6G-DISAC
6G for Distributed Intelligent Sensing and Communication

6G-DISAC: Use Cases

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SNS ICE / GUIDE
Automotive, Transport & Logistics Solutions Webinar
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6G-DISAC HORIZON PROJECT

Runtime: 01 January 2024 – 31 December 2026

6G SNS

PHASE 2

6G DISAC

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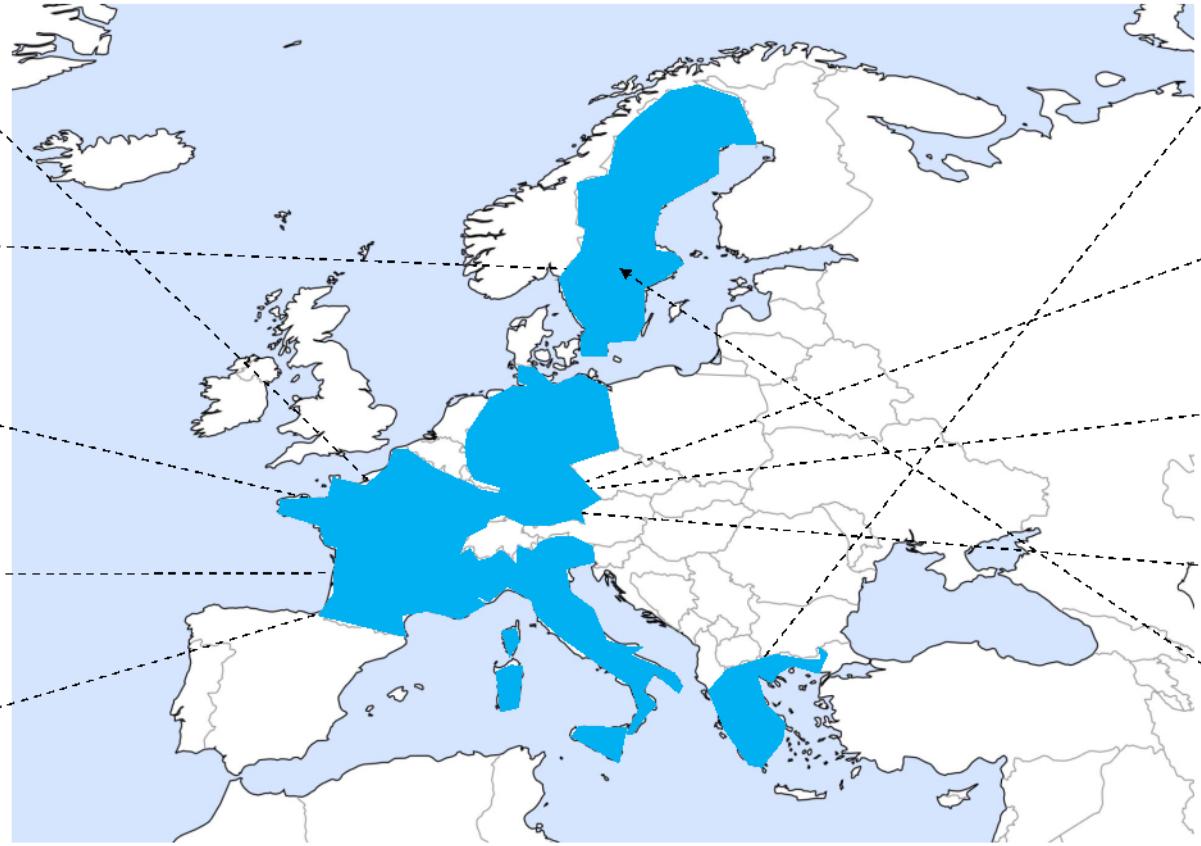

