

CuSIM: O-CU Emulation Solution

For O-DU testing over F1 interface

Capturing the Promises of Dis-Aggregated 5G RAN

With O-RAN dis-aggregated architecture, three distinct components emerge, the radio unit (O-RU), the distributed unit (O-DU), and the centralized unit (O-CU). O-RAN open interfaces facilitate multi-vendor networks deployments, enabling a more competitive supplier system, thus introducing a strong demand for conformance, interoperability, and performance testing for all these components.

Keysight helps network equipment manufacturers, as well as mobile operators, in simplifying the interoperability challenges among multiple vendors to test the split architecture.

CuSIM is a O-CU emulator to validate O-RAN O-DU and gNB functionality, performance, and conformance over the Higher-Layer Split midhaul interface (F1 interface).

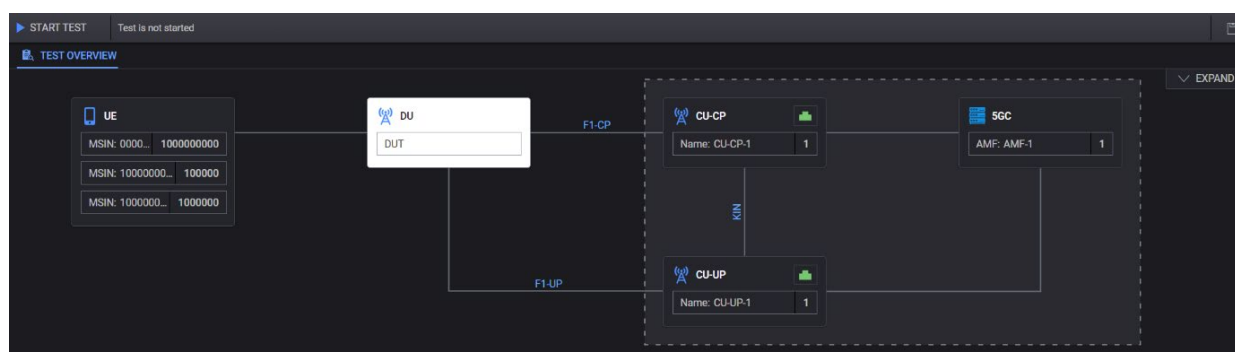


Figure 1. O-CU Emulator graphical user interface

CuSIM Overview

Highly scalable, CuSIM can support hundreds O-DUs and is targeted to O-DU and gNB vendors who want to test the scalability of their architectures. This virtual solution (with Keysight specialized hardware optionally available) supports the CU-UP/CU-CP split and O-DU wrap-around testing using RuSIM or UeSIM.

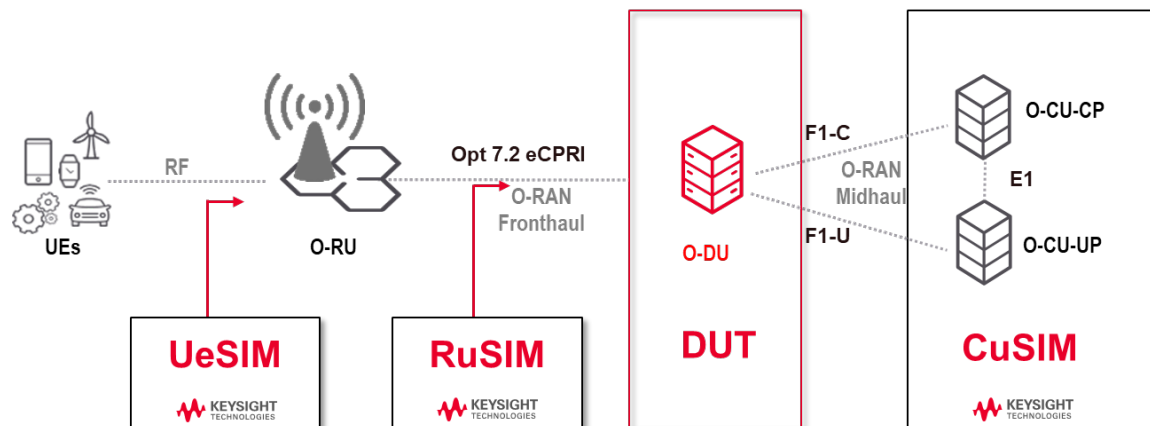


Figure 2. CuSIM testing reference topology.

