Demo: Plug & Play Network Application Chaining for Multi-Service Programmability in 5G RAN

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ABSTRACT

RAN slicing is one of the key enabler to enable virtualization of a BS and its delivery as a service with different levels of network isolation and sharing so as to accommodate the needs of mobile network operators and verticals. In this demonstration, we show a prototype of a RAN slicing runtime system to enable flexible slice customization on the top of a disaggregated RAN infrastructure [1] with different levels of isolation and sharing in terms of resources and network functions, while retaining the quality of service (QoS) for different slice instances. Furthermore, a novel plug & play network application chaining framework empowered by a network software development kit (SDK) is demonstrated to show how the multi-service programmability on per-slice basis can be achieved. Our demonstration is based on the OpenAirInterface [3], Mosaic-5G FlexRAN [4] and LL-MEC [2] platforms. Finally, we highlight how the the proposed approach can be extended to an end-to-end network slicing scenario.

1 DEMONSTRATION

The proposed demonstration has the following goals:

- To show how the RAN runtime slicing system enables the dynamic creation of slices with quality of service (QoS) support, while providing functional and resource isolation among different slices (e.g., verticals).
- To highlight the efficiency and flexibility of the proposed RAN runtime to partition and allocate radio resources among different slices based on the QoS requirement as well as the corresponding service level agreement (SLA).
- To demonstrate a novel plug & play (P&P) execution environment for network control applications running on the top of the platform software development kits (SDKs) so as to customize and control the RAN programmability as per slice requirements.

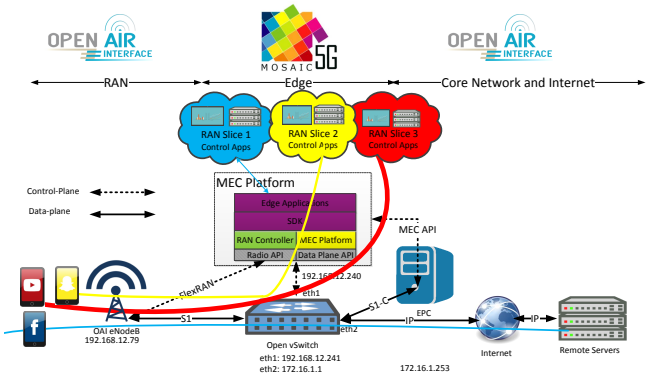

Figure 1: Multi-service programmability demo setup

We will use the testbed setup illustrated in Fig. 1, including three commercial smart phones, three Intel-based mini PCs (Intel i7, 3.4GHz processor with 8GB RAM) and 1 Ettus USRP B205 software-defined radio (SDR). The SDR is connected to one of the PCs, over which the eNodeB (eNB) data plane and the RAN runtime is deployed. The RAN runtime communicates through an OpenFlow-enabled open virtual switch (OVS) to the multi-access edge computing (MEC) node, where the network control application chains of three RAN slices are deployed. Each slice-specific chain is deployed in the form of P&P virtual network functions on the top of MEC platform, running isolatedly between each other. The eNB also communicates with the third PC, which acts as an evolved packet core (EPC) and home subscriber server (HSS) shared among all three RAN slices.

MobiSys '18, Munich, Germany
 ACM ISBN: 978-1-4503-5720-3/18/06…$15.00
DOI: 10.1145/3210240.3211116

REFERENCES

[1] C.-Y. Chang et al. 2018. Slice orchestration for multi-service disaggregated ultra dense RANs. *IEEE Communications Magazine* (2018).
[2] A. Huang et al. 2017. Low Latency MEC Framework for SDN-based LTE/LTE-A Networks. In *IEEE International Conference on Communications Conference (ICC '17)*.
[3] N. Nikaein et al. 2014. OpenAirInterface: A flexible platform for 5G research. *ACC SIGCOMM Comput. Commun. Rev.* (2014).
[4] X. Foukas et al. 2016. FlexRAN: A Flexible and Programmable Platform for Software-Defined Radio Access Networks. In *Conference on Emerging Networking EXperiments and Technologies (CoNEXT '16)*.