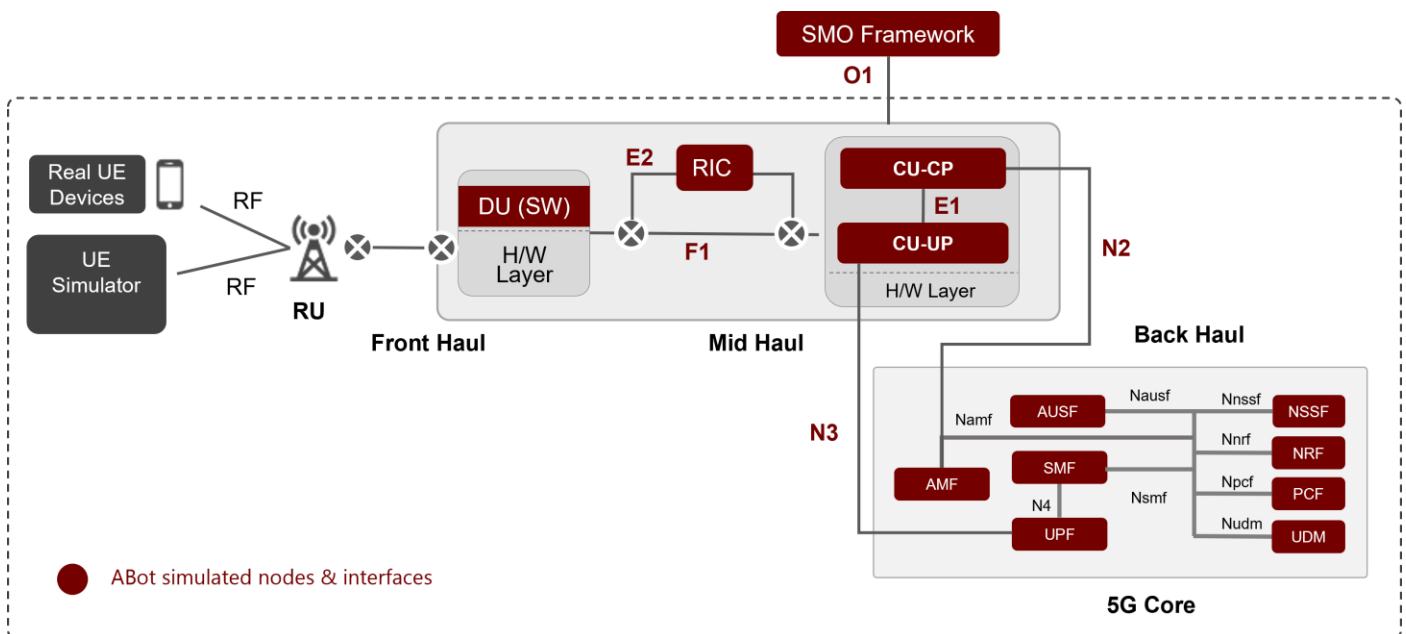




# Comprehensive 3GPP defined validation of 4G/5G/ORAN stacks with ready to use test cases, AI- driven analytics and ease of automation

ABot emulates, validates, and helps to troubleshoot and analyze telecom interfaces and nodes which can be PNF, VNF, or CNF. It can simulate the 5G SBA Core Network Functions and the gNodeB N1/N2 interface. It can simulate relevant 4G/5G protocols like S1AP, NAS, NGAP, GTPv1u, GTPv1c, Diameter, PFCP, GTPv2, and HTTPv2. ABot supports 3GPP split RAN architecture and validates the F1, E1, E2, and O1 interfaces. It can emulate gnb-DU, gnb-CU (CU-CP and CU-UP), and SMO. It supports ORAN protocols like F1AP, E1AP, E2AP, and NETCONF.

ABot can generate various types of traffic, including video, to validate 5G slicing use cases. It is capable of simulating Gbps level traffic with a huge number of simulated devices.