National and Kapodistrian University of Athens

ims Bordeaux

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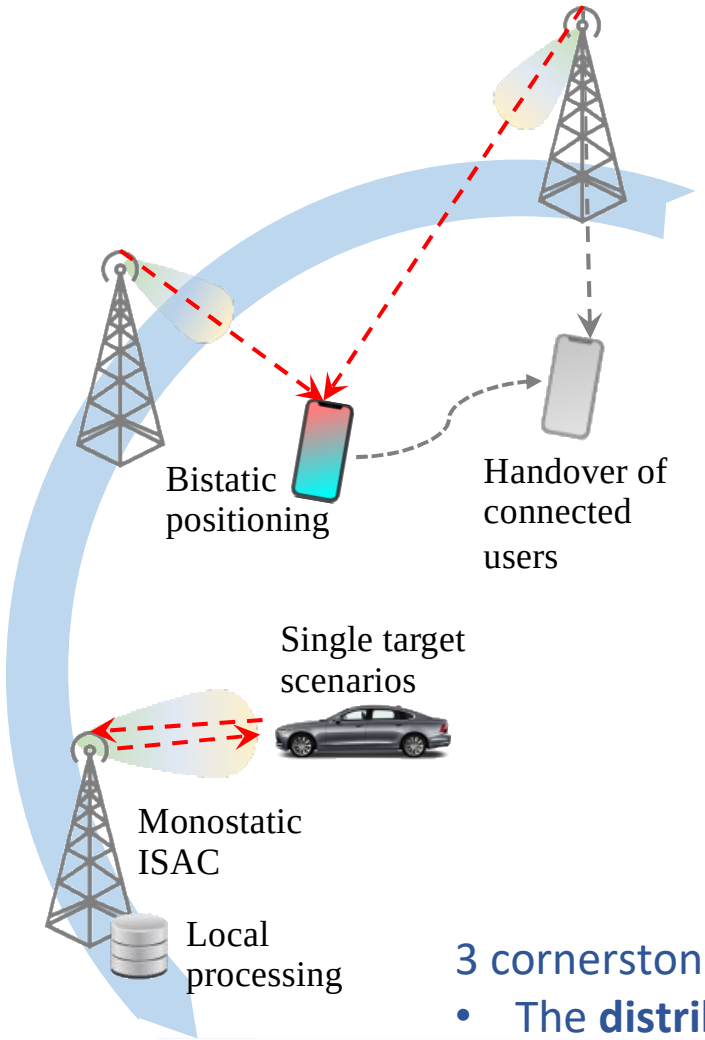
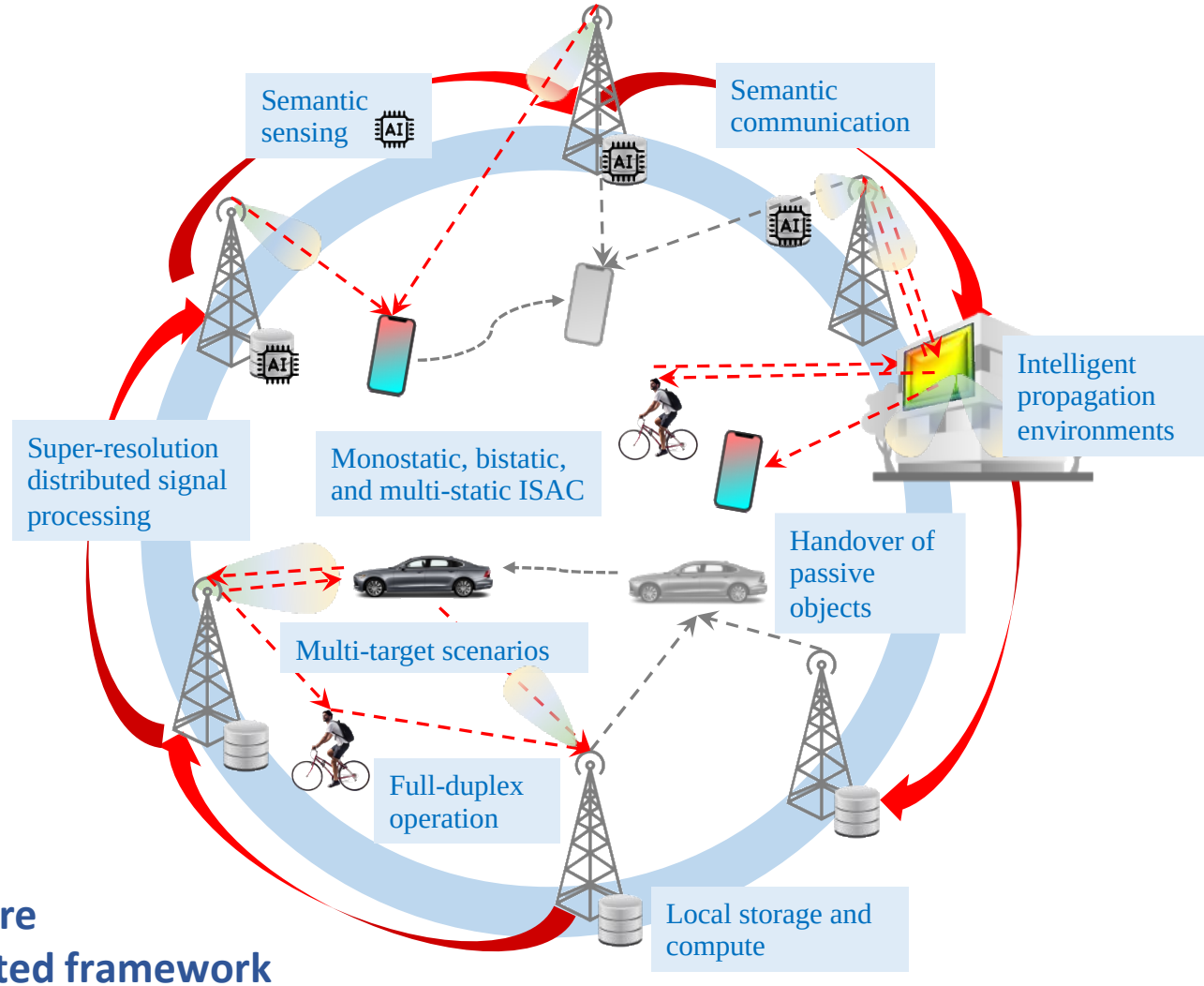
5 EU Member States

