3GPP TSG-RAN WG4 Meeting #111 R4-240xxxx

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

**Agenda item:** 7.12.3

**Source:** Ericsson

**Title:** Ad hoc minutes for AH#1 on Rel-18 positioning (Monday)

**Document for:** Approval

# Introduction

The document contains discussions on the topics as indicated below.

Positioning RRM core requirements across the following 3 threads:

* Topic # 1: core [111][212] NR\_pos\_enh2\_part1 (-)
* Topic # 2: core [111][213] NR\_pos\_enh2\_part2 (-)
* Topic # 3: core [111][214] NR\_pos\_enh2\_part3 (-)

Positioning RRM performance across the following 3 threads:

* Topic # 4: perf [111][212] NR\_pos\_enh2\_part1 (Tuesday/May21 come backs)
* Topic # 5: perf [111][213] NR\_pos\_enh2\_part2 (Tuesday/May21 come backs and SL positioning)
* Topic # 6: perf [111][214] NR\_pos\_enh2\_part3 (Tuesday/May21 come backs)

Documents for approval and draft CRs:

* Topic # 7: core draft CRs for all threads (Tuesday/May21)
* Topic # 8: perf draft CRs for all threads (Tuesday/May21)
* Topic # 9: other documents for approval, including updated work split (Tuesday/May21)

# Topic #1: core [111][212] NR\_pos\_enh2\_part1

## RedCap positioning (Agenda 7.12.1.4)

Issues recommended for discussion by moderator: -

Issues prioritized during the AH: -

## PRS/SRS bandwidth aggregation (Agenda 7.12.1.4)

Issues recommended for discussion by moderator: -

Issues prioritized during the AH: -

# Topic #2: core [111][213] NR\_pos\_enh2\_part2

## SL positioning (Agenda 7.12.1.2)

Issues recommended for discussion by moderator: -

Issues prioritized during the AH: -

## Carrier phase positioning (Agenda 7.12.1.2)

Issues recommended for discussion by moderator: -

Issues prioritized during the AH: -

# Topic #3: core [111][214] NR\_pos\_enh2\_part3

## LPHAP (Agenda 7.12.1.3)

Issues recommended for discussion by moderator:

Issues prioritized during the AH: -

# Topic #4: performance [111][212] NR\_pos\_enh2\_part1

## General (Agenda 7.12.2.1)

Issues recommended for discussion by moderator:

* + Issue 3-1-1: Updated work split on test cases for RedCap positioning.
  + Issue 3-1-2: Test cases for RRC\_IDLE mode
  + Issue 3-1-4: Testing principles for positioning TCs in RRC\_IDLE mode

Issues prioritized during the AH: 3-1-1, 3-1-2, 3-1-4

### Issue 3-1-4: Testing principles for positioning TCs in RRC\_IDLE mode

* Proposals
  + Option 1: HW
    - For an RRC\_INACTIVE TC that UE needs to pass based on testing applicability, if UE supports the measurement in RRC\_IDLE and the corresponding RRC\_IDLE TC exists, then UE is only required to pass the RRC\_IDLE TC.
* Recommended WF
  + Discussion on this issue rely on the progress made on **Issue 3-1-2**.

Discussion:

Conclusion: To be discussed together with the worksplit in RAN4#111 and draft CRs in RAN4#112.

## RedCap positioning (Agenda 7.12.2.4)

Issues recommended for discussion by moderator:

* + Issue 4-1-1-1: Bandwidth configuration for accuracy requirement for positioning measurement with RX FH for RedCap positioning.
  + Issue 4-1-2-2: PRS bandwidth for FH TCs for RedCap positioning.
  + Issue 4-1-2-1: PRS RMC for RedCap positioning TCs
  + Issue 4-1-1-3: Accuracy requirement for RedCap positioning

Issues prioritized during the AH: 4-1-1-1, 4-1-2-2, 4-1-2-1, 4-1-1-3.

### Issue 4-1-2-2: PRS bandwidth for FH TCs for RedCap positioning

* Proposals
  + Option 1: HW
    - Discuss how to handle PRS BW for FH TCs and clarify the definition of Io.
      * Option 1: consider the BW in test configuration as UE BW, and cell BW can be larger
      * Option 2: consider PRS are transmitted from non-serving cells (the cell BW of the non-serving cells need to be defined), and BW in test configuration is only for serving cell
* Recommended WF
  + Discuss the option(s).

Discussion:

Conclusion: Collect feedback from TE vendors.

