ULTIMATE FLEXIBILITY. UNRIVALLED CONTROL.

YOUR TRUSTED PNT PARTNER

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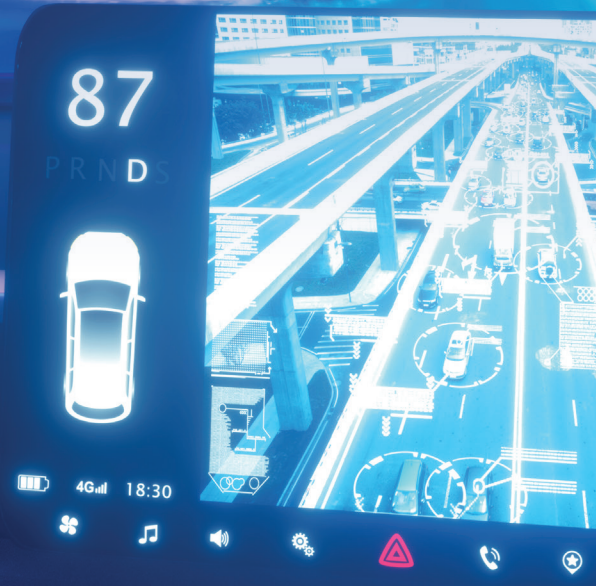
GSS7000 SERIES

MULTI-FREQUENCY, MULTI-GNSS SIMULATOR

Delivering reliable results faster with Spirent's GSS7000 simulation solution

Getting successful products to market demands precise, reliable, and flexible test capabilities. The GSS7000 offers exceptional accuracy, fidelity, and authentic GNSS signal emulation, ensuring true performance at every test stage.

Precision multi-frequency, multi-GNSS simulation: up to 256 channels per system, flexibly allocated across all current and planned GNSS and SBAS signals

Flexible and powerful architecture: built on Spirent's proven architecture for realistic testing and easy upgrade and calibration in the field

Advanced features: embedded multipath, interference and spoofing capabilities deliver comprehensive vulnerabilities testing

Ospirent™
Promise. Assured.

From smartphones to autonomous vehicles, modern applications are demanding greater accuracy and robustness in positioning, navigation, and timing than ever before. The GSS7000 is the ultimate tool for developers of GNSS-enabled consumer products, delivering the flexibility required for comprehensive testing and the true performance needed for reliable results.

Proven Architecture

Employing state-of-the-art technology, refined over five decades of leading the industry, the GSS7000 has been designed and built for PNT testing. This dedicated architecture enables the GSS7000 to maintain the precision specifications for accuracy, synchronization and latency needed to truthfully represent the constellation and operating environment under the full range of specified dynamics.

Uncompromising Signal Generation

Spirent have patented Direct Digital Synthesis (DDS) techniques for generating signals that are 100% representative of the 'truth data'. With the GSS7000, you can be sure that the results you see represent the true performance of the device under test.

Ultimate Flexibility

A highly digital architecture enables real-time configuration of signals generated and in-field upgrades of both hardware and software. In addition, the GSS7000 is designed to work seamlessly with a broad range of additional tools, giving you the flexibility to grow and vary your test capabilities.

Unrivalled Control

Spirent's industry-leading Positioning Application software family enables adjustment of virtually every parameter imaginable - from signal control to bit-level manipulation of the navigation message, to adjustment of models such as orbital parameters and atmospheric errors.

Verified Performance

Spirent signal ICD implementations and performance specifications are verified by external entities.

Advanced Features and Integrations

Embedded Interference

Embedded interference generation capability enables realistic and precise reproduction of in-band interference signals in test lab. It allows users to set transmitter locations, trajectories, and antenna patterns, also enables the customer defined interference signal parameters such as centre frequency, signal modulation and power level:

- 8 transmitters and 16 interference channels in a single chassis
- Maximum power level -47 dBm
- User defined interference transmitter trajectory and antenna patterns

