



## IBIS Open Forum Minutes

Meeting Date: **June 29, 2018**

Meeting Location: **Teleconference**

### **VOTING MEMBERS AND 2018 PARTICIPANTS**

ANSYS	Curtis Clark*
Applied Simulation Technology	(Fred Balistreri)
Broadcom	(Yunong Gan)
Cadence Design Systems	Brad Brim*, Ken Willis, Ambrish Varma
Cisco Systems	Stephen Searce, Cassie Yan, Baosh Xu
CST	Stefan Paret
Ericsson	Anders Ekholm, Zilwan Mahmood, Guohua Wang
GLOBALFOUNDRIES	Steve Parker*
Huawei Technologies	(Hang (Paul) Yan)
IBM	Greg Edlund, Luis Armenta, Hubert Harrer
Infineon Technologies AG	(Christian Sporrer)
Intel Corporation	Hsinho Wu*, Michael Mirmak*, Nilesh Dattani Fernando Mendoza Hernandez, Varun Gupta Subas Bastola, Hansel Dsilva, Gianni Signorini
IO Methodology	Lance Wang
Keysight Technologies	Radek Biernacki*, Ming Yan, Heidi Barnes Pegah Alavi
Maxim Integrated	Joe Engert, Yan Liang
Mentor, A Siemens Business	Arpad Muranyi*, Weston Beal, Raj Raghuram Carlo Bleu, Mikael Stahlberg, Yasushi Kondou Vladimir Dmitriev-Zdorov, Nitin Bhagwath
Micron Technology	Randy Wolff*, Justin Butterfield*
NXP	(John Burnett)
Raytheon	Joseph Aday
SiSoft	Mike LaBonte*, Walter Katz*, Todd Westerhoff
Synopsys	Ted Mido*, Adrien Auge, Scott Wedge
Teraspeed Labs	Bob Ross*
Xilinx	Ravindra Gali
ZTE Corporation	(Shunlin Zhu)
Zuken	Michael Schaefer, Takayuki Shiratori

### **OTHER PARTICIPANTS IN 2018**

Google	Zhiping Yang
Haskware	David Banas
John Baprawski, Inc.	John Baprawski

KEI Systems	Shinichi Maeda
Lattice Semiconductor	Dinh Tran, Maryam Shahbazi
OmniVision	Sirius Tsang
Politecnico di Milano	Flavia Grassi, Xinglong Wu
Politecnico di Torino	Tommaso Bradde, Marco De Stefano, Paulo Manfredi Riccardo Trincherio, Stefano Grivet-Talocia
Qualcomm	Kevin Roselle, Tim Michalka
Ricoh	Kazuki Murata
RITA Electronics Ltd.	Kenichi Higashiura, Hiroyuki Motoki (Jose Godoy)
SAE ITC	Ron Olisar
Signal Metrics	Megumi Ono
Socionext	Wei-hsing Huang
SPISim	Tom Lee
Stanford University	Aurora Sanna, Olivier Bayet
STMicroelectronics	Yasuki Torigoshi, Yoshinori Fukuba
Toshiba	Mihai Telescu, Charles Canaff
Université de Bretagne Occidentale	José Schutt-Aine
University of Illinois	Elmar Griese
University of Siegen	Torben Wendt
University of Technology Hamburg	

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
July 20, 2018	624 227 121	IBISfriday11

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

<http://tinyurl.com/y7yt7buz>

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.

NOTE: "AR" = Action Required.

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## INTRODUCTIONS AND MEETING QUORUM

Mike LaBonte declared that a quorum was reached and the meeting could begin.

## **CALL FOR PATENTS**

Mike LaBonte called for declaration of any patents or pending patents related to the IBIS 3.2, IBIS 4.2, IBIS 5.1, IBIS 6.1, Touchstone 2.0, IBIS-ISS 1.0 or ICM 1.1 specifications. No patents were declared.

## **REVIEW OF MINUTES AND ARS**

Mike LaBonte noted that in the previous meeting of June 8, 2018, there was not a quorum required for approving the minutes reviewed during that meeting.

Mike called for comments on the minutes of the May 18, 2018 IBIS Open Forum teleconference, the May 25, 2018 IBIS Open Forum Summit at IEEE SPI, and the June 8, 2018 IBIS Open Forum teleconference. Walter Katz moved to approve all the minutes. Curtis Clark seconded the motion. There were no objections.

