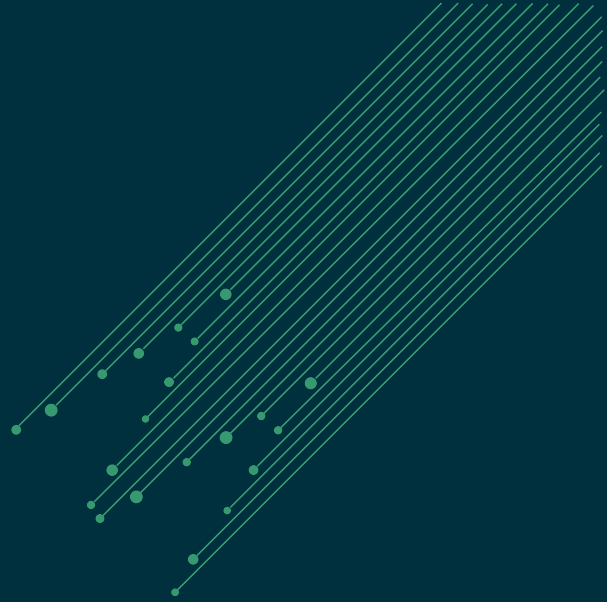




SIMNOVUS



SIMNOVATOR INFINITY

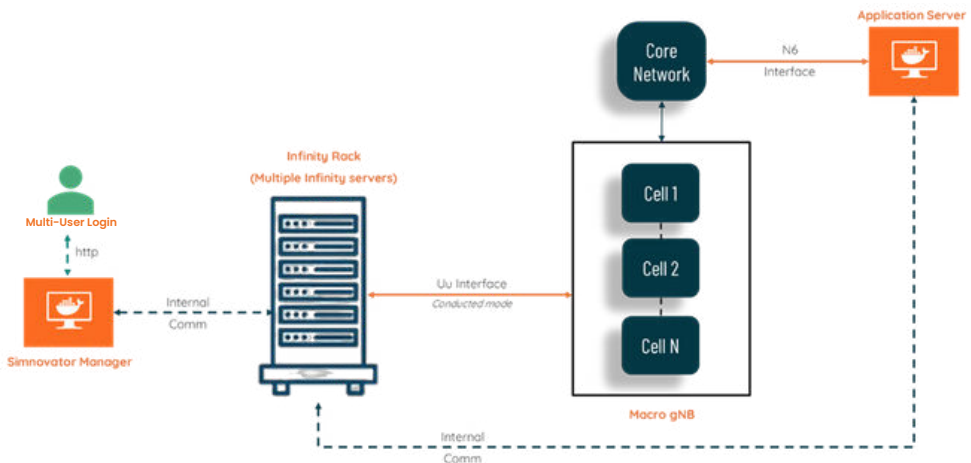
Datasheet

OVERVIEW

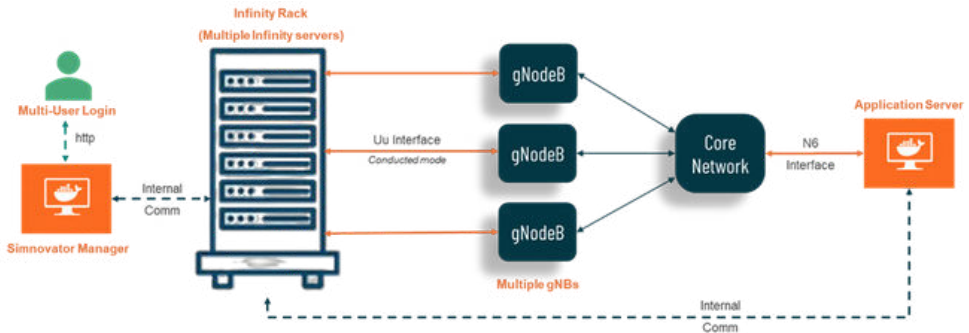
Bringing massive simulated UEs and multiple users capability to your workspace. This UE simulator offers a powerful platform for both functional and performance validation across 4G and 5G networks. Designed to meet 3GPP standards, it supports LTE, LTE-M, NB-IoT, and 5G SA/NSA, enabling the simulation of very large number of user equipment, loading all cells and sectors of a macro base station. With scalable architecture, it allows multiple Infinity servers to be daisy chained, expanding simulation capacity to tens of thousands of UEs across numerous cells. The solution orchestrates management of multi-servers setup and enables multi-users access with parallel test execution[MM1] .