Integrated Spoofing

Spoofing is a growing concern for any safety- or mission-critical application. The GSS7000 enables spoofing test as a licensable capability. Without any additional hardware required, the GSS7000 is capable of simulating real-world spoofing test cases such as meaconing attacks, trajectory spoofing, base station spoofing, and satellite navigation data spoofing.
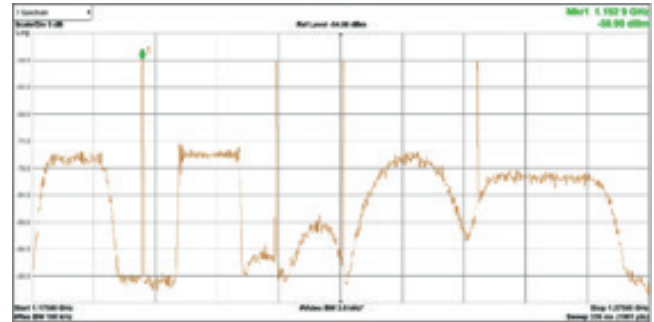
Example of interference signals generated on GSS7000

Sim3D: Realistic multipath and obscuration testing by simulating the impact of the 3D local environment on GNSS signals.

SimSAFE: Evaluate the vulnerability of a receiver to comprehensive spoofing or meaconing attacks, and assess the effectiveness of mitigation strategies.

SimHIL: Integrate the GSS7000 into your hardware-in-the-loop (HIL) set-up using our open and rich interface. SimHIL is preconfigured to work with the leading HIL platforms.

GSS7765: Offering a broad range of interfering signal options, which can be used to represent an array of threat sources, both in-band and out-of-band. Supports high-power interference generation with variable bandwidth and can be configured to support multiple fully independent interference sources.

SimROUTE: Route-matched trajectory generation tool that interfaces with the most popular free mapping tools.

SimINERTIAL Series: Test the operational performance of integrated GNSS/inertial systems with inertial sensor outputs coherently generated to match the simulated vehicle trajectory.

Live-sky Sync Utility: Enabling real, powerful field spoofing tests to be performed with a timing receiver of customer choice, adjusted for a tight time sync between live sky and simulated signals.

"We needed a new approach to R&D testing that combined best-in-class components. By working with Spirent's experts, we have created a system that will help to bring connected cars to market faster."

Antonio Casu
Chief Technical Officer
Italdesign

Key Features and Capabilities

Comprehensive simulation of environmental impacts on GNSS signals ensures that testing with the GSS7000 is truly realistic.

Native Capabilities

Class leading accuracy, fidelity, and reliability: bespoke software-defined radio and optimised RF synthesis and upconversion – high performance testing for high performing products

Embedded interference generation: with the capability to set transmitter locations and trajectories, and signal frequencies, types, and power levels

Trajectory spoofing and nav data spoofing test creation: without the need for any additional hardware

High channel density: up to 256 channels in a single chassis

Simulation Control

Multipath and obscuration: including embedded models, or seamless integration with Spirent's advanced 3D environment modelling tool – Sim3D

Ionospheric and tropospheric effects: multiple configurable models available

Satellite orbital editing: enabling complete control over orbital parameters and induced errors

Satellite clock error and navigation data errors: adding declared and undeclared errors to create a comprehensive test methodology - including recreation of real-world events

Satellite transmit antenna pattern control: unique capability to model gain and phase patterns for different transmission frequencies

Receiver antenna modelling: reception gain and phase pattern control for flexible conducted testing

Remote control: remote control and integration with automation tools via native SimREMOTE API

High Precision Applications

Multi-antenna, multi-vehicle simulation: 6-DOF trajectories from one or two independent RF outputs

Correction support: streaming of RTCM data over RS232 or via in-built NTRIP server interface

