SIMNOVUS

O-RU SIMULATOR

Data Sheet

OVERVIEW

The O-RAN architecture is based on hardware and software disaggregation and using RAN applications as cloud-native functions. Validation strategies for O-RAN require a completely new approach based on software simulators vs. the traditional proprietary hardware.

The Simnovus software solution is designed for this new architecture.

Validate 5G Combined O-DU and O-CU Using Software

The Simnovus O-RU Simulator offers a comprehensive solution to validate the functionality and performance of the combined O-DU (O-RAN distributed unit) and O-CU (O-RAN central unit) over eCPRI-based 7.2x split fronthaul interface. The Simnovus solution simulates multiple O-RUs and hundreds of UEs generating realistic traffic models.

Our highly intuitive, web-based user interface provides superior user experience enabling quick ramp-up. It runs on commercial off-the-shelf (COTS) hardware enabling parallel test beds in a cost-effective manner.

Eliminate Analog Issues

With our solution, the need to procure and configure an O-RU goes away. With the traditional validation products, a lot of time is lost in making sure the analog parameters like gain, power, attenuation, carrier frequency offsets are calibrated between the UE Simulator and the O-RU.

Our solution not only completely removes the need for these but also makes it easy to configure scenarios like signal fading, channel modeling, and handover use cases.

All-Inclusive Subscriptions

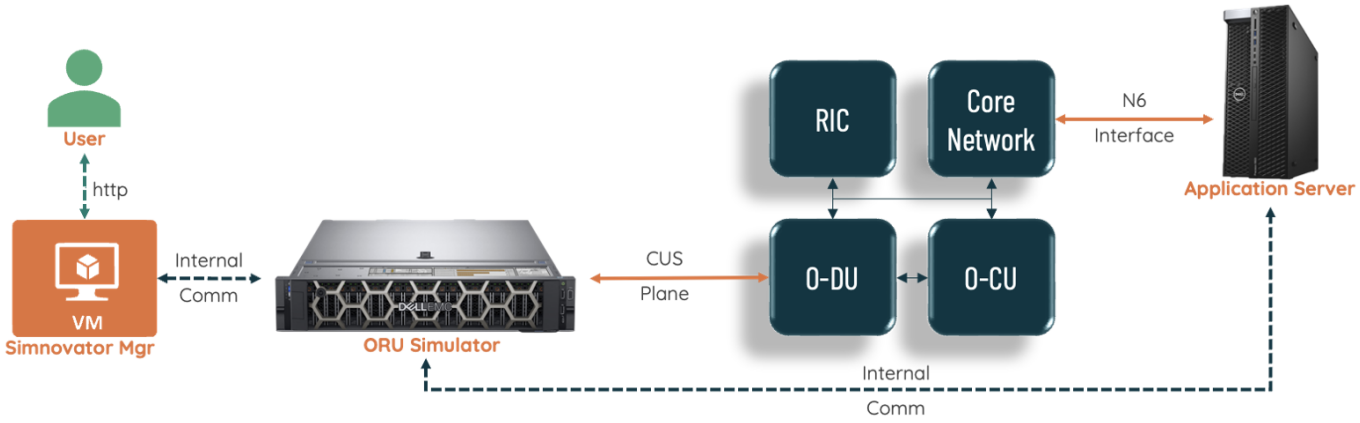
Our solution is sold as an all-inclusive annual subscription. Simply choose the number of UEs to select the subscription needed. This modern subscription model enables customers to create parallel test beds without large upfront Capex.

Scale Easily

Multiple licenses of the O-RU Simulator can be combined to validate higher capacity and performance. This model allows for the maximum flexibility throughout the validation life cycle as both functional and performance validation can be achieved using the same product.

No-Script Automation

Automation is built into our solution to accelerate Continuous Integration/Continuous Development (CI/CD). Our solution includes a rich set of pre-packaged automation libraries ready for integration into your automation framework. Scripts are auto-generated with our powerful and flexible web-based UI, allowing for CI/CD and eliminating the need to write your own scripts. Simply choose from our comprehensive list of RESTful APIs to control the test and obtain test results.



