

3GPP TSG RAN Meeting #101

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Rel-19 positioning enhancements for NR

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■ NR positioning

- In Rel-16, RAT-dependent positioning was specified for the first time in NR specifications. Rel-16 NR positioning supports Cell ID-based method, timing-based methods and angle-based methods.
- In Rel-17, to extend the target scenarios of NR positioning to IIoT use-cases, multiple enhancements for providing higher positioning accuracy and/or lower latency were introduced based on Rel-16 NR positioning methods.
- In Rel-18, additional positioning features were specified to cover further various device types, e.g., vehicle, wearable device, RedCap UE. In addition, carrier phase-based positioning method was specified to achieve cm-level positioning accuracy.

■ RAN Chair's summary in RWS-230488

- Positioning Enhancements was captured as one of the Additional RAN1-led Candidate Topics for Rel-19
- Following general guidance is provided
 - » *For any topics of a continuing evolution nature from previous 5G release(s), it is expected that these topics are subject to more careful checking and dimensioning*

■ For the practical use of NR positioning in more commercial networks

- Positioning enhancements for higher accuracy, lower latency, lower power consumption and so on have been specified in Rel-17 and Rel-18 based on Rel-16 NR positioning methods mainly based on PRS (DL-PRS, SRS for positioning). Further enhancements on top of them may not be so urgent.
- Since PRS is the specific reference signal for positioning purpose, there would still be many commercial networks that have not been compatible with PRS yet (especially DL-PRS).
 - » Transmitting DL-PRS for positioning purpose increases an overhead in terms of NW resource utilization for throughput.
- If some existing reference signal with which all commercial networks are compatible e.g., SSB, TRS, can be used for positioning purpose (in addition to cell-ID based method and TA based method), it can facilitate the practical use of NR positioning in more commercial networks.
 - » NW resource efficiency can also be improved compared with the positioning based on dedicated reference signal such as DL-PRS.
 - » It is also possible that DL-PRS is used for other purpose than positioning, but utilizing existing reference signal with which all commercial networks are compatible seems to be a better approach.

→ We propose to consider Rel-19 positioning enhancements for improving NW resource efficiency and facilitating the practical use of NR positioning in more commercial networks

- Given the guidance in RWS-230488, Rel-19 positioning enhancements (if any) should have limited scope(s) e.g., within 0.5~1.5 TU for each WGs

- The following enhancements can be considered in Rel-19 Positioning Enhancements.
 - Improving NW resource efficiency of NR positioning [RAN1, RAN2, RAN3, RAN4]
 - » Specify solution for NW efficiency related to positioning procedure and related physical layer measurements [RAN1, RAN2, RAN3, RAN4]
 - E.g., utilizing SSB and/or TRS for timing-based and/or angle-based positioning methods

■ Views on other potential proposals based on RAN Rel-19 WS papers

- [Carrier phase positioning (CPP) enhancements]
 - » NR CPP was specified in Rel-18. Since there are a lot of CPP related leftover items (e.g., additional solution for integer ambiguity resolution), it is possible to consider CPP enhancements. However, as we argued in P3, we think it is more important to improve NW resource efficiency of positioning to facilitate the practical use of NR positioning.
- [SL positioning in unlicensed band]
 - » SL in unlicensed band and SL-pos were specified in Rel-18. Although it may be desirable to support SL-pos in unlicensed band as well, we think it is too early as the real commercial need for SL-pos in unlicensed band is unclear.
- [SL positioning in FR2]
 - » SL in FR2 was discussed in Rel-18 SI, and whether the SL in FR2 is to be specified in Rel-19 or not is unclear at this moment. SL evolution in Rel-19 is also one of the additional RAN1-led candidate topics according to RWS-230488. SL-pos in FR2 should be considered after SL in FR2 is specified.

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