

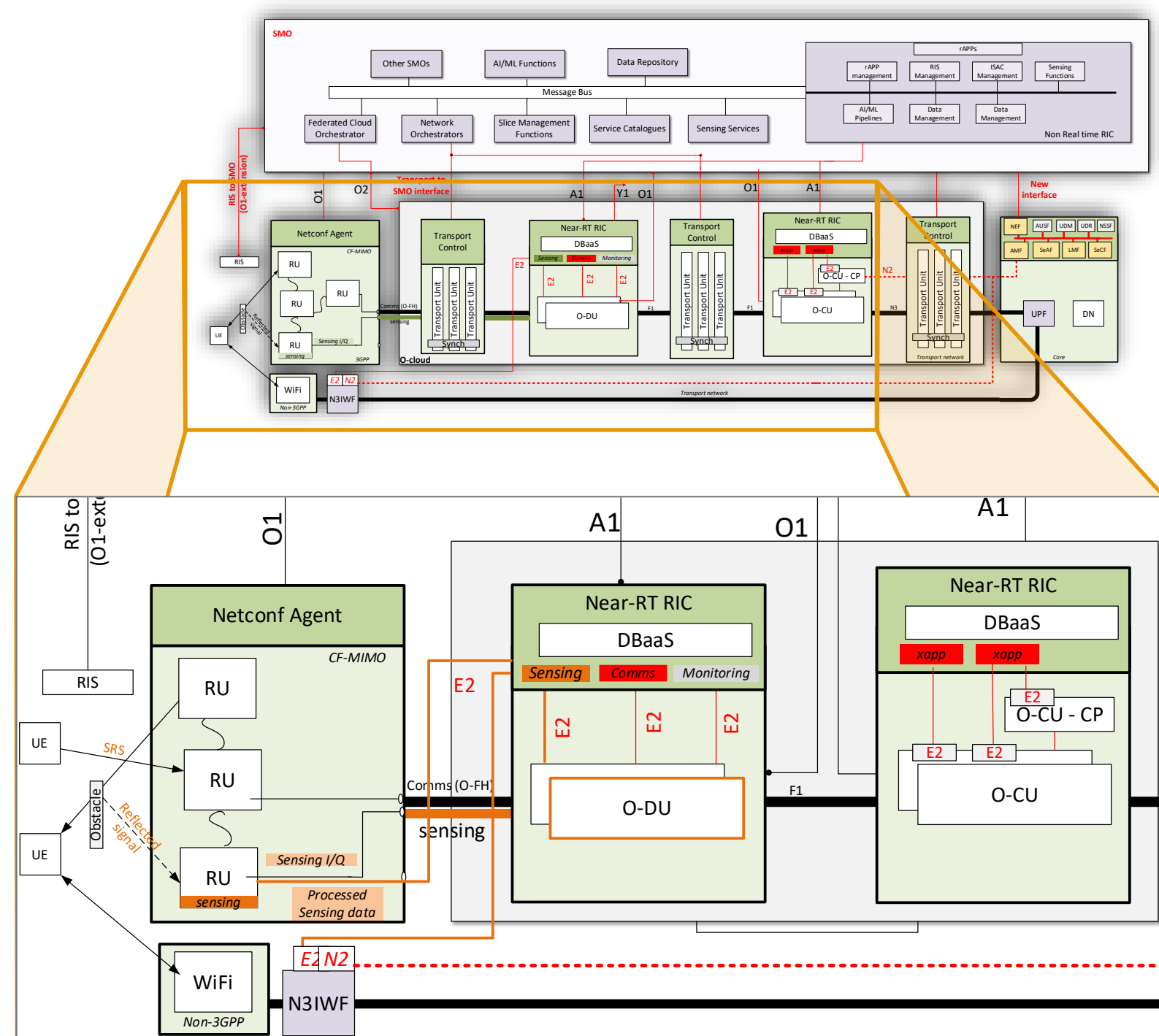
Multi-technology ISAC: Objectives and Architecture

Objectives

- Provide a Multi-WAT (Sub-6, mmWave, Wi-Fi and 5G NR technologies) ISAC platform that ingests cross-technology sensing to evolved O-RAN RICs integrating to achieve sub-cm precision
- Extending capability of O-RAN E2AP/E2SM to Sub-6, mmWave (non-3GPP, non-Wi-Fi)

