3GPP TSG RAN #102

Edinburgh, UK, December 11-15, 2023

RP-233327

Discussion on Rel-19 Positioning Enhancements

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Potential RAN1-led objectives for consideration in Rel-19 Positioning enhancements

SL positioning in unlicensed spectrum

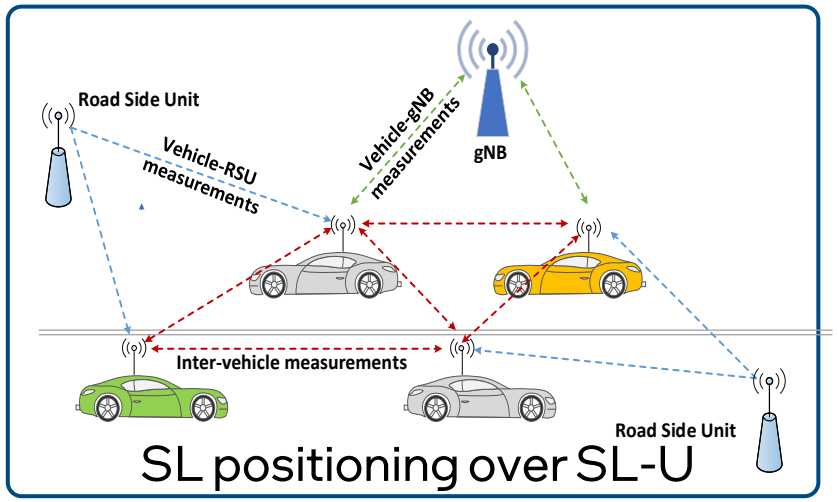
- Based on design of SL comm in unlicensed spectrum, enable SL positioning/ranging using unlicensed bands offering larger BWs.
  - In Rel-18, maximum bandwidth for SL positioning is effectively limited to 40 MHz.
- Use-cases and KPIs can be similar as considered during Rel-18.

DL and UL positioning in unlicensed spectrum

- Currently, positioning features are not supported in NR unlicensed carriers which presents a critical shortcoming for standalone NR-U operation.
- Based on design of NR-U for data communication over DL/UL to enable support of positioning features in unlicensed spectrum (FR1 and FR2-2 bands).
- Use-cases and KPIs can be similar as considered during Rel-16/17.

SL positioning in FR2

- SL positioning in FR2 bands can also enable high accuracy positioning via accessibility to larger bandwidths and narrower beamforming techniques.



SL positioning over SL-U

Carrier Phase Positioning (CPP) enhancements

- In Rel-18 DL/UL CPP measurements are limited to single PFL/carrier (respectively). This limits the ability to accurately estimate the pseudo-range (corresponding to the integer number of cycles of the carrier wave).
- It would be desirable to support DL/UL CPP measurements across multiple DL PFLs/UL carriers (respectively) to facilitate highly accurate positioning based on NR CPP in practice.

Potential RAN2-led objectives for consideration in Rel-19 Positioning enhancements

UL positioning in RRC_IDLE state

- To further facilitate LPHAP use-cases identified during Rel-18.
- Prior solutions for supporting UL transmissions by RRC_IDLE UEs (e.g., as for PUR in LTE) can be leveraged to extend current UL positioning support for UEs in RRC_INACTIVE state.

Support of broadcast and groupcast for SLPP

- At RAN #101, the above were removed from Rel-18 scope due to lack of time in RAN2.

AGNSS enhancements with specific regional interests

- AGNSS support for Navigation with Indian Constellation (NavIC) L1 Standard Position Services (SPS) service in NR specifications [*ref. RP-231976*].
- AGNSS support for B2b signal defined in BeiDou Navigation Satellite System (BDS) [*ref. http://www.beidou.gov.cn/xt/gfxz/202008/P020230516558683155109.pdf*].

Scope of Positioning enhancements in Rel-19

- Considering the discussions during RAN #100 and #101, and the proposed way forward for the Rel-19 package from the RAN chair [RP-232745], it is evident that limited time budget may be available for positioning-related enhancements, with very low likelihood of TUs being available for RAN1.
- Thus, the following proposals are made for the scope of Rel-19 Positioning enhancements:
  - Do pursue any RAN1-led objectives
  - Consider a RAN2-led WI to address at least the following:
    - The down-scoped elements of SL positioning: broadcast and groupcast for SLPP.
    - AGNSS enhancements to support NavIC L1 SPS.
    - AGNSS enhancements to support B2b signal of A-BDS.
- With such a well constrained scope, the TUs required should be quite small and the WI could be started at a later point in Rel-19.

Further evolution of NR positioning in Rel-19: Proposed objectives for WI

- Specify solutions for support of broadcast and groupcast for SLPP [RAN2, RAN3].
- AGNSS enhancements to support NavIC L1 SPS [RAN2, RAN3].
- AGNSS enhancements to support B2b signal of A-BDS [RAN2, RAN3].
- Performance requirements for the above objectives [RAN4].

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