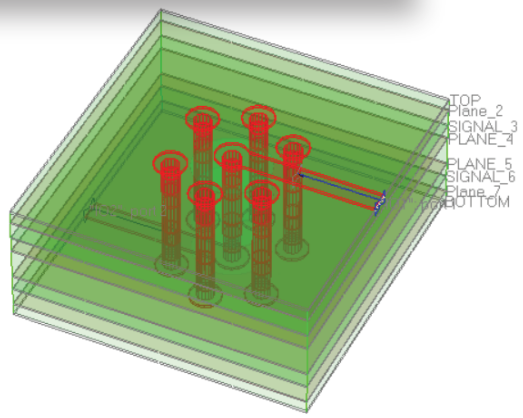
Simbeor EDA Training – A Channel Modeling Approach

Wild River Technology Signal Integrity Training

Simbeor EDA class for SI Engineers

This class has been developed for the signal integrity engineer and utilizes Wild River Technology's CMP-28 Channel Modeling Platform as a signal integrity vehicle to learn the Simbeor electromagnetic signal integrity software. The ability to create meaningful 50 GHz signal integrity simulations using Simbeor, as relevant to signal integrity, is the driving focus of the class.



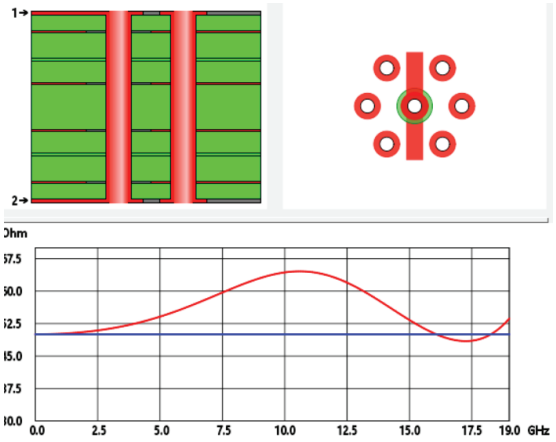
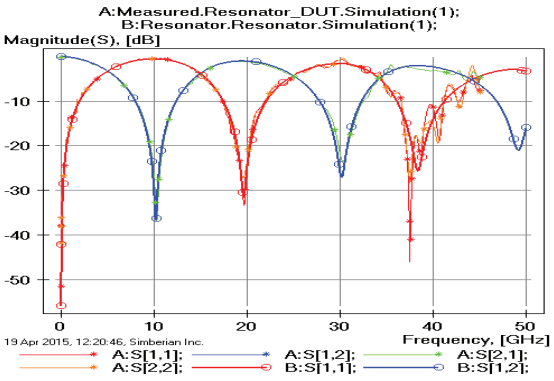


Figure 1: Via optimization using Via Analyzer and SITune

> "I really learned this tool. It is so different than other 1-2 day classes I have taken in the past. Great class! Thanks WRT!"

Value of Channel Modeling Approach

- Practical problems using real test circuits
- Stellar signal integrity for measurement to simulation
- De-embedding capable
- A wide swath of practical test circuits from single ended to differential
- Convenient layout files provided
- Measured S-parameters provided



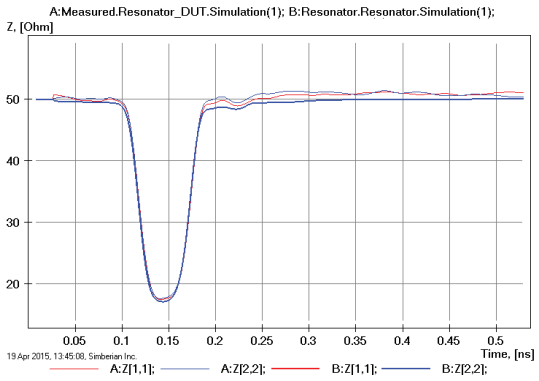


Figure 2: Simulation to measurement frequency domain and time domain correspondence of the de-embedded CMP-28 Beatty structure. Used in Session 10 on text fixture de-embedding.

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Some of the Course Objectives Using Actual Layout and Measured S-parameters:

The key objective is core competency in the usage of Simbeor to 50 GHz and beyond. Upon successful completion of this course, students should be able to demonstrate the following competencies:

1. Creating multilayer objects, including materials, stack-up, and geometry definition and editing
2. GMS method of material identification to 50GHz with 2 simple measurements in
3. Fast and simple via optimization using SI Tune
4. 10 Examples (vias, resonators, Beatty standards, breakouts, transitions…) of simulation to measurement
5. S-parameter quality metrics and rational compact modeling (RCM)
6. End-to-end interconnect de-compositional analysis
7. Analysis in both time (TDR/TDT, and eye diagrams) and frequency analysis, including mixed-mode
8. De-embed a structure in a systematic fashion using GMS methods.
9. Fast PCB design file import and how to run a de-compositional analysis.

PACKAGE COST

Number of Students	Price
1 - 3	Contact WRT
> 3	Contact WRT

ORGANIZATION

11 — 11 week series

1.5 hour on-line classes — 1.5

1 Session — An additional 1 session based on customer interest or relevant issues.

REQUIREMENTS

2-3 hours/week minimum commitment,
1.5 hour live web presentations.

RESOURCES

- Solution examples are provided in the Simbeor installation module. If you did not install the solution examples during the regular installation, you can install them by invoking Windows menu item **Start > Program > Simberian > Simbeor THz > Install Simbeor Examples.**
- Assignments are reviewed.
- Questions and issues with homework can be emailed to the instructor.
- The latest version of the Simbeor Manual. Download the Simbeor Manual in PDF form from the Downloads page on the Simberion web site.