TEST TOPOLOGIES

Massive testing of Macro gNB / eNB



Parallel testing of multiple gNBs / eNBs



Simnovator Components

Simnovator Manager: Provides ease of managing Infinity rack, along with multiple users, while enabling the creation & execution of complex test scenarios, simulating upto 60,000 UEs. It offers consolidated statistics for streamlined analysis and supports multi-users management with parallel test execution, ensuring efficient utilization of resources. Additionally, it simplifies overall test management, improving usability and operational efficiency. Also supports REST-API based automation, that can be integrated into CI/CD/CT pipeline.

Simnovator Application Server: Functions as termination of user plane traffic and is connected to the core network over the N6 interface. It supports the generation of various application data, diverse traffic patterns, enabling comprehensive traffic profiling & validation. Additionally, it facilitates multi-bearers and PDN establishment testing to ensure robust end-to-end performance verification.

TECHNICAL SPECIFICATIONS

Single Infinity Server Capacity

Parameter	Details
Simulated UEs	5000 UEs
Supported Cells	8 Cells or 8 Carriers
Supported Users	2
Channel Bandwidths	Up to 100 MHz
Sub-Carrier Spacing	15, 30, 60 kHz
Antenna Configuration	SISO, MIMO (2x2, 4x4)

Infinity Rack Capacity (12 servers in a rack)

Parameter	Details
Simulated UEs	60000 UEs
Supported Cells	96 Cells
Supported Users	24

UE Simulator Features

Parameter	Details
3GPP Release	NR Release 19, LTE Release 17
UE Categories	5G, NB-IoT, Cat-M1, LTE (0-13), RedCap
5G Deployment Modes	NSA and SA with Dynamic Spectrum Sharing
Non-Terrestrial Networks	NTN support for NB-IoT and NR
Supported Frequency Bands	FR1 and custom bands (400 MHz to 6 GHz); SDR50 RF coverage – 500 MHz to 6 GHz FR2 with additional software and hardware
Handovers	Inter-RAT, inter/intra-frequency, inter-duplex, inter-eNB/gNB, intra-eNB/gNB
QAM	QPSK, 16 QAM, 64 QAM, 256 QAM (DL & UL), 1024 QAM (DL)
UES/TTI	16
Miscellaneous	Emergency call, SUL, asymmetric BW, UAC
Channel Emulation	Tests link adaptation by varying channel conditions, mobility and handover scenarios. Simulate AWGN, 3GPP channel models (AWGN, EPA, EVA, ETU, TDL A/B/C/D/E)
Power Control	UL power control, PHR, IPC
Logging and Statistics	Provides multi-layer logging (All layers - L1, L2, L3 and SIP) and multi-level statistics with correlation
VoLTE / VoNR and ViLTE / ViNR	Supported with per-UE MOS calculation, EPS fallback
Other Application Traffic	Fixed payload UDP/TCP data, HTTP, FTP, ICMP Ping, Video streaming, non-IP data
Automation	RESTful APIs (create, edit, execute, delete, collect logs and stats)

CAPACITY SUMMARY

Simnovator Infinity is a highly flexible solution designed to align closely with specific customer requirements. Its scalable architecture allows simulation of very large UE volumes, reaching tens of thousands of devices. A single server can handle up to 5,000 UEs across 8 cells, with each cell supporting 100 MHz bandwidth and 4x4 MIMO. By daisy chaining multiple servers (currently up to 12 per rack), the system can scale up to approximately 60,000 UEs; 96 cells; 24 parallel users.

The platform is designed to support validation of macro base station and also parallel testing[MM1] of multiple base stations. It can be partitioned to enable multiple users to operate the UE simulator simultaneously, improving resource utilization

FUNCTIONAL OVERVIEW

Intuitive Web Interface

With the Simnovator 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.

