

# Boundary-Scan Project Phase 3: Investigation into Challenges of using .BSDL Files

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# Presentation Outline

- iNEMI's Boundary-Scan Adoption Project
- Boundary-Scan Phase 3 Project Background
- Boundary-Scan Phase 3 .bsdl Survey Methodology
- Summary

# iNEMI's Boundary-Scan Adoption Project

- Organized under the iNEMI Board and Systems Manufacturing Test Technology Integration Group (TIG)
- Goals of the Boundary-Scan Adoption Project:
  - Gauge the adoption level of boundary-scan
  - Promote wider adoption of boundary-scan (IEEE 1149.x) and associated standards (i.e. IEEE 1581, P1687)
  - Encourage semiconductor suppliers to include the technology in their products

## BScan Phase 3 Project Background

- The 2012 iNEMI roadmap gap analysis determined that one of the greater risks to High Volume Manufacturing (HVM) board test was the continuous erosion of test point access due to:
  - increasing bus signal speeds
  - higher component densities
  - shrinking PCB and component form factors
- A significant solution to the test point erosion issue is to use boundary-scan based testing to test areas where test point access has been eroded
- In order to generate boundary-scan tests, a required input is a correct, compliant Boundary-scan Description Language .bsdl file

# BScan Phase 3 Project Background

- The number one issue in generating boundary-scan tests identified by the 2009 iNEMI Boundary-Scan survey:
  - Problems obtaining correct and compliant boundary-scan description language (.bsdl) files from the semiconductor industry for use in printed circuit board assembly (PCBA) boundary-scan test generation.
- The major conclusions from the survey were:
  - The semiconductor industry needs to make a greater effort to produce correct and compliant BSDLs.
  - A better job needs to be done verifying semiconductor JTAG implementation compliance to .bsdl files.
    - Non-compliance is typically found when a test is generated and it doesn't work!

## BScan Phase 3 Project Background

- Consequences of not having correct and compliant .bsdl files:
  - inability to generate comprehensive boundary-scan tests
    - results in lower overall test coverage for PCBAs
    - resulting in higher manufacturing costs and lower overall product quality.
- .bsdl files are no longer the only output files specified by IEEE 1149.1 and other specifications.
  - IEEE 1149.1 2013 added .pdl (Procedure Definition Language)
  - New IEEE 1149.1 2013 .bsdl features further complicate the validation process
  - IEEE P1687 adds .pdl and .icl (Instrument Connectivity Language)

## BScan Phase 3 Project Purpose

- Generate an industry survey that focuses on .bsdl file generation, validation, and industry usage
  - Focus on two groups
    - PCBA Board/System Engineering
    - Semiconductor (IC) Engineering
- Analyze and evaluate the survey results
- Determine Best Practices for .bsdl file generation and validation
- Increase industry awareness of the issues and potential solutions

# Survey Methodology

- 15-20 minute survey
- Target respondents:
  - PCBA Design and Development Engineers/Managers
  - PCBA Test Engineers/Managers
  - IC Design Engineers/Managers
  - IC Manufacturing Engineers/Managers

# Survey Methodology

- Question Categories
  - General demographic information
    - Name, Company info, area of responsibility
  - Board/System Engineering Questions
    - PCBA Design and Test Engineers
  - Semiconductor Engineering Questions
    - IC Design Engineers
    - IC Manufacturing Engineers

# Survey Methodology

- PCBA Board/System Engineering Questions
  - PCBA Engineering specific demographics
  - BSDL usage
  - Issues seen with .bsdl files
  - Impact of issues
  - Methods of obtaining .bsdl files
  - Awareness of .bsdl file set evolution

# Survey Methodology

- Semiconductor (IC) Engineering Questions
  - Semiconductor Engineering specific demographics
  - Does respondent create/make .bsdl files
    - If so, how are they generated?
    - What issues are there in generating .bsdl files?
  - Awareness of .bsdl file set evolution
  - Is respondent in IC design or IC manufacturing?
    - Some questions vary based on respondent's job function.

# Survey Methodology

- Semiconductor (IC) Engineering Questions
  - BSDL usage
    - Quantity of .bsdl files used per year
    - What are they used for?
  - Issues seen with using .bsdl files
  - Impact of issues
  - Methods of validating .bsdl files
  - Issues seen with validating .bsdl files

# Summary

- #1 issue reported in 2009 iNEMI Boundary-scan survey for generating boundary-scan tests was obtaining correct and compliant .bsdl files
- There has been no indication of any significant improvement since 2009 and .bsdl file sets are becoming more complex
- iNEMI is conducting a new survey focused on
  - .bsdl file implementation issues
  - .bsdl file creation practices
  - .bsdl file validation practices
- Outcomes of the .bsdl survey project:
  - Updated analysis of issues using/generating/validating .bsdl files
  - Best Practices Guidelines for .bsdl file generation and validation

## Summary

- If you are in the PCBA or Semiconductor engineering fields and you create or use .bsdl files, please go take the iNEMI survey.
- You can find a link to the survey at [www.inemi.org](http://www.inemi.org)