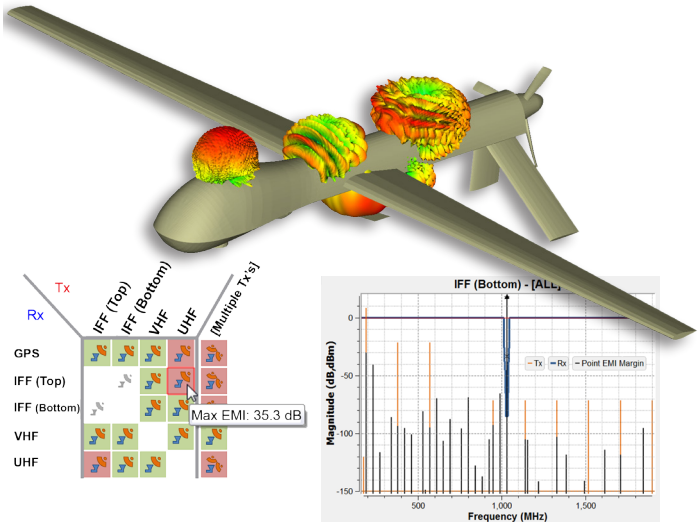
DELCROSS TECHNOLOGIES

EMIT

RF Cosite and Coexistence EMI Modeling and Mitigation

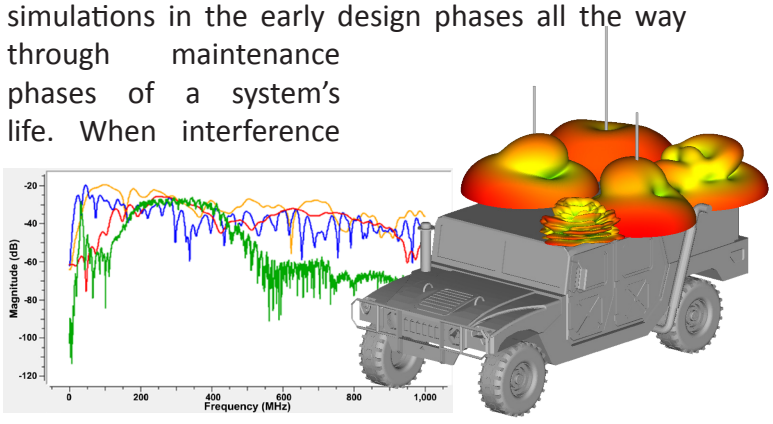


EMIT is simulation software used to predict electromagnetic interference (EMI) in complex RF environments containing multiple transmitters and receivers.

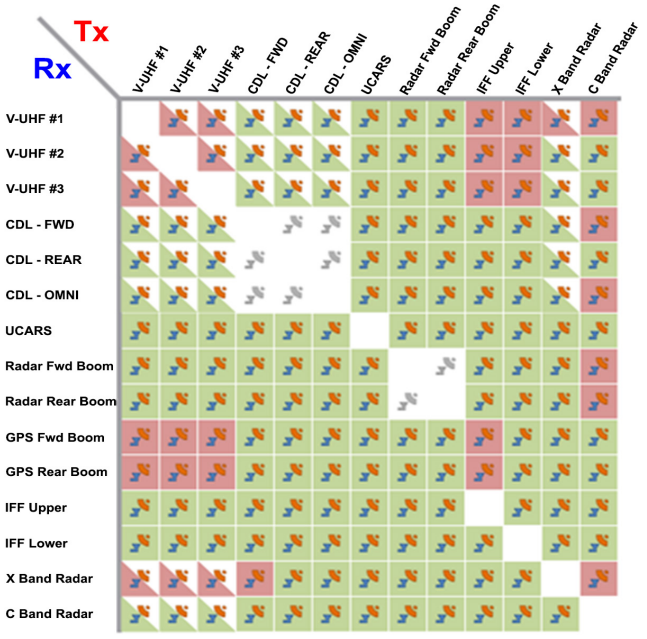
EMIT provides a framework for managing RF system performance data, simulating cosite and coexistence EMI effects, and mitigating EMI issues, resulting in a comprehensive database/model maintainable over the life of a multi-RF system platform or vehicle. It takes a unique multi-fidelity approach to predicting RF cosite/coexistence interference to provide rapid identification and "root-cause" analysis of EMI issues in complex RF environments.

EMIT provides a data management and analysis framework for the simulation of electromagnetic interference (EMI) in complex RF environments. EMIT brings together the sophisticated simulation engines and multi-fidelity parametric models that are necessary for accurate cosite interference predictions for any environment from large vehicular platforms down to personal electronic devices. EMIT is a complete analysis tool suitable for analysts of varying levels of expertise working with available system data of varying levels of fidelity.