Validation of combined O-DU, O-CU

FEATURE SUMMARY

Software on COTS	Simulates multiple O-RUs and hundreds of UEs; scales up horizontally, quickly and efficiently
All Digital Interfaces	Abstracts radio interface with O-RU emulation
Multi-Purpose	Enables functional, interoperability, and performance testing of the combined O-DU and O-CU
Multi-Topology	Enables validation of combined O-DU and O-CU in wrap around or end-to-end (E2E) configuration
Realistic Scenarios	Generates realistic traffic patterns towards the combined O-DU and O-CU
Advanced Troubleshooting	Provides multi-layer logging and multi-level statistics with correlation

KEY BENEFITS

Enables Parallel Testbeds	Software on COTS enables parallel test beds to accelerate validation
Simplifies Test Setup	Digital interfaces remove lab setup complexities by eliminating need for radio equipment
No Expensive Capex	Flexible subscription enables broad coverage without millions in Capex
Quick Ramp-up	Packaged tests and intuitive workflows ensure fast and robust validation
100% Automation on Day 1	Packaged scripts and RESTful APIs enable out-of-the-box automation and CI/CD acceleration
2x Faster Troubleshooting	Comprehensive multi-layer logging and multi-level statistics ensure faster problem isolation

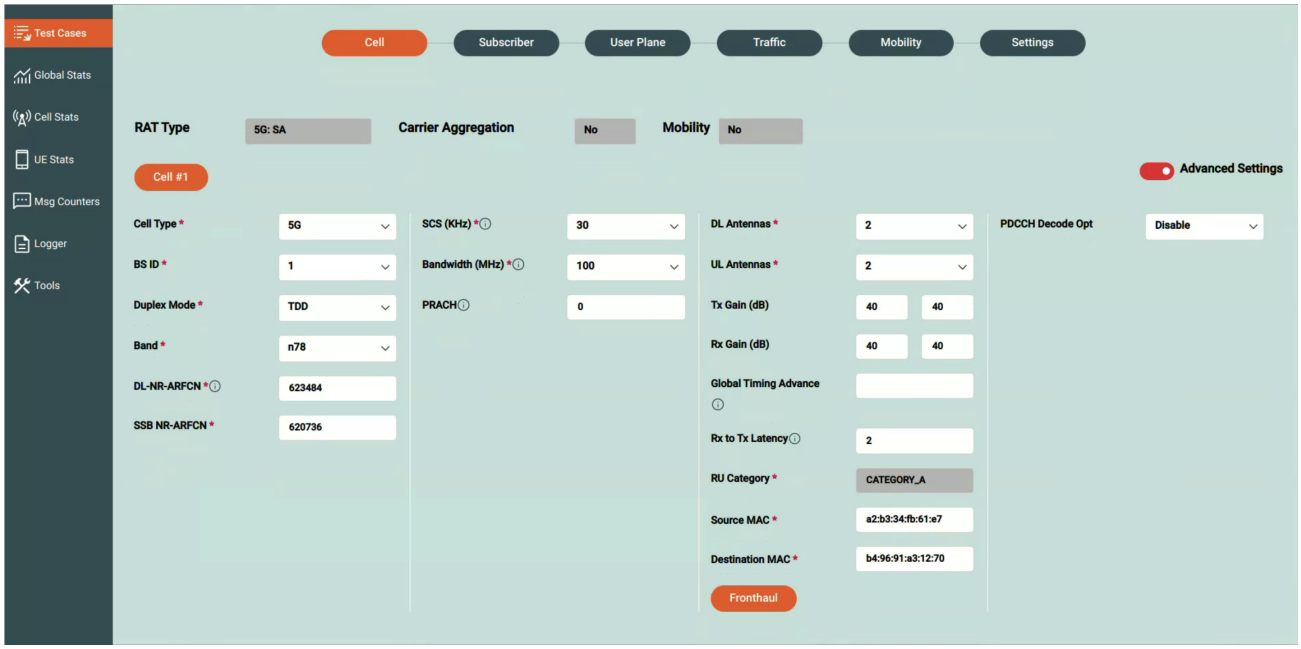
O-RU SIMULATOR SPECIFICATIONS

WG4 ORAN Specifications	O-RAN Fronthaul Control, User and Synchronization Plane specification v7.0 O-RAN Open Fronthaul Management Plane specification v7.0 – (Hierarchical model) O-RAN Fronthaul Interoperability Test specification (IOT) v6.0
Simulated UEs	Up to 256
eCPRI Specifications	v2.0
Fronthaul Split	7.2a
Test Configuration	Cat-A O-RU Frequency Range 1 FDD and TDD 100 MHz Sub Carrier Spacing: 15, 30 and 60 KHz Number of antennas: up to 4 x 4 MIMO
3GPP Release	Rel.16
M-Plane	Hierarchical model • JSON-based static configuration
S-Plane	Transport Synchronization configurations: LLS-C1, LLS-C2, LLS-C3 PTP telecom profiles: ITU-T G.8275.1 & ITU-T G.8275.2
C & U-Plane	Section type 0, 1 and 3 Programmable static-bit-width fixed point IQ (16 bits) Block-floating point compression Static configuration of U-Plane IQ format and compression header eCPRI with concatenation Application layer fragmentation and reassembly L2: Ethernet with support of jumbo frames QoS over fronthaul
CUS-Plane IoT Profile	A. 2.1.1 NR TDD IOT Profile 1 -NR-TDD-FR1-CAT-A-NoBF

O-RU Simulator Specifications cont.

