Qualcomm

RP-223124

3GPP TSG RAN#98-e
Electronic Meeting, Dec 12-16, 2022
Agenda Item: 9.2.6

Views on scope for expanded and improved NR positioning WI

5G

Summary of the outcome from the Positioning Studies

Topic	Summary of the Outcome from the WG studies
Sidelink Positioning	• Recommendations (TR 38.859): PC5-only & Joint PC5/Uu Positioning, SL-RTT, SL-AoA, SL-TDOA, introduction of SL-PRS, dedicated and shared resource pool, scheme 1 and 2, support of 100 MHz SL-PRS BW in FR1, Positioning Protocols, and more
Integrity	• Recommendations (TR 38.859): Both UE-based and LMF-based integrity for RAT-dependent methods
PRS/SRS Aggregation	• TR 38.857 (Rel-17): positioning accuracy improvement was concluded, and a recommendation was reached to further study, and if needed specify this enhancement during normative work. • Question remained whether RAN4 considers it feasible and for which scenarios is applicable. • TR 38.859: RAN4 concluded that it is feasible to perform intra-band contiguous PRS/SRS aggregation and identified the applicable scenarios.
NR Carrier Phase Positioning	• RAN1 concluded that it is feasible to achieve a few cm accuracy performance at 50% under a set of conditions. No performance comparison with Rel-17 positioning methods was performed. • The TR does not include a recommendation for normative work on CPP; conditional recommendations were reached related to the specification impact if CPP positioning is introduced. • RAN4 didn't perform feasibility study (R4-2220439)
LPHAP	• Recommendations (TR 38.859): Enhancements on SRS configuration, RRC_IDLE Positioning measurements, DRX cycle > 10.24s, alignment between DRX and PRS. • 1-symbol PRS was concluded that can be studied further and if needed, specified. • Paging Relaxation was conditionally recommended by RAN2, but RAN1 didn't confirm it.
Enhancements for Redcap Positioning	• Recommendations (TR 38.859): PRS and SRS frequency hopping

Expected workload per Working Group

Topic	RAN1	RAN2	RAN3	RAN4
Sidelink Positioning	High (Lead WG)	High	Low	High
Integrity	Low	Medium (Lead WG)	Low	Low
PRS/SRS Aggregation	Medium	Low	Low	Medium (Lead WG)
NR Carrier Phase Positioning	Medium (Lead WG)	Medium	Low	High
LPHAP	Low	Medium (Lead WG)	Low	Low
Enhancements for Redcap Positioning	Medium (Lead WG)	Low	Low	Medium

- Large set of potential objectives which cannot be accommodated in a single release
- Workload across all the WGs should be carefully considered

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Proposal for the Study Item to Work Item conversion

- Proposed Principles for the SI to WI conversion for this Rel-18 WI on Positioning:
  - We suggest to focus on the objectives that have **a clear recommendation** from the study.
  - Avoid assigning to a single WG multiple objectives with an expected high workload or a large number of objectives with medium workload.
  - Include the objective: "core and performance requirements for positioning measurements performed by RedCap UEs" which was not included in the SID since it was understood as an objective that could move directly to the normative phase.

Topic	Proposed objectives for Rel-18 WI
Sidelink Positioning	According to the recommendations from the TR 38.859, e.g., • PC5-only & Joint PC5/Uu Positioning • Positioning methods: SL-RTT, SL-AoA, SL-TDOA • SL-PRS in dedicated and shared resource pool • Resource allocation scheme 1 and 2 • Architecture, Protocols, signaling for enabling both PC5-Only Positioning and Uu/PC5-based positioning
Integrity	According to the recommendations from the TR 38.859: • UE-based integrity for RAT-dependent methods • LMF-based integrity for RAT-dependent methods
LPHAP	According to the recommendations from the TR 38.859: • Enhancements on SRS configuration • RRC_IDLE Positioning measurements • Alignment between DRX and PRS
Redcap Positioning	• PRS and SRS frequency hopping • Core and performance requirements for positioning measurements performed by RedCap UEs

Topic		RAN1	RAN2	RAN3	RAN4
Sidelink Positioning		High (Lead WG)	High	Low	High
Integrity		Low	Medium (Lead WG)	Low	Low
LPHAP Positioning		Low	Medium (Lead WG)	Low	Low
Redcap Positioning	**Performance requirements for legacy measurements**	None	None	None	Low (Lead WG)
	PRS/SRS Hopping Enhancement	Medium (Lead WG)	Low	Low	Medium

Objectives for future normative phases

- We propose the following objectives to be deferred to a later normative work:
  - **PRS/SRS Aggregation**
    - Positioning accuracy improvement was concluded in the Rel-17 SI (TR 38.857) and a recommendation was reached to further study, and if needed specify this enhancement during normative work.
    - RAN4 concluded that it is feasible to perform intra-band contiguous PRS/SRS aggregation and identified the applicable scenario.
  - **SL positioning for unlicensed spectrum**
    - Due to the already high workload, we propose this to be deferred for a future normative phase.
  - **NR Carrier Phase Positioning**
    - RAN1 concluded that it is feasible to achieve a few cm accuracy performance at 50% under a set of conditions which include the need of deployment of PRUs and a very accurate gNB location knowledge (cm-level).
    - A target accuracy of a “few cm” at 50-percentile does not address an imminent and clear use-case.
    - No performance comparison with Rel-17 positioning methods.
    - Only conditional recommendations were reached related to the specification impact if CPP positioning is introduced.
    - RAN4 didn’t perform feasibility study.
  - **The following LPHAP objectives**
    - "Extending DRX cycle beyond 10.24s" should not be an objective in a Positioning WI since it is a generic power saving enhancement.
    - "Paging relaxation" received only conditional recommendation by RAN2. RAN1 didn’t confirm its benefits.
    - 1-symbol PRS didn’t get a clear recommendation.
  - If there are available TUs for an additional objective, our preference is to add PRS/SRS Aggregation in this release.

Summary of Proposals

- **Proposal 1.** The following topics should be included in the Rel-18 positioning WI (see slide 4 for details):
  - Sidelink Positioning
  - Integrity for RAT-Dependent Positioning Techniques
  - Low Power High Accuracy Positioning
  - Positioning for RedCap UEs
    - Note, this includes performance requirements for the legacy (Rel-16/17) measurements.
- **Proposal 2**. If there are available TUs for an additional objective, add PRS/SRS Aggregation in the Rel-18 normative phase.
- **Proposal 3**. Defer remaining topics to Rel-19.

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Proposal for Study Item conversion to Work Item

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Redcap UEs Positioning	• Recommendations (TR 38.859): PRS and SRS frequency hopping • Positioning performance requirements for redcap devices are missing (even for legacy positioning methods)

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