Towards Stress Testing Open5GS Core (UPF Node) On A 5G Standalone Testbed

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Abstract

The global market for 5G technology has been experiencing significant growth and is expected to continue expanding rapidly in the foreseeable future. In 2020 alone, more than 225 million 5G smartphones were sold worldwide. This trend urges network operators to investigate and assess the readiness of their existing and planned 5G network infrastructure to effectively serve the increasing number of 5G subscribers. Among the various components of a 5G mobile network, the User Plane Function (UPF) within the core network plays a crucial role in determining its performance. As a result, it is essential for both network equipment vendors and operators to evaluate the performance of their UPF ecosystem. This research paper takes an initial step towards profiling UPF performance by employing stress testing procedures. The primary performance metric measured in this study is the CPU utilization of a UPF Network Function under different levels of network traffic. We leverage open-source 3GPP-compliant 5G New Radio stack by UERANSIM and a Core Network implementation by the Open5GS project. Our results show that the Open5Gs UPF implementation can achieve up to 200 concurrent data connections using only 17 % of the virtual machine's CPUs and 200 control traffic connections using only 15% of the same CPUs.