

DESIGNCON[®] 2014

13-TU1, Tuesday Jan 28th, 3rd Speaker 9:55 am to 10:30 am

28 Gb/s SERDES Channel Overview

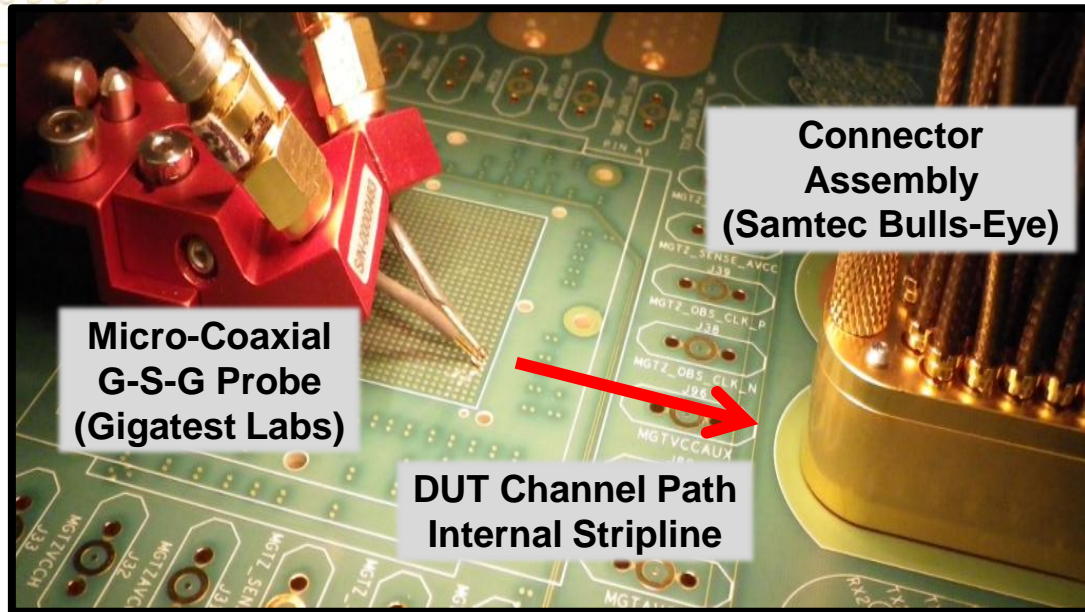
Heidi Barnes



January 28-31, 2014 | Santa Clara Convention Center | Santa Clara, CA

Hybrid Fixture De-Embedding

High Density Fixture with Multiple High Speed Connections



Channel Model De-Embedding Options

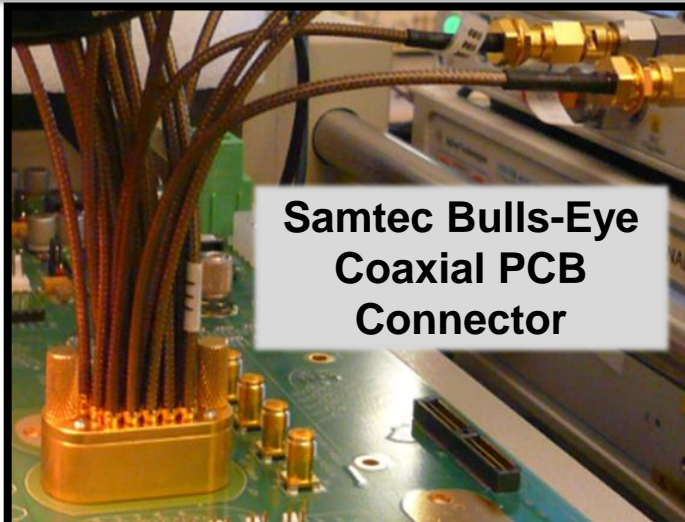
- 1) Direct Probe Measurement
- 2) Test Coupon Structure with AFR
- 3) Hybrid Multi-Path Simulation with Minimal Test Structures

