Summary of the PhD thesis **"Slicing in 5G-NR (gNB) access layer"**
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This thesis addresses both academic and experimental system research toward the future 5G-NR (gNB) access layer as well as their interworking with the evolved LTE (eLTE) and next generation service-oriented core networks (NGC). It focuses on "network slicing", i.e. a transition to a flexible radio access network (RAN), in order to meet user demands in a dynamic and distributed manner. This also leverages several benefits for the mobile network operator in terms of increased capacity, densification, reduced costs, ease of deployment, to name a few.

Main pillar of the thesis will be the envisioned cloud-RAN (C-RAN). In this setting, the RAN as well as the core network are seen as virtualized services running partially or fully in the cloud. The mobile network consists of remote radio units (RRU, "light-weight" base stations) at the network edge and baseband units (BBU) in central data centers. They may run on commodity hardware or partially being accelerated (e.g. for computationally intensive physical layer functions) while leveraging network function virtualization (NFV) which, as the name says, virtualizes the different functional entities in the network.

This virtualization brings the previously mentioned advantages, as new network functionality can be easily instantiated, updated and changed. Through a higher degree of centralization, the different parts of the network can be more easily coordinated, without being constraint to this. Additional technological approaches, as software-defined networking (SDN) and mobile-edge computing (MEC), are driving factors of this development.

In particular, the thesis centers around the flow-based quality of service (QoS) management at the access layer (the newly introduced SDAP layer), data-flow aggregation, radio resource allocation and management algorithms and policies. Four network slice categories, namely massive multimedia broadband (mMBB), ultra-reliable low-latency communications (URLLC), massive machine-type communications (mMTC), and best effort, will be considered when designing the above methods and algorithms.

Furthermore, 5G is expected to make use of higher frequencies (above 6 GHZ) to counter the increasing spectrum scarcity and use previously under-utilized resources. Due to the specificities of this frequency range like increased path loss, lowered wall penetration, short-range communication, it is assumed that a 5G's gNB will use beamforming as its main mode for transmitting directly to the user. In order to reflect this, slice-aware MAC scheduling and resource allocation, taking in account different numerologies and sharing models (UL, and potentially DL between eLTE and 5G-NR), will be studied.

It is planned to evaluate the performance of the envisioned methods and algorithms both in Matlab and the OpenAirInterface (OAI) software-defined radio platform. Experimentation and validation will be done through emulation and real experimentations in a small scale deployment at EURECOM open5G Lab (a living test bed).

Two general approaches for setting up slices will be studied: user-centric and network-centric. In a user-centric view, the user decides about resources he wishes to be allocated to him (e.g. by providing a manifest outlining the different required functionalities). In this scenario, the impact of net neutrality will be considered. To this end, literature about approaches in wired communications might prove useful. In a network-centric view, the operator intends different slices for user with differing requirements. In this way, he can tailor his network for demands he anticipates for his user classes.

During the thesis, at least two publications in conferences as well as a one or two publications in a journal of the working domain of the thesis are planned. Additional publications/posters/demos in workshops and conferences will be done opportunistically.