



GSS9000 Series

The very best in performance, flexibility and capability for GNSS developers and testers



GSS9000 Series

GNSS Simulation System

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 enhanced GSS9000 Series multi-frequency, multi-GNSS RF constellation 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 enhanced GSS9000 Series produces a comprehensive range of emulated RF signals with industry-leading flexibility, fidelity, performance and reliability.

Space-Borne Receiver Testing for Earth-Moon Missions

Developing and testing an Earth to Moon GNSS-based receiver has its challenges: in high altitudes, GNSS signals can be very weak; the satellites are obscured by earth; and there is no augmentation system readily available. Moreover, the spacecraft is travelling with very high dynamic motion. These scenarios can be simulated realistically using the GSS9000 due to:

- Spacecraft dynamics (6DOF) simulation with a high simulation iteration rate (1 KHz)
- Signal power and delay control for high-altitude orbits
- Trajectory control, with modelled Earth, Sun, Moon and atmospheric drag gravitational effects

GSS9000

GNSS Constellation Simulator



Key Attributes

Performance

- 1000 Hz 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/s² relative acceleration
 - 890 km/s³ relative jerk
 - >60π rad/s angular rate
- 0.3 mm RMS pseudorange accuracy
- Full performance specification met under all simulation conditions

Modeling

- Full satellite constellation ephemeris and almanac
- Extensive multipath
- Tx and Rx antenna gain and phase pattern
- Lever arm effects
- Ionosphere and troposphere
- DGPS corrections
- Pseudorange ramps for RAIM testing and spoofing
- Vehicle motion

Unrivalled 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

Features

- Up to 320 channels in one chassis
- Highly flexible configurations selectable via a cabinet of licence keys
- Single or Dual RF composite output versions
- Support for CRPA/Wavefront testing applications (via a special 'GSS9790' mode of operation)
- Complete portability of Spirent SimGEN scenarios
- In-field upgradability of principle GNSS functionality and capability
- On-the-fly reconfiguration of constellations and signals
- Multi-copy constellations—up to 10 copies of any licenced constellation can be created for sophisticated spoofing testing
- Two vehicle trajectories can be specified at one RF output to easily orchestrate-trajectory spoofing and meaconing
- Flexible signals—enabling users to set up and control non-ICD GNSS signals (PRN codes/rates, nav. data content/rate, edge-shaping and modulation types)
- Extensive real-time plotting, bulk logging and streaming of all scenario truth data

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 configured by the user to meet all requirements.

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	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	PRS Noise, CS Data/Pilot (without encryption)	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	
	B2	B2a	
	B3	B3I	
QZSS	L1	L1S, C/A, L1C	
	L2	L2c	
	L5	I, Q	
	L6	D/E	
SBAS	L1	C/A	
	L5	I	
NavIC	L5	BPSK	S, RS*

* For authorized users only.

† Available via third-party solution only.

‡ Ground-based interference transmitter (embedded in the chassis)

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

Extensions and Options

Increasingly, GNSS receivers and sensors do not operate in isolation. The GSS9000 has been designed to operate with all of Spirent's extensive range of options and system extensions, ensuring all additional signals are reproduced coherent with GNSS.

SimINERTIAL™: Operational performance of integrated GPS/inertial (IGI) navigation systems can be established in the laboratory using real-time emulation of the inertial sensors' outputs. All signals are coherently generated to exactly match the simulated vehicle trajectory. Typical inertial sensor performance can be represented by a sensor error model driven by the simulated motion, with appropriate coefficients entered by the user.

SimMNSA™: Supporting MNSA M-Code testing, approved by the GPS Directorate.

SimMCODE™: AES M-Code testing with SimMCODE, and server-based SDS M-Code testing.

SimCLASS™ / SimSAAS™: Providing SA/A-S simulation for the testing of SAASM equipment with Y Code.

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

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

SimREMOTE™: Extend the GSS9000's native Ethernet remote control facility to include GPIB and SCRAMNet. Allows input and output of simulation, signal control and external 6DOF motion data.

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

Flexibility and Connectivity

The GSS9000 is designed for real-world testing environments, with a wide range of both analogue and digital interfaces.

- Low-level RF outputs are supplemented by high-level RF inputs and outputs for monitoring and signal injection
- Digital interfaces include IEEE-488, Ethernet and SCRAMNet GT
- Extensive timing, trigger and remote control capabilities

About Spirent Federal

Spirent provides simulators that incorporate the highest levels of quality, accuracy, fidelity, and reliability with unparalleled performance and customer support. Spirent Federal continues to support US Government and its contractors by being the first to provide the new GPS/GNSS signals as they become available. Find out why lab after lab trusts Spirent.

Why Spirent?

With experience gained over more than 30 years of supporting GNSS development, our systems offer the proven performance and reliability our customers demand. They have been successfully deployed globally in over 50 countries and approved by all major GNSS design authorities

Spirent offers:

- Comprehensive features as standard
- Highly extensible and future-proofed solutions
- Ongoing investment in cutting edge developments and continuous improvements
- Quality systems backed up by a global support network
- Tailored Solutions capability to support special applications and configurations
- Large team dedicated to implementing new signals and ICDs

ISO 9001:2008
ISO 14001:2004
OHSAS 18001:2007

ISO/IEC 17025:2005
The GSS9000 is calibrated to the ISO 17025 standard at the time of delivery.



Contact Us

For more information call us today at 801-785-1448 or visit us on the web at www.spirentfederal.com

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