Description

The Environment Generation and Analysis (EGA) suite of software models is used to create and analyze complex, multi-emitter signal environments. EGA generates a software pulse-by-pulse description of an environment, such as a dynamic, coordinated air defense network, that includes a dense and diverse assortment of emitters. This software pulse environment, generated from the perspective of an ownship System Under Test (SUT), may then be used either to stimulate customer-supplied EW receiver algorithms or to perform a variety of environmental analyses.

Key EGA Features

- EGA suite of software tools is used to create and analyze complex multi-emitter signal environments
- Generates a pulse-by-pulse software description of an environment
- Often used in concert with a CEESIM RF simulator, as a tool for scenario development and environmental analysis
- Software pulse model and post-processing analysis toolkit

Scenario Generation

Scenario generation allows for programming of all of today’s emerging threats. Programmable emitter modulations include: RF (Stable, Random Agile, Discrete Agile, Sequential Agile, Channelized, Associated, etc.); PRI (Stagger, Constant, Dwell/Switch, Discrete Jitter, Continuous Jitter, Sinusoidal, Sliding, etc.); PW (Constant Duty Cycle, Jitter, Pulse Group Modulation, DFMOP, LFMOP, PMOP, AMOP, etc.); ERP, Scan (Circular, Sector, Raster, Phased Array, Conical, Spiral, Helical, etc.); and Antenna Characteristics (Azimuth and Elevation antenna patterns, Transmit Polarization, Reflector Model Type, etc.).

All types of platforms and their associated motions can be programmed and simulated in round-earth or flat-earth format. Scenarios can be run with a variety of additional simulation variables such as terrain, LOS effects, ducting, atmospheric effects, range and frequency attenuation, and Doppler algorithms, to name a few.

Scenarios created on the EGA are fully compatible with a CEESIM simulator (and vice versa).

Pulse Generation

The pulse generation component generates a non-real-time software simulation of the Electronic Combat environment specified in the scenario. Users can advance to a particular time in the scenario, and generate and store as much of the environment as they desire. The user can choose to capture all pulses in the environment or invoke a level of filtering.

ASCII Viewer

ASCII Viewer lists all filtered PDWs captured that would be seen at RF during a scenario run. The user may toggle the display status (either on or off) for 80 unique PDW fields using the parameters dialog from a pull-down menu. PDW fields include: Scenario Time, Elapsed Time, Frequency, Received Power, Received AOA (AZ), Received AOA (EL), PW, and Slant Range, to name a few.
Statistics
Statistical post-processors provided with EGA include:

- Aggregate Counts - Minimum, maximum, average, and standard deviation data are displayed for emitter attributes over the selected time base
- Emitter Beam Counts - Statistical data are presented for every emitter/emitter beam (generator) present in the pulse file. The following items are listed: frequency range, maximum received power at the SUT, average PW, and total pulse counts in the pulse file
- Numerical Counts - Scenario time, pulse counts, pulse density and emitter counts are displayed based on either scenario time or filter types that have been set (e.g., pulse density vs. AOA)
- Graphical Counts - Graphically plots the data identified in the Numerical Counts, Pulse Counts, Average Pulse Counts, Pulse Density, and Emitter Counts can be displayed

EGA Specifications
- Motif-based graphical user interface
- Intuitive user interface
- 24-hour scenario timeline
- Earth Type: Round (WGS-84) and Flat (X,Y,Z)
- Six degrees of freedom (DOF) platform motion
- Euler platform body motion
- Typical control computer uses a LINUX operating system or equivalent; AIT Tape; DVD-RW
- Programmable filtering criteria
- Fully compatible with a CEESIM

General Capabilities
- Fully programmable emitter simulation
- Single or multiple emitters can reside on a platform
- Emitters can be spatially offset from platform location
- Emitters can have multiple beams
- Multibeam emitters can be synchronized in RF, PRI, and Scan

Frequency Characteristics
- Frequency Range: Definable from 0.05 to 40 GHz
- Modulation Types: CW, Stable Frequency, Frequency Sequence, Periodic Frequency Modulation, Frequency Switching, Discrete Frequency Agility

Periodic Frequency Modulation Types
- Sinusoidal, Sawtooth, Triangular, Trapezoidal, Exponential, User-Defined
- Intra-Pulse Modulation: Linear FMOP (Chirp), Discrete FMOP, Phase MOP, Amplitude MOP

Transmit Scan Types
- Circular
- AZ/EL Sector (Unidirectional, Bidirectional)
- Steady
- 3-D Scanning
- Conical
- Raster (AZ/EL, Interleaved or Non-Interleaved)

Transmit Antenna Characteristics
- User can create unique antenna patterns
- Linear, circular, or elliptical transmit polarization
- Rectangular or elliptical reflector models

Emitter Script Events
- Script events include activate, deactivate, change mode based on scenario time, and change mode based on range

Environmental Effects
- Terrain
- LOS (User-selectable Earth radius factor)
- Multipath
- Ducting
- Atmospheric Absorption
- Selectable rain-fall rate
- Sea-state selection
- Range and Frequency Attenuation
- Doppler effects

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

www.northropgrumman.com
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