



NE6000

4G LTE-A Network Emulator



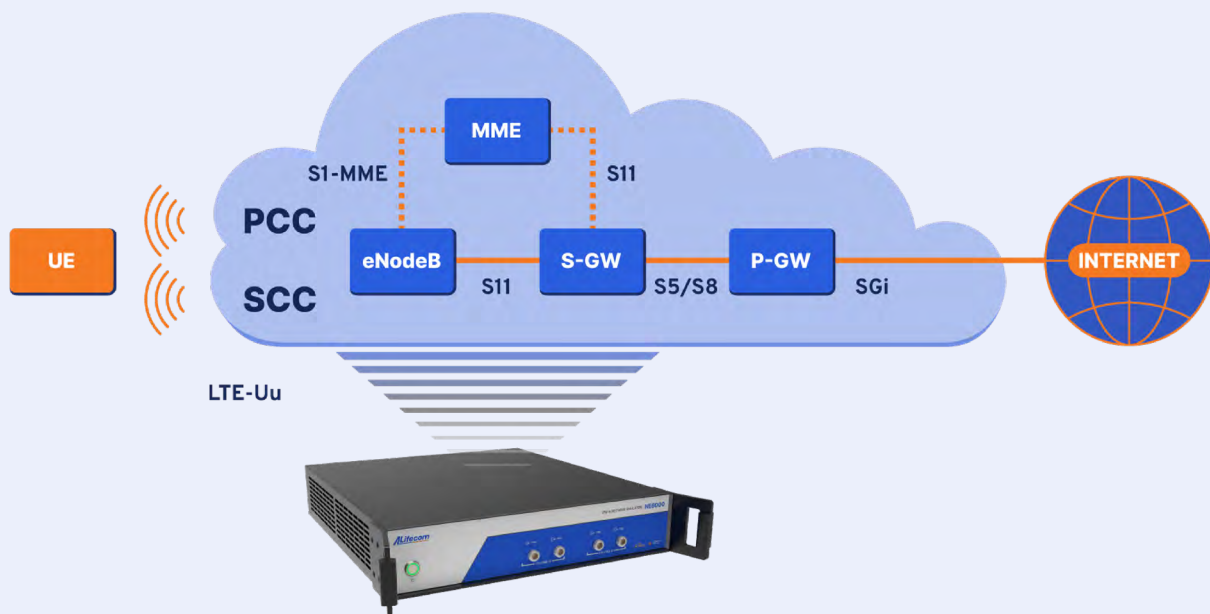
Product Catalog

June 2024

1 NE6000 at a Glance

The NE6000 4G LTE-A Network Emulator stands as a versatile and all-encompassing testing platform, offering support for a wide array of telecommunications technologies including LTE/LTE-A, NB-IoT, eMTC, and IoT-NTN. Engineered to meet the evolving demands of modern communication devices, the NE6000 provides unparalleled testing of user equipment capabilities across multiple domains.

The NE6000 emulates a complete LTE-A network system with eNB and true EPC. By implementing signaling test methodology and a user-friendly GUI, the NE6000 is an excellent tool for development and debugging of LTE-A systems. With its unique multi-DUT capabilities and small formfactor, the NE6000 is the ideal solution for production line, reliability testing and quality assurance.



