orolia

POWERED BY skydel

The Global Leader in Resilient **PNT**

GSG-7 Advanced GNSS Simulator

High Performance and Capability Made Easy

Advanced Performance Made Easy

GSG-7 is the newest positioning, navigation, and timing test solution offered through Orolia's family of Skydel-based simulators.

GSG-7 delivers the highest standard of GNSS signal testing in a cost-effective, easy-to-use, turnkey form factor supporting the growing need for location-aware applications and systems that require navigation or timing.

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The GSG-7 GNSS simulator features high-end performance with a 1000 Hz simulation iteration rate, high dynamics, real-time synchronization, and simulation of all-in-view satellite signals.

The GSG-7 is ideal for development and integration projects that require high performance and an increased number of constellation licenses and satellites in view for a single antenna or trajectory.

GSG-7 supports multi-constellation and multi-frequency GNSS simulations. Powered by our industry-leading Skydel simulation engine, GSG-7 can be programmed to simulate operations with all current and future GNSS signals.

GSG-7 can also incorporate proprietary signals with a comprehensive SDK, which allows the generation of even the most sensitive signals.

GSG-7: High Capability. Software-defined

GSG-7 is redefining GNSS simulation with its easy-to-use, advanced simulation capabilities and extraordinary flexibility. Using the robust and innovative 1000Hz Skydel software engine and commercial-off-the-shelf (COTS) software-defined radios (SDRs), GSG-7 easily outperforms the competition. It can accommodate nearly any configuration to conduct system testing and simulation.

GSG-7 Benefits

- Flexible software-defined platform
- Future proof design
- Supports all GNSS constellations
- Robust, integrated automation
- Easy and powerful HIL integration
- User-defined waveforms
- Supports aerospace simulations:
  - Ultra-high dynamics trajectories
  - High iteration rates
  - Orbit simulations

The leveraging of COTS SDRs and GPUs permits easy customization and maintenance, while reducing costs. More affordable than other options on the market, the GSG-7 delivers precision and performance for your critical programs. In addition, the GPU provides signal generation processing power, with 150 to 225 signals (depending on signal complexity) generated simultaneously.

Automate in Seconds

The unique and modern architecture of the Skydel simulation engine provides an extensive application program interface (API) to configure and control all aspects of the simulator. The open-source client API is available in a wide range of programming languages such as Python, C#, C++ and LabVIEW. Moreover, all human and machine interactions with the simulator are instantly recorded and can be exported as executable python scripts, which greatly simplifies the work of test engineers who want to automate or expand the simulator's capabilities.

Furthermore, all scripts, configurations and scenarios created on a Skydel-powered simulator, are portable to any other Skydel platform.

GSG-7 Key Features

- Small size – 2U Rack-Mountable or Bench Top
- All MF/MC Signals via Composite Port
- Available in three configurations with up to 3 SDRs
- Nanosecond-level synchronization between RF bands
- High-end RF quality

Skydel features and capabilities

Skydel Key Features

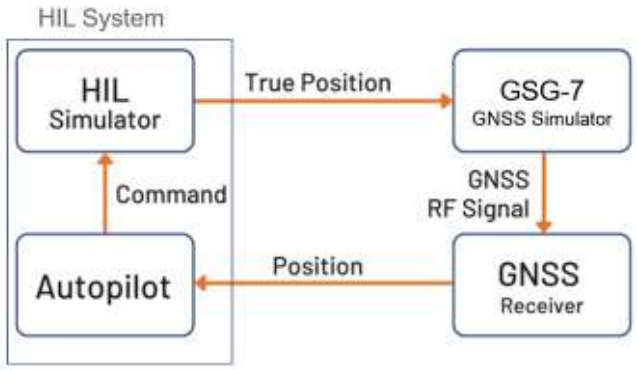
- All-in-view satellites simulation
- 1000Hz simulation iteration rate
- Low-latency HIL
- Live sky time synchronization
- On-the-fly scenario reconfiguration
- Flexible licensing
- In-field software upgradability
- High-end performance (precision, resolution, ultra-high dynamic motion)
- Simulate hundreds of satellites in real-time using off-the-shelf graphics cards (GPU)
- Comprehensive and intuitive API (Python, C# and C++ open-source client)
- IQ file generation
- Scalable and highly flexible architecture using software-defined radios

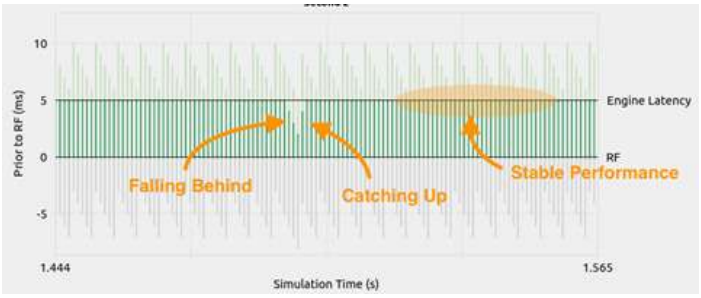
Signal Propagation and Errors Simulation

