**3GPP T****SG-RAN WG3 Meeting #122 R3-23xxxx was7823**

**Chicago, USA, 13th – 17th November, 2023**

**Title:** **SoD on Positioning R18**

**Source: CATT**

**Agenda item: 23.1**

**Document Type: Decision**

# 0. For Chair’s Notes

**/////////////////////////////////////////////////// Begin /////////////////////////////////////////////////////**

**CB: # Pos\_Sidelink**

**- If possible, agree to an LS to RAN2 on SL-PRS resource allocation**

**- LS to RAN2 in R3-237860**

**- Discuss and, if possible, agree on remaining proposals**

(moderator - CATT)

**CB: # Pos\_LPHAP**

**- Discuss and, if possible, agree on remaining proposals**

(moderator - CATT)

**CB: # Pos\_Others**

**- Discuss and, if possible, agree on remaining proposals**

(moderator - CATT)

**TP work split:**

* **SL Positioning:**
	+ **LS to RAN2 (Xiaomi)**
* **LPHAP:**
	+ **Stage 2, Revise from 7303 (CATT)**

Mainly cleanup FFS.

* + **NRPPa, revise from 7399 (Nok)**

LPHAP Parameters, LPHAP Validity Area details, procedure texts?

Remove FFS and EN according to the online and offline agreements.

* + **F1AP, revise from 7366 (HW)**

Necessary alignment with NRPPa

As proposed in 7366, The cell list of positioning validity area is transparent to DU in the positioning information transfer procedure. F1AP clean-up is needed.

* **BW Aggregation & CPP:**
	+ **NRPPa: Revise from 7538 (Ericsson)**

Details on BW aggregation, procedure texts?

Update of time window details?

Cleanup FFS and Editor’s Note

* + **F1AP: revise from 7698 (ZTE)**

Necessary alignment with NRPPa.

**Note: moderator will help to request for revision numbers together~**

**SL Positioning (AI 23.2.1):**

**Add semantics description for *Ranging and Sidelink Positioning Service Information* IE, indicating it’s only applied when the UE is authorized for NR V2X services and/or 5G ProSe services**

* **R3-237387 is agreed**
* **R3-237536 is agreed**
* **R3-237639 is agreed**

**On sending of the LS to RAN2?**

**🡺Agree to send the LS to RAN2 on SL Positioning, with only simple questions on LMF impact on SL-PRS resource allocation. Wording could be further checked.**

**LPHAP (AI 23.2.2):**

**Proposal 3: Further work on details of the IE *LPHAP SRS Parameters:***

* **The value range of the LPHAP SRS Parameters should refer to the ones defined in the Positioning SRS Resource IE.**
* **List the sub-IEs in *LPHAP SRS Parameters in the end of Requested SRS Transmission Characteristics. (which means the LPHAP SRS Parameters IE is removed)***
* **Remove *Repetition Factor,* as it’s not part of *Positioning SRS Resource* IE.**
* ***Aperiodic* type should be removed from the *Resource Type*, or mark it as not applicable in semantics description. (Which has been agreed in RAN2).**
* ***Semi-persistent* type should be kept in the *Resource Type*, as it has been agreed in RAN2#123 meeting.**

**Propose 4: Further work on details of the IE *LPHAP Validity Area Cells:***

* **Rename it to “Positioning Validity Area Cell List” (RAN2 text)**
* **The NR CGI in the validity area should refer to 9.2.9 (NR CGI) not 9.2.6 (NG-RAN CGI).**
* **keep NR PCI as optional IE in the validity area.**

**Proposal 5: SRS Configuration and the Validity Area Cells shall be included in SRS INFORMATION RESERVATION NOTIFICATION message, for both SRS reservation and SRS release purpose.**

**Proposal 6: If *SRS Reservation Request* IE is set to "release", the NG-RAN node shall release the indicated SRS configuration from the indicated validity area cells.**

* **If agreeable, procedure texts should be updated accordingly.**

Companies have issues on having the reservation procedure, whether it’s really needed.

Rapporteur: If WI is closed, the reservation procedure should be removed from BL CR as no consensus, it could be further discussed in the maintenance phase. (no actions for TP work for now)

**Turn WA into an agreement:**

**＂The last serving gNB notifies LMF when the UE moves out of the validity area by sending the Positioning Information Update message with a new NR CGI where the UE request for SRS configuration.＂**

**There is no need for a new cause value or indicator for XnAP UE Context Retrieval Request message.**

**No need to introduce SRS validity Timer when reserving the SRS configuration. When to release the reserved SRS configuration is up to implementation.**

**Not reopen the discussion on whether and how LMF obtains the available SRS configuration from the gNBs.**

**🡺TP work is needed to remove FFS in corresponding BL CRs.**

**BW Aggregation/CPP/RedCap: (AI 23.2.3)**

**BW Aggregation:**

**Proposal 11: *Bandwidth Aggregation Request Information* in Requested SRS Transmission Characteristics is needed to indicate the SRS BW aggregation is requested/expected.**

**🡺Moderator un-green this bullet, and add the following 2 proposals on top of RAN1 parameters, and HW proposal in 7367.**

**Proposal x: Base on the RAN1 defined RAN1 parameters, the Bandwidth in Requested SRS Transmission Characteristics should be extended.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| NR UL SRS for Positioning BW Aggregation | Bandwidth | Existing | Indicates requested SRS bandwidth including when configuring SRS for positioning bandwidth aggregation. | Choice of bandwidth for SRS to be extended to include:FR1 bands: {160, 200M}FR2 bands: {600, 800} | Bandwidth in (9.2.27) Requested SRS Transmission Characteristics | 38.455 |

*Bandwidth Aggregation Request Information* IE, in Positioning Information Request message in BL CR is not needed, because the NG-RAN node can take the bandwidth information into account to decide whether perform SRS aggregation.

Proposal y: Remove *Bandwidth Aggregation Request Information* IE in Positioning Information Request message from BL CR.

