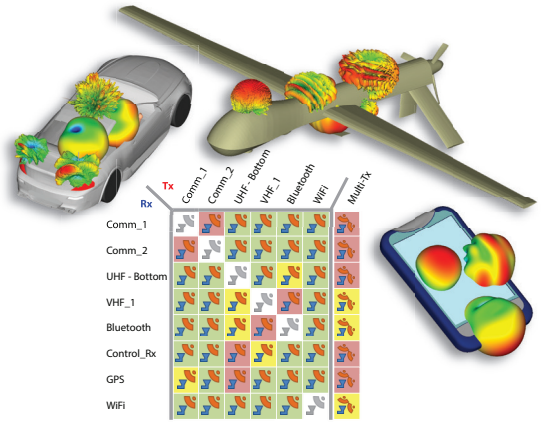
ANSYS

EMIT

RF Cosite and Coexistence
RFI Modeling and Mitigation

EMIT provides a powerful new capability to the ANSYS RF Option. It is used to predict radio frequency interference (RFI) in complex environments containing multiple RF systems that must operate simultaneously. EMIT represents a revolutionary advance in RFI analysis providing a host of powerful features for usability, computational efficiency and results diagnostics.

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



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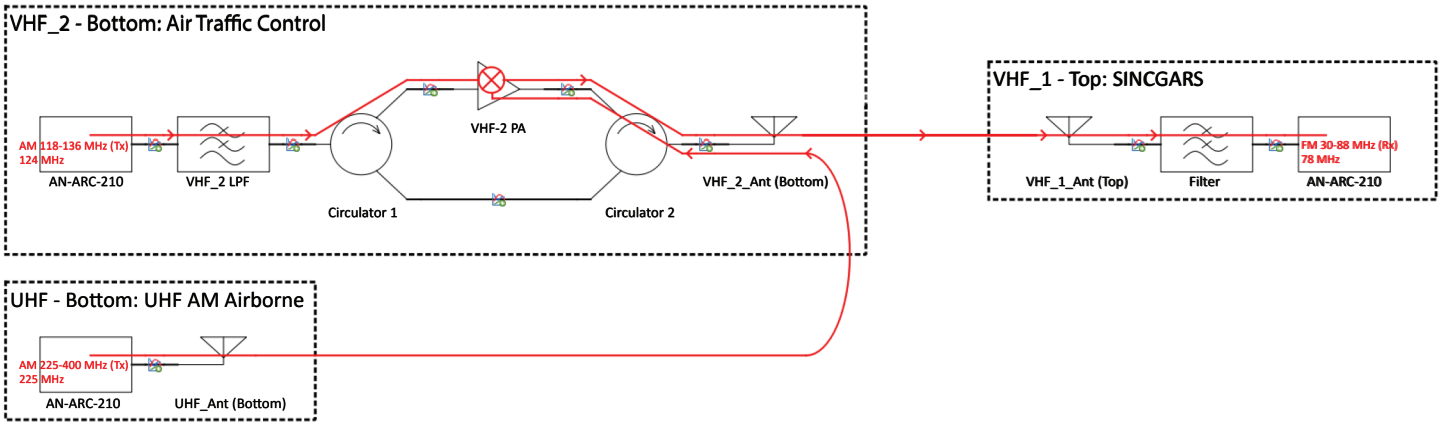
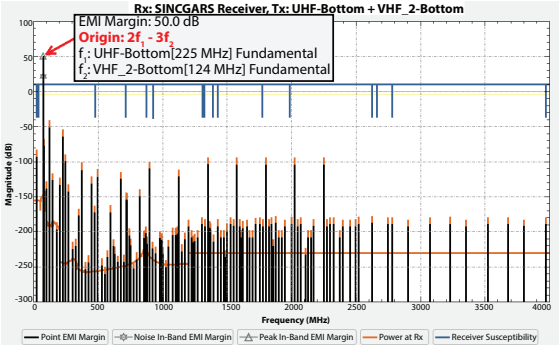
EMIT provides a data management and analysis framework for the simulation of electromagnetic interference (EMI) in complex RF environments. EMIT brings together the sophisticated simulation engines