Method #3 - Hybrid Channel Model De-Embedding Solution

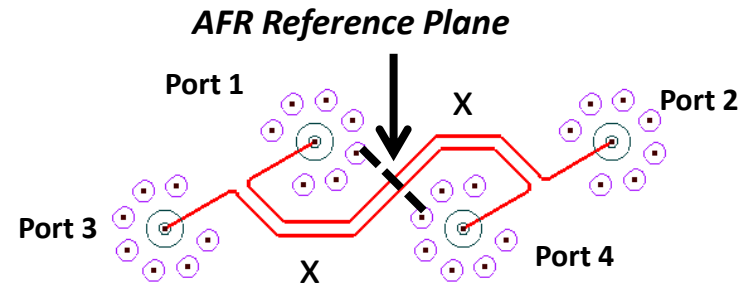
Direct Measurement of the Cable/Connector Assembly and PCB Transition
+
Measurement Based PCB Path Model for Variable Path Lengths

Hybrid Fixture Cable Assembly

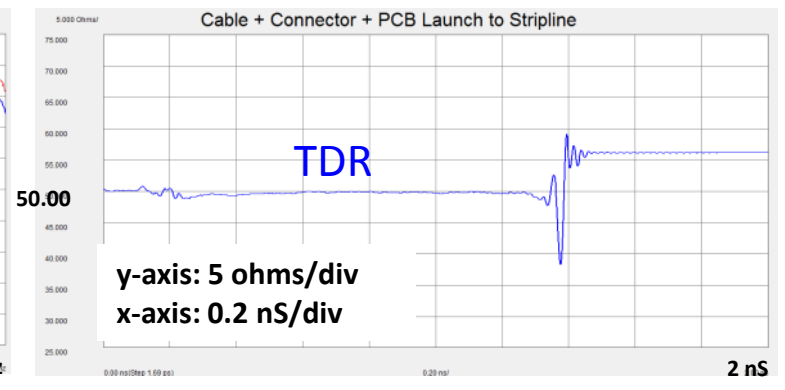
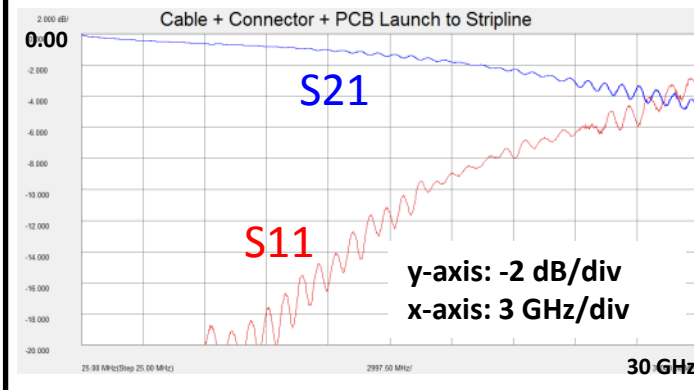
Direct Measurement of the Cable/Connector Assembly and PCB Transition
using
2x Through Path Automatic Fixture Removal (AFR)



2x Test Fixture Through Path PCB Layer 5



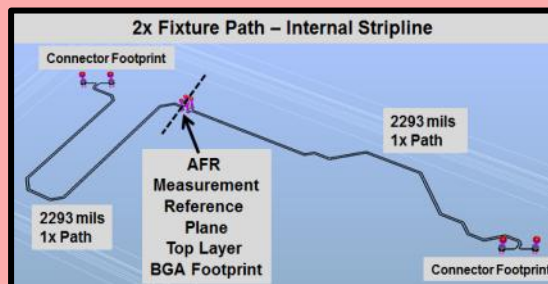
Bulls-Eye PCB Loopback Footprint



Hybrid Fixture Channel Simulation

Measurement Based Transmission Line Model Creation
Tune PCB DK and Loss Characteristics to Match Measurements