The software is designed to allow the user to begin simulations in the early design phases all the way through maintenance phases of a system's life. When interference problems are identified, mitigation strategies can be explored in the software before any modifications are made to the device or system.



EMIT will combine antenna isolation from antenna simulation tools and measurements when available.



Ultimately, EMIT can provide your organization with major cost savings by identifying cosite interference problems early in the design and integration workflow.

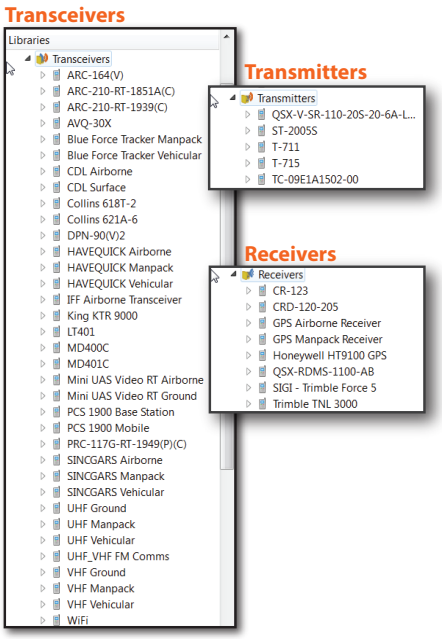
EMIT Features At A Glance:

- **Predicts in-band and out-of-band EMI** in complex RF environments containing multiple transmitters and receivers.
- **Result Summary views identify interfering systems**, while detailed EMI Margin plots identify specific channels and the cause of the interference.
- **Quickly test EMI mitigation strategies** by inserting RF components or by changing receiver, transmitter or mixer settings.
- **Multi-fidelity modeling approach works with available system data.** No need to wait for complete detailed information before beginning EMI analysis. Models can be easily refined as more information becomes available.
- **Applies antenna-to-antenna coupling** using 3D far-field patterns or directly uses S-parameter data from measurements or EM simulations.
- **Multi-channel radio models** capture in-band performance as well as out-of-band spurious and harmonic effects.
- **Integrated radio model library** can be expanded as needed. Custom RF system libraries can be created and shared.
- **Models 1-on-1 and N-on-1 interference effects** between RF systems, including inter-transmitter intermodulation products.
- **Include outboard RF components** such as filters, amplifiers (including nonlinearities) and cables.
- **Seamless integration to the CST STUDIO SUITE®** 3D electromagnetic software suite is included free of charge.

Built-in RF Component Library

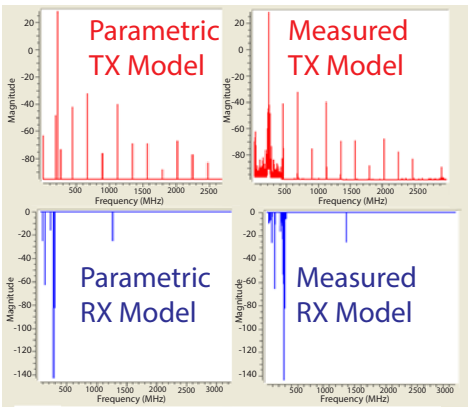
EMIT has the ability to manage libraries of RF components and performance data. EMIT comes with a built-in library that provides multiple models of 'typical' radios of interest to military and commercial users as well as other representative components (filters, amplifiers, etc.) Each model is notated with specific details of the system. The content of this Delcross library continues to be expandedwith updates provided as they become available.

Users can create and maintain their own databases of systems and components in custom libraries which can be exported for sharing with other users.



Multi-Fidelity Parametric Radio Models

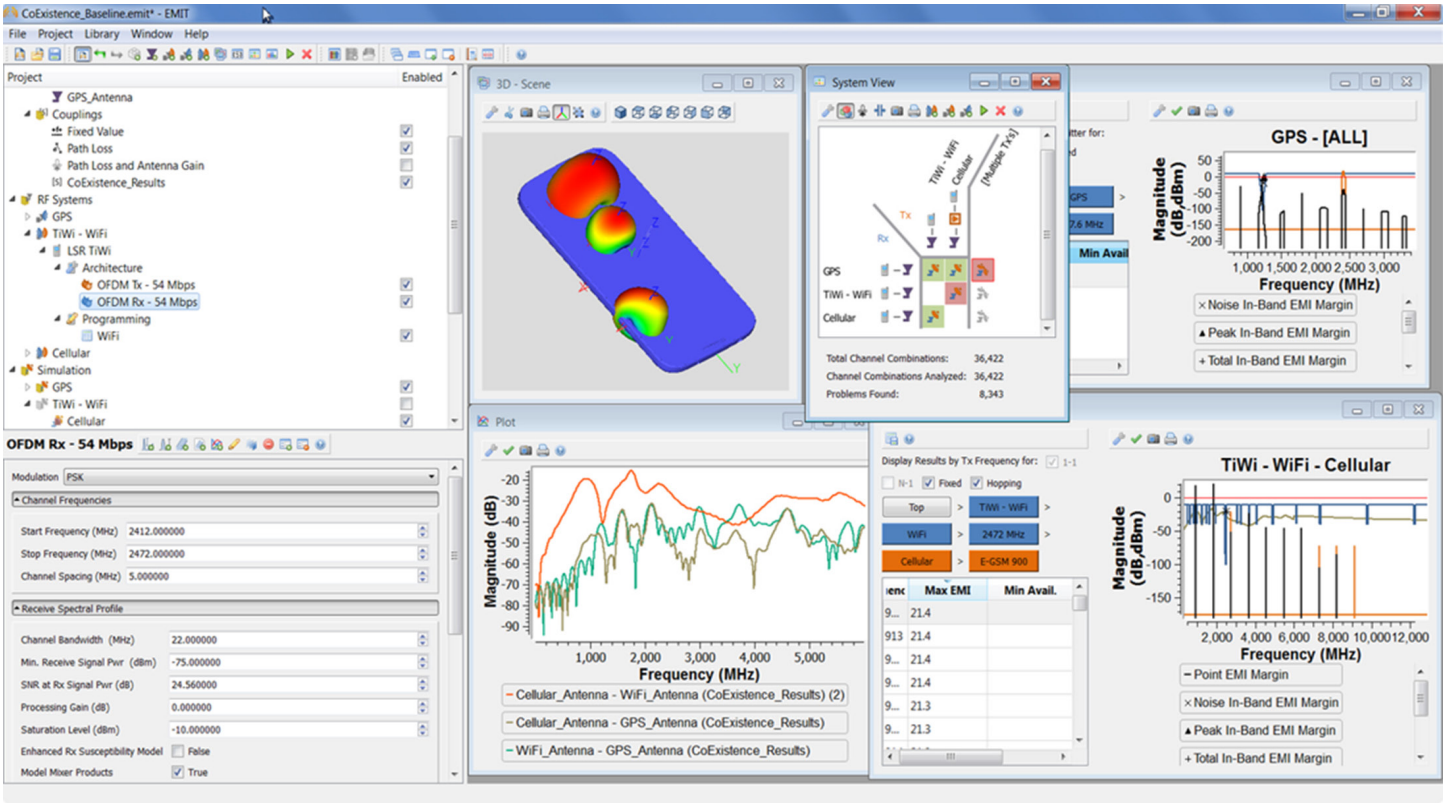
Access to detailed radio performance specifications are often difficult to obtain, particularly early in a design cycle when specific hardware may not yet be defined. EMIT's multi-fidelity parametric radio models permit simulations to be performed using minimal knowledge of a radio's performance specs, such as those found on a vendor's data sheet. This allows EMIT to perform useful simulations early in the design cycle with a minimal amount of input data. EMIT's multi-fidelity parametric models can reproduce radio performance characteristics that are quite close to the radio's actual measured response.



Antenna-to-Antenna Coupling Models

EMIT supports wideband multi-port antenna isolation data using the industry standard Touchstone file format. There is no need for all of the data to be contained in a single Touchstone file because EMIT will 'stitch' together multiple data sets for all antennas being considered. EMIT also provides several built-in approximate antenna coupling models for assessing cosite EMI before more accurate isolation data become available. In the absence of specific isolation data, EMIT can be used to compute what isolation is required between antenna pairs in order to avoid interface.

When CST STUDIO SUITE® is used to simulate antenna isolation, EMIT provides a direct link that will automatically create an EMIT project using the CST STUDIO model. Only the radios need be specified in EMIT to perform the full cosite simulation.



The EMIT user environment provides an efficient workflow, integrating problem setup with result post-processing

Multiple EMI Margin Types for Rapid "Root-Cause" Analysis

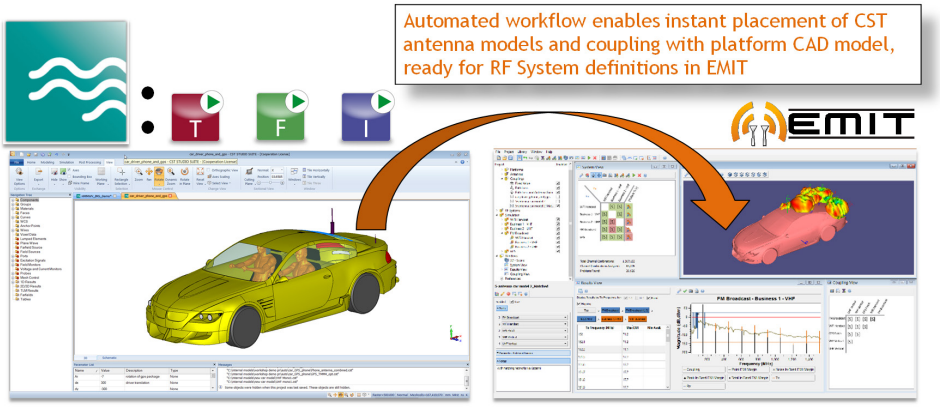
EMIT's powerful analysis engine accounts for all important interference mechanisms in complex RF environments. The results provide three different EMI margins (Peak In-Band, Noise In-Band and Out-of-Band) that makes rapid identification of the root-cause of interference straightforward. Contributors to interference problems can be traced back to the originating transmitter(s) and channels.

View Results at Different Levels to Quickly Zero in on the EMI Problems

EMIT provides results at several different levels from the System View that provides a snapshot of which RF systems on the platform are experiencing interference, all the way down to the Detailed Results views that provide complete plots of the interference problem at the Tx/Rx channel pair level. It is in the Detailed Results view that rapid identification of interference mechanisms are easily obtained in order to recommend suitable mitigation measures.

Quickly Assess and Compare Potential Mitigation Measures

EMIT provides for quick "what if" analyses to evaluate potential interference mitigation measures. For example, a tuneable bandpass filter that tracks a receiver channel in a frequency hopping system can be quickly added from the library to a receiver experiencing interference, and its impact quickly simulated.



A Complete RF cosite/coexistence Analysis Environment

EMIT is a powerful and modern RF cosite/coexistence analysis software tool. With an advanced GUI, high level and low level analysis summaries and built-in diagnostic features, you can characterize the interference between the RF systems in your target application with confidence.

EMIT Feature Detail

- Predicts EMI in complex RF environments containing multiple transmitters and receivers.
- Predicts in-band and out-of-band interference effects for all Tx/Rx pairs in the scene.
- Computes separate narrow band and broadband EMI margins for a more complete assessment of interference problems.
- Result Summary views identify interfering systems and channels, while detailed EMI Margin plots identify the specific cause of the interference.
- EMIT's analysis engine accounts for all components in the Tx-to-Rx path to compute EMI Margin:
  - Broadband Tx & Rx characteristics
  - Outboard components such as filters, amplifiers (including nonlinearities) and cables
  - Broadband antenna coupling using S-Parameters or 3D patterns
- Transmitters and Receivers are modeled using EMIT's built-in parametric radio models or with actual measured data when available.
- Parametric models for transmitters and receivers allow RF systems to be built using a minimal amount of information.
- MIL-STD and statistical based models for transmitter and receiver spurious responses.
- Multi-channel radio models capture in-band performance as well as out-of-band spurious and harmonic effects.
- EMIT includes a library of common RF system models, including GPS, PCS, V/UHF communications, Blue Force Tracker, CDL, IFF and many other common radios. The models are generic but representative of typical performance. Also included are models for filters, cables and other RF components.
- Streamlined cosite interference simulation workflow provides one step import of CST STUDIO SUITE® models into EMIT.
- Multi-fidelity modeling approach works with different types of system data allowing predictions using whatever data is available to you. As additional data becomes available it can be used to improve the basic models.
- RF System, Antenna and Outboard Component definitions can be stored in EMIT Libraries for use in future projects, and can be shared with other users.
- Multi-port Antenna-to-Antenna coupling can be computed from imported 3D far field patterns or S-parameter data from measurements or simulations can be utilized.
- Import geometric models in native CAD formats as well as direct import from full wave electromagnetic (EM) simulation tools like Savant, CST Microwave Studio and WIPL-D.
- Intuitive user interface for setting up, running and interpreting an EMIT simulation
- Standard 1-on-1 and N-on-1 analysis modes to predict the effects of multiple cosite emitters on selected receivers including transmitter and receiver generated intermodulation products. There is no limit on intermod product order; all significant intermod products are considered.
- Support for a variety of CAD formats including IGES, STL, ACAD Facet and Wavefront OBJ.
- Includes built-in parametric free space antenna models such as monopoles, dipoles, isotropic, hemitropic, directive beam, loop, etc. which can be used if measured or simulated antenna coupling data is not available.
- Multi-core support. The user can specify number of cores to use for a computation through the GUI.

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