## PRS/SRS bandwidth aggregation (Agenda 7.12.2.5)

Issues recommended for discussion by moderator:

* + Issue 5-1-1-1: Bandwidth configuration for PRS aggregation based measurement accuracy requirement.
  + Issue 5-1-1-2: Accuracy requirement for PRS-RSRP/RSRPP measurement based on PRS aggregation.
  + Issue 5-1-1-4: Accuracy requirement based on baseband sampling rate for measurements based on PRS aggregation.
  + Issue 5-1-1-5: Accuracy requirements for 2 PFL and 3 PFL cases.
  + Issue 5-1-1-8: Applicability of requirements for PRS aggregation
  + Issue 5-1-2-1: PRS resource set up for measurement delay test cases

Issues prioritized during the AH: 5-1-1-1, 5-1-1-2, 5-1-1-4, 5-1-1-5, 5-1-1-8, 5-1-2-1.

# Topic #5: performance [111][213] NR\_pos\_enh2\_part2

## SL positioning (Agenda 7.12.2.2)

Issues recommended for discussion by moderator:

Subtopic 1-2: Issue 1-2-1/2/3/4/5/6

Issues prioritized during the AH: -

### Issue 1-2-1: SINR side conditions

Previous agreements:

* *SL AoA and SL RTOA (for core requirements only):*
  + *-6 dB*
* *Two sets of side conditions for DL RSCPD accuracy requirements:* 
  + *[-3, -6] dB for AWGN, two-tap channel model,*
  + *[-6, -13] dB for AWGN.*
* *Relative DL RSCP:*
  + *[0, -6] dB for AWGN, two-tap channel model,*
  + *[-3, -13] dB for AWGN.*
* Proposals

For SL RSTD,

* + Option 1: (CATT, vivo)
    - (-3, -6) dB for reference UE and target UE respectively.
  + Option 2: (OPPO, Ericsson)
    - (0, -6) dB for reference UE and target UE respectively.
  + Option 3: (Qualcomm, Huawei)
    - (0, -3) dB for reference UE and target UE respectively.

For SL UE Rx-Tx, SL RSRP(P),

* + Option 1: (CATT, OPPO, vivo, Ericsson)
    - -6 dB
  + Option 2: (Qualcomm)
    - Define two side conditions: 0 dB and -3 dB
  + Option 3: (Huawei)
    - -3 dB for the target UE
* Recommended WF
  + Discuss the option(s).

Discussion:

### Issue 1-2-6: Test case configurations

|  |
| --- |
| Issue 3-1-7: Test configurations *Agreements in RAN4#110bis:*   * Define SL positioning test cases using only AWGN and 2-tap channel (for SL PRS RSRPP) propagation conditions. * RAN4 to define the test cases for dedicated resource pool and shared resource pool as test configurations, and the SL PRS configurations could apply to both types of resource pool. |

* Proposals
  + Option 1: (Qualcomm)
    - Define SL positioning test cases for a single carrier and single resource pool.
    - Do not define SL positioning test cases with additional path reporting.
    - Do not define SL positioning test cases with LoS/NLoS reporting.
    - Do not define SL positioning test cases with Tx/Rx ARP-ID reporting.
    - Define SL PRS configurations for SL positioning test cases that apply to both shared and dedicated resource pools
      * No TDM of SL PRS from different UEs in the same slot
      * No comb-based multiplexing of SL PRS from different UEs in the same slot
      * No FDM of SL PRS from different UEs in the same slot
  + Option 2: (vivo)
    - Consider the following configurations for test:

|  |  |
| --- | --- |
| **SCS and BW** | **Config 1: 15 kHz SCS 48 RBs 10MHz** |
| **Config 2: 15 kHz SCS 96 RBs 20MHz** |
| **Config 3: 30 kHz SCS 48 RBs 20MHz** |
| **Coverage** | **In coverage** |
| **Synchronization source** | **gNB** |
| **SINR for test** | **For UE 1, 3dB, for other UEs, -6dB** |

* + Option 3: (Huawei)
    - Shared and dedicated resource pools are randomly used among different TCs
    - All TX and RX UEs are in coverage and using gNB as sync reference
    - Es/Iot: 3dB (to ensure 100% PSCCH decoding)
    - RAN4 to consider the following SL PRS related parameters for the test.
      * (symbol num, comb size): (4, 4) and (2, 4)
      * BW: 48 RB for delay TCs, 24 and 48 RB for accuracy TCs
      * MUX of multiple TX UEs: TX UE1: slot n, TX UE2: slot n + 1 and slot n + 100ms
  + Option 4: (Ericsson)
    - SL positioning test cases are defined for 3 general NR Uu configurations:

|  |  |
| --- | --- |
| NR Uu configuration | Description |
| 1 | NR Uu: 15 kHz SSB SCS, 20 MHz bandwidth, FDD duplex mode |
| 2 | NR Uu: 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 3 | NR Uu: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