10 Consortium Partners

5G PPP PUBLIC-PRIVATE PARTNERSHIP

ISAC TO SEMANTIC-AWARE DISTRIBUTED ISAC

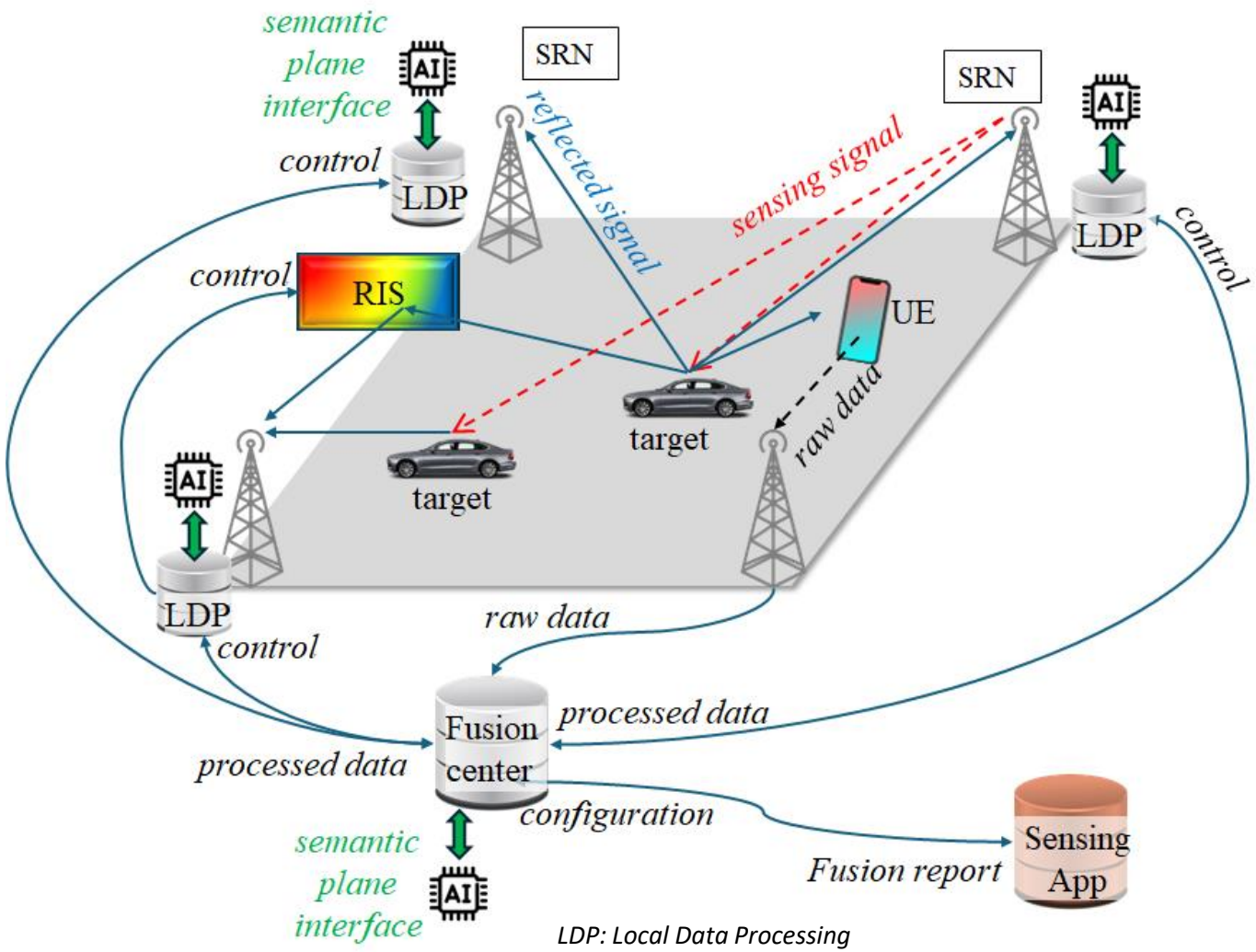




3 cornerstones

- The **distributed architecture**
- The **semantic / goal-oriented framework**
- The **high-resolution signal processing**