Architecture

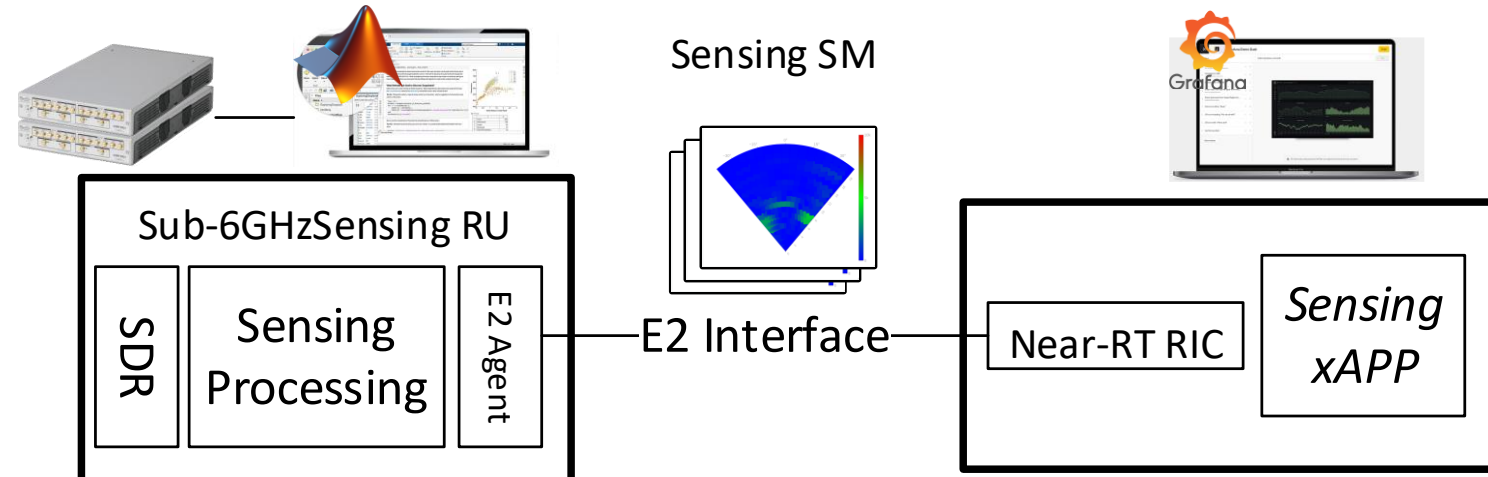
- 6G-SENSES proposes a 6G architecture that interconnects a multi-technology RAN able to offer sensing functionalities (3GPP and non-3GPP) with CN domains, to facilitate joint support of sensing and communication services
- The output of the sensing information from non-3GPP networks is expthe RAN segment in a secure way through suitable extensions of the E2 interface of the RAN Intelligent Controller (RIC).
- Use of the non-3GPP Inter-Working Function (N3IWF), responsible for inter working between untrusted non-3GPP networks and the 5G CN