Mike reviewed ARs from the previous meeting.

1. Mike to replace the contents of the roster page permanently with a notice about GDPR restrictions [AR].  
Mike reported this as done.
2. Mike to add a minutes link to the SPI page [AR].  
Mike reported this as done.
3. Bob Ross to get scheduling and details of upcoming EPEPS and EDI CON conferences for Summit consideration [AR].  
Bob reported this as done.

## **ANNOUNCEMENTS, CALL FOR ADDITIONAL AGENDA ITEMS**

Walter Katz requested time to discuss a potential BIRD for DDR mask requirements.

## **MEMBERSHIP STATUS AND TREASURER'S REPORT**

Bob Ross reported that we have 25 members now with payments received recently from Intel and Maxim Integrated. The quorum is now 7 participants for meetings. There is \$19,109 in the treasury. This includes new membership payments and a payment for the SPI Summit.

## **WEBSITE ADMINISTRATION**

Mike LaBonte reported he added a short phrase at the bottom of the home page to note that the website makes no use of cookies. He also made GDPR updates as mentioned in his AR. Bob Ross requested the website be updated with information about upcoming conferences. Mike will update the information on the upcoming events page [AR].

## **MAILING LIST ADMINISTRATION**

Curtis Clark reported it has been quiet this period. He has not yet sent out notification of how GDPR has affected the lists. He has also gotten access fixed for approving list changes.

## **LIBRARY UPDATE**

No update.

## **INTERNATIONAL/EXTERNAL ACTIVITIES**

### - Conferences

EPEPS – The 27<sup>th</sup> IEEE Conference on Electrical Performance of Electronic Packaging and Systems will be held in San Jose, CA on October 14-17, 2017. More information is available at:

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

EDI CON – Electronic Design Innovation Conference & Exhibition will be held in Santa Clara, CA on October 17-18, 2018. More information is available at:

<http://www.ediconusa.com>

### - Press Update

None.

### - Related standards

IEC 63055/IEEE 2401, JEITA “LPB”

Michael Mirmak reported that the most recent DASC meeting did not have much content relevant to IBIS. An IEEE 2401 meeting happened Monday evening. They reviewed upcoming changes to LPB. The IEEE Project Authorization Request (PAR) has been approved. Changes are relatively minor, but they are adding a feature in response to the anticipated IBIS Interconnect BIRD to be able to access IBIS internal nodes through the LPB proposal. They are also aligning the schedule with the IBIS 7.0 release. They have a full schedule that is about 2 years long for other development. The next meeting is July 30.

## **SUMMIT PLANNING AND STATUS**

### - EPEPS/EDI CON Discussion

Bob Ross reported that he inquired about EPEPS with the organizers. Wednesday afternoon’s schedule is free for an IBIS meeting. They do not have any competing events planned. He told them, since they need to know whether to reserve a room for IBIS, that we would decide before the next meeting. Bob moved to hold a Summit on Wednesday afternoon, October 17, 2018 at EPEPS with costs not to exceed \$2,000. The meeting is close to the November 12 start of the Asian IBIS Summits. Bob would be able to attend, and there may be many others in California who could attend. There were no seconds to the motion. Bob withdrew the motion. Mike LaBonte noted that we have not had contact with EDI CON. Timing is still an issue for a Summit at EDI CON.

### - IBIS Asian Summits

Bob moved to hold a Summit in Tokyo on November 12, 2018 for a cost not to exceed \$1,000, a Summit in Shanghai on November 14, 2018 at a cost not to exceed \$9,000, and a Summit in Taipei on November 16, 2018 at a cost not to exceed \$8,000. Randy Wolff seconded the

motion. There were no objections. Bob noted that the dates have been reserved, and the formal approval means that we can sign the agreements with the hotels.

The roll call vote tally was:

ANSYS – yes  
Cadence – yes  
Ericsson – yes (by email)  
GLOBALFOUNDRIES – yes  
Infineon – yes (by email)  
Intel – yes  
Keysight – yes  
Mentor – yes  
Micron – yes  
SiSoft – yes  
Synopsys – yes  
Teraspeed Labs – yes

The roll call vote concluded with a vote tally of Yes – 12, No – 0, Abstain – 0. The vote passed.

