

**IBIS Open Forum Minutes**

Meeting Date: **November 30, 2018**

Meeting Location: **Teleconference**

**VOTING MEMBERS AND 2018 PARTICIPANTS**

ANSYS Curtis Clark, Miyo Kawata

Applied Simulation Technology (Fred Balistreri)

Broadcom (Yunong Gan)

Cadence Design Systems Brad Brim\*, Ken Willis, Ambrish Varma, Zhen Mu

 Morihiro Nakazato, Jinsong Hu, Skipper Liang

 Zuli Qin, Haisan Wang, Hui Wang, Yitong Wen

 Clark Wu, Zhangmin Zhong, Jessica Yen, Nemo Hsu

Cisco Systems Stephen Scearce, Cassie Yan, Baosh Xu

CST Stefan Paret

Ericsson Anders Ekholm, Zilwan Mahmod, Guohua Wang

 Wenyan Xie, Amy Zhang

GLOBALFOUNDRIES Steve Parker\*

Huawei Technologies (Hang (Paul) Yan)

IBM Greg Edlund, Luis Armenta, Hubert Harrer

 Michael Cohen

Infineon Technologies AG (Christian Sporrer)

Intel Corporation Hsinho Wu\*, Michael Mirmak\*, Nilesh Dattani

 Fernando Mendoza Hernandez, Varun Gupta

 Subas Bastola, Hansel Dsilva, Gianni Signorini

 Kai Yuan, Denis Chen, Jimmy Hsu, Cucumber Lin

IO Methodology Lance Wang\*

Keysight Technologies Radek Biernacki\*, Ming Yan, Heidi Barnes

 Pegah Alavi, Toshinori Kageura, Satoshi Nakamizo

 Umekawa Mitsuharu

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

 Kazuhiro Kadota, Terence Guo

Micron Technology Randy Wolff\*, Justin Butterfield

 Micron Memory Japan Masayuki Honda, Tadaaki Yoshimura, Toshio Oki

 Mikio Sugawara

NXP (John Burnett)

Raytheon Joseph Aday

SiSoft Mike LaBonte\*, Walter Katz\*, [Todd Westerhoff]

Synopsys Ted Mido\*, Adrien Auge, Scott Wedge, Xuefeng Chen

 Jinghua Huang, Yuyang Wang

Teraspeed Labs Bob Ross\*

Xilinx Ravindra Gali

ZTE Corporation Shunlin Zhu, Liqiang Meng, Yonghui Ren, Bi Yi

Zuken Michael Schaeder, Takayuki Shiratori

**OTHER PARTICIPANTS IN 2018**

A&D Print Engineering Co. Ryu Murota

Abeism Corporation Nobuyuki Kiyota, Noboru Kobayashi

Alpine Electronics Norio Mashiko

AMD Japan Tadashi Arai

Apollo Giken Co. Naoya Iisaka, Satoshi Endo

ASRock Rack Eric Chien, Timmy Kao

ASUSTek Computer Eric Hsieh, Nick KH Huang, Jenyung Li, Eric Tsai

Avnet Shinya Ishizuka

BasiCAE Kiki Li, Darcy Liu, Linda Zhang

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Canon Syoji Matsumoto, Yusuke Matsudo, Manabu Sakakibara

 Tadashi Aoki, Hitoshi Matsuoka, Ryuta Kusaka

 Masaaki Ohishi, Satoru Ishikawa

Casio Computer Co. Yasuhisa Hayashi

Celestica Sophia Feng, Bowen Shi

CMK Products Corp. Hiroyasu Miura

Credo Anyun Liu

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Denso Corp. Yukiya Fukunaga

Eizo Corp. Tokimitsu Eso

Finnhan Yuan Xu

Fuji Xerox Manufacturing Co. Rumi Maeda

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Fujitsu Interconnect Technologies Masaki Kirinaka, Akiko Tsukada

