**3GPP TSG-RAN WG4 Meeting # 112 R4-2411805**

**Maastricht, NL, 19 ‒ 23 August, 2024**

**Agenda item:** 6.1.3

**Source:** Moderator (Ericsson)

**Title:** Topic summary for [112][210] NR\_pos\_enh2\_part1

**Document for:** Information

# Introduction

Contributions submitted to the following agenda items are summarized in this paper.

* Relevant tDocs submitted to General (Agenda items 6.1.1.1 and 6.1.2.1)
* Core requirements for RedCap positioning (Agenda item 6.1.1.4)
* Core requirements for PRS/SRS BW aggregation (Agenda item 6.1.1.4)
* Performance requirements for RedCap positioning (Agenda item 6.1.2.4)
* Performance requirements for PRS/SRS BW aggregation (Agenda item 6.1.2.5)

The following issues are recommended (*in the decreasing order of priority*) for the online discussion:

* Topic 2: Core requirements for RedCap positioning (Agenda item 6.1.1.4)
  + Issue 2-1: Requirement on for RedCap positioning core requirements
  + Issue 2-2: Requirement on for RedCap positioning core requirements
  + Issue 2-3: Requirement on for RedCap positioning core requirements
* Topic 3: Core requirements for PRS/SRS BW aggregation (Agenda item 6.1.1.4)
  + Issue 3-1: Considerations for interruption length for SRS aggregation for positioning
  + Issue 3-2: Values of interruption length for SRS aggregation for positioning
* Topic 4: General Performance requirement (AI 6.1.2.1)
  + Issue 4-1: Updated work split for Rel. 18 positioning
* Topic 5: Performance requirements for RedCap positioning (Agenda item 6.1.2.4)
  + Issue 5-2: Bandwidth configuration for accuracy requirement for RedCap positioning with Rx FH
  + Issue 5-3: Group delay calibration margin for RedCap positioning
  + Issue 5-4: PRS RMC for RedCap positioning TCs
  + Issue 5-1: Additional BW configuration for RedCap positioning accuracy requirement with Rx FH
* Topic 6: Performance requirements for PRS/SRS BW aggregation (Agenda item 6.1.2.5)
  + Issue 6-1: Group delay margin for positioning measurement by aggregating PRS resources
  + Issue 6-2: Frequency drift margin for positioning measurement by aggregating PRS resources
  + Issue 6-3: PRS configuration for positioning TCs for PRS aggregation

# Topic 1: General Core Requirement (AI 6.1.1.1)

No contributions were submitted to this agenda item.

# Topic 2: Core Requirements for RedCap Positioning (Agenda item 6.1.1.4)

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| **[R4-2412647](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412647.zip)** | **Huawei, HiSilicon** | **Proposal 1: Update the requirement on as**  **where**   * **is the index of hops within an MG instance** * **is the number of unmuted PRS repetitions that overlaps with the sampling window of hop ,** * **if = 2, otherwise .**   **Proposal 2: Update the requirements on by adding an upper bound for N3 capability**  **Proposal 3: Update the requirements on Lprs by considering measurement of different PRS resources in different MG occasions** |

## Summary of open issues

**Issue 2-1: Requirement on for RedCap positioning core requirements**

* Proposals
  + Option 1: HW
    - Update the requirement on as

where

* + - * is the index of hops within an MG instance
      * is the number of unmuted PRS repetitions that overlaps with the sampling window of hop ,
      * if = 2, otherwise .
* Recommended WF
  + Discuss option(s).

**Issue 2-2: Requirement on for RedCap positioning core requirements**

* Proposals
  + Option 1: HW
    - Update the requirements on by adding an upper bound for N3 capability

.

* Recommended WF
  + Discuss option(s).

**Issue 2-3: Requirement on for RedCap positioning core requirements**

* Proposals
  + Option 1: HW
    - Update the requirements on by considering measurement of different PRS resources in different MG occasions

.

* Recommended WF
  + Discuss option(s).