Radar-based location

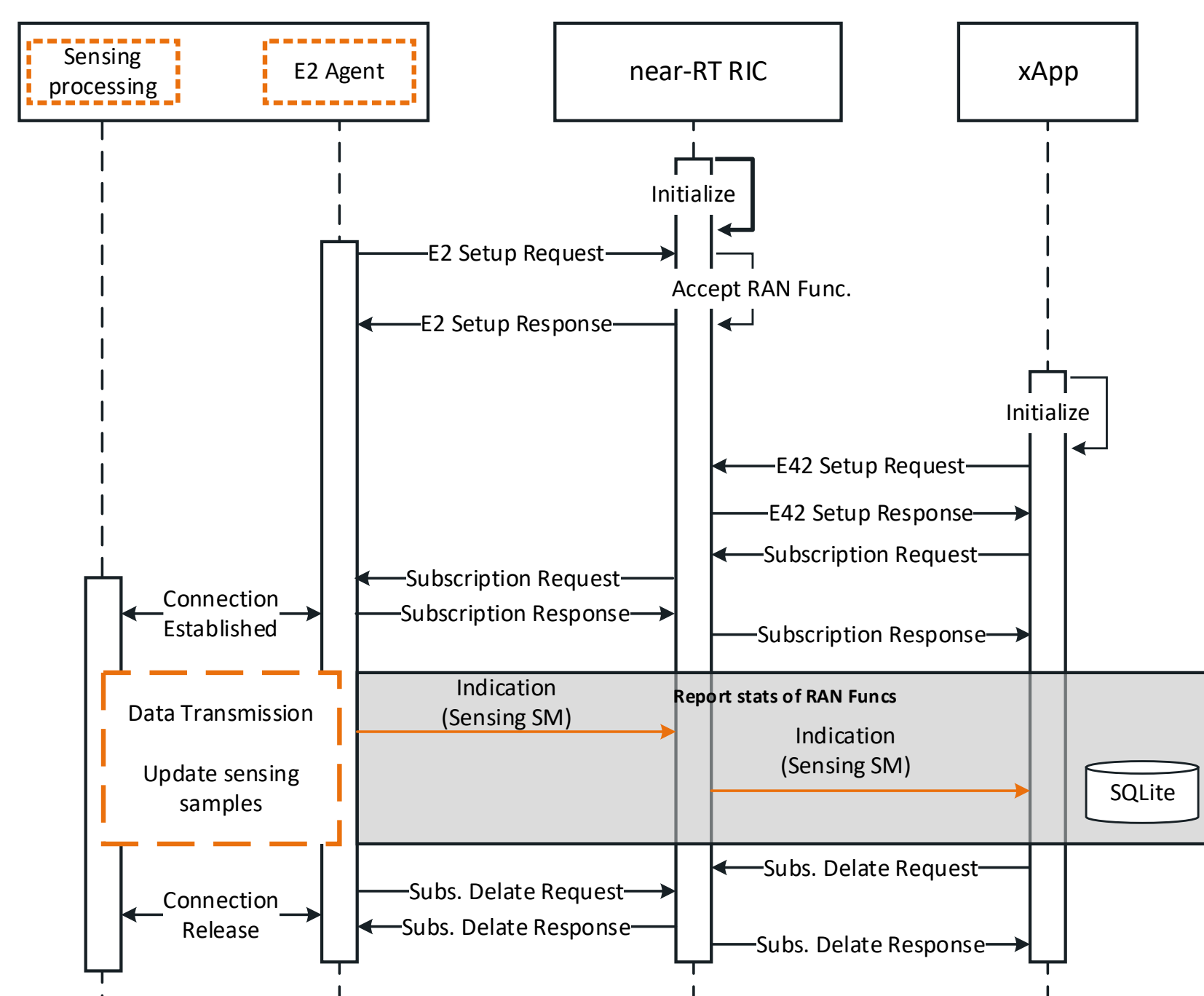
Integration of sensing RU with O-RAN

- Extension of O-RAN interfaces for RU sensing devices
- O-RAN compatible E2 service model to transport sensing heatmaps



Demo workflow

- Only sensing RU equipped with E2 agent to interact with O-RAN
- Local processing to generate lightweight sensing data (heatmaps) forwarded through E2 agent
- Monitoring xApp for data storing and visualzaition