UE Categories	5G
5G Deployment Modes	SA
Handovers	Inter/intra-frequency, inter-duplex,
QAM	QPSK, 16 QAM, 64 QAM, and 256 QAM
Channel Emulation	AWGN, 3GPP channel models (AWGN, EPA, EVA, ETU, TDL: A/B/C)
Power Control	UL Power Control, PHR, TPC
Dual Stack UE	Supported
VoLTE/VoNR	Supported with per-UE MOS calculation
Other Application Traffic	Fixed payload UDP and TCP data, FTP, ICMP PING
Automation	RESTful APIs
Statistics	Comprehensive counters and KPI's as per the specification Statistics at different levels Global, per RU, per Antenna, per UE Separate counters for UL and DL for C and U plane
Logging	UE Logs: All layers (L1, L2 and L3), SIP Fronthaul Logs: C-plane, U-plane, and M-plane
Miscellaneous	VLAN Support • Data flow separation based on VLAN ID • Data flow separation based on MAC addresses Uplink Traffic Management using C-Plane

FUNCTIONAL OVERVIEW



Generate complex test profiles in minutes with our step-by-step-test creation wizard.

Intuitive Web Interface

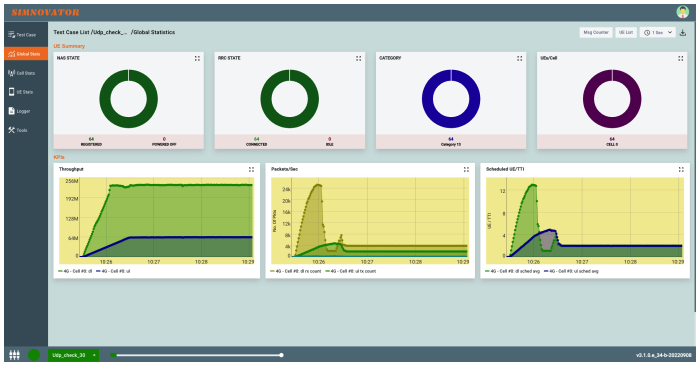
With Simnovus's web graphical user interface (GUI), there is no need to install any client software to use our solution. Plus, once you upgrade the server, all users will have direct access to the latest software by simply logging in on their browser.

Simplified Test Configurations

Our solution has an intuitive step-by-step workflow to walk users through the generation of even the most complex test profiles in just a few minutes. For more customized validations, users can easily edit our library of prepackaged tests. A variety of configurations are readily available, including multi-UE test cases with mobility scenarios and channel models.

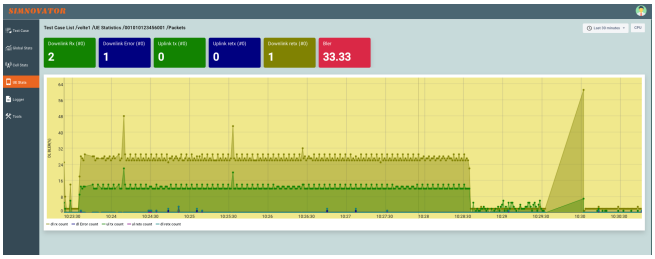
Extensive Statistics

Simnovus provides a wide range of key performance indicators (KPIs) at the global scale and allows users to drill down to per O-RU instance, per-cell, and per-UE levels. Examine current values and data over time for trend analysis.



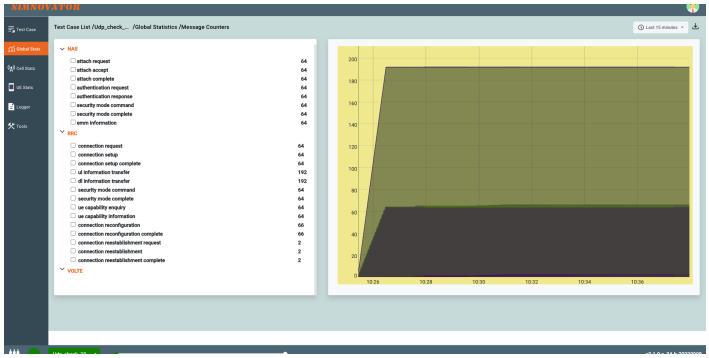
Examine trends with global statistics.

Compare various uplink and downlink statistics for visual analysis and troubleshooting.

