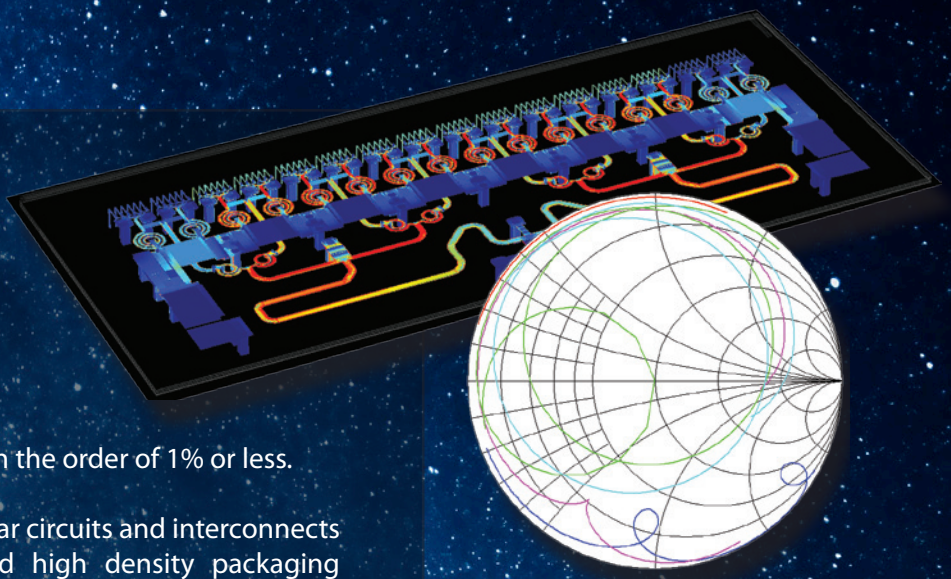
Discover SONNET®

The Leader in Precision Electromagnetics

High Accuracy

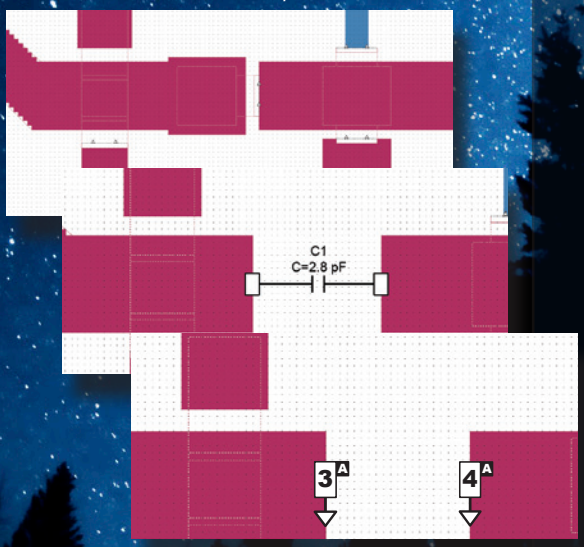
Sonnet® Software provides engineers all around the world with the capability and precision needed for their advanced circuit designs. As the leading high frequency electromagnetic software tool for planar circuit analysis, Sonnet utilizes the Shielded Domain Method of Moments technique to provide model extraction error frequently on the order of 1% or less.



A high-precision simulation plotted on a Smith Chart

Sonnet offers high-accuracy analysis of planar circuits and interconnects in applications including RFIC, MMIC and high density packaging applications, and handles kHz through THz frequencies. *Explore what has made Sonnet Software the longest running name in EM simulation!*

Top: placement within a circuit
Middle: Co-calibrated™ ports conencting a capacitor model
Bottom: Co-calibrated™ internal ports



Co-calibrated™ Internal Ports

Internal ports are advantageous for connecting outside elements into an existing geometry during design, but are a frequent source of error in most simulators due to the non-physical discontinuities that may be inserted into the simulation results. Sonnet's Co-calibrated ports solve this issue. Calibration group properties are designed to simultaneously de-embed any co-calibrated ports to reduce error. Sonnet's process removes unintended discontinuities of the port allowing precision for any transition, connector, component, or measurement probe models to be added to the current simulation, resulting in S-parameter dynamic ranges that often meet or exceed 100dB. This also enables powerful circuit optimization techniques based on usage of specific internal connections to attach many small series and shunt tuning elements in a framework schematic simulator.