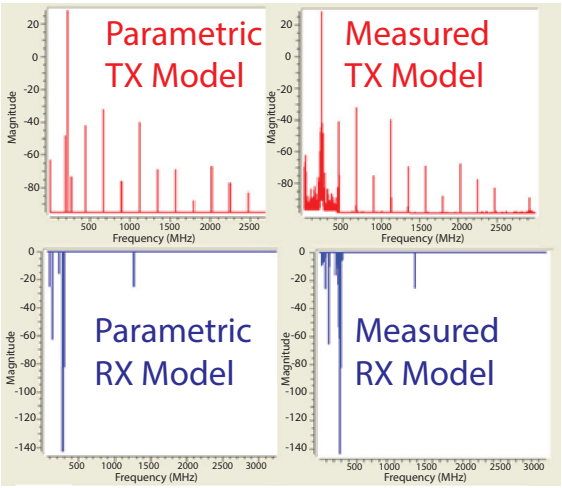


Interaction Diagram in EMIT traces RFI source signal paths



RFI Margin Plot provides "root cause" indicators

and multi-fidelity parametric models that are necessary for accurate cosite interference predictions for any environment including vehicular platforms and communications sites as well as coexistence and desense in personal electronic devices. EMIT is a complete analysis tool suitable for analysts of varying levels of expertise working with available system data at different 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. Ultimately, EMIT can provide your organization with major cost savings by identifying cosite interference problems early in the design and integration workflow.

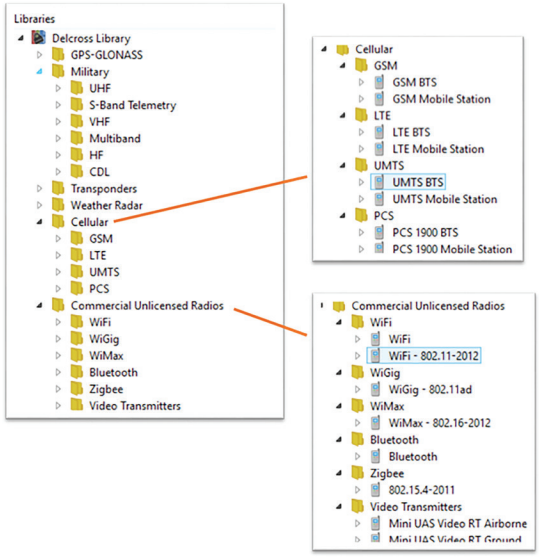


Built-in RF Component Library

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. Each model is notated with specific details of the system. The content of this library continues to be expanded with 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

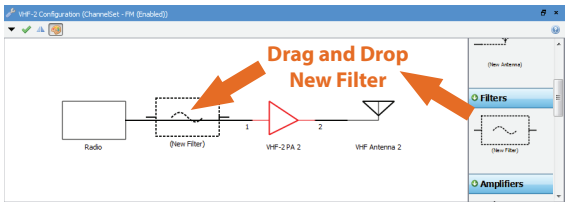
Access to detailed radio performance specifications are often difficult to obtain, particularly early in a design cycle when specific hardware may not yet be defined. EMIT's multi-fidelity parametric radio models permit simulations to be performed using minimal knowledge of a radio's performance specs, 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 RFI before more accurate isolation data becomes available. In the absence of specific isolation data, EMIT can be used to compute the isolation that is required between antenna pairs in order to avoid interference.

EMIT works in conjunction with, ANSYS HFSS. The HFSS/EMIT Datalink, available within the ANSYS Electronics Desktop, automates the creation of an EMIT model directly from an HFSS project to provide antenna isolation data, installed antenna patterns and geometric, models for RFI simulation in EMIT using RF system models added in EMIT.



Filters and other RF components can be quickly inserted using the EMIT Configuration Diagram

EMIT Features At A Glance:

- Predicts in-band and out-of-band RFI in complex RF environments containing multiple transmitters and receivers.
- Multiple linked views provides for rapid "root-cause" identification of even the most devious RFI problems with a click of the mouse. Automatically reports the causes and mechanisms for each interference identified in the scenario.
- Quickly test RFI mitigation strategies and evaluate their impact on the entire system.
- Determine the required antenna isolation or filtering to avoid interference.
- Multi-fidelity modeling approach works with available system data. No need to wait for complete detailed information before beginning RFI analysis. Models can be easily refined as more information becomes available.
- Multi-channel wideband 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 intermodulation products.
- Include outboard RF components such as filters (including tracking filters), amplifiers, multiplexers, circulators, isolators, cables, and power dividers.

