Expectations for IBIS 7.1

Michael Mirmak
Intel Corporation

DesignCon Virtual IBIS Summit
August 19, 2021
Agenda

• History of IBIS 7.1 Development
• Major and Minor Features
  • Complex C_comp Modeling
  • On-die Power Distribution Networks
  • EMD: Electrical Module Descriptions
  • Other Major Changes
• What Comes Next
IBIS 7.1 Taking Shape...

- Editorial Task Group re-convened February 26, 2021 to assemble IBIS 7.1
  - Weekly meetings Wednesday, 8 AM US Pacific time

- Technical content closed with 13 BIRDs approved for inclusion on July 16

- Current Editorial work focused on
  - BCI and repeater analysis flows
  - Clarity and consistency of text
  - Delivery to the Open Forum for review and vote before Q4’21

- Documents and minutes available at https://www.ibis.org/editorial_wip
Major and Minor Features of 7.1

- **BIRD195.1**: Enabling [Rgnd] and [Rpower] Keywords for Input Models
- **BIRD197.7**: New AMI Reserved Parameter DC_Offset
- **BIRD198.3**: Keyword Additions for On-Die PDN (Power Distribution Network) Modeling
- **BIRD199**: Fix Rx_Receiver_Sensitivity Inconsistencies
- **BIRD200**: C_comp Model Using IBIS-ISS or Touchstone
- **BIRD201.1**: Back-channel Statistical Optimization
- **BIRD202.3**: Electrical Descriptions of Modules
- **BIRD203**: Submodel Clarification
- **BIRD205**: New AMI Reserved Parameter for Sampling Position in AMI_Init Flow
- **BIRD206**: Clarification of text "transition time"
- **BIRD207**: New AMI Reserved Parameters Component_Name and Signal_Name
- **BIRD208**: Clock-Data Pin Relationship Keyword
- **BIRD209**: Make Clock Times Output Required for Clock Executable Models
- **BIRD212**: Clarification of PAM4_UpperThreshold, PAM4_CenterThreshold, PAM4_LowerThreshold

Individual changes documented at http://ibis.org/birds/
Complex C\(_{\text{comp}}\) Modeling

- Modeling impedance using complex frequency- or time-dependent networks rather than single capacitors

This entire block replaces C\(_{\text{comp}}\) and its variants

The model can be a SPICE model or an S-parameter network
On-Die Power Distribution Networks

• A new set of keywords has been added to describe decoupling networks on the device die, to capture power supply noise effects, “especially in the high-frequency range”

PDN networks are simply described, and connect between signal names or bus labels (terminals) described as PDN Domains

This connects rails, not just pins

Variations are independent of [Model] typ/min/max corners

This is an alternative to Series and Interconnect Model keyword representations and can coexist with them
EMD: Electrical Descriptions of Modules

• A way to describe complex networks of devices and/or interconnects that can in turn be used as modules in other networks
  • Imagine a DIMM electrical model: a PCB and DRAM device which, together, can be used in multiple instances in a PCB system model

• The successor to EBD, the Electrical Board Description (EBD) format
  • EBD had many limitations on connectivity and electrical modeling capabilities

Four devices here are instances of a single IBIS component

The devices are combined on a substrate with its own interconnect description

The substate is a DIMM, which would be simulated in a larger system
Summary of Other Major Changes

• DC Offset
  • Expands support for single-ended interfaces (e.g., DDR) by communicating channel DC level to IBIS-AMI receivers

• Back-channel Statistical Optimization
  • Expands model-to-model training of equalization beyond bitstream simulation

• Sampling Position in AMI_Init Flow
  • Enables more model-level control of signal sampling in statistical IBIS-AMI simulations

• Expanding Architectural Descriptions, Including Clocking and Clock-Forwarding Support
  • Adding Component_Name and Signal_Name enables buffer-specific information to be passed into IBIS-AMI models at the component level
  • DQ/DQS GetWave support enables clock ticks to be used in data latching across models
  • Explicit links between clock and data pins permits tools to monitor and impose component latching relationships
What’s Next

• A more detailed overview of IBIS 7.1 will be presented at a future IBIS Summit

• Until then, IBIS Editorial and the Open Forum will be reviewing the document in preparation for approval

Please review the draft IBIS 7.1 documents – your feedback is gratefully accepted!