## No scripting or programming is required for ABot’s plug-and-play use case specific test cases written in English-like domain-specific language (DSL)

ABot’s DSL-based test cases along with a 3GPP-aware SmartEditor are ideal for rapid resource on-boarding and making them productive for testing. ABot test cases can be used in unit testing, development testing, system integration, interoperability, conformance, and performance testing. ABot supports standards-compliant test cases for 5G Standalone, 5G Non-Standalone, NG-RAN architecture, and different ORAN WGs.

```

When I send X2AP message X2_SGNB_RECONFIG_COMPLETE on interface Xx with the following details from node eNodeB1 to gNB
parameter
| menb_ue_x2ap_id.enb_ue_x2ap_id | value
| sgnb_ue_x2ap_id.enb_ue_x2ap_id | incr(1001,1)
| resp_info.choice_resp_type.config_successfully_applied.menb_to_sgnb_container | incr(2000,1)
| resp_info.choice_resp_type.config_successfully_applied.menb_to_sgnb_container | 0000

Then I receive and validate X2AP message X2_SGNB_RECONFIG_COMPLETE on interface Xx with the following details on node
parameter
| menb_ue_x2ap_id.enb_ue_x2ap_id | value
| sgnb_ue_x2ap_id.enb_ue_x2ap_id | {string:eq}(incr(1001,1))
| resp_info.choice_resp_type.config_successfully_applied.menb_to_sgnb_container | {string:eq}(incr(2000,1))
| resp_info.choice_resp_type.config_successfully_applied.menb_to_sgnb_container | {string:eq}(0000)

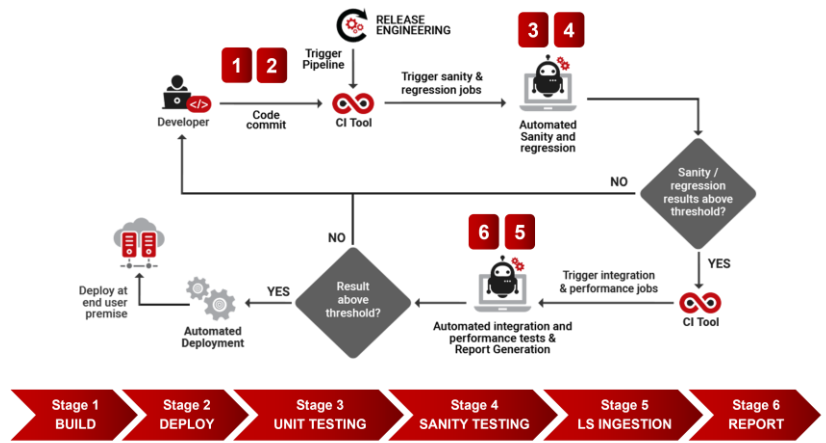
When I send X2AP message X2_SN_STATUS_TRANSFER on interface Xx with the following details from node eNodeB1 to gNodeB
parameter
| new_enb_ue_x2ap_id.enb_ue_x2ap_id | value
| old_enb_ue_x2ap_id.enb_ue_x2ap_id | incr(3001,1)
| e_rabs_subject_to_status_transfer_list.e_rab_id | incr(1001,1)
| e_rabs_subject_to_status_transfer_list.e_rab_id | 5
| e_rabs_subject_to_status_transfer_list.ul_count_value.count_value.pdcp_sn | 1
| e_rabs_subject_to_status_transfer_list.dl_count_value.count_value.pdcp_sn | 1
| e_rabs_subject_to_status_transfer_list.ul_count_value.count_value.hfn | 2
| e_rabs_subject_to_status_transfer_list.dl_count_value.count_value.hfn | 2

Then I receive and validate X2AP message X2_SN_STATUS_TRANSFER on interface Xx with the following details on node gNB
parameter
| new_enb_ue_x2ap_id.enb_ue_x2ap_id | value
| old_enb_ue_x2ap_id.enb_ue_x2ap_id | {string:eq}(incr(3001,1))
| e_rabs_subject_to_status_transfer_list.e_rab_id | {string:eq}(incr(1001,1))

