**3GPP TSG-RAN WG4 Meeting # 104-e R4-2214462**

**Electronic Meeting, August 15 ‒ 26, 2022**

**Title: [DRAFT]** WF on expanded and improved NR positioning study

**Agenda Item:** 11.14.4

**Source: Intel Corporation**

**Document for:** Approval

# General aspects

## RAN4 work plan

*A tentative work plan for RAN4 tasks is included in R4-2212149. For RAN4 #104Bis-e, the following is captured:*

|  |  |
| --- | --- |
| **RAN4 Meeting** | **Tentative Work Plan** |
| RAN4#104bis-eOctober 2022,(RF 0.25 TUsRD 0.5 TUs) | * Evaluation work on potential solutions for PRS/SRS bandwidth aggregation for intra-band carriers considering potential timing errors, phase coherency, frequency errors, power imbalance, etc.
* Continue study solutions for accuracy improvement based on NR carrier phase measurements
	+ Focus on RAN4 RF aspects and potential inputs to RAN1, if any
* Preparation of text proposals for 3GPP TR 38.859, if there are any
 |

*Given the work scope, the above discussion split may not be the most effective. It was suggested to not split discussions between the two sessions in the upcoming meeting.*

**[Tentative] Way forward/Agreement**: Consider suggested change to discussion split for upcoming RAN4 #104Bis-e meeting

* TBD

# Accuracy improvement study based on PRS/SRS bandwidth aggregation

## Intra-band CA scenario

**[Tentative] Agreement:**

* Intra-band contiguous CA scenario will be prioritized in study

## Scope of study based on PRS/SRS bandwidth aggregation

*Further discuss the following:*

* *RF architecture – can we agree to focus on a single RF architecture (i.e., single Tx/Rx chain)*
* *Studying RF impairment model (timing/group delay/frequency/phase) first to assess performance and accuracy gain with realistic impairments*
* *Studying achievable accuracy gain when TAE is within specified requirement for intra-band contiguous CA*
* *Deprioritizing power imbalance discussion*
* *Notifying RAN1 of the UE transmit power limitation due to potential prioritization*

**Agreement:**

* TBD

## Baseline assumptions

*Discuss whether the assumption in the proposal below is truly needed in our study, and if it is better suited for RAN1 discussion.*

* *Proposal: RAN4 assumes that the legacy FFT processing strategy of legacy RXs, that is one FFT processing per CC with standard FFT size, must be baseline. Processing with extended FFT-size specifically for high accuracy positioning measurement is not assumed as baseline.*

**Agreement:**

* TBD

## Initial conclusion on feasibility

**[Tentative] Agreement:**

* PRS/SRS bandwidth aggregation for intra-band contiguous carrier is feasible for single chain Tx/Rx architectures

# Accuracy improvement study based on carrier phase measurements

## Scope of study based on carrier phase measurements

*Options discussed:*

* *Proposal 1: RAN4 should study how to model impacts of antenna/beam phase response, residual carrier-frequency offset, and frequency drift on carrier phase positioning*
* *Proposal 2: RAN4 to wait for further progress in RAN1 to evaluate and assess the scope of solutions based on NR carrier phase measurements to be studied by RAN4.*
* *Proposal 3: RAN4 need to study the timing error and phase errors among different TRPs and provide the corresponding information to RAN1.*

*Further discuss whether a detailed scope for study is needed now or if RAN4 should wait on RAN1 progress and input.*

**Agreement:**

* TBD

## RF requirements

*Candidate options:*

* *Proposal 1: The practical RF impairments can be mitigated by double difference methods with the phase measurement in the baseband, and thus will not define the RF requirement for carrier phase measurements.*
	+ *The carrier phase measurement requirement should be covered by RRM.*
* *Proposal 2: No need to define the requirement of phase continuity across slots for carrier phase positioning for both TDD and FDD spectrum*

*Discuss if we should postpone RF requirement discussion for this study.*

**Agreement:**

* TBD

# References

1. R4-2214248, “Email discussion summary for [104-e][137] FS\_NR\_pos\_UERF,” Moderator (Intel Corporation), RAN4 #104e, August 2022