

Coordinated multi-point operation for Joint Communication and Radar Sensing (JCRS)

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Motivation

In today's rapidly advancing technological landscape, various innovations are reshaping our world. From the coordinated multi-point operation merging communication and radar sensing to the emergence of self-driving cars revolutionising transportation and the evolution of 5G to 6G networks promising unprecedented connectivity. These advancements not only redefine how we communicate and travel but also offer transformative solutions for surveillance, aerospace, and beyond.

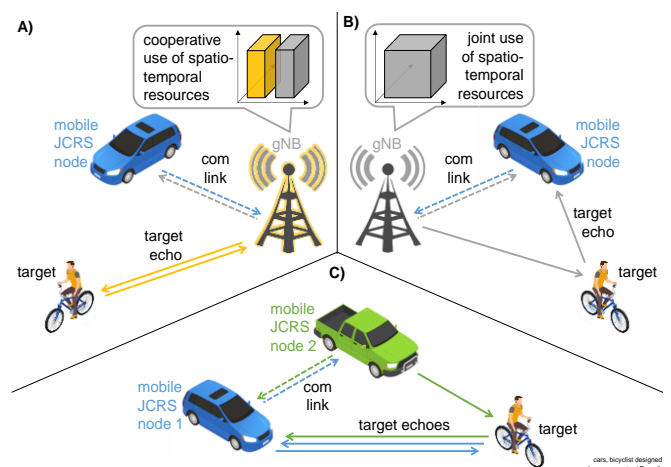
Our project aims to design a complete radio system for coordinated multi-point transmission and reception in Joint Communication and Radar Sensing (JCRS-CoMP). We'll focus on a communication-centric approach with distributed architectures, which are common in advanced networks like 5G and beyond. This design will enable distributed multi-static sensing and illumination between stationary Radio Remote Units (RRUs) acting as Transmitter Points (TPs) and Receiver Points (RPs). Similar architectures involve multiple base stations, which may be loosely synchronised via the main network. Our system will ensure that the radio access meets radar requirements in complex environments.

Tasks:

- Defined and Simulated different scenarios of JCRS networks.
- A review of the literature relevant to JCRS in general and that relevant to Synchronization in particular.
- Develop Multipoint synchronisation protocol-based cooperative and waveform-based synchronisation in JCRS networks.

Requirements:

- Basic Knowledge of Mobile communication and radar systems.
- Good Programming skills in MATLAB (Python is a plus).



Simultaneous communication and sensing of a JCRS node:

- A) Using monostatic configuration
- B) Using a bi-static configuration
- C) JCRS in the sidelink