RF SIGNAL ENVIRONMENT GENERATION

Ensure better communications system performance and development savings with realistic RF signal environment generation

Complex Signal Generation

As the world's RF signal environment grows increasingly complex and diverse, today's Intelligence, Surveillance and Reconnaissance (ISR) and Communications systems must be able to perform in the midst of extreme signal depth and diversity. With Viasat's RF Signal Environment Generation, you can help ensure your systems are ready for the real world before operational deployment. Our RF Signal Environment Generation goes beyond ordinary simulation to create a true-to-life RF environment with signals behaving in a realistic manner.

Scalable

Viasat can tailor the RF Signal Environment Generation technology to meet your unique test requirements. Our systems are scalable and programmable using a flexible and powerful user interface.

Repeatable

Viasat's RF Signal Environment Generation creates real life RF signal activity in a repeatable environment to test sensor systems and uncover design issues early. This real-world environment enables you to resolve issues before your first deployment, so you can:

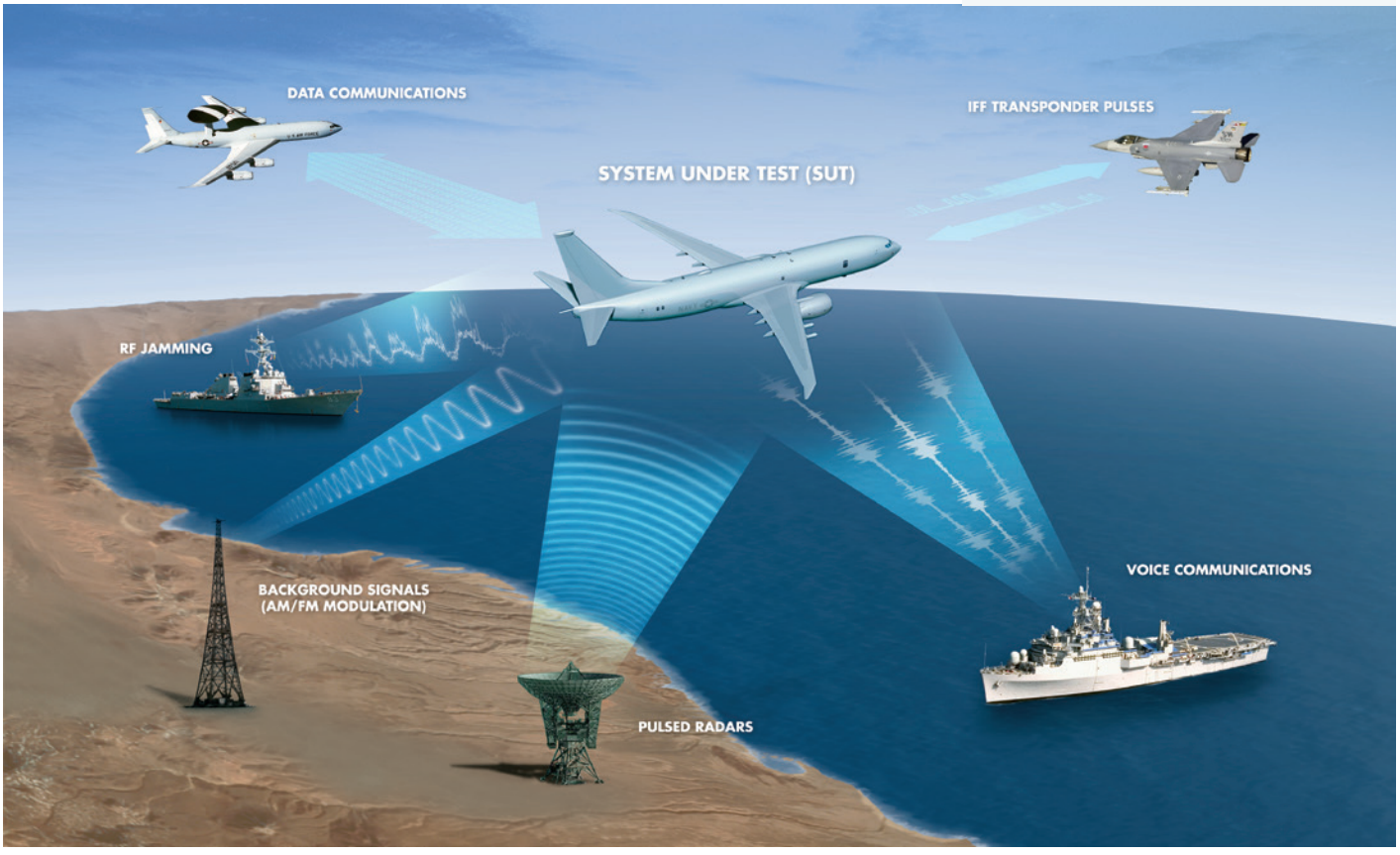
- Save potentially millions of dollars in development, range test and deployment costs
- Speed time to market
- Optimize system performance
- Reduce deployment risks

Existing Signal Library

Viasat offers a library of signals for realistic environment generation, as well as custom signals for your specific needs. We are continually expanding our waveform library in response to customer testing needs in modern military and commercial environments.

