3GPP RAN #88e
June 29th - July 3rd, 2020
E-meeting

RP-200866

Agenda Item 9.1

Motivation for Sidelink Positioning

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Motivation

Sidelink Positioning provides a new positioning method that fits new 5G use cases

- Sidelink Positioning (relative/absolute) refers to the transmission of Positioning Reference Signals (PRS) over sidelink, that can operate independently of network or RAT coverage
  - For example, relative positioning for collision avoidance, and absolute positioning for navigation
- Sidelink Positioning is especially useful for some of the vertical applications when network-based positioning is not available
- Service requirements for Sidelink Positioning have long been defined in the corresponding stage-1 specification, e.g. SA1 TS 22.186 for V2X
- External groups have also expressed a desire for 3GPP to design a solution for Sidelink Positioning, e.g. LS from 5GAA [RP-200546] and SAE [RP-200567] for the V2X services

What needs to be studied - I

Sidelink Positioning operation needs to support out of coverage use cases

- It is expected that the services that can benefit from Sidelink Positioning may operate in out of coverage modes
  - For example, Public Safety use cases, and V2X services
- Additionally, not all NG-RAN/E-UTRAN can be upgraded to support the new positioning operation from day 1
  - For example, the UE may be under the coverage of a legacy (pre-R17) gNB
- Therefore, the Sidelink Positioning study needs to investigate and support:
  - a distributed operation mode that does not rely on network connection

What needs to be studied - II

Sidelink Positioning needs to support power efficient operation

- Sidelink Positioning may be used by UE with limited power capacities
  - For example, Pedestrian UE (Vulnerable Road User UEs) in the V2X communication would also need to participate in the positioning
  - A Public Safety UE needs to operate over an extended time during some emergency situations

- The positioning method should be flexible enough to accommodate both vehicle UEs and Pedestrian UEs

- Therefore, the Sidelink Positioning study needs to investigate and support:
  - a power efficient operation so that UEs with limited power capacities can benefit from it

What needs to be studied - III

Sidelink Positioning needs to investigate the potential use of unlicensed bands

- As shown in the figure, wider bandwidth allows a more accurate measurement of time of arrival (ToA), and thus better positioning accuracy
  - Given the requirements of 0.1m or 0.5m accuracy for V2X applications, this is important

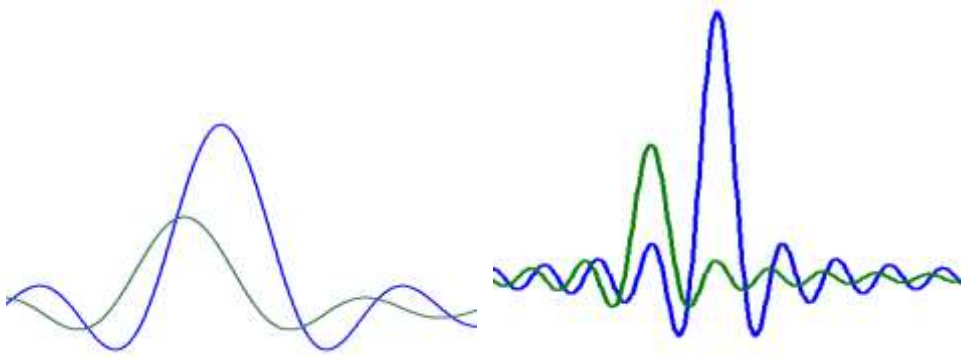

Fig.1. Channel impulse response of smaller bandwidth signal (left) and larger bandwidth signal (right)

- Potential bands to be considered should include unlicensed bands, e.g. U-NII-3 has 125 MHz available, because:
  - ITS bands (e.g. 5850-5925MHz) only have limited bandwidth
  - Licensed band availability depends on region and deployment

- Therefore, the Sidelink Positioning study needs to investigate the use of the following bands:
  - ITS bands
  - Unlicensed bands
  - Licensed bands

Conclusion

- RAN should approve the Rel-17 study item on Sidelink Positioning

- The study should cover at least the following aspects:
  - Distributed Sidelink Positioning (relative/absolute), both in coverage and out of coverage;
  - Power efficient Sidelink Positioning operation;
  - Suitability of different bands for Sidelink Positioning, including ITS bands, unlicensed bands, and licensed bands