

## Description of the research unit

This job offer is opened by the LS2PR laboratory (Signals, Protocols and Radio Platforms Laboratory) of LETI's "Systems" department in Grenoble. Composed by 20 permanent researchers, this dynamic team conducts research into broadband radio communications systems (channel coding, modulation, access protocols and radio resource management). The main applications include cellular network evolutions (beyond-5G and 6G), satellite communications and optical wireless communications. The laboratory brings together experts in signal processing, information coding and optimization techniques, as well as researchers working on hardware and software implementation on custom targets. This diversity makes it possible to produce the advanced prototypes needed to validate and promote the work carried out. At the same time, LS2PR has a strong publication and intellectual property activity, with respectively 40 publications and 10 patents per year. The lab's areas of development include the evolution of cellular networks towards 6G, as well as the use of new tools such as artificial intelligence to optimize network architectures and digital communications systems. Similarly, the design of systems operating in the millimeter bands is another core activity.

## Description of the job offer

We invite applications for a post-doctoral research position focused on advancing the fundamentals of semantic and goal-oriented communications within next-generation networks, such as 6G. The successful candidate will work on cutting-edge topics that lie at the intersection of communication theory, machine learning, and artificial intelligence (AI), aimed at reshaping the way data and information are transmitted, processed, and understood by network systems and intelligent agents.

## Key Responsibilities:

- Conduct fundamental research in **semantic and goal-oriented communications**, focusing on how meaning and context can be incorporated into communication systems, beyond traditional data transmission models. [Calvanese2019].
- Explore **goal-oriented communication paradigms**, where the effectiveness of transmitted information is measured by its contribution to a specific task or objective.
- Develop new **AI-driven models** that integrate the understanding of context, relevance, and intent in network communication.
- Investigate the **efficiency, sustainability and reliability of data transmission**, focusing on selective information sharing and minimizing redundancy in large-scale, distributed networks.
- Study the **theoretical and algorithmic design principles of domain transferability-based general optimization policies** and their adaptation to pragmatic, goal-oriented policies.
- Collaborate with interdisciplinary teams to apply semantic and goal-oriented communication theories in real-world scenarios such as autonomous systems, IoT, and intelligent infrastructure.
- Publish research outcomes in leading journals and conferences, and contribute to the scientific community through workshops and presentations.
- As part of this study, the candidate will interact with people in the department who will provide inputs to enrich the study (e.g., realistic channel or antenna models, energy consumption models, etc.).

## Expected candidate profile

- Ph.D. in Electrical Engineering, Computer Science, Telecommunications, or a related field.
- Strong background in communication theory, information theory, machine learning, or artificial intelligence.
- Experience with next-generation communication systems (e.g., 5G/6G), including network architecture, protocols, and AI-driven network management.
- Proven research track record demonstrated by high-quality publications.

- Excellent programming skills (e.g., Python, MATLAB) and familiarity with machine learning frameworks.
- Strong analytical and problem-solving skills, with the ability to work both independently and collaboratively.
- Excellent English communication skills, both written and verbal.
- Experience on an NS-3 network simulator and mastery of C and C++ languages is a plus.

Contact: **Dr. Calvanese Strinati Emilio**, PhD, HDR

[emilio.calvanese-strinati@cea.fr](mailto:emilio.calvanese-strinati@cea.fr)