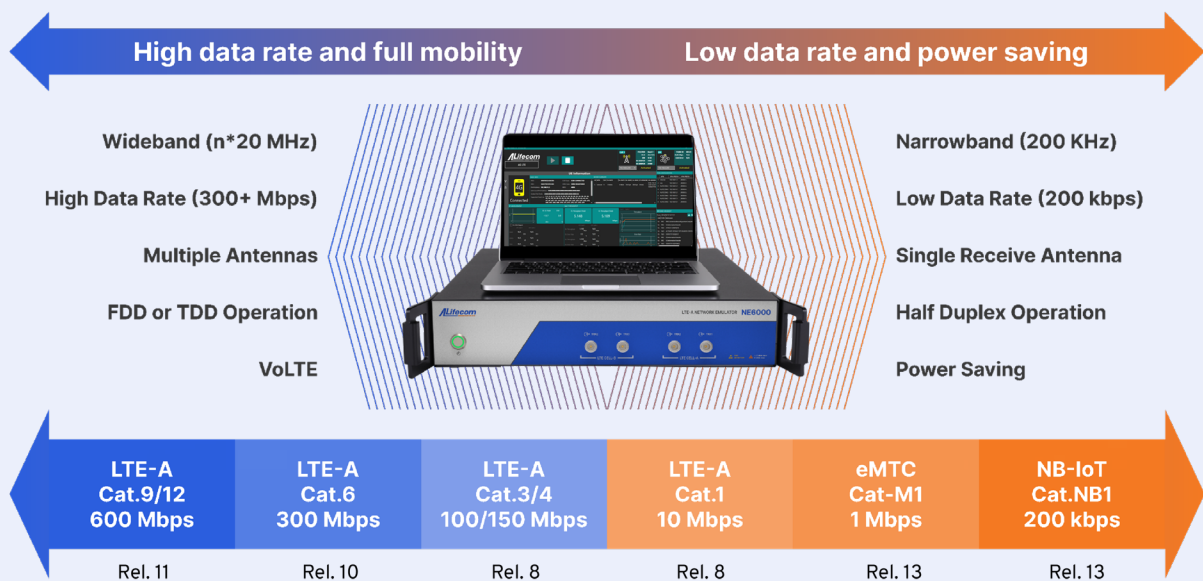
Key Features

- LTE/LTE-A, NB-IoT, eMTC, and IoT-NTN
- Up to 4X4 MIMO
- Up to 4CC carrier aggregation
- Support up to LTE Cat 12 connection
- Concurrent connections up to 4 UE's for high throughput
- All 3GPP LTE-A bands coverage
- Compact formfactor

2 Test Coverage

The NE6000 4G LTE-A Network Emulator supports all operation modes of LTE connectivity options from low data rate NB-IoT to high data rate LTE-A as show in the picture below. In addition, the NE6000 supports Non-Terrestrial Network communication via IoT-NTN.

The NE6000 features 4 antenna ports, and a single machine supports 4X4 MIMO with 1CC carrier aggregation or 2X2 MIMO with 2CC carrier aggregation. By combining two NE6000's the support is extended to 2X2 MIMO with 4CC carrier aggregation for LTE Cat 12.



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3 Test Items

Physical Layer Testing

Test Item	Type	Operation Mode Supported				
		LTE	LTE-A	NB-IOT	eMTC	IoT-NTN
UL Max. Tx Power	Standard	✓	✓	✓	✓	✓
DL Reference Sensitivity	Standard	✓	✓	✓	✓	✓
DL RSSI Reporting	Standard	✓	✓		✓	
EVM	Standard	✓	✓	✓	✓	✓

Functional Testing

Test Item	Type	Operation Mode Supported				
		LTE	LTE-A	NB-IOT	eMTC	IoT-NTN
IPv4 / IPv6 Testing	Standard	✓	✓	✓	✓	✓
Multi-PDN Testing	Standard	✓	✓	✓	✓	✓
PDN Verification	Standard	✓	✓	✓	✓	✓
PDN Switch Testing	Standard	✓	✓	✓	✓	✓
QoS	Optional	✓	✓	✓	✓	✓
Reject Cause	Standard	✓	✓	✓	✓	✓
User Authentication	Optional	✓	✓	✓	✓	✓
Resource Allocation Mode	Optional	✓	✓	✓	✓	
UE Capability	Optional	✓	✓	✓	✓	✓

Performance Testing

Test Item	Type	Operation Mode Supported				
		LTE	LTE-A	NB-IOT	eMTC	IoT-NTN
MAC Throughput Performance	Standard	✓	✓	✓	✓	✓
IP Throughput Performance	Optional	✓	✓	✓	✓	✓
Application Testing	Standard	✓	✓	✓	✓	✓

Mobile Service Testing

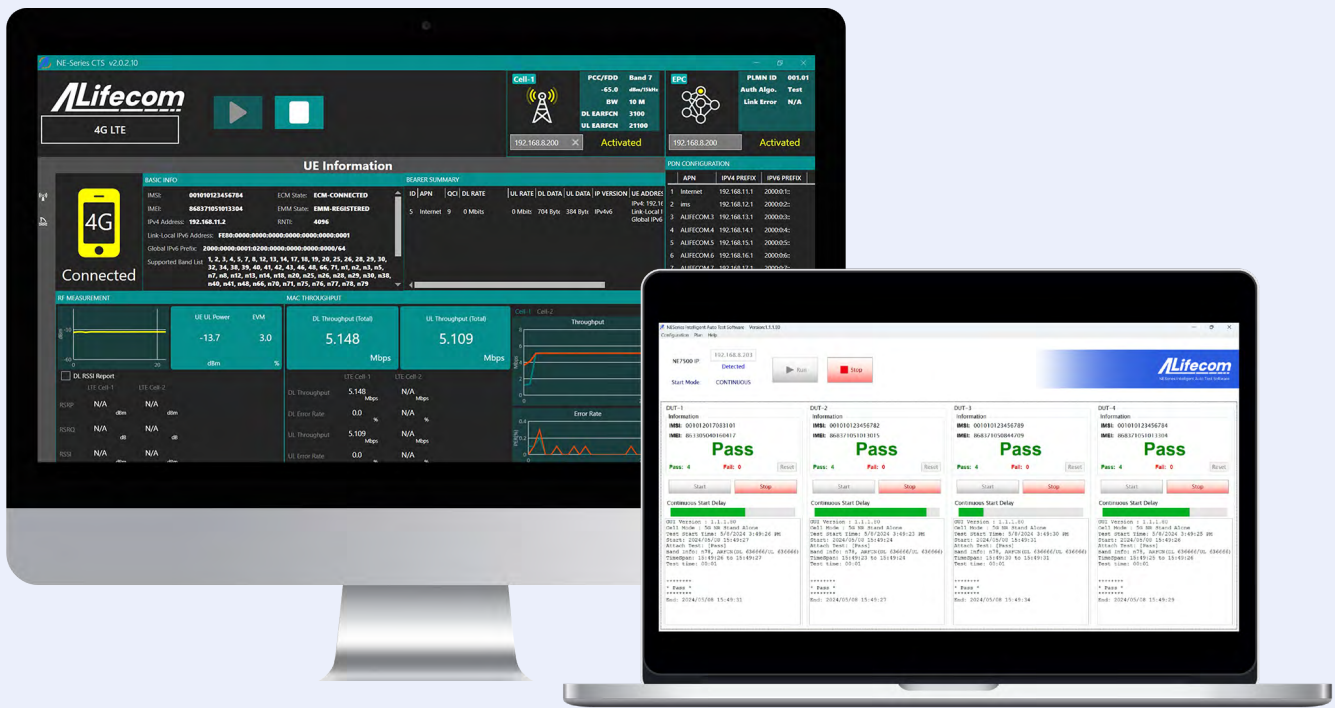
Test Item	Type	Operation Mode Supported				
		LTE	LTE-A	NB-IOT	eMTC	IoT-NTN
VoLTE (IMS)	Optional	✓	✓			
SMS over IMS	Optional	✓	✓			
SMS over SGs	Optional	✓	✓	✓	✓	✓
IMS Enhancement - IPSec	Optional	✓	✓			
PWS (ETWS+CMAS)	Optional	✓	✓			

4 Software

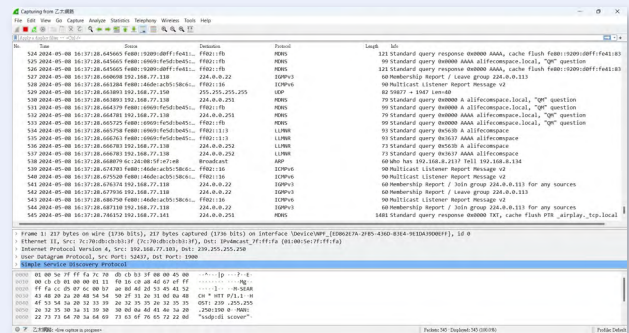
Together with NE6000 4G LTE-A Network Emulator, ALifecom has developed a series of software for different UE testing purposes.

For **Research & Development testing**, the **NE-Series Comprehensive Test Suite (CTS)** serves as a powerful and foundational interface to control the NE6000 LTE-A Network Emulator.

For **production line testing**, the **NE-Series Automated Test Suite (ATS)** elevates efficiency by automating the execution of predefined plans for production line testing. **The NE-Series Intelligent Automated Test Suite (iATS)** represents the pinnacle of automated testing, with enhanced capabilities tailored for multi-device testing scenarios.



In addition, the **Protocol Analyzer** offers real-time insights into the intricate dynamics of protocol message exchanges between user equipments and base stations for enhanced troubleshooting, instantaneous diagnosis, and comprehensive protocol analysis with precision and efficiency.



5 Operation Modes

LTE / LTE-A

NE6000 is designed to replicate the functionality and performance of commercially operated LTE-A networks. By integrating essential network elements such as eNB, MME, S-GW, and P-GW into a single unified platform, the NE6000 facilitates seamless testing and validation of complex network scenarios.

NB-IoT

NB-IoT ensures prolonged battery life without compromising on connectivity. Its flexible deployment options, including stand-alone, guard band, and in-band modes, make NB-IoT an ideal choice for diverse IoT deployment scenarios.

eMTC

Enhanced Machine Type Communication (eMTC) represents a robust cellular technology optimized for IoT applications requiring higher data rates and enhanced mobility support. Operating within a bandwidth of 1.4 MHz, eMTC offers a balance between data throughput and power efficiency, making it suitable for a wide range of IoT deployments.

