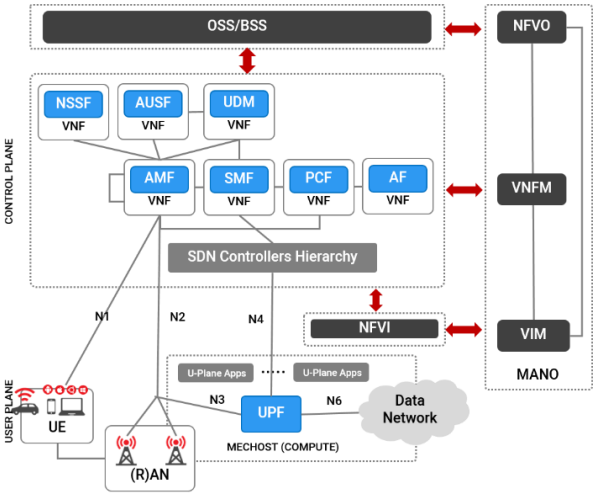
ABotEdu

An innovative 4G/5G/O-RAN Test Bench

By Rebaca Technologies

ABotEdu can be a great facilitator for any establishment **teaching or researching 5G** and related technologies. It can emulate any Network Function and has a plethora of sample call flows - **3GPP conformance, Interoperability in disaggregated architectures**, and **Performance Benchmarking.** ABotEdu has AI-driven **advanced call flow analytics** with **Root Cause Analysis** for debugging and KPI level analysis with insight. **Extensive REST API** to all the features of ABotEdu will enable integration with any 3rd party application.

We at Rebaca **believe in innovation and facilitating research institutes, labs, and consortiums**. Rebaca's flagship product ABot is very **active in Open source initiatives** and ABot is used in various such integration demos. The customized educational version of ABot, ABotEdu, is meant to facilitate learning and short term critical projects on **communication and wireless networking for the research community**. Our **offers are catered** to educational, research labs, Govt. institutes and non-profit entities.



ABotEdu is a **plug-and-play 5G emulation platform** on **VM or cloud environment** for the universities to provide hands-on experiments on 5G network configurations based on **3GPP** or similar such specifications. One can set up use-cases such as **network slicing, CUPS, massive bandwidth and ultra-low latency use-cases** with different application traffic. ABotEdu enables **emulation of a 4G, 5G NSA, 5G SA, or CIoT network in a lab** and analysis of the network protocols and interfaces. Its lightweight network protocol stacks **can be installed on VMs, edge networks or IoT platforms**. It **comes with a variety of ready to use 4G/5G 3GPP compliant test cases including ORAN** related scenarios for end-to-end simulation. These test cases are written in **domain-specific English like user friendly language** for easy understanding, modification and enhancements. The test artifacts are **classified, correlated and saved in a Data Lake** for easy harvesting by any type of application.

Features:

- Sample Call Flows: Functional, E2E, and Performance
- Live test Execution dashboard
- Execution Call Flow Ladder Diagram generation with PCAP and Log message overlay
- Result Analytics Dashboard: 3GPP Procedure & Scenario use cases identification, failure analysis, Mobility statistics, etc.
- KPI Canvas: Canvas for various KPI monitoring (NF, Mobility and NFVI)
- Execution Evaluation: Report comparing two executions
- Scenario Authoring: AI enabled supervised test case authoring environment
- ABot Micro-Services: Micro-service based 5G Network Functions and Analytics features allow flexible network configuration, scaling, analyzing and generating KPI visualizations
- Individual workspace: enrolment, account, and automated report generation

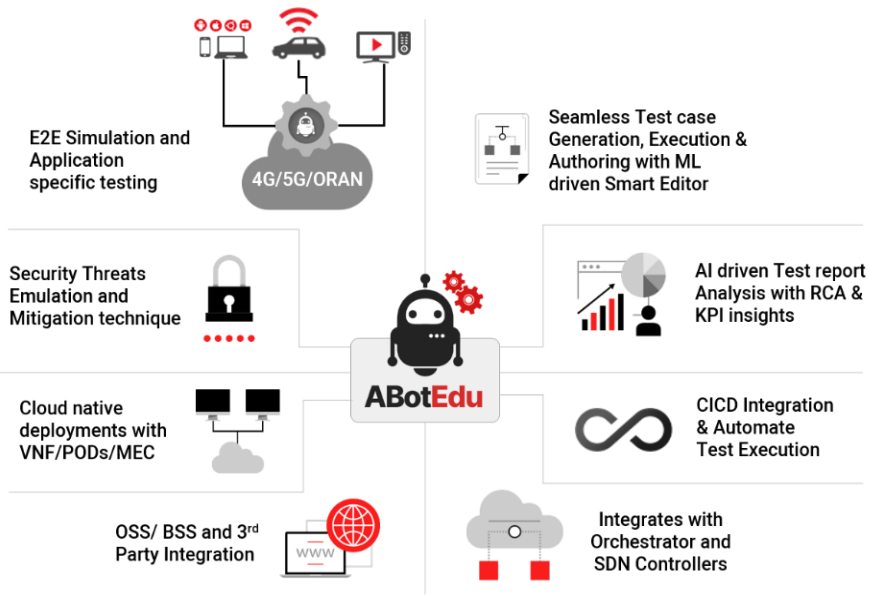
Options:

4G Lab	5G Lab	Open RAN Lab
EPC emulation and 4G 3GPP compliant Call Flows	All 5G NF emulation and 5G 3GPP compliant Call Flows	CU-DU emulation and ORAN specific Call flows

ABotEdu Package:

5G Lab Course:

A comprehensive environment for the students to learn about 5G associated procedures from scratch. 3GPP defined Call Flow are available, along with visualization of message sequence and IE (Information Element) exchange to help build familiarity with the specification. Students can create new call flows for different scenarios, execute them and analyze. Configuration capability of ABotEdu and its extensive REST API enables integration with components like SDN Controllers, Orchestrators, and various Container-based frameworks. Students can experiment with simulated use-cases related to latency, bandwidth requirement, speed, mobility, energy efficiency, data security, etc. with different Slice/Service Type based video/application traffic and classification.



5G R&D:

ABotEdu offers the ability to simulate different network conditions, capture data and analyze them for various types of experiments and applications. Service chaining is possible through integration with SDN, Orchestrators and other security virtual functions, such as DDOS, IDS, and IPS. The canvas facility of the ABotEdu test bench enables capturing of real time execution data and presentation. Both CP (Control Plane) and UP (User Plane) call flows can be created to emulate security attacks in the network including denial of service attacks, man-in-the-middle attacks, etc. It provides the ability to create various network configurations involving Radio Access Network, Mobile Edge Computing, over data plane, control plane, user plane, applications layer, etc. and study its properties.

Possible Projects:

1. Vulnerability of a fully virtualized network: Emulate call flows on ABotEdu, validate against different traffic rate and type, apply synthetic traffic, observe KPI behaviors, modify network configuration using Orchestrator API. Use various services of ABotEdu for project test bench.
2. SDN Controller vulnerability to attacks: Use the monitoring capability of ABotEdu to analyze device attacks, control plane threats, API attack, use orchestration capabilities of ABotEdu to incorporate closed loop automation to scale up and scale down the network functions in the event of performance overload.
3. Autonomous Network: Design closed-loop automation system over a 4G or 5G network using ABotEdu, Orchestrator and SDN controller to detect attacks, send alerts and build mitigation models.

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