**IBIS Open Forum Minutes**

Meeting Date: **May 22, 2015**

Meeting Location: **Teleconference**

**VOTING MEMBERS AND 2015 PARTICIPANTS**

Altera [David Banas], Masashi Shimanouchi, Hsinho Wu\*

ANSYS (Steve Pytel), Curtis Clark\*

Applied Simulation Technology Fred Balistreri, Norio Matsui

Avago Technologies Minh Quach, Leif Zweidinger

Cadence Design Systems Brad Brim\*, Joshua Luo, Ken Willis, Joy Li, Ambrish Varma

Cisco Systems David Siadat, Rockwell Hsu, Bidyut Sen

Ericsson Anders Ekholm

Huawei Technologies Xiaoqing Dong

IBM Adge Hawes\*, Luis Armenta

Infineon Technologies AG Christian Sporrer

Intel Corporation Michael Mirmak, Todd Bermensolo, Nhan Phan

Gianni Signorini

IO Methodology Lance Wang\*

Keysight Technologies Radek Biernacki\*, Pegah Alavi, Colin Warwick

Jian Yang, Nicholas Tzou, Heidi Barnes, Dave Larson

Kyla Thomas

Maxim Integrated Products Mahbubul Bari, Don Greer\*, Joe Engert, Joe Rayhawk\*

Mentor Graphics Arpad Muranyi\*, Ed Bartlett, Vladimir Dmitriev-Zdorov

Micron Technology Randy Wolff\*

Qualcomm Senthil Nagarathinam, Kevin Roselle

Signal Integrity Software Mike LaBonte\*, Walter Katz\*, Todd Westerhoff

Mike Steinberger

Synopsys Ted Mido\*, Rita Horner, William Lau, Scott Wedge

Michael Zieglmeier, Joerg Schweden

Teraspeed Labs Bob Ross\*, Tom Dagostino

Toshiba (Yasumasa Kondo)

Xilinx (Raymond Anderson)

ZTE Corporation (Min Huang), Tao Guo

Zuken Michael Schaeder, Markus Buecker, Griff Derryberry

Ralf Bruening

**OTHER PARTICIPANTS IN 2015**

Bayside Design Elliot Nahas

Continental Automotive Felix Goelden, Markus Bebendorf, Sebastian Groener

Stefanie Schatt

CST Stefan Paret, Matthias Troescher

Freescale Jon Burnett

Galbi Research Dave Galbi

Independent Tim Wang Lee

Instituto de Telecomunicações Wael Dghais\*

KEI Systems Shinichi Maeda

Lattice Semiconductor Xu Jiang

Leading Edge Pietro Vergine

Politecnico di Torino Stefano Grivet-Talocia

Raytheon Joseph Aday

SAE International Chris Denham

Siemens AG Boris Kogan, Michael Flint

Simberian Yuriy Shlepnev

Technische Universität Jan Preibisch

### Hamburg-Harburg

Vitesse Siris Tsang

ZI Consulting Iliya Zamek

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

June 12, 2015 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 a.m. to 9:55 a.m. 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.

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**INTRODUCTIONS AND MEETING QUORUM**

Randy Wolff declared that a quorum was reached and the meeting could begin. Mike LaBonte ran the meeting in Michael Mirmak’s absence.

Wael Dghais introduced himself. He is starting his PhD work at the University of Aveiro, Institute of Telecommunications, in Portugal. He is working on blackbox behavioral modeling connected with IBIS algorithm generation and improvements. He works on a project with ST Microelectronics to enhance and solve issues in IBIS model generation in certain drivers and receivers. He has participated in the IBIS Summit at SPI multiple times.

Joe Rayhawk of Maxim Integrated Products introduced himself. He works on a tool at Maxim that creates IBIS files.

**CALL FOR PATENTS**

Mike LaBonte called for any patents or pending patents related to the IBIS 3.2, IBIS 4.2, IBIS 5.1, IBIS 6.0, Touchstone 2.0, IBIS-ISS 1.0 or ICM 1.1 specifications. No patents were declared.

**REVIEW OF MINUTES AND ARS**

Randy Wolff called for comments regarding the minutes of the May 1, 2015 IBIS Open Forum teleconference. The minutes were approved without changes.