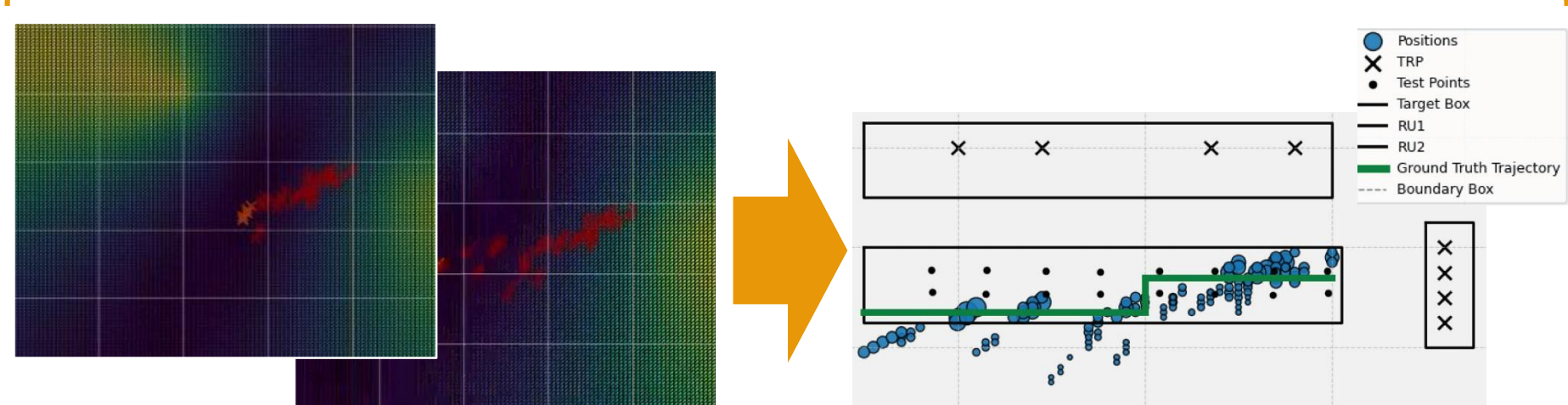
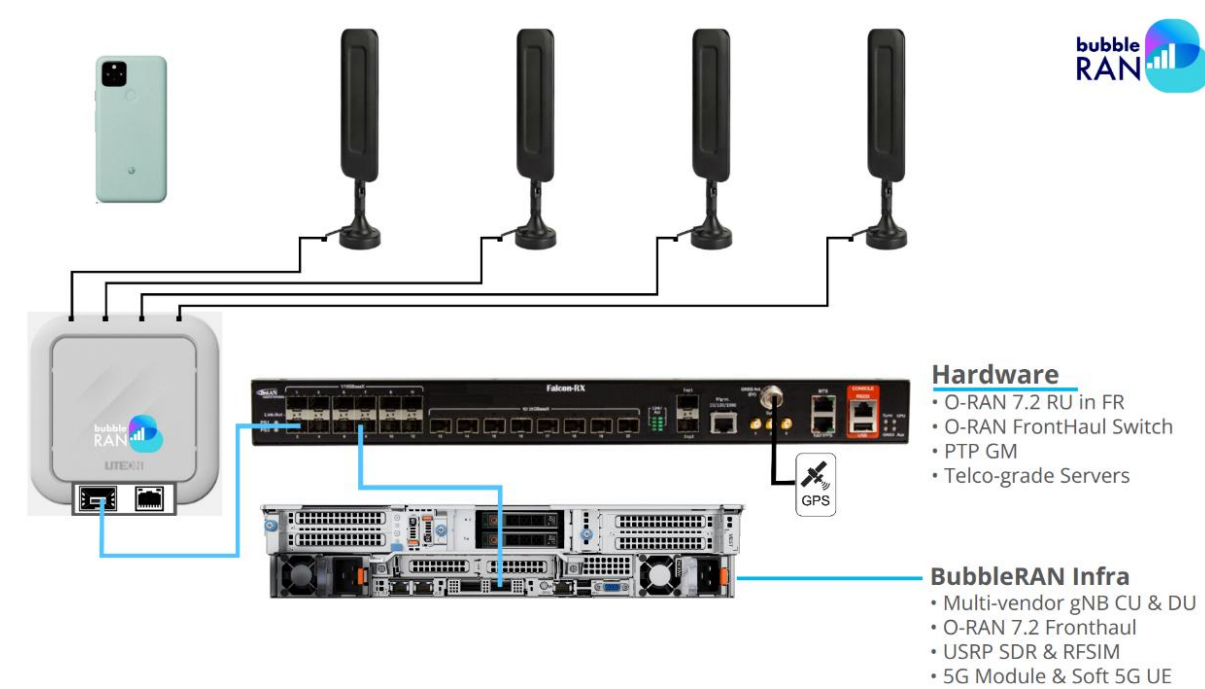
SRS-based positioning

O-RAN compatible E2AP SM

- I/Q samples from multiple Transmission Reception Points (TRPs) forwarded to xApp. **Sub-millisecond resolution** for real-time UCs

Demo workflow

- xApp interacts with the RU to collect SRS data for UE tracking
- Hyperbolic estimator based on TDoA determines the position of the UE. Solved using a PSO a algorithm.



Next integration steps

Extensions

- Merging of data from different sources to improve the perception of the surrounding environment
- Integration of sensors in other frequency bands (mmWave)
- Extend xApps to control sensing devices real time

New integration options

- Dual Comm. sensing RU without local processing capabilities