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COURSE TOPICS AND ASSIGNMENTS

Session	Topic	Manual/Tutorial Suggested Reading
1	De-compositional analysis and the Electromagnetic Simulation Environment, Getting around the Simbeor GUI Intro to Rational Compact Models	Chapter 4 - Electromagnetic Simulation Environment, Pages 68 – 80 Chapter 10 – Input and output files Chapter 11 - GUI navigation and shortcut keys
2	Defining Solutions, Project Materials and Stack-up	Chapter 4 - Electromagnetic Simulation Environment, Pages 81-98 Solutions and Projects, Pages 39–46 Materials and Stackup, Pages 47-48 Chapter 5 – Models of Materials Tutorial 1: How to create a Project with Materials and StackUp
3	Model creation wizards and tools	How to create a transmission line model, Pages 61 – 62 Tutorial 2: How to simulate transmission lines How to create a 3D full-wave model for via-holes, Pages 62-63 Via Analyzer, Pages 192 -201 Tutorial 3: How to simulate via-holes
4	Using the SI Tune tool Import of Touchstone models	SiTune tool, Pages 148-153 Scattering Parameters, Pages 352-362 Touchstone Analyzer, Pages 184-191 Tutorial 4: How to create parameterized models
5	Circuits and Simulations	Circuits and Simulations, Pages 48 – 60 Simbeor Solvers, Pages 61 – 62 Symmetry, Page 287, 358 Geometry meshing, Pages 281-284 Circuits and Simulations, Pages 48 – 60 Simbeor Solvers, Pages 61 – 62 Symmetry, Page 287, 358 Geometry meshing, Pages 281-284
6	End-to- end interconnects analysis with linear solver, Outputting model files	Results section, Pages 140-143 Tutorial 5: End-to- end analysis of a simple data channel Multilayered circuit section, Pages 99-123
7	Plotting S-parameters Time-domain analysis (TDR/TDT)	How to compute time-domain response matrix, Page 56-60 Time-domain response matrix, Pages 363-364 Multiport model file processor, Pages 306 – 308
		Tutorial 6 - Time-domain analysis of a simple data channel

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Session	Topic	Manual/Tutorial Suggested Reading
8	Plotting eye diagrams, Geometry import and auto-decomposition	Eye Analyzer, Pages 154-156, How to import geometry from Allegro PCB file, Pages 46-47 Document - Simbeor Board Analyzer, available at
9	Material parameters identification, Roughness estimates	Simberion.com, in Downloads, Documentation Section Web site paper: Broadband material model identification with GMS-parameters, found in the Simberian web site AppNotes page.
10	Test fixture de-embedding, Analysis to measurement correspondence	Extraction of test fixture S-parameters and de-embedding, Pages 298-305
11	Advanced 3DML circuit design and simulation for pre-layout analysis	
12	Customer requested	

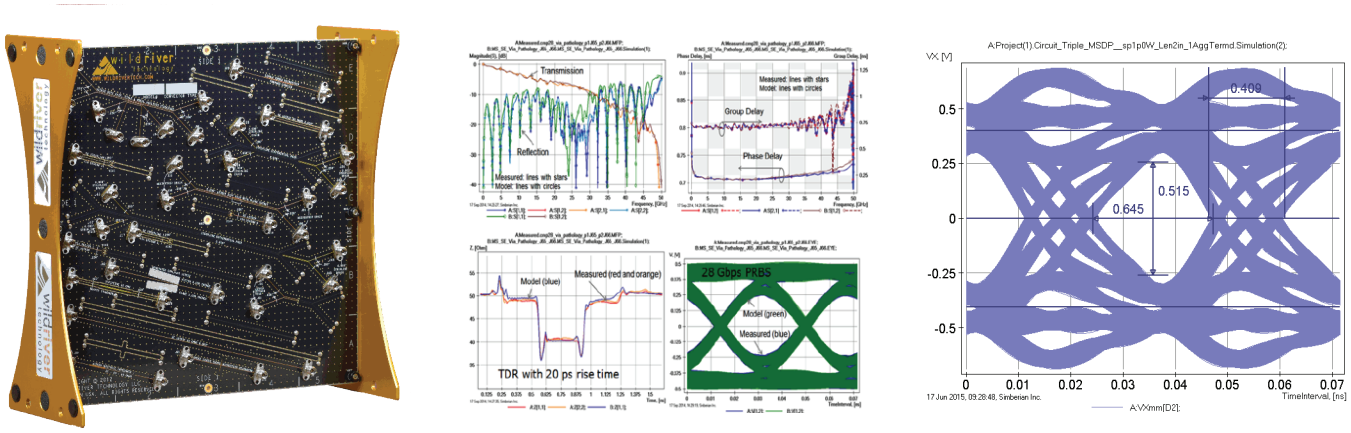

Figure 3: Channel Modeling Platform CMP-28 is used for exercises, actual measurement to simulation correspondence is address for time, frequency, and eye diagrams.

INSTRUCTOR

James C. Bell

8311 SW Charlotte Drive
Beaverton, OR 97007

503-329-2613

jim@wildrivertech.com

James is one of the founders of Wild River Technology and is an experienced design and signal integrity engineer with over 30 years' experience in complex system design, interconnect, and signal integrity engineering. He has been a consultant to engineering organizations world-wide, with expertise in pre- and post-route signal integrity and timing validation for advanced systems.

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