## Draft CRs

|  |  |  |
| --- | --- | --- |
| **T-Doc number** | **Title** | **Company** |
| **[R4-2411330](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2411330.zip)** | **Draft CR on core requirements for RedCap positioning** | **CATT** |
| **[R4-2412648](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412648.zip)** | **draftCR on RRM requirements for RedCap positioning** | **Huawei, HiSilicon** |
| **[R4-2412682](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412682.zip)** | **draftCR 38.133 Core requirement for RedCap positioning** | **Ericsson** |

# Topic 3: Core Requirements for PRS/SRS BW Aggregation (Agenda item 6.1.1.4)

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| **[R4-2411336](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2411336.zip)** | **CATT** | **Proposal 1: Interruption length is derived by: guard period + SRS transmission + guard period.**  **Proposal 2: The interruption lengths for SRS aggregation with aggressor cell(s) in FR1 are defined as:**  Table 1: Interruption length X1 (slot)   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | **NR Slot length**  **(ms) of victim cell** | **Guard period**  **(us) Note 1** | **Interruption length X1 (slots)** | | | **SCS for aggressor cell (kHz)** | | | **15** | **30** | | **0** | **1** | **≤ 200** | **1** | **1** | | **1** | **0.5** | **0, 30** | **1** | **1** | | **100, 140** | **2** | **1** | | **200** | **2** | **2** | | **2** | **0.25** | **0** | **2** | **1** | | **30** | **2** | **2** | | **100, 140** | **3** | **2** | | **200** | **4** | **3** | | **3** | **0.125** | **0** | **4** | **2** | | **30** | **4** | **3** | | **100** | **5** | **4** | | **140** | **6** | **4** | | **200** | **7** | **5** | | **5** | **0.03125** | **0** | **13** | **7** | | **30** | **15** | **9** | | **100** | **20** | **13** | | **140** | **22** | **16** | | **200** | **26** | **20** | | **6** | **0.015625** | **0** | **26** | **13** | | **30** | **30** | **17** | | **100** | **39** | **26** | | **140** | **44** | **31** | | **200** | **52** | **39** | | **Note1: Guard period is UE capability indicated by *guardPeriod* in *NR-UL-SRS-Capability*.** | | | | |   **And for aggressor cell(s) in FR2, the interruption lengths are:**  Table 2: Interruption length X2 (slot)   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | **NR Slot length**  **(ms) of victim cell** | **Guard period**  **(us) Note 1** | **Interruption length X2 (slots)** | | | | **SCS for aggressor cell (kHz)** | | | | **60** | **120** | **480, 960** | | **0** | **1** | **≤ 200** | **1** | **1** | **1** | | **1** | **0.5** | **≤ 140** | **1** | **1** | **1** | | **200** | **2** | **1** | **1** | | **2** | **0.25** | **0** | **1** | **1** | **1** | | **30** | **1** | **1** | **1** | | **100** | **2** | **1** | **1** | | **140** | **2** | **2** | **2** | | **200** | **3** | **2** | **2** | | **3** | **0.125** | **0** | **1** | **1** | **1** | | **30** | **2** | **1** | **1** | | **100** | **3** | **2** | **2** | | **140** | **4** | **3** | **3** | | **200** | **5** | **4** | **4** | | **5** | **0.03125** | **0** | **4** | **2** | **1** | | **30** | **6** | **4** | **3** | | **100** | **10** | **8** | **7** | | **140** | **13** | **11** | **10** | | **200** | **17** | **15** | **14** | | **6** | **0.015625** | **0** | **7** | **4** | **1** | | **30** | **11** | **8** | **5** | | **100** | **20** | **16** | **14** | | **140** | **25** | **22** | **19** | | **200** | **33** | **29** | **27** | | **Note1: Guard period is UE capability indicated by *guardPeriod* in *NR-UL-SRS-Capability*.** | | | | | | |
| **[R4-2412647](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412647.zip)** | **Huawei, HiSilicon** | **Proposal 4: For interruption requirements for SRS BWA on CC without PUCCH/PUSCH,**   * **SRS is transmitted only if SRS duration plus guard period before and after does not collide with other UL transmission or DL reception with higher priority as defined by RAN1 on victim cells** * **SRS is transmitted only if SRS duration plus guard period before and after does not collide with any NR L3 or L1 measurement on victim cells** * **The victim cells are given by 41-4-9** * **The interruption length is defined on symbol level as 2\*guard period + SRS duration, where the guard period is indicated via component 9 of 41-4-7**   **Proposal 5: In PRS BWA requirements for , replace the margin as .** |
| **[R4-2412681](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412681.zip)** | **Ericsson** | 1. **Interruption requirements for SRS transmission with BW aggregation on CC without PUSCH/PUCCH are defined based on the existing SRS carrier switching framework only.** 2. **Interruption requirements are defined separately for UEs supporting guard period values {0µs, 30µs, 100µs} and UEs supporting guard period values {140µs, 200µs}.** |

