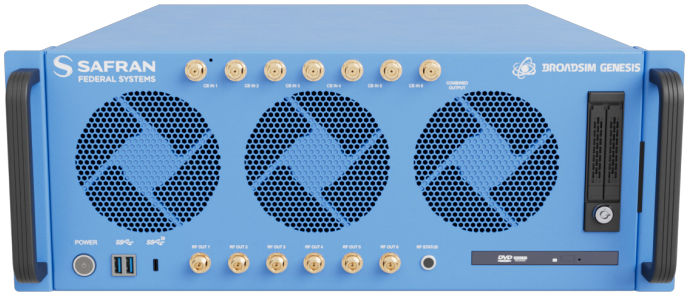
BROADSIM GENESIS

Advanced NAVWAR Simulator



Safran Federal System's BroadSim Genesis represents the next generation of advanced GNSS simulation, building on the legacy of the BroadSim. As part of Safran's Skydel-based simulator family, it delivers expert-level positioning, navigation, and timing (PNT) testing in a powerful yet intuitive turnkey solution.

Powered by a high-performance GPU, BroadSim Genesis is designed to meet the demands of today's most complex and dynamic Navigation Warfare (NAVWAR) testing scenarios. It features six high-quality front-facing RF outputs, supporting full GNSS bandwidth coverage. With a 1000 Hz simulation iteration rate, support for high dynamics, real-time synchronization, and all-in-view satellite simulation, it sets the standard for performance and precision.

Whether you're developing next-gen systems, conducting NAVWAR testing, or integrating multi-vehicle and multi-antenna setups, BroadSim Genesis provides the high fidelity and scalability needed for mission-critical applications.

Why Choose BroadSim Genesis

BroadSim Genesis is redefining GNSS simulation with unmatched flexibility, cost-effectiveness, and rapid development cycles. Powered by Safran's Skydel simulation engine and commercial off-the-shelf (COTS) software-defined radios (SDRs), it delivers high-performance GNSS signal generation at a fraction of the cost of traditional industry solutions.

By enabling simulation of military and multi-constellation signals on scalable COTS hardware, BroadSim Genesis offers exceptional value, accelerates time to market, and ensures adaptability for evolving test needs.

Quad Frequency NAVWAR Support: Simultaneously simulates four GNSS frequency bands with integrated jamming and all-in-view spoofing capabilities that are critical for testing resiliency.

2000+ Signal Performance: GEO, MEO, or LEO BroadSim Genesis provides the GPU power to simulate it all.

Military GPS Simulation: Facilitates secure and effective MGUE testing with Y-Code or M-Code (AES, MNSA, or SDS), ideal for classified testing environments.

Safran Federal Systems is the trusted Resilient PNT mission partner to U.S. government and defense organizations, from the lab to the field.

Key Simulation Features

- 1000 Hz simulation iteration rate. Enables highly accurate dynamic GNSS environment modeling, crucial for high-speed aerial and terrestrial navigation applications.
- Advanced Jamming and Spoofing Capabilities. Allows for the creation of complex interference and spoofing scenarios, ensuring GNSS equipment maintains functionality and security in electronic warfare conditions.
- Live Sky Synchronization. Provides real-time emulation of GNSS environments, including satellite positions, transmitted data, and timing, essential for accurate and current operational condition testing.

Signal Propagation & Errors Simulation

Propagation Effects:

- Multipath. Simulates signal reflections from surfaces to test receiver performance in complex environments.
- Ionospheric and Tropospheric Models. Includes atmospheric models to simulate signal delay and phase shift for testing GNSS accuracy under varied atmospheric conditions.
- Terrain Modeling. Assesses the impact of terrain on signal propagation, crucial for operations in geographically diverse settings.

Error Introduction and Management:

- Additive Pseudorange Ramps and Ephemeris Errors. Introduces gradual range and satellite position errors to assess receiver robustness.
- Satellite Clock Error Modification and Navigation Message Errors. Tests receiver resilience to timing inaccuracies and corrupted data messages.
- Antenna Pattern Models. Evaluates how different antenna designs influence signal reception and overall system performance.

Signal Dynamics

- Max Relative Velocity: Up to 1,500,000 m/s, enabling simulation of extremely high-speed objects such as missiles and space vehicles.
- Max Relative Acceleration and Jerk: No limits, facilitating accurate modeling of dynamic objects undergoing rapid changes in speed and direction.

Receiver Trajector Simulation

- Diverse Trajectory Options: Includes static, circular, car trajectories with integrated maps, and spacecraft orbits (LEO/GEO), enhancing the realism and applicability of simulations.
- Import Capabilities: Allows for the import of arbitrary tracks/routes from formats like NMEA, CSV, or KML files, offering flexibility in testing scenarios.
- Hardware-in-the-Loop (HIL): Supports real-time integration with hardware, crucial for systems testing and validation.

System Performance and Integration

- Operating System: Custom Linux designed for enhanced security and performance, ensuring reliable operation under various testing conditions.
- Low-Latency Hardware-in-the-Loop (HIL): Achieves latency as low as 10 milliseconds with zero effective latency, crucial for real-time feedback in integrated testing setups.
- Flexible Licensing & Upgradability: Offers scalable solutions to meet evolving project demands and technological advancements.
- Comprehensive and Intuitive API (Python, C#, C++): Facilitates custom scenario development and automation for streamlined integration into larger test frameworks.
- IQ File Generation: Supports recording and playback of raw signal data for in-depth analysis and system validation.

Hardware

Feature	Description
Physical Dimensions	4U Rack Mounted: Width 19 in, Height: 7 in
Power Consumption	1600 Watts
Inputs	10 MHz, 1 PPS, GPS Ant
Frequency Range	32 to 3225 MHz
Instantaneous Bandwidth	Up to 100 MHz
Transmit Channels	4 or 6

Signals

Thanks to the Skydel engine, BroadSim Genesis can simulate all constellations and frequency bands. The BroadSim Genesis is equipped with six RF outputs, allowing for simultaneous simulation of four different frequency bands including integrated threat transmitters. This capability allows users to create the most advanced NAVWAR scenarios with 100+ custom jammers and multiple all-in-view spoofers to fully test the resiliency of the PNT system.

- GPS Open: L1C/A, L1C, L1P, L2P, L2C, L5
- GPS Encrypted: P(Y) Code, M-Code (AES, SDS, MNSA)
- GLONASS: G1, G2
- BeiDou: B1I, B1C, B2I, B2a, B3I
- Galileo: E1, E1B-OS-NMA, E5a, E5b, E5-AltBOC, E6HAS
- QZSS: L1C/A, L1C/B, L1C, L1S, L2C, L5, L5S, L6
- SBAS: L1, L5 - WAAS, EGNOS, MSAS, GAGAN, SDCM
- NavIC: L1, L5, S
- PULSAR: X 1, X5, XL
- Alternative Navigation
- Custom Signals
- Custom Constellation

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