Inertial integration: support for Spirent's SimINERTIAL series of products, generating inertial sensor outputs synchronous with GNSS
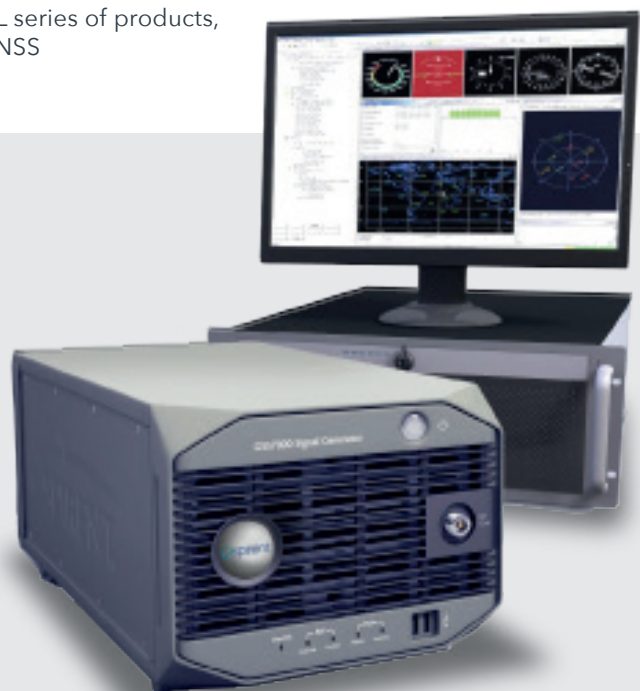
Signal Generation

Generating signals from first principles is the only way a simulator can generate truthful signals with the control developers and integrators need. The GSS7000 generates signals via bit-by-bit generation of the navigation message by full implementation of the relevant SIS-ICD. All the orbital data and ephemerides are calculated to create the perfect truth data that downloaded observed datasets with potential decoding and SIS errors cannot provide.

Available Signals

GPS	L1 C/A, L2 C/A, L5 I/Q
GLONASS	L1OF, L2OF
Galileo	E1 OS, E5 A/B
BeiDou-2	B1I, B2I
BeiDou-3	B1C, B2a, B3I
QZSS	L1, L2, L5, L6
IRNSS	L5

Signal Characteristics

A test instrument must be many times more accurate than the device it is testing. Without this, the performance of the instrument can have a significant and unwanted effect on results. The GSS7000 uses dedicated hardware to accurately represent signals without Introducing artificial phase noise and spurious signal effects to the test, enabling complete confidence and powerful analysis.

Rate

- Simulation iteration rate   100 Hz

Signal Accuracy

- Pseudorange   ±0.003 m
- Pseudorange range   ±0.001 m/s
- Interchannel bias   zero

All signal accuracy specifications are achieved under the highest dynamics and maximum simulation iteration rate.

Signal Dynamics

- Relative velocity   ±30,000 m/s
- Relative acceleration   ±2000 m/s^2
- Relative jerk   ±22,000 m/s²

Signal Quality

- Spurious (Max)   -30 dBc
- Harmonics (Max)   -35 dBc
- Phase Noise (Max)   0.02 rad RMS
- Frequency stability   ±5 x 10-10

Signal Control

- Level control range   +15 dB to -40 dB
- Level control resolution   0.1 dB
- Level control accuracy   ±0.5 dB

"Spirent has world-class products and services, which provide good support for our scientific research and talent training."

Professor Mingquan Lu
Department of Electronic Engineering
Tsinghua University

Americas   Europe   Asia

About Spirent Positioning Technology

Spirent enables innovation and development in the GNSS (global navigation satellite system) and additional PNT (positioning, navigation and timing) technologies that are increasingly influencing our lives.

Our clients promise superior performance to their customers. By providing comprehensive and tailored test solutions, Spirent assures that our clients fulfil that promise.

Why Spirent?

Over five decades Spirent has brought unrivalled power, control and precision to positioning, navigation and timing technology. Spirent is trusted by the leading developers across all segments to consult and deliver on innovative solutions, using the highest quality dedicated hardware and the most flexible and intuitive software on the market.

Spirent delivers

- Ground-breaking features proven to perform
- Flexible and customisable systems for future-proofed test capabilities
- World-leading innovation redefining industry expectations
- First-to-market with new signals and ICDs
- Signals built from first principles – giving the reliable and precise truth data you need
- Unrivalled investment in customer-focused R&D
- A global customer support network with established experts

Contact Us

For more information, visit us on the web at spirent.com/ContactSpirent.

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MCD00367 Issue 3-00 | 06/20