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4.8.3_2023

Sample Tests

Search More Filters

TestCase Name	Actions
sample_MB-wt_ICELL_M_PNG	
sample_MB-T-RAT_2CELLS_UDF	
sample_MB-T-RAT_2CELLS_UDF_TCP_VONR	
sample_SA_ICELL_2x2_HO_UDF	
sample_SA_ICELL_4x2_VONR	
sample_MB-wt_ICELL_M_SMB	
sample_SA_ICELL_4x2_TCP	
sample_SA_2CELL_2x2_CA	
sample_SA_ICELL_4x2_TIP	
sample_SA_ICELL_4x2_PNG	
sample_SA_ICELL_4x2_UDF	
sample_SA_ICELL_4x2_HTFP	
sample_SA_ICELL_4x2_REGISTRATION_ONLY	
sample_SA_ICELL_4x2_BTFP	

17 of 17 items

Tester View

Pre-packaged Test Case library

Creating Test Case: Test-Screenshot

Cell | Subscriber | User Plane | Traffic | Mobility | Settings

Of Group 1

Total Life: Advanced

Profile Configuration

of UEs:

Serving Cell:

Starting SUR:

Next SUR:

Algorithm:

Network Configuration

Shared Key (x):

Increment Shared Key:

Attach PDN Type:

PDN Type:

Default APN:

Network Slicing:

Protection Scheme:

Public Key ID:

Routing Indicator:

Device Configuration

AS Release:

UE Category Type:

UE Category:

V2X Support:

CSI Configuration

CGP:

R1:

PM:

MNC Digits:

Authorization Security

OP:

OR:

SQN:

Res Len:

Access Control

Access Class Value:

UAC Access Identifiers:

Advanced Options

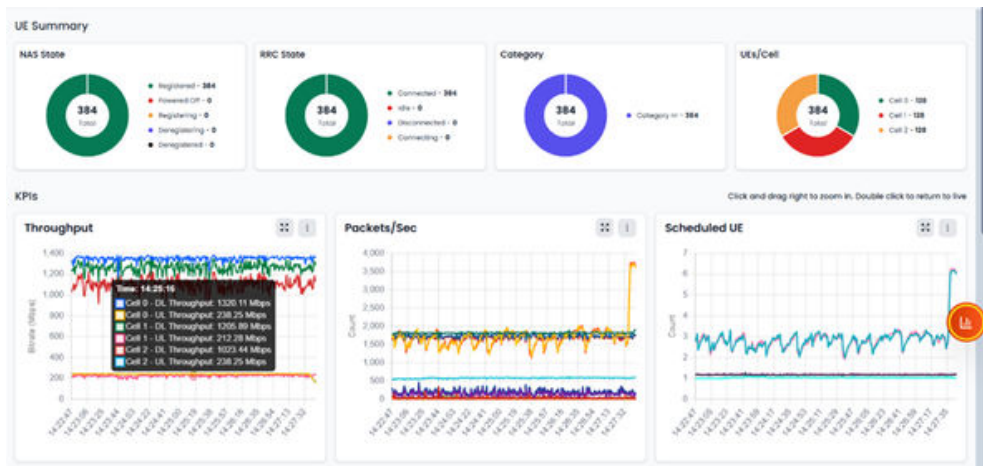
BLER Override:

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

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. 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.



Examine trends with global statistics

Cell 0		Cell 1		Cell 2	
NAS State 128 Registered Power Off 0 RRC State 128 Connected 0 Idle		NAS State 128 Registered Power Off 0 RRC State 128 Connected 0 Idle		NAS State 128 Registered Power Off 0 RRC State 128 Connected 0 Idle	
Category 128 UE/Cat 128 UEs		Category 128 UE/Cat 128 UEs		Category 128 UE/Cat 128 UEs	
PCI 500 Duplex Mode TDD DL NR-ARFCN 63666 UL NR-ARFCN 63666 DL RBs 273 Rx Gain (dB) 10, 10, 10, 10 Tx Gain (dB) 80, 80		PCI 501 Duplex Mode TDD DL NR-ARFCN 63406 UL NR-ARFCN 63406 DL RBs 273 Rx Gain (dB) 10, 10, 10, 10 Tx Gain (dB) 80, 80		PCI 503 Duplex Mode TDD DL NR-ARFCN 63228 UL NR-ARFCN 63228 DL RBs 273 Rx Gain (dB) 10, 10, 10, 10 Tx Gain (dB) 80, 80	

