

Channel Simulator Wideband

Realistically Test to Assure Communication System Success for High Bandwidth Applications

KRATOS



In today's rapidly changing and complex communication environments, bandwidth demands are growing exponentially. High Throughput Satellites (HTS), Low Earth Orbit (LEO) constellations, aircraft, UAVs, missiles and a range of other applications are increasing data throughput, imagery downloads and video transmissions.

Assuring communication systems success for these broadband applications is a daunting task and failure isn't an option. Engineers need to be able to test the ground segment and terminals of the latest high bandwidth satellite communication systems realistically, reliably and cost-effectively.

Kratos' next generation Channel Simulator is a hardware-in-the-loop instrument that can be inserted between modems, receivers and transmitters, or other communications devices to enable engineers to simulate the most challenging RF conditions without ever leaving the lab. The wideband platform is built with over a decade of innovation and hundreds of deployments to ensure reliability and accuracy.

With 600 MHz (plus options of 125 and 300 MHz) of instantaneous bandwidth, the Channel Simulator performs realistic and comprehensive RF testing to significantly enhance communication system quality, save time and decrease costs for new satellite networks.

Customers can create realistic complex and reproducible scenarios to test flight and ground systems such as LEO, GEO, and MEO satellites, UAVs, modems, transmitters and receivers, as well as telemetry tracking and ranging verification and even terrestrial microwave links.

Assuring Communication System Success Complete, Accurate and Realistic Testing

- Validate wideband communication system performance prior to launch
- Test the most punishing RF conditions by generating signal and carrier Doppler shift,



Simplify operations with an easy-to-use web based interface with a channel based layout.

Key Features

- *Bandwidth: up to 600 MHz for high bandwidth simulations and additional options (125, 300) for narrowband applications*
- *RF Frequency: 900 to 2450 MHz (without converters)*
- *Flexibility: Easily add required channel effects*
- *Control: Simplified web-based GUI*
- *Fidelity: Industry-leading RF fidelity and highest control rate*
- *Proven: built on 12 years of IP and hundreds of deployments*

Supports Wideband Applications

- *Satellite (HTS, LEO, GEO, MEO, Micro, Nano, Pico)*
- *UAVs*
- *Missile and target applications*
- *Modem, radio, transmitter and receiver testing*
- *Telemetry tracking system and range verification*
- *Reference signal and interference signal generation on-air or in the laboratory*
- *Training and education*

delay, path loss, noise and multi-path effects

- Run advanced effects simultaneously to rigorously test challenging new scenarios
- Recreate live space-to-ground RF conditions for high and narrowband applications including HTS, UAVs, smallsats, missiles and targets
- Emulate changing scenarios such as motion where the receiver and transmitter are moving with high fidelity as close to real-world physics as possible
- Integrate seamlessly with STK for enhanced scenario modeling

Cost-effective and Faster RF testing

- Simulate various scenarios without requiring the high costs of actual flights or satellite bandwidth time
- Reduce the amount of time and manpower required for live testing through realistic simulation
- Characterize and simulate phenomena as it occurs in real-time
- Create repeatable test scenarios for faster and more accurate simulations
- Replace a collection of commodity lab equipment with a single more cost-effective Channel Simulator
- Simplify operation with an easy-to-use web-based interface with simple channel visualization
- Expand capabilities seamlessly to include various advanced channel effects

Reliable Communications and Lower Risk

- Simulate all possible testing scenarios to avoid unexpected communication failures
- Minimize the potential for signal distortions, loss of equipment and life, reduced revenue and dissatisfied customers
- Troubleshoot anomalies of interference or other loss of communications

Key Specifications

Bandwidth (1 dB)	125 MHz		300 MHz		600 MHz		Units
Fixed Frequency	1200						MHz
Edge to Edge Frequency Range	900-2450						MHz
Time Delay							
Range	Min	Max	Min	Max	Min	Max	
	7	1.25E+06	7	1.25E+06	7	1.25E+06	μs
Resolution	4.88		2.44		1.22		ps
Velocity	73.2		36.6		18.3		km/s
Phase Offset							
	Min	Max	Min	Max	Min	Max	
Range	0	360	0	360	0	360	degrees
Carrier Doppler Shift							
	Min	Max	Min	Max	Min	Max	
Range	-62.5	62.5	-150	150	-300	300	MHz
Resolution	46.6		93.1		186.3		mHz
Signal Doppler Shift							
	Min	Max	Min	Max	Min	Max	
Range	-15.2	15.2	-18.3	18.3	-18.3	18.3	MHz
Resolution	0.31		0.37		0.37		mHz
Fading/Attenuation/Path Loss							
	Min	Max	Min	Max	Min	Max	
Range	0	50	0	50	0	50	dB
Resolution (typical)	0.001		0.001		0.001		dB
Additive White Gaussian Noise (AWGN)							
	Min	Max	Min	Max	Min	Max	
Range	-168	-105.2	-168	-105.2	-168	-105.2	dBm/Hz
Resolution (typical)	0.5		0.5		0.5		dB
System							
ADC	12		12		12		bits
DAC	16		16		16		bits
Complex Filter							
(User programmable)	50		50		50		Taps