Package Modeling Decisions

IBIS ATM Teleconference
October 8, 2013
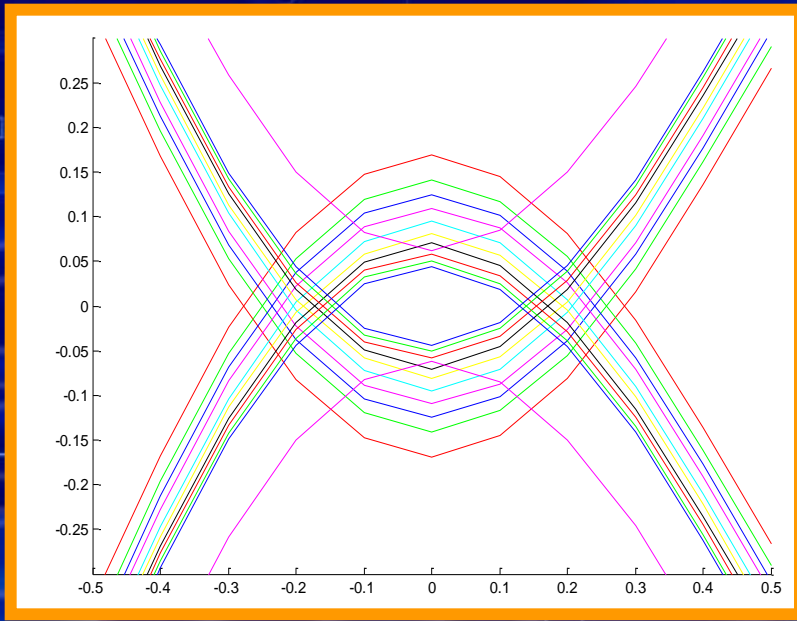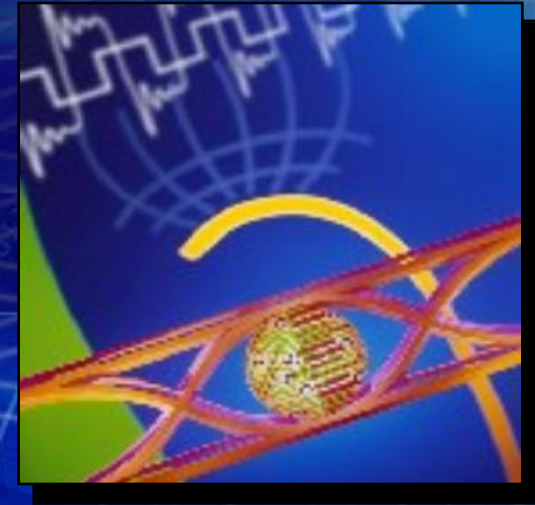
Arpad Muranyi

Overview of BIRD 125

- **The BIRD makes use of IBIS-ISS to describe the package**
- **IBIS-ISS replaces the R, L, C matrix or Fork/Endfork syntax**
- **The IBIS-ISS subcircuits are instantiated with a syntax similar to [External Circuit] under [Define Package Model]**
- **Implicit and Explicit on-die nodes (pads) are declared so that the IBIS-ISS subcircuit terminals can be connected to them**
  - the IBIS-ISS subcircuits are connected to the pin/pad names
- **The proposal was written with the mindset of keeping the changes to the IBIS specification at a minimum**

- **Splits/joins in the package or on-die interconnect could be addressed using BIRD 145**
- **"Pre-layout" package modeling using [Model] name associations can be addressed with modifications to the BIRD**
  - introduce a new keyword [Model Names] in place of [Pin Numbers]
- **Stacked die modeling not addressed, need other BIRD(s)**

Overview of BIRD 145

- **The BIRD makes provisions for connecting [Model]s and [External Model]s in series**
- **This allows on-die interconnect modeling in [External Circuit] to be used with legacy [Model]s**
- **The [Model Call] syntax allows for declaring die pad names which are useful for making connections to package models**
- **Very small change to the specification, quick path to success**

- **With a little "poetic license" this BIRD could also be used for package modeling**
  - zeroing out the normal package parameters: pin=pad

Overview of EMD

- **The proposal introduces a brand new syntax to supersede EBD**
  - could be written with the tree or keyword style
  - replacement of path syntax with subcircuits
  - intended to model "Modules"
  - could implement package in EMD
  - not a good solution for IBIS Component packaging problem
- **The syntax is more efficient and compact than the familiar IBIS syntax**
- **The concept is based on the familiar EBD specification**
- **Since it is evolving as we speak, all of the current modeling needs are addressed**
  - sliding package modeling, etc…
- **EMD might take over the "cockpit" role from .ibs files**
  - instantiates IBIS models using "U" designators in .ibs files
  - where is the package, in .ibs, .emd, or both?
  - the definition of what a "component" is may change

"EMD like" IBIS package model

- **Proposes to have a new [Die Pad] keyword**
  - to declare Pad_name, Signal Name, Model_name

- **Proposes to change the rules for [Pin]**
  - allow duplicate rows with the same pin name or signal name to support splits and/or joins in the package

- **Stacked die is not addressed by this proposal**

The inconsequential, correctable, and fundamental differences between BIRD 125 and "EMD Like" - from Walter

- **Inconsequential differences:**
  - Terminal/Port and Pin_Name/Pin_Number, and parameter tree syntax vs. keyword syntax
- **Correctable deficiencies in BIRD 125:**
  - Direct support for corners on Parameters
  - Direct support for sNp without requiring IBIS-ISS subcircuit
  - [Package Circuit]s are not named
- **Fundamental difference:**
  - BIRD 125 requires that Ports (aka Terminals) of a subcircuit have a name, and that the name of the Port has properties (e.g. Pin/Pad/Model/Model_type, …)
  - The format of the [Pin Numbers] section is column sensitive, and you must be aware of the pains of adding information to existing IBIS records that are column sensitive *{AM: This is correctable}*
  - EMD Like defines a structure for each Terminal (aka Port), with information for that Terminal (Pin|Pad, Pin_Number|Model_name|Model_type, Victim|Aggressor, Connection, Polarity)
  - SI2 and MCP do exactly what EMD Like does, they define properties for each Terminal/Port #. They do not assign properties to a name, and then assign the name to the Terminal.

Mentor Graphics®

Basic decision to be made, independent of "EMD Like", BIRD 125 and BIRD 145 - from Walter

- **Solution must support (not a decision – a requirement):**
  - Models between specific pins and specific die pads
  - Models between specific die pads and specific buffer terminals
  - Coupled and uncoupled models
  - Models must include supply pins, pads and terminals
- **Need to decide if IBIS Component requires enhancements:**
  - Two pins to single die pad
  - One pin to multiple die pads
  - Stacked die (which can alternatively be handled by EMD)
  - Different number of supply pins and supply die pads
- **Need to decide if package and on-die models need higher level of abstractions:**
  - Some or all of the Terminals/Ports associated with Models instead of specific Pins/Pads/Buffer
  - Some or all of the Terminals/Ports associated with Inputs or Outputs (NEXT/FEXT) instead of specific Pins/Pads/Buffer

Decision time

- **BIRD 145 could provide a solution very quickly**
  - could be a useful interim solution while we work on EMD

- **BIRD 125 is complete, but would need more work to address some needs identified recently (sliding package, stacked die)**

- **"EMD Like" package modeling**

- **EMD needs more detail work**

- **Is it a good idea to have both in future IBIS specifications?**
  - the specification would get unnecessarily large
  - model makers might get confused on which method to use
  - tool vendors might implement only their favorite solution which can lead to models which only work in some tools

www.mentor.com