SIMNOVUS
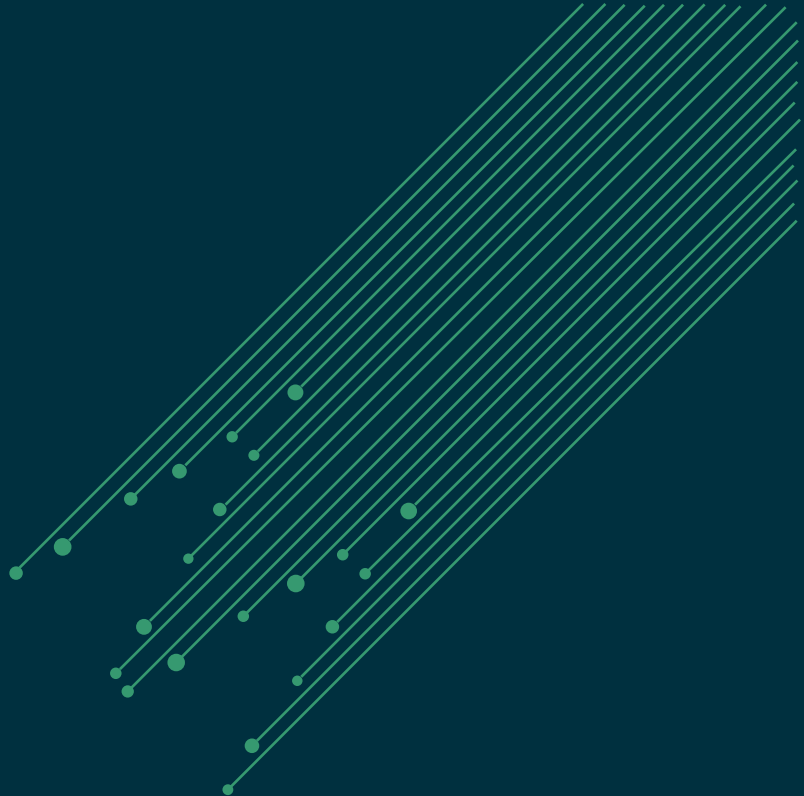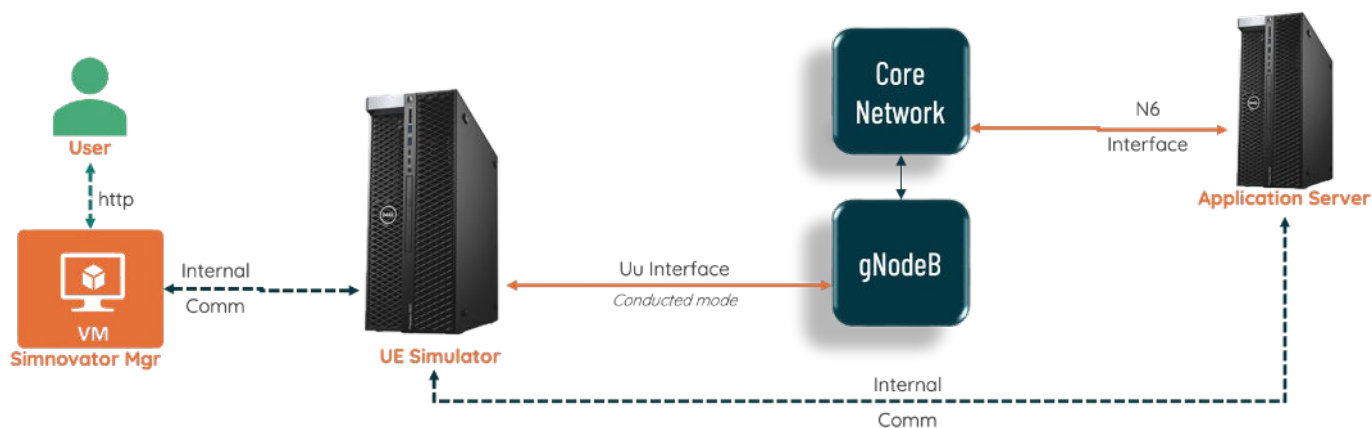
UE SIMULATOR

Data Sheet

OVERVIEW

Validate 5G RAN Functionality and Performance

The Simnovus UE Simulator, brings a software mindset to validating 5G/4G base station functionality, capacity, and reliability. Our highly intuitive web-based application leverages servers with General Purpose Processors (GPP) with software-defined radio (SDR) to enable ubiquitous, automated, and simplified validation.

The UE Simulator enables performance, load, and capacity testing over the radio interface for various validation needs including massive connectivity, high throughput, and complex signaling procedures, using 4G and 5G real-life scenarios and realistic traffic mixes.

Take validation to the next level with extensive capabilities to create realistic test scenarios in the lab to accelerate base station innovations.

Base station testing.

Accelerate Deployment

With our UE Simulator, automation is built in for Continuous Integration/Continuous Development (CI/CD). Scripts are auto-generated with a powerful and flexible web-based user interface (UI), allowing for CI/CD and eliminating the need to write your own scripts. The UE Simulator includes a rich set of prepackaged automation libraries ready for integration.

Simplify Testing and Get to Market Faster

Significantly reduce 5G/4G base station validation time with our plug-and-play UE Simulator that helps you ramp up quickly and easily isolate data needed to debug faster. Get extensive statistics and correlation across protocol layers and dynamic log levels that are automatically adjusted based on user-defined triggers. Or filter data—like IQ samples—and export for analysis with third party tools.

Our UE simulator software runs on COTS and SDR systems, enabling the deployment of multiple test beds without having to spend millions on Capex. Parallel testing can save your team time and effort when executing automated tests.

FEATURE SUMMARY

Runs on GPP	Simulates hundreds of UEs on a single server with General Purpose Processors; scale up horizontally, quickly, and efficiently
Multi-Purpose	Enables functional, interoperability, and load testing on the same platform
Multi-Technology	Simulates 5G, Nb-IoT, and LTE UE categories
Multi-Topology	Validates O-RAN systems in isolation or in end-to-end (E2E) configuration
Channel Modeling	Tests link adaptation by varying channel conditions
Realistic Traffic Mix	Combines UE procedures with a large variety of data and Volte/VoNR traffic
Advanced Troubleshooting	Provides multi-layer logging and multi-level statistics with correlation

KEY BENEFITS

Enables Parallel Test Beds
Software on COTS enables parallel test beds to accelerate validation

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

2x Faster Troubleshooting
Comprehensive multi-layer logging and multi-level statistics ensure faster problem isolation

100% Automation on Day 1
Packaged scripts and RESTful APIs facilitate out-of-the-box automation and CI/CD acceleration

UE SIMULATOR SPECIFICATIONS

Simulated UEs/Cell	5G (up to 1000[1]), LTE (up to 1K), Nb-IoT (up to 4K)
Supported Cell/System	5G – up to 3; 4G – up to 4
3GPP Release	Rel. 17
UE Categories	5G, NB-IoT, Cat-M1, LTE (0-13), RedCap
5G Deployment Modes	NSA and SA
Non-Terrestrial Networks	NTN support for NR and Nb-IoT
Supported Frequency Bands	FR1 (70 MHz to 6.0 GHz)
Channel Bandwidths	Up to 100 MHz
Sub-Carrier Spacing	15, 30, 60 KHz
Antenna Configuration	SISO, MIMO (2x2, 4x4)
Carrier Aggregation	5G - 2CC, 3CC LTE - 3CC
Handovers	Inter-RAT, Inter/intra-frequency, inter-duplex, Inter-eNB/gNB, intra-eNB/gNB
QAM	QPSK, 16 QAM, 64 QAM, and 256 QAM
UEs/TTI	16
4x4 MIMO 2CC Support in 100MHz (UL - 2 layers)	Supported
Channel Emulation	AWGN, 3GPP channel models (AWGN, EPA, EVA, ETU, TDL: A/B/C)
Power Control	UL Power Control, PHR, TPC
Logging	All layers (L1, L2 and L3), SIP
VoLTE/VoNR	Supported with per-UE MOS calculation, EPS Fallback
Other Application Traffic	Fixed payload UDP and TCP data, non-IP data, FTP, ICMP PING
Automation	RESTful APIs (create, edit, execute, delete, collect logs and stats)

1: under development

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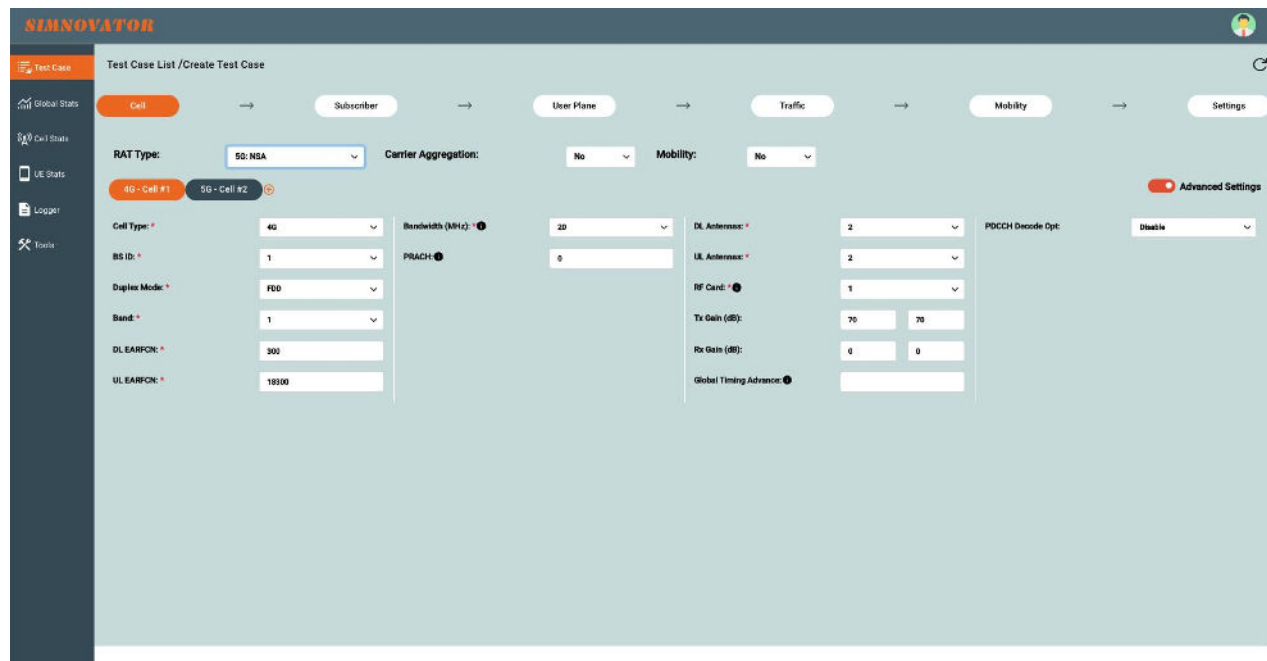
Generate complex test profiles in minutes with our step-by-step-test creation wizard.

Intuitive Web Interface

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

Simplified Test Configurations

The UE Simulator 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.
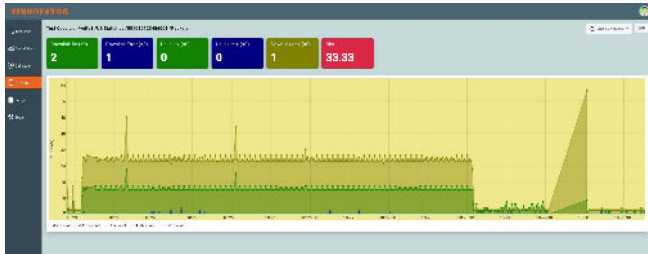
Extensive Statistics

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

Examine trends with global statistics.

