

**NORTHROP GRUMMAN***Electronic Systems***CEESIM: Combat Electromagnetic Environment Simulator**

Operationally realistic simulation conditions in laboratory, chamber, training range, and flightline environments play a critical role in optimizing development, test, performance, and training of today's integrated electronic warfare (EW) systems. CEESIM provides multiple simultaneous emitters, combining user-defined high fidelity with the wide-band performance required to faithfully simulate true-to-war conditions. Simulations of this quality present the most cost-effective means of testing and validating EW system effectiveness.

In its various configurations, Northrop Grumman Amherst Systems' CEESIM generates complex, dynamic electromagnetic environments for injection or free-space radiation into EW systems with unmatched fidelity, accuracy, and affordability. With over 100 installations worldwide, CEESIM has been entrusted with the development, test, and evaluation of today's most advanced EW equipment.

**Types of EW Systems Tested**

- Radar Warning Receivers (RWR)
- Electronic Countermeasures (ECM)
- Electronic Support Measures (ESM)
- Installed EW systems
- SIGINT systems
- Towed Radar Decoy (TRD)

**Typical Applications**

- Developmental Test and Evaluation (DT&E)
- ECM effectiveness evaluation
- Anechoic chamber test and evaluation
- EW system reprogramming station
- Tactics effectiveness evaluation
- Weapon system trainer
- Initial Operational Test and Evaluation (IOT&E)
- Pierside and shipboard test and training
- Mobile threat simulation
- Airborne threat simulator pods
- Operator, aircrew, squadron and force-on-force level training
- ESM equipment and crew test and training

**Commonality Throughout the CEESIM Family**

CEESIM emitter and scenario libraries provide compatibility among all CEESIM configurations, which enables use of this data throughout the EW system test process and life cycle. As part of the Amherst Systems family of simulators, each CEESIM — whether it be a full-scale laboratory configuration or one of the portable or flightline packages — produces signals with the same high fidelity. All known EW emitters can be accurately simulated.

## CEESIM: Combat Electromagnetic Environment Simulator

### CEESIM features

- Easy-to-use graphical user interface (GUI)
- X-Windows/Motif compliant
- Immediate verification of on-line emitter/scenario changes
- User-defined platform and emitter libraries for ease of scenario-building
- Commercial off-the-shelf (COTS) design

### Fully dynamic simulations, including operator or external control of events and emitters

- Distributed simulation compatibility (DIS/HLA)
- Real-time reprogrammability of all emitter features with no loss of complexity
- Navigational data input or output for 'train as you fight' realism
- All operator functions can be controlled externally
- Hardware-in-the-loop and man-in-the-loop test as well as training environments
- Reactive threat emitter capabilities with optional Signal Measurement System (SMS)

### Up to 8,192 instantaneous emitters and platforms

- Over 32,000 emitters available for use during a scenario
- Geometry of system under test (SUT) and all platforms can be updated at up to 500 Hz
- Data used in all range determination and AOA calculations
- Each platform modeled with full 6 degrees of freedom
- Environmental effects modeled:
  - Polarization, ducting, atmospheric propagation
  - Third-party tracking, terrain masking, and multipath

### Up to 64 RF sources

- Frequency coverage of 0.01-100 GHz
- True pulse-on-pulse and pulse-on-CW capability
- DTO, FLO, or synthesizer-based
- Low-noise and ultra-low-noise RF configurations available



For more information, please contact:

Northrop Grumman Corporation  
Amherst Systems  
1740 Wehrle Drive  
Buffalo, New York 14221-7032 USA  
Phone: 1-800-631-0610, ext. 2259  
Fax: (716) 631-0629  
e-mail: amherstsolutions@ngc.com  
http://www.amherst.com

### Pulse density from 0.5-1.6 MPPS (per RF Source) including pulse burst

- Advanced resource management for maximum throughput:
  - Channel pooling
  - SUT thresholding
  - Emitter priority
  - CW 'fill-in' modes

### Substantial installed customer base

- Over 100 systems installed worldwide
- Over 500,000 hours of field operation
- Users include 13 DoD agencies, all major prime contractors, and numerous foreign governments
- Established worldwide support network

### Multiple SUT interface types

- Digital pulse descriptor words (PDWs)
- Intermediate Frequency (IF)
- Video
- RF

### Standard RF interfaces:

- From 1 to over 100 ports per frequency band
- Amplitude angle-of-arrival (AOA) simulation
- Phase AOA simulation
- Time difference of arrival (TDOA) simulation
- Detailed SUT aperture modeling (combined amplitude/phase/time) available

### Unmatched signal fidelity

- Fully coherent emitter mode changes
- Complete intrapulse modulation capability (FMOP [chirp], PMOP, and AMOP) for true UMOP simulation
- Every emitter can be fully complex - no background emitters
- All polarization effects (transmit/receive) simulated
- Precision PRI timing for simulation of individual emitter crystal clocks

### Extensive post-test analysis capability

- Digital pulse memory collects up to 16M PDWs
- Historian utility records all test events
- Data merge, analysis, and correlation software merges simulator and SUT data to allow analysis of time-to-detect

