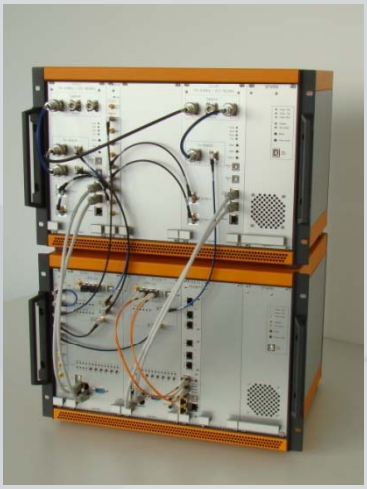
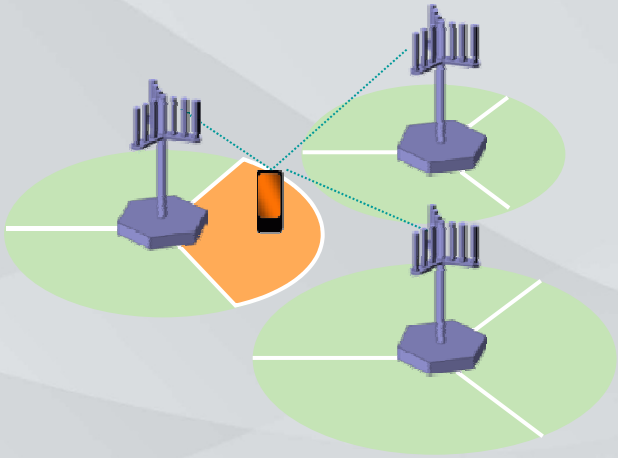
SIGNALION

SORBAS 200 3GPP-LTE Test-UE Solution

for FDD and TDD Operation





The SORBAS 3GPP LTE Test-UE is designed for testing evolving LTE mobile communications infrastructure and networks. It has the capabilities of a 3GPP LTE mobile terminal, with additional advanced test interfaces and features, making it an ideal tool for network infrastructure equipment developers requiring the following:

- PHY, MAC & RLC tests
- IODT and IOT testing
- full feature protocol test (with L3 option)
- Multi-UE & Load testing (with Multi-UE option)
- Monitoring for field trials

Signalion SORBAS 200 3GPP-LTE Test-UE Solution offers an industry-proven LTE infrastructure test solution. Our customers benefit from Signalion's superior test methodology which offers:

Increase Your Cost Efficiency

Reduce your overall T&M costs by reusing the Sorbas Single UE hardware platform for the two different LTE standard variants FDD and TDD.
Avoid the need of different test set-ups by conducting four different test cases with one test system platform:
1. Single-UE functional test,
2. L3 E2E service testing,
3. Multi-UE functional testing,
4. Performance & capacity testing

Shorten Your Time To Market

Along with the Sorbas test platform, Signalion offers test services and support that allows the customer a fast and flexible set-up of complex test applications.

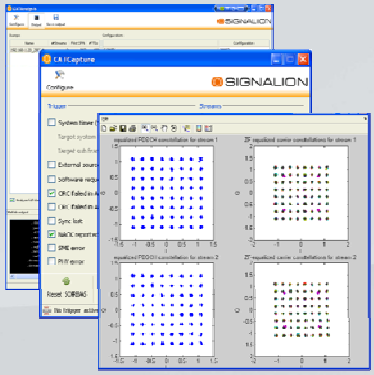
Improve Your Test Quality

by utilising Sorbas for regression testing. Sorbas offers flexible tools dedicated to regression testing. The concept of an open API (Application Programming Interface) supports a seamless integration into customer specific regression testing set-ups.

driving the wireless future

Sorbas Tooling Makes the Difference

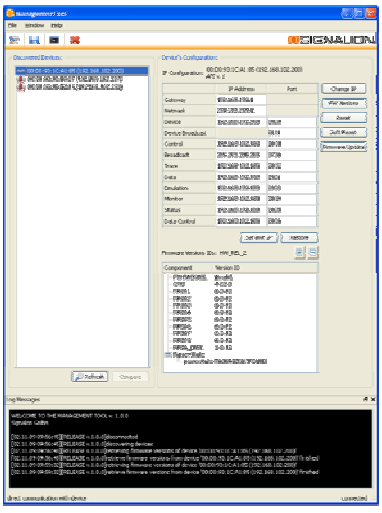
Sorbas 200 CAT (Capture & Analysis Tool)



The Capture & Analysis Tool (CAT) enables your Sorbas200 to provide a world-first protocol triggered PHY monitoring solution for LTE. This tool significantly shortens the time spent locating and fixing bugs and thereby reduces costs in the vital Integration & Verification-Phase. Signalion CAT offers:

•detailed analysis of signals
•simplified error event analysis due to a wide range of monitoring triggers
•significantly shorter cycles for bug tracing and debugging
•advanced Signalion Support by remote evaluation of DL signals
•revolutionary Multi-UE PHY analysis

Detailed analysis of the DL-signals includes (but is not limited to):
•AGC, Time Tracking,
•Synchronization (PSCH, SSCH)
•PBCH, PCCH, PDSCH,
•ACK/NACK
•CRC
•Channel estimation



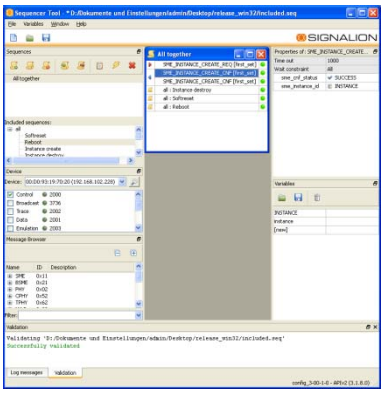
Open LTE API

Sorbas offers a flexible and powerful Open LTE application programming interface (API) for all Layers (L1/2/3) which enables:

- Smooth integration into customer test environments
- Automatic code generation via XML interface description
- Primitives allow for easy-to-use scripting
- Efficient regression test setup

The API is available for all Sorbas systems (single-link & Multi-UE)

Sequence Composer



Sorbas Open LTE API allows an easy integration into customers' test environments based on a generic, primitive-based control of all Sorbas functionalities. This allows complex automatic regression test set-ups as well as manual testing.

The Signalion Sequence Composer is a powerful tool offering a comprehensive graphical user interface to enable the generation of test scripts from scratch as well as the modification of existing scripts. The built-in syntax checker shortens the script generation time significantly by verifying the syntactical correctness of the scripts during programming. Furthermore, the Sorbas Test-UE can be fully controlled via the Signalion Sequence Composer.

- Simple drag & drop creation of message sequences
- Managing sets of sequences
- Simple Sequence parameter selection
- Sequence syntax checking
- Sequence execution
- Generated test sequences can be stored via XML for further use in customer specific test frameworks
- Extra command line tool to embedded sequence execution in customer test setups

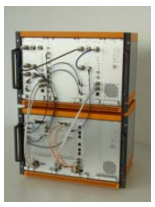
Signalion‘s Services Offering

Customer Project

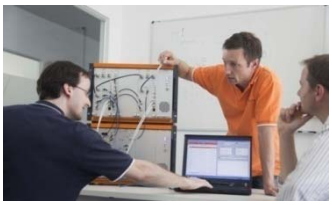
Signalion’s customer work on ambitious LTE infrastructure development projects. Large parts of such projects are dedicated to test & performance measurement. To achieve a short Time To Market (TTM) and the best quality it is vital to have a flexible and powerful test methodology

Reliable Test & Measurement services are often the missing pieces of the puzzle in such projects.
Successful test & measurement methodology does not only rely on the test devices, but also includes complex test plans and well designed test environments. To find a reliable partner that not only offers test devices but also comprehensive test service offerings is often vital for the success of such development projects.

Benefit from Signalion‘s state of the art LTE test solutions



Optimize your test tool usage



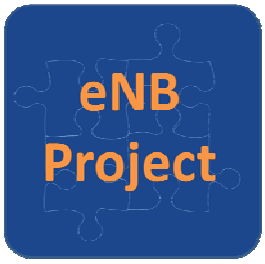
Profit from the competence of one of the LTE testing market leaders

Test Tools: The Foundation: Signalion’s Sorbas Test-UE
- ✓ Sorbas HW platform
- ✓ Sorbas Firmware
- ✓ Sorbas Tools

Product Services
- ✓ Start up assistance
- ✓ Sorbas & eNB integration
- ✓ Sorbas integration into customer test environment(i.e. test automation frame work)
- ✓ On-site or remote test tool support for specific test topics (i.e. interference tests, load/stress tests)
- ✓ Scripting support
- ✓ Shared resources assistance

Testing Services
- ✓ LTE technology training
- ✓ LTE test case definition
- ✓ Test execution – remote and on-site
- ✓ Trouble shooting and RCA – remote and on-site
- ✓ Script provisioning

Signalion supports its customers to develop efficiently and deliver early LTE infrastructure to the operators



driving the wireless future

SIGNALION

TEST SOLUTIONS FOR

- CELLULAR BASE STATION DEVELOPMENT
- WIRELESS FIELD TRIALS
- INTER-OPERABILITY TESTS (IOT)
- NETWORK DEPLOYMENT

SIGNALION IS AN ACTIVE MEMBER OF THE LSTI

Signalion is an active member of the LTE/SAE Trial Initiative (LSTI) supporting activities with measurement and monitoring equipment. The LSTI was launched in May 2007 by leading telecommunications companies.