* + - SL positioning test cases are defined for 3 general NR SL configurations:

|  |  |
| --- | --- |
| NR SL configuration | Description |
| 1 | SL: 15 kHz, 10 MHz bandwidth, TDD duplex mode |
| 2 | SL: 30 kHz, 10 MHz bandwidth, TDD duplex mode |
| 3 | SL: 30 kHz, 20 MHz bandwidth, TDD duplex mode |

* + - The number of SL UEs in the measurement delay test cases for SL positioning is 4:
      * 1 target UE,
      * 3 anchor UEs (1 reference anchor UE and 2 other anchor UEs).
    - The number of SL UEs in the measurement accuracy test cases for SL positioning is 3:
      * 1 target UE,
      * 2 anchor UEs (1 reference anchor UE and 1 other anchor UE).
    - For each SL positioning measurement type, measurement delay test cases are defined for both numbers of samples (can be in the same section):
      * 1 sample, and
      * 4 samples.
    - For each SL positioning measurement type (for which accuracy requirements are defined), measurement accuracy test cases are defined for both numbers of samples (can be in the same section):
      * 1 sample, and
      * 4 samples.
* Recommended WF
  + Discuss the options considering the following aspects:
    - NR Uu configurations.
    - SL PRS configurations.
    - Parameters for test configurations, e.g., SCS and BW.
    - Whether all TX and RX UEs are in coverage and using gNB as sync reference.
    - Es/Iot.
    - The number of SL UEs in test cases.

Check for agreement:

* RAN4 will not specify SL positioning test cases with additional path reporting
* RAN4 will not specify SL positioning test cases with LoS/NLoS reporting (no corresponding RAN4 requirements to test)
* RAN4 will not specify SL positioning test cases with Tx/Rx ARP-ID reporting (no corresponding RAN4 requirements to test)
* NR Uu configurations

|  |  |
| --- | --- |
| NR Uu configuration | Description |
| 1 | NR Uu: 15 kHz SSB SCS, 20 MHz bandwidth, FDD duplex mode |
| 2 | NR Uu: 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 3 | NR Uu: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

* SL PRS configurations

|  |  |
| --- | --- |
| NR SL configuration | Description |
| 1 | SL: 15 kHz, 10 MHz bandwidth, TDD duplex mode |
| 2 | SL: 30 kHz, 10 MHz bandwidth, TDD duplex mode |
| 3 | SL: 30 kHz, 20 MHz bandwidth, TDD duplex mode |

* The number of SL UEs in test cases
  + The number of SL UEs in the SL measurement delay test cases for SL positioning:
    - SL RSTD: **3** (1 target rx UE, 3 anchor tx UEs [1 reference anchor UE and 2 other anchor UEs)])
    - SL Rx-Tx, SL PRS-RSRP/RSRPP, SL AoA: **2** (1 target rx UE, 2 anchor tx UEs),
    - SL RTOA: **2** (1 target tx UE, 1 anchor rx UE, 1 other target tx UE).
  + The number of SL UEs in the SL measurement accuracy test cases for SL positioning:
    - SL RSTD, SL Rx-Tx, SL PRS-RSRP/RSRPP, SL AoA: **3** (1 target rx UE, 2 anchor tx UEs [1 reference anchor UE and 1 other anchor UE]),
    - SL RTOA: **2** (1 target tx UE, 1 anchor rx UEs, 1 other target tx UE).
* All TX and RX UEs are in coverage and using gNB as sync reference
* Parameters for test configurations, e.g., SCS and BW (depends on the previous issues)
* Es/Iot.

Discussion:

### Issue 1-2-2: Margin for RF calibration

* Proposals
  + Option 1: (OPPO)
    - The existing margins due to frequency drift and RF calibration for DL PRS can be reused for SL PRS.
    - Consider time margins due to frequency drift to Rx-Tx time difference accuracy requirement if the UE reports the transmission timestamp of a SL PRS, and the time margins for RSTD could be reused.
  + Option 2a: (Qualcomm)
    - Define the RF calibration margin for SL RSTD measurements in FR1 using the following structure:

|  |  |  |  |
| --- | --- | --- | --- |
| PRS BW (RB number) | | | Margin (Tc) |
| SCS=15kHz | SCS=30kHz | SCS=60kHz |
| ≥ 48 | ≥ 24 | N/A | Z1 |
| ≥ 96 | ≥ 48 | ≥ 24 | Z2 |
| N/A | ≥ 96 | N/A | Z3 |

* + - Define the RF calibration margin for SL Rx-Tx measurements in FR1 using the following structure:

|  |  |  |  |
| --- | --- | --- | --- |
| Min(SL PRS Rx BW, SL SRS Tx BW) (RB) | | | Margin (Tc) |
| SCS = 15 kHz | SCS = 30 kHz | SCS = 60 kHz |
| ≥ 48 | ≥ 24 | N/A | δ1 |
| ≥ 96 | ≥ 48 | ≥ 24 | δ2 |
| N/A | ≥ 96 | N/A | δ3 |