Extensive Statistics Cont.

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

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

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

Access layer-by-layer message counters.

## Detailed Logging and Troubleshooting

To help users analyze base station behavior, the UE Simulator provides advanced logging and troubleshooting capabilities.

Key logging capabilities include:

- 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

Key troubleshooting tools include:

- Constellation plot
- System resource utilization
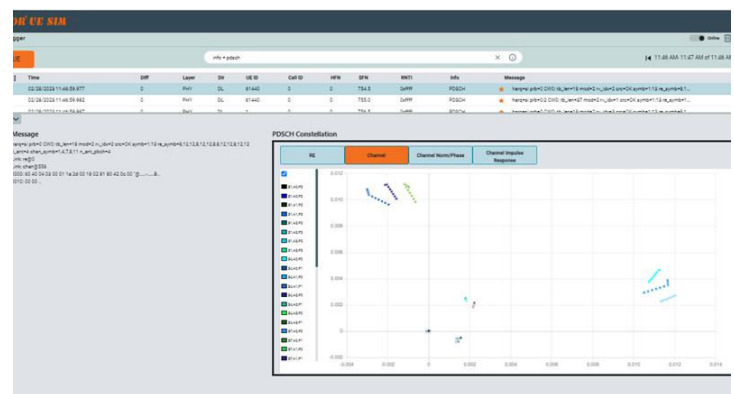
Detailed layer logging.

SYSTEM REQUIREMENTS

The Simnovus UE Simulator solution runs on servers running on General Purpose Processors (GPP) and comprises of the following components:

**Manager:** GUI and controller node running on a VM.

UE Simulator*: Simnovus ships servers running on GPPs for higher test configuration which can house multiple SDR cards for up to 3 NR cells.

Simnovus supports other options of COTS hardware such as Dell Precision 5820 for certain test requirement. For

App Server: Application server for terminating user plane traffic.

UE Simulator platform
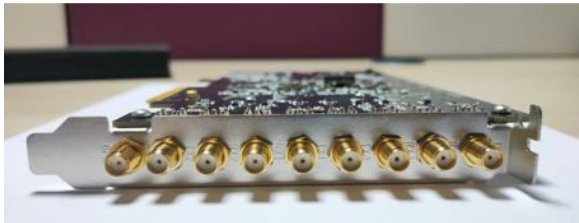
SDR cards

SDR Specifications

- RF power output: <10 dBm
- Max RF input power: -10 dBm
- 4 SMA female (TX1, TX2, RX1, RX2), AC coupled
- 1 SMA female (GPS antenna with 3.3V DC power supply)
- PCIe full height, short length

SYSTEM SPECIFICATIONS

UE Simulator (Provided by Simnovus)	Manager (Arranged by Customer)	App Server (Arranged by Customer)
COTS hardware	Virtual Machine	Virtual Machine
CPU: Intel i9, Intel Xeon, AMD Ryzen	CPU: Intel i5 or Xeon	CPU: Intel i5 or Xeon
Clock speed: Max turbo frequency 4.60GHz	Clock frequency: 2.6 GHz or higher	Clock frequency: 2.6 GHz or higher
Max Number of cores: 64 for 2CC)	Number of cores: 4 or more	Number of cores: 4 or more
RAM: 4 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: 50 GB or more
NIC ports: dual Intel 2.5G Ethernet	NIC port: 1 x 1GbE	NIC ports: • 1 x 10GbE for traffic • 1 x 1GbE for management
PCIe Gen 3 slots: 7		

Platforms with different CPU are proposed based on the test configuration.

ORDERING INFORMATION

The Simnovus flexible all-inclusive licensing provides simplified ordering:

Step 1:

Select number of UEs (64, 128, 256 or 1000[1]) for software license.

App server software is also included.

Step 2:

Select number of SDR cards (1 ,2 or 3) to ship with server.

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

1: under development

This information is subject to change without notice.

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