UE ID	IMSI	EMM State	RRC State	PCI	IP Address	RNTI	RSCP (dBm)	RSRQ (dB)	Path Loss (dB)	SNR (dB)
1	00101023456301	registered	connected	500	10.10.1.3	18453	-81.4	-10.7	-2.6	33.3
2	00101023456302	registered	connected	500	10.10.1.6	18586	-81.4	-10.7	-2.6	33.3
3	00101023456303	registered	connected	500	10.10.1.5	18547	-81.4	-10.7	-2.6	33.3
4	00101023456304	registered	connected	500	10.10.1.10	18192	-81.4	-10.7	-2.6	33.3
5	00101023456305	registered	connected	500	10.10.1.14	18368	-81.4	-10.7	-2.6	33.3
6	00101023456306	registered	connected	500	10.10.1.17	18553	-81.4	-10.7	-2.6	33.3
7	00101023456307	registered	connected	500	10.10.1.22	18257	-81.4	-10.7	-2.6	33.3
8	00101023456308	registered	connected	500	10.10.1.25	18108	-81.4	-10.7	-2.6	33.3
9	00101023456309	registered	connected	500	10.10.1.27	18083	-81.4	-10.7	-2.6	33.3
10	00101023456310	registered	connected	500	10.10.1.38	18437	-81.4	-10.7	-2.6	33.3
11	00101023456311	registered	connected	500	10.10.1.34	18625	-81.4	-10.7	-2.6	33.3
12	00101023456312	registered	connected	500	10.10.1.37	18321	-81.4	-10.7	-2.6	33.3
13	00101023456313	registered	connected	500	10.10.1.36	18310	-81.4	-10.7	-2.6	33.3
14	00101023456314	registered	connected	500	10.10.1.42	18115	-81.4	-10.7	-2.6	33.3
15	00101023456315	registered	connected	500	10.10.1.44	18325	-81.4	-10.7	-2.6	33.3
16	00101023456316	registered	connected	500	10.10.1.49	18327	-81.4	-10.7	-2.6	33.3

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

Messages Show All Hide All

● NAS - 5gs_nas_authentication_request	384	✕ 👁
● NAS - 5gs_nas_authentication_response	384	✕ 👁
● NAS - 5gs_nas_configuration_update_command	384	✕ 👁
● NAS - 5gs_nas_dl_nas_transport	384	✕ 👁
● NAS - 5gs_nas_pdu_session_establishment_ac...	384	✕ 👁
● NAS - 5gs_nas_registration_accept	896	✕ 👁
● NAS - 5gs_nas_registration_complete	896	✕ 👁
● NAS - 5gs_nas_security_mode_command	384	✕ 👁
● NAS - 5gs_nas_security_mode_complete	384	✕ 👁
● NAS - 5gs_nas_ul_nas_transport	384	✕ 👁
▼ RRC (14) 👁		
● RRC - nr_rrc_dl_information_transfer	1664	✕ 👁
● RRC - nr_rrc_reconfiguration	1310	✕ 👁
● RRC - nr_rrc_reconfiguration_complete	1310	✕ 👁

