* or *pdsch-ConfigMTCH* if provided in a common MBS frequency resource for broadcast and the PDSCH is scheduled by PDCCH with the CRC scrambled by MCCH-RNTI or G-RNTI, respectively;

- $N\_{ID}^{0}\in \left\{0,1,…,65535\right\}$ is given by the higher-layer parameter *scramblingID0* in *pdsch-ConfigMCCH* or *pdsch-ConfigMTCH* if provided in a common MBS frequency resource for multicast in RRC\_INACTIVE state and the PDSCH is scheduled by PDCCH with the CRC scrambled by MCCH-RNTI or G-RNTI, respectively;

- $N\_{ID}^{\overbar{n}\_{SCID}^{\overbar{λ}}}=N\_{ID}^{cell} $ otherwise;

- $\overbar{n}\_{SCID}^{\overbar{λ}} and \overbar{λ} are$ given by

- if the higher-layer parameter *dmrs-Downlink* in the *DMRS-DownlinkConfig* IE is provided

$$\overbar{n}\_{SCID}^{\overbar{λ}}=\left\{\begin{matrix}n\_{SCID}&λ=0 or λ=2\\1-n\_{SCID}&λ=1\end{matrix}\right.$$

$$\overbar{λ}=λ$$

 where λ is the CDM group defined in clause 7.4.1.1.2.

- otherwise by

$$\overbar{n}\_{SCID}^{\overbar{λ}}=n\_{SCID}$$

$$\overbar{λ}=0$$

The quantity $n\_{SCID}\in \left\{0, 1\right\}$ is given by the DM-RS sequence initialization field, if present, in the DCI associated with the PDSCH transmission if DCI format 1\_1, 1\_2, or 4\_2 in [4, TS 38.212] is used, otherwise $n\_{SCID}=0$.