Proofs of Concept (PoCs)

E2E small-scale proof-of-concept prototype to demonstrate performance and energy efficiency of ISAC

Build an end-to-end PoC prototype to demonstrate performance and energy efficiency of ISAC in a form of an operated RU, DU, and CU/UPF pools with a real-time control fabric providing sub-millisecond control loop over each network component

6G CF-mMIMO PHY prototype with real-time control loop support

6G CF-mMIMO PHY prototype that supports real-time control loop. The algorithms related to this implementation will be deployed on top of representative real-time SDR hardware components to demonstrate the feasibility of the concept as well as achieving high network performance

5G/6G Offline (online) Network Digital Twin

In the context of 5G/6G offline and online network digital twin, the project will leverage a variety of WATs to ingest cross-technology sensing, telemetry, and control into the evolved 6G RIC. The goal is to enable efficient management and optimization of heterogeneous networks with multiple WATs

About 6G-SENSES

Start date: January 2024
Duration: 30 months
Overall budget: €3,810,062.50 €
Call: HORIZON-JU-SNS-2023-STREAM-B-01-02

Consortium:

IHP, IASA, UC, Aalelleran, OTE, Sapienza Università di Roma, Technische Universität Braunschweig, bubble ran, barkhausen institut, intel, Nottingham Trent University

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SEamless integratioN of efficient 6G wirelesS tEchnologies for Communication and Sensing

6g-senses.eu

Disclaimer:

6GSNS

Co-funded by the European Union

Main 6G-SENSES Proposition

6G-SENSES proposes the integration of novel 6G RAN technologies such as Cell-Free (CF) Massive Multiple-Input Multiple-Output (MIMO) and Joint Communication and Sensing (JCAS) to support the 6G vision that is sustained by the current (and future) architectural framework based on 3GPP and O-RAN. The project considers a multi-technology RAN ecosystem with technologies that are able to offer sensing functionalities.

Main Innovations

- **Development of a multi-technology RAN ecosystem** (3GPP 5G and non-3GPP) with technologies such as Sub-6, Wi-Fi, mmWave @ 60 GHz, 5G NR, which that are **able to offer sensing functionalities** and to **exploit distributed antenna schemes from CF and distributed MIMO architectures**.
- Use an **RIS infrastructure** as one of the enablers for JCAS and CF-mMIMO
- Design and fabrication of a **scalable MIMO mmWave front-end**
- **Extension of the RIC and control-plane intelligence** to support 'cross-domain AI optimization',
- **AI/ML models** for network management, configuration (e.g. adaptive L1/L2 functions) and optimization

Key Objectives:

- **Provide use cases and scenarios that can prove the benefits of 6G-SENSES**
- **Provide a Multi-WAT (Sub-6, mmWave, Wi-Fi and 5G NR technologies) ISAC platform**
- **Design, develop and demonstrate a Cell-Free architecture able to offer ISAC services**
- **Analyze synergies between 3GPP and O-RAN with regards to ISAC and CF-mMIMO**
- **Design and development of an 'Intelligent Plane'**
- **Maximize the project impact by actively contributing to the SNS program**