IBIS Chair’s Report

Randy Wolff
Micron Technology
Chair, IBIS Open Forum

2019 Asian IBIS Summits
Taipei, Taiwan
November 4, 2019

http://www.ibis.org/
26 IBIS Members

Number of Members by Year

Organization
IBIS Officers 2019-2020

Chair:  Randy Wolff, Micron Technology
Vice-Chair: Lance Wang, Zuken USA
Secretary: Curtis Clark, ANSYS
Treasurer: Bob Ross, Teraspeed Labs
Librarian: Anders Ekholm, Ericsson
Postmaster: Mike LaBonte, SiSoft (MathWorks)
Webmaster: Steve Parker, GlobalFoundries
IBIS Meetings

• Weekly teleconferences
  – Quality Task Group (Tuesdays)
  – Advanced Technology Modeling Task Group (Tuesdays)
  – Interconnect Task Group (Wednesdays)
  – Editorial Task Group (some Fridays)

• IBIS Open Forum teleconference every 3 weeks
  – 502 meetings so far

• IBIS Summit meetings: DesignCon, IEEE SPI, Shanghai, Taipei, Tokyo
SAE ITC

• SAE Industry Technologies Consortia is the parent organization of the IBIS Open Forum
• IBIS is assisted by SAE employees José Godoy, Phyllis Gross, Laurie Strom
• SAE ITC provides financial, legal, and other services
• http://www.sae-itc.org/
Task Groups

• Interconnect Task Group
  – Chair: Michael Mirmak, Intel
  – http://ibis.org/interconn_wip/
  – Develop on-die/package/module/connector interconnect modeling BIRDs

• Advanced Technology Modeling Task Group
  – Chair: Arpad Muranyi, Mentor, A Siemens Business
  – http://ibis.org/atm_wip/
  – Develop most other technical BIRDs

• Quality Task Group
  – Chair: Mike LaBonte, SiSoft (MathWorks)
  – http://ibis.org/quality_wip/
  – Oversee IBISCHK parser testing and development

• Editorial Task Group
  – Chair: Michael Mirmak, Intel
  – http://ibis.org/editorial_wip/
  – Produce IBIS Specification documents

BIRD = Buffer Issue Resolution Document
IBIS Milestones

I/O Buffer Information Specification

- 1993-1994 **IBIS 1.0-2.1**:
  - Behavioral buffer model (fast simulation)
  - Component pin map (easy EDA import)
- 1997-1999 **IBIS 3.0-3.2**:
  - Package models
  - Electrical Board Description (EBD)
  - Dynamic buffers
- 2002-2006 **IBIS 4.0-4.2**:
  - Receiver models
  - AMS languages
- 2007-2012 **IBIS 5.0-5.1**:
  - IBIS-AMI SerDes models
  - Power aware
- 2013-2015 **IBIS 6.0-6.1**:
  - PAM4 multi-level signaling
  - Power delivery package models
- 2019 **IBIS 7.0**:
  - Back-channel support
  - Interconnect modeling using IBIS-ISS and Touchstone

Other Work

- 1995: **ANSI/EIA-656**
  - IBIS 2.1
- 1999: **ANSI/EIA-656-A**
  - IBIS 3.2
- 2001: **IEC 62014-1**
  - IBIS 3.2
- 2003: **ICM 1.0**
  - Interconnect Model Specification
- 2006: **ANSI/EIA-656-B**
  - IBIS 4.2
- 2009: **Touchstone 2.0**
- 2011: **IBIS-ISS 1.0**
  - Interconnect SPICE Subcircuit specification
IBIS Version Development

New! IBIS 7.0

IBIS 7.0 ratified March 15, 2019

Open Forum Meetings after Previous Release

IBIS Version

IBIS 7.0

ratified
March 15, 2019

2 2.1 3 3.1 3.2 4 4.1 4.2 5 5.1 6 6.1 7

0 1 2 3 4 5

Years

0 1 2 3 4 5

IBIS Version Development
IBISCHK7 Version 7.0.0

• Executables available at [www.ibis.org/ibischk7/](http://www.ibis.org/ibischk7/)
  – Interconnect Model syntax
  – Subdirectory references
  – Bus_label definitions
  – Etc.

• Contact [treasurer@ibis.org](mailto:treasurer@ibis.org) for Source Code License purchase ($3,000)
Beyond IBIS 7.0

• Currently 5 BIRDs in discussion
  – 2 about redriver flow (BIRD166.4, BIRD190)
  – 1 editorial (BIRD181.1)
  – 1 to support single-ended IBIS-AMI (BIRD197.4)
  – 1 for on-die PDN modeling (BIRD198)

• EBD update supporting IBIS-ISS and Touchstone
  – Improved module and multi-chip package modeling

• BIRD200 approved: C_comp model supporting IBIS-ISS and Touchstone

• BIRD195.1 approved: [Rgnd] and [Rpower] for IBIS-AMI

• What other new ideas do you have for IBIS?
What Else Could IBIS Be Used For?

