**3GPP TSG-RAN WG1 Meeting #118** **R1- 2407234**

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

Agenda Item: 8.1

Source: Moderator (Ericsson)

Title: Feature Lead summary #1 for Maintenance of Positioning for RedCap UEs

Document for: Discussion, Decision

# Introduction

This document summarizes the draft CRs received in RAN1#118 during the maintenance of NR positioning.

For Redcap positioning maintenance, the following draft CRs have been identified. The draft CRs identified as alignment CR candidates are treated by the general alignement CR discussion for positioning maintenance.

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| **Tdoc#** | **Title and proposal** | **Comments** |
|  R1-2406019 | Corrections to TS 38.214 on SRS for positioning with frequency hopping Intel Corporation |  See moderator CR C/D |
| R1-2406170  | Draft CR on higher-layer parameter for for SRS transmission with frequency hopping in TS 38.213 vivo | Treated in alignment CR |
| R1-2406171  | Draft CR on higher-layer parameter for SRS frequency hopping in TS 38.211 vivo | Treated in alignment CR |
| R1-2406165 | Draft CR on bandwidth part considering SRS frequency hopping for positioning vivo |  See moderator draft CR A |
| R1-2406956 | Corrections on positioning in TS 38.214 ZTE Corporation, Sanechips | See moderator CR B |
| R1-2406351  | Correction on SRS frequency hopping for positioning CATT |  Same topic as x7170See moderator CR C |
| R1-2407170 | Draft CR for correction to SRS for positioning with tx hopping in 38.214 Ericsson | Same topic as x6351See moderator CR C |
| R1-2406953  | Draft CR for collision handling of positioning SRS with Tx hopping in TDD system ZTE Corporation, Sanechips | See moderator CR D |
| R1-2406954 | Draft CR for staircase pattern for SRS Tx hopping in TS 38.211 ZTE Corporation, Sanechips |  See moderator CR E |
| R1-2407099 | Correction on SRS frequency hopping for positioning Nokia | See moderator CR F |
| R1-2407169 | Draft CR for correction to SRS for positioning with tx hopping in 38.211 Ericsson | See moderator CR G |
| R1-2407172 | Draft CR for correction to SRS for positioning with tx hopping in 38.213 Ericsson | Treated in alignment CR |

# Maintenance for Redcap Positioning

## Bandwidth part for SRS frequency hopping for positioning

### Background

In x6165 it is proposed to clarify that the SRS with Tx hopping may be transmitted outside of an active bandwidth part. Currently 38.211 states that the UE shall not transmit SRS outside of an active bandwidth part.

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| **Tdoc#** | **Title and proposal** |
| x6165  | A UE can be configured with up to four bandwidth parts in the uplink with a single uplink bandwidth part being active at a given time. If a UE is configured with a supplementary uplink, the UE can in addition be configured with up to four bandwidth parts in the supplementary uplink with a single supplementary uplink bandwidth part being active at a given time. The UE shall not transmit PUSCH or PUCCH outside an active bandwidth part. For an active cell, the UE (except for reduced capability UE configured with SRS frequency hopping for positioning as described in clause 6.2.1.4.1 of [6, TS 38.214]) shall not transmit SRS outside an active bandwidth part. |

###  First round

From the FL perspective, the specification text may need even further changes, considering that the SRS for positioning is also transmitted in inactive mode and outside the UL active BWP as stated in 38.214. since the BWP behaviour of the SRS for positioning is already captured in 38.214, it may be sufficient to clarify the statement in 38.211 to limit it to the SRS for mimo and exclude SRS for positioning. Hence it is propose in the moderator CR to instead add “configured by *SRS-Resource”*  to the paragraph.

A draft moderator CR is provided in R1-24XXXX\_A. Companies are encouraged to provide their view on the draft CR below:

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| --- | --- |
| **Company** | **Comment** |
| Qualcomm | OK |
| Huawei, HiSilicon | Such change is not needed. 211 should be kept in general. Alternatively, can have a simpler change in the end of the sentence as ‘unless stated otherwise’ and merged in to 211 combo CR from Debdeep.  |
| CATT | OK. HW’s suggestion is also fine to us. |
| ZTE | OK with HW’s suggestion. |
| vivo | Support the CR, and at least we need to indicate the misalignment case or limit it to the cases which can be aligned the wording. Otherwise the misalignment between 38.211 and 38.214 will be existed.In addition, we would like to note 211 also has same indication for CSI-RS

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| A UE can be configured with up to four bandwidth parts in the downlink with a single downlink bandwidth part being active at a given time. The UE is not expected to receive PDSCH, PDCCH, or CSI-RS (except for RRM) outside an active bandwidth part. |

 |
| Nokia | OK |
| FL | All comments beside Huawei, HiSilicon and ZTE seem to favor a change. Let’s try to bring up the draft CR online. Alternatively, we can discuss wording for alignment CR. |
| FL | AgreementThe draft CR in R1-2407235 for 38.211 is endorsed. Final CR in R1-240XXXX.Companies please reach out for co-signing.  |

## (closed) Slot offset configuration for SRS with tx hopping in TS 38.214

###  Background

In x6956 it is proposed to correct the description of the slot offset configuration with tx hopping is configured:

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| **Tdoc#** | **Title and proposal** |
| x6956 |  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 *resourceType* wherein *SRS-PeriodicityAndOffset* for periodic and semi-persistent SRS and *slotOffset* for aperiodic SRS, starting slot offset for each hop following the first hop in *SlotOffsetForRemainingHops*, 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 *nrofSymbol*s 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.<omitted text>  |

### First round

A draft moderator CR is provided in R1-24XXXX\_B. Companies are encouraged to provide their view on the draft CR below:

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| **Company** | **Comment** |
| Huawei, HiSilicon | This one has been reflected in 214 combo CR so can be discussed there.  |
| FL | Closed, will be discussed in alignment.  |
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## Definition of “Cycle” for SRS with tx hopping in 38.214

### Background

In x6165 , x6019 and x7170 it is proposed to either remove the brackets on “cycle” or clarify the wording in the paragraph describing the case of overlapping srs with tx hopping transmission with a configured UL tx window.

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| **Tdoc#** | **Title and proposal** |
| x6351  |  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. |
| X7170 | 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 to transmit a SRS resource with positioning with 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.  |
| x6019 | 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.  |

### First round

Let’s check the views on the two candidate CRs. The moderator CR C is based on x6351. Companies are encouraged to provide their view on the draft CR below:

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| **Company** | **Comment** |
| Qualcomm | The word “one cycle” is still not a good option. We need some discussion to understand what was really the intention of the “cycle”. If the intention was to say that all the hops need to be within a single time window, the x7170 proposal doesn’t say that. Something like the following could say that more clearly:The UE is expected to be configured with a SRS resource for positioning with transmit frequency hopping which has all the hops, including the switching time from/to active BWP required ahead of the first hop and after the last hop, fully overlapped with a single instance of a time window. If the intention was to say that a hop should not partially overlap with a time window, then indeed x7170 appears to be enough, however, this allows the hops to straddle across time window instances.  |
| Huawei, HiSilicon | Suggested as: The UE does not expect to be configured with a SRS resource for positioning with transmit frequency hopping with the time duration from the fist hop till the last hop, including the switching time from/to active BWP required ahead of the first hop and after the last hop, fully overlapped with a single instance of a time window.  |
| CATT | In our view, the configured SRS resource for positioning should be *within* the single instance of a time window, but does not have to fully overlapping *with* it. Suggested change:The UE is - expected to be configured with a SRS resource for positioning with transmit frequency hopping with the time duration from the fist hop till the last hop, including the switching time from/to active BWP required ahead of the first hop and after the last hop, fully overlapped within a single instance of a time window |
| Samsung  | I thought the agreement (note) is to ensure there is no partial overlap, meaning the window will contains full SRS hops, but what QC and HW suggested that “UE does not expect such time span of a full hop cycle to fully overlap with time window”, which is contradict to the original agreement. Suggested as (red change based on HW’s version): The UE does not expect to be configured with a SRS resource for positioning with transmitting frequency hopping with the time duration from the first hop till the last hop, including the switching time from/to active BWP required ahead of the first hop and after the last hop, partially overlapped with ~~a single instance of~~ a time window.  |
| Nokia | We hope this issue could be resolved in this meeting. We have the following suggestion.The UE is expected to be configured with a SRS resource for positioning with transmit frequency hopping within a time duration which includes all the hops, including the switching time from/to active BWP required ahead of the first hop and after the last hop, fully overlapped with a single instance of a time window.  |
| FL | Many changes has been proposed based on x7170. I think all proposed changes go in the same direction. I will propose to go with Nokia’s changes to x7170. I propose to also clarify the the single instance is for the configured UL time window. “a time window” feels too generic.  |

### Second round

The draft CR was reworked and the following was the latest available proposal on the screen:

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| 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 expected to be configured with a SRS resource for positioning with transmit frequency hopping for wich the transmission, which includes all the hops and the switching time from/to active BWP required ahead of the first hop and after the last hop, occurs within with a single instance of the configured UL time window.  |

Companies are encouraged to provide further feedback below:

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| --- | --- |
| **Company** | **Comment** |
|   |   |

## collision handling of positioning SRS with Tx hopping in TDD

### Background

In x6953 it is proposed to add text to capture the SRS behaviour when colliding with downlink transmission in TDD. This issue was previously discussed and most commenting companies opposed the change and prefer to treat the collision as an error case. In x6019 the issue is similar, but the solution is to instead point to relevant clauses.

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| **Tdoc#** | **Title and proposal** |
| x6953  |  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. In unpaired spectrum, if the SRS symbol(s), including the switching time to and from the active bandwidth part, of the transmit frequency hopping collides with DL signals or channels, and if the UE determines the SRS to be dropped, the colliding SRS symbol(s) are dropped. |
| x6019 | 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 and Clause 7.5, 8.1, 11.1, 11.2A and 17.2 in [6, TS38.213]. |

### First round

From the FL perspective, the proposal in x6019 seems simpler and avoids repeating the rules on collision. A draft moderator CR is provided in R1-24XXXX\_D. Companies are encouraged to provide their view on the draft CR below:

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| --- | --- |
| **Company** | **Comment** |
| Qualcomm | Would a merged version of the above proposal be useful? Something like: the following with X,Y,Z to be populated accordingly: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 according to the priority rules defined in Clause X and Y, the colliding SRS symbol(s) are dropped. In unpaired spectrum, if the SRS symbol(s), including the switching time to and from the active bandwidth part, of the transmit frequency hopping collides with DL signals or channels, and if the UE determines the SRS to be dropped according to the priority rules defined in Clause Z and W, the colliding SRS symbol(s) are dropped. |
| Huawei, HiSilicon | For the addition of ‘in unpaired spectrum…..’, when the DL can be actually used for switching or retuning as allowed as legacy, does it mean UE behavior will change to drop the collided SRS symbol instedad? |
| ZTE | Support in general.OK with either version from Intel or Qualcomm. |
| vivo | We prefer not discuss those CR, and don’t think we can consider all the cases |
| FL | From the comments and offline discussion, at least intel’s version has a majority support and is concise. Proposed to discuss online.  |

### Second round

The draft CR was reworked and the following wa the latest available proposal on the screen:

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|  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 and Clauses, 11.1, 11.2A and 17.2 in [6, TS38.213]. |

Companies are encouraged to provide further feedback below:

|  |  |
| --- | --- |
| **Company** | **Comment** |
|  vivo | Based on double check, the priority between PRACH and SRS in Clause 8.1 can be accepted for us. But for DL, we still have some concerns on the issue.1. For example, according to 11.1 as follow, the DCI triggered SRS is higher priority than higher layer configured DL signal or channels. In this case, if switching time is overlapped with DL symbol as follow figure, the switching time should be higher priority than DL signal or channel in DL symbol?

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| For operation on a single carrier in unpaired spectrum, if a UE is configured by higher layers to receive a PDCCH, or a PDSCH, or a CSI-RS, or a DL PRS in a set of symbols of a slot, the UE receives the PDCCH, the PDSCH, the CSI-RS, or the DL PRS if the UE does not detect a DCI format that indicates to the UE to transmit a PUSCH, a PUCCH, a PRACH, or a SRS in at least one symbol of the set of symbols of the slot; otherwise, the UE does not receive the PDCCH, or the PDSCH, or the CSI-RS, or the DL PRS in the set of symbols of the slot.  |

1. For the clause of 11.2, it is the cancellation indication, why it can be seen as priority rules?

So, we can compromise as follows

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|  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 and Clauses 8.1 in [6, TS38.213]. |

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## Staircase pattern for SRS Tx hopping in TS 38.211

### Background

In x6954 it is proposed to clarify in 38.211 that since only the wrapped staircase pattern may be configured, the list of slot offsets must be sequentially in ascending order, i.e. *SlotOffsetForRemainingHops* in *slotOffsetForRemainingHopsList* are in ascending order.

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| **Tdoc#** | **Title and proposal** |
| x6954  |  - $n\_{SRS}^{TxHopping}=0,1,…,N\_{hops}^{SRS}-1$ is the hop transmission counter in the time domain, where $n\_{SRS}^{TxHopping}=1,2,…,N\_{hops}^{SRS}-1 $ 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. |

### First round

A draft moderator CR is provided in R1-24XXXX\_E. Companies are encouraged to provide their view on the draft CR below:

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| --- | --- |
| **Company** | **Comment** |
| Qualcomm | Support |
| Futurewei | Ok.  |
| CATT | OK |
| Samsung  | May not needed“$n\_{SRS}^{TxHopping}=0,1,…,N\_{hops}^{SRS}-1$” which is already ascending order sequentially |
| ZTE | SupportTo samsung, we agree that $n\_{SRS}^{TxHopping}=0,1,…,N\_{hops}^{SRS}-1$ is already ascending order sequentially. However, the transmission counter $n\_{SRS}^{TxHopping}$ for SRS Tx hopping corresponds to the order of higher layer parameter for hops. However, there is no such restriction in either RAN1’s spec or RAN2’s spec, and the (wrapped) staircase pattern can not be guaranteed. |
| Vivo | Same view as Samsung, otherwise why $n\_{SRS}^{TxHopping}$ is called hop transmission counter in the time domain |
| Nokia | OK |
| ZTE | To address vivo’s concern and thanks to vivo’s suggestion, we may update the wording as follows:- $n\_{SRS}^{TxHopping}=0,1,…,N\_{hops}^{SRS}-1$ is the hop transmission counter in the time domain, where $n\_{SRS}^{TxHopping}=1,2,…,N\_{hops}^{SRS}-1 $ corresponds to the order of the higher-layer parameter *SlotOffsetForRemainingHops* in *slotOffsetForRemainingHopsList*, wherein the UE expects to be configured with the starting slot offset and starting symbol of the $N\_{hops}^{SRS}$ hops in an ascending order sequentially in time domain. |
| FL | Proposed to discuss online.  |
| FL | AgreementThe draft CR in R1- 2407236 for 38.211 is endorsed. Final CR in R1-240XXXX.Companies please reach out for co-signing.  |

##  Sequence generation for SRS Tx hopping in TS 38.211

### Background

 In x7099, it is proposed to change the text on sequence generation for SRS with tx hopping in 38.211. the current specification states that each hop is generated separately. The concern in x7099 is that the overall transmitted SRS is not a ZC sequence anymore.

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| **Tdoc#** | **Title and proposal** |
| x7099  |  The sounding reference signal sequence for an SRS resource shall be generated according to $r^{(p\_{i})}\left(n,l'\right)=w\_{TDM}^{(p\_{i})}\left(l'\right)r\_{u,v}^{(α\_{i},δ)}\left(n\right)$ $0\leq n\leq M\_{sc,b}^{SRS}-1$ $l'\in \left\{0,1,…,N\_{symb}^{SRS}-1\right\}$where $M\_{sc,b}^{SRS}$ is given by clause 6.4.1.4.3, $r\_{u,v}^{\left(α,δ\right)}(n)$ is given by clause 5.2.2 with $δ=log\_{2}\left(K\_{TC}\right)$ and the transmission comb number $K\_{TC}\in \left\{2,4,8\right\}$ is contained in the higher-layer parameter *transmissionComb*. The quantity $l'\in \left\{0,1,…,N\_{symb}^{SRS}-1\right\}$ is the OFDM symbol number within the SRS resource.**<Unchanged parts are omitted>** |

### First round

A draft moderator CR is provided in R1-24XXXX\_F. Companies are encouraged to provide their view on the draft CR below:

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| **Company** | **Comment** |
| Qualcomm | Do not support. If our understanding is correct, this proposal says that a UE will generate a long sequence according to the large BW (summed BW of all the hops), and then transmit parts of that long sequence on different symbolsThis violates our understanding of the agreement and the feature overall. Our understanding is that the UE will be generating sequence according to the hop BW and we don’t introduce a “large sequence” that the UE transmits in “split manner”. We didn’t agree to generate new waveforms to transmit for SRS, and this proposal is actually doing that.  |
| Huawei, HiSilicon | Not support. Agree with QC. The PAPR should be lower if keeping the sequence generated per hop.  |
| ZTE | Do not support. |
| Nokia | Support. In our understanding, SRS resource-based sequence generation is aligned with what we have used since Rel-16 from the gNB perspective so that the gNB can see a single ZC sequence from an SRS resource. PAPR issue could be further discussed.  |
| FL | From the comments no companies agree tot he change except the proponents. Further discussion is needed to further align the view on PAPR.  |

## Starting position for SRS Tx hopping in TS 38.211

### Background

 In x7169 it is proposed to clarify which parameter configures the starting position for each hop:

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| **Tdoc#** | **Title and proposal** |
| x7169  |  - $l\_{0}$, the starting position in the time domain given by $l\_{0}=N\_{symb}^{slot}-1-l\_{offset}$ where the offset $l\_{offset}\in \left\{0,1,…,13\right\}$ counts symbols backwards from the end of the slot and is given by the field *startPosition* contained in the higher layer parameter *resourceMapping* and $l\_{offset}\geq N\_{symb}^{SRS}-1$. If $N\_{hop}>1$ $l\_{0}$ is the starting position of each hop in the time domain, determined by the field *startPosition* contained in the higher layer parameter *resourceMapping* for the first hop and contained in the higher layer parameter *SlotOffsetForRemainingHops* for each remaining SRS transmission hop. |

### First round

A draft moderator CR is provided in R1-24XXXX\_G. Companies are encouraged to provide their view on the draft CR below:

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| **Company** | **Comment** |
| Huawei, HiSilicon | Not needed. The original spec is clear since the parameter *startPosition* applied to both the first hop and the remaining hops. |
| Samsung  | Agree with hw, the “If $N\_{hop}>1$ $l\_{0}$ is the starting position of each hop in the time domain, determined by the field *startPosition*”, already say it is for each hop |
| Ericsson | Our concern is that the specs currently read that the field *startPosition* from *resourceMapping* is applied to all hops. It should be clear that remaining hops are separately configured.  |
| Ericsson2 | Considering the discussion in alignment CR for the slot offset configuration in 214, we think this draft CR is a similar alignment and may be needed for 211. Our concern is that start position is currently linked to resourcemapping parameter in the spec, which is not part of the remaining hop configuration.  |

# LS discussion

### Background

In the RAN4 LS reply “LS on synchronization source change at the transmitting anchor UE in SL positioning”[1] RAN4 asks the following to RAN1:

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| *LS from R1-2405788*1. **Overall Description:**

During the discussion on RRM core requirements for SL positioning, RAN4 reached the following agreement. * Agreement
	+ It is a RAN4 understanding that UE performing measurements may not be aware on the synchronization source change at the Tx UE.
	+ For synchronization reference source change occurring at Tx side, measurement accuracy requirements do not apply and no specific UE behaviour is defined.
		- Note: the agreement can be revisited if a RAN1/2 solution is introduced to inform the UE performing measurements on the synchronization source change at the Tx UE.

RAN4 would like to check whether RAN1 and RAN2 have introduced or are working on any solutions to inform a UE performing an SL positioning measurement (e.g., SL RSTD, SL Rx-Tx, and SL RTOA) about synchronization reference source change at a UE which is transmitting SL-PRS for the measurement.**2. Actions:****To RAN1, RAN2:****ACTION:** RAN4 kindly requests RAN1 and RAN2 to clarify whether they have introduced or are working on any solutions to inform an SL UE performing an SL positioning measurement (e.g., SL RSTD, SL Rx-Tx, and SL RTOA) about synchronization reference source change at a UE which is transmitting SL-PRS for the measurement. |

The following contribution discuss the issue:

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| **Tdoc#** | **Proposal** |
|  x7167 |  Proposal 1 Confirm RAN4 understanding that to not impact a timing measurement, the transmitting UE's sync source should not change while another UE is performing a measurement based on its transmission, otherwise the measurement needs to be restarted. Proposal 2 RAN1 should not plan further enhancements for notification of a change in sync ref source from a tx UE to another measuring UE. |
| x6998 | Proposed LS response:

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| RAN1 thanks RAN4 for the LS.RAN1 has discussed this matter, and confirms that RAN1 has not introduced and is not working on any solutions to inform an SL UE performing an SL positioning measurement (e.g., SL RSTD, SL Rx-Tx, and SL RTOA) about synchronization reference source change at a UE which is transmitting SL-PRS for the measurement. It is RAN1 understanding that such a solution is not necessary. |

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| x6952 | Proposed LS response:RAN1 discussed the synchronization error issues, and agreed the Tx anchor UE’s **synchronization source type** can be informed to an LMF or another UE for SL-TDOA or SL-TOA. Moreover, for SL-RTT a Tx UE’s synchronization source type can be informed in a Tx time stamp of a measurement report. From RAN1’s perspective, RAN1 will NOT specify additional solutions for Tx UE’s synchronization source change. The related agreements are marked in yellow in the following RAN1 agreements. |
| x6675 | Proposal 1: Support an indication from one UE to another UE or LMF on time reference change for Tx time (i.e., SyncRef change).Proposal 2: If RAN1 agrees to support a SyncRef change indication, then reply to RAN4 accordingly. |
| x6617 | Proposed LS response:RAN1 has discussed this issue, and concluded that* It is up to RAN2 to decide whether to introduce/introduced any solutions to inform an SL UE performing an SL positioning measurement about synchronization reference source change at a UE which is transmitting SL-PRS for the measurement.
 |
| x6532 | Proposed LS response:While synchronization source information can be provided to a UE performing measurements on SL PRS as assistance information from a server via ***sl-RTD-Info***, the server may not always be aware of changes to synchronization source for a transmitting anchor UE. Accordingly, as observed in the quoted RAN4 agreement, a measuring UE may not always be aware of synchronization source change for a transmitting anchor UE. Beyond the methods currently available, RAN1 does not intend to introduce any specific solutions for Rel-18 to inform a measuring UE of changes to synchronization source for a transmitting anchor UE and would like to confirm that RAN4’s agreement is reasonable from RAN1’s perspective. |
| x6322 | Proposed LS responseProposal 1: Regarding the question related to synchronization source change at the transmitting anchor UE in SL positioning in the RAN4 LS R1-2405788(R4-2410352), suggest providing the following response:• RAN1 had introduced solutions to inform an SL UE performing an SL positioning measurement (e.g., SL RSTD, SL Rx-Tx, and SL RTOA) about synchronization reference source change at a UE which is transmitting SL-PRS for the measurement as follows, The UE, which transmits SL PRS, may report synchronization source type via syncSourceType and/or relative time difference with the associated quality metric, via sl-RTD-Info. If reported syncSourceType is gNB-eNB, the UE may report cell identity information.  The UE, which performs an SL positioning measurement, may be provided with synchronization source type of the UE that transmits SL-PRS and/or the relative time difference with the associated quality metric, via syncSourceType and sl-RTD-Info, respectively. |
| x6150 | RAN1 confirms the following mechanisms are supported to mitigate the impact of synchronization errors for SL positioning (i.e., exchange the synchronization information of transmiting UE and RTD between transmitting anchor UE ).

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| **Agreement**Support at least the following mechanism to mitigate the impact of synchronization errors between anchor UEs for SL-TDoA based measurement* Exchange of synchronization information of anchor UEs between a UE and LMF or another UE.
* FFS detailed synchronization information. E.g: synchronization source, relative time difference (RTD), synchronization quality information
* FFS other mechanisms

AgreementSupport to include the following in the exchanged synchronization information of anchor UEs between a UE and LMF or another UE:The synchronization source type (GNSS, gNB/eNB, and UE) of anchor UEs, AgreementUpdate previous agreement on synchronization information exchange with the following modification:

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| To mitigate the impact of synchronization errors between anchor UEs for SL-PRS based measurement, the exchanged synchronization information of anchor UEs between a UE and LMF or another UE includes the following:* The synchronization source type (GNSS, gNB/eNB, and UE) of anchor UEs,
	+ ~~[If the synchronization source of an anchor UE is SyncRef UE, the anchor UE can optionally indicate the coverage status and synchronization connection status (whether the SyncRef UE is directly or indirectly synchronized to GNSS/gNB, or other SyncRef UE) of the SyncRef UE]~~
	+ If the synchronization source of an anchor UE is gNB/eNB, the anchor UE can further provide cell identity information
* ~~[Synchronization quality/accuracy information]~~
* The RTD between anchor UEs
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RAN1 confirms the following mechanisms are supported to mitigate the impact of synchronization errors for SL positioning (i.e., exchange the synchronization information of transmiting UE and RTD between transmitting anchor UE ).In addition, for SL Rx-Tx measurement, the following agreement is achieved so that the UE can provide the Tx time for SL Rx-Tx measurement which can align the Tx time between transmitting UE and reception UE.

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| **Agreement**For definition of SL-PRS based Rx-Tx measurement, the actual SL-PRS transmission time is used for the definition of SL-PRS based Rx-Tx time difference measurement if the UE optionally reports the Tx time information, otherwise use the Rel-16/17 definition for gNB Rx-Tx time difference/UE Rx-Tx time difference in Uu.* FFS: details of the Tx time information
* FFS: whether additionally the network or LMF can request the UE to report the Tx time information
* Note: the value of Rx-Tx measurement is within [-0.5 0.5] ms
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The majority of contribution agrees with RAN4 view, and want to confirm that RAN1 will not plan to work on a solution to inform a Rx UE of syncref change in the tx UE. For 1 company, RAN2 could handle the issue.

Below is a draft response based on the received comments. Please provide feedback on whether including the RAN1 agreements to the LS response is necessary, as well as further wording revision:

RAN1 thanks RAN4 for the LS. RAN1 has discussed this matter, and has the following response:

* RAN1 has not introduced and is not working on any solutions to inform an SL UE performing an SL positioning measurement (e.g., SL RSTD, SL Rx-Tx, and SL RTOA) about synchronization reference source change at a UE which is transmitting SL-PRS for the measurement.
* Beyond the methods currently available, RAN1 does not intend to introduce any specific solutions for Rel-18 to inform a measuring UE of changes to synchronization source for a transmitting anchor UE and would like to confirm that RAN4’s agreement is reasonable from RAN1’s perspective.
* This does not preclude other RAN group to introduce such signalling.

In addition, RAN1 thinks the following RAN1 agreements are relevant to the discussion:

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| --- | --- |
| **Agreement**Support at least the following mechanism to mitigate the impact of synchronization errors between anchor UEs for SL-TDoA based measurement* Exchange of synchronization information of anchor UEs between a UE and LMF or another UE.
* FFS detailed synchronization information. E.g: synchronization source, relative time difference (RTD), synchronization quality information
* FFS other mechanisms

AgreementSupport to include the following in the exchanged synchronization information of anchor UEs between a UE and LMF or another UE:The synchronization source type (GNSS, gNB/eNB, and UE) of anchor UEs, AgreementUpdate previous agreement on synchronization information exchange with the following modification:

|  |
| --- |
| To mitigate the impact of synchronization errors between anchor UEs for SL-PRS based measurement, the exchanged synchronization information of anchor UEs between a UE and LMF or another UE includes the following:* The synchronization source type (GNSS, gNB/eNB, and UE) of anchor UEs,
	+ ~~[If the synchronization source of an anchor UE is SyncRef UE, the anchor UE can optionally indicate the coverage status and synchronization connection status (whether the SyncRef UE is directly or indirectly synchronized to GNSS/gNB, or other SyncRef UE) of the SyncRef UE]~~
	+ If the synchronization source of an anchor UE is gNB/eNB, the anchor UE can further provide cell identity information
* ~~[Synchronization quality/accuracy information]~~
* The RTD between anchor UEs
 |

**Agreement**For definition of SL-PRS based Rx-Tx measurement, the actual SL-PRS transmission time is used for the definition of SL-PRS based Rx-Tx time difference measurement if the UE optionally reports the Tx time information, otherwise use the Rel-16/17 definition for gNB Rx-Tx time difference/UE Rx-Tx time difference in Uu.* FFS: details of the Tx time information
* FFS: whether additionally the network or LMF can request the UE to report the Tx time information

Note: the value of Rx-Tx measurement is within [-0.5 0.5] msAgreementFor SL-PRS based Rx-Tx measurement, the Tx time information in the measurement report is the associated SL-PRS transmission timestamp.AgreementRegarding the time stamp information in measurement report, support the following:* For the timestamp of SFN and slot number, at least one of nr-PhysCellID, nr-ARFCN, nr-CellGlobalID is included.
* For the timestamp of DFN and slot number, the synchronization reference source indication ‘GNSS or UE’ can be optionally included.

Note: The number of SL-PRS symbols is not signalled in the SL positioning measurement report. |

### First round

Please provide feedback on whether including the RAN1 agreements to the LS response is necessary, as well as further wording revision:

|  |  |
| --- | --- |
| **Company** | **Comment** |
|  |  |

# Offline Sessions

TBD

# Online sessions

## Tuesday session

Issue 1, bandwidth part configuration

Proposal 2.1:

The draft CR in R1- 2407235 for 38.211 is endorsed

Issue 3 definition of cycle

Proposal 3.1:

The draft CR in R1- 2407240 for 38.214 is endorsed

Issue 4 collision handling

Proposal 3.1:

The draft CR in R1- 2407241 for 38.214 is endorsed

Issue 5 staircase pattern configuration

Proposal 4.1:

The draft CR in R1- 2407236 for 38.211 is endorsed

# Conclusion

 TBD

#  References

1. R1-2406019 Corrections to TS 38.214 on SRS for positioning with frequency hopping Intel Corporation
2. R1-2406165 Draft CR on bandwidth part considering SRS frequency hopping for positioning vivo
3. R1-2406170 Draft CR on higher-layer parameter for for SRS transmission with frequency hopping in TS 38.213 vivo
4. R1-2406171 Draft CR on higher-layer parameter for SRS frequency hopping in TS 38.211 vivo
5. R1-2406351 Correction on SRS frequency hopping for positioning CATT
6. R1-2406953 Draft CR for collision handling of positioning SRS with Tx hopping in TDD system ZTE Corporation, Sanechips
7. R1-2406954 Draft CR for staircase pattern for SRS Tx hopping in TS 38.211 ZTE Corporation, Sanechips
8. R1-2406956 Corrections on positioning in TS 38.214 ZTE Corporation, Sanechips
9. R1-2407099 Correction on SRS frequency hopping for positioning Nokia
10. R1-2407169 Draft CR for correction to SRS for positioning with tx hopping in 38.211 Ericsson
11. R1-2407170 Draft CR for correction to SRS for positioning with tx hopping in 38.214 Ericsson
12. R1-2407172 Draft CR for correction to SRS for positioning with tx hopping in 38.213 Ericsson