A modular small-scale platform for experimentation over mobile networks

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I. MOTIVATION

At the dawn of the 5G era, a lot of effort has been allocated from the research community (especially in the research projects under the 5G PPP umbrella) to the development of 5G experimentation platforms around Europe. The major objective of those platforms is to facilitate the validation of the 5G performance and allow vertical industries to test their services (and even upgrade them or develop new ones based on the new capabilities that 5G brings). The rationale behind this intense activity is also originated at technologies like network function virtualization that made feasible the softwarisation of the full chain of the functionality of a mobile network (as for example the OpenAirInterface-OAI software). In this context, a portable platform that enables experimentation over a small-scale mobile network infrastructure is proposed. The key advantages of the platform are its modular set-up at the infrastructure level, the integrated testing automation capabilities, and the experimentation formulation using well defined test case descriptors and slice templates.

II. THE PLATFORM

The platform abides by the architectural principles defined in the 5GENESIS project[1], and refers to the integration activities conducted towards realising the 5GENESIS portable demonstrator[2]. The added value of the platform is summarized below:

Modular set up: Three separated and well interfaced layers for the three major functional components (Figure 1), namely infrastructure, management and orchestration, and experiment coordination. This allows the flexible update/change/expand of the platform. It also enables i) the potential for use case-specific configuration, and ii) the use of portable infrastructure components (for demonstration in events or on side testing).

Openness and automation: Opensource software components (i.e., the OAI) have been adopted to implement the mobile network functionality (RAN and core network functions). Also, all the management and coordination layer features are either openly released by 5GENESIS project or online available, such as the OpenTAP from Keysight. The strategic selection of the

open TAP enables automation capabilities for the experiments. This guarantees accuracy and reliability of the measurements since multiple experimentation scenarios can be repeated under the same conditions.

Experiments formulation. In addition to the developments and the integrations conducted, a lot of effort has been allocated in order to facilitate the experimenters on the procedure of running an experiment. To this end the information required for running an experiment has been formulated. The formulation led to a set of useful templates that an experimenter should refer to, as well as a pool of available predefined tests.
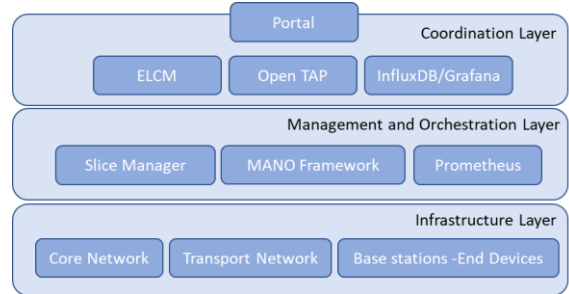

Figure 1: The thee-layer architecture of the platform

III. DEPLOYMENT VIEW

To facilitate platform's portability and the feature of "on-site testing", the experimentation platform is realized with small-form factor PCs and laptops, while all the software and tools are onboarded, in order to be self-contained and autonomous. However, the potential of connecting the experimentation part of the platform with other infrastructures is not excluded. This potential could enable new demonstration scenarios not foreseen so far. Figure 2 depicts the physical components of the proposed experimentation platform.
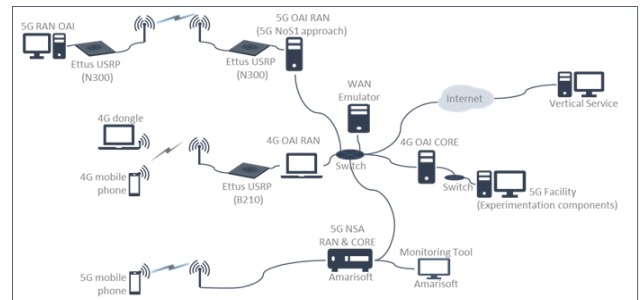

Figure 2: Physical layout of the platform

[1]5GENESIS Consortium, "D2.1," September 2018. [Online]. Available: https: https://5genesis.eu/wp-content/uploads/2019/12/5GENESIS_D2.1_v1.0.pdf

[2]5GENESIS Consortium, "D4.17," January 2020. [Online]. Available: https: https://5genesis.eu/wp-content/uploads/2020/02/5GENESIS_D4.17_v1.0.pdf