PROJECT FACTSHEET

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5G-EMIT

A data-driven network planning solution to recommend optimal deployment strategies and facilitate the adoption, compliance and sustainability of 5G in Luxembourg.

INSPIRATION

The deployment of 5G and beyond networks will by necessity involve the installation of new base station equipment to support the requirements of next generation mobile services. In a scenario where there are already many sources of Radio Frequency Electromagnetic Fields (RF-EMFs), including overlapping 2G/3G/4G technologies of competing network operators, there is growing concern that network planning, design and deployment operations will become increasingly complex.

The assessment of RF-EMF compliance has always been a major challenge for the deployment of new cellular communication technologies, as it requires matching the regulatory framework to new technical needs. In Europe, the regulations proposed by the International Commission on Non-ionizing Radiation Protection (ICNIRP) are used as framework for the deployment of new radio technologies. This expert group is formally recognised by the World Health Organization (WHO) and the International Labour Organization (ILO) and collaborates with several bodies, including the EU commission.

5G's use of active antenna technologies, such as massive MIMO (Multiple Input, Multiple Output) with precise beamforming, significantly overestimates the result of conventional exposure assessment approaches. In some countries like Luxembourg, where specific regulatory measures have been adopted, this could constrain or even prevent the deployment of new 5G radio technologies. There is therefore a challenge in finding and implementing new assessment methodologies and network planning solutions to ensure an optimised deployment of 5G infrastructures in accordance with current regulations.

INNOVATION

5G-EMIT aims to propose and validate a data-driven network planning solution to recommend optimal network deployment strategies, while considering RF-EMF limits and the various features provided by new 5G technologies. This decision support system will aim at facilitating the deployment, compliance and sustainability of 5G in Luxembourg. LIST's researchers have the ambition to create guidelines to implement new RF-EMF assessment methods and new deployment approaches using multi-objective optimisation techniques. In this context, a range of complementary aspects will be investigated, in order to consider scientific (e.g., new algorithms for evaluating emissions, simulations/emulation), technical (software, hardware) and standards and regulatory frameworks (e.g., eligible EMF exposure limits). The knowledge accumulated on this project, funded by the Department of Media, Telecommunications and Digital Policy (SMC) of Luxembourg, will also serve as an input to complement existing approaches and standards.

Throughout this project supervised by the Environment Agency (Administration de l'Environnement), the Ministry of Energy and Spatial Planning, the Ministry of Health, and the FNR, LIST's researchers will benefit from their strong expertise to develop a software simulation using optimisation models and new algorithms for evaluating emissions. The main use-case will cover connected mobility applications and their long-term evolution. Together with Proximus (acting as subcontractor), LIST will also get access to experimental test sites in Luxembourg for monitoring in near real-time, and with the help of IoT sensors, the behaviour, emission rate, as well as the characteristics of the base stations' context usage. The collected data will be incorporated to optimise the developed models.

IMPACT

5G-EMIT will not only provide significant advances on the current state-of-the-art of network planning, design and optimisation but will also develop innovative assessment methodologies considering the new technological features related to 5G's advanced antenna systems. As a support decision-making tool, the online software monitoring platform will provide a planer to predict the effect of specific deployment scenarios, as well as exposure predictions and estimates, all of which will be scientifically validated during the project. This national project will therefore be of high interest for operators eager to optimise the deployment of 5G infrastructures while meeting current regulations. The platform will also make it possible to automate specific procedures required for the deployment of equipment, such as Commodo requests (permit to operate). It is expected that the results of this project will also benefit other European countries by using Luxembourg as lead case study.

Partners

Proximus Luxembourg (subcontractor)

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