

BROCHURE

# GSS9000 GNSS Simulator

Maximum performance without compromise  
for PNT test environments



## Why Choose the GSS9000?

To develop positioning, navigation and timing systems for military, space, and other high precision applications you require comprehensive, highly sophisticated testing. The GSS9000 GNSS simulator sets a new standard of excellence in future-proofed simulation for R&D and performance testing.

Powered by SimGEN®, and using the latest state-of-the-art technology designed specifically for GNSS signal simulation, the GSS9000 produces a comprehensive range of emulated RF signals with industry-leading flexibility, fidelity, performance and reliability.

- Comprehensive and feature rich SDR simulation
- Full control of all aspects of the GNSS operating environment
- Exact repeatability
- Ability to apply systematic errors and incidents unrealisable with real-world signals

## Key Attributes

### Hardware Configuration

- Single and dual RF versions
- Available with up to 10 outputs for multi-antenna/wave-front and multi-vehicle applications
- Highly flexible configurations selectable via a cabinet of licence keys
- Complete portability of Spirent SimGEN scenarios
- In-field upgradability of principle GNSS functionality and capability

### Performance

- Unrivaled 2000 Hz configurable simulation iteration rate (SIR) and hardware update rate (HUR) – enabling real-time remote control and trajectory delivery
- Precision simulation of high dynamic motion with ultra-low latency
  - 120 km/s relative velocity
  - 193 km/s<sup>2</sup> relative acceleration
  - 890km/s<sup>3</sup> relative jerk
  - 60π rad/s angular rate
- 0.3 mm RMS pseudorange accuracy
  - 0 mm uncertainty due to inter-channel bias
- Full signal performance specification met under all simulation conditions

### Modeling

- Full satellite constellation ephemeris and almanac
- Real-time injection of RINEX data for close alignment to live-sky signals
- Multiple options for multipath
- Tx and Rx antenna gain and phase pattern
- Lever arm effects
- Ionosphere and troposphere
- DGPS corrections
- Pseudorange ramps for RAIM and spoofing testing
- Vehicle motion

### Flexibility

- On-the-fly reconfiguration of constellations and signals
- Extensive real-time plotting, bulk logging and streaming of all scenario truth data
- Optional - embedded spoofing simulation
- Flexible signals – enabling users to set up and control non-current SIS ICD PRN codes, nav data content/rate, chipping rate, edge shaping and modulation types
- Embedded interference capabilities supporting signals such as CW, FM, AM, PM, AWGN, BPSK or CW Pulse
- Generation of in-band non-GNSS signals from I/Q data files

### Global Support

- Regional technical support center network
  - Email
  - Online
  - Phone
- Regular software upgrades
- Application notes and test methodologies via online knowledge base
- Test scenario packs
- Professional GNSS testing services



## Full Signals Capability

Whether testing with multiple signals from a single constellation, or testing hybrid systems with signals from multiple constellations, the GSS9000's flexible modular design is easily user-configurable to meet all needs.

Select any combination of signals from:

Constellation	Carrier	Standard Signal Types	Optional Signal Types
GPS	L1	C/A, L1C Data/Pilot, P, M Noise, Pseudo Y, GTx	Y*, MNSA*, AES-M* and SDS M-code via data server*
	L2	L2c, P, M Noise, Pseudo Y, GTx	Y*, MNSA*, AES-M* and SDS M-code via data server*
	L5	I, Q	
Galileo	E1	PRS Noise, OS Data/Pilot	PRS[WARE]*†
	E6	E6-A, E6-B, E6-C	PRS[WARE]*†, CS Data/Pilot (with encryption)*
	E5ab	E5a Data/Pilot, E5b Data/Pilot	
GLONASS	L1	C/A, P (Chan No. -7 thru +6)	
	L2	C/A, P (Chan No. -7 thru +6)	
BeiDou	B1	B1I	
	B1	B1C	
	B2	B2I, B2B	
	B2	B2a	
	B3	B3I	
QZSS	L1	L1S, C/A, L1C	
	L2	L2c	
	L5	I, Q, S	
	L6	L61/L62	
SBAS	L1	C/A	
	L5	I	
NavIC	L5	C/A	S, RS*

\* For authorized users only.