## Summary of open issues

**Issue 3-1: Considerations for interruption length for SRS aggregation for positioning**

* Proposals
  + Option 1: CATT
    - Interruption length is derived by: guard period + SRS transmission + guard period.
  + Option 2: HW
    - For interruption requirements for SRS BWA on CC without PUCCH/PUSCH,
      * SRS is transmitted only if SRS duration plus guard period before and after does not collide with other UL transmission or DL reception with higher priority as defined by RAN1 on victim cells
      * SRS is transmitted only if SRS duration plus guard period before and after does not collide with any NR L3 or L1 measurement on victim cells
      * The victim cells are given by 41-4-9
      * The interruption length is defined on symbol level as 2\*guard period + SRS duration, where the guard period is indicated via component 9 of 41-4-7
* Recommended WF
  + Discuss option(s).

**Issue 3-2: Values of interruption length**

* Proposals
  + Option 1: CATT
    - The interruption lengths for SRS aggregation with aggressor cell(s) in FR1 are defined as.

The interruption lengths for SRS aggregation with aggressor cell(s) in FR1 are defined as:

Table 1: Interruption length X1 (slot)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | NR Slot length  (ms) of victim cell | Guard period  (us) Note 1 | Interruption length X1 (slots) | |
| SCS for aggressor cell (kHz) | |
| 15 | 30 |
| 0 | 1 | ≤ 200 | 1 | 1 |
| 1 | 0.5 | 0, 30 | 1 | 1 |
| 100, 140 | 2 | 1 |
| 200 | 2 | 2 |
| 2 | 0.25 | 0 | 2 | 1 |
| 30 | 2 | 2 |
| 100, 140 | 3 | 2 |
| 200 | 4 | 3 |
| 3 | 0.125 | 0 | 4 | 2 |
| 30 | 4 | 3 |
| 100 | 5 | 4 |
| 140 | 6 | 4 |
| 200 | 7 | 5 |
| 5 | 0.03125 | 0 | 13 | 7 |
| 30 | 15 | 9 |
| 100 | 20 | 13 |
| 140 | 22 | 16 |
| 200 | 26 | 20 |
| 6 | 0.015625 | 0 | 26 | 13 |
| 30 | 30 | 17 |
| 100 | 39 | 26 |
| 140 | 44 | 31 |
| 200 | 52 | 39 |
| Note1: Guard period is UE capability indicated by *guardPeriod* in *NR-UL-SRS-Capability*. | | | | |

And for aggressor cell(s) in FR2, the interruption lengths are:

Table 2: Interruption length X2 (slot).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | NR Slot length  (ms) of victim cell | Guard period  (us) Note 1 | Interruption length X2 (slots) | | |
| SCS for aggressor cell (kHz) | | |
| 60 | 120 | 480, 960 |
| 0 | 1 | ≤ 200 | 1 | 1 | 1 |
| 1 | 0.5 | ≤ 140 | 1 | 1 | 1 |
| 200 | 2 | 1 | 1 |
| 2 | 0.25 | 0 | 1 | 1 | 1 |
| 30 | 1 | 1 | 1 |
| 100 | 2 | 1 | 1 |
| 140 | 2 | 2 | 2 |
| 200 | 3 | 2 | 2 |
| 3 | 0.125 | 0 | 1 | 1 | 1 |
| 30 | 2 | 1 | 1 |
| 100 | 3 | 2 | 2 |
| 140 | 4 | 3 | 3 |
| 200 | 5 | 4 | 4 |
| 5 | 0.03125 | 0 | 4 | 2 | 1 |
| 30 | 6 | 4 | 3 |
| 100 | 10 | 8 | 7 |
| 140 | 13 | 11 | 10 |
| 200 | 17 | 15 | 14 |
| 6 | 0.015625 | 0 | 7 | 4 | 1 |
| 30 | 11 | 8 | 5 |
| 100 | 20 | 16 | 14 |
| 140 | 25 | 22 | 19 |
| 200 | 33 | 29 | 27 |
| Note1: Guard period is UE capability indicated by *guardPeriod* in *NR-UL-SRS-Capability*. | | | | | |