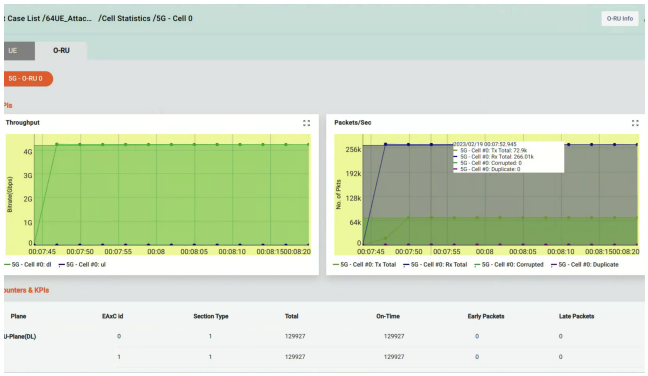


Drill down to per-cell and per-UE level statistics.

In addition, users have access to various message counters at the protocol level, including NAS and RRC messages.



Access layer-by-layer message counters.



Drill down to per-O-RU and per-eAxC level statistics.

Detailed Logging and Troubleshooting

To help users analyze base station behavior, our solution provides advanced logging and troubleshooting capabilities.

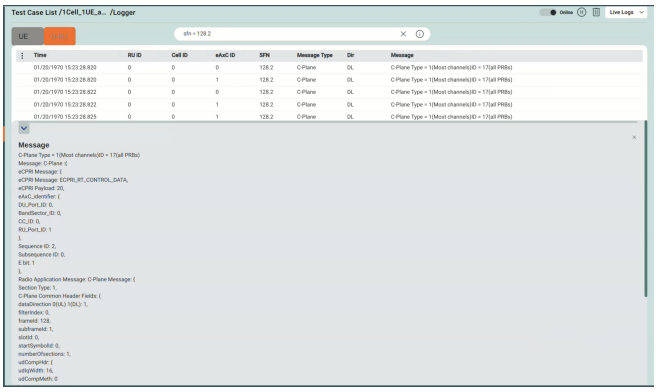
Key logging capabilities include:

UE and cell level

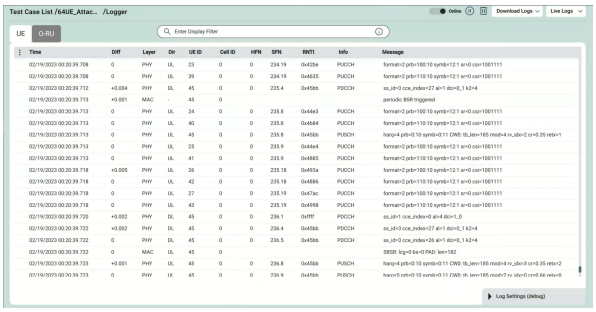
- View detailed logging of all layers (PHY, MAC, RLC, PDCP, RRC, NAS)
- Selectively enable or disable logging of a layer
- Choose log level for each layer of the stack
- Filter logs for a particular UE or cell
- Switch from detailed decoding of NAS and RRC messages to logs of all PHY layers
- Save logs in text or graphical format for offline analysis

O-RU level

- Detailed C Plane logs for Extended Antenna-Carrier (eAxC) configured, both uplink and downlink



OFH C-plane logging in JSON format.



Detailed layer logging.

SYSTEM REQUIREMENTS

The Simnovus solution runs on COTS hardware and comprises of the following components:

Manager: GUI and controller node

O-RU Simulator: simulating UEs and O-RUs

It requires one or more multi 25GbE Ethernet Network Adaptor PCIe cards for connectivity on the fronthaul.

Recommended card:

Broadcom57504 Quad Port 10/25GbE, SFP28, OCP NIC 3.0

Intel® Ethernet Converged Network Adapter XXV710-DA2-25G 52000

App Server: Application server for terminating user plane traffic.

SYSTEM SPECIFICATIONS

O-RU Simulator	Manager	App Server
Dell R750/R760 (2 socket)	Virtual Machine	Virtual Machine
CPU: Intel Xeon Gold/ Platinum	CPU: Intel i5 or Xeon	CPU: Intel i5 or Xeon
Clock speed: Max turbo frequency above 3.4 GHz	Clock frequency: 2.6 GHz or higher	Clock frequency: 2.6 GHz or higher
Core Count: 32 per CPU	Number of cores: 4 or more	Number of cores: 4 or more
RAM: 8 x 8GB DDR4	RAM: 16 GB or higher	RAM: 16 GB or higher
OS: Ubuntu 20.04	OS: Ubuntu 20.04 or higher	OS: Ubuntu 20.04 or higher
Disk space: 1TB	Disk space: 500GB or more	SDD: 500GB or more
Intel® Ethernet Network Adapter XXV710-DA2	NIC port: 1 x 1GbE	NIC ports: • 1 x 10GbE for traffic • 1 x 1GbE for management
PCIe Gen 3 slots: 2		

ORDERING INFORMATION

The Simnovus flexible all-inclusive software subscription provides simplified ordering:

Simply Choose

Number of UEs (1, 16, 32, 64, 128, or 256).

App server software is also included.

Get started today!
Contact **sales@simnovus.com.**

This information is subject to change without notice.

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