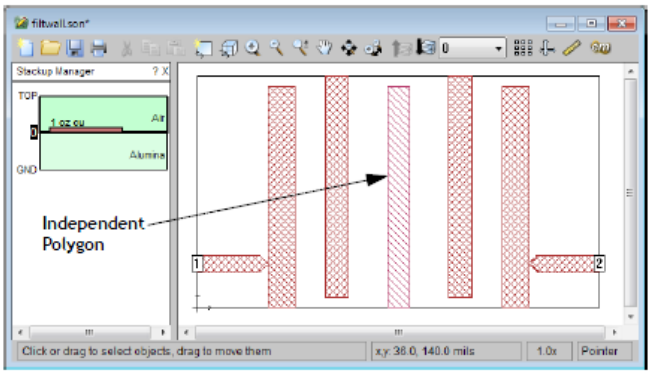
An Entire Workflow...

Sonnet removes the hassle of learning to use new electromagnetic analysis software. Our quick-start guide and clear tutorials make it simple to master the intuitive controls. Even the most complex designs will feel effortless with Sonnet's experienced support team and useful online help.

Excerpt from Sonnet's "Getting Started" Tutorials

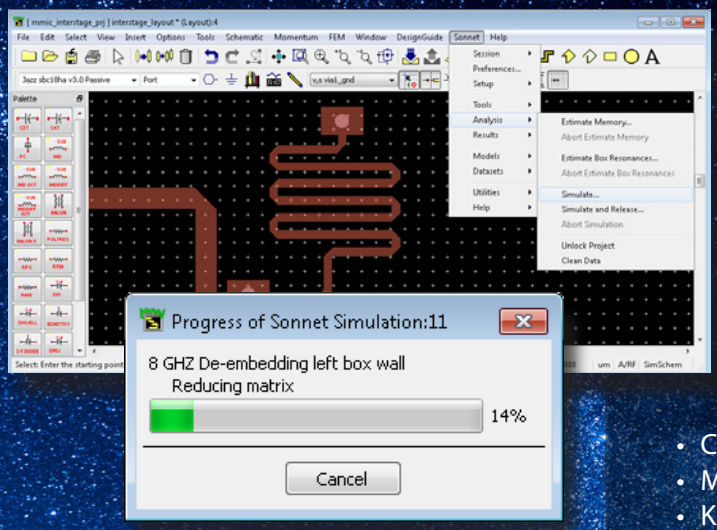
21 Click on the Metal drop list and select "Lossless" from the list. Click on the OK button to apply the change and close the dialog box.

The fill pattern changes for the selected polygon as shown below.



The metal for this polygon now has the loss associated with the default lossless planar metal. The project editor allows you to define any number of metal types for use in your circuit. For details on defining metal types, see the project editor's online help.

Sonnet within a circuit theory framework



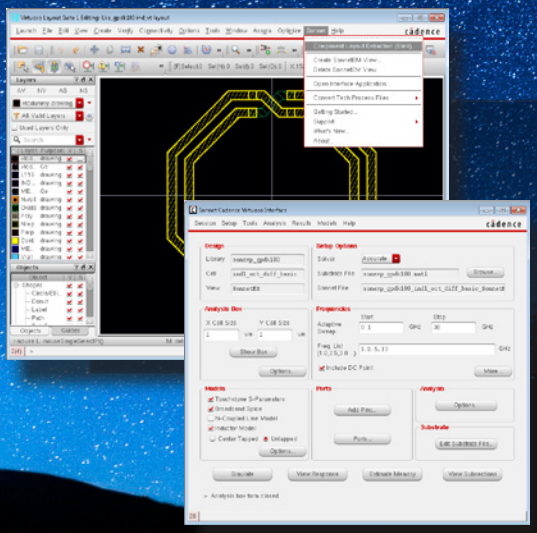
...Or Part of a Framework

Sonnet also provides seamless, error-free interfaces to work within major high frequency CAE design frameworks:

- Cadence® Virtuoso®
- MATLAB®
- Keysight® EEsof EDA's Advanced Design System (ADS™)*
- National Instruments AWR® Microwave Office® (MWO)

*A GENESYS™ Suite interface for Sonnet is available from Keysight® EEsof EDA

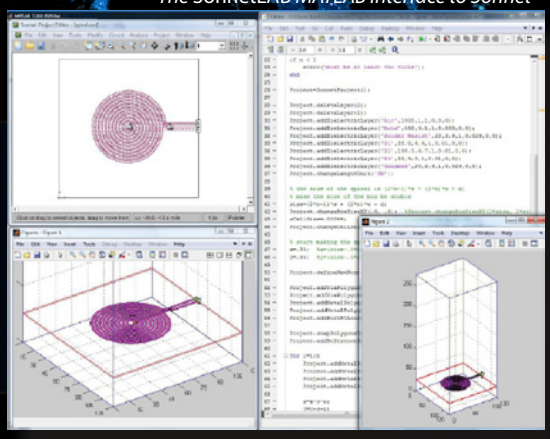
Sonnet within Cadence Virtuoso



Cadence Virtuoso

- Simple unified interface used within the Cadence Virtuoso environment
- Time and frequency domain model extraction
- Provides layout look-alike symbol for schematic view
- Sonnet EM analysis can run independently

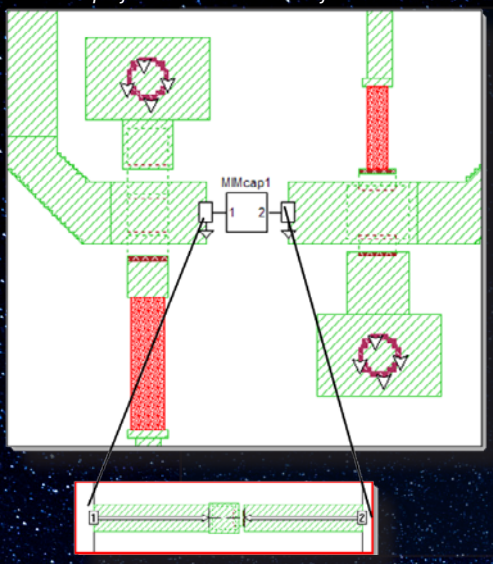
The SonnetLAB *MATLAB Interface to Sonnet*



MATLAB

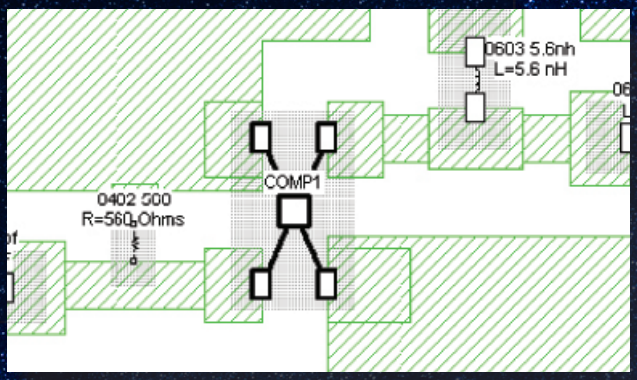
- Free addition to Sonnet Suites
- Programmable API
- Self Documented with examples
- Limitless optimization
- Monte Carlo or yield analysis
- Equation-based geometry