Fujitsu Ltd. Takashi Kobayashi

Fujitsu Optical Components Masaki Kunii

Genesis Technology TF Chiang

Gifu University Toshikazu Sekine

Global Unichip Japan Masafumi Mitsuishi

Google Zhiping Yang

Hamamatsu Photonics Akihiro Inoguchi, Shigenori Fujita, Hidetoshi Nakamura

Haskware David Banas

Hewlett Packard Enterprise Passor Ho, Corey Huang, Hellen Lo, Edward Pan

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Hitachi Ltd. Yasuhiro Ikeda

Hoei Co. Tatsuya Chiba

Huawei Technologies Haiping Cao, Longfang Lv, Shengli (Victory) Wang

 Hang (Paul) Yan, Chen (Jeff) Yu, Zhengyi Zhu

 Peng Huang

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Inspur Technologies Josh Chen, Steven Ho, Dane Huang, Nieves Lee

 Eric Lee, Rock Wang

Institute for Information Industry Joseph Yang

Japan Radio Co. Hiroto Katakura

JEITA Yukio Masuko

John Baprawski, Inc. John Baprawski

JVC Kenwood Corp. Yasutoshi Ojima, Masayuki Kurihara

KEI Systems Shinichi Maeda

Keihin Corp. Takayuki Ota

Lapis Semiconductor Co. Satoshi Tachi

Lattice Semiconductor Dinh Tran, Maryam Shahbazi

Lenovo Mark Zheng, Alex Chu, Alan Sun, Simon Yeh

Marvell Jianping Kong, Fang Lv, Banglong Qian

 Songjie (Jacky) Wang, Liang Wu

Megachips Corp. Tomochika Kitamura

Mitsubishi Electric Corp. Yusuke Suzuki

Mobile Techno Corp. Kazuhiro Kamegawa

Molex Japan Nobumasa Motohashi

Murata Manufacturing Co. Kazutaka Mukaiyama

Nanya Technology Corp. Ching-Feng Chen, Chi-Wei Chen

 Taco (Changqun) Hsieh, Benson Hsu, George Lee

 Linda, Allen Ye

NEC Magnus Communications Toshio Saito

New H3C Group Xinyi Hu, Zixiao Yang

Nikon Corp. Manabu Matsumoto

Nvidia Corp. Norman Chang, Chiayuan Hsieh, Rich Lu

 Chihwei (Jason) Tsai

Oki Electric Industry Co. Kenichi Saito

OmniVision Sirius Tsang

Panasonic Corp. Minori Harada, Tomohiro Tsuchiya, Naoyuki Aoki

 Atsushi Nakano

Panasonic Industrial Devices, Kazuki Wakabayashi

 Systems and Technology Co.

Politecnico di Milano Flavia Grassi, Xinglong Wu

Politecnico di Torino Tommaso Bradde, Marco De Stefano, Paulo Manfredi

 Riccardo Trinchero, Stefano Grivet-Talocia

PWB Corp. Toru Ohisa

Qualcomm Kevin Roselle, Tim Michalka, Zhiguang Li

Razer Irwin (Zhilong) Xue

Renesas Electronics Corp. Masayasu Koumyou, Kazunori Yamada, Kenzo Tan

 Hiroyoshi Kuge, Masato Suzuki

Ricoh Company Kazuki Murata, Yasuhiro Akita, Kazumasa Aoki

 Toshihiko Makino, Koji Kurose

RITA Electronics Ltd. Kenichi Higashiura, Hiroyuki Motoki

Rohm Co. Noboru Takizawa, Ryosuke Inagaki, Nobuya Sumiyoshi

Ryosan Co. Takahiro Sato, Takumi Ito

SAE ITC (Jose Godoy)