**Proposal 12: SRS positioning resource sets which are aggregated should be indicated from gNB to LMF in Positioning Information Response message, to indicate the SRS positioning resource sets in the two or three carriers that are linked.**

* **Then, further discuss and decide the details on the IE encoding:**
	+ **using Aggregation ID to bind the Positioning SRS Resource Set**
	+ **or simply indicate the SRS Resource Set is linked to BW Aggregation**
	+ **or add a list of aggregated SRS resource sets in SRS Configuration (go for this approach)**
	+ **Note that, more than one aggregation list may be needed, according to RAN1/RAN2 agreements. Signalling design should take it into account.**

**Note：If there’s any misalignment, we can handle it in the maintenance phase.**

**Proposal 13: Introduce a new IE in Measurement Request to indicate the UL positioning measurement from aggregated SRS resources across multiple CCs is requested for UL-TDOA and/or Multi-RTT.**

**Proposal 14: Introduce a new IE *Aggregated SRS Positioning Resource ID List* to the *TRP measurement Report* to indicate aggregated resource IDs for the reported measurements.**

**Proposal 15: Discuss whether need to enhance Positioning Activation/Deactivation messages to support LMF to flexibly activate/deactivate the aggregated carriers. (may need to be further discussed and decided in maintenance phase)**

**Proposal 16: Introduce a new IE in *PRS Configuration* in PRS CONFIGURATION RESPONSE message to indicate the aggregation information for PRS per TRP.**

**Note that, more than one aggregation list may be needed, according to RAN1/RAN2 agreements. Signalling design should take it into account.**

**Proposal 17: Introduce an indication in TRP INFORMATION REQUEST and PRS CONFIGURATION REQUEST to indicate the PRS aggregation is requested by the LMF.**

**🡺 the TP work should take care of the highlighted texts as above, and please take care of the RAN1 higher layer parameters into account.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR DL PRS BW Aggregation | nr-linked-DL-PRS-ResourceSetIDList-PrsAggregation | New | Indication of DL PRS resource sets in the two or three DL PFLs that are linked for DL PRS BW aggregation from the NG-RAN node to the LMF | Per TRPExample: in PRS Configuration (as in 9.2.44) in PRS CONFIGURATION RESPONSE message |
| NR UL SRS for Positioning BW Aggregation | aggregated-SRSPosResourceSetIdList | New | Indication of the SRS for positioning resource sets in the two or three carriers that are linked for SRS for positioning BW aggregation from the gNB to the LMF | In SRS Confgiuration in POSITIONING INFORMATION RESPONSE message |
| NR UL SRS for Positioning BW Aggregation | reqMeasBasedOnSrsAggregation | New | Request from LMF to NG-RAN node for the UL positioning measurement from aggregated SRS resources across multiple CCs for UL-TDOA and/or Multi-RTT. | For each UL-RTOA and/or gNB Rx-Tx time difference measurement in TRP Measurement Quantities in Measurement Request message.Whether this indication may be common to multiple measurements is up to RAN3.  |
| NR UL SRS for Positioning BW Aggregation | measBasedOnSrsAggregation | New | Indicates whether the reported UL-TDOA or gNB Rx-Tx time difference measurement is based on processing of SRS for positioning resources across aggregated carriers. | For each UL-RTOA or gNB Rx-Tx time difference measurement in TRP Measurement Result message.Whether this indication may be common to multiple measurements is up to RAN3.  |
| NR UL SRS for Positioning BW Aggregation | aggregated-SRSPosResourceIdList | New | SRS resource IDs for the aggregated measurement which are used for RSRP/RSRPP and/or timing measurement results . | For each UL-RTOA or gNB Rx-Tx time difference measurement in TRP Measurement Result message.Whether this indication may be common to multiple measurements is up to RAN3.  |
| NR UL SRS for Positioning BW Aggregation | Bandwidth | Existing | Indicates requested SRS bandwidth including when configuring SRS for positioning bandwidth aggregation. | Bandwidth in (9.2.27) Requested SRS Transmission Characteristics |

**CPP:**

**Proposal 18: Update the *Time Window Information of SRS* IE and *Time Window Information of Measurement* IE to align with the definition of RAN1, e.g. extend the IE to a list of time windows with max number of the time windows as 16.**

**Proposal 19: Introduce Carrier Phase Quality Info reported by gNB to LMF, the definition of the parameters could refer to the RAN1 LS R3-237898.**

|  |  |  |  |
| --- | --- | --- | --- |
| CarrierPhaseQualityInfo | New | Carrier Phase quality information reported by gNB to LMF. Includes:- phase quality index- phase quality resolution | Includes:- phase quality index: INTEGER (0, …, 179)- phase quality resolution: ENUMERATED (0.1, 1) degrees~~Value Ranges up to RAN4.~~ |

**Proposal 20: Remove the FFS for the Symbol Index IE in the Time Stamp and add the following semantics description: “Applicable to UL RSCP measurement only”.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UL CPP | TimeStamp-SymbolIndex | New | A gNB may optionally provide an OFDM symbol index in the timestamp that is by default indicated via Time Stamp in 38.455 | In TimeStamp (9.2.42) |

**🡺The above info should be taken into account when preparing the TP.**

**RedCap:**

**Proposal 21: Further work on the RAN3 details on support of Redcap Positioning, when the parameters are stable in RAN1/RAN2.**

**Issues to be continued as the maintenance:**

**Considering the strong dependency on the other WGs, the following issues should be further discussed in the coming meeting.**

**For SL Positioning:**

* **Work on SL-PRS allocation procedures over NRPPa and F1AP, if any RAN3 impact is identified by the RAN1/RAN2.**

**For LPHAP:**

* **All details on SRS Reservation procedure.**
* **The overall procedures and signalling details on activation/deactivation of semi-persistent SRS configuration to be further discussed, taking RAN2 agreements into account.**

**For BW Aggregation:**

* **Whether to enhance Positioning Activation/Deactivation messages to support LMF to flexibly activate/deactivate the aggregated carriers.**
* **ReportingGranularityfactor also supports k = {-3, -4, -5, -6} in addition to {-1, -2}, RAN3 work is pending to RAN4 definition.**

**For RedCap Positioning:**

* **RAN3 signalling details on support of RedCap Positioning, taking RAN1/RAN2 final decision into account.**

**Any other RAN3 impact taking into account the RAN1/RAN2/RAN4 decisions or LS into account.**

**/////////////////////////////////////////////////// End /////////////////////////////////////////////////////**

# Discussion

## SL Positioning

1. According to paper 7387/7536/7639, clarify that the Ranging and Sidelink Positioning Service Information IE applies only if the UE is authorized for NR V2X services and/or 5G ProSe services.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Ranging and Sidelink Positioning Service Information  | O |  | 9.3.1.xx1 | This IE applies only if the UE is authorized for NR V2X services and/or 5G ProSe services. | YES | ignore |

The rapporteur understands that it’s ok to add a semantics description in our intrfaces, even if it’s already clearly specified in SA2 spec. Thus, it’s proposed:

**Proposal 1: Add semantics description for *Ranging and Sidelink Positioning Service Information* IE, indicating it’s only applied when the UE is authorized for NR V2X services and/or 5G ProSe services. Correspnding TPs are agreeable.**

1. **SL-PRS resource allocation**

In 7388/7537, it’s mentioned the RAN3 impact on SL-PRS resource allocation.