```

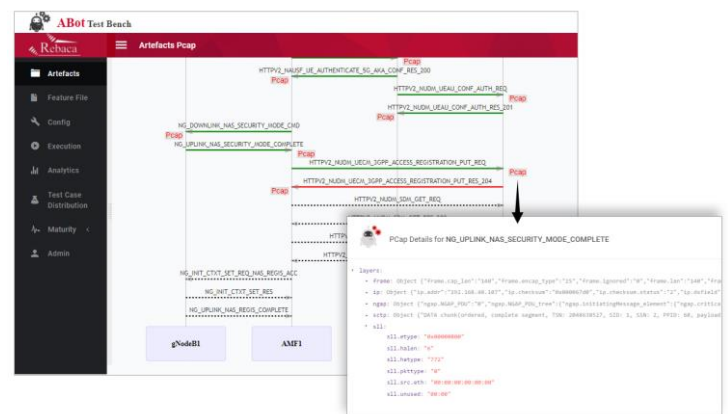
## ABot is cloud-native, software-only & hardware agnostic thus easy to scale and deploy on various configuration

The containerized, lightweight emulated stacks of ABot are conducive to the Edge network's use case validation. It can be deployed in various configurations and orchestrated to simulate any topology. It seamlessly integrates with any cloud orchestrator like Jujju, Openshift, ONAP, Kubernetes, etc. ABot REST API can be used to integrate with Orchestrators, Northbound OSS/BSS solutions, and CI/CD engines. Its comprehensive test suites, traffic generation capability, and automated execution analysis greatly facilitate continuous test assurance.



## ABot can simulate different security threats, analyze them, and help to plan a mitigation model

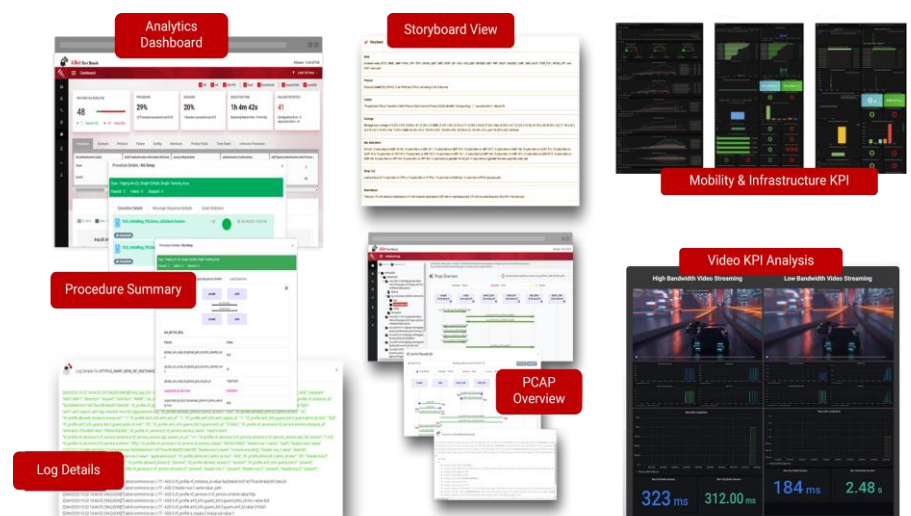
ABot can identify and simulate different security threats of the 5G network and help to plan the mitigation & threat model. ABot can simulate network attacks like DoS, Man in the middle, IP spoofing, MEC/Slicing-related attacks, fake base station / IMSI catcher, and API-specific attacks. It helps to understand the business impact of each attack, model for each threat, detect the anomaly, and monitor the network health and overall vulnerabilities on the go.



## ABot is a continuous test assurance engine, it can analyze test results, enable troubleshooting and do Root Cause Analysis.

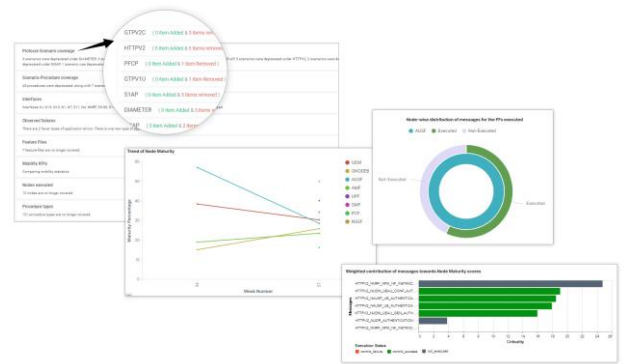
All test execution data are ingested into an Elastic DB which ABot Analytics engine processes to provide data insight using AI-driven ML algorithms. An interactive dashboard enables deeper analysis of the execution data provides:

- Pass/Fail statistics of the Feature Files (test cases) executed.
- Failure analysis for the feature file, test authoring error, configuration error, or application failure
- Nodes, Protocols, and Interfaces covered and their associated configuration
- A ladder diagram representation of the call flow is provided
- Sort and analyse PCAP and log files by interfaces on the call flow
- 3GPP Procedures and Scenario covered by the execution data and its maturity statistics
- System-level KPIs, Container and Mobility statistics presented graphically
- Story-board representation of test cases executed



## Know the best possible release combinations with ABot's Maturity Trend Analysis

ABot's Maturity trend analysis reports provide build by build analysis of the product maturity by processing the test execution data. Detailed reports of Interfaces, Protocols, Mobility characteristics, and the Nodes tested are provided through an interactive dashboard for easy navigation. A graphical representation of the node maturity is provided with maturity scores based on the pass/fail analysis of the messages and their criticality based on the use cases verified.



## ABot is comprehensive, easy to deploy and use

ABot can be installed on VMs or as containerized micro services. It comes built in with UI for configuration, test case authoring, test execution, artefacts analysis, and an analytics dashboard. All the functions of ABot are available through REST API for integration with other frameworks. The entire test cycle can be automated using the ABot framework and any CI/CD engine.

ABot can be licensed Perpetually, Quarterly or as a Service (pay-as-you-go) in various VM and Cloud configurations.

## The high-level classification of test cases is given below –

### 5G SA Test Cases as per ETSI 3GPP Specification 23.501

- 5G Standalone Registration/Deregistration Procedures
- N1/N2 Procedures
- Security Procedures
- 5G Standalone Emergency Registration Management
- 5G Standalone Service Request, AN release & Paging Procedures
- 5G Standalone Session Management Procedures
- 5G Standalone Emergency Session Management Procedures
- 5G Handover Procedures
- 4G- 5G Interworking Procedures
- 5G Network Function Service Framework (NEF) & NRF Procedures
- 5G Data Plane Traffic Testing
- 5G Dynamic Slice Selection Procedures with video traffic
- 5G Conformance procedures
- 5G Application specific use case testing
- ..... and many more

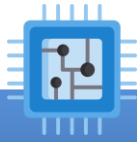
### 5G NSA & ORAN Test Cases Catalogue 5G NSA

- MN initiated SN Modification
- Initial Registration by DCNR capable UE
- SN initiated SN Modification with MN involvement
- MN/SN initiated Secondary Node Release
- MN/SN initiated SN Change
- Activity Notification

### ORAN

- F1 Startup Cells and Activation.
- UE Initial Access with data flow
- NSA mode of operation in split RAN
- Handovers
- RRC state transition use cases & reestablishment
- Multiple TNLAs
- Bearer context management procedures
- UE context management procedures
- RIC integration use cases
- SMO related procedures
- ....and many more

## All in one package for 4G/5G/ORAN/CIoT validation designed for:



### OEMs

- In-depth functional, performance & conformance validation of 4G/5G/ORAN Stacks
- Plug & play 3GPP4G/5G, ORAN and CIoT test cases
- No scripting needed for test case authoring or modification
- Cloud native, vendor neutral deployments with zero touch provisioning
- End to end 4G/5G (NSA+SA)/ORAN NF simulation
- SMO support with O1 Plane & RIC integration
- 5G application testing & private 5G validation with dynamic slicing and video



### Network Operators

- Failure detection, root cause analysis & advanced analytics support for bug-free deployments
- KPI generation from various layers for deeper analysis
- MEC Use case validation
- Rapid Release validation with CI-CD-CT
- Extensive REST API for seamless integration with other frameworks and applications
- Maturity trend analysis across different releases
- Metaverse readiness & industry 4.0 use case validation



### System Integrators

## About Rebeca Technologies

Rebeca Technologies is a niche solution provider in the Telecom and OTT video streaming domain. We have been delivering customized high-tech solutions & services to the industry leaders since 2002. We provide software development and test automation services for Video Delivery, Video Consumption, and 4G/5G/ORAN domain.



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