CuSIM supports full automation via REST APIs, allowing users to create regression test plans for continuous validation of product quality.

Key benefits

- Designed for O-DU testing over F1 interface, modeling complex subscriber behaviors and application traffic flows.
- Runs in lightweight VM on standard COTS hardware, or as container in public/private cloud.
- Performance, Capacity Testing with Cloud Native platform that supports vertical and horizontal scaling to achieve control and user plane test objectives.
- Can be used together with UeSIM or RuSIM for a complete O-DU wraparound test.

Keysight O-RAN Midhaul Interface Validation

CuSIM emulates the O-CU over the F1 interface, including the C-plane/U-plane split. It's the perfect companion to accelerate O-DU validation over the midhaul interface. When deployed together with RuSIM or UeSIM, it enables O-DU wrap-around testing.

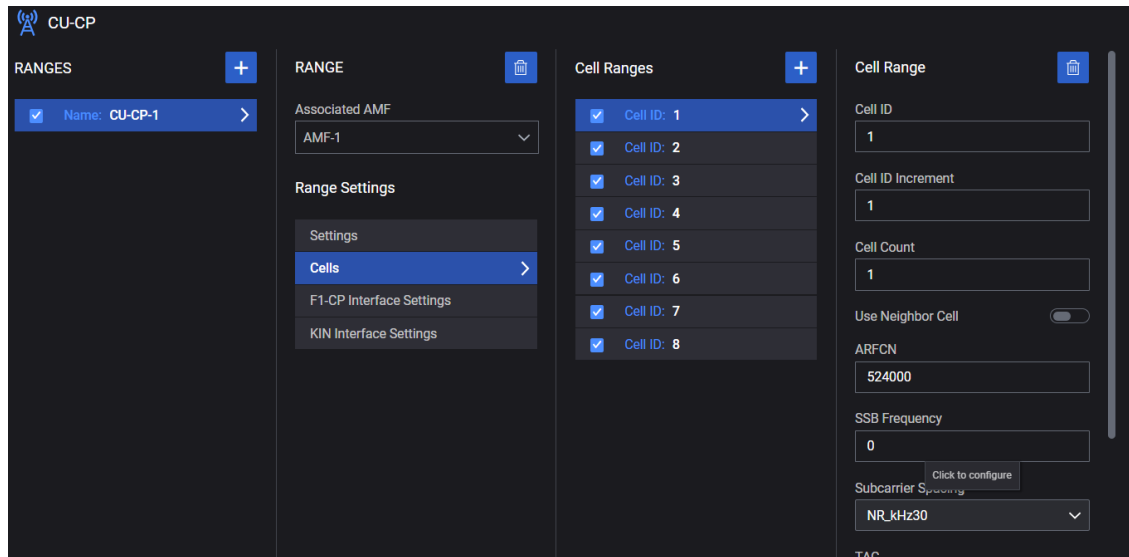


Figure 3. Keysight CuSIM Cell Configuration

User has access to comprehensive KPIs in real-time during test execution with user-configurable views. All statistics are also available after the test is concluded in CSV format for post-processing.

Product capabilities

- Validate O-RAN O-DU functionality, performance, and conformance over the F1 interface, with PDCP, RRC, NAS stateful protocol functionalities at O-CU and 5G Core simulation.
- Support for multiple O-DUs and thousands of UEs' sessions
- Solution support for both Virtual Machine and Container approaches (with Keysight hardware optionally available)
- Support of realistic traffic mixes including using built-in traffic generator or IP passthrough option
- Quality of Experience metrics: real-time statistics with user-configurable views and post-processing data in CSV format
- IPv4/IPv6 Support for F1-C and F1-U
- Message capture on control plane interface F1-C and F1-U
- Support for HTTP/FTP/HTTPS/UDP traffic
- Jumbo frames support for user plane traffic
- Negative testing scenario using impairment capability.
- Support for Passthrough mode allowing IP traffic injection.
- Can be used as a standalone test tool or in combination with other Keysight O-RAN test solutions.
- Topology-driven User Interface

- Full automation via OpenTAP platform. Integration with other systems using REST APIs. Complete documentation and samples available
- Keysight hardware optionally available for on-prem installation. Multiple NIC types and speeds supported (10G/25G/100G)

Keysight Open RAN Simulators Cloud Edition

CuSIM runs on top of the Keysight Open RAN Simulators infrastructure, a cloud-native platform which allows multiple Keysight products to run in parallel (CuSIM, DuSIM, CoreSIM and LoadCore). This test solution provides seamless integration on the same infrastructure as the Device Under Test (DUT), sharing the same look-and-feel and functionalities across all products. The Keysight Open RAN Simulators platform can accommodate any type of cloud – public or private – via the deployment of containers or complete Virtual Machines (VMs).

