

IBIS Open Forum Minutes

Meeting Date: **April 5, 2013**

Meeting Location: **Teleconference**

VOTING MEMBERS AND 2013 PARTICIPANTS

Agilent	Radek Biernacki, Pegah Alavi, Heidi Barnes, Fangyi Rao, Colin Warwick
Altera	David Banas*, Hsinho Wu
ANSYS	Luis Armenta
Applied Simulation Technology	Fred Balistreri, Norio Matsui
ARM	(Vipul Patel)
Cadence Design Systems	Terry Jernberg, Joy Li, Yingxin Sun, Ambrish Varma, Kevin Yao, Brad Brim*
Ericsson	Anders Ekholm, Martina Fiammengo
Foxconn Technology Group	(Sogo Hsu)
Freescale	Jon Burnett
Huawei Technologies	(Jinjun Li)
IBM	Greg Edlund*, Adge Hawes
Infineon Technologies AG	(Christian Sporrer)
Intel Corporation	Michael Mirmak*, Mohammad Bapi, Stewart Gilbert, Ravindra Rudraraju
IO Methodology	Lance Wang*
LSI	Brian Burdick*, Sarika Jain*
Maxim Integrated Products	Hassan Rafat, Mahbubul Bari, Ron Olisar
Mentor Graphics	Arpad Muranyi*, Ed Bartlett, Vladimir Dmitriev-Zdorov
Micron Technology	Randy Wolff*
Nokia Siemens Networks GmbH	(Eckhard Lenski)
QLogic	James Zhou
Signal Integrity Software	Walter Katz*, Mike LaBonte*, Mike Steinberger, Todd Westerhoff
Synopsys	John Ellis, Ted Mido, Scott Wedge, Rinsha Reghunath
Teraspeed Consulting Group	Bob Ross*, Tom Dagostino
Texas Instruments	(Pavani Jella)
Toshiba	(Yasumasa Kondo)
Xilinx	(Raymond Anderson)
ZTE	(Huang Min)
Zuken	Masaud Raeisi, Reinhard Remmert

OTHER PARTICIPANTS IN 2013

Bayside Design	Elliot Nahas
ECL Advantage	Thomas Iddings
Granite River Labs	Vamshi Kandalla, Miki Takahashi
Hewlett-Packard	Yongjin Choi, Ting Zhu

KEI Systems	Shinichi Maeda
National Instruments	Lee Mohrmann
Nvidia	Eric Hsu
Qualcomm	Scott Powers
TechAmerica	(Chris Denham)
Teradyne	Raymond Yakura*
University of Illinois	Tom Comberiate, José Schutt-Ainé
Vitesse Semiconductor	Sirius Tsang

In the list above, attendees at the meeting are indicated by *. Principal members or other active members who have not attended are in parentheses. Participants who no longer are in the organization are in square brackets.

UPCOMING MEETINGS

The bridge numbers for future IBIS teleconferences are as follows:

Date	Meeting Number	Meeting Password
April 26, 2013	205 475 958	IBIS

For teleconference dial-in information, use the password at the following website:

<https://ciscosales.webex.com/ciscosales/j.php?J=205475958>

All teleconference meetings are 8:00 AM to 9:55 AM US Pacific Time. Meeting agendas are typically distributed seven days before each Open Forum. Minutes are typically distributed within seven days of the corresponding meeting. When calling into the meeting, follow the prompts to enter the meeting ID. For new, local international dial-in numbers, please reference the bridge numbers provided by Cisco Systems at the following link:

http://www.cisco.com/web/about/doing_business/conferencing/index.html

NOTE: "AR" = Action Required.

INTRODUCTIONS AND MEETING QUORUM

Randy Wolff declared that a quorum was reached and the meeting could begin.

Raymond Yakura of Teradyne introduced himself. He is a Signal Integrity engineer and is looking into IBIS for running IBIS-AMI simulations.

Sarika Jain is an engineer working for LSI Logic in India. She is working on IBIS 5.1 and 4.2 models.

