MLDR: A Machine Learning-Driven Radio Interface

Abstract for the general public

In the following years, we will see the advent of many new Internet applications and scenarios such as the metaverse (the adoption of augmented reality and virtual reality), holographic telepresence, the Internet of the Senses, the consolidation of the Internet of Things, with autonomous robots, fully automated industries and manufacturing plants, as well as smart infrastructures and environments, to mention just a few. To satisfy the high communication requirements (in terms of throughput, delay, reliability, connectivity, and power consumption) wireless networks (and their radio interface in particular) are becoming exceedingly complex, with a plethora of advanced communication features, protocols and parameters, usually involving hidden dependencies between them. To deal with such complexity, the use of Artificial Intelligence and Machine Learning (AI/ML) techniques—and their ability to deal with complexity in general—is the necessary performance enabler for next-generation wireless networks.

In this project, we aim to build a new, clean-slate AI/ML-Driven Radio (MLDR) interface. This new MLDR interface will learn to communicate by selecting and configuring the set of communication protocols and functionalities that better suit every particular use-case and scenario, thus satisfying the aforementioned hard performance requirements and efficiently using the available radio resources. In other words, MLDR will enable deploying 'bespoke wireless networks'. While the project proposal is groundbreaking in terms of focus and goals, we will follow a standard research approach to reach the stated objectives, i.e., we will move from use-cases, concepts/specifications and design, to implementation, evaluation and analysis. The consortium includes four partners, all working at the intersection of wireless networks and AI/ML areas, with complementary expertise. During the MLDR design and evaluation process, we will generate new knowledge in the form of new ideas, theories, practical solutions, ML algorithms, and disruptive communication functions. We expect the results from this project will guide the design of future AI/ML-driven wireless communications and networks, becoming a reference to follow and compare with.