* + Option 2: E///
    - Interruption requirements for SRS transmission with BW aggregation on CC without PUSCH/PUCCH are defined based on the existing SRS carrier switching framework only.
    - Interruption requirements are defined separately for UEs supporting guard period values {0µs, 30µs, 100µs} and UEs supporting guard period values {140µs, 200µs}.
* Recommended WF
  + Discuss option(s).

**Issue 3-3: Core requirement for RSTD measurement**

* Proposals
  + Option 1: HW
    - In PRS BWA requirements for , replace the margin as .
* Recommended WF
  + Discuss option(s).

## Draft CRs

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Title** | **Company** |
| **[R4-2411331](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2411331.zip)** | **Draft CR on interruption requirements for SRS BW aggregation** | **CATT** |
| **[R4-2412649](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412649.zip)** | **draftCR on requirements for PRS BWA** | **Huawei, HiSilicon** |

# Topic 4: General Performance Requirement (AI 6.1.2.1)

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Title** | **Company** |
| **[R4-2412683](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412683.zip)** | **Updated work split for Rel. 18 positioning** | **Ericsson** |

## Summary of open issues

**Issue 4-1: Updated work split for Rel. 18 positioning**

* Proposals
  + Option 1: E///
    - Clause numbers to capture changes in draftCRs for Rel. 18 positioning TCs in TS38.133 are proposed in R4-2412683.
* Tentative agreement
  + *Updated work split for Rel. 18 positioning is approved*.
* Recommended WF
  + *Agree on tentative agreement*.

## Draft CRs

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Title** | **Company** |
| **[R4-2412684](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412684.zip)** | **draftCR 38.133 Corrections to accuracy requirements for Rel18. positioning** | **Ericsson** |
| **[R4-2413390](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2413390.zip)** | **Draft Big CR to 38133 for RRM performance part for expanded and improved NR positioning** | **Ericsson** |

# Topic 5: Performance Requirements for RedCap Positioning (Agenda item 6.1.2.4)

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| **[R4-2411338](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2411338.zip)** | **CATT** | **Observation 1: The measurement accuracy requirements are not clear for the cases when the new accuracy requirements are not applicable due to total BWs smaller than the minimum total BWs.**  **Proposal 1: The measurement results shall satisfy the accuracy value of the same or the closet smaller BW defined in the legacy measurement accuracy requirements without FH, when the new accuracy requirements are not applicable because total hopping BWs are smaller than the minimum total BWs.**  **Proposal 2: The structure of accuracy tables for measurements with FH in different clauses shall be aligned, and example tables for accuracy requirements with FH for 2Rx RedCap in FR1 and FR2 are given below:**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Accuracy | PRS Ês/Iot | PRS SCS | BW per hop | Total PRS bandwidth | | Tc | dB | kHz | MHz | MHz | | **TBD** | **(PRS Ês/Iot)ref ≥-6dB**  **(PRS Ês/Iot)*i* ≥-13dB** | **15** | **≥10** | **≥ 50** | | **TBD** | **30** | **≥20** | **≥ 100** | | **TBD** | **60** | **≥20** | **≥ 100** |  |  |  |  |  |  | | --- | --- | --- | --- | --- | | Accuracy | PRS Ês/Iot | PRS SCS | BW per hop | Total PRS bandwidth | | Tc | dB | kHz | MHz | MHz | | **TBD** | **(PRS Ês/Iot)ref ≥-6dB**  **(PRS Ês/Iot)*i* ≥-13dB** | **60** | **≥50** | **≥ 200** | | **TBD** | **120** | **≥100** | **≥ 400** |   **The rest of structure can reuse the applicable parts in the existing accuracy tables, for example, Io range, etc.** |
| **[R4-2412655](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412655.zip)** | **Huawei, HiSilicon** | **Proposal 1: RAN4 not to define FH accuracy requirements for additional BW configurations.**  **Proposal 2: Per-hop BW is defined in RB number instead of MHz.**  **Proposal 3: RAN4 not to re-use non-FH accuracy requirements for FH cases.**  **Proposal 4: RAN4 to use the following assumptions for group delay calibration margin for RedCap**   * **Non-FH: existing values for non-RedCap for the applicable BW** * **FH: existing values for non-RedCap for per-hop BW plus an extra margin (value TBD)**   **Proposal 5: For PRS BW for FH TCs, consider the BW in test configuration as UE BW and allow cell BW to be larger.**  **Proposal 6: For FH TCs, introduce a new PRS RMC with large BW and repetitions.** |
| **[R4-2412687](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412687.zip)** | **Ericsson** | 1. **RAN4#111 agreement on per-hop BW and the total BW for RedCap positioning with Rx FH is revised and the accuracy requirements for Rx FH case are defined only for the following BW groups:**  * **15 kHz: per-hop BW ≤ 52 RB, total BW = 268 RB** * **30 kHz: per-hop BW ≤ 48 RB, total BW = 272 RB** * **60 kHz (FR1): per-hop BW ≤ 24 RB, total BW = 132 RB** * **60 kHz (FR2): per-hop BW ≤ 64 RB, total BW = 264 RB** * **120 kHz: per-hop BW ≤ 64 RB, total BW = 264 RB** |

## Summary of open issues

**Issue 5-1: Additional BW configuration for RedCap positioning accuracy requirement with Rx FH**

* Proposals
  + Option 1: CATT
    - The measurement results shall satisfy the accuracy value of the same or the closet smaller BW defined in the legacy measurement accuracy requirements without FH, when the new accuracy requirements are not applicable because total hopping BWs are smaller than the minimum total BWs.
  + Option 2: HW
    - RAN4 not to define FH accuracy requirements for additional BW configurations.
    - RAN4 not to re-use non-FH accuracy requirements for FH cases.
* Recommended WF
  + Discuss option(s).

**Issue 5-2: Bandwidth configuration for accuracy requirement for RedCap positioning with Rx FH**

* Proposals
  + Option 1: CATT

The structure of accuracy tables for measurements with FH in different clauses shall be aligned, and example tables for accuracy requirements with FH for 2Rx RedCap in FR1 and FR2 are given below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Accuracy | PRS Ês/Iot | PRS SCS | BW per hop | Total PRS bandwidth |
| Tc | dB | kHz | MHz | MHz |
| TBD | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)i ≥-13dB | 15 | ≥10 | ≥ 50 |
| TBD | 30 | ≥20 | ≥ 100 |
| TBD | 60 | ≥20 | ≥ 100 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Accuracy | PRS Ês/Iot | PRS SCS | BW per hop | Total PRS bandwidth |
| Tc | dB | kHz | MHz | MHz |
| TBD | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)i ≥-13dB | 60 | ≥50 | ≥ 200 |
| TBD | 120 | ≥100 | ≥ 400 |

The rest of structure can reuse the applicable parts in the existing accuracy tables, for example, Io range, etc.

* + Option 2: HW
    - Per-hop BW is defined in RB number instead of MHz.
  + Option 3: E///
    - RAN4#111 agreement on per-hop BW and the total BW for RedCap positioning with Rx FH is revised and the accuracy requirements for Rx FH case are defined only for the following BW groups:
      * 15 kHz: per-hop BW ≤ 52 RB, total BW = 268 RB
      * 30 kHz: per-hop BW ≤ 48 RB, total BW = 272 RB
      * 60 kHz (FR1): per-hop BW ≤ 24 RB, total BW = 132 RB
      * 60 kHz (FR2): per-hop BW ≤ 64 RB, total BW = 264 RB
      * 120 kHz: per-hop BW ≤ 64 RB, total BW = 264 RB
* Recommended WF.
  + Discuss option(s).

**Issue 5-3: Group delay calibration margin for RedCap positioning**

* Proposals
  + Option 1: HW
    - RAN4 to use the following assumptions for group delay calibration margin for RedCap
      * Non-FH: existing values for non-RedCap for the applicable BW.
      * FH: existing values for non-RedCap for per-hop BW plus an extra margin (value TBD).
* Recommended WF
  + Discuss option(s).

**Issue 5-4: PRS RMC for RedCap positioning TCs**

* Proposals
  + Option 1: HW
    - For PRS BW for no-FH TCs, consider the BW in test configuration as UE BW and allow cell BW to be larger.
    - For FH TCs, introduce a new PRS RMC with large BW and repetitions.
* Recommended WF
  + Discuss option(s).

## Draft CRs

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Title** | **Company** |
| **[R4-2411490](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2411490.zip)** | **[TC 3-31 and 3-32] CR on TC for PRS-RSRPP delay with Rx FH in RRC inactive** | **OPPO** |
| **[R4-2411491](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2411491.zip)** | **[TC 10-17 and 11-17] CR on TC for PRS-RSRP delay wo Rx FH in RRC IDLE** | **OPPO** |
| **[R4-2412253](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412253.zip)** | **(4-21, 22, 23, 24) Draft CR on UE Rx-Tx measurement accuracy TCs for RedCap positioning** | **vivo** |
| **[R4-2412423](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412423.zip)** | **(4-17~20) Test cases for RedCap CONNECTED and INACTIVE mode RSTD measurement accuracy with frequency hopping** | **Intel Corporation** |
| **[R4-2412656](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412656.zip)** | **draftCR on performance requirements for RedCap positioning** | **Huawei, HiSilicon** |
| **[R4-2412689](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412689.zip)** | **draftCR 38.133 Phase II RedCap positioning test cases** | **Ericsson** |
| **[R4-2413044](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2413044.zip)** | **test case for PRS-RSRPP measurement accuracy TC in RRC\_CONNECTED state in FR1 without Rx FH** | **ZTECorporation,Sanechips** |
| **[R4-2413045](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2413045.zip)** | **test case for PRS-RSRPP measurement accuracy TC in RRC\_INACTIVE state in FR1 without Rx FH** | **ZTECorporation,Sanechips** |
| **[R4-2413046](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2413046.zip)** | **test case for PRS-RSRPP measurement accuracy TC in RRC\_INACTIVE state in FR2 with Rx FH** | **ZTECorporation,Sanechips** |
| **[R4-2413292](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2413292.zip)** | **(NR\_pos\_enh2-Perf) (3-11, 3-12) PRS-RSRP measurement delay test case for RedCap positioning without Rx FH in RRC INACTIVE state in FR1 and FR2** | **Nokia** |
| **[R4-2413329](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2413329.zip)** | **draftCR (3-2)(3-4) TCs for RedCap positioning without FH on RSTD measurement delay in CONNECTED and INACTIVE states** | **MediaTek inc.** |
| **[R4-2413330](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2413330.zip)** | **draftCR (4-2)(4-4) TCs for RedCap positioning without FH on RSTD measurement accuracy in CONNECTED and INACTIVE states** | **MediaTek inc.** |
| **[R4-2413331](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2413331.zip)** | **draftCR (10-7)(10-8) TCs for RedCap positioning without FH on RSTD measurement delay in IDLE state without eDRX** | **MediaTek inc.** |
| **[R4-2413332](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2413332.zip)** | **draftCR (11-7)(11-8) TCs for RedCap positioning without FH on RSTD measurement accuracy in IDLE state without eDRX** | **MediaTek inc.** |

## Simulation Results

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| **T-doc number** | **Title** | **Company** |
| **[R4-2411792](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2411792.zip)** | **Additional simulation results for 1Rx RedCap UEs without frequency hopping** | **Qualcomm Incorporated** |
| **[R4-2412688](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412688.zip)** | **Summary of simulation results for RedCap positioning** | **Ericsson** |

# Topic 6: Performance Requirements for PRS/SRS BW Aggregation (Agenda item 6.1.2.5)

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| **[R4-2412657](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412657.zip)** | **Huawei, HiSilicon** | **Proposal 1: For group delay calibration margin for RSTD and UE Rx-Tx with PRS BWA, re-use the existing margin for single PFL when the aggregated BW is no larger than largest BW of single PFL. FFS margins for aggregated BW larger than largest BW of single PFL.**  **Proposal 2: For accuracy TCs, test one BW based on the existing PRS RMC with larger BW.** |
| **[R4-2412690](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412690.zip)** | **Ericsson** | **Proposal 1: Group delay margin values defined in Tables 10.1.23.2-5/5a and 10.1.23.2-6/6a are reused to define group delay margin values for RSTD measurements performed by aggregating PRS resources on multiple PFLs.**  **Proposal 2: Group delay margin values defined in Tables 10.1.25.2-5 and 10.1.25.2-6 are reused to define group delay margin values for UE Rx-Tx measurements performed by aggregating resources on multiple PFLs.**  **Proposal 3: RAN4 to define frequency drift margin for RSTD measurement on the PRS resources from the reference and target TRPs belonging to the same PFL group or different PFL groups by reusing the values of Y from the existing specification.** |

## Summary of open issues

**Issue 6-1: Group delay margin for positioning measurement by aggregating PRS resources**

* Proposals
  + Option 1: HW
    - For group delay calibration margin for RSTD and UE Rx-Tx with PRS BWA, re-use the existing margin for single PFL when the aggregated BW is no larger than largest BW of single PFL. FFS margins for aggregated BW larger than largest BW of single PFL.
  + Option 2: E///
    - Group delay margin values defined in Tables 10.1.23.2-5/5a and 10.1.23.2-6/6a are reused to define group delay margin values for RSTD measurements performed by aggregating PRS resources on multiple PFLs.
    - Group delay margin values defined in Tables 10.1.25.2-5 and 10.1.25.2-6 are reused to define group delay margin values for UE Rx-Tx measurements performed by aggregating resources on multiple PFLs
* Recommended WF
  + Discuss option(s).

**Issue 6-2: Frequency drift margin for positioning measurement by aggregating PRS resources**

* Proposals
  + Option 1: E///
    - RAN4 to define frequency drift margin for RSTD measurement on the PRS resources from the reference and target TRPs belonging to the same PFL group or different PFL groups by reusing the values of Y from the existing specification.
* Recommended WF
  + Discuss option(s).

**Issue 6-3: PRS configuration for positioning TCs for PRS aggregation**

* Proposals
  + Option 1: HW
    - For accuracy TCs, test one BW based on the existing PRS RMC with larger BW.
* Tentative agreement:
  + *PRS BW per PFL based on the existing PRS RMC with largest BW is considered for the accuracy TCs for positioning measurements based on the PRS aggregation*.
* Recommended WF
  + *Agree on tentative agreement*.

## Draft CRs

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| **T-doc number** | **Title** | **Company** |
| **[R4-2411328](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2411328.zip)** | **(10-5, 6) Draft CR on RSTD measurement reporting delay test cases with PRS aggregation in FR1 and FR2 in RRC\_IDLE state** | **CATT** |
| **[R4-2411329](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2411329.zip)** | **(11-5, 6) Draft CR on RSTD measurement accuracy test cases with PRS aggregation in FR1 and FR2 in RRC\_IDLE state** | **CATT** |
| **[R4-2411787](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2411787.zip)** | **Draft CR – Performance requirements for UE Rx-Tx measurement accuracy with PRS BW aggregation (Set 2-7)** | **Qualcomm Incorporated** |
| **[R4-2411788](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2411788.zip)** | **Draft CR – Test cases for UE Rx-Tx measurement accuracy with PRS BW aggregation, Sets 6-5, 6-6, 6-7, 6-8** | **Qualcomm Incorporated** |
| **[R4-2412658](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412658.zip)** | **draftCR on performance requirements for PRS BWA** | **Huawei, HiSilicon** |
| **[R4-2412691](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412691.zip)** | **draftCR 38.133 Phase II test cases for bandwidth aggregation for positioning measurements** | **Ericsson** |

## Simulation Results

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| --- | --- | --- |
| **T-doc number** | **Title** | **Company** |
| **[R4-2412692](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_112/Docs/R4-2412692.zip)** | **Summary of simulation results for PRS aggregation** | **Ericsson** |