**Press release**
**Nota de prensa**

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# DAEMON: Beyond 5G with (Network) Intelligence

IMDEA Networks is the project coordinator for the Network intelligence for aDAptive and sElf-Learning MObile Networks (DAEMON) project, **financed under the European Union H2020-ICT-2020-2 call** on Information and Communication Technology. From January 2021 to December 2023, the team of researchers will work on the application of Network Intelligence (NI) to 6G systems so as to fully automate network management, with a substantial participation of industry players, including world-leading manufacturers such as Nokia and NEC Corporation, top operators like Telefonica and OTE, as well as innovative SMEs like SRS, ADLINK or WINGS ICT.

6G shall run entirely diverse classes of services, and do so with outstanding performance: near-zero latency, apparent infinite capacity, and 100% reliability and availability will make the **communication infrastructure fully transparent** to the applications. Meeting this ambitious goal requires growing the already substantial complexity of mobile network architectures to instantly orchestrate physical resources and **Virtual Network Functions (VNF)** across different network domains, in concertation with time-varying demands and multi-tenancy requirements. Zero-touch technologies that fully automate the network operation will become the standard, and the success of 6G will vastly depend on the quality of the Network Intelligence (NI) that will run at schedulers, controllers, and orchestrators across network domains, and de-facto manage the infrastructure.

Though Artificial Intelligence (AI) models are commonly regarded as the cornerstone for NI design, they are not the best solution for every NI task. Parting from the current practice, **DAEMON will set forth a pragmatic approach to NI design**, by identifying network functionalities for which AI is (not) a suitable tool, and designing tailored machine learning models that respond to the specific needs of such functionalities. Building on these models, DAEMON will design an end-to-end NI-native architecture for 6G that fully coordinates NI-assisted network functionalities.

## Efficiency and sustainability

The advances will be applied in practical network settings, and will enable extremely high performance while making an efficient use of the underlying radio and computational resources. In addition, the project solutions target reducing the energy footprint of mobile networks, and boost their reliability. Concretely, DAEMON will design **practical algorithms for eight practical NI-assisted functionalities**, and the performance of the algorithms will be evaluated in real-world conditions via four experimental sites, as well as at scale with data-driven approaches based on two nationwide traffic measurement datasets, against nine ambitious yet feasible KPI targets.

The results above will be achieved by developing machine learning solutions that are suitably customized for and integrated into network environments, via three technical objectives:

- **Understanding the limits of AI for mobile networks**: DAEMON will carry out the first systematic, critical analysis of which NI problems can be appropriately solved with AI models rather than other techniques.
- **Designing practical NI algorithms empowered by highly customized AI techniques**: for NI problems where AI is an appropriate solution, the project will design tailored AI models that respond to the specific needs of network management functionalities.
- D**esigning an end-to-end NI-native architecture**: it will be defined a NI-native network architecture that, stemming from current standardization trends, enables the coordination of the many and varied NI instances deployed in the network, and goes beyond centralized orchestration to provide NI directly at VNF level.

Dr. Marco Fiore, Project Coordinator and Research Associate Professor at IMDEA Networks, highlights the significance of this development, **granted with an amount close to five million euros**: “DAEMON sets forth an innovative, controversial and potentially disruptive approach to the automated management of 6G networks. While current efforts at integrating NI in mobile networks aim at tweaking machine learning solutions so that they fit networking environments, DAEMON upends the approach, and seeks to update the network architecture so that it natively supports NI operations. The project questions the current mindset of considering fashionable but complex Artificial Intelligence models such as deep neural networks as the 'silver bullet' to all network management problems; instead, it fosters the tailoring of such AI models to the networking context, as well as their combination with statistical, analytical or hybrid approaches whenever relevant”.

A disruptive vision that can revolutionize the way in which AI will be integrated into future-generation mobile network architectures, and **play a key role in helping 6G to meet its very high expectations**: “DAEMON – Dr. Fiore remarks – is an especially important project for IMDEA Networks, as it is one of the two EU-funded ICT projects up to date where the institute acts as overall coordinator, and the first in the context of the H2020 ICT work programme. Furthermore, it is the first project under the 5G PPP umbrella that is coordinated by the Institute".

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(*) Consortium

IMDEA Networks Institute (Spain), NEC Laboratories Europe GmbH (Germany), Telefónica I+D (Spain), OTE (Greece), Nokia Bell Labs (Belgium), Software Radio Systems (Ireland), WINGS ICT (Greece), ADLINK Technology (France), Universidad de Malaga (Spain), IMEC (Belgium), Universidad Carlos III de Madrid (Spain), TU Delft (Netherlands).

**Source(s): IMDEA Networks Institute**

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## About us

**IMDEA Networks Institute, promoted by the Regional Government of Madrid, is a research organization on computer and communication networks** whose multinational team is engaged in cutting-edge fundamental science and technology. As a growing, English speaking institute located in Madrid, Spain, IMDEA Networks offers a unique opportunity for pioneering scientists to develop their ideas. IMDEA Networks has established itself internationally at the forefront in the **development of future network principles and technologies**. Our team of highly-reputed researchers is designing and creating today the networks of tomorrow.

**Some keywords that define us:** 5G, Big Data, blockchains and distributed ledgers, cloud computing, content delivery networks, data analytics, energy-efficient networks, fog and edge computing, indoor positioning, Internet of Things (IoT), machine learning, millimeter-wave communication, mobile computing, network economics, network measurements, network security, networked systems, network protocols and algorithms, network virtualization (software defined networks – SDN and network function virtualization – NFV), privacy, social networks, underwater networks, vehicular networks, wireless networks and more…

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