Signalion was the first test & measurement supplier to join the group and contributes actively to LTE field trials.

STANDARD EVOLUTION

The 3GPP standardisation process continues.

The main features of SORBAS are software defined. On this basis the LTE Test-UE can be adopted to reflect the latest standards extremely quickly.

CONTACT

Signalion GmbH
Am Waldschlösschen 2
D-01099 Dresden, Germany
Fon +49 351 2069310
Fax +49 351 20693111
Mail sales@signalion.com

Sorbas 200 Test UE

ENVIRONMENTAL & SAFETY

Voltage Range:	100 to 250V AC
Nominal Power consumption:	450 VA
AC Frequency range:	50 – 60 Hz
Dimensions :	19" rack with 7 HU (33 cm x 48 cm x 39 cm)
Mass:	17kg
Operating Temperature range:	5°C to 40°C
Humidity	10% to 90% RH (non-condensing)

CERTIFICATION

Safety:	EN 60950-1:2006
EMC:	EN 55022:2001-11. RF Emission Class B, Immunity Table 1.
RoHS:	RoHS-5, Compliant

INTERFACES

Analog IF:	Independent Rx/Tx connector SMA-type (female)
Digital	CPRI
Frequency Reference	10 MHz external reference
LAN	Ethernet (GbE) 1000 Base-T with RJ-45

Sorbas 400 RF-Unit

ENVIRONMENTAL & SAFETY

Voltage Range:	100 to 250V AC
Nominal Power consumption:	100 VA
AC Frequency range:	50 – 60 Hz
Dimensions :	19" rack with 7 HU (33 cm x 48 cm x 39 cm)
Mass:	16kg
Operating Temperature range:	5°C to 40°C
Humidity	10% to 90% RH (non-condensing)

CERTIFICATION

Safety:	EN 60950-1:2006
EMC:	EN 55022:2001-11. RF Emission Class B, Immunity Table 1.
RoHS:	RoHS-5, Compliant

INTERFACES

Analog IF:	Independent Rx/Tx connector SMA-type (female)
Digital	CPRI
Frequency Reference	10 MHz external reference
LAN	Ethernet (GbE) 1000 Base-T with RJ-45

INTERFACES

RF:	up to 4 independent Rx/Tx connector N-type (female)
Frequency Reference:	10 MHz external/internal reference
Transmitter Characteristics:	-40dBm up to 25dBm (depending on configuration)
Receiver Characteristics:	-95dBm up to -5dBm (measured with 10Mhz, Band7, 5%BLER)

AVAILABLE SORBAS TEST-UE OPTIONS:

Basis Option FDD (UE Category 1,2, 3)
High Throughput Option FDD (UE Category 4)
Basis Option TDD (UE Category 1,2, 3)
High Throughput Option FTD (UE Category 4)
Multi-UE (simulation of up to 64 UEs with one Sorbas Test-UE)

DUPLEX MODES
FDD and TDD is supported (Test-UE options)

RADIO FREQUENCY

FDD:	Band 1-14, 17-19 UHF 790-862 MHz (Digital Dividend)
TDD:	Band 33-40 UHF 790-862 MHz (Digital Dividend)

PHYSICAL LAYER FEATURES

Standard Specification:	Signalion will provide ongoing standard adaptation. The UE PHY implementation is according to 3GPP Release 8: TS 36.201 ,TS 36.211 ,TS 36.212 ,TS 36.213 ,
Downlink Characteristics:	OFDM including HARQ; Modulation QPSK, 16 QAM, 64 QAM; SISO, SFBC , RX diversity, 2x2 MIMO
Uplink Characteristics:	SC-FDMA UL Modulation QPSK, 16 QAM,;
Physical Signals & Channels:	P-SCH/ S-SCH / RS; PBCH; PRACH; PUSCH; PUCCH, PDSCH; PDCCH; PCFICH; PHICH SRS;

LAYER 2 FEATURES

Standard Specification:	Signalion will provide ongoing standard adaptation. The UE MAC & RLC implementation according to 3GPP Release 8: TS 36.321, TS 36.322
MAC:	*Channel multiplexing,* *Random Access,* *HARQ support,* *Priority handling,* *Buffer status reporting*
RLC:	*Transparent Mode (TM)* *Unacknowledged Mode (UM)* *Acknowledged Mode (AM);*
PDCP:	*Part of the protocol test Option*
Transport Channels:	*RACH;* *UL-SCH;* *DL-SCH;* *PCH;* *BCH/D-BCH*