TESTING SOPHISTICATED COMMUNICATIONS AND ISR SYSTEMS

- **Realistic Signal Environment** A simulated environment generating real RF
- **High-Density Signal Environment** Hundreds of independent signals
- **Dynamic RF Environment** Independent signal behavior
- **Behavioral Emitter Models** Coherent signals that react to the environment
- **Independent Platform Motion** 6 DOF motion models
- **Independent Signal Control** Frequency, amplitude, delay, Doppler, pulse characteristics, and more…

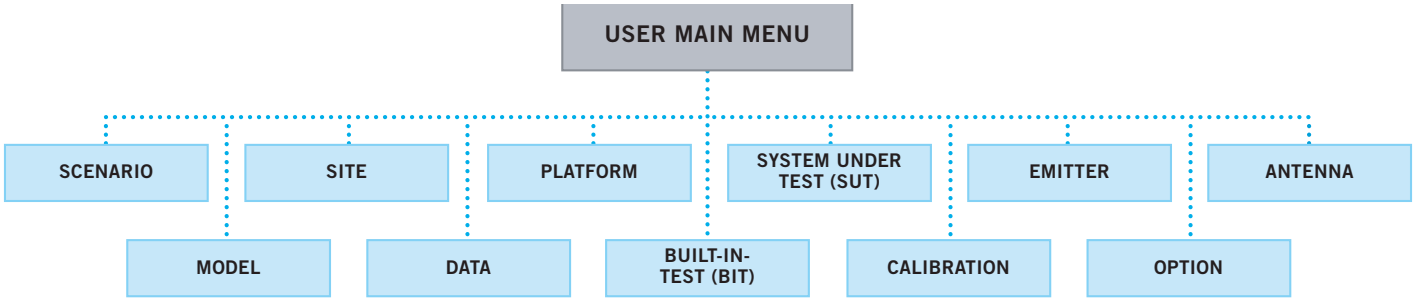


Viasat RF Signal Environment Generation

RF Signal Generation Experience

For over 30 years, systems designers have relied on Viasat's signal modeling expertise to help successfully launch better ISR systems. Our RF Signal Environment Generation can shake out design problems during developmental testing in a true-to-life environment. Signal scenarios are controlled, repeatable and dynamic to help you optimize your system's performance. Viasat has delivered large-scale systems to the Air Force, Navy, and others. A wide variety of platforms have been tested using our systems, some of the most notable are the F-22 and F-35.

Building an RF Signal Environment Generation Scenario



Begin by selecting emitters from our library of signals. Use the graphical user interface (GUI) to select from a set of emitter types and to associate an antenna pattern. Find an antenna pattern from our predefined data base or create a custom antenna pattern by importing a high-fidelity gain pattern modeled by an azimuth and elevation look-up table.

The system supports predefined emitter models that represent real-world objects such as an air defense network, Identification Friend or Foe (IFF) system, navigation system, etc. The technology offers emitter behavioral models, changing modes, turning transmissions on and off, and setting fixed power levels at specified times.

Specify platforms with desired dynamic capabilities, such as fixed, surface, subsurface, ground, or airborne. Add emitters to the platforms, defining all the transmitted signals from real-world objects.

Next, specify the scenario of the desired RF environment, which can be at any geographic location in the physical world, with topography provided by a Defense Terrain/Elevation Database (DTED). Simply place static or dynamic platforms in the scenario at the desired locations.

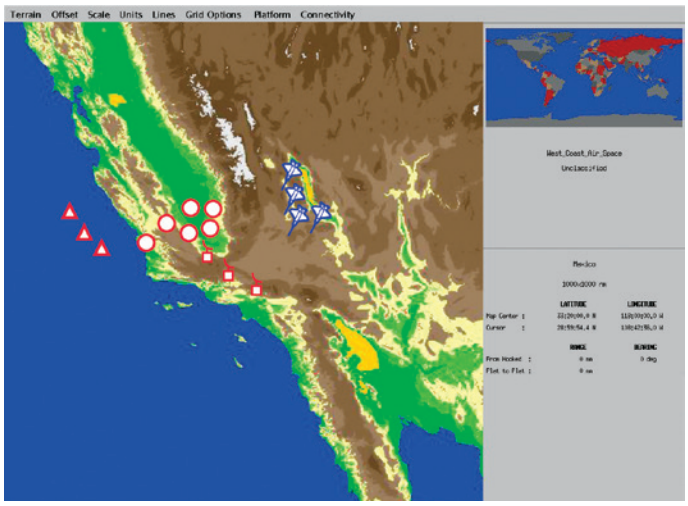
Establish dynamic motion for the platforms by setting velocity parameters or via waypoint definitions. The simulation computes platform position using a six degrees of freedom (6-DOF) motion model that tracks both position and altitude of the platform with update rates of 100 Hz.

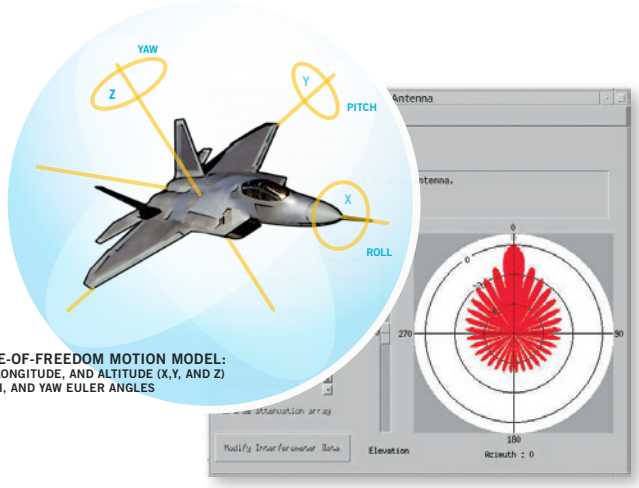
Platform and emitter models can be easily replicated using the GUI to create scenarios generating high density, real-world RF environments.

Complete the scenario definition by defining the System Under Test (SUT) using platform and antenna models. The SUT can be static or dynamic (using the 6-DOF motion model). Use an antenna pattern from our database or import a detailed antenna model that reflects the unique features of your system. For complex systems, the SUT can include multiple antenna patterns that feed into multiple sensors on a specific platform.

Now run the RF Environment Generation system. The system generates the RF signals as seen by the System Under Test (SUT), creating signals "transmitted" by the platforms in the scenario. Each signal generates the desired waveform with correct RF characteristics such as amplitudes, frequencies, modulations, polarization, propagation delays, and Angle of Arrival (AoA) based on electrical phase when required to support Direction Finding capabilities.