* + Option 2b: (vivo, Huawei)
    - Define the RF calibration margin for SL RSTD measurements in FR1 using the following structure:

|  |  |  |  |
| --- | --- | --- | --- |
| *PRS BW (RB number)* | | | *Margin (Tc)* |
| *SCS=15kHz* | *SCS=30kHz* | *SCS=60kHz* |
| ***≥ 48*** | ***≥ 24*** | ***N/A*** | ***Z1*** |
| ***≥ 96*** | ***≥ 48*** | ***≥ 24*** | ***Z2*** |

* + - Define the RF calibration margin for SL Rx-Tx measurements in FR1 using the following structure:

|  |  |  |  |
| --- | --- | --- | --- |
| *Min(SL PRS Rx BW, SL SRS Tx BW) (RB)* | | | *Margin (Tc)* |
| *SCS = 15 kHz* | *SCS = 30 kHz* | *SCS = 60 kHz* |
| ***≥ 48*** | ***≥ 24*** | ***N/A*** | ***δ1*** |
| ***≥ 96*** | ***≥ 48*** | ***≥ 24*** | ***δ2*** |

* Recommended WF
  + Discuss the option(s) with Option 2b as the starting point.

Discussion:

### Issue 1-2-5: Measurement accuracy requirements

|  |
| --- |
| *Agreements in RAN4#110bis:*  **Issue 3-1-3: Assumptions to define SL PRS measurement accuracy requirements**  *Agreements:*   * Define measurement accuracy requirements for SL-PRS based RSTD, SL-PRS based UE Rx-Tx time difference, SL-PRS based RSRP and SL-PRS based RSRPP:   + independent of SL-PRS comb size,   + for same channel profiles as defined for Uu   + for measurement samples 1 or 4 depending on the RB number of PRS BW   **Issue 3-1-4: Measurement accuracy requirements**  *Agreements:*   * RAN4 to define accuracy requirement for SL RSTD and SL Rx-Tx by considering the framework of ±(X+Y[+Z]) Tc and ±(X[+δ]) Tc, respectively.   + X is the simulated measurement accuracy for a given propagation condition and number of measurement samples,   + Y is the frequency/clock drift margin,   + FFS: Z and δ are the RF calibration margins. |

* Proposals
  + Option 1: (Qualcomm)
    - Define SL position measurement accuracy using the following structure, aligned with the simulation assumptions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Accuracy (Tc)** | **SL PRS Ês/Iot (dB)** | **SL PRS SCS (kHz)** | **SL PRS bandwidth (num RB)** | **Nsample** |
|
| [TBD] | (Ês/Iot)ref ≥TBD  (Ês/Iot)i ≥TBD | 15 | ≥ 48 | [1] |
| ≥ 96 | 1 |
| [TBD] | 30 | ≥ 24 | 4 |
| ≥ 48 | [1] |
| ≥ 96 | 1 |
| [TBD] | 60 | ≥ 24 | 4 |

* + - At least for AWGN, define one set of measurement accuracy requirements applicable to fully staggered and partially staggered (half comb) SL PRS.
    - For measurement accuracy requirements with multiple samples (Nsample = 4), do not assume coherent combining between samples.
  + Option 2: (Qualcomm, vivo)
    - RAN4 to define accuracy requirement for SL RSTD and SL Rx-Tx by considering the framework of ±(X+Y+Z) Tc and ±(X+**δ**) Tc, respectively.
  + Option 3a: (vivo)
    - Define measurement accuracy requirements based on the following RB number configuration
      * 15kHz SCS: 48, 96
      * 30kHz SCS: 24, 48,
      * 60kHz SCS: 24
  + Option 3b: (Huawei)
    - Accuracy requirements for SL PRS measurements are defined based on BW of
      * 15kHz SCS: 48 RB≤BW< 96 RBs, 96 RB≤BW
      * 30kHz SCS: 24 RB≤BW< 48 RBs, 48 RB≤BW<96 RBs
      * 60kHz SCS: 24 RB≤BW
  + Option 4: (Ericsson)
    - Two sets of accuracy requirements are to be defined for SL positioning measurements, i.e., for:
      * 1 sample (>48 PRBs), and
      * 4 samples (≤48 PRBs)
    - The measurement accuracy requirements can be specified in the following format:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| SL-PRS Ês/Iot | SL-PRS SCS | SL-PRS bandwidth  Note 1 | Number of samples, S | Io Note 2 range | | |
| NR operating band groups Note 3 | Minimum Io | Maximum Io |
| Tc Note 4 | dB | kHz | RB |  |  | dBm/SCS | dBm/BWChannel |
| TBD | (SL-PRS Ês/Iot)ref ≥  0 dB  (SL-PRS Ês/Iot)*i* ≥  -6 dB | 15 | ≥ 24 | ≥ 4 | NR\_TDD\_FR1\_B | -126.5 | -50 |
| NR\_TDD\_FR1\_J | -122.5 | -50 |
| TBD | >48 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| TBD  TBD | 30 | ≥ 24 | ≥ 4 | NR\_TDD\_FR1\_B | -123.5 | -50 |
| NR\_TDD\_FR1\_J | -119.5 | -50 |
| TBD | >48 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| TBD | 60 | ≥ 24 | ≥ 4 | NR\_TDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_J | -116.5 | -50 |
| TBD | >48 | ≥ 1 | Note 5 | Note 5 | Note 5 |
| NOTE 1: Minimum SL-PRS bandwidth, which is the minimum of the SL-PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Io is assumed to have constant EPRE across the bandwidth.  NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 4: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 5: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the SL-PRS bandwidth of the smallest PRB number for the corresponding SCS. | | | | | | | |

