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

Maastricht, Netherlands, August 19th – August 24th, 2024

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| *CR-Form-v12.1* | | | | | | | | |
| **DRAFT CHANGE REQUEST** | | | | | | | | |
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|  | **38.211** | **CR** | **-** | **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:*** | Draft CR for staircase pattern for SRS Tx hopping in TS 38.211 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Moderator (Ericsson), ZTE Corporation, Sanechips | | | | | | | | | |
| ***Source to TSG:*** | RAN1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh2-Core | | | | |  | ***Date:*** | | | 2024-08-09 |
|  |  | | | |  | |  | | |  |
| ***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 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
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| ***Reason for change:*** | | According to the agreement, staircase pattern is supported for the SRS Tx hopping pattern:   |  | | --- | | **Agreement**  For the SRS Tx hopping pattern configuration support at least the staircase pattern, including a wrapped staircase pattern.   * Support configuring the starting PRB of the first hop * FFS: details of signalling of PRB overlap across consecutive hops and bandwidth of each hop |   Currently in TS38.211, the transmission counter for SRS Tx hopping corresponds to the order of higher layer parameter for hops. To make sure the SRS hops is a (wrapped) staircase pattern, the hop position should be sequentially configured in an ascending order in time domain. However, there is no such restriction in either RAN1’s spec or RAN2’s spec, and the (wrapped) staircase pattern can not be guaranteed. | | | | | | | | |
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| ***Summary of change:*** | | Make it clear in TS 38.211 that: UE expects to be configured with hops in an ascending order sequentially in time domain | | | | | | | | |
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| ***Consequences if not approved:*** | | The (wrapped) staircase pattern can not be guaranteed for SRS Tx hopping pattern. | | | | | | | | |
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| ***Clauses affected:*** | | 6.4.1.4.3 | | | | | | | | |
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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:*** | | **Impact Analysis:**  No backward compatible issue is expected from the CR. | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

#### 6.4.1.4 Sounding reference signal

##### 6.4.1.4.3 Mapping to physical resources

Throughout this clause, when the higher layer parameter *numberOfHops* is provided for *SRS-PosResource*, the sounding reference signal sequence definitions applies to a given hop.

When SRS is transmitted on a given SRS resource, the sequence for each OFDM symbol and for each of the antenna ports of the SRS resource shall be multiplied with the amplitude scaling factor  in order to conform to the transmit power specified in [5, 38.213] and mapped in sequence starting with  to resource elements  in a slot for each of the antenna ports  according to

The length of the sounding reference signal sequence is given by

where is given by a selected row of Table 6.4.1.4.3-1 with  where  is given by the field *b-SRS* contained in the higher-layer parameter *freqHopping* if configured, otherwise . The row of the table is selected according to the index  given by the field *c-SRS* contained in the higher-layer parameter *freqHopping*. The quantity is given by the higher-layer parameter *FreqScalingFactor* if configured, otherwise . When *FreqScalingFactor* is configured, the UE expects the length of the SRS sequence to be a multiple of 6.

The frequency-domain starting position is defined by

where

and

and

- is given by the higher-layer parameter *StartRBIndex* if configured, otherwise ;

- is given by Table 6.4.1.4.3-3 with

if the higher-layer parameter *EnableStartRBHopping* is configured, otherwise .

- is given by the higher-layer parameter *overlapValue* in *TxHoppingConfig*.

- is the hop transmission counter in the time domain, where corresponds to the order of the higher-layer parameter *SlotOffsetForRemainingHops* in *slotOffsetForRemainingHopsList*, wherein the UE expects to be configured with hops in an ascending order sequentially in time domain.- is the initial hop index.