**3GPP TSG-RAN WG1 Meeting #118 R1-24xxxxx**

**Maastricht, The Netherlands, August 19 - 23, 2024**

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| *CR-Form-v12.2* | | | | | | | | |
| **DRAFT CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.211** | **CR** | **xxxx** | **rev** | **-** | **Current version:** | **18.3.0** |  |
|  | | | | | | | | |
| *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:*** | Alignment of parameter names | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_MBS-Core, NR\_feMIMO-Core | | | | |  | ***Date:*** | | | 2024-08-26 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **A** |  | | | | | ***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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | * Misalignment of RRC parameter names between 38.211 and 38.331 * 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. (R1-2407265) | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * Aligning RRC parameter names with 38.331 * 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. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | * Inconsistent parameter names across specifications. * gNB may have different interpretations with UEs regarding which ID is used for the multicast or for the broadcast. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.4.1.4.2, 7.3.1.1, 7.4.1.1.1, 7.4.1.5.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

##### 6.4.1.4.2 Sequence generation

The sounding reference signal sequence for an SRS resource, or if *numberOfHops* for *SRS-PosResource* is provided, for a given hop within an SRS resource, shall be generated according to

where is given by clause 6.4.1.4.3, is given by clause 5.2.2 with and the transmission comb number is contained in the higher-layer parameter *transmissionComb*. The quantity is the OFDM symbol number within the SRS resource.

The quantity is given by

- if the higher-layer parameter *nrofSRS-Ports-n8* equals *ports8tdm*

- otherwise

The cyclic shift for antenna port is given as

where

where is contained in the higher layer parameter *transmissionComb*. The maximum number of cyclic shifts is given by Table 6.4.1.4.2-1.

The quantities and  are given by

- if the higher-layer parameter *nrofSRS-Ports-n8* equals *ports8tdm*

- otherwise

The quantity is given by

- if the higher-layer parameter *cyclicShiftHopping* is not configured:

- if the higher-layer parameter *cyclicShiftHopping* is configured:

where and is the th entry and the cardinality of the set

respectively, where is given by the higher-layer parameter *hoppingSubset* inthe *cyclicShiftHopping* IE if configured, otherwise . The higher-layer parameter *hoppingSubset* inthe *cyclicShiftHopping* IE includes a bitmap of bits with non-zero bits, where if the th non-zero bit is the :th bit in the bitmap, then .

The pseudo-random sequence is defined by clause 5.2.1 and shall be initialized with at the beginning of each radio frame for which , where the cyclic-shift hopping identity is contained in the higher-layer parameter *cyclicShiftHopping*.

If the higher-layer parameter *hoppingFinerGranularity* is configured, , otherwise .

The sequence group and the sequence number in clause 5.2.2 depends on the higher-layer parameter *groupOrSequenceHopping* in the *SRS-Resource* IE or the *SRS-PosResource* IE*.* The SRS sequence identity is given by the higher layer parameter *sequenceId* in the *SRS-Resource* IE.

- if *groupOrSequenceHopping* equals 'neither', neither group, nor sequence hopping shall be used and



- if *groupOrSequenceHopping* equals 'groupHopping', group hopping but not sequence hopping shall be used and



where the pseudo-random sequence is defined by clause 5.2.1 and shall be initialized with at the beginning of each radio frame.

- if *groupOrSequenceHopping* equals 'sequenceHopping', sequence hopping but not group hopping shall be used and



where the pseudo-random sequence is defined by clause 5.2.1 and shall be initialized with at the beginning of each radio frame.

Table 6.4.1.4.2-1: Maximum number of cyclic shifts as a function of .

|  |  |
| --- | --- |
|  |  |
| 2 | 8 |
| 4 | 12 |
| 8 | 6 |

#### 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 , where is the number of bits in codeword  transmitted on the physical channel, are scrambled prior to modulation, resulting in a block of scrambled bits according to

where the scrambling sequence is given by clause 5.2.1. The scrambling sequence generator shall be initialized with

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;

-  equals the higher-layer parameter *dataScramblingIdentityPDSCH* in *pdsch-ConfigMulticast* if configured in a common MBS frequency resource for multicast and the RNTI equals the G-RNTI or the G-CS-RNTI;

- 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;

- 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;

- otherwise

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

##### 7.4.1.1.1 Sequence generation

The UE shall assume the sequence is defined by

.

where the pseudo-random sequence is defined in clause 5.2.1. The pseudo-random sequence generator shall be initialized with

where is the OFDM symbol number within the slot, is the slot number within a frame, and

- 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, 1\_2, or 1\_3 with the CRC scrambled by C-RNTI, MCS-C-RNTI, or CS-RNTI;

- 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;

- 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 and the PDSCH is scheduled by PDCCH using DCI format 4\_2 with the CRC scrambled by G-RNTI or G-CS-RNTI;

- 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 and the PDSCH is scheduled by PDCCH using DCI format 4\_1 with the CRC scrambled by G-RNTI or G-CS-RNTI;

- 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;

- otherwise;

- given by

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

where λ is the CDM group defined in clause 7.4.1.1.2.