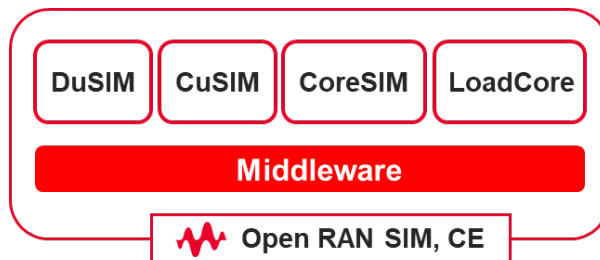


Figure 4. Keysight Open RAM Simulators Cloud Edition

One user interface for the different O-RAN and Core testing needs

The Keysight Open RAN Simulators user interface is common across the different products of the Keysight O-RAN testing portfolio, both virtual and hardware-based, enabling end-to-end testing from a single common user interface.

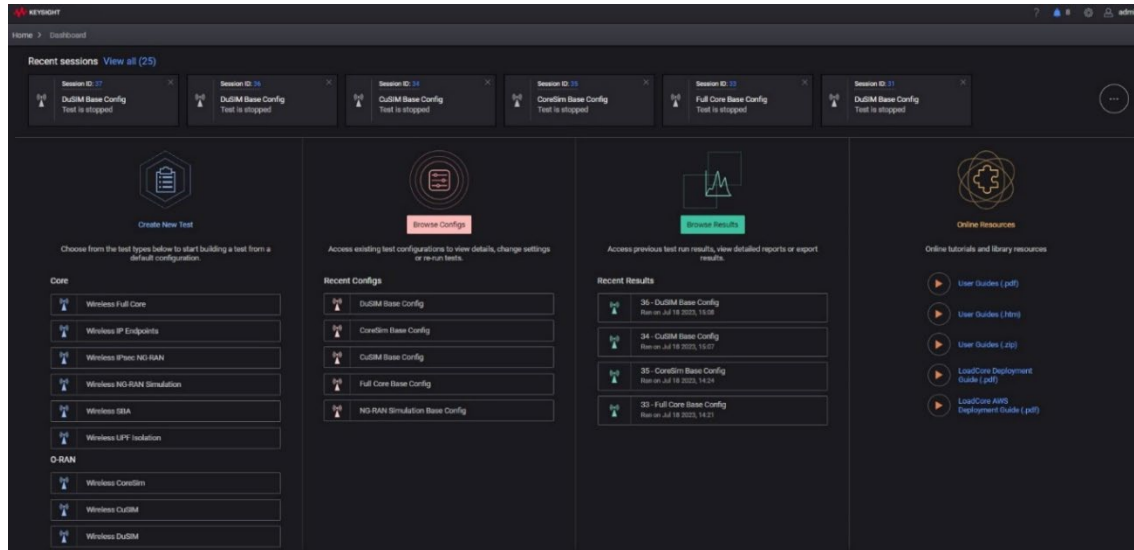


Figure 4. Keysight Open RAM Simulators Cloud Edition

Software-Only Solution with Optional Hardware

CuSIM components are software-based and optimized for stateful protocol emulation in virtual environments, adapting to your infrastructure and easily scaling to follow your testing needs.

Comprehensive platform support is provided, including standalone hypervisors (VMware ESXi and KVM) and OpenStack-based private clouds.

Specialized Keysight hardware is available on demand.

Model	Description
P88109H 	ORAN Server, runs Ubuntu OS • 56c Xeon 6238R processor • 128 GB RAM (3200MHz) • 2 x HDD: 4TB + 2TB • 2 x Power Supply
Network Interface Cards	Network Interface Cards • 4 x 10GbE X710 T4 • 2 x 100GBE-SFP MCX516A-CCAT • 2 x 10GBE-SFP Intel 520 • 2 x 25 GBE Intel XXV710 • 2 x 10GBE-SFP Intel 520
Size and weight	• Size: 43.7 cm width (19" rack mounted) 8.89 cm height (2U rack mounted) 45 cm depth • Weight: 14 Kg.



Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.

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