† Available via third-party solution.

Your GSS9000 can be field-upgraded to meet your evolving test needs.

## Features and Capabilities

Increasingly, GNSS receivers and sensors do not operate in isolation. To support the evolving needs of GNSS developers, the GSS9000 has an extensive range of features and capabilities, including:

**GPS/inertial testing:** The GSS9000 enables testing of integrated and embedded GPS/inertial systems via its SimINERTIAL capability. By simulating GNSS signals and inertial sensor outputs concurrently, the GSS9000 brings multi-sensor testing into the lab.

**Classified GPS testing:** The GSS9000 enables authorized users to test using classified GPS signals. This includes GPS Directorate approved MNSA M-Code testing, AES M-Code and server-based SDS M-Code testing, as well as SA/A-S simulation for the testing of SAASM equipment with Y-Code.

**Classified Galileo testing:** Through Spirent's established partnership with Fraunhofer IIS, the GSS9000 is able to facilitate testing of Galileo's secure PRS signals.

**Realistic 3D test environments:** Assess the impact of multipath and obscuration effects on GNSS signals based on a virtual 3D local environment.

**Interference testing:** The GSS9000 offers a broad range of high-power interfering signal options and can be configured to support multiple fully independent interference sources. It also supports noise generation with variable bandwidth.

**Remote control:** In addition to its native Ethernet remote control facility, the GSS9000 can be configured to utilize GPIB and SCRAMNet, enabling input and output of simulation, signal control and external 6DOF motion data. Users can also take advantage of comprehensive APIs for Labview, C++ and other common programming languages and test environments.

**Spoofing testing:** Generate spoofing scenarios in SimGEN®, such as trajectory spoofing, navigation data spoofing and meaconing attacks. Simulate up to 4 independent spoofer in a given scenario, each of them allowing user definition of up to 64 spoofer transmitters and their location (absolute or vehicle relative), spoofer power level selection, false vehicle position (spoofed position) and spoofing signal content selection, including navigation data and errors.

**Custom waveform I/Q:** Generate and replay I/Q files containing in-band GNSS signals, interference, noise or custom waveforms.

## Environmental Social & Governance (ESG)

Spirent's Positioning Technology business unit has been committed to ESG good practice and improvement since achieving ISO14001:2015 Environmental Management System certification in 2004.

ESG is a priority for Spirent across all aspects of our business, from sustainable buildings and sustainable product design to sustainable supply chain, manufacturing and shipping/export processes. As is best practice, we follow a continuous improvement process in respect of ESG.

Many of Spirent's test solutions rely on physical test equipment used in situ by our customers. We are working to reduce the lifecycle impacts of our products, and the environments in which they are used, in a number of ways:

- Designing for environment and end of life, including compliance with all legal requirements;
- Reducing the size, weight, noise and power use of our products;
- Virtualization and the development of Test-as-a-Service via PNT Professional Services;
- Improving utilization and automation; and
- In-field servicing and upgrades.

We use formal sustainability metrics in the product development process.

For more specific information on how ESG applies to our PNT test solutions, please contact your Spirent representative. For more information on Spirent initiatives, visit <https://corporate.spirent.com/sustainability>.

### 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 and assurance solutions, Spirent assures that our clients fulfill that promise.

### Why Spirent?

Across five decades Spirent has brought unrivaled 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 customizable SDR technology 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
- Unrivaled investment in customer-focused R&D
- A global customer support network with established experts



**INVESTORS IN PEOPLE**  
We invest in people Platinum



### About Spirent Communications

Spirent Communications (LSE: SPT) is a global leader with deep expertise and decades of experience in testing, assurance, analytics and security, serving developers, service providers, and enterprise networks. We help bring clarity to increasingly complex technological and business challenges. Spirent's customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled. For more information visit: [www.spirentfederal.com](http://www.spirentfederal.com)

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