• IBIS is nominally about I/O buffers, used to:
  – Solve signal quality problems like loss, inter-symbol interference (ISI) and crosstalk
  – Generate waveforms used in timing analysis

• But engineers also:
  – Insure proper timing between pins
  – Insure sufficient power distribution
  – Include optical links in analyses
  – Analyze channel operating margin (COM), forward error correction (FEC), etc.
  – Comply with any other new requirements posed by JEDEC, etc.

• What other data might IBIS formats convey?
New Directions for IBIS?

- IBIS VRM models
- IBIS chip power models
- IBIS timing models
- IBIS waveform analysis language
- Data probability distributions (or at least more than 3 corners)
- IBIS-ISS [Test Load], external [Test Data]
- Optical Model_type(s) for Vertical Cavity Surface Emitting Laser (VCSEL), etc.
Submitting Your Idea – BIRD Process

• BIRD – Buffer Issue Resolution Document
  – Official method for submitting a proposed change to the IBIS specification

• BIRD Template found on IBIS website
  – Standardized method to describe your idea

• Submit BIRD to chair@ibis.org

• BIRDs discussed in Open Forum meetings
  – Eventual vote by members for approval

• Idea not ready for an official BIRD?
  – Join an IBIS Task Group meeting for technical discussion
BIRD Link on IBIS Website

Welcome to the IBIS Open Forum

NEW 2019 IBIS Touchstone Survey Report: Touchstone Survey
NEW IBIS Version 7.0 has been ratified: IBIS 7.0

Our Specifications

I/O Buffer Information Specification (IBIS 7.0) (SAE/EIA-STD-656-B) (IEC-62014-1)
IBIS Interconnect Modeling Specification (ICM 1.1) (SAE/GEIA-STD-0001)
IBIS Interconnect SPICE Subcircuit Specification (IBIS-ISS 1.0)
Touchstone® File Format Specification (Touchstone 2.0)

Our Members

Link to BIRDS webpage
# Buffer Issue Resolution Documents (BIRD)

To submit a BIRD to the IBIS Open Forum, please use the [BIRD Template Rev. 1.3](#).

<table>
<thead>
<tr>
<th>ID#</th>
<th>Issue Title</th>
<th>Requester</th>
<th>Date Submitted</th>
<th>Date Accepted</th>
<th>Supporting Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>C_comp Model Using IBIS ISS or Touchstone</td>
<td>Randy Wolff, Micron Technology, Inc. Walter Katz, Signal Integrity Software, Inc.</td>
<td>July 9, 2019</td>
<td>September 27, 2019</td>
<td></td>
</tr>
<tr>
<td>199</td>
<td>Fix Rx_Receiver_Sensitivity Inconsistencies</td>
<td>Arpad Muranyi, Mentor a Siemens Business</td>
<td>March 19, 2019</td>
<td>June 7, 2019</td>
<td></td>
</tr>
<tr>
<td>198</td>
<td>Keyword additions for On Die PDN (Power Distribution Network) Modeling</td>
<td>Kazuki Murata; Ricoh Co., Ltd.; Miyoko Goto; Ricoh Co., Ltd.; Kazuyuki Sakata; Renesas Electronics Corporation; Kazunori Yamada; Renesas Electronics Corporation; Kenji Ichikawa; Denso Corporation; Atsushi Tomishima; Toshiba Electronic Devices &amp; Storage Corporation; Takashi Hasegawa; Sony LSI Design Inc.; Koichi Seko, Panasonic Industrial Devices Systems and Technology Co., Ltd.; Toshiki Kanamoto; Hiroaki University Megumi Ono; Socionext Inc.</td>
<td>March 11, 2019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>196.1</td>
<td>Prohibit Periods at the End of File Names</td>
<td>Arpad Muranyi, Mentor Graphics, A Siemens Business</td>
<td>September 25, 2018, October 12, 2018</td>
<td>October 12, 2018</td>
<td>7.0</td>
</tr>
<tr>
<td>195.1</td>
<td>Enabling [Read] and [Recover] Keywords for Input Models</td>
<td>Michael Mirmak, Intel Corp.</td>
<td>June 19, 2018, June 29, 2018</td>
<td>August 31, 2018</td>
<td></td>
</tr>
</tbody>
</table>
[Thank You]

IBIS Open Forum:
Web: http://www.ibis.org
Email: ibis-info@freelists.org

We welcome participation by all IBIS model makers, EDA tool vendors, IBIS model users, and interested parties.