- otherwise by

The quantity 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, 1\_3, or 4\_2 in [4, TS 38.212] is used, otherwise .

##### 7.4.1.5.3 Mapping to physical resources

For each CSI-RS configured, the UE shall assume the sequence  being mapped to resources elements according to



when the following conditions are fulfilled:

- the resource element is within the resource blocks occupied by the CSI-RS resource for which the UE is configured

The reference point for is subcarrier 0 in common resource block 0.

The value of is given by the higher-layer parameter *density* in the *CSI-RS-ResourceMapping* IE or the *CSI-RS-CellMobility* IE and the number of ports is given by the higher-layer parameter *nrofPorts*. For NZP CSI-RS configured by the *TRS-ResourceSet* IE or by the *TRS-ResourceSet-r18* IE, the density and number of ports .

The UE is not expected to receive CSI-RS and DM-RS on the same resource elements.

The UE shall assume  for a non-zero-power CSI-RS where  is selected such that the power offset specified by the higher-layer parameter *powerControlOffsetSS* in the *NZP-CSI-RS-Resource* IE or in the *TRS-ResourceSet* IE, if provided, or the power offset specified by the higher-layer parameter *powerControlOffsetSS-r18* in the *TRS-ResourceSet-r18* IE, if provided, is fulfilled.

The quantities , , , and  are given by Tables 7.4.1.5.3-1 to 7.4.1.5.3-5 where each in a given row of Table 7.4.1.5.3-1 corresponds to a CDM group of size 1 (no CDM) or size 2, 4, or 8. The CDM type is provided by the higher layer parameter *cdm-Type* in the *CSI-RS-ResourceMapping* IE. For NZP CSI-RS configured by the *TRS-ResourceSet* IE or by the *TRS-ResourceSet-r18* IE, the CDM type is 'noCDM'. The indices and index resource elements within a CDM group.

The time-domain locations and are provided by the higher-layer parameters *firstOFDMSymbolInTimeDomain* and *firstOFDMSymbolInTimeDomain2*, respectively, in the *CSI-RS-ResourceMapping* IE or the *CSI-RS-ResourceConfigMobility* IE and defined relative to the start of a slot. For NZP CSI-RS configured by *TRS-ResourceSet* IE, the time-domain location is provided by the higher-layer parameter *firstOFDMSymbolInTimeDomain* or *firstOFDMSymbolInTimeDomain*+4. For NZP CSI-RS configured by *TRS-ResourceSet-r18* IE, the time-domain location is provided by the higher-layer parameter *firstOFDMSymbolInTimeDomain-r18* or *firstOFDMSymbolInTimeDomain-r18*+4.

The frequency-domain location is given by a bitmap provided by the higher-layer parameter *frequencyDomainAllocation* in the *CSI-RS-ResourceMapping* IE, the *CSI-RS-ResourceConfigMobility* IE, or the *TRS-ResourceSet* IE, or by the higher-layer parameter *frequencyDomainAllocation-r18* in the *TRS-ResourceSet-r18* IE, with the bitmap and value of in Table 7.4.1.5.3-1 given by

- , for row 1 of Table 7.4.1.5.3-1

- , for row 2 of Table 7.4.1.5.3-1

- , for row 4 of Table 7.4.1.5.3-1

- , for all other cases

where  is the bit number of the  bit in the bitmap set to one, repeated across every of the resource blocks configured for CSI-RS reception by the UE. The starting position and number of the resource blocks in which the UE shall assume that CSI-RS is transmitted are given by the higher-layer parameters *freqBand* and *density* in the *CSI-RS-ResourceMapping* IE for the bandwidth part given by the higher-layer parameter *BWP-Id* in the *CSI-ResourceConfig* IE or given by the higher-layer parameters *nrofPRBs* in the *CSI-RS-CellMobility* IE where the the *startPRB* given by *csi-rs-MeasurementBW* is relative to common resource block 0*.* For NZP CSI-RS configured by *TRS-ResourceSet* IE, the starting position and number of the resource blocks in which the CSI-RS can be transmitted are given by the higher-layer parameters *nrofRBs*, and *startingRB* in the *TRS-ResourceSet* IE, where *startingRB* is relative to common resource block 0 and the density . For NZP CSI-RS configured by *TRS-ResourceSet-r18* IE, the starting position and number of the resource blocks in which the CSI-RS can be transmitted are given by the higher-layer parameters *nrofRBs-r18*, and *startingRB-r18* in the *TRS-ResourceSet-r18* IE, where *startingRB-r18* is relative to common resource block 0 and the density .