IoT-NTN

The NE6000 IoT-NTN signaling test solution emulates a complete NB-IoT non-terrestrial network, including the eNodeB and EPC, and features a channel emulator that accurately replicates real-world signal propagation conditions for comprehensive testing and validation of IoT-NTN devices.

The IoT-NTN features a custom interface in the NE-Series CTS that enables the specific NTN related parameters as listed below.

- Satellite type selection
- Gateway and User Terminal position
- Ephemeris Information
- Common T_a
- $K_{\text{offset}} / K_{\text{mac}}$



6 Specifications

General Specifications		Transmission Signal	
Frequency Range	400 MHz – 3800 MHz	Maximum Output level (DL)	-35 dBm
Frequency Bandwidth	1.4/3/5/10/15/20 MHz	Output Level Range (DL)	-95 to -35 dBm @20MHz BW
RF Ports	4	Output Level Accuracy	Level \geq -60 dBm \pm 1 dB, Level \leftarrow -60 dBm \pm 1.5 dB
Operation modes	LTE and LTE-A Cat 1-12 / NB-IOT / eMTC / IOT-NTN	Output Level Resolution	0.1dB
Carrier Aggregation	1 to 4 CA (3 CA and 4 CA requires 2x NE6000)	Output EVM Accuracy	<2%
Antenna Mode	1x1 SISO / 2x2 MIMO / 4x4 MIMO	Access method	OFDMA
Max number of DUTs	4	Modulation method	QPSK/16QAM/64QAM
QoS	GBR/non-GBR and traffic priority		
Security	AES/Snow3G	Received Signal	
Networking	MME/S-GW/P-GW full function	Maximum Input level	+27dBm
Number of PDN	8	Input Level Range (UL)	-40 to +27 dBm
Frequency Resolution	1 MHz	Input Level accuracy	\pm 1.0 dB
Reference Frequency	10 MHz	Access method	OFDMA/SC-FDMA
RF Input/Output Impedance	50 Ω	Modulation method	QPSK/16QAM
Computer Control Interface	Gigabit Ethernet		

Instrument Specifications

Dimensions (H x W x D)	Without handles	100 mm x 440 mm x 480 mm
	With handles	100 mm x 490 mm x 540 mm
Weight	Without handles	9.8 kg, 21.6 pounds
	With handles	10.3 kg, 22.7 pounds
Voltage and frequency	100/120/220/240 VAC, 50/60 Hz, nominal	
Power Consumption	Typ. 75 W, Max = 150 W	
Operating Temperature	10 to 40 °C, < 85 % relative humidity (RH)	
Storage Temperature	10 to 70 °C, < 85 % RH	
Calibration Cycle	12 months (Recommended)	

Regulatory Information

EMC	Complies with the essential requirements of the following standards: <ul style="list-style-type: none"> EN 61326-1:2021, Industrial electromagnetic environment EN 61326-2-1:2021, EN 61000-3-2:2014, Class A EN IEC 61000-3-2:2019+A1:2021, Class A EN 61000-3-3: 2013+A1:2019+A2:2021 EN 55011:2016+A1:2017+A11:2020+A2:2021, Class A EN 61000-4-2:2009/ IEC 61000-4-2:2008 ED. 2.0 EN IEC 61000-4-3: 2020 / IEC 61000-4-3: 2020 ED. 4.0 EN 61000-4-4:2012/ IEC 61000-4-4:2012 ED. 3.0 EN 61000-4-5:2014 +A1:2017 / IEC 61000-4-5: 2017 ED. 3.1 EN 61000-4-6: 2014+AC:2015 / IEC 61000-4-6: 2013 ED. 4.0 EN 61000-4-8:2010/ IEC 61000-4-8:2009 ED. 2.0 EN IEC 61000-4-11: 2020+AC:2020 / IEC 61000-4-11: 2020 ED. 3.0
Safety	Complies with the essential requirements of the following standards: <ul style="list-style-type: none"> IEC 61010-1:2010 + A1:2016
RoHS	Complies with the essential requirements of the European Parliament and Council Directives <ul style="list-style-type: none"> 2011/65/EU on the Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) 2015/863/EU (Phthalates Test) Amendment of the European Parliament and Council Directive 2011/65/EU
WEEE	Complies with the essential requirements of the European Parliament and Council Directives <ul style="list-style-type: none"> 2012/19/EU on the Waste Electrical and Electronic Equipment (WEEE)



Established in 2009, ALifecom has been dedicated to algorithm development, hardware design and software implementations to develop innovative communication testing solutions. The high-quality testing solutions from ALifecom support a range of communication protocols from 5G and NTN to WiFi and Bluetooth. ALifecom provides customers with a customized one-stop solution for functional testing, communication protocols, and RF measurements.

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