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 group is meeting on Tuesdays at 8:00 a.m. PT. Discussion has been mostly about IBISCHK as well as a new parser bug report. There has been some small progress on the document that will be sent to the parser developer to lay out the technical details.

The IBISCHK6 user guide work in progress can be reviewed at:

[http://www.ibis.org/ibischk6/ibischk\\_6.1.4\\_UserGuide\\_wip1.pdf](http://www.ibis.org/ibischk6/ibischk_6.1.4_UserGuide_wip1.pdf)

The Quality task group checklist and other documentation can be found at:

[http://www.ibis.org/quality\\_wip/](http://www.ibis.org/quality_wip/)

### **ADVANCED TECHNOLOGY MODELING TASK GROUP**

Arpad Muranyi reported that the group is meeting regularly on Tuesdays at 12:00 p.m. PT. The July 3, 2018 meeting is cancelled. The group is addressing new topics and making progress.

Task group material can be found at:

[http://www.ibis.org/macromodel\\_wip/](http://www.ibis.org/macromodel_wip/)

### **INTERCONNECT TASK GROUP**

Michael Mirmak reported that the group usually meets at 8:00 a.m. PT on Wednesdays. The group is temporarily suspending meeting pending discussion and votes on the interconnect modeling proposal.

Task group material can be found at:

[http://www.ibis.org/interconnect\\_wip/](http://www.ibis.org/interconnect_wip/)

### **EDITORIAL TASK GROUP**

Michael Mirmak reported that this group remains suspended. Should there be any official document to review such as IBIS 7.0, the task group will resume meetings (on Fridays when there is no Open Forum teleconference).

Task group material can be found at:

[http://www.ibis.org/editorial\\_wip/](http://www.ibis.org/editorial_wip/)

### **NEW ADMINISTRATIVE ISSUES**

- IBIS Officer Elections

Mike LaBonte thanked Radek Biernacki for being the returning officer. Radek reported results on June 19, 2018. The entire current board has been reelected. Almost everyone received 15 yes votes. The librarian position received two abstention votes.

### **BIRD195: ENABLING [RGND] AND [RPOWER] KEYWORDS FOR ALGORITHMIC INPUT MODELS**

Michael Mirmak stated that this BIRD enables use of simplified Input models for AMI models to replace I-V tables for terminators with simple linear termination values. This enables the [Rgnd] and [Rpower] keywords from Terminator type models to be available to the Input model type. Bob Ross commented by email that the word Algorithmic should be removed from the title since it does not apply just to AMI models. Bob also commented that the Input \_ECL model type should be added. Michael will be releasing a BIRD195.1 addressing these changes. Michael added that this BIRD does not have to be included in IBIS Version 7.0.

### **BIRD189.6: INTERCONNECT MODELING USING IBIS-ISS AND TOUCHSTONE**

Michael Mirmak reported that BIRD189.6 is the Interconnect modeling proposal. There have been some adjustments and tweaks, all editorial corrections and minor clarifications, that were suggested since BIRD189.6 was submitted. He noted that any motion to approve the BIRD should be as amended with the proposed changes and considered as BIRD189.7. Michael noted email traffic from Radek Biernacki requesting some language changes to how Touchstone is referenced in the document. This could be addressed by the Editorial task group.

Walter Katz moved to vote on approval of BIRD189.6 with the four editorial changes shown. Arpad Muranyi seconded the motion. There were no objections. Mike proposed that Radek's editorial suggestions be addressed by the Editorial task group. Radek noted that his changes are purely editorial, and these could be made later if everyone agrees on them. There are no specific changes proposed yet. The language is related to referencing Touchstone files. Bob Ross asked if changes would be proposed for the entire IBIS specification. Arpad Muranyi noted there are no technical changes, only wording changes to be more precise in language about connecting to Touchstone "circuits" as opposed to "files". Bob asked about capturing notes about potential Touchstone changes in the BIRD history. Randy Wolff added that there is a known issues file started for editorial changes to make in IBIS 7.0, and the issue could be noted in there. Walter added that the issue is also captured in the minutes. Radek requested that we authorize the Editorial task group to address the issue.