CALL FOR PATENTS

Michael Mirmak called for any patents or pending patents related to the IBIS 3.2, IBIS 4.2, IBIS 5.1, Touchstone 2.0 or ICM 1.1 specifications. No patents were declared.

REVIEW OF MINUTES AND ARS

Randy Wolff called for comments regarding the minutes of the March 15, 2013 IBIS Open Forum teleconference. The minutes were approved without changes.

MEMBERSHIP STATUS AND TREASURER'S REPORT

No update.

WEB PAGE UPDATES

Mike LaBonte reported that there have not been any web updates.

MAILING LIST ADMINISTRATION

Mike LaBonte reported that he has an open AR to send a note to the list about terms of use.

MODEL LIBRARY UPDATE

No update.

MISCELLANY/ANNOUNCEMENTS

Michael Mirmak asked if there was a way to access any information about usage on the website to see what areas of the site are most heavily used. Mike LaBonte thought that he could not get access to any server logs, but he could modify pages such as the library page to require a click-through to count the number of visitors. Michael asked Mike to setup a counter on the website on a page such as the model review page after updating it with new information.

CALL FOR NEW ISSUES

Arpad Muranyi asked for further discussion about publishing a list on the website of individuals available for model review. Michael Mirmak noted that we need to decide if we are going to have a central contact email or list individual model reviewers. Arpad added that if the list is ever published, he wanted to be listed only for AML model review.

Mike LaBonte noted that he might need to make a new page for model review on the website. Mike thought we might need criteria about who can be a reviewer. Lynne Green was previously a central contact, and it was advantageous because she was not associated with an IC vendor or EDA company. Greg Edlund noted a central contact could tally usage of the review task group's time and keep track of issues discovered. A central contact would need to simply route information about requests to reviewers once confirming with the requestor if they have an NDA in place (if needed) with the companies of specific model reviewers. The central contact could

also simply share the list of available reviewers with the requestor. Bob Ross volunteered to become the central contact. Mike took the AR to post all the relative information on the webpage.

IBIS AFFILIATIONS

Michael Mirmak noted that he is deferring this topic until the next meeting.

INTERNATIONAL/EXTERNAL ACTIVITIES

- Conferences

The 17th IEEE Workshop on Signal and Power Integrity (SPI 2013) will be held May 12-15, 2013 in Paris, France. There will be a European IBIS Summit in conjunction with this conference. Bob Ross noted that Anders Ekholm is the keynote speaker. More information is available at:

<http://spi2013.org>

The 22nd IEEE Workshop on Electrical Performance of Electronic Packaging and Systems (EPEPS 2013) will be held October 27-30, 2013 in San Jose, California. There may be content related to IBIS modeling. More information is available at:

<http://epeps.ece.illinois.edu/>

- Press Update

Michael Mirmak noted a paper describing the use of IBIS-AMI modeling in a USB3 analysis. The paper was presented at the 2013 IEEE National Conference on Communications (NCC) in February. The paper title is "Modeling, design and automation of 5 Gbps serial link transceiver with jitter cancellation." It can be found on IEEEExplore at this link:

<http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=6487971>

Michael noted a second paper on IBIS-AMI models. The paper was presented at the 2012 IEEE Electrical Design of Advanced Packaging and Systems Symposium (EDAPS) in December. The paper is titled "Crosstalk analysis of multigigabit links on high density interconnects PCB using IBIS AMI models." It can be found on IEEEExplore at this link:

<http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=6469432>

SUMMIT PLANNING

- SPI 2013 will be held in Paris on May 12-15, 2013. The IBIS Summit meeting is planned for Wednesday afternoon, May 15, at the Hotel Concorde La Fayette. The first meeting announcement went out. Lance Wang noted 7 people registered already. Bob Ross noted one paper is scheduled so far. More papers are welcome. Zuken and Micron Technology are co-sponsors so far.

Sponsorship opportunities for all upcoming IBIS summits are available, with sponsors receiving free mentions in the minutes, agenda, and other announcements. Contact the IBIS Board for

further details.