* Recommended WF
  + Depends on the discussion of other issues.
  + Discuss the options using Option1 as the starting point:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Accuracy (Tc)** | **SL PRS Ês/Iot (dB)** | **SL PRS SCS (kHz)** | **SL PRS bandwidth (num RB)** | **Nsample** |
|
| [TBD] | (Ês/Iot)ref ≥TBD  (Ês/Iot)i ≥TBD | 15 | ≥ 48 | [1] |
| ≥ 96 | 1 |
| [TBD] | 30 | ≥ 24 | 4 |
| ≥ 48 | [1] |
| ≥ 96 | 1 |
| [TBD] | 60 | ≥ 24 | 4 |

Check for agreement:

Requirements are to be defined for 1 and 4 samples, depending on BW.

The accuracy requirements for 4 samples allow for non-coherent combining.

Accuracy requirements to cover all supported BWs.

Discussion:

### Issue 1-2-4: Value of Nsample for 48 PRB SL-PRS BW

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| --- |
| *Agreements in RAN4#110:*   * Update the definition of Nsample as the following:   + = 1 for SL-PRS BW > 48 PRBs,   + = 4 for SL-PRS BW ≤ 48 PRBs   + FFS whether for 48 PRBs SL-PRS BW a lower number of samples can be used based on performance results. |

* Proposals
  + Option 1: (Huawei)
    - Use Nsample = 1 for SL-PRS BW = 48 PRB.
* Recommended WF
  + Discuss the option(s).

Discussion:

### Issue 1-2-3: Time margin for Rx-Tx time difference measurements when UE reports the transmission timestamp of a SL PRS

* Proposals
  + Option 1: (OPPO)
    - Consider time margins due to frequency drift to Rx-Tx time difference accuracy requirement if the UE reports the transmission timestamp of a SL PRS, and the time margins for RSTD could be reused.
* Recommended WF
  + Discuss the option(s).

Discussion:

## Carrier phase positioning (Agenda 7.12.2.6)

Issues recommended for discussion by moderator:

Subtopic 2-2: Issue 2-2-1/2/3

Issues prioritized during the AH: 2-2-1/2/3

### Issue 2-2-1: Whether to verify the accuracy of legacy measurements in RSCPD/RSCP TCs

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| --- |
| Issue 4-1-7: Test requirements *Agreements in RAN4#110bis:*   * For carrier phase-based positioning, test cases are only defined for the case where the UE is configured to perform carrier phase measurement with legacy positioning measurements within the configured measurement time window. * Further discussion is needed on whether to verify in the RSCPD/RSCP TC the accuracy of the other measurement configured and reported together with RSCPD/RSCP. |

* Proposals
  + Option 1: (CATT, Ericsson, Nokia)
    - Verify both the accuracies of legacy measurements and CPP measurements in one TC with a 90% success rate to reflect UE’s real positioning performance in the deployment.
  + Option 2: (OPPO, Huawei, Nokia)
    - Not verify the accuracy requirements for legacy RSTD/Rx-Tx measurement in the RSCPD/RSCP TC.
* Recommended WF
  + Discuss the option(s).

Discussion:

Further discussion is needed.

# Topic #6: performance [111][214] NR\_pos\_enh2\_part3

## LPHAP (Agenda 7.12.2.3)

Issues recommended for discussion by moderator:

Issue 1-2-1: eDRX related configuration

Issue 1-2-2: whether to configure PRS measurement reporting periodicity

Issue 1-2-3: configurations for cell reselection TCs

Issues prioritized during the AH: 1-2-1, 1-2-2, 1-2-3.

### Issue 1-2-2: whether to configure PRS measurement reporting periodicity

* Proposals
  + Option 1 (HW):
    - No
  + Option 2 (E///):
    - Yes, configured as 20s (smaller than eDRX cycle)
* Recommended WF
  + Discuss the options.

Discussion:

Further discussion is needed.

1. Topic #7: Core draft CRs for all threads

## General (AI 7.12.1.1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Old TDoc** | **Title** | **Source** | **Comments** | **Recommendation/decision** |
| [**R4-2409368**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409368.zip) | Draft Big CR to 38.133 on RRM core requirements for Positioning Enhancements | Ericsson |  | Revised draft CR or a new tdoc for agreement? |

## RedCap positioning (AI 7.12.1.4)

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| **Old TDoc** | **Title** | **Source** | **Comments** | **Recommendation/decision** |
| [**R4-2407789**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407789.zip) | (NR\_Pos\_enh2-Core) 38.133 CR addressing the use of expected to in normative text | BeammWave, Nokia | Change is not consistent with the description in the cover sheet. Similar changes under other WIs. | Revised to: R4-240xxxx |
| [**R4-2407833**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407833.zip) | draftCR for RedCap postioing requirements in RRC\_Idle | Xiaomi | Review comments in the CR. The removed text is not duplicate. Some changes are not correct. Comments should be removed. | Noted |
| [**R4-2409267**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409267.zip) | draftCR on RRM requirements for RedCap positioning | Huawei, HiSilicon | Cover sheet and comments received from other companies. | Revised to: R4-240xxxx |
| [**R4-2409585**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409585.zip) | DraftCR to 38.133 on core requirements for RedCap positioning | Ericsson | Include changes to 5.6A.4.5/5.5 from R4-2409265. | Revised to: R4-240xxxx |

## PRS/SRS bandwidth aggregation (AI 7.12.1.4)

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| **Old TDoc** | **Title** | **Source** | **Comments** | **Recommendation/decision** |
| [**R4-2409268**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409268.zip) | draftCR on RRM requirements for PRS CA | Huawei, HiSilicon | Date is wrong in the coversheet – correct. | Revised to: R4-240xxxx |
| [**R4-2409584**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409584.zip) | DraftCR to 38.133 on core requirements for bandwidth aggregation for positioning measurements | Ericsson |  | Can be endorsed? |

## SL positioning (AI 7.12.1.2)

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| --- | --- | --- | --- | --- |
| **Old TDoc** | **Title** | **Source** | **Comments** | **Recommendation/decision** |
| [**R4-2409263**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409263.zip) | draftCR on RRM requirements for SL positioning | Huawei, HiSilicon | Depends on new agreements. Why don’t we have max() in legacy? | Return to |
| [**R4-2409370**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409370.zip) | Draft CR to 38.133 on SL positioning RRM core requirements | Ericsson |  | Revised to: R4-240xxxx |

## Carrier Phase positioning (AI 7.12.1.2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Old TDoc** | **Title** | **Source** | **Comments** | **Recommendation/decision** |
| [**R4-2409264**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409264.zip) | draftCR on RRM requirements for CPP | Huawei, HiSilicon | Depends on the progress, revise or merge | ? |
| [**R4-2409581**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409581.zip) | DraftCR to 38.133 on core requirements for CPP | Ericsson | Depends on the progress, revise or merge | ? |

## LPHAP (AI 7.12.1.3)

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| **Old TDoc** | **Title** | **Source** | **Comments** | **Recommendation/decision** |
| [**R4-2407972**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407972.zip) | Draft CR – Corrections to PRS measurement period with eDRX in RRC\_IDLE state | Qualcomm Incorporated | Changes to 4.5.2.5 to captured in revision of R4-2409582. Changes to 4.5.3.5/4.6.3.5 to be captured in revision of R4-2409265. Comments received from other companies. | Revised to: R4-240xxxx |
| [**R4-2409265**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409265.zip) | draftCR on RRM requirements for LPHAP | Huawei, HiSilicon | Changes to 5.6A.4.5/5.5 are captured in the revision of R4-2409585. Comments received from other companies. | Revised to: R4-240xxxx |
| [**R4-2409582**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409582.zip) | DraftCR to 38.133 on Core requirements for LPHAP | Ericsson | Capture changes to 4.5.2.5 and 5.6.2.5 from R4-2407972 and R4-2409265. | Revised to: R4-240xxxx |