The roll call vote tally was:

ANSYS – yes  
Cadence – yes  
GLOBALFOUNDRIES – yes  
Infineon – yes (by email, vote cast before noted BIRD189.7 changes)  
Intel – yes  
Keysight – yes  
Mentor – yes  
Micron – yes  
SiSoft – yes  
Synopsys – yes  
Teraspeed Labs – yes

The roll call vote concluded with a vote tally of Yes – 11, No – 0, Abstain – 0. The vote passed.

#### **BIRD194: REVISED AMI TS4FILE ANALOG BUFFER MODELS**

Bob Ross noted that the BIRD approval will supersede BIRD158.7, and BIRD158.7 will be automatically rejected.

Arpad Muranyi moved to approve BIRD194. Walter Katz seconded the motion. There were no objections.

The roll call vote tally was:

ANSYS – yes  
Cadence – abstain  
GLOBALFOUNDRIES – yes  
Intel – yes  
Keysight – yes  
Mentor – yes  
Micron – yes

SiSoft – yes  
Synopsys – yes  
Teraspeed Labs – yes

The roll call vote concluded with a vote tally of Yes – 9, No – 0, Abstain – 1. The vote passed.

Bob requested there be additional documentation of BIRD158.7 being superseded. Mike LaBonte will make a note on the BIRD page on the website [AR]. Arpad suggested there be a note added in Section 3 of the IBIS specification where the included BIRDS are described. Michael Mirmak suggested adding a note in the known issues list so this change is not forgotten.

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

Arpad Muranyi moved to un-table BIRD125.1, BIRD145.3, BIRD163, and BIRD164 for discussion. Bob Ross seconded the motion. There were no objections.

Arpad moved to schedule a vote for BIRD125.1, BIRD145.3, BIRD163, and BIRD164 in the next IBIS Open Forum meeting. The recommendation is to reject these BIRDS given the approval of BIRD189.6. Walter Katz seconded the motion. There were no objections.

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

See discussion above under BIRD125.1.

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

See discussion above under BIRD125.1.

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

See discussion above under BIRD125.1.

#### **BIRD166.4: RESOLVING PROBLEMS WITH REDRIVER INIT FLOW**

Discussion was tabled.

#### **BIRD181.1: I-V TABLE CLARIFICATIONS**

Discussion was tabled.

#### **BIRD190: CLARIFICATION FOR REDRIVER FLOW**

Discussion was tabled.



## **IBISCHK PARSER AND BUG STATUS**

Bob Ross reported a new bug, BUG197. A delta value in Increment and a step value in Steps should not be allowed to be 0. We could prohibit the number of steps being 0 or less than zero and issue a warning in the parser. Bob suggested classification as Annoying severity and Low priority. Mike LaBonte asked when this might get fixed. Bob responded that we need to decide which bugs are fixed in an IBIS 7.0 parser. Walter Katz moved to classify the bug as Annoying severity and Low priority. Radek Biernacki seconded the motion. There were no objections. Bob will update the status of the bug on the website [AR].

## **NEW TECHNICAL ISSUES**

Walter Katz shared a presentation titled “DDR4/DDR5 BIRD Requirements”. Walter would like to move forward with a BIRD to specify in IBIS, with new subparameters, new threshold values and rules covering DDR4 and DDR5 inputs. He would like to be able to put these rules in a file so they are not repeated multiple times within the IBIS file. He would also like to support multiple speed grades within a single file, where the different speed grades would have different mask rules.

The next step is that he would like to get consensus from all the EDA vendors on potential support for the BIRD ideas before proceeding.

Steve Parker asked in terms of the IBIS-AMI model for DDR5, are there considerations of the clock-forwarded handling in this discussion. Walter responded that this proposal will only address input threshold modeling. He added there are discussions in the ATM task group related to these AMI issues. This includes assumptions such as rising/falling edge mismatches and clock forwarding. The ATM task group is the forum for those issues. Mike LaBonte requested Walter send him the presentation for posting and inclusion in the minutes [AR].