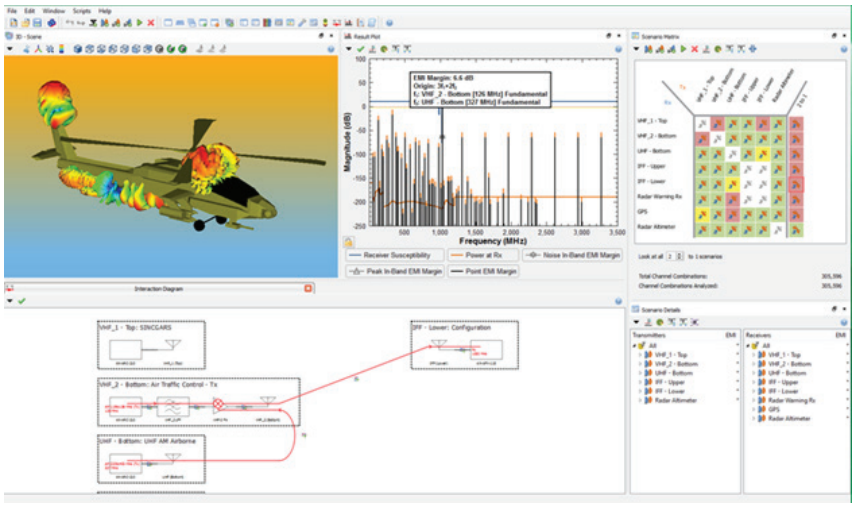
EMIT's powerful analysis engine accounts for all important interference mechanisms in complex RF environments. The results provide multiple performance metrics (EMI Margin, Desense, Sensitivity and Availability) for each Rx that make rapid identification of the root-cause of interference straightforward. Contributors to interference problems are automatically traced back to the originating transmitter(s) and the mechanism for the interference reported in EMIT.

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

EMIT provides results at several different levels from the Scenario Matrix that provides a snapshot of which RF systems in the environment are experiencing interference, all the way down to the Results Plot that provides complete details of the wideband interference problems at the Tx/Rx channel pair level and automatically identifies the root-cause of each type of interference. Results Categories filters allow you to easily exclude certain types of interference from the results (e.g., co-channel interference) to enable you to filter the results to see the issues of most concern in your application. It is in the results views that rapid identification of interference mechanisms are easily obtained in order to recommend suitable mitigation measures. All of the results views are dynamically linked so that settings and selections in any one view are reflected in all of them.

Quickly Assess and Compare Potential Mitigation Measures

EMIT yields 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 immediately evaluated.



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

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 automated diagnostic features, you can characterize the interference between the RF systems in your target application with ease and confidence.

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EMIT Feature Detail

- Predicts RFI 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.
- Results Display and Interference Diagnostics:
  - Customize any number of interference thresholds (and associated colors) based on Rx performance metrics.
  - Diagnostic tags on result plots immediately show the source of interference including identification of intermodulation products.
  - Plot signal spectra at any point in the signal paths to facilitate analysis and troubleshooting of complex scenarios.
  - Automatic graphical identification of interference paths via the Interaction Diagram
  - Filter results by interference type to display only specific types of problems.
- EMIT's analysis engine accounts for all components in the Tx-to-Rx path to compute RFI Margin:
  - Broadband Tx & Rx characteristics
  - Outboard components such as filters (including tracking filters), amplifiers, multiplexers, circulators, isolators, cables, and power dividers.
  - Broadband antenna coupling using S-Parameters or 3D patterns
- Transmitters and Receivers are modeled using EMIT's built-in parametric radio models or by importing radio performance data such as transmitter emission masks and receiver selectivity curves.
- EMIT includes a library of common RF system models, including GPS, PCS, LTE, V/UHF communications, Blue Force Tracker, SINCGARS, CDL, IFF and many other common types of radios.
- 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.

- Intuitive and customizable user interface for setting up, running and interpreting an EMIT simulation:
  - **Configuration Diagram** for configuring RF systems graphically with “drag & drop” component placement and connection.
  - **Interaction Diagram** shows all, or selected parts, of the complete scenario and identifies worse-case interference paths.
  - **Results Categorization** permits filtering of results to display only specific interference mechanisms for rapid “root-cause” problem ID.
- Standard 1-on-1 and N-on-1 analysis modes to predict the effects of multiple interference sources on selected receivers including transmitter and receiver generated intermodulation products. There is no limit on intermod product order.
- Multi-core and GPU support to accelerate simulations of large scenarios.

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