

3GPP RAN Rel-19 Workshop

June 15th-16th, 2023, Taipei, Taiwan

Agenda Item: 5

RWS-230175

Integrated Sensing and Communication

Qualcomm Incorporated

Channel modeling and evaluation methodology

- **Channel model enhancement (for indoor/outdoor and all frequency bands)**
 - Sensing aims to infer properties of passive objects based on how they interact with RF signals
 - Explicit modeling of these interactions (e.g. reflection/absorption/diffraction/scattering) is very limited in current TR38.901
 - Multipaths seen by different (Tx, Rx) nodes are not necessarily consistent with reflection from the same object(s)
 - Thus, for the sensing study and evaluations, it is critical to study approaches to remove these limitations in the channel modeling
 - E.g., consider adding additional path(s) that are consistent with reflections from a specific object.
 - Consider statistical abstractions to capture the key properties of the interactions of the objects with RF signals
 - Help to limit excessively detailed (e.g., ray-tracing) modeling of RF propagation
 - E.g., capture only impact to timing, angle, and power of the reflected signal. Use statistical modeling for the variability in these parameters that is caused by the detailed shape of the object (e.g., statistical RCS model, or simplified object shape models)
- **Evaluate missed/false detection probability and accuracy of position and velocity of detected object(s)**
 - This captures the KPIs needed for a broad class of use cases discussed in the Rel-19 SA1 SI TR 22.837
 - Use cases needing more detailed modeling such as micro-doppler signature detection or object shape detection could be treated as second priority
 - Study both monostatic and bistatic sensing. Monostatic may be modeled as a special case of bistatic with colocated Tx and Rx

Sensing Waveform and Measurement Reporting

- Treat PRS and SRS-for-positioning as baseline, and extend for sensing
 - Study sensing-specific enhancements to existing configuration, measurements and reporting for Rel-16/17/18 positioning
 - E.g., extend PRS configuration to support:
 - longer coherent processing interval for doppler estimation
 - switching between scanning vs tracking mode
 - Study measurement and reporting enhancements to identify and estimate position and velocity of specific objects
 - E.g., reporting per-path doppler and UE AoA estimates
- Study of new sensing waveforms such as FMCW or lower PAPR waveforms could be lower priority

Network architecture and procedures

- Treat Rel-16/17/18 Positioning architecture and procedures as baseline, and study extensions for sensing
 - Definition and indication of a 'sensing area' within which to locate the target objects
 - Extend LMF function to enable sensing, or define a new 'Sensing Management Function (SnMF)'
 - Enable a flexible framework for reporting of various types of non-3gpp sensor data to the SnMF
 - LPP reporting of measurements not based on 3gpp RATs (e.g., Wifi, IMU, barometer etc) could be a starting point
 - Extend existing frameworks for PRS/SRS to support sensing functions. Existing frameworks include:
 - configuration of PRS (with and without measurement gaps) and SRS, on-demand PRS, participation of multiple UEs (Rel-18 SL positioning), scheduled location time, etc
 - Allow computation of sensing results at SnMF or UE (analogous to UE-based/UE-assisted/network-based positioning)
 - Allow client (node requiring the sensing results) to be UE, gNB, or SnMF
 - Client at gNB enables support of sensing-assisted communications.



Thank you

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