QUALITY TASK GROUP

Mike LaBonte reported that the task group meetings have mostly been Bob Ross and Mike for much of this year. They are developing a document for ibischk to explain what it does, documenting message meanings and checking algorithms. They are also cleaning up a spreadsheet documenting all the ibischk messages. They have identified several discrepancies in error messages. They are changing the meetings to every week now starting next week, Tuesday, April 9 at 8:00AM PT.

The Quality Task Group checklist and other documentation can be found at:

http://www.eda.org/ibis/quality_wip/

ADVANCED TECHNOLOGY MODELING TASK GROUP

Arpad Muranyi reported that the group is meeting regularly on Tuesdays at 12:00PM PT. The latest discussions were on analog modeling, discussing BIRD160. He encouraged participation to help finalize work on the analog modeling BIRDs.

Task group material can be found at:

http://www.eda.org/ibis/macromodel_wip/

INTERCONNECT TASK GROUP

Arpad Muranyi reported that the group discussed draft 4 of the EMD proposal and reviewed some test cases from Micron. More test cases for review are welcome. Greg Edlund requested some help with logging in to the task group meeting.

The task group documents can be found at:

http://www.eda.org/ibis/interconnect_wip/

NEW ADMINISTRATIVE ISSUES

Michael Mirmak reported on an IEEE DASC meeting this week. They discussed having a vote to open a study group at IEEE for developing a System-C/AMS standard. The proposal is to expand System C to include AMS modeling concepts. This would bridge the gap between something that looks like C code and something that looks like Verilog-AMS or VHDL-AMS. Michael asked if IBIS has any interest in this study group. Arpad Muranyi commented that considering controversial discussions over [External Circuit/Model], he isn't sure if our committee really wants to evolve these keywords to include more modeling languages. We might want to look into different ways to tie new languages into the IBIS specification. Arpad asked how we might monitor progress on this study group. Michael noted there would be regular monthly updates from the study group in the DASC meetings that Michael attends.

IBIS-ATM TASK GROUP RECOMMENDATIONS

Arpad Muranyi reported that the ATM task group is making an official recommendation to the Open Forum to reject a series of BIRDs. All these BIRDs have been updated with newer BIRDs and are no longer needed.

BIRDs 116.2, 117.5, 118.4 and 129.1 were rolled up in a new BIRD160. BIRD122 is replaced by BIRD158, a newer proposal. BIRD144.3 describes a shortcut for Touchstone under the [Model] keyword, but it is not necessary to the specification since the same capability exists elsewhere. BIRD159 discussions revealed that Arpad's interpretation of the specification was not correct and no modifications were needed for Rx_Receiver_Sensitivity.

Bob Ross moved that we schedule a vote for the next meeting on BIRDs 116.2, 117.5, 118.4, 122, 129.1, 144.3 and 159. Mike LaBonte seconded the motion. There were no objections.

BIRD160: ANALOG BUFFER MODELING IMPROVEMENTS

Arpad Muranyi noted this BIRD is an editorial combination of BIRDs 116.2, 117.5, 118.4 and 129.1. All of these BIRDs are related and would be expected to be voted up or down together. It will be easier to understand the overall effects of the 4 BIRDs by reviewing the new BIRD160. Arpad requested that people review the BIRD for discussion in the ATM task group and then hopefully bring it up for a vote soon.

BIRD116.2: ADD IBIS-ISS TO [EXTERNAL MODEL] AND [EXTERNAL CIRCUIT] AS A SUPPORTED LANGUAGE

Arpad Muranyi moved to un-table this BIRD for discussion. Mike LaBonte seconded the motion. There were no objections.

BIRD117.5: PARAMETERIZE A_TO_D AND D_TO_A CONVERTERS

Arpad Muranyi moved to un-table this BIRD for discussion. Mike LaBonte seconded the motion. There were no objections.

BIRD118.4: ANALOG PARAMETER ASSIGNMENTS

Arpad Muranyi moved to un-table this BIRD for discussion. Mike LaBonte seconded the motion. There were no objections.

BIRD122: IBIS-AMI NEW RESERVED PARAMETERS FOR ANALOG MODELING

Arpad Muranyi moved to un-table this BIRD for discussion. Mike LaBonte seconded the motion. There were no objections.

BIRD125.1: MAKE IBIS-ISS AVAILABLE FOR IBIS PACKAGE MODELING

Discussion was tabled.

BIRD128: ALLOW AMI_PARAMETERS_OUT TO PASS AMI_PARAMETERS_IN DATA ON CALLS TO AMI_GETWAVE

Discussion was tabled.

BIRD129.1: ADD “POLARITY” ARGUMENT TO D_TO_A CONVERTERS

Arpad Muranyi moved to un-table this BIRD for discussion. Mike LaBonte seconded the motion. There were no objections.

BIRD 131: IBIS-AMI REPEATERS

Discussion was tabled.

BIRD144.3: ADD TOUCHSTONE TO [EXTERNAL MODEL] AND [EXTERNAL CIRCUIT] AS A SUPPORTED LANGUAGE

Arpad Muranyi moved to un-table this BIRD for discussion. Mike LaBonte seconded the motion. There were no objections.

BIRD145.2: CASCADING IBIS I/O BUFFERS WITH [EXTERNAL CIRCUIT]S USING THE [MODEL CALL] KEYWORD

Discussion was tabled.

BIRD147: BACK-CHANNEL SUPPORT

Discussion was tabled.

BIRD150: IBIS-AMI NEW RESERVED PARAMETERS FOR DEPENDENCY TABLES

Discussion was tabled.

BIRD153.1: PARAMETER TREE KEYWORD

Discussion was tabled.

BIRD154: USING IBIS-AMI LEAF LABELS IN LIST PARAMETERS

Discussion was tabled.

BIRD155: NEW AMI API TO RESOLVE DEPENDENT MODEL PARAMETER

Discussion was tabled.

BIRD156.1: IBIS-AMI EXTENSION FOR MID-CHANNEL REDRIVER

Discussion was tabled.

BIRD157: PARAMETERIZE [DRIVER SCHEDULE]

Discussion was tabled.

BIRD158: AMI TOUCHSTONE ANALOG BUFFER MODELS

Discussion was tabled.

BIRD159: RX_RECEIVER_SENSITIVITY CLARIFICATION

Arpad Muranyi moved to un-table this BIRD for discussion. Mike LaBonte seconded the motion. There were no objections.

IBIS SPECIFICATION CHANGE STATUS

Michael Mirmak summarized recent changes to the document. He noted that this will change again after votes at the next meeting.

The document is available at the following link:

<http://www.eda.org/ibis/docs/ibis-version-change-strategy-v2p7.pdf>

IBISCHK5 PARSER AND BUG STATUS

Bob Ross reported that ibischk version 5.1.3 is released. Some executables are uploaded. BUGs 139-144 are closed with this release. No bugs are open now. One important change is BUG140, the combined I-V table check, where messages were moved from a Warning to a Note. Michael Mirmak noted that the source code has been distributed to licensees. Mike LaBonte noted that he tested the code and it appeared to be working correctly. Michael add that he got a request to put the ibischk version number into the executable file name.

NEW TECHNICAL ISSUES

David Banas wanted to discuss overclocking, as we are talking about error and warning messages in the ibischk parser. If we use V-t curves in IBIS-AMI models, then there are typically messages about I-V and V-t curves not matching DC levels because the V-t curves are shortened to a specific UI. Typically, including V-t curves improves correlation to Spice over just using [Ramp]. Are people using the modeling technique of on-die S-parameters to help alleviate this issue?

Arpad Muranyi noted that having issues in only 'some' simulators doesn't necessarily mean the results from 'other' simulators are good. David said that in the specific case of running the AMI model in a real world channel, DC level match from I-V to V-t isn't typical. Arpad responded that

when you don't have DC level matching and you are overclocking, you are operating in a non-LTI fashion. David added that this seems more like a problem with 'startup' and not with a long channel simulation.

Arpad noted that a Touchstone model doesn't capture time-variant behavior in PRBS-like patterns. Walter Katz described that in AMI simulation, for purposes of the AMI flow for generating the impulse response of channel is to use a step response, and a step response doesn't overclock the device. If the V-t curve is longer, it doesn't matter. For a time based simulation, you could run into overclocking. The Input to GetWave is a digital stimulus that is convolved with the impulse response of the channel. One way of generating it is to use the step response and take its derivative to get the impulse response of the channel, so one never has to do a simulation that overclocks the buffer. The Touchstone file has nothing to do with the shape of V-t curves but describes insertion loss and return loss of the buffer. This has nothing to do with how transistors reach their final switching levels. The shape of V-t curves has nothing to do with being LTI.

David asked what you do about a buffer that has a shelf in its edge transition. Walter responded that an AMI model with pre- and post-cursor taps and strengths, in reality, will rarely have transitions from strong low to strong high. Transitions change before you settle out to a full DC level. David noted the shelf is a phenomenon only when taking the driver from a fully saturated state in one direction to the same state in another direction. Walter added that the shelf is only in a short t-line load. You won't see this in a longer channel. A SerDes driver is operating as a small signal swing. Two approaches are taken now. We need models that match measurements in real operating conditions. One method is to generate an .s4p model that gives the correct measurement behavior.

Greg Edlund asked if you get the step response, is the V-t information discarded and not used. Arpad responded that yes, it is not used. Arpad noted that if you make an analog impulse response from the step response with a buffer which would be overclocked with a 101010 pattern, and then take the derivative of that step response to generate the impulse response for the AMI models, the impulse response may be not be correct because in the overclocked condition the amplitude of the waveform might be smaller than in a step response. Walter responded that this is correct, and this method is flawed. A Touchstone model of the input works better to match real world conditions.

David Banas will look to verify if he doesn't see errors with overclocking of AMI models. Also, if not running in a saturated situation, he will look to see if the shelf goes away.

NEXT MEETING

The next IBIS Open Forum teleconference will be held April 26, 2013 from 8:00AM to 10:00AM US Pacific Time. Votes are scheduled on BIRDs 116.2, 117.5, 118.4, 122, 129.1, 144.3 and 159.

Mike LaBonte moved to adjourn. Greg Edlund seconded. There were no objections.

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NOTES

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This meeting was conducted in accordance with the TechAmerica Legal Guides and TechAmerica Manual of Organization and Procedure.

The following e-mail addresses are used:

majordomo@eda.org

In the body, for the IBIS Open Forum Reflector:

subscribe ibis <your e-mail address>

In the body, for the IBIS Users' Group Reflector:
subscribe ibis-users <your e-mail address>

Help and other commands:
help

ibis-request@eda.org

To join, change, or drop from either or both:
IBIS Open Forum Reflector (ibis@eda.org)
IBIS Users' Group Reflector (ibis-users@eda.org)
State your request.

ibis-info@eda.org

To obtain general information about IBIS, to ask specific questions for individual response, and to inquire about joining the IBIS Open Forum as a full Member.

ibis@eda.org

To send a message to the general IBIS Open Forum Reflector. This is used mostly for IBIS Standardization business and future IBIS technical enhancements. Job posting information is not permitted.

ibis-users@eda.org

To send a message to the IBIS Users' Group Reflector. This is used mostly for IBIS clarification, current modeling issues, and general user concerns. Job posting information is not permitted.

ibis-bug@eda.org

To report ibischk parser BUGs as well as tschk2 parser BUGs. The BUG Report Form for ibischk resides along with reported BUGs at:

<http://www.eda.org/ibis/bugs/ibischk/>
<http://www.eda.org/ibis/bugs/ibischk/bugform.txt>

The BUG Report Form for tschk2 resides along with reported BUGs at:

http://www.eda.org/ibis/tschk_bugs/
http://www.eda.org/ibis/tschk_bugs/bugform.txt

icm-bug@eda.org

To report icmchk1 parser BUGs. The BUG Report Form resides along with reported BUGs at:

http://www.eda.org/ibis/icm_bugs/
http://www.eda.org/ibis/icm_bugs/icm_bugform.txt

To report s2ibis, s2ibis2 and s2iplt bugs, use the Bug Report Forms which reside at:

<http://www.eda.org/ibis/bugs/s2ibis/bugs2i.txt>

<http://www.eda.org/ibis/bugs/s2ibis2/bugs2i2.txt>

<http://www.eda.org/ibis/bugs/s2iplt/bugsplt.txt>

Information on IBIS technical contents, IBIS participants and actual IBIS models are available on the IBIS Home page:

<http://www.eda.org/ibis>

Check the IBIS file directory on eda.org for more information on previous discussions and results:

<http://www.eda.org/ibis/directory.html>

To create an account on the TechAmerica KAVI workspace, check out:

<http://workspace.techamerica.org/kwspub/join/>

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IBIS – TECHAMERICA STANDARDS BALLOT VOTING STATUS

I/O Buffer Information Specification Committee (IBIS)

Organization	Interest Category	Standards Ballot Voting Status	January 31, 2013	February 22, 2013	March 15, 2013	April 5, 2013
Agilent Technologies	User	Active	X	X	X	-
Altera	Producer	Active	X	X	-	X
ANSYS	User	Inactive	X	-	-	-
Applied Simulation Technology	User	Inactive	X	-	-	-
ARM	Producer	Inactive	-	-	-	-
Cadence Design Systems	User	Active	X	-	X	X
Ericsson	Producer	Active	X	-	X	-
Foxconn Technology Group	Producer	Inactive	-	-	-	-
Freescale	Producer	Inactive	X	-	-	-
Huawei Technologies	Producer	Inactive	-	-	-	-
IBM	Producer	Active	X	X	X	X
Infineon Technologies AG	Producer	Inactive	-	-	-	-
Intel Corp.	Producer	Active	X	-	X	X
IO Methodology	User	Active	X	-	X	X
LSI	Producer	Inactive	-	-	-	X
Maxim Integrated Products	Producer	Inactive	X	-	-	-
Mentor Graphics	User	Active	X	X	X	X
Micron Technology	Producer	Active	X	X	X	X
Nokia Siemens Networks	Producer	Inactive	-	-	-	-
QLogic	Producer	Inactive	X	-	-	-
Signal Integrity Software	User	Active	X	X	X	X
Synopsys	User	Inactive	X	-	X	-
Teraspeed Consulting	General Interest	Active	X	X	X	X
Texas Instruments	Producer	Inactive	-	-	-	-
Toshiba	Producer	Inactive	-	-	-	-
Xilinx	Producer	Inactive	-	-	-	-
ZTE	User	Inactive	-	-	-	-
Zuken	User	Inactive	X	-	-	-

CRITERIA FOR MEMBER IN GOOD STANDING:

- MUST ATTEND TWO CONSECUTIVE MEETINGS TO ESTABLISH VOTING MEMBERSHIP
- MEMBERSHIP DUES CURRENT
- MUST NOT MISS TWO CONSECUTIVE MEETINGS

INTEREST CATEGORIES ASSOCIATED WITH TECHAMERICA BALLOT VOTING ARE:

- USERS - MEMBERS THAT UTILIZE ELECTRONIC EQUIPMENT TO PROVIDE SERVICES TO AN END USER.
- PRODUCERS - MEMBERS THAT SUPPLY ELECTRONIC EQUIPMENT.
- GENERAL INTEREST - MEMBERS ARE NEITHER PRODUCERS NOR USERS. THIS CATEGORY INCLUDES, BUT IS NOT LIMITED TO, GOVERNMENT, REGULATORY AGENCIES (STATE AND FEDERAL), RESEARCHERS, OTHER ORGANIZATIONS AND ASSOCIATIONS, AND/OR CONSUMERS.