3rd party identity card

Project acronym/name	**6G-MOBKPI: KPI measurement in 6G networks under mobility scenarios**
Logo (if any)	**The project has no specific logo**
Organisation name(s)	**University of Vigo**

Objective, goal, use case

Reproducible experiments are crucial to ensure that results can be validated, replicated and compared. Experimental research on mobile networks faces additional challenges in terms of reproducibility, especially when considering dynamic scenarios involving user mobility.

The aim of the 6G-MOBKPI experiment is to design, develop and integrate a tool for the automated measurement of Key Performance Indicators (KPIs) of mobile networks under reproducible mobility conditions.

Concept, approach

We first designed the proposed solution, identifying and acquiring the required hardware equipment for the implementation, which includes the Boxie 2 autonomous mobile robot from Marvelmind Robotics, Raspberry Pi 5, Quectel RM510Q-GL 5G Modem and a power bank.

The designed solution was implemented, integrating the different hardware components and developing the required software modules, leading to the first proof of concept of the complete solution. We defined the metrics to be captured both on the radio level, such as cell ID, RSSI, RSRP and RSRQ, and also end-to-end network level Key Performance Indicators (KPIs) such as Round Trip Time (RTT) latency, packet losses and throughput. Our implemented tool captures these metrics, along with the robot position, and saves them in permanent storage, generating time-series datasets with location information.

We did some initial tests on our local facilities at the University of Vigo, using our private 5G network testbed, which allowed us to validate the proper behavior of the tool. Then, the proposed tool was validated and integrated in the Málaga platform provided by the 6G-SANDBOX project. Different mobility patterns have been explored, involving both indoor and outdoor scenarios, with handovers taking place. These final tests, let us verify that the proposed tool satisfies the objectives set at the beginning of the project, being able to execute reproducible-mobility experiments in mobile networks for dataset generation.

Results (testing, validation) and Impact

The main result is the design, development and validation of the automated KPI measurement tool for mobility scenarios. The generated datasets with KPI measurements and location information are also a valuable result, which we have used to analyse the suitability of specific 5G setups to support IIoT use case applications. Moreover, we used the proposed tool to study the impact of handover on network KPIs, and identified some limitations of current handover algorithms to guarantee low latency and ensure network availability, which are critical for IIoT scenarios.

Finally, as a side result of this experiment, we submitted a conference paper, in collaboration with the University of Málaga, describing our proposed solution for enabling reproducible-mobility experiments in mobile networks, which will be presented at the 2025 EuCNC conference.

This tool is an excellent element to be integrated into the 6G-SANDBOX platform, since it enables the execution of mobility-related experiments in an autonomous, programmable and reproducible way.