Sanwa Denki Kogyo Co. Yutaka Takasaki

Shanghai IC R&D Center (ICRD) Huijie Yan, Hailing Yang

Shanghai Zhaoxin Semiconductor Chuanyu (Liam) Li

Shinewave Nike Yang

Shinko Electric Industries Co. Takumi Ikeda

Signal Metrics Ron Olisar

Silvaco Japan Co. Yoshihiko Yamamoto, Kaoru Kashimura

SMK Corp. Norihide Taguchi

Socionext Megumi Ono, Yumiko Sugaya, Mitsuhiro Tomita

 Katsuya Ogata, Yoshihiko Sumimoto, Yuji Nakagawa

 Takashi Araki

Sohwa & Sophia Technologies Tomoki Yamada

Sony Global Manufacturing & Takashi Mine, Toshio Murayama, Taichi Hirano

 Operations Corp. Takashi Mizoroki

Sony LSI Design Toru Fujii

Sony Semiconductor Solutions Takeshi Ogura

SPISim Wei-hsing Huang, Wei-Kai Shih

Stanford University Tom Lee

STMicroelectronics Aurora Sanna, Olivier Bayet

Syswave Kazuo Ogasawara

Tatung Technology Barry Chen

TDK Corp. Kotaro Suzuki

Technopro Design Co. Mai Fukuoka

Teledyne LeCroy Denny Li, Nan Son, Suping Wu, Sherry

Telepower Kenji Kobayashi

TFF Tektronix Co. Katsuhiko Suzuki

Thine Electronics Takafumi Nakamori

Tomen Devices Corp. Kinji Mitani

Toshiba Corp. Yasuki Torigoshi

Toshiba Development & Nobuyuki Kasai

 Engineering Corp.

Toshiba Electronic Devices & Atsushi Tomishima, Yasunobu Umemoto

 Storage Corp. Yoshinori Fukuba, Hitoshi Imi, Motochika Okano

 Tetsuya Nakamura

Toshiba Memory Corp. Masato Kanie, Takayuki Mizogami

Toshiba Memory Systems Co. Eiji Kozuka, Tomomichi Takahashi

Toshiba Microelectronics Corp. Jyunya Masumi

Unisoc Junyong Deng, Nikki Xie

Université de Bretagne Occidentale Mihai Telescu, Charles Canaff

University of Illinois José Schutt-Aine
University of Siegen Elmar Griese
University of Technology Hamburg Torben Wendt
Xpeedic Suxiang Zhou

Xrossvate Toshiyuki Kaneko

Yamaha Corp. Tetsuya Kakimoto

Zhejiang Uniview Technologies Fang Yang

Zheijiang YUSHI Technology E. Deng

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

December 21, 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**

Randy Wolff declared that a quorum was reached.

**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 called for comments on the minutes of the November 2, 2018 IBIS Open Forum teleconference. Walter Katz moved to approve the minutes. Lance Wang seconded the motion. There were no objections.

Mike noted that the Asian IBIS Summit meeting minutes were released relatively shortly before this meeting. Bob Ross suggested the minutes be reviewed in the next IBIS Open Forum teleconference meeting. Bob asked Ted Mido about the spelling of Japanese names where sometimes an “o” is followed by an “h”, as in “oh”. Ted noted that there is no set rule about these spellings, and it is up to individual preference.

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

Bob Ross noted that BIRD197 was sent out, but it is not on the agenda sent out. Mike LaBonte noted it is on his agenda for discussion.

Bob also noted that Ted Mido had interest in sharing his presentation from the Japan IBIS Summit during the meeting.

**MEMBERSHIP STATUS AND TREASURER'S REPORT**

Bob Ross reported that we have 25 members. There is $26,147 in our account, with $24,897 accumulated for 2018. $1,250 is allocated to 2019 for DesignCon sponsorship. We are expecting several expenses from the Summits to be paid out soon.

Bob sent a membership renewal list to Phyllis Gross [at SAE] so she can send out 2019 renewal notices at her convenience.

