**3GPP TSG-RAN WG1 Meeting #117** ***R1-24xxxxx***

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

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| *CR-Form-v12.3* |
| **Draft CHANGE REQUEST** |
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|  | **38.214** | **CR** |  | **rev** |  | **Current version:** | **18.2.0** |  |
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| *For* [***HELP***](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:***  | Editorial corrections to TS 38.214 for Rel-18 Positioning |
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| ***Source to WG:*** | Moderator (Intel Corporation) |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | NR\_pos\_enh2-Core |  | ***Date:*** | 2024-05-20 |
|  |  |  |  |  |
| ***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:*** | Clause 5.1.6.5.1:* Temporary placeholders for higher layer parameter names related to PRS receiver frequency hopping need to be updated.

Clause 5.1.6.5.3:* There is no higher layer parameter of *nr-DL-PRS-JointMeasurementRequested* in current TS 37.355.

Clause 6.2.1.4.1:* According to the TS38.331 and RAN1 agreement, SRS frequency hopping can be configured without window (i.e., *srs-PosUplinkTransmissionWindowConfig*). SRS frequency hopping is configured via *SRS-PosTx-Hopping*.
* According to RAN1’s agreement, the starting slot offset for the first hop and that for the hops following the first hop are separately configured. Specifically, starting slot of the first hop reuse SRS-PeriodicityAndOffset IE, and a new IE *slotoffset* is introduced for the starting slot offset for the remaining hops. Further, the parameter *slotoffest* can only be used for aperiodic SRS. Current specification does not correctly reflect these details.
* At the RAN1#115 meeting, it was agreed that UE is not expected to be configured with a SRS for positioning hopping cycle, including the switching time from/to active BWP required ahead of the first hop and after the last hop, partially overlapping with UTW. However, this is not accurately captured in the specification.
* Temporary placeholders for higher layer parameter names related to SRS frequency hopping for positioning need to be updated.

Clause 6.2.1.4.2:* There is no higher layer parameter of *freqInfoAdditionalCcList* in current TS 38.331.

Clause 8.2.4:* Parameter *sl-CombSize* and *sl-PRS-comb-offset* can only be used in dedicated resource pool. *sl-PRS-CombSizeN-AndReOffset* should be used in shared resource pool.
* Parameter *mNumberOfSymbols* can only be used in shared resource pool*. sl-NumberOfSymbols* should be used a dedicated resource pool.

Clause 8.2.4.2A:* There is no ‘SL-PRS resource ID (s)’ field in SCI format 1-B.
* Parameter *sl-MaxNumPerReserve* cannot be used for dedicated resource pool.

Clause 8.2.4.3:* Parameter *sl-CR-Limit* cannot be used for dedicated resource pool.
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| ***Summary of change:*** | Clause 5.1.6.5.1:* Replace “[*nr-Requested-DL-PRS-measurementBasedOnMultihopRx*]” with “*nr-DL-PRS-RxHoppingRequest*”.
* Replace placeholder “[*higher layer parameter*]” with actual parameter name “*nr-ReportDL-PRS-MeasBasedOnSingleOrMultiHopRx*”.

Clause 5.1.6.5.3:* Replace *nr-DL-PRS-JointMeasurementRequested* with *nr-DL-PRS-JointMeasurementRequestedPFL-List*.

Clause 6.2.1.4.1:* Update ‘*srs-PosUplinkTransmissionWindowConfig*’ to ‘*SRS-PosTx-Hopping*’.
* Clarify in the spec that the starting slot offset for the first hop and that for the hops following the first hop are configured with different parameters. Add slot offset parameter for periodic and semi-persistent SRS.
* Remove brackets for hopping cycle for SRS with Tx frequency hopping during uplink time window.
* Align higher layer parameter names including replacing placeholders with actual parameter names agreed by RAN2, including references to *startPosition, nrofSymbols*, and *SRS-PosTx-Hopping*.

Clause 6.2.1.4.2:* Replace “*freqInfoAdditionalCcList* on” with “*SRS-PosRRC-AggBW-InactiveConfigList* for”.

Clause 8.2.4:* Describe comb offset and comb size for dedicated SL PRS resource pool and for shared SL PRS resource pool, respectively. Add “in a dedicated SL PRS resource pool. *sl-PRS-CombSizeN-AndReOffset* indicates a comb offset and a comb size of the SL PRS resource in a shared SL PRS resource pool”.
* Change *sl-NumberOfSymbols* to *mNumberOfSymbols* for shared SL PRS resource pool.

Clause 8.2.4.2A:* Replace “SL-PRS resource ID (s)” with “Resource ID indication”.
* Add ""sl-MaxNumPerReserve” is replaced by “sl-MaxNumPerReserveDedicatedSL-PRS-RP””.
* Delete “[potential parameter name changes]”.

Clause 8.2.4.3:* Add “"*sl-CR-Limit*” is replaced by “*sl-PRS-CR-Limit*”“.
* Delete “[potential parameter name changes]”.
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| ***Consequences if not approved:*** | Specification is incomplete or incorrect. |
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| ***Clauses affected:*** | 5.1.6.5.1, 5.1.6.5.3, 6.2.1.4.1, 6.2.1.4.2, 8.2.4, 8.2.4.2A, 8.2.4.3 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  |  |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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-MeasBasedOnSingleOrMultiHopRx* 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.

**<Unchanged text omitted>**

5.1.6.5.3 PRS bandwidth aggregation for positioning measurements

When the UE is expected to perform aggregated measurements for bandwidth aggregation across DL PRS positioning frequency layers, the UE expects to be configured with linkage information, via higher layer parameter *nr-DL-PRS-AggregationInfo*, between DL PRS resource sets across DL PRS positioning frequency layers. For the linked DL PRS resource sets, the UE is expected to be configured with the same values of QCL, *dl-PRS-Periodicity-and-ResourceSetSlotOffset, dl-PRS-NumSymbols*,*dl-PRS-ResourceTimeGap, dl-PRS-ResourceRepetitionFactor, dl-PRS-ResourceSymbolOffset,* *dl-PRS-MutingBitRepetitionFactor,* *dl-PRS-SubcarrierSpacing, dl-PRS-CyclicPrefix*, comb size, power per subcarrier, *NR-MutingPattern*, and *NR-DL-PRS-SFN0-Offset,* and the UE is expected to be configured with DL PRS resources that maintain uniformly spaced DL PRS RE pattern within a symbol across aggregated DL PRS positioning frequency layers. The UE assumes that DL PRS resources across the linked DL PRS resource sets which satisfy the above conditions are linked for bandwidth aggregation, and the UE may assume phase continuity on the DL PRS resources on same symbol(s); otherwise, the UE does not assume that PRS resources from the linked DL PRS resource sets are linked for bandwidth aggregation.

The UE may be indicated by the network that aggregated DL PRS resource set(s) can be used as the reference for the aggregated DL RSTD, DL PRS-RSRP, DL PRS-RSRPP, and UE Rx-Tx time difference measurements.

The UE may be configured to measure and report, subject to UE capability, up to 4 aggregated DL RSTD measurement(s) per pair of *dl-PRS-ID,* from a different pair of aggregated DL PRS resources across two or three DL PRS positioning frequency layers*.* The UE may report up to 4 RSTD measurements associated with different aggregated DL PRS resources per UE Rx TEG per *dl-PRS-ID*.

The UE may be configured to measure and report, subject to UE capability, up to 4 aggregated UE Rx-Tx time difference measurement(s) from aggregated DL PRS resources across two or three DL PRS positioning frequency layers. The UE may report up to 4 UE Rx-Tx time difference measurements associated with different aggregated DL PRS resources per UE RxTx TEG per *dl-PRS-ID*.

The UE may be requested via higher layer parameter*nr-DL-PRS-JointMeasurementRequestedPFL-List* to perform the aggregated DL RSTD measurement(s) or the aggregated UE Rx-Tx time difference measurement(s) across two or three DL PRS positioning frequency layers.

The UE may report via higher layer parameter *nr-RSTD-BasedOnAggregatedResources* or *nr-UE-RxTxTimeDiffBasedOnAggregatedResources* in a measurement report whether the aggregated DL RSTD measurement(s) or the aggregated UE Rx-Tx time difference measurement(s) is performed. If any aggregated measurement is performed, the two or three DL PRS positioning frequency layers to be used may also be reported by reporting PRS resource set IDs.

If the UE reports a DL PRS-RSRP or a DL PRS-RSRPP with aggregated DL RSTD measurement(s) or aggregated UE Rx-Tx time difference measurement(s), the DL PRS-RSRP or the DL PRS-RSRPP correspond to the aggregated DL PRS resources across two or three DL PRS positioning frequency layers.

For PRS resources on multiple DL PRS positioning frequency layers (PFLs) linked for aggregation, the channel over which a symbol on one PFL for PRS transmission is conveyed can be inferred from the channel over which the same symbol of another PFL or the aggregated PFL is conveyed.

**<Unchanged text omitted>**

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 the first hop in *SRS-PeriodicityAndOffset*, starting slot offset for each hop following the first hop in *slotOffset* for aperiodic SRS and in *periodicityAndOffset* for periodic or semi-persistent SRS, 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'.

**<Unchanged text omitted>**

##### 6.2.1.4.2 SRS bandwidth aggregation for positioning measurements

The UE is expected to be configured with linkage information *SRS-PosResourceSetLinkedForAggBWList* on SRS resource sets for positioning across two or three CCs which are linked for bandwidth aggregation. For the linked SRS resource sets, the UE is expected to be configured with the same values of *startPosition, nrofSymbols,* *periodicityAndOffset, slotOffset, alpha, p0,* *spatialRelationInfoPos, resourceType*, subcarrier spacing, CP, and comb size, and the UE is expected to maintain phase continuity for the SRS transmission on the same symbol(s). The UE assumes that SRS resources across the linked SRS resource sets which satisfy the above conditions are linked for bandwidth aggregation, otherwise, the UE does not assume that SRS resources of the linked SRS resource sets are linked for bandwidth aggregation. For the linked SRS resource sets for bandwidth aggregation across CCs, if an SRS configured by the higher layer parameter *SRS-PosResource,* along with the [switching period] when applicable*,* collides with other signals or channels on a symbol and if the SRS in that symbol is dropped, SRS transmission of the linked SRS resource sets across all CCs is dropped on that symbol.

If the UE is configured with *dci-TriggeringPosResourceSetLink*, and if the UE receives a DCI 0\_1, 0\_2, 1\_1, or 1\_2 triggering an aperiodic SRS resource set for positioning linked for bandwidth aggregation in a CC, subject to UE capability, UE transmits SRS of the linked SRS resource sets across all CCs.

A UE in RRC\_INACTIVE mode is expected to be configured with *SRS-PosRRC-AggBW-InactiveConfigList* for additional component carrier(s) with respective SRS configuration(s) for bandwidth aggregation.

When an SRS resource configured in a CC without PUSCH or PUCCH is linked for bandwidth aggregation with an SRS resource configured in an active UL BWP of another CC, there is a guard period during which the UE is not expected to transmit or receive other signals or channels, subject to UE capability.

**<Unchanged text omitted>**

### 8.2.4 SL PRS transmission procedure

The following parameters for SL PRS transmission are associated with each SL PRS resource:

- SL PRS resource ID provided by *sl-PRS-ResourceID* indicates an identity of a SL PRS resource. The SL PRS resource is identified by the SL PRS resource ID that is unique within a slot of a dedicated SL PRS resource pool. For a shared SL PRS resource pool, a SL PRS resource is uniquely identified by a combination of the SL PRS resource ID, SL PRS frequency domain allocation within a slot indicated by “frequency resource assignment” field in the associated SCI format 1-A, and a starting symbol within the slot as determined by clause 8.2.4.1.1.

- *sl-CombSize* and *sl-PRS-comb-offset* indicates a comb offset and a comb size of the SL PRS resource in a dedicated SL PRS resource pool. *sl-PRS-CombSizeN-AndReOffset* indicates a comb offset and a comb size of the SL PRS resource in a shared SL PRS resource pool.

- *sl-PRS-starting-symbol* and *sl-NumberOfSymbols* indicates the starting symbol index and the number of symbols of the SL PRS resource within a slot in a dedicated SL PRS resource pool. *mNumberOfSymbols* indicates the number of symbols of the SL PRS resource within a slot in a shared SL PRS resource pool.

**<Unchanged text omitted>**

8.2.4.2A UE procedure for determining slots and SL PRS resource(s) associated with an SCI format 1-B in a dedicated SL PRS resource pool

The set of slots and SL PRS resources for SL PRS transmission is determined by the PSCCH containing the associated SCI format 1-B, and fields '*Resource ID indication'*, '*Time resource assignment*' of the associated SCI format 1-B as described below.

The set of slots is determined as in clause 8.1.5, with the following modifications:

- "SCI format 1-A" is replaced by "SCI format 1-B",

- "*sl-MaxNumPerReserve*" is replaced by "*sl-MaxNumPerReserveDedicatedSL-PRS-RP*".

**<Unchanged text omitted>**

#### 8.2.4.3 Sidelink congestion control in a dedicated SL PRS resource pool in sidelink resource allocation mode 2

When transmitting SL-PRS in a dedicated SL PRS resource pool the UE shall perform sidelink congestion control as specified in clause 8.1.6, with the following modification(s):

- "PSSCH" is replaced by "SL PRS"

- "*sl-CR-Limit*" is replaced by "*sl-PRS-CR-Limit*"

- the congestion control processing time *N* is based on µ of Table 8.1.6-1, Table 8.1.6-2 and Table 8.2.4.3-1 for UE processing capability 1, 2 and 3 respectively, where µ corresponds to the subcarrier spacing with which the SL PRS is to be transmitted. A UE shall only apply a single processing time capability in SL-PRS congestion control in dedicated SL PRS resource pool.

Table 8.2.4.3-1: Congestion control processing time for processing timing capability 3

|  |  |
| --- | --- |
| **µ**  | Congestion control processing time *N* [slots] |
| 0 | 3 |
| 1 | 6 |
| 2 | 12 |
| 3 | 24 |

**<Unchanged text omitted>**