Spirent **Sim3D**

Realistic Multipath and Obscuration Simulation– Simulating the Impact of the Local Environment on GNSS Signals

Features:

- Supports all constellations, frequencies, and codes currently simulated by Spirent
- The signal code, carrier, and power are manipulated based on interaction with the environment
- Supports static and dynamic scenarios
- Up to 31 multipath signals per line of sight (LOS) simulated
- Up to 6 reflections per multipath computed
- Ability to generate your own 3D models
- Import externally generated models and objects
- Multiple 3D models are included
- Dynamic trajectory generation
- Support for a scene size of up to 5km 2—or greater for highway scenes
- Unprecedented level of control
  - Obscuration mode on/off
  - Multipath on/off
  - Number of reflections per multipath signal
- User-defined filtering algorithms to simulate only multipath in chosen delay/power ranges
- Visualise the multipath direction of arrival
- Building and object materials are modelled and taken in to account during the computation
- Support for hardware-in-the-loop setups
- Generate GNSS reception heat maps for mission planning
- Import user antenna patterns—with RHCP/LHCP polarisation

Verify Positioning Performance in a True-to-Life Synthetic Environment

Obscuration, as well as the reflection and diffraction of signals known as multipath, can be one of the main sources of error in a GNSS receiver. Multipath errors can vary from a few metres to hundreds of metres according to satellite geometry and the receiver environment. The characterisation and study of multipath is complex but important, as its effects need to be compensated for in most positioning, navigation, or timing solutions.

Sim3D is an innovative real-time system that enables the reproduction of an authentic multipath environment. The system combines a state-of-the-art GNSS simulator and an advanced GNSS propagation model. The propagation model relies on a 3D scene of the environment, which is used to generate the multipath and obscuration signature that strictly depends on the location of the receiver's antennawhether static or dynamic.

Sim3D enables testing in fully customisable environments, ranging from deep urban to dense forest to highway. With a wide range of models available, and the ability to build and introduce your ownincluding true-to-life buildings, cars, pedestrians, and treesthe level of detail is completely in your control.

Working in conjunction with Spirent's GSS7000 or GSS9000 simulators, and our industry leading positioning software platform, Sim3D enables testing using a broad range of signals.

Users working in the development, integration, or verification of the full range of GNSS-enabled products are able to verify product performance under controlled, repeatable, and true-to-life conditions.

Benefits:

Realistic Multipath and Obscuration Simulation

Multipath and obscuration is simulated based on a synthetic 3D model. Real-life locations can be regenerated and used in simulation to recreate the multipath signature of that location. In addition, traffic, crowd, and other objects are used in the simulation to provide a level of realism not available in any other product in the market.

Ability to Simulate Real Life Applications

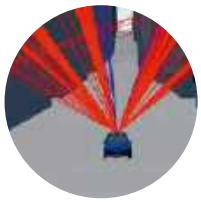
Define your antenna carrier as a vehicle or pedestrian, then position your antenna relative to the carrier centre of gravity. The multipath and obscuration are computed considering the antenna carrier body position and motion. This provides valuable insight for optimising the location of the antenna for optimum performance.

Better Level of Control and Analysis

Sim3D provides a level of control not available in any other multipath/obscuration simulation approaches. Choose which constellations to simulate, the number of satellite to simulate, the minimum satellite elevation, and much more.

Fully Verified with Real-Life Data

The performance of Sim3D simulation relative to field data has been exhaustively assessed, with good indicative results shown.

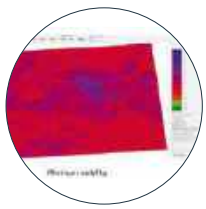


Full Level of Customisation

Sim3D enables you to create your own 3D models with the level of accuracy desired. Many generic 3D model formats are supported using provided convertors, meaning existing or purchased models can be easily imported.

Generate Heat Maps

Improve mission planning and productivity by identifying areas of compromised GNSS reception in modeled environments.



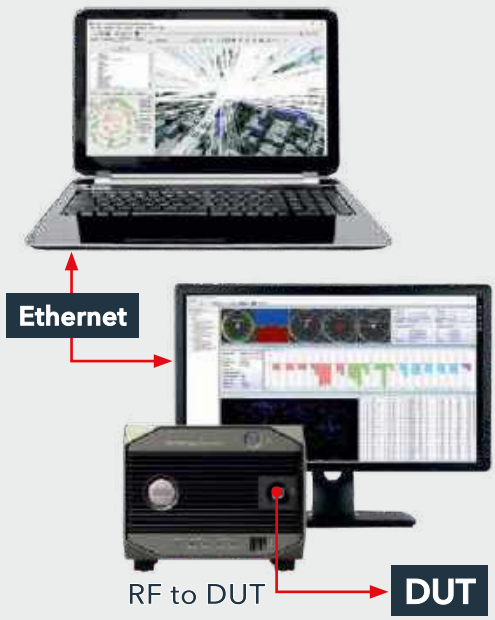
PosApp Sends in Real-Time at each Epoch:

- Satellite and signal information
- Vehicle/antenna location
- Vehicle/antenna attitude

The Sim3D GNSS Propagation Model Computes in Real-Time:

- Signal Power (LOS/NLOS)
- Code offset (NLOS)
- Carrier offset (NLOS)
- Azimuth and Elevation (NLOS)

PosApp controls multipath channels and output RF to the DUT according to the provided data.



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.

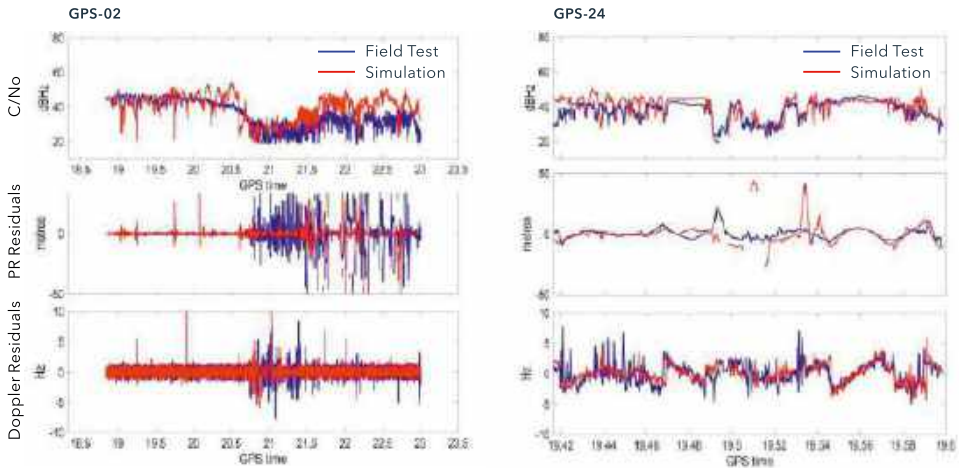
Spirent's customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled.

For more information, visit: www.spirent.com

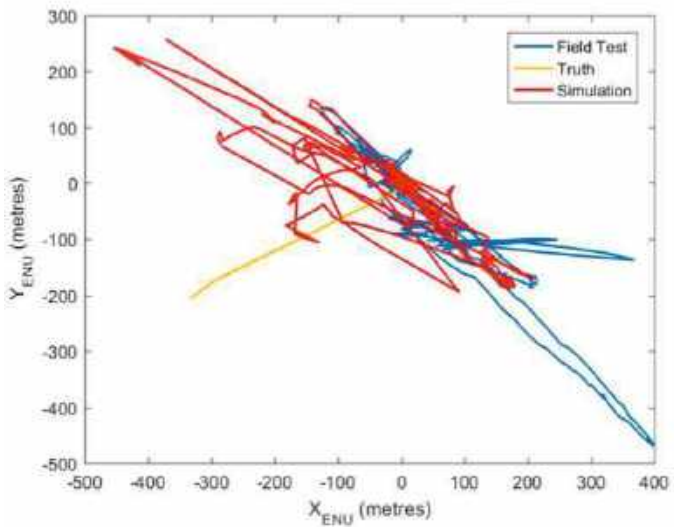
True-to-Life Validation

To establish the true value of Sim3D over the existing multipath testing methodologies, Spirent carried out extensive validation testing. The failure of older technologies is the inability to recreate a truly realistic environment, so overcoming this was the benchmark we set.

We collected field data from San Jose and San Francisco, California, and then recreated the environments in Sim3D. Signals simulated in the virtual environment were then compared to the recorded field data, demonstrating strong indicative results, and even close correlation in many cases.

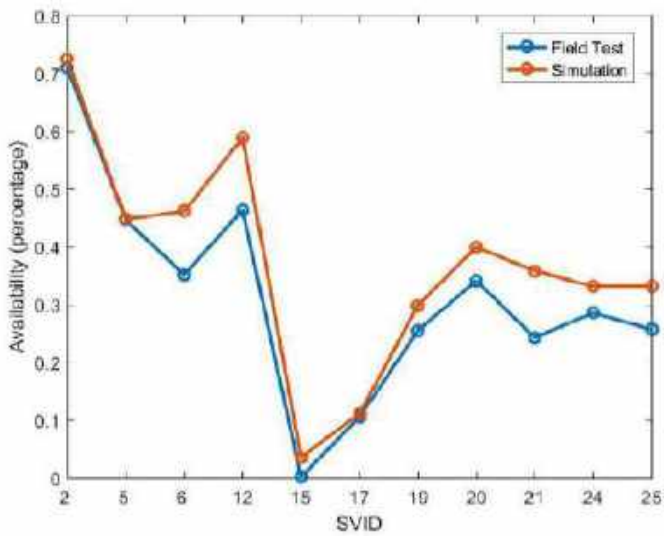


Static Scenario



Static Scenario—Positioning Error

Dynamic Scenario



Static Scenario—Satellite Availability