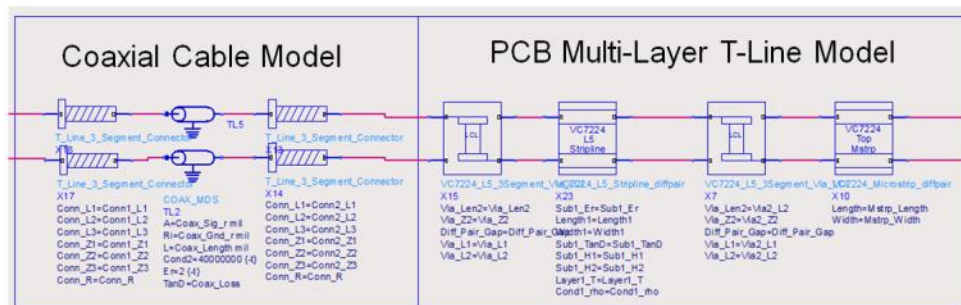
Test Fixture Structures



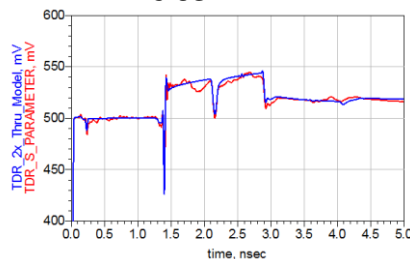
a) 2x Through Path

b) 2x Through Path + 2 inches

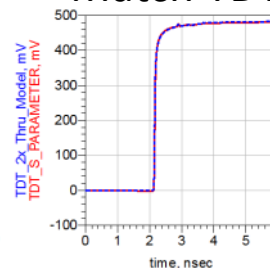
Measurement Based Model



Match TDR



Match TDT



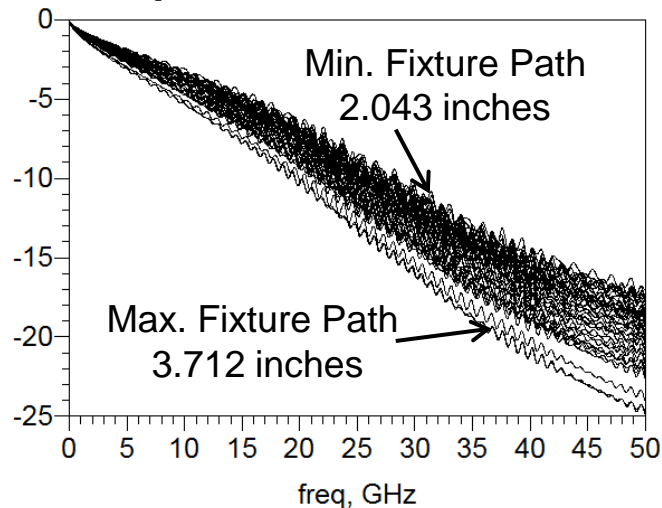
Extract Material Properties

Megtron, Layer 5
Stripline Width = 4.1 mils
DK Height Above = 4.1 mils
DK Height Below = 6 mils
DK = 3.7
Loss Tangent .0132
Copper Conductivity = 3e7
Copper Thickness = 0.5 mils

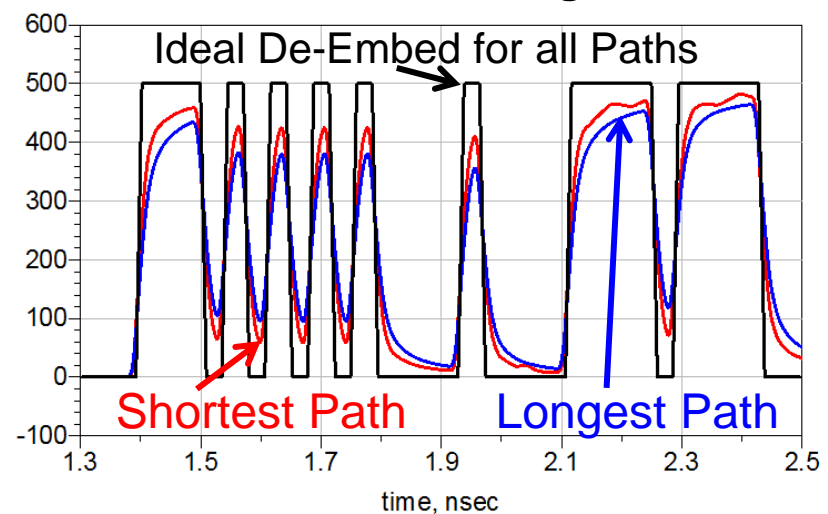
Hybrid Fixture De-Embed Data

“Hybrid Channel Model De-Embedding easily corrects for path length variation enabling best case routing for each high speed connection. Costly length matching to the longest path is avoided.”