A Sonnet project within a Sonnet Project



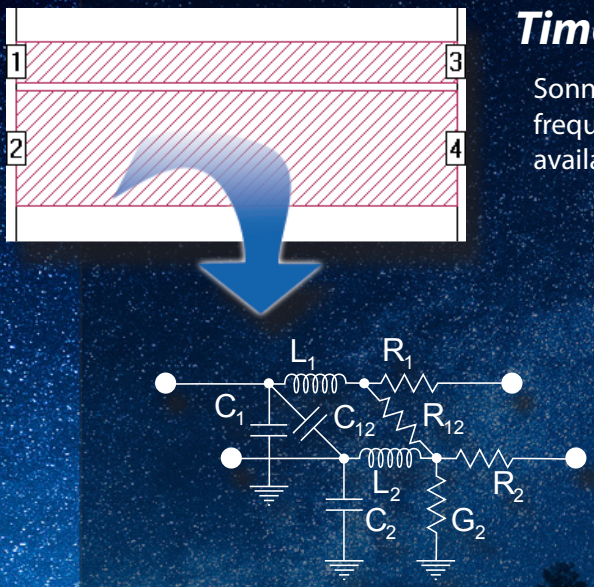
Components

Utilizing Sonnet's Co-calibrated Port technology, components may be introduced into simulations. These can be ideal lumped elements, surface mount device (SMD) vendor models, or device measurements (e.g., transistor or amplifier). Components can be used to remove uncertainty from SMD pad and terminal parasitic effects. New for V16 is support for custom user models as well as Modelithics® CLR library.



Use of Components within Sonnet

A Sonnet Model Extraction



Time and Frequency Domain Extraction Models

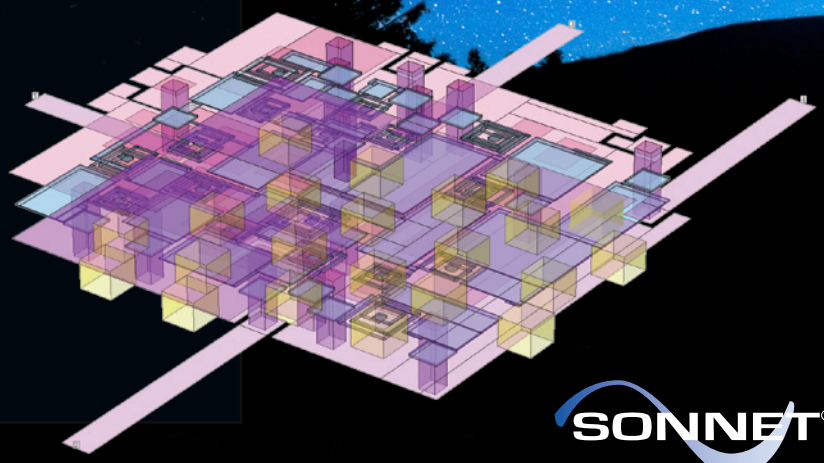
Sonnet's analysis engine extracts electrical models suitable for use in both frequency and time domain circuit theory simulators. Extraction models available in Sonnet are:

- **PI-network Spice model extraction:** Fits a PI-model between each pair of circuit ports, including mutual inductances (k factor), for use in simple circuits and circuits where a PI-model applies (multiple frequencies).
- **Broadband Spice network model extraction:** Extracts a single Spice model to match EM project behavior over the full simulation band with no limit placed on the circuit size or configuration.
- **Transmission Coupling Matrix models:** Exports the RLGC parameters in a format compatible with the mtline component present in the Cadence® Spectre® simulator.
- **S, Y and Z-parameter models:** Available in Touchstone™ and Cadence formats.

Desktop Parallel Processing

Parallel processing takes a multicore x86 processor, and allows each of these cores to function like a separate 64-bit parallel processor to yield maximum processing efficiency. Sonnet's analysis engine makes efficient use of parallel processing on up to 48 CPU cores. This results in up to *N*-fold speed improvement for *N* cores. For optimal results in time-critical design cycles, Sonnet's advanced High Performance Solver engine in combination with the *emCluster*® feature yields maximum speed-up potential.

A complex circuit that benefits greatly from parallel processing

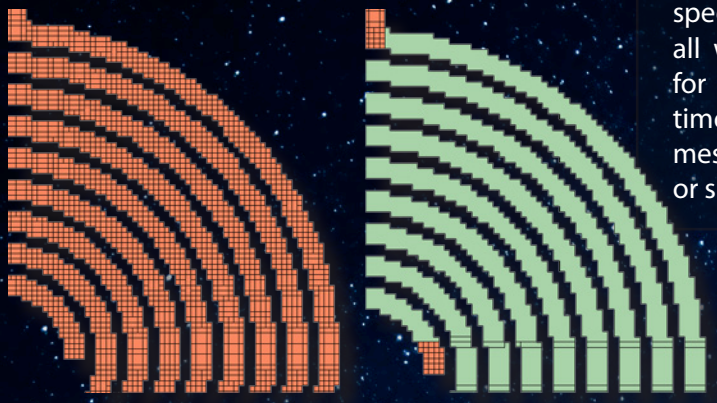


SONNET®

Meshing

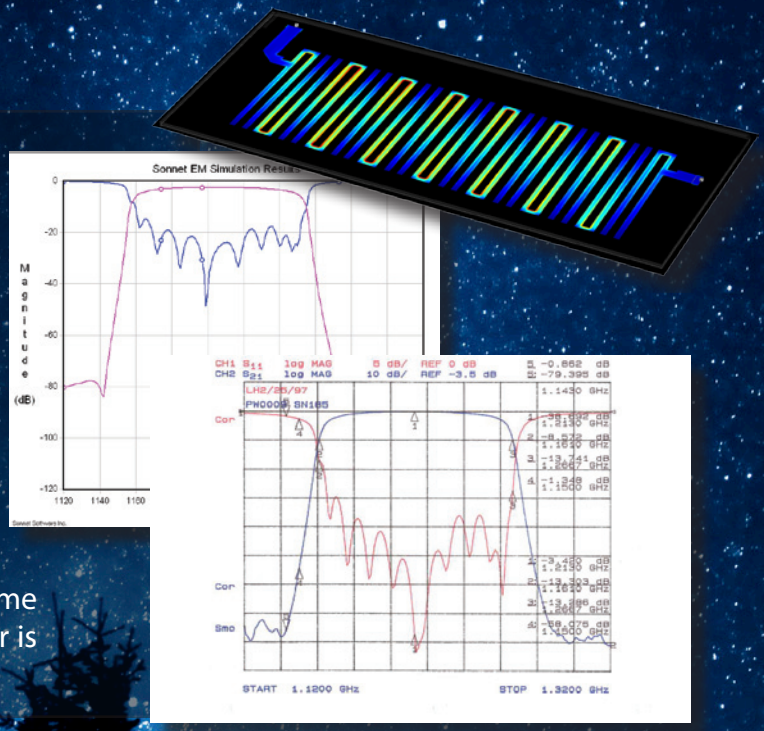
Using the patented Conformal Meshing technology, Sonnet simplifies the work and increases simulation speed of curved geometries and off-grid circuit elements, all while including built-in edge current consideration for high accuracy models. This reduces memory and time required as compared to rectangular and triangular meshing techniques, while avoiding error-prone iterative or sparse matrix techniques.

An example of curves that benefit from Confromal Meshing



Adaptive Band Synthesis

Precision for any circuit analysis is achieved through Sonnet's unique technique of Adaptive Band Synthesis (ABS). ABS runs a detailed frequency sweep which provides reliable results in the fraction of the time required by point-by-point EM simulation, especially for bandwidths exceeding 100x. After the user sets a specific band of interest, Sonnet's ABS adaptively selects the smallest number of discrete EM simulation samples possible, and provides a detailed broadband S-, Y- or Z-parameter data sweep. Overall simulation time is cut dramatically while detailed spectral behavior is still calculated to extreme precision.



An extremely accurate ABS sweep

Experience Sonnet

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