- Multipath and standard models
- Additive pseudorange ramps
- Satellite clock error modification
- Navigation message errors
- Multiple ionospheric/tropospheric models
- Antenna pattern models
- Relativistic effects
- Pseudorange/ephemeris errors

Advanced Hardware-in-the-Loop

Advanced HIL was designed to dramatically reduce Skydel integration time within a complex environment. With a simple, yet powerful API, built-in performance monitoring tools, and an industry-leading zero-effective latency, the GSG-7 ensures the best performance in even the most stringent applications.





Above: Skydel real-time HIL monitoring

Signals

- GPS: L1-C/A, L1C, L1-P, L2-P, L2C, L5
- NavIC L5
- Galileo: E1, E5a, E5b, E5AltBOC, E6HAS
- BeiDou-2: B1, B2
- BeiDou-3: B1C, B2a
- QZSS: L1-C/A, L1S, L2C, L5, L5S
- GLONASS: G1, G2
- SBAS L1/L5: WAAS, EGNOS, MSAS, GAGAN, SDCM
- Custom signals

Signal Specifications

- Maximum bandwidth (per radio) 100 MHz
- Pseudorange accuracy - ±0.001m
- Pseudorange rate - ±0.001m/s
- Inter-channel bias - zero
- Spurious transmission < -65 dBc
- Harmonics < -50 dBc
- Phase noise: < 0.003 rad RMS*
- Signal Dynamics
  - Maximum relative velocity: 1,500,000 m/s
  - Maximum relative acceleration: No limits
  - Maximum relative jerk: No limits
- 1000 Hz iteration rate
- RF Signal Level (GNSS)
  - Power accuracy: +/- 0.5dB
  - Output reference power: -80 to -50 dBm, 0.1dB resolution*
  - Dynamic range (relative to reference power):
  - 45 to +30 dB
  - Total range: -125 to -20 dBm

Oscillator Performance

- Frequency accuracy: < 100 ppb
- Recommended warm-up time: 30 min
- Minimum operational warm-up time: 5 min

Skydel Plugins

- SKY-PLG-IMU – Inertial sensors emulation.
- SKY-PLG-RTK – RTCM message generation via virtual basestation.
- SKY-PLG-SDK – Plugin SDK allows the creation and integration of custom plugins for Skydel.

Base Configurations

- GSG-711 – GNSS Simulator with 1 RF band and 1 GPU
- GSG-721 - GNSS Simulator with 2 RF bands and 1 GPU
- GSG-731 - GNSS Simulator with 3 RF bands and 1 GPU

Included with Instrument

- Quickstart Guide
- N-Type-SMA RF Cable

Optional Features

- SKY-HIL – Hardware-in-the-loop mode allows input of vehicle trajectory information in real-time.
- SKY-EXLI – Extended Limits allows simulation of vehicle speeds greater than 600m/s.
- SKY-IQFILE – IQ File, allows saving of generated IQ data to file
- SKY-CSI – Custom signal injections, allows real-time simulation of user-defined GNSS signals (custom modulation and navigation message).

Physical Specifications

Certifications

Safety:

- EN/IEC 61010-1:2010
- ROHS2, 2011/65/EU Emissions
- 2011/65/EU & Amendment 2015/863 EU on the Restriction of Hazardous Substance (RoHS3)
- EN 61326-1:2013
- EN 55011:2009/A1:2010
- FCC Part 15 Subpart B Class A, ICES-003 Issue 6
- AS/NZ CISPR 32:2015
- EN61000-3-2:2014, EN61000-3-3:2013

Compliance:

CE

Interfaces

- RF output: N-Type
- 10 MHz output: BNC
- 1 PPS output: BNC
- 10 MHz input: BNC
- 1 PPS input: BNC
- Antenna input: SMA
- HDMI, USB, Ethernet ports

Dimensions

- Size: 2U
- Weight: 11.5 kg (25 lbs) estimated
- Width: 48 cm (19 in)
- Depth: 41 cm (16 in) estimated

Environmental

- Temperature – +0C to +30C (operating), -15C to +50C non-condensing @ 12,000m (storage)
- Humidity 10% to 70% (non-condensing)

Power

- Line voltage – 100-240VAC, 50-60Hz
- Power consumption – 400W

Warranty and Support

All systems are provided with a three-year hardware warranty and one-year software support. Software support includes:

- Software updates
- Engineering support
- Email support
- Phone support
- User forums

As with all Orolia products, phone and email support are always available, regardless of your support contract status.

Ext Warranty – Extends Hardware warranty over 3-years

SKY-SSUP – Extends Software support

29 September, 2022

* GSG-7 Specifications subject to change or improvement without notice