DISAC ARCHITECTURE



LDP: Local Data Processing
SRN: Sensing Receive Node
RIS: Reconfigurable Intelligent Surfaces

- **Intelligent distributed processing**
- Seamlessly **integrate heterogenous sensing** nodes with different capabilities
- **Support** for Large MIMO and RIS Sensing
- **Semantic layer** to facilitate sensing aided communication and communication aided sensing

Use case 1: DISAC for smart factory shop floors

Story:

- An Automated Guided Vehicle (AGV) is driving on the shop floor.
- The AGV is sensing the environment while in motion.
- A dynamic mapping of this environment is required for the safe and optimal operation of the smart factory.

Goal:

- Real-time, collective building of a map of the environment while AGVs are driving.
- Efficient task allocation and decision making supported by dynamic object sensing.
- Demonstrating the algorithms developed in the project
- Implementation of Radio-SLAM for AGVs.

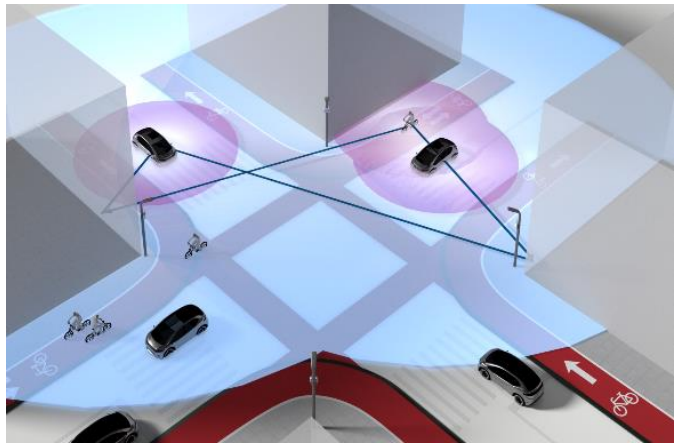
DISAC over ISAC:

- Using DISAC and the on-board sensors of the AGVs, the mapping of the environment is more efficient and more robust to dynamic changes.
- Leveraging the distributed feature of the system, obstructions are avoided by complementary fields of view.

Use Case 2: VRU protection at a smart intersection

Story:

- VRUs (Vulnerable Road Users) and vehicles are sharing an urban intersection.
- The intersection can be observed by traffic cameras, infrastructure, vehicle sensors of the involved vehicles, or by other vehicles (collective perception).
- Currently, the communication infrastructure is not involved.



Goal:

- Utilize DISAC to detect and localize VRUs at an intersection through communication signals.
- Combine the information from communication-based sensing with other sensing modalities.

DISAC over ISAC:

- DISAC goes beyond ISAC by allowing a heterogeneous approach involving different sensing methods at different geographical locations.

Use Case 2: VRU protection at a smart intersection

Challenges and Safety Considerations:

- **Real-time Sensing and Adaptation:**
  - Continuous sensing and adaptation of traffic signals and vehicle movements to avoid collisions with VRUs.
  - High-resolution sensors and enhanced 6G signal coverage are critical.
- **Safety Protocols:**
  - Implement protocols prioritizing VRUs, such as activating pedestrian crossing signals when detected.
- **Communication Latency:**
  - Low-latency communication for real-time decision-making.
  - 6G network ensures quick data processing from sensors and connected vehicles.

Technical Implementation:

- **Smart Traffic Management and VRU Protection:**
  - System architecture integrates several key components, leveraging DISAC alongside 6G network capabilities.
- **Sensor Deployment and Data Acquisition:**
  - Dense network of sensors (LIDAR, radar, video cameras, environmental sensors) positioned at intersections, in addition to DISAC sensing.
  - Sensors capture high-resolution data on vehicle dynamics, VRU movements, and environmental conditions.
- **6G Network Infrastructure:**
  - Provides low-latency reliable communication between IoT sensors, vehicles, and the central traffic control system.

Get in touch

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Thank you!

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