3GPP TSG RAN Meeting #98-e
Electronic Meeting, December 12 – 16, 2022

RP-223085

Title: On work scope of Rel-18 expanded and improved NR positioning

Agenda item: 9.2.6
Source: Samsung
Document for: Decision

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Background

- **Rel-18 study item on “Expanded and Improved Positioning“ in RP-222616 can be considered complete for the following:**
  - Sidelink positioning
  - Improved positioning accuracy, integrity, and power efficiency
  - Positioning for RedCap UEs

- **For sidelink positioning, check point at RAN#98 regarding whether unlicensed spectrum can be considered in further work.**

- **Rel-18 work item scope on “Expanded and Improved Positioning” should be decided based on the study results captured in TR38.859 and TU allocation in RP-213697**

Sidelink positioning (1/2)

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- **TR 38.859 has captured the following for sidelink positioning:**
  - From RAN1's perspective, it is recommended that SL-PRS bandwidths of up to 100 MHz are supported by the specifications in FR1 spectrum.
  - Note: The above recommendations are based on the evaluations in licensed and ITS spectra.

- **Proposal 1: Unlicensed spectrum and FR2 are not considered in Rel-18 work for sidelink positioning.**

Sidelink positioning (2/2)

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- **For sidelink (SL) positioning, the following are recommended in TR 38.859 for normative work:**
  - Operation Scenarios: PC5-only-based positioning and combination of Uu- and PC5-based positioning
    - Protocol between UE and UE (SLPP) and protocol between UE and LMF for supporting SL positioning [RAN2]
  - Procedures/signaling/measurements for supporting SL positioning in IC, PC and OoC scenarios [RAN2, RAN1]
  - Positioning methods: RTT-type solution(s) using SL, SL-AoA and SL-TDOA [RAN1]
  - A new SL reference signal (SL-PRS) design [RAN1] and SL-PRS configuration [RAN2]
  - SL-PRS resource allocations: network-centric operation (Scheme 1) and UE autonomous operation (Scheme 2) [RAN1]
  - Both dedicated resource pool and shared resource pool with existing SL communication for SL-PRS transmission [RAN1, RAN2]
  - Unicast, Groupcast (not including many to one) and Broadcast of SL-PRS transmission [RAN1, RAN2]

- **Proposal 2: Specify the recommended areas in TR 38.859 as Rel-18 RAN1 and RAN2 work for SL positioning.**

Improved positioning accuracy

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- **For PRS/SRS bandwidth aggregation for intra-band carriers, the following agreement was made in RAN4 as:**
  - PRS/SRS bandwidth aggregation for intra-band contiguous carrier is feasible for single chain Tx/Rx architectures at both the UE and gNB.
  - The assumption for a single-chain Tx architecture is that PRS/SRS resources to be aggregated are transmitted from a single Tx antenna.
    - Single chain Tx architecture means the single RF chain with single antenna
- **The assumptions for contiguous carrier and single chain Tx/Rx architectures are very restrictive.**

- **Proposal 3: PRS/SRS bandwidth aggregation for intra-band carriers is not introduced for Rel-18 work for improved positioning accuracy.**

Positioning integrity

- **For positioning integrity, both UE-based and LMF-based integrity for RAT-dependent positioning techniques are recommended for normative RAN2 work, but there was NO recommended work in RAN1.**

- **Proposal 4: Specify UE-based and LMF-based integrity as Rel-18 RAN2 work only for RAT-dependent positioning.**

Positioning power efficiency

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- **For positioning power efficiency, the following areas are recommended in TR 38.859 for normative work:**
  - Enhancements on SRS configuration in RRC_INACTIVE [RAN2]
  - SRS positioning validity area for UL positioning in RRC_INACTIVE [RAN2]
  - Extending DRX cycle beyond 10.24s [RAN2]
  - Alignment between DRX and PRS [RAN2]
  - DL positioning for UEs in RRC_IDLE state [RAN1, RAN2]
  - Skipping paging reception in RRC_INACTIVE [RAN2]
- **Since too many candidate solutions are listed for positioning power efficiency, we need to down select only promising solution(s).**

- **Proposal 5: Down select the candidate solutions listed in TR 38.859 for positioning power efficiency and specify solutions as Rel-18 RAN1 and RAN2 work.**

Positioning for RedCap UEs

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- **For positioning for RedCap UEs, support of PRS frequency hopping and SRS frequency hopping is recommended for normative work in TR 38.859 with the following note as:**
  - During the normative phase, the complexity of the corresponding capabilities for RedCap UEs should be addressed for the introduction of appropriate capabilities for RedCap UEs.

- **Proposal 6: Specify PRS frequency hopping and SRS frequency hopping as Rel-18 RAN1 and RAN2 work for positioning for RedCap UEs.**

Proposals

- **Proposal 1: Unlicensed spectrum and FR2 are not considered in Rel-18 work for sidelink positioning.**
- **Proposal 2: Specify the recommended areas in TR 38.859 as Rel-18 RAN1 and RAN2 work for SL positioning.**
- **Proposal 3: PRS/SRS bandwidth aggregation for intra-band carriers is not introduced for Rel-18 work for improved positioning accuracy.**
- **Proposal 4: Specify UE-based and LMF-based integrity as Rel-18 RAN2 work only for RAT-dependent positioning.**
- **Proposal 5: Down select the candidate solutions listed in TR 38.859 for positioning power efficiency and specify solutions as Rel-18 RAN1 and RAN2 work.**
- **Proposal 6: Specify PRS frequency hopping and SRS frequency hopping as Rel-18 RAN1 and RAN2 work for positioning for RedCap UEs.**

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Thank you