Example Path Loss Distribution



Shortest Path vs. Longest Path



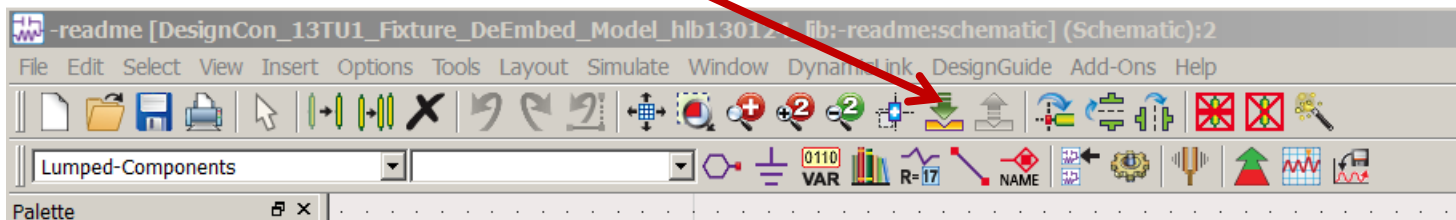
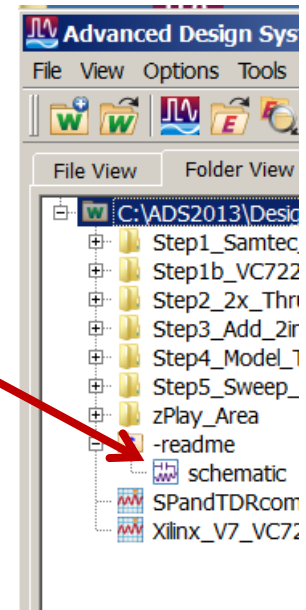
Open ADS

- Check the task bar – it should be running...
 - If not open ADS and select recently opened workspace



DesignCon_13TU1_Fixture_DeEmbed_Model_hlb130124_wrk

- Make sure the **–readme schematic** is open
 - double click on the –readme schematic in the Folder View
- Use the Push and Pop Icons to step through the –readme schematic:



-readme Examples

Push into and Pop out of the schematic symbols

Simulated Measurement Based Model Creation:

Example 1: 2x Thru (set up the model)

Time Domain Sweep



Xilinx_V7_VC7224_2x_fixture_Opt



Frequency Domain Sweep



Xilinx_V7_VC7224_2x_fixture_Opt

Example 2: 2x Thru + 2inches (refine the model)

Time Domain Sweep



Xilinx_V7_VC7224_2x_fixture_Opt

Frequency Domain Sweep



Xilinx_V7_VC7224_2x_fixture_Opt

Final_2x_Thru_Model



Xilinx_V7_VC7224_2x_fixture_Opt

Example 3: 1x Thru (use half of the 2x model)

Frequency Domain Sweep
S-Parameter Model



Xilinx_V7_VC7224_TX1_Model_SP

Frequency Domain Sweep



Xilinx_V7_VC7224_L5_Sweep_SP

DesignCon_13TU1_Fixture_DeEmbed_Model_hlb130124.lib

-readme

Tue Jan 28 06:19:03 2014

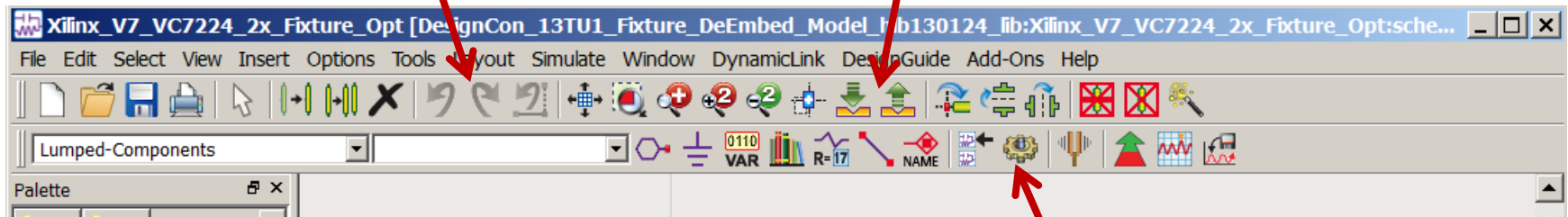
Select the Subcircuit Icon
Then use **Push** and **Pop** to go
To the subcircuit example
And return to the top level
-readme

Schematic ToolBar

Undo and Redo Changes



Pop back up to the –readme schematic



Simulate and see results



Next Speaker

- **28 Gb/s SERDES Channel Overview – Romi Mayder and Jack Carrel (20min)**
- **Fixture S-parameter model from 2x Fixture Physical Test Structures – Mike Resso (40 min)**
- **Fixture S-parameter model from Simulated Measurement Based Model – Heidi Barnes (40 min)**
- **Waveform Measurements at the DUT using S-parameter model de-embedding. Rob Sleigh (1 hour)**
- **Lessons Learned – Jack Carrel (15 min)**