**3GPP TSG RAN WG1 #119 R1-241xxxx**

Orlando, US, November 18th –22nd, 2024

**Source: Moderator (ZTE)**

**Title:** **Summary on timeline of BW aggregation SRS for positioning**

**Agenda Item: 8.1**

**Document for:** **Discussion and Decision**

# Introduction

In this contribution, a summary of the following submitted draft CR is provided.

R1-2410455 Draft CR on timeline of BW aggregation SRS for positioning ZTE Corporation, Sanechips

The details are copies here:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | | | | |
| ***Reason for change:*** | | In RAN1#118bis meeting, the timeline was agreed for positioning SRS bandwidth aggregation when there is collision between PUSCH/PUCCH and the positioning SRS. It specified the time interval between the last symbol of PDCCH and the SRS.   |  | | --- | | For an SRS transmission for bandwidth aggregation starting in symbol of carrier and a conflicting transmission in any aggregated carrier starting in symbol, the UE shall apply the prioritization / dropping rules in this clause taking into account:  - DCI(s) for which the time interval between the last symbol of PDCCH and is at leastsymbols and an additional guard period when applicable, and the time interval between the last symbol of PDCCH and is at least symbols*;*  where the time interval unit of OFDM symbol is counted based on the subcarrier spacing of the aggregated SRS transmission. |   However, the conflicting transmission may also be semi-persistent CSI report or semi-persistent MIMO SRS activated by a MAC CE. In such case, the activation should not be too closed to the positioning SRS, otherwise, UE may not have sufficient to drop the positioning SRS. The corresponding description has been captured for carrier switching SRS and positioning SRS with frequency hopping for Redcap UE. | | | |
|  | |  | | | |
| ***Summary of change:*** | | Defines the activation used to active CSI reports or MIMO SRS for which the time interval between the activation and the colliding positioning SRS | | | |
|  | |  | | | |
| ***Consequences if not approved:*** | | UE behavior is missing and ambiguous for the case when semi-persistent CSI report or semi-persistent MIMO SRS collides with bandwidth aggregation SRS for positioning | | | |
|  | |  | | | |
| ***Clauses affected:*** | | 6.2.1.4.2 | | | |
|  | |  | | | |
|  | | **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:*** | | **Impact Analysis:**  No backward compatible issue is expected from the CR. | | | |
|  | |  | | | |
| ***This CR's revision history:*** | |  | | | |
|  |  | | | | |
| ***Reason for change:*** | | In RAN1#118bis meeting, the timeline was agreed for positioning SRS bandwidth aggregation when there is collision between PUSCH/PUCCH and the positioning SRS. It specified the time interval between the last symbol of PDCCH and the SRS.   |  | | --- | | For an SRS transmission for bandwidth aggregation starting in symbol of carrier and a conflicting transmission in any aggregated carrier starting in symbol, the UE shall apply the prioritization / dropping rules in this clause taking into account:  - DCI(s) for which the time interval between the last symbol of PDCCH and is at leastsymbols and an additional guard period when applicable, and the time interval between the last symbol of PDCCH and is at least symbols*;*  where the time interval unit of OFDM symbol is counted based on the subcarrier spacing of the aggregated SRS transmission. |   However, the conflicting transmission may also be semi-persistent CSI report or semi-persistent MIMO SRS activated by a MAC CE. In such case, the activation should not be too closed to the positioning SRS, otherwise, UE may not have sufficient to drop the positioning SRS. The corresponding description has been captured for carrier switching SRS and positioning SRS with frequency hopping for Redcap UE. | | | |
|  | |  | | | |
| ***Summary of change:*** | | Defines the activation used to active CSI reports or MIMO SRS for which the time interval between the activation and the colliding positioning SRS | | | |
|  | |  | | | |
| ***Consequences if not approved:*** | | UE behavior is missing and ambiguous for the case when semi-persistent CSI report or semi-persistent MIMO SRS collides with bandwidth aggregation SRS for positioning | | | |
|  | |  | | | |
| ***Clauses affected:*** | | 6.2.1.4.2 | | | |
|  | |  | | | |
|  | | **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:*** | | **Impact Analysis:**  No backward compatible issue is expected from the CR. | | | |
|  | |  | | | |
| ***This CR's revision history:*** | |  | | | |

##### 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*, *subcarrierSpacing*, *cyclicPrefix*, and *transmissionComb*, 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.