Randy reviewed ARs from the previous meeting. These included:

1. Bob Ross will continue sending reminders to unpaid members about membership renewal.  
   Bob said this is done.
2. Mike LaBonte took an AR to investigate our options for moving to a more modern website.  
   Mike said this is done.
3. Michael Mirmak will send a call for officer election votes by email either May 8 or May 17.  
   Bob confirmed this is done.
4. Bob will update the status of BUG162 on the website.  
   Bob said this is done.

**ANNOUNCEMENTS**

None.

**CALL FOR ADDITIONAL AGENDA ITEMS**

Radek Biernacki asked for time to discuss a new BIRD, BIRD177.

**MEMBERSHIP STATUS AND TREASURER'S REPORT**

Bob Ross reported that we have 20 paid members so far this year. The treasury balance stands at $61,239, and one parser sale has completed. Pending is payment for the upcoming Shanghai summit support. Some companies like to pay a combined invoice for membership dues and Summit support. He has emailed 4 additional members to remind them of membership payment.

**WEB PAGE AND MAILING LIST ADMINISTRATION**

Mike LaBonte reported that he has researched updating our website services. He showed an updated report on our IT services including details of our website and email services. The document also contains a roadmap discussing social media, email needs, file storage needs and backup needs.

Mike noted that the eda.org email list has been reduced to just Bob Ross and Mike to check for any emails coming into the list. Since the migration, not a single legitimate email has been sent to the old lists.

**LIBRARY UPDATE**

No update.

**INTERNATIONAL/EXTERNAL ACTIVITIES**

- Conferences

The 24th Conference on Electrical Performance of Electronic Packaging (EPEPS) will be held October 25-28, 2015 in San Jose, California. There is usually some IBIS and/or signal integrity related material. More information is available at:

<http://www.epeps.org>

- Press Update

Mike LaBonte noted that Michael Mirmak sent out information about two papers mentioning IBIS. Cisco has published two IBIS-AMI-related papers:

“Design of package BGA pin-out for >25Gb/s high speed SerDes considering PCB via crosstalk”

Yao, Wei, Lim, Jane ; Zhang, Ji ; Tseng, Kenneth ; Qiu, Kelvin ; Brooks, Rick;

Cisco Systems, Inc., 170 West Tasman Dr., San Jose, CA 95134, USA;

Electromagnetic Compatibility and Signal Integrity, 2015 IEEE Symposium on; 15-21 March 2015; pp 111 – 116;ISBN: 978-1-4799-1992-5

<http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=7107669>

“QSFP28 connector footprint optimization of crosstalk and ILD\_rms\_dB for 25+ Gbps signaling”

Park, IL-Young; Rowlands, Michael ; Quach, Minh ; Zhang, Ji ; Tooyserkani, Pirooz ; Lim, Jane

Cisco Systems, Inc., San Jose, CA, 95134, USA

Electromagnetic Compatibility and Signal Integrity, 2015 IEEE Symposium on; 15-21 March 2015; pp 242-247;ISBN: 978-1-4799-1992-5

<http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=7107693>

**ORGANIZATIONAL ACTIVITIES**

- Officer Nominations

Radek Biernacki is acting as the returning officer for the elections. He noted the call for nominations was sent out about a week ago, and the nominating period is open through May 29. Bob Ross noted that Michael Mirmak is not running for Chair, so we will need nominations for Chair.

**SUMMIT PLANNING AND STATUS**

- European Summit at SPI Review

Randy Wolff reported that an IBIS Summit meeting was co-located with the SPI conference in Berlin, Germany on May 13, 2015. There were 17 people in attendance and 7 presentations. There was discussion of package modeling, via modeling, and simulation and modeling with IBIS power-aware models. There was also an ad-hoc discussion on improving participation in both the IBIS Summit and the SPI conference. Wael Dghais also commented that the meeting was successful. He noted that he would like to see more participation from European universities and industry participants. He expects several papers from his university for the Summit in 2017, which is to be held in Aveiro, Portugal. Wael also noted there was a paper on the Mpilog modeling approach for power aware buffer modeling from Intel at the SPI conference. Bob Ross thanked the 5 co-sponsors, ANSYS, CST, Mentor Graphics Corporation, Synopsys and Zuken. Bob asked if he could recommend Zuken to handle sponsorship arrangements for next year. There were no objections. Bob mentioned an email from Michael Schaeder suggesting we discuss the possibility of having an IBIS tutorial before the meeting next year to attract more participation.

- EPEPS Summit Planning

EPEPS is taking place October 25-28, 2015 in San Jose, CA. October 28 would be the date for the Summit if it takes place. We will need to discuss at a later time if an IBIS Summit will be held at EPEPS. The website for Electrical Performance of Electronic Packages and Systems is:

<http://www.epeps.org/>

- Asian Summit Planning

Bob Ross noted that Summit dates for Shanghai, Taipei and Tokyo are being decided now. Lance Wang noted he is waiting for feedback on the Shanghai dates.

- DesignCon Summit Planning

Bob Ross noted that DesignCon planners have offered a meeting space for the morning of January 22, but not a full day 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 they are discussing IBISCHK6.1 parser development. They are also updating a parser development spreadsheet used by the developer for documentation. The group is meeting on Tuesdays at 8:00 a.m. PT.

The IBISCHK6 User Guide work in progress can be reviewed at:

<http://www.eda.org/ibis/ibischk6/ibischk_6.0.0_UserGuide_wip1.pdf>

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 12:00 p.m. PT. They recently discussed the AMI directionality BIRD, and further feedback is needed. They have also discussed the use of ground references in the specification. Other discussion topics include backchannel and re-driver modeling.

Task group material can be found at:

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

**INTERCONNECT TASK GROUP**

Walter Katz reported that the group is meeting on Wednesdays at 8:00 a.m. PT. They have been discussing the use of ground in IBIS. This does not have an effect on the interconnect modeling BIRD. They will be going back to discussing the interconnect BIRD.

Task group material can be found at:

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

**EDITORIAL TASK GROUP**

Bob Ross reported that the group is meeting on Fridays at 8:00 a.m. PT, with the exception of the weeks when Open Forum meetings are held in the same time slot. He noted there will be some work to potentially merge in contents of BIRD176 and BIRD177. Mike LaBonte asked how long the editorial effort might continue. Bob noted that the work is being delayed due to the previously mentioned BIRDs.

**NEW ADMINISTRATIVE ISSUES**

Bob Ross noted that we received feedback from SAE on the approved Policies and Procedures document. We will have to address these items in a future revision.

Mike LaBonte showed a spreadsheet tracking the status of currently open BIRDs. He tried to track the last dates that each BIRD has been discussed in the Open Forum or in a task group. Arpad Muranyi noted that some BIRDs will likely be automatically rejected once they are superseded by newer proposals.

**BIRD176: POWER PIN PACKAGE MODELING**

Randy Wolff introduced the BIRD. He described how it is common in package modeling to reduce the number of power and ground terminals by merging multiple pins connected to the same plane or fill structure into a single terminal. When using this data in an IBIS RLC matrix format, [Pin Mapping] data will not be consistent with the [Pin Numbers] list under [Define Package Model], as power and ground pins may be missing. BIRD176 was written to explain this situation and propose default methods for EDA software to handle the missing pins. Pins without model data due to merging are connected with implicit shorts. A new keyword [Merged Pins] is also introduced to explicitly define merged pin groups.

Bob Ross noted he had a reservation about a default statement in the BIRD, but after discussion with the BIRD authors, he felt that EDA tools can still do what they want and offer more complicated options if desired.

Arpad Muranyi asked if this BIRD only applied when [Pin Mapping] was present. Randy confirmed this is the case.

Mike LaBonte questioned if the parser could check for valid connections and issue an info statement for suspected problems. Radek Biernacki felt this was beyond the scope of the parser. Bob commented that this could be discussed as an IBISCHK discussion later on.

Walter Katz commented that he felt EDA software already knew what to do for hooking up power and ground to buffers, and this BIRD seemed overly complicated. Bob commented that he thought the BIRD went beyond handling simple cases.

Bob moved to vote on the BIRD in the next Open Forum teleconference. Randy seconded the motion. There were no objections.

**BIRD175: EXTENDING IBIS-AMI FOR PAM4 ANALYSIS**

Walter Katz presented some slides related to the BIRD. He showed that PAM4 has four signal levels. He noted that IBIS currently has a concept of bit\_time, but PAM4 uses symbol\_time. The BIRD also introduces descriptions of NRZ signaling and PAM4 signaling, allowing selection between the two analysis types using the Modulation parameter.

Walter will be posting a BIRD175.1 which makes changes to the eye offsets, introducing a PAM4\_CenterEyeOffset parameter. He noted that the changes have been discussed and agreed upon between many members of the ATM task group.

Bob Ross moved to vote on the BIRD in the next Open Forum teleconference. Radek Biernacki seconded the motion. There were no objections.

Walter’s presentation is available at:

<http://eda.org/ibis/minutes/min2015/m052215_docs/PAM4_BIRD_175.pptx>

Wael Dghais asked how the driver’s multiple levels are handled by IBIS-AMI simulators. Walter Katz responded that in Spice, a step response between symbol level 0 and symbol level 3 is simulated, and that goes into creating the impulse response. So, this models the full swing for the Init flow. More can be done in GetWave, but as a practical matter models don’t do more than this. Arpad Muranyi noted that it is clear in AMI now that for NRZ models you model the full swing of the Tx with equalization off for the channel analysis. He wondered if a statement is needed to be made similar to this for the PAM4 situation. Walter will look to see if this needs to be added to the BIRD175.1 revision.

**BIRD177: [INITIAL DELAY] KEYWORD FOR SUBMODELS AND DRIVER SCHEDULES**

Radek Biernacki introduced the BIRD. This originated from discussions in the Editorial task group about how to apply [Initial Delay] to models scheduled with [Driver Schedule] or to [Submodel]s. For [Driver Schedule], scheduled models could either inherit [Initial Delay] parameters from the top level model or use [Initial Delay] values local to each [Model]. The BIRD clarifies that [Initial Delay] values are always local to each [Model]. The BIRD also describes that [Initial Delay] can also be included in a [Submodel].

Curtis Clark commented on a minor editorial change. Radek will make the change before posting the BIRD.

Bob Ross commented that it might be good to add a note for [Submodel]s that I-T parameters are illegal, since [Composite Current] is not allowed in a [Submodel]. Radek commented that this is implied in an earlier statement in the BIRD.

Radek Biernacki moved to vote on the BIRD in the next Open Forum teleconference. Bob Ross seconded the motion. There were no objections.

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

Discussion was tabled.

**BIRD128.2: ALLOW AMI\_PARAMETERS\_OUT TO PASS AMI\_PARAMETERS\_IN DATA ON CALLS TO AMI\_GETWAVE**

Discussion was tabled.

**BIRD145.3: CASCADING IBIS I/O BUFFERS WITH [EXTERNAL CIRCUIT]S USING THE [MODEL CALL] KEYWORD**

Discussion was tabled.

**BIRD147: BACK-CHANNEL SUPPORT**

Discussion was tabled.

**BIRD157: PARAMETERIZE [DRIVER SCHEDULE]**

Discussion was tabled.

**BIRD158.3: AMI TOUCHSTONE ANALOG BUFFER MODELS**

Discussion was tabled.

**BIRD161.1: SUPPORTING INCOMPLETE AND BUFFER-ONLY [COMPONENT] DESCRIPTIONS**

Discussion was tabled.

**BIRD163: INSTANTIATING AND CONNECTING [EXTERNAL CIRCUIT] PACKAGE MODELS WITH [CIRCUIT CALL]**

Discussion was tabled.

**BIRD164: ALLOWING PACKAGE MODELS TO BE DEFINED IN [EXTERNAL CIRCUIT]**

Discussion was tabled.

**BIRD165: PARAMETER PASSING IMPROVEMENTS FOR [EXTERNAL CIRCUIT]S**

Discussion was tabled.

**BIRD166: RESOLVING PROBLEMS WITH REDRIVER INIT FLOW**

Discussion was tabled.

**IBISCHK6 PARSER AND BUG STATUS**

Bob Ross noted no new bugs.

Bob noted that the parser development is stalled, waiting for potential additions of BIRD176 and BIRD177. He expects the parser cost to increase due to the new checking requirements for the BIRDs and some new bugs.

**NEW TECHNICAL ISSUES**

Related to BIRD175, Arpad Muranyi noted that section 10.2.2.3.1 in the IBIS specification mentions how the impulse response should not include filtering effects such as equalization. He thought this could be an appropriate place to mention PAM4. Walter Katz did not think this was necessary.

**NEXT MEETING**

The next IBIS Open Forum teleconference meeting will be held June 12, 2015. Votes on BIRD175.1, BIRD176 and BIRD177 are scheduled. The following IBIS Open Forum teleconference meeting will be held July 10, 2015.

Arpad Muranyi moved to adjourn. Randy Wolff seconded the motion.

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**NOTES**

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This meeting was conducted in accordance with ANSI guidance.

The following e-mail addresses are used:

[ibis-request@eda.org](mailto:ibis-request@eda-stds.org)

To join, change, or drop from either or both:

IBIS Open Forum Reflector ([ibis@eda.org](mailto:ibis@eda-stds.org))

IBIS Users' Group Reflector ([ibis-users@eda.org](mailto:ibis-users@eda-stds.org))

State your request.

[ibis-info@eda.org](mailto:ibis-info@eda-stds.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@freelists.org](mailto:ibis@freelists.org) (changed from [ibis@eda.org](mailto:ibis@eda.org), which has been deactivated)

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@freelists.org](mailto:ibis-users@freelists.org) (changed from [ibis-users@eda.org](mailto:ibis-users@eda.org), which has been deactivated)

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](mailto:ibis-bug@eda-stds.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](http://www.eda-stds.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](mailto:icm-bug@eda-stds.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-stds.org/ibis/icm_bugs/)

[http://www.eda.org/ibis/icm\_bugs/icm\_bugform.txt](http://www.eda-stds.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-stds.org/ibis/bugs/s2ibis/bugs2i.txt)

[http://www.eda.org/ibis/bugs/s2ibis2/bugs2i2.txt](http://www.eda-stds.org/ibis/bugs/s2ibis2/bugs2i2.txt)

[http://www.eda.org/ibis/bugs/s2iplt/bugsplt.txt](http://www.eda-stds.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](http://www.eda-stds.org/ibis/directory.html)

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**IBIS – SAE STANDARDS BALLOT VOTING STATUS**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Organization** | **Interest Category** | **Standards Ballot Voting Status** | **April 10, 2015** | **May 1, 2015** | **May 13, 2015** | **May 22, 2015** |
| Altera | Producer | Active | X | X | - | X |
| ANSYS | User | Active | X | X | - | X |
| Applied Simulation Technology | User | Inactive | - | - | - | - |
| Avago Technologies | Producer | Inactive | - | - | - | - |
| Cadence Design Systems | User | Active | - | X | - | X |
| Cisco Systems | User | Inactive | - | - | - | - |
| Ericsson | Producer | Inactive | - | - | X | - |
| Huawei Technologies | Producer | Inactive | - | - | - | - |
| IBM | Producer | Active | X | X | - | X |
| Infineon Technologies AG | Producer | Inactive | - | - | X | - |
| Intel Corp. | Producer | Active | X | X | X | - |
| IO Methodology | User | Active | X | X | - | X |
| Keysight Technologies | User | Active | X | X | - | X |
| Maxim Integrated Products | Producer | Active | - | X | - | X |
| Mentor Graphics | User | Active | X | X | - | X |
| Micron Technology | Producer | Active | X | - | X | X |
| Qualcomm | Producer | Inactive | - | - | - | - |
| Signal Integrity Software | User | Active | X | X | - | X |
| Synopsys | User | Active | X | - | X | X |
| Teraspeed Labs | General Interest | Active | X | X | - | X |
| Toshiba | Producer | Inactive | - | - | - | - |
| Xilinx | Producer | Inactive | - | - | - | - |
| ZTE | User | Inactive | - | X | - | - |
| Zuken | User | Inactive | - | - | X | - |

**I/O Buffer Information Specification Committee (IBIS)**

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 SAE 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.