Embracing Openness and Disaggregation: Our Journey with OpenRAN@Brasil

The evolution in network function virtualization, driven by market and regulatory demand seeking more openness and interoperability within Radio Access Networks (RAN) for next-generation cellular networks, motivated the introduction of Open RAN. This innovative framework, comprised of cutting-edge standards, protocols, and open-source software components, addresses the evolving demands of the industry. This openness aims to democratize parts of the telecommunications network and thus not depend on large telecommunications equipment manufacturers, allowing reduced costs and dependency on large manufacturers. The Open RAN architecture combines modular base station software with off-the-shelf hardware, assigning baseband and radio unit components from single vendors for seamless interoperability, whether there are virtualized/disaggregated RAN elements or not.

Co-executed by the National Education and Research Network (RNP) in Brazil and the Centro de Pesquisa e Desenvolvimento em Telecomunicações (CPQD), the OpenRAN@Brasil Program is the largest research, development, and innovation program in the field of open and disaggregated radio access networks in Brazil. In the first of its three phases, we are providing an open-source experimentation platform for the control and management of programmable network infrastructures composed of open and disaggregated equipment, i.e., built from the integration of multiple components supplied by different hardware and software manufacturers. The tesbed provides different experimentation capabilities, such as 5G, programmable networking, resource slicing, artificial intelligence, and services orchestration, among many other technological domains related to the open RAN stack. Currently, six working groups were selected through an open call initiative for academia and are actively engaged in crafting innovative solutions using the program's testbed.

Its second phase is developing a 5G radio unit that adheres to the requirements defined by the O-RAN Alliance (O-RU 5G) for use in macrocells in the sub-6GHz band, achieving a major milestone in terms of research, development, and innovation in the technological components of the open RAN architecture. The O-RU 5G will feature low cost, high programmability, and serve relevant niche markets relevant for the development of the country. The second phase also addresses RD&I in the intelligence layers of the Radio Intelligent Controller (RIC) and the cybersecurity aspects of Open RAN, with the first xApps and rApps already under development.

Finally, the third phase of OpenRAN@Brasil focuses on expanding the testbed to all regions in Brazil. Designing and deploying additional sites covering all regions in Brazil (south, middle-west, north, and northeast) is a major challenge and a key activity to engage more ICTs and startups with the program. We aim to integrate the 5G radio units developed during the second phase in the testbed expansion of the third phase. The program will also promote open calls for both ICTs and startups, offering potential funding and access to the testbed, allowing them to evaluate their research, propose improvements to the infrastructure, and validate new applications and business models, among other key activities for open RAN research and innovation.

The TNC audience will delve into the challenges faced by the OpenRAN@Brasil Program, especially regarding the building of the nationwide open RAN testbed, a resource offered to the industry, government, and academia for experimentation. We want to share our experience so far with state-of-the-art technologies over the two years of the program's existence. The audience will also learn how to get involved with the program and the ways to prospect partnerships with other testbeds available nationally and internationally. We will also present the evolution of the research performed by the working groups regarding innovative applications and solutions for open RAN and our experience in building open calls for working groups.