The presentation can be found at:

[https://ibis.org/minutes/min2018/m062918\\_docs/DDR4\\_BIRD\\_Requirements.pptx](https://ibis.org/minutes/min2018/m062918_docs/DDR4_BIRD_Requirements.pptx)

Mike noted we have approved all BIRDS originally proposed for inclusion in IBIS 7.0. We will need to make a motion for inclusion of all BIRDS for IBIS 7.0 before official editorial work can begin on IBIS 7.0. Michael Mirmak noted we should write a document noting details of the BIRDS included for preparation of a vote motion at the next Open Forum meeting. Michael will prepare this document [AR]. This vote gives a clear indication of the technical content for IBIS 7.0, although issues could arise during editorial review.

## **NEXT MEETING**

The next IBIS Open Forum teleconference meeting will be held on July 20, 2018. Votes are scheduled for BIRD125.1, BIRD145.3, BIRD163, and BIRD164. The following IBIS Open Forum teleconference meeting is tentatively scheduled on August 10, 2018.

Arpad Muranyi moved to adjourn. Bob Ross seconded the motion. The meeting adjourned.

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## NOTES

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This meeting was conducted in accordance with ANSI guidance.

All inquiries may be sent to [info@ibis.org](mailto:info@ibis.org). Examples of inquiries are:

- To obtain general information about IBIS.
- To ask specific questions for individual response.
- To subscribe to the official [ibis@freelists.org](mailto:ibis@freelists.org) and/or [ibis-users@freelists.org](mailto:ibis-users@freelists.org) email lists (formerly [ibis@eda.org](mailto:ibis@eda.org) and [ibis-users@eda.org](mailto:ibis-users@eda.org)).
- To subscribe to one of the task group email lists: [ibis-macro@freelists.org](mailto:ibis-macro@freelists.org), [ibis-interconn@freelists.org](mailto:ibis-interconn@freelists.org), or [ibis-quality@freelists.org](mailto:ibis-quality@freelists.org).
- To inquire about joining the IBIS Open Forum as a voting Member.
- To purchase a license for the IBIS parser source code.
- To report bugs or request enhancements to the free software tools: `ibischk6`, `tschk2`, `icmchk1`, `s2ibis`, `s2ibis2` and `s2iplt`.

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

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

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

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

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

<http://www.ibis.org/bugs/icmchk/>  
[http://www.ibis.org/bugs/icmchk/icm\\_bugform.txt](http://www.ibis.org/bugs/icmchk/icm_bugform.txt)

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

<http://www.ibis.org/bugs/s2ibis/bugs2i.txt>  
<http://www.ibis.org/bugs/s2ibis2/bugs2i2.txt>  
<http://www.ibis.org/bugs/s2iplt/bugspl.txt>

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

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

Check the IBIS file directory on [ibis.org](http://www.ibis.org) for more information on previous discussions and results:

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

Other trademarks, brands and names are the property of their respective owners.

## SAE STANDARDS BALLOT VOTING STATUS

Organization	Interest Category	Standards Ballot Voting Status	May 18,	May 25,	June 8,	June 29,
			2018	2018	2018	2018
ANSYS	User	Active	X	-	X	X
Applied Simulation Technology	User	Inactive	-	-	-	-
Broadcom Ltd.	Producer	Inactive	-	-	-	-
Cadence Design Systems	User	Inactive	X	-	-	X
Cisco Systems	User	Inactive	-	-	-	-
CST	User	Inactive	-	-	-	-
Ericsson	Producer	Inactive	-	-	-	X
GLOBALFOUNDRIES	Producer	Inactive	X	-	-	X
Huawei Technologies	Producer	Inactive	-	-	-	-
IBM	Producer	Inactive	X	X	-	-
Infineon Technologies AG	Producer	Inactive	-	-	-	X
Intel Corp.	Producer	Active	X	X	X	X
IO Methodology	User	Inactive	X	-	-	-
Keysight Technologies	User	Active	X	-	X	X
Maxim Integrated	Producer	Inactive	-	-	-	-
Mentor, A Siemens Business	User	Active	X	X	-	X
Micron Technology	Producer	Active	X	-	X	X
NXP	Producer	Inactive	-	-	-	-
Raytheon	User	Inactive	-	-	-	-
SiSoft	User	Active	X	X	X	X
Synopsys	User	Inactive	X	-	-	X
Teraspeed Labs	General Interest	Active	X	-	X	X
Xilinx	Producer	Inactive	-	-	-	-
ZTE Corp.	User	Inactive	-	-	-	-
Zuken	User	Inactive	-	X	-	-

Criteria for SAE 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 standards 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.