The UE shall assume that a CSI-RS is transmitted using antenna ports  numbered according to



where  is the sequence index provided by Tables 7.4.1.5.3-2 to 7.4.1.5.3-5,  is the CDM group size, and  is the number of CSI-RS ports. The CDM group index  given in Table 7.4.1.5.3-1 corresponds to the time/frequency locations  for a given row of the table. The CDM groups are numbered in order of increasing frequency domain allocation first and then increasing time domain allocation.

For a CSI-RS resource configured as periodic or semi-persistent by the higher-layer parameter *resourceType*, configured by the higher-layer parameter *CSI-RS-CellMobility* or configured by the higher-layer parameter *TRS-ResourceSet*or by the higher layer parameter *TRS-ResourceSet-r18*, the UE shall assume that the CSI-RS is transmitted in slots satisfying



where the periodicity  (in slots) and slot offset  are obtained from the higher-layer parameter *CSI-ResourcePeriodicityAndOffset*, *slotConfig*, *periodicityAndOffset*or *periodicityAndOffset-r18*. The UE shall assume that CSI-RS is transmitted in a candidate slot as described in clause 11.1 of [5, TS 38.213], clause 10.4B of [5, TS 38.213].

The UE may assume that antenna ports within a CSI-RS resource are quasi co-located with QCL Type A, Type D (when applicable), and average gain.

Table 7.4.1.5.3-1: CSI-RS locations within a slot.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Row** | **Ports** | **Density** | ***cdm-Type*** |  | **CDM group index** |  |  |
| 1 | 1 | 3 | noCDM | , , | 0,0,0 | 0 | 0 |
| 2 | 1 | 1, 0.5 | noCDM | , | 0 | 0 | 0 |
| 3 | 2 | 1, 0.5 | fd-CDM2 | , | 0 | 0, 1 | 0 |
| 4 | 4 | 1 | fd-CDM2 | , | 0,1 | 0, 1 | 0 |
| 5 | 4 | 1 | fd-CDM2 | , | 0,1 | 0, 1 | 0 |
| 6 | 8 | 1 | fd-CDM2 | , , , | 0,1,2,3 | 0, 1 | 0 |
| 7 | 8 | 1 | fd-CDM2 | , ,, | 0,1,2,3 | 0, 1 | 0 |
| 8 | 8 | 1 | cdm4-FD2-TD2 | , | 0,1 | 0, 1 | 0, 1 |
| 9 | 12 | 1 | fd-CDM2 | , , , ,, | 0,1,2,3,4,5 | 0, 1 | 0 |
| 10 | 12 | 1 | cdm4-FD2-TD2 | , , | 0,1,2 | 0, 1 | 0, 1 |
| 11 | 16 | 1, 0.5 | fd-CDM2 | , , , ,, , , | 0,1,2,3,  4,5,6,7 | 0, 1 | 0 |
| 12 | 16 | 1, 0.5 | cdm4-FD2-TD2 | , , , | 0,1,2,3 | 0, 1 | 0, 1 |
| 13 | 24 | 1, 0.5 | fd-CDM2 | , , , , , ,, , , , , | 0,1,2,3,4,5,  6,7,8,9,10,11 | 0, 1 | 0 |
| 14 | 24 | 1, 0.5 | cdm4-FD2-TD2 | , , , , , | 0,1,2,3,4,5 | 0, 1 | 0, 1 |
| 15 | 24 | 1, 0.5 | cdm8-FD2-TD4 | , , | 0,1,2 | 0, 1 | 0, 1, 2, 3 |
| 16 | 32 | 1, 0.5 | fd-CDM2 | , , , ,, , , , , , , , , , , | 0,1,2,3,  4,5,6,7,  8,9,10,11,  12,13,14,15 | 0, 1 | 0 |
| 17 | 32 | 1, 0.5 | cdm4-FD2-TD2 | , , , , , , , | 0,1,2,3,4,5,6,7 | 0, 1 | 0, 1 |
| 18 | 32 | 1, 0.5 | cdm8-FD2-TD4 | , , , | 0,1,2,3 | 0,1 | 0,1, 2, 3 |

Table 7.4.1.5.3-2: The sequences  and  for *cdm-Type* equal to 'noCDM'.

|  |  |  |
| --- | --- | --- |
| Index |  |  |
| 0 | 1 | 1 |

Table 7.4.1.5.3-3: The sequences  and  for *cdm-Type* equal to 'fd-CDM2'.

|  |  |  |
| --- | --- | --- |
| Index |  |  |
| 0 |  | 1 |
| 1 |  | 1 |

Table 7.4.1.5.3-4: The sequences  and  for *cdm-Type* equal to 'cdm4-FD2-TD2'.

|  |  |  |
| --- | --- | --- |
| Index |  |  |
| 0 |  |  |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |

Table 7.4.1.5.3-5: The sequences  and  for *cdm-Type* equal to 'cdm8-FD2-TD4'.

|  |  |  |
| --- | --- | --- |
| Index |  |  |
| 0 |  |  |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |