**3GPP TSG RAN WG1 #117R1-24XXXX\_e**

**Fukuoka City, Fukuoka, Japan, May 20th – 24th, 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.214** | **CR** | **DRAFT** | **rev** |  | **Current version:** | **18.2.0** |  |
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| *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:***  | Correction to Parameters for SRS with tx hopping  |
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| ***Source to WG:*** | Moderator (Ericsson), [vivo, ZTE, Ericsson, Intel] |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | NR\_pos\_enh2-Core |  | ***Date:*** | 2024-05-04 |
|  |  |  |  |  |
| ***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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** |  The parameters for PRS and SRS for positioning frequency hopping were not aligned between 38.214 and RAN2 specifications.  |
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| ***Summary of change:*** | Parameter name alignment between RAN1 and RAN2 for the PRS and SRS for positioning with frequency hopping |
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| ***Consequences if not approved:*** | Misaligned specs between RAN1 and RAN2. |
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| ***Clauses affected:*** |  |
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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:*** |  |

**5.1.6.5.1 PRS receiver frequency hopping**

The reduced capability UE may be configured to measure and report, subject to UE capability, via *nr-DL-PRS-RxHoppingRequest* the DL RSTD, DL PRS-RSRP, DL PRS-RSRPP, or UE Rx-Tx time difference using receiver frequency hopping for a DL PRS resource, with a requested bandwidth of all hops that may be greater than the maximum reduced capability UE bandwidth. The reduced capability UE performing receiver frequency hopping may report via *nr-ReportDL-PRS-MeasBasedOnSingleOrMultiHopR*x one measurement associated with one received frequency hop or one measurement based on multiple hops of the DL PRS. The reduced capability UE may report whether the measurement is associated with one received frequency hop or multiple frequency hops of the DL PRS. In RRC\_CONNECTED mode, the reduced capability UE is expected to use a single instance of a configured measurement gap to receive all hops of the DL PRS using receiver frequency hopping.

6.2.1.4.1 SRS frequency hopping for positioning

The reduced capability UE may be configured via *SRS-PosTx-Hopping*, subject to UE capability, to perform transmit frequency hopping separate from the UL BWP configuration and outside of the UL BWP, where the UE may be configured with subcarrier spacing, CP and bandwidth that are different from the UL active BWP. The reduced capability UE transmit frequency hopping is configured within one SRS resource for positioning, that may be configured with a bandwidth larger than the maximum bandwidth of the reduced capability UE, in RRC\_CONNECTED or RRC\_INACTIVE mode. The reduced capability UE transmit frequency hopping, may be configured with overlapping or non-overlapping frequency hops in the frequency domain. When the reduced capability UE is configured to perform transmit frequency hopping:

- it expects to be configured with the following parameters:

- starting PRB of the first hop in time domain in *freqDomainShift*

- starting slot offset for each hop in *slotOffset* and starting symbol for each hop in *startPosition*

- number of symbols in each hop in *nrofSymbols*

- hop bandwidth in *c-SRS*

- number of overlapping resource block(s) between hops, if present, in *overlapValue*

- number of hops in *numberOfHops*.

- it does not expect to be configured with the sum of *startPosition* and *nrofSymbols* for a hop that exceeds a slot duration.

- it expects to be configured with the same periodicity of each hop of an SRS resource with the transmit frequency hopping.

The reduced capability UE may be configured, via *srs-PosUplinkTransmissionWindowConfig*, subject to UE capability, with an UL time window where the UE is not expected to transmit other signals/channels and is only expected to transmit the SRS for positioning using frequency hopping. The UE is not expected to be configured with one [cycle] of the transmit frequency hopping, including the switching time from/to active BWP required ahead of the first hop and after the last hop, that is partially overlapped with the time window.

For aperiodic positioning SRS with Tx frequency hopping, the minimal time interval between the last symbol of the PDCCH triggering the aperiodic SRS transmission and the first symbol of SRS resource is *N2* symbols and an additional time duration corresponding to the switching time from the active uplink BWP.

The reduced capability UE is expected to switch back to the active BWP if the time between two consecutive hops exceeds twice the switching time from/to the active BWP.

In RRC\_CONNECTED mode, for a transmission of a hop for an SRS resource for positioning with frequency hopping starting in symbol $N\_{c\_{1}}$ and a colliding PUSCH or PUCCH transmission$ $starting in symbol $N\_{S} $, the UE shall apply the dropping rules taking into account:

- DCI(s) for which the time interval between the last symbol of PDCCH and the SRS symbol $N\_{c\_{1}}$is at least $N\_{2}$ symbols and additional time duration $T\_{SRS\_{h}}$, where $T\_{SRS\_{h}}$ is the switching time to/from the active BWP.

- DCI(s) for which the time interval between the last symbol of PDCCH and the colliding PUSCH/PUCCH symbol $N\_{S} $is at least $N\_{2}$ symbols, where calculation of $N\_{2}$ is based on the smallest SCS between the SCS configured for positioning SRS with the frequency hopping, the SCS of the PUSCH/PUCCH, and the SCS of the PDCCH.

- semi-persistent CSI reports or SRS considered active at least $N\_{2}$ symbols and an additional time duration $T\_{SRS\_{h}}$ before $N\_{c\_{1}}$, and considered active at least $N\_{2}$ symbols before $N\_{S}$.

If the SRS symbol(s), including the switching time to and from the active bandwidth part, of the transmit frequency hopping collides with PUSCH or PUCCH, and if the UE determines the SRS to be dropped, the colliding SRS symbol(s) are dropped.

When the reduced capability UE is configured by the higher layer parameter *SRS-PosTx-Hopping*, including a switching time to and from the active bandwidth part, the UE shall use the same priority rules as defined in Clause 6.2.1.

For operation in the same carrier, the reduced capability UE is not expected to be configured on overlapping symbols with an SRS resource of the transmit frequency hopping configured by the higher layer parameter *SRS-PosTx-Hopping* including the switching time to or from the active bandwidth part and an SRS resource with *resourceType* of both SRS resources as 'periodic'.

For operation in the same carrier, the reduced capability UE is not expected to be activated or triggered to transmit SRS on overlapping symbols with a SRS resource of the transmit frequency hopping configured by the higher layer parameter*SRS-PosTx-Hopping* including the switching time to or from the active bandwidth part and a SRS resource with *resourceType* of both SRS resources as 'semi-persistent' or 'aperiodic'.