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

TIME	DIFF	LAYER	SUB LAYER	DIR	UE ID	CELL ID	MESSAGE
03/25/2025, 14:28:06	+0.00%	PHY	POSCH	DL	300	2	harq=0 prb=0 symb=2/2 kh=8 ni=4 CWO: 0b, len=437 mod=8 rv_id=0 cr=0.90 rate=0 crc=0K
03/25/2025, 14:28:06	+0.00%	MAC		DL	300	2	[TAG-0 to=31 PADDlen=434]
03/25/2025, 14:28:06	+0.00%	PHY	POCCH	DL	33	0	ss_id=2 cce_index=14 of=1 of=1,1
03/25/2025, 14:28:06	+0.00%	PHY	POCCH	DL	271	2	ss_id=2 cce_index=50 of=1 of=1,1
03/25/2025, 14:28:06	+0.00%	PHY	POCCH	DL	375	2	ss_id=2 cce_index=49 of=1 of=0,1
03/25/2025, 14:28:06	+0.00%	MAC		UL	375	2	[SBR log=0 ss=0 SE PReigh=52 pc=53 PADDlen=271]
03/25/2025, 14:28:06	+0.00%	PHY	POSCH	DL	134	1	harq=0 prb=25/238 symb=2/2 kh=8 ni=4 CWO: 0b, len=105587 mod=8 rv_id=0 cr=0.93 rate=0
03/25/2025, 14:28:06	+0.00%	PHY	POSCH	DL	238	1	harq=0 prb=0/4 symb=2/2 kh=8 ni=4 CWO: 0b, len=6273 mod=8 rv_id=0 cr=0.93 rate=0 crc=
03/25/2025, 14:28:06	+0.00%	MAC		DL	134	1	[LCID:4 len=910 LCID:4 len=1034 LCID:4 len=1034 LCID:4 len=1034 LCID:4 len=1034 LCID:4 len=1034
03/25/2025, 14:28:06	+0.00%	RLC	DRBI	DL	134	-	[D]C=1 F=0 SH=00 SN=135094
03/25/2025, 14:28:06	+0.00%	RLC	DRBI	DL	134	-	[D]C=1 F=0 SH=00 SN=135095
03/25/2025, 14:28:06	+0.00%	RLC	DRBI	DL	134	-	[D]C=1 F=0 SH=00 SN=135096
03/25/2025, 14:28:06	+0.00%	RLC	DRBI	DL	134	-	[D]C=1 F=0 SH=00 SN=135097
03/25/2025, 14:28:06	+0.00%	RLC	DRBI	DL	134	-	[D]C=1 F=0 SH=00 SN=135098

Detailed layer logging

SYSTEM SPECIFICATION

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

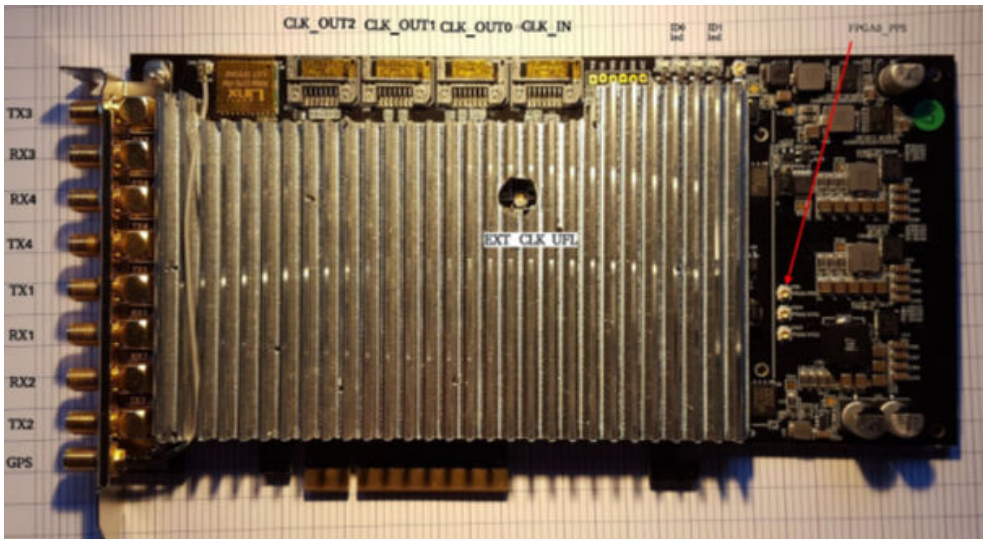
System Components

- **Manager:** GUI and controller node running on a VM.
- **UE Simulator:** Simnovus ships servers running on GPPs which can house multiple SDR cards for up to 8 cells.
- **App Server:** Application server for terminating user plane traffic.



SDR Specifications

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





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