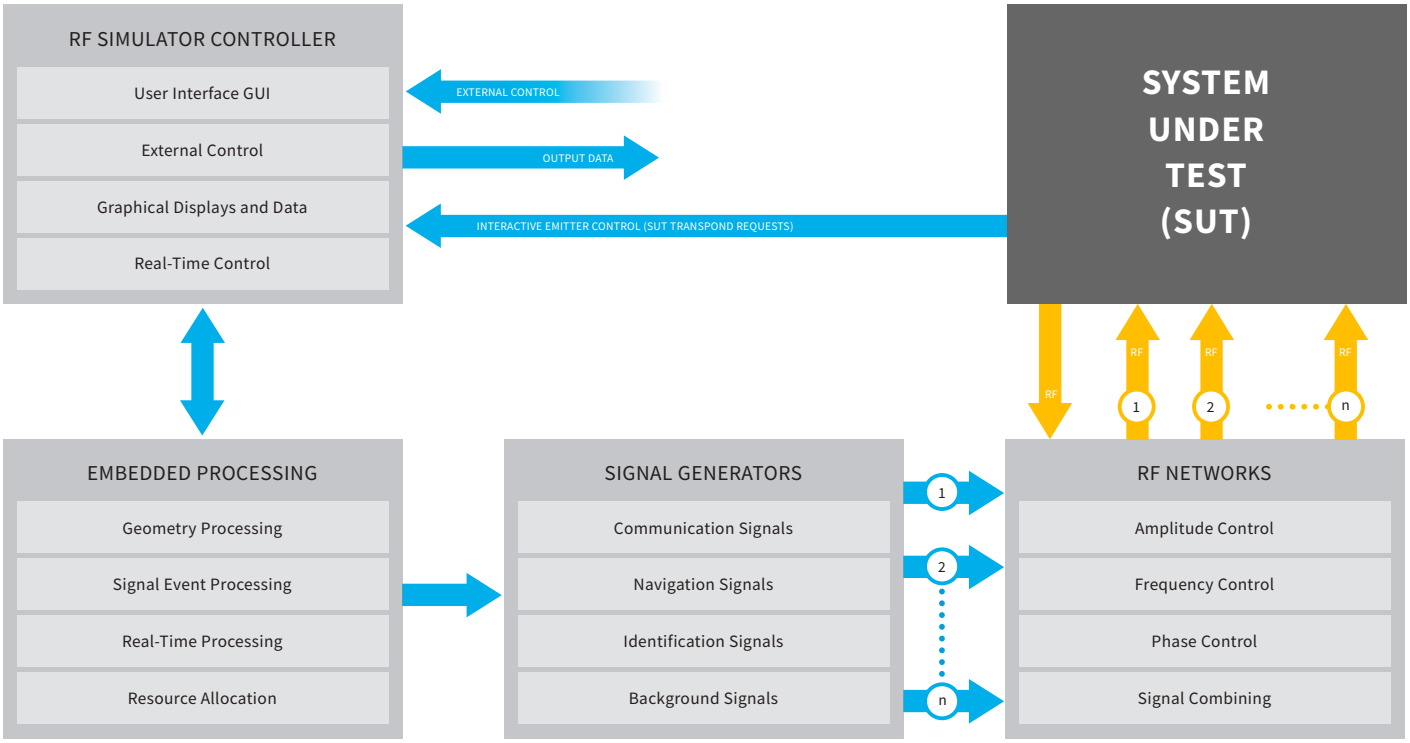
The operator has the flexibility to stop and resume a scenario, as well as to make dynamic changes to platforms and emitters during run time. This virtual environment emulates the real-world RF environment to the SUT with a high degree of fidelity, flexibility, and repeatability.





SIX-DEGREE-OF-FREEDOM MOTION MODEL:
- LATITUDE, LONGITUDE, AND ALTITUDE (X,Y, AND Z)
- ROLL, PITCH, AND YAW EULER ANGLES

Viasat RF Signal Environment Generation



RF Signal Environment Generation Architecture for Your Specific Needs

Viasat's RF signal generation technology provides a mature development environment for custom user requirements. We offer engineered-to-order systems, with customer-driven requirements for signal types, processing throughput, interfaces to other systems, quantities of signal generation elements, and RF networks and output ports. Our architecture facilitates scalability and extensions to the existing stimulator signal set and functionality, thus providing a scalable and flexible test and evaluation environment for your system. The RF Stimulator Controller hosts the Graphical User Interface (GUI) for scenario development, data storage and display, and real-time scenario control.

Embedded processors perform the computationally intensive tasks of platform motion and geometry calculations between the scenario platforms and the SUT. The embedded processing components also keep the timing for signals and control the parameters for the programmable signal generators.

The signal generation uses a unique arbitrary waveform generator subsystem to emulate a wide variety of pulsed and continuous RF waveforms. The RF signal generators adjust the amplitude, frequency and phase of the signals based on the geometry, range, modulation, polarization, and antenna characteristics of the platforms and the SUT, all under control of embedded processors. The signal generators output the waveforms at baseband with rates as high as 200 Mega samples/second.

Frequency is controllable in 1 Hz increments. As the communications system designer, you can determine the number of signal generators based on the required signal density of the real-world application. Multiple emitter signals are combined to present a composite signal to the SUT. You can also specify the number of RF output ports, which correlates to the number of input antenna ports needed to stimulate the SUT. The phase control of the signal allows directional sensing from an interferometer.

Viasat offers an existing library of signals for realistic environment simulation. Viasat's experienced signal modeling team can also leverage our flexible stimulation architecture to develop additional waveforms for your needs.

The physical configuration of the system is highly dependent on the specific customer requirements for signal density and RF complexity. Viasat has delivered customized systems in many forms, ranging from a one-device system to systems with four racks or more. We continue to develop smaller and more modular stimulators that promise additional flexibility for your needs.

Testing with Viasat's RF Signal Environment Generators reduces net system costs by helping you discover and fix design problems before fielding your system.

Viasat RF Signal Environment Generation

The Viasat RF Stimulation engineering team is committed to helping you successfully design and launch your complex communications or ISR system. We deliver the highest quality RF stimulators for your system testing needs to help you gain savings in time and development costs, while ensuring optimal system performance.

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