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 frequency information via *freqInfo* in *SRS-PosResourceSetLinkedForAggBW* 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 in the same band, there is a guard period during which the UE is not expected to transmit or receive other signals or channels in this band, or any other affected band(s), subject to UE capability.

For the linked SRS resource sets for bandwidth aggregation across CCs in RRC\_CONNECTED state, if an SRS configured by the higher layer parameter *SRS-PosResource*, along with the guard 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.

For the linked SRS resource sets for bandwidth aggregation in RRC\_INACTIVE state, if an SRS configured by the higher layer parameter *SRS-PosResource*, along with the guard period when applicable, collides with other signals or channels on a symbol, SRS transmission of all linked SRS resource sets is dropped on that symbol.

If the UE receives an activation or deactivation command of semi-persistent SRS resource set(s) for positioning in up to three aggregated carriers or SRS resource set(s) for positioning in up to two aggregated carriers as specified in [10, TS 38.321] and when the UE would transmit a PUCCH with HARQ-ACK information in slot *n* corresponding to the PDSCH carrying the activation or deactivation command, the corresponding actions in [10, TS 38.321] and the UE assumptions on SRS transmission or cessation corresponding to the SRS resource set(s) shall be applied starting from the first slot that is after slot where µ is the SCS configuration for the PUCCH.

For positioning SRS resources on multiple carriers linked for aggregation, the channel over which a symbol on one carrier for SRS transmission is conveyed can be inferred from the channel over which the same symbol of another carrier or the aggregated carrier is conveyed.

For an SRS transmission for bandwidth aggregation starting in symbol of carrier and a conflicting transmission in any aggregated carrier starting in symbol, the UE shall apply the prioritization / dropping rules in this clause taking into account:



- DCI(s) for which the time interval between the last symbol of PDCCH and is at leastsymbols and an additional guard period when applicable, and the time interval between the last symbol of PDCCH and is at least symbols*;*



For an SRS transmission for bandwidth aggregation starting in symbol of carrier and a conflicting transmission in any aggregated carrier starting in symbol, the UE shall apply the prioritization / dropping rules in this clause taking into account:



- DCI(s) for which the time interval between the last symbol of PDCCH and is at leastsymbols and an additional guard period when applicable, and the time interval between the last symbol of PDCCH and is at least symbols*;*



where the time interval unit of OFDM symbol is counted based on the subcarrier spacing of the aggregated SRS transmission.

- semi-persistent CSI reports or SRS configured by the higher layer parameter *SRS-Resource* considered active at least symbols and an additional guard period before , and considered active at least symbols before .

<omitted text>

# Discussion

**Moderator Proposal :**

* Agree the draft CR R1-2410455 as above

|  |  |  |
| --- | --- | --- |
| Company | YES/NO | Comment |
| CATT |  | It is unclear to us what it means by “considered active at least symbols and an additional guard period before , and considered active at least symbols before ”. From the reason for change, to avoid the conflict, the UL Tx mission should be completed “at least symbols before ”, and the dropping rule applies if the UL Tx mission is not completed “at least symbols before ”., e.g.,  - semi-persistent CSI reports or SRS configured by the higher layer parameter *SRS-Resource* considered active at least symbols and an additional guard period before , if the transmission is not completed at least symbols before . |
| Qualcomm |  | We are OK with the wording from the FL, but not from CATT. The wording from CATT exists already in the SRS carrier switching section: |
| Huawei, HiSilicon |  | The inserted text should be before the following text.  where the time interval unit of OFDM symbol is counted based on the subcarrier spacing of the aggregated SRS transmission. |