1. Topic #8: Perf draft CRs for all threads

## General (AI 7.12.2.1)

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| **Old TDoc** | **Title** | **Source** | **Comments** | **Recommendation/decision** |
| [**R4-2409270**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409270.zip) | draftCR on time window configuration | Huawei, HiSilicon | (CPP) “DL-PRS Measurement time window”, according to RAN2? Abbreviations in section 3? | Revised to: R4-240xxxx |
| [**R4-2409369**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409369.zip) | Draft Big CR to 38.133 on RRM performance requirements for Positioning | Ericsson |  | Revised to: R4-240xxxx |
| [**R4-2409587**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409587.zip) | DraftCR to 38.133 on general aspects related to performance requirement | Ericsson |  | Can be endorsed? |

## RedCap positioning (AI 7.12.2.4)

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| **Old TDoc** | **Title** | **Source** | **Comments** | **Recommendation/decision** |
| [**R4-2407488**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407488.zip) | (2-4, 3-21, 22, 23, 24) Draft CR on PRS-RSRPP performance requirements and UE Rx-Tx measurement delay test cases for RedCap positioning | CATT |  | Revised to: R4-240xxxx |
| [**R4-2407882**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407882.zip) | [TC 3-29 and 3-30] Draft CR on TC for PRS-RSRPP delay with Rx FH in RRC CONNECTED | OPPO |  | Revised to: R4-240xxxx |
| [**R4-2408488**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408488.zip) | (3-17~20) Test cases for RedCap RSTD measurement delay with frequency hopping | Intel Corporation |  | Revised to: R4-240xxxx |
| [**R4-2409277**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409277.zip) | draftCR on performance requirements for RedCap positioning | Huawei, HiSilicon |  | Revised to: R4-240xxxx |
| [**R4-2409590**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409590.zip) | DraftCR to 38.133 on performance requirements for Rel.18 RedCap positioning | Ericsson |  | Revised to: R4-240xxxx |
| [**R4-2409650**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409650.zip) | (NR\_pos\_enh2-Perf) (3-9, 3-10) PRS-RSRP measurement delay test case for RedCap positioning without Rx FH in RRC CONNECTED state in FR1 and FR2 | Nokia |  | Revised to: R4-240xxxx |
| [**R4-2409700**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409700.zip) | Draft CR for test case on RedCap positioning\_PRS RSRPP | ZTECorporation,Sanechips |  | Revised to: R4-240xxxx |
| [**R4-2409731**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409731.zip) | draftCR (3-1)(3-3)(4-1)(4-3) TCs for RedCap positioning without FH on RSTD measurement delay and accuracy in FR1 | MediaTek inc. |  | Revised to: R4-240xxxx |

## PRS/SRS bandwidth aggregation (AI 7.12.2.5)

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| **Old TDoc** | **Title** | **Source** | **Comments** | **Recommendation/decision** |
| [**R4-2407489**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407489.zip) | (5-3, 4) Draft CR on RSTD measurement reporting delay test cases for PRS aggregation in FR1 and FR2 in RRC\_INACTIVE state | CATT | Should be same TRP | Return to |
| [**R4-2407884**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407884.zip) | [2-6] Draft CR on PRS-RSRP Measurements Based on PRS BWA | OPPO | Shouldn’t be “absolute measurement report mapping”? | Revised to: R4-240xxxx |
| [**R4-2407973**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407973.zip) | Draft CR – Test cases for UE Rx-Tx measurement delay with PRS BW aggregation, Sets 5-5, 5-6, 5-7, 5-8 | Qualcomm Incorporated |  | Revised to: R4-240xxxx |
| [**R4-2407974**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407974.zip) | Draft CR – Performance requirements for UE Rx-Tx measurements with PRS bandwidth aggregation (Set 2-7) | Qualcomm Incorporated |  | Revised to: R4-240xxxx |
| [**R4-2408295**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408295.zip) | Draft CR on PRS-RSRPP measurements based on PRS aggregation - set 2-8 | Vivo |  | Revised to: R4-240xxxx |
| [**R4-2409279**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409279.zip) | draftCR on performance requirements for PRS CA | Huawei, HiSilicon |  | Revised to: R4-240xxxx |
| [**R4-2409592**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409592.zip) | DraftCR to 38.133 to introduce test cases for PRS aggregation for positioning measurements | Ericsson |  | Revised to: R4-240xxxx |

## SL positioning (AI 7.12.2.2)

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| --- | --- | --- | --- | --- |
| **Old TDoc** | **Title** | **Source** | **Comments** | **Recommendation/decision** |
| [**R4-2407519**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407519.zip) | (Set 1-4 & 10-2) Draft CR for SL PRS configuration and SL Rx-Tx measurement delay TC in FR1 | CATT | A.3.X, A.9A.1.1.X (UE RxTx delay TC) | Revised to: R4-240xxxx |
| [**R4-2407880**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407880.zip) | [2-14] Draft CR on Measurements Accuracy for SL PRS-RSRPP | OPPO | 10.4A.5.2  “or” should not be in italic, TBDs for accuracy, incorrect side conditions | Revised to: R4-240xxxx |
| [**R4-2408297**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408297.zip) | Draft CR on measurement delay test cases for SL positioning - Sets 10-3 10-4 | Vivo | A.9A.1.1.3 (SL AoA delay), A.9A.1.1.4 (SL RTOA delay) | Revised to: R4-240xxxx |
| [**R4-2409272**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409272.zip) | draftCR on performance requirements for SL positioning | Huawei, HiSilicon | 10.4A.4.2 | Revised to: R4-240xxxx |
| [**R4-2409372**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409372.zip) | Draft CR to 38.133 on SL positioning RRM performance | Ericsson | Reference (accuracy and delay TC) | Revised to: R4-240xxxx |

## Carrier Phase positioning (AI 7.12.2.6)

|  |  |  |  |  |
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| **Old TDoc** | **Title** | **Source** | **Comments** | **Recommendation/decision** |
| [**R4-2407520**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407520.zip) | (Set 7-3 & 7-4) Draft CR for RSCPD with RSTD measurement delay TC in RRC\_INACTIVE in FR1 and FR2 | CATT |  |  |
| [**R4-2407834**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407834.zip) | Draft CR – Test cases for UE Rx-Tx measurement delay with PRS BW aggregation, Sets 5-5, 5-6, 5-7, 5-8 | Xiaomi |  |  |
| [**R4-2409166**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409166.zip) | Sets (2-9), (7-5) and (7-6) DL CPP performance requirements and measurement delay TCs for RSCP with UE Rx-Tx in RRC\_CONNECTED for FR1 and FR2 | Nokia |  |  |
| [**R4-2409594**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409594.zip) | DraftCR to 38.133 to introduce measurement delay test case for RSCPD with RSTD measurement for NR positioning | Ericsson |  |  |

## LPHAP (AI 7.12.2.3)

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| --- | --- | --- | --- | --- |
| **Old TDoc** | **Title** | **Source** | **Comments** | **Recommendation/decision** |
| [**R4-2407881**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407881.zip) | [TC 9-5 and 9-6] Draft CR on PRS-RSRP delay TC for case 2 in FR1 | OPPO |  |  |
| [**R4-2407975**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407975.zip) | Draft CR – Test cases for UE Rx-Tx measurement delay with eDRX > 10.24s in RRC\_INACTIVE, Sets 9-11, 9-12 | Qualcomm Incorporated |  |  |
| [**R4-2408296**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408296.zip) | Draft CR on measurement delay test cases for LPHAP - Sets 9-3 9-4 | vivo |  |  |
| [**R4-2409274**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409274.zip) | draftCR on performance requirements for LPHAP | Huawei, HiSilicon |  |  |
| [**R4-2409588**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409588.zip) | DraftCR to 38.133 to introduce test cases for LPHAP in RRC\_INACTIVE state in FR1 | Ericsson |  |  |

# Topic #9: Other documents for approval, including updated work split

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| **TDoc** | **Title** | **Source** | **Comments** | **Recommendation/decision** |
| [**R4-2409586**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409586.zip) | Updated work split on test cases for RedCap positioning | Ericsson | To be updated based on ad hoc #1 agreement in issue 3-1-2 | Revised to: R4-240xxxx |
|  | WF on RedCap positioning and PRS/SRS bandwidth aggregation | Ericsson |  | New document: R4-240xxxx |
|  | WF on SL positioning and carrier phase positioning | CATT |  | New document: R4-240xxxx |
|  | WF on LPHAP | Huawei |  | New document: R4-240xxxx |
|  | Ad-hoc minutes #1 on RRM for NR\_pos\_enh2 | Ericsson |  | New document: R4-240xxxx |
|  | Ad-hoc minutes #2 on RRM for NR\_pos\_enh2 | Ericsson |  | New document: R4-240xxxx |
|  | Ad-hoc minutes #3 on RRM for NR\_pos\_enh2 | Intel |  | New document: R4-240xxxx |

# Annex: Remaining issues after ad hoc #1 which were not discussed in the meeting

## Core part

### RedCap positioning (Agenda 7.12.1.4)

All issues

### PRS/SRS bandwidth aggregation (Agenda 7.12.1.4)

All issues

### SL positioning (Agenda 7.12.1.2)

All issues

### Carrier phase positioning (Agenda 7.12.1.2)

All issues

### LPHAP (Agenda 7.12.1.3)

All issues

## Performance part

### RedCap positioning (Agenda 7.12.2.4)

### PRS/SRS bandwidth aggregation (Agenda 7.12.2.5)

### SL positioning (Agenda 7.12.2.2)

### Carrier phase positioning (Agenda 7.12.2.6)

### LPHAP (Agenda 7.12.2.3)