Currently, it’s not clear to us, whether NRPPa/F1 need to be involved for SL-PRS resource allocation. The procedure is similar to DL-PRS or UL-SRS resource allocation procedure which LMF is involved. Or just like the SL resource allocation as we designed for SL communication, no extra NRPPa impact is required.

Checked the progress of RAN2, they have not discussed and defined any new signalling/IE over LPP. Which means the SL-PRS configuration is not provided by LMF to the UE via LPP. In this case, no NRPPa impact for allocation of SL-PRS resource.

If no further progress from the other group, e.g. RAN2, which requires the further RAN3 work on SL-PRS allocation, we just keep the status. Either actions base on the further input from the other WGs, or send the LS to RAN2, asking for the views on SL-PRS allocation.

**Proposal 2: Discuss whether send the LS to RAN2, to check the overall procedure on SL-PRS resource allocation.**

## LPHAP

|  |  |  |
| --- | --- | --- |
| [R3-237303](Docs%5CR3-237303.zip) | (TP for BL CR to TS 38.455, 38.423, 38.305) on support of LPHAP (CATT) | other |
| [R3-237366](Docs%5CR3-237366.zip) | (TP BL 38.xxx) Remaining Issues on LPHAP (Huawei) | other |
| [R3-237389](Docs%5CR3-237389.zip) | (TP for TS 38.455) Support of LPHAP (Xiaomi) | other |
| [R3-237399](Docs%5CR3-237399.zip) | (TP for TS 38.455 BL CR) Further details for LPHAP (Nokia, Nokia Shanghai Bell) | other |
| [R3-237696](Docs%5CR3-237696.zip) | Further discussion on LPHAP impacts (ZTE) | discussion |

### 1.2.1 LPHAP Parameters

In the contributions 7303/7366/7399, some proposals on the details of the IE definition.

In 7366, it’s proposed to quick check RAN3 view on alternative to provide in the *LPHAP SRS Parameters* IE a list of SRS configuration. Such approach, should be more robust and quicker to achieve. “Quick check RAN3 if it makes sense to adopt a list of SRS Configuration for the *LPHAP SRS Parameters* IE.”

Base on the current situation, to make life easier, the rapporteur proposes to keep using a separate section to define the LPHAP SRS Parameters, not put all the parameters in the SRS characteristics. Then we can further work on the detail parameters.

9.2.A4 LPHAP SRS Parameters

This IE is used to indicate the set of recommended SRS LPHAP parameters for the Validity Area.

| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** |
| --- | --- | --- | --- | --- |
| CHOICE *Transmission Comb* | M |  |  |  |
| *>Comb Two* |  |  |  |  |
| >>Comb Offset | M |  | INTEGER(0..1) |  |
| >>Cyclic Shift | M |  | INTEGER(0..7) |  |
| *>Comb Four* |  |  |  |  |
| >>Comb Offset | M |  | INTEGER(0..3) |  |
| >>Cyclic Shift | M |  | INTEGER(0..11) |  |
| *>Comb Eight* |  |  |  |  |
| >>Comb Offset | M |  | INTEGER(0..7) |  |
| >>Cyclic Shift | M |  | INTEGER(0..5) |  |
| Resource Mapping | M |  |  |  |
| >Start Position | M |  | INTEGER(0..13) | Start Position |
| >Number of Symbols  | M |  | ENUMERATED(n1,n2,n4, n8, n12, n14, …) | Number of Symbols |
| >Repetition Factor | M |  |  ENUMERATED(r1, r2, r3, r4, r5, r6, r7, r8, r10, r12, r14, …) |  |
| Frequency Domain Shift | M |  | INTEGER(0..268) | Frequency Domain Shift |
| C-SRS | M |  | INTEGER(0..63) |  |
|  |  |  |  |  |
| CHOICE *Resource Type* | M |  |  |  |
| *>Periodic* |  |  |  |  |
| >>Periodicity | M |  | ENUMERATED(slot1, slot2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160, slot320, slot640, slot1280, slot2560, …) |  |
| >>Offset | M |  | INTEGER(0..2559, …) |  |
| *>Semi-persistent* |  |  |  |  |
| >>Periodicity | M |  | ENUMERATED(slot1, slot2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160, slot320, slot640, slot1280, slot2560, …) |  |
| >>Offset | M |  | INTEGER(0..2559, …) |  |
| *>Aperiodic* |  |  |  |  |
| >>Aperiodic Resource Type | M |  | ENUMERATED(true,…) |  |
| Sequence ID | M |  | INTEGER(0..1023) |  |

**Proposal 3: Further work on details of the IE *LPHAP SRS Parameters:***

* **Remove Repetition Factor or keep it?**
* **For CHOICE Resource Type, whether Semi-persistent, and Aperiodic is applied?**

### 1.2.2 LPHAP Validity Area Cells

1st issue is whether to rename it to “Positioning Validity Area Cell List” as proposed in 7399, rapporteur is fine with the change.

2nd issue is how the IE is defined, base on 7303, it’s proposed to define NR CGI in the validity area with referred to 9.2.9 not 9.2.6, and remove NR PCI from the validity area.

9.2.A3 LPHAP Validity Area Cells

This IE is used to indicate the cells belong to the validity area.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| **Positioning Validity Area Cell List** |  | 1 |  |  |
| >LPHAP Validity Area Cell Item |  | *1 .. <maxnoVACell>* |  |  |
| >>NR CGI  | O |  | 9.2.9  |  |
|  |  |  |  |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| *maxnoVACell* | 16 |

**Propose 4: Further work on details of the IE “LPHAP Validity Area Cells”**

* **Should it be renamed to “Positioning Validity Area Cell List”?**
* **The NR CGI in the validity area should refer to 9.2.9 (NR CGI) not 9.2.6 (NG-RAN CGI)?**
* **remove NR PCI from the validity area?**

### 1.2.3 SRS reservation in VA

Base on the company contributions, it could be easily agreed that the SRS configuration and LPHAP Validity Area Cells are needed for SRS reservation procedure, to reserve or unreserve the SRS configuration towards the gNB in a VA.

**Proposal 5: SRS Configuration and the Validity Area Cells shall be included in SRS INFORMATION RESERVATION NOTIFICATION message, for both SRS reservation and SRS release.**

When LMF request gNB to release the reserved SRS configuration, it should also provide the SRS configuration and the validity area cells, to indicate which reserved SRS resource should be removed, not simply remove all. Corresponding TP should be updated accordingly:

If the *SRS Reservation Request* IE is set to "reserve", the NG-RAN node shall reserve the indicated SRS configuration for LPHAP in the indicated Validity Area Cells. If *SRS Reservation Request* IE is set to "release", the NG-RAN node shall release the previous SRS configuration from the indicated validity area cells.

**Proposal 6: If *SRS Reservation Request* IE is set to "release", the NG-RAN node shall release the indicated SRS configuration from the indicated validity area cells.**

### 1.2.4 LPHAP SRS Validity Timer?

It’s proposed in 7389 to introduce the *LPHAP SRS Validity Timer* IE in the SRS INFORMATION RESERVATION NOTIFICATION message, the NG-RAN node can take it into account to reserve the indicated resources.

As there’s no clear agreement on the validity timer of the area-specific SRS configuration, from RAN3 perspective, the LMF may release the reserved SRS at any time, it could up to implementation, thus, the rapporteur understands that not necessary to introduce the validity timer for now.

**Proposal 7: No need to introduce SRS validity Timer when reserve the SRS configuration.**

### 1.2.5 Check/Collection of Availabe SRS configuration?

In Contribution 7389, it’s mentioned about how LMF can obtain the available SRS from different gNBs and provides some options:

- option 1, OAM configures static SRS resources for the gNBs in the area.

- option 2, LMF obtains dynamic available SRS resources for the gNBs in the area.

option 1 may cause resources wasted and it’s not flexible and efficient.

RAN3 to down-select between option 1 and option 2.

If RAN3 agree option 2, include the available SRS request in TRP information request message and include the SRS configuration in the TRP information response message to obtain the available SRS resource for LMF.

To be honest, this issue has been discussed in the beginning of the LPHAP discussion, we could not easily reach the consensus on that, we can leave it there, we can further consider it as a small enhancement in TEI-18, if it really needed.

**Proposal 8: Not reopen the discussion on whether and how LMF obtains the available SRS configuration from gNBs. We can further consider it as a small enhancement in TEI-18, if really needed.**

### 1.2.4 UE moves out of the validity area

**Issue 1, Which node sends the Positioning Information Update message to LMF?**

Companies agreed to change the WA into agreement.

**Proposal 9: Turn WA ＂The last serving gNB could notify LMF the UE moves out of the validity area by sending the Positioning Information Update message with a new NR CGI where the UE request for SRS configuration.＂into agreement.**

**Issue 2, whether need to introduce the cause value in XnAP Context Retrieval Request?**

In contribution 7303, it’s proposed to clearly indicate the cause of the RRC Resume, while some companies believed it’s not necessary, the last serving gNB could deduce that base on implementation.

**Proposal 10: The new cause value or indicator is not needed for XnAP UE Context Retrieval Request message.**

## BW Aggregation

|  |  |  |
| --- | --- | --- |
| [R3-237141](Docs%5CR3-237141.zip) | LS on request for clarifications on RedCap positioning, carrier phase positioning, and bandwidth aggregation for positioning (RAN2(Nokia)) | LS in |
| [R3-237144](Docs%5CR3-237144.zip) | Reply LS on R1-2308644 for CPP (RAN2(CATT)) | LS in |
| [R3-237304](Docs%5CR3-237304.zip) | (TP for BL CR to TS 38.455) More details on support of BW aggregation (CATT) | other |
| [R3-237367](Docs%5CR3-237367.zip) | (TP BL 38.xxx) Discussion on CPP, Bandwidth Aggregation and Redcap Postioning (Huawei) | other |
| [R3-237400](Docs%5CR3-237400.zip) | (TP for TS 38.455 BL CR) Resolution of open issues for accuracy enhancements (Nokia, Nokia Shanghai Bell) | other |
| [R3-237538](Docs%5CR3-237538.zip) | Discussion on SRS BW aggregation and RedCap positioning (Ericsson) | other |
| [R3-237640](Docs%5CR3-237640.zip) | Remaining issues on positioning others (Samsung) | discussion |
| [R3-237698](Docs%5CR3-237698.zip) | (TP for 38.455 & 38.473 BLCR) Discussion on PRS&SRS Band Aggregation (ZTE) | other |

### 1.3.1 SRS BW Aggregation

**Background Information:**

Agreement
For SRS bandwidth aggregation across two or three carriers, support enhancement of SRS configuration to indicate the SRS resources from which two or three carriers are linked
• SRS resources are per BWP per carrier configuration
• FFS whether the link is per SRS resource set basis or per SRS resource basis.

Agreement
For SRS bandwidth aggregation across two or three carriers, support
• Option 2: Per SRS resource set basis.
o Support new signaling to indicate which SRS resource sets across carriers are linked.
o It is assumed that the SRS resources across the linked SRS resource sets are linked if the conditions are satisfied. For the non-linked SRS resource sets, no aggregation is assumed even if the conditions are satisfied.

As been defined by RAN1 in the higher layer parameters:

|  |  |  |  |
| --- | --- | --- | --- |
| aggregated-SRSPosResourceSetIdList | Indication of the SRS for positioning resource sets in the two or three carriers that are linked for SRS for positioning BW aggregation from the gNB to the LMF | Indication of SRS for positioning resource sets in each of the Indicated 2 or 3 carriers. | In SRS Confgiuration in POSITIONING INFORMATION RESPONSE message |

**CATT:**

Proposal 1: Introduce *Aggregated SRS Positioning Resource Set Information* IE in *SRS Configuration* to indicate LMF which SRS resource sets are aggregated.

Proposal 2: Positioning SRS Resource Aggregation ID IE in the Positioning SRS Resource Set IE is not needed, which should be removed from the BL CR.

Proposal 3: Remove the FFS and add procedure texts for the IE “*Bandwidth Aggregation Request Information*”.

Proposal 6: Remove the Editor’s note and FFS and the value of the K, and define the *Timing Reporting Granularity Factor Extended* IE as enumerated type.

**HW:**

Bandwidth Aggregation:

* Proposal 3: The gNB indicates the linked resource sets in SRS Configuration IE in Positioning Information Response message using explicit resource set ID list with frequency information. Aggregation ID is not needed.
* Proposal 4: Extend bandwidth values in Re*quested SRS Transmission Characteristics* IE to support SRS bandwidth aggregation.
* Proposal 5: Remove Bandwidth *Aggregation Request Information* IE in Positioning Information Request message from BL CR.
* Proposal 6: Provide a common SRS aggregation information per Measurement Request, which can either be an indicator or explicit resource ID list.
* Proposal 7: Enhance TRP Measurement Result IE to indicate aggregated resource IDs for the reported measurements
* Proposal 8: Enhance Positioning Activation/Deactivation messages to support LMF to flexibly activate/deactivate the aggregated carriers.
* Proposal 9: Confirm the measurement report mapping values for k=-1 and k=-2 for gNB Rx-Tx time difference and UL-RTOA.

**Nok:**

For SRS bandwidth aggregation:

Proposal 3: Encode the *Timing Reporting Granularity Factor Extended* IE as INTEGER (-2 .. -1, …), and remove the associated FFSes and Editor’s Notes.

**E///:**

SRS BW aggregation

Proposal 1: Agree to capture the following list of changes in NRPPa/F1AP:

1. Introduce a new indication in the PRS Configuration IE to indicate which of DL PRS resource sets in the two or three DL PFLs are linked for PRS BW aggregation.
2. Introduce a new indication in the SRS configuration IE to indicate which SRS for positioning resource are linked for SRS BW aggregation,
3. Introduce a new request from LMF to RAN to request providing measurements from the aggregated SRS resources for UL-TDOA and/or multi-RTT.
4. Introduce new indication from gNB to LMF to indicate whether the reported measurements are based on using SRS resources across aggregated carriers and the used SRS Resource IDs.

**ZTE:**

SRS Bandwidth Aggregation:

Proposal 2: SRS bandwidth aggregation does not have any impact on the SRS Resource Set. The LS to RAN1 may be needed for clarification if there are any concerns.

Proposal 3: LMF can request the gNB for UL measurement aggregated SRS resources through the aggregation ID in SRS configuration IE in the MEASUREMENT REQUEST message.

Proposal 4: RAN3 should discuss following option to support gNB reporting to LMF whether/which the measurement is aggregated:

- Option 1: Introduce the Aggregation ID IE in the TRP Measurement Result IE.

- Option 2: Introduce the Aggregation Information IE in the TRP Measurement Result IE.

Proposal 5: In the NRPPa/F1AP measurement report message, introduce Aggregation ID IE in the TRP Measurement Result IE.

**On the request of the BW aggregation from LMF,** some companies preferred to use Bandwidth Aggregation Request Information in Requested SRS Transmission Characteristics as the BL, to indicate the SRS BW aggregation is expected. However, some company proposed to remove it. The rapporteur understand such kind of request is needed, whether the conditions are fulfilled are up to gNB.

**c**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Bandwidth Aggregation Request Information | O |  | ENUMERATED(true, …) |  | YES | ignore |

**On the SRS BW aggregation result provided by the gNB,** it’s proposed in the RAN1 higher layer parameters, as below:

|  |  |  |  |
| --- | --- | --- | --- |
| aggregated-SRSPosResourceSetIdList | Indication of the SRS for positioning resource sets in the two or three carriers that are linked for SRS for positioning BW aggregation from the gNB to the LMF | Indication of SRS for positioning resource sets in each of the Indicated 2 or 3 carriers. | In SRS Confgiuration in POSITIONING INFORMATION RESPONSE message |

From companies contributions, there’re 3 possible ways:

**Option 1:** Add a new IE in SRS Configuration, to indicate the Aggregated SRS Positioning Resource Set Information, which is aligned with RAN1 proposal. (7304, 7367)

9.2.x5 Aggregated SRS Positioning Resource Set Information

This information element is used to indicate aggreagted SRS positioning resource set information.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IE/Group Name |  | Presence | Range | IE type and reference | Semantics description |
| **Aggregated SRS Positioning Resource Set List** |  |  | 1 |  |  |
|  **>Aggregated SRS Positioning Resource Set Item** |  |  | *1.. < maxnoAggSRSPosResourceSets >* |  |  |
| >>Point A |  | M | INTEGER (0..3279165) | NR ARFCN |  |
| >>NR PCI |  | O |  | INTEGER(0..1007) |  |
| >>Positioning SRS Resource Set ID  |  | M |  | INTEGER(0..15) |  |

9.2.x SRS Aggregation

This information element is used to indicated aggreagted SRS resource sets.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| SRS Aggregation List |  | 1 |  |  |
|  >SRS Aggregation Item |  | *1..< maxnoAggregatedCarrier>* |  |  |
|  >>Resource Set ID | O |  | INTEGER(0..15) |  |
|  >>Point A | O |  | INTEGER (0..3279165) |  |
|  >>Offset to Carrier | O |  | INTEGER(0..2199,…) |  |

**Option 2:** Indicate the Positioning SRS Resource Set is linked to SRS BW aggregation by adding *Positioning SRS Resource Set Linked* in the Positioning SRS Resource Set. (7538)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Positioning SRS Resource Set Linked | O |  | ENUMERATED (true,..) | Indicates the Positioning SRS Resource Set ID values linked for SRS bandwidth aggregation. |

**Option 3:** Using Aggregation ID to bind the Positioning SRS Resource Set in the Positioning SRS Resource Set. (as the BL CR, and proposed in 7698)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Positioning SRS Resource Aggregation ID  | O |  | INTEGER(0..16)  |  |

The rapporteur understands that the above options are all feasible, but considering there’s no such kind of terminology for Aggregation ID, to avoid confusion, it’s preferred to go for the option 1 or option 2.

To make LMF easier, it’s preferred to clearly indicate the aggregation info to LMF as option 1, or else, LMF need to learn which resource sets are aggregated by checking each of the resource sets.

**Proposal 12: Aggregated SRS Positioning Resource Set Information should be introduced in Positioning Information Response message, to indicate the SRS for positioning resource sets in the two or three carriers that are linked.**

* **Further discuss the details and work on TP on the details, e.g. using Aggregation ID to bind the Positioning SRS Resource Set, simply indicate the SRS Resource Set is linked to BW Aggregation, or add a list of aggregated SRS resource sets in SRS Configuration?**

**On the measurement with SRS BW Aggregation, some new parameters should be added.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| reqMeasBasedOnSrsAggregation | Request from LMF to NG-RAN node for the UL positioning measurement from aggregated SRS resources across multiple CCs for UL-TDOA and/or Multi-RTT. | requested | For each UL-RTOA and/or gNB Rx-Tx time difference measurement in TRP Measurement Quantities in Measurement Request message.Whether this indication may be common to multiple measurements is up to RAN3.  | 38.455 | AgreementSupport joint measurement and report for the SRS resources across the aggregated carriers for UL-TDOA and Multi-RTT positioning methods• Single UL RTOA or gNB Rx-Tx time difference is reported for the SRS resources across aggregated carrierso FFS: RSRP or RSRPP• FFS: SRS carrier aggregation indication is reported along with the measurement results to indicate whether/which carriers are aggregated for the joint SRS measurement• Support LMF to request gNB for the UL positioning measurement from aggregated SRS resources across multiple CCs |

Request from LMF to NG-RAN node for the UL positioning measurement from aggregated SRS resources across multiple CCs for UL-TDOA and/or Multi-RTT.

**Proposal 13: Introduce a new IE in Measurement Request to indicate the UL positioning measurement from aggregated SRS resources across multiple CCs is requested for UL-TDOA and/or Multi-RTT.**

Changes in 7304:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TRP Measurement Quantities** |  | *1* |  |  | YES | reject |
| **>TRP Measurement Quantities Item** |  | *1 .. <maxnoPosMeas>* |  |  | EACH | reject |
| >>TRP Measurement Type | M |  | ENUMERATED (gNB-RxTxTimeDiff, UL-SRS-RSRP, UL-AoA, UL-RTOA,…, Multiple UL-AoA, UL SRS-RSRPP, UL-RSCP) |  | - |  |
| >>Timing Reporting Granularity Factor | O |  | INTEGER (0..5) | Value (0..5) corresponds to (k0..k5)TS 38.133 [16].This IE is ignored when the Timing Reporting Granularity Factor Extended IE is included. | - |  |
| >>Timing Reporting Granularity Factor Extended | O |  | ENUMERATED (minus1, minus2, ...) |  | - |  |
| >>Measurement Based On SRS Aggregation Request | O |  | ENUMERATED (Requested, ...) | Request from LMF to NG-RAN node for the UL positioning measurement from aggregated SRS resources across multiple CCs for UL-TDOA and/or Multi-RTT. | - |  |

Changes in 7367:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TRP Measurement Quantities** |  | *1* |  |  | YES | reject |
| **>TRP Measurement Quantities Item** |  | *1 .. <maxnoPosMeas>* |  |  | EACH | reject |
| >TRP Measurement Type | M |  | ENUMERATED (gNB-RxTxTimeDiff, UL-SRS-RSRP, UL-AoA, UL-RTOA,…, Multiple UL-AoA, UL SRS-RSRPP, UL-RSCP) |  | - |  |
| >Timing Reporting Granularity Factor | O |  | INTEGER (0..5) | Value (0..5) corresponds to (k0..k5)TS 38.133 [16].This IE is ignored when the Timing Reporting Granularity Factor Extended IE is included. | - |  |
| >Timing Reporting Granularity Factor Extended | O |  | FFS | FFS |  |  |
| SFN initialisation Time | O |  | Relative Time 19009.2.36 | If this IE is not present, the TRP may assume that the value is same as its own SFN initialisation time. | YES | ignore |
| SRS Configuration | O |  | 9.2.28 |  | YES | ignore |
| Measurement Beam Information Request | O |  | ENUMERATED (true,...) | This IE is ignored when the *Measurement Characteristics Request Indicator* IE is included. | YES | ignore |
| System Frame Number | O  |  | INTEGER(0..1023) |  | YES | ignore |
| Slot Number | O |  | INTEGER(0..79) |  | YES | ignore |
| Measurement Periodicity Extended | C-ifMeasPerExt |  | ENUMERATED (160ms, 320ms, 1280ms, 2560ms, 61440ms, 81920ms, 368640ms, 737280ms, 1843200ms, …) |  | YES | reject |
| Response Time | O |  | 9.2.68 | This IE is ignored when the *Report Characteristics* IE is set to “periodic”. | YES | ignore |
| Measurement Characteristics Request Indicator | O |  | 9.2.81 |  | YES | ignore |
| Measurement Time Occasion | O |  | ENUMERATED (o1, o4, …) |  | YES | ignore |
| Measurement Amount | O |  | ENUMERATED (0, 1, 2, 4, 8, 16, 32, 64) | This IE is ignored if the *Report Characteristics* IE is set to ‘OnDemand’. Value 0 represents an infinite number of periodic reporting. | YES | ignore |
| Time Window Information for Measurement | O |  | 9.2.x2 |  | YES | ignore |
| CHOICE *Positioning* *SRS* *Aggregation Information*  | O |  |  |  | YES | ignore |
| >Aggregated Measurement Requested | M |  | ENUMERATED(true,…) |  | YES | ignore |
| >Aggregated Resources | M |  | 9.2.x |  | YES | ignore |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| measBasedOnSrsAggregation | Indicates whether the reported UL-TDOA or gNB Rx-Tx time difference measurement is based on processing of SRS for positioning resources across aggregated carriers. | enabled | For each UL-RTOA or gNB Rx-Tx time difference measurement in TRP Measurement Result message.Whether this indication may be common to multiple measurements is up to RAN3.  | 38.455 | AgreementSupport joint measurement and report for the SRS resources across the aggregated carriers for UL-TDOA and Multi-RTT positioning methods• Single UL RTOA or gNB Rx-Tx time difference is reported for the SRS resources across aggregated carrierso FFS: RSRP or RSRPP• FFS: SRS carrier aggregation indication is reported along with the measurement results to indicate whether/which carriers are aggregated for the joint SRS measurement• Support LMF to request gNB for the UL positioning measurement from aggregated SRS resources across multiple CCs |
| aggregated-SRSPosResourceIdList | SRS resource IDs for the aggregated measurement which are used for RSRP/RSRPP and/or timing measurement results . | SRS resource IDs.  | For each UL-RTOA or gNB Rx-Tx time difference measurement in TRP Measurement Result message.Whether this indication may be common to multiple measurements is up to RAN3.  | 38.455 | AgreementFor SRS bandwidth aggregation across carriers, support• Single RSRP or RSRPP is reportedo FFS: the single RSRP/RSRPP is based on aggregated SRS resources across aggregated carriers• The used SRS resource IDs for the aggregated measurement are shared for RSRP/RSRPP and/or timing measurement results |

From the above RAN1 input for higher layer parameters:

**Observation x: A new IE e.g. *Measurement Based On SRS Aggregation* should be introduced to the TRP measurement Report.**

SRS resource IDs for the aggregated measurement which are used for RSRP/RSRPP and/or timing measurement results

**Observation y: Aggregated SRS resource IDs for the aggregated measurement should be introduced to the TRP measurement Report.**

Base on the observations above, maybe we only need to introduce a new IE, e.g. *Aggregated SRS resource ID List* for the aggregated measurement in the TRP measurement Report.

**Proposal 14: Introduce a new IE *Aggregated SRS Positioning Resource ID List* to the *TRP measurement Report* to indicate aggregated resource IDs for the reported measurements.**

In 7367, it’s also proposed to enhance Positioning Activation/Deactivation messages to support LMF to flexibly activate/deactivate the aggregated carriers.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CHOICE *Positioning* *SRS* *Aggregation Activation*  | O |  |  |  | YES | ignore |
| >Activate All | M |  | ENUMERATED(true,…) |  | YES | ignore |
| >Activated Resource Set | M |  | 9.2.x |  | YES | ignore |

**Proposal 15: Discuss whether need to enhance Positioning Activation/Deactivation messages to support LMF to flexibly activate/deactivate the aggregated carriers.**

### 1.3.2 PRS BW Aggregation

Agreement
For PRS bandwidth aggregation across PFLs, support enhancement of PRS configuration to inform UE by LMF (or inform LMF by NG-RAN) PRS resources from which two or three PFLs are linked.
• FFS whether the link is for all TRPs or per TRP basis
• FFS whether the link is per PRS resource set basis or per PRS resource basis.

Agreement
For PRS bandwidth aggregation across PFLs, support
• Option 2: Per TRP basis and per PRS resource set basis.
o For each TRP, support new signaling to indicate which PRS resource sets across PFLs are linked.
o It is assumed that the PRS resources across the linked PRS resource sets are linked if the conditions are satisfied. For the non-linked PRS resource sets, no aggregation is assumed even if the conditions are satisfied.

Agreement
For PRS bandwidth aggregation, with regards to the signaling in the location information request message, introduce the following:
• A request to indicate UE which two or three PFLs to be used for performing joint measurement
• A new ReportingGranularityfactor smaller than 0 which can be applicable at least when the LMF requests aggregated measurements
o Support at least the values of k={-1,-2}
§ FFS other values e.g. -3, -4, -5, -6
o Send RAN4 an LS to confirm the feasibility

As been agreed in RAN1 [3]:

|  |  |  |  |
| --- | --- | --- | --- |
| nr-linked-DL-PRS-ResourceSetIDList-PrsAggregation | Indication of DL PRS resource sets in the two or three DL PFLs that are linked for DL PRS BW aggregation from the NG-RAN node to the LMF | ~~TBD~~Up to three NR-DL-PRS-ResourceSetID values | Per TRPExample: in PRS Configuration (as in 9.2.44) in PRS CONFIGURATION RESPONSE message |

CATT:

Proposal 4: Introduce *Aggregated PRS Resource Set Information* IE in *PRS Configuration* to indicate LMF which PRS resource sets are aggregated.

Proposal 5: Introduce an indication in TRP INFORMATION REQUEST and PRS CONFIGURATION REQUEST to indicate the PRS aggregation is requested by the LMF.

**HW:**

Bandwidth Aggregation:

* Proposal 2: Introduce a new IE in TRP Information Response message to indicate the aggregation information for PRS per TRP.

SS:

Proposal 3: Introduce Aggregation ID as the indication of DL PRS resource sets in the two or three DL PFLs that are linked for DL PRS BW aggregation from the NG-RAN node to the LMF.

Proposal 4: LMF determine the Aggregation ID for DL PRS BW aggregation, i.e. at least introduce the Aggregation ID in the Requested DL PRS Transmission Characteristics IE as the BW Aggregation Request Info.

ZTE:

Proposal 1: Introduce PRS Aggregation Information IE in PRS Configuration IE, including DL PRS Frequency Layer ID IE and PRS Resource Set ID IE.

Base on RAN1 agreements and companies contributions, we can easily agree to introduce a new IE to indicate LMF which PRS resource sets are aggregated.

**Proposal 16: Introduce a new IE in *PRS Configuration* in PRS CONFIGURATION RESPONSE message to indicate the aggregation information for PRS per TRP.**

**Proposal 17: Discuss whether need to introduce an indication in TRP INFORMATION REQUEST and PRS CONFIGURATION REQUEST to indicate the PRS aggregation is requested by the LMF.**

## CPP

**Agreement**

**When a LMF requests the serving gNB and neighboring gNBs of a UE to measure the UL SRS resources from the UE within indicated time window(s):**

**• The duration of a time window can be configured as follows:**

**o {1, 2, 4, 6, 8, 12, 16} slots.**

**• the number of the time windows can be:**

**o {1, 2, …, 16}**

**CATT:**

Proposal 7: Update the *Time Window Information of SRS* IE and *Time Window Information of SRS* IE to align with the definition of RAN1, and remove corresponding FFS and Editor’s note.

### 9.2.x1 Time Window Information of SRS

This IE contains the time window(s) when UL SRS transmission is requested.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| Time Window SRS List |  | 1 |  |  |
| **>Time Window SRS Item** |  | *1..<maxnoofTimeWindowSRS>* |  |  |
| >>Time Window Start |  | *1* |  |  |
| >>>System Frame Number | M |  | INTEGER(0..1023) |  |
| >>>Slot Number | M |  | INTEGER(0..79) |  |
| >>>Symbol Index | M |  | INTEGER(0..13) |  |
| >>CHOICE *Time Window Duration* | M |  |  |  |
| >>>Symbols |  |  |  |  |
| >>>>Duration in Symbols | M |  | ENUMERATED (1, 2, 4, 8, 12, …) |  |
| >>>Slots |  |  |  |  |
| >>>>Duration in Slots | M |  | ENUMERATED (1, 2, 4, 6, 8, 12, 16, …) |  |
| >>Time Window Type | M |  | ENUMERATED (single, periodic, …) |  |
| >>Time Window Periodicity | C-ifTimeWindowTypePeriodic |  | ENUMERATED (0.125, 0.25, 0.5, 0.625, 1, 1.25, 2, 2.5, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 160, 320, 640, 1280, 2560, 5120, 10240, …)  | Unit: Milli-seconds |

|  |  |
| --- | --- |
| Condition | Explanation |
| ifTimeWindowTypePeriodic | This IE shall be present if the *Time Window Type* IE is set to the value “periodic”. |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofTimeWindowSRS | Maximum no of Time Window of SRS. Value is 16. |

**HW:**

Carrier Phase Positioning:

* Proposal 1: Enhance Measurement Quality IE to support the gNB to report the associated phase quality of carrier phase measurements. Wait for RAN1 LS on other issues for CPP.

**Nok:**

For UL CPP:

Proposal 1: Introduce Phase Measurement Quality as an addition choice in the *Measurement Quality* IE, which includes the *Phase Quality Index* IE and *Phase Quality Resolution* IE. Encoding details are pending RAN4.

Proposal 2: Remove the FFS for the *Symbol Index* IE in the Time Stamp and add the following semantics description: “Applicable to UL RSCP measurement only”.

### 9.2.43 Measurement Quality

This information element contains the TRP’s best estimate of the quality of the measurement.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
| CHOICE *Measurement Quality* | M |  |  |  | - |  |
| >Timing Measurement Quality |  |  |  | Corresponds to information provided in *NR-TimingQuality* IE as defined in TS 37.355 [14] | - |  |
| >>Measurement Quality | M |  | INTEGER(0..31) |  |  |  |
| >>Resolution | M |  | ENUMERATED(0.1m, 1m, 10m, 30m, …) |  |  |  |
| >Angle Measurement Quality |  |  |  |  | - |  |
| >>Azimuth Quality | M |  | INTEGER(0..255) |  |  |  |
| >>Zenith Quality | O |  | INTEGER(0..255) |  |  |  |
| >>Resolution | M |  | ENUMERATED (0.1deg, …) |  |  |  |
| >Phase Measurement Quality |  |  |  |  | YES | ignore |
| >>Phase Quality Index | M |  | INTEGER(0..FFS) |  |  |  |
| >>Phase Quality Resolution | M |  | ENUMERATED(FFS) |  |  |  |

**SS:**

Proposal 1: RAN3 is kindly asked to discuss whether and how to reflect the case when UL RSCP measurement result reported together with gNB Rx-Tx time difference measurement or UL-TDOA measurement in NRPPa.

Proposal 2: Add OFDM symbol index in Time Stamp IE for positioning measurement, as requested by RAN1.

**Proposal 18: Update the *Time Window Information of SRS* IE and *Time Window Information of Measurement* IE to align with the definition of RAN1, e.g. extend the IE to a list of time windows with max number of the time windows as 16.**

**Proposal 19: Definition of Phase Quality Index and Phase Quality Resolution is pending to RAN1 and RAN4, introduce the IE in our interfaces when there’s clear definition.**

**Proposal 20: Remove the FFS for the Symbol Index IE in the Time Stamp and add the following semantics description: “Applicable to UL RSCP measurement only”.**

## RedCap Positioning

HW:

* Proposal 10: It is proposed to enhance SRS Configuration IE based on RAN1 agreements to support SRS Tx frequency hopping and enhance Positioning Information Request message so that the LMF can request for SRS frequency hopping.
* Proposal 11: Enhance Measurement Request/Response messages to support the UL SRS measurement based on frequency hopping. Wait RAN1 for details.

**Ericsson:**

Observation 1 : RedCap Positioning will have specifications impacts to NRPPa and possible F1AP. We are dependent on RAN1’s updated parameters list and RAN2 alignment

Observation 2: PRS transmission with longer time duration is preferred for PRS-frequency-hopping-based RedCap positioning.

Proposal 2: Indicate either RedCap positioning or extended PRS repetition factors in the On-demand PRS TRP Information and/or TRP Information in the TRP INFORMATION RESPONSE message.

Proposal 3: Add a *Allowed Extended Resource Repetition Factor Values* IE in *On-demand PRS TRP Information* 9.2.65.

Proposal 4: Extend the Resource Time Gap IE in Requested DL PRS Transmission Characteristics and PRS Configuration with new values 64 and 128 (FFS RAN1) for RedCap PRS frequency hopping. FFS if other parameters such as Resource Time Gap are also impacted

As the Redcap positioning related parameters are not stable in RAN1, the RAN3 design on NRPPa and F1AP should wait a little bit.

**Proposal 21: Further work on the RAN3 details on support of Redcap Positioning, when the parameters are stable in RAN1/RAN2.**

# 2. Reference

1. R3-237082 (BL CR to 38.305) Support of NR Positioning Enhancements, Nokia, Nokia Shanghai Bell, CATT, Huawei, Ericsson, Xiaomi, ZTE, Samsung
2. R3-237083 (BL CR to 38.413) Support of NR Positioning Enhancements, ZTE, CATT, Huawei, Nokia, Nokia Shanghai Bell, Ericsson
3. R3-237084 (BL CR to 38.423) Support of NR Positioning Enhancements, Huawei, CATT, ZTE, Nokia, Nokia Shanghai Bell, Ericsson
4. R3-237085 (BL CR to 38.455) Support of NR Positioning Enhancements, CATT, Huawei, Ericsson, Nokia, Nokia Shanghai Bell, ZTE, Xiaomi, Samsung
5. R3-237086 (BL CR to TS 38.470) Support of NR Positioning Enhancements, Samsung, Huawei, CATT, Ericsson, Nokia, Nokia Shanghai Bell, ZTE, Xiaomi
6. R3-237087 (BL CR to TS 38.473) Support of NR Positioning Enhancements, Ericsson, CATT, Huawei, ZTE, Nokia, Nokia Shanghai Bell
7. R3-237136 LS on PRS bandwidth aggregation RAN1(ZTE)
8. R3-237141 LS on request for clarifications on RedCap positioning, carrier phase positioning, and bandwidth aggregation for positioning RAN2(Nokia)
9. R3-237144 Reply LS on R1-2308644 for CPP RAN2(CATT)
10. R3-237148 Reply LS to RAN1 on SRS and PRS bandwidth aggregation for positioning RAN4(ZTE)
11. R3-237149 LS on report mapping for positioning measurements with PRS\_SRS bandwidth aggregation RAN4(Ericsson)
12. R3-237150 LS on SL positioning and carrier phase positioning measurements RAN4(CATT)
13. R3-237302 Work Plan for Rel-18 WI on Expanded and Improved NR Positioning, CATT
14. R3-237303 (TP for BL CR to TS 38.455, 38.423, 38.305) on support of LPHAP, CATT
15. R3-237304 (TP for BL CR to TS 38.455) More details on support of BW aggregation, CATT
16. R3-237366 (TP BL 38.xxx) Remaining Issues on LPHAP, Huawei
17. R3-237367 (TP BL 38.xxx) Discussion on CPP, Bandwidth Aggregation and Redcap Postioning, Huawei
18. R3-237387 (TP to TS 38.413) Clarification on Ranging and Sidelink Positioning Service Information, Xiaomi, Ericsson, Samsung
19. R3-237388 (draft LS to RAN2) Support of SL positioning, Xiaomi
20. R3-237389 (TP for TS 38.455) Support of LPHAP, Xiaomi
21. R3-237399 (TP for TS 38.455 BL CR) Further details for LPHAP, Nokia, Nokia Shanghai Bell
22. R3-237400 (TP for TS 38.455 BL CR) Resolution of open issues for accuracy enhancements, Nokia, Nokia Shanghai Bell
23. R3-237536 (TP to TS 38.423) Clarification on Ranging and Sidelink Positioning Service Information, Ericsson, Xiaomi, Samsung
24. R3-237537 Discussion on SL positioning in network coverage mode and NRPPa impacts + LS to RAN2, Ericsson
25. R3-237538 Discussion on SRS BW aggregation and RedCap positioning, Ericsson
26. R3-237639 (TP to TS 38.473) Clarification on Ranging and Sidelink Positioning Service Information, Samsung, Xiaomi, Ericsson
27. R3-237640 Remaining issues on positioning others, Samsung
28. R3-237696 Further discussion on LPHAP impacts, ZTE
29. R3-237698 (TP for 38.455 & 38.473 BLCR) Discussion on PRS&SRS Band Aggregation, ZTE