**WEBSITE ADMINISTRATION**

Mike LaBonte reported that the Past Summits page has been updated to add in the Asian IBIS Summits. Mike found a problem with the script generating the presentation posting page. When a title of a presentation had a colon, the portion after the colon was missing. This is fixed now.

**MAILING LIST ADMINISTRATION**

Mike LaBonte reported that there has been no unusual activity. There have been a few drops and joins on the mailing list.

**LIBRARY UPDATE**

No update.

**INTERNATIONAL/EXTERNAL ACTIVITIES**

- Conferences

None.

- Press Update

None.

- Related standards

IEC 63055/IEEE 2401, JEITA “LPB”

Michael Mirmak reported that Draft 2 of LPB was made available today and is open for comments. December 18, 2018 is the next meeting of the LPB group. Mike LaBonte asked if Michael is able to discuss the document in more detail, given that only working group members have access. Michael will confirm what he is able to share more broadly [AR].

**SUMMIT PLANNING AND STATUS**

- Asian IBIS Summit (Tokyo)

An IBIS Summit was held at the Akihabara UDX building on November 12, 2018. Mike LaBonte noted the event was very well managed by JEITA. About 135 people representing 81 organizations attended. There were good presentations. He added that we have a good relationship with JEITA. Mike noted thanks to the sponsors including ANSYS, Apollo Giken Co., Cadence Design Systems, Cybernet Systems, Keysight Technologies, Ricoh, Toshiba Corporation, and Zuken.

- Asian IBIS Summit (Shanghai)

An IBIS Summit was held at the Parkyard Hotel Shanghai on November 14, 2018. About 58 people representing 25 organizations attended. Mike noted attendance might be lower due to the event taking place on a Wednesday instead of a Friday. Lance Wang noted attendees were talking in Shanghai and Taipei about attendance going down. There were suggestions to change the meeting format to bring in sessions for vendor specific talks. Vendors might bring more customers to the meeting to attend their technical portion. Mike noted this could be handled more like the sponsored vendor presentations at DesignCon. We should discuss amongst the IBIS board some ideas to increase attendance for next year. Mike noted thanks to Huawei Technologies, the primary sponsor, and IO Methodology, Mentor, a Siemens Business, Synopsys, Teledyne LeCroy, and ZTE Corporation, the additional sponsors.

- Asian IBIS Summit (Taipei)

An IBIS Summit was held at the Sherwood Hotel on November 16, 2018. About 47 people representing 17 organizations attended. Mike noted thanks to the sponsors Cadence Design Systems, KairosTech Innovation (SPISim), and Synopsys.

Mike reported that he discussed the BIRD process during each of the Summits. Some presentations each year discuss BIRD ideas, but these ideas rarely turn into BIRDs. He took time to show the process to the attendees.

- DesignCon 2019 IBIS Summit

DesignCon will be held in Santa Clara, CA on January 29 through January 31, 2019. An IBIS Summit will be held on Friday, February 1, 2019. Mike noted UBM is doing more cross promotions. SAE is doing a press release for DesignCon as well as some social media postings. We will likely have some promotional materials to send out to our mailing list. Keysight Technologies is a sponsor, with others to be determined.

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. The discussion has been mostly about the development of IBISCHK.

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

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

**ADVANCED TECHNOLOGY MODELING TASK GROUP**

Arpad Muranyi reported that the group normally meets regularly on Tuesdays at 12:00 p.m. PT.

They started to discuss the BIRD draft submitted for single ended IBIS-AMI simulations by Walter Katz. The meeting next Tuesday will be used by the Editorial task group.

Task group material can be found at:

<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 remains suspended until IBIS 7.0 activities are completed.

Task group material can be found at:

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

**EDITORIAL TASK GROUP**

Michael Mirmak reported that the group is meeting at 8:00 a.m. PT on Wednesdays and on Fridays when there is no Open Forum teleconference as well as during some ATM task group time slots. The group remains on schedule to finish the editorial work before the end of the year. No additional BIRDs are expected to be included at this time. Some editorial issues have technical implications and need further discussion. Watch the reflectors for a submittal of IBIS 7.0 before the December 21, 2018 IBIS Open Forum meeting.

Task group material can be found at:

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

**NEW ADMINISTRATIVE ISSUES**

None.

**STUDY ON POTENTIAL FEATURE ADDITIONS FOR BIT-BY-BIT SIMULATION TECHNIQUE TO ADDRESS THE DDR5 REQUIREMENTS**

Ted Mido gave an overview of his presentation given during the Tokyo IBIS Summit. He presented on collecting items probably needed for DDR5 simulations. Equalizers in DDR5 are used. Very low BER is taken into account in the future. Transient analysis is still useful, but long bit pattern simulations are also needed. The convolution technique is commonly used for IBIS-AMI simulation, with a bit stream convolved with the channel impulse response. Superposition is an alternative, using pulse patterns. This technique can capture rise/fall asymmetry from a driver. Transient analysis is the third technique, and the most accurate, but is very slow to simulate long bit patterns. Switchable simulation engines could allow customers to compare multiple simulation techniques.

He discussed capturing SSO in an eye diagram simulation. A two-step approach captures a non-SSO eye diagram. Then, the power supply is characterized and a power supply induced jitter (PSIJ) number is derived. He showed a target system used to analyze various simulation techniques. There are challenges with SSO noise characterization, where a PDN may have a very long time constant. SSO is input pattern dependent, with stronger timing variation than voltage variation. He looked at edge response superposition for the SSO probability density function. The response looked very Gaussian for a 1-million-bit superposition, but he is not sure how true this is for other systems.

He showed how to translate voltage noise to timing noise. The timing jitter probability was convolved with the eye diagram. There was good agreement between transient and edge response superposition. He noted the clock\_times array, as an output of AMI\_GetWave, could be modified to be an input for DDR5 models, with a new Reserved\_Parameter to indicate the use model. This would allow the DQS signal to be used to clock the DQ IBIS-AMI model. He showed simulation results with correlated jitter on DQ and DQS. If the external clock is not used, the jitter is amplified, as it might not be in reality. He then showed the results with uncorrelated jitter on DQ and DQS. Not using the external clock may result in more pessimistic eye opening.

Bob Ross asked on slide 20, if there is a new array needed. Ted noted no change in the AMI\_GetWave prototype, where the same clock\_times variable is used. There is a new parameter needed, likely as a Type Info. Mike noted the proposal would mean the clock\_times vector would not be passed in blank, as it is done now.

Walter Katz noted IBIS-AMI can describe jitter of the clock inside the DLL. He asked how the EDA tool would know the correct phase of the DQS for generating the clock\_times vector. This is done through training in a real system. Ted noted StatEye can take the timing offset of the two eye diagrams into account. Walter noted if you have clock ticks as an input to Rx, then the Tx model should generate the clock ticks, needing some BIRD147 backchannel like training between the Tx and Rx. Walter noted he puts a CDR in the Rx model currently to emulate what the training does. Ted noted they use two channels for DQ and DQS, then assume a 90-degree phase shift of DQS to DQ.

Walter asked about the non-LTI labeling noted in the presentation for the channel description. Is this related to the asymmetric rise/fall time? Since it is likely that the TX buffer operates in a restricted voltage range, is a linear approximation ok? Ted noted some drivers are operated in the linear region and some are not. He does not assume the TX buffer is linear.

Arpad Muranyi asked if Ted researched asymmetric rising/falling edges. Ted noted in StatEye, a multi-edge model pattern can take more non-linearity into account. Arpad asked more about the IBIS-AMI flow. Ted confirmed he is not using IBIS-AMI for the Tx side. Using IBIS-AMI for the Rx is relatively straightforward. Ted noted there was another presentation in the Summit about doing some special convolution techniques using rise and fall impulse responses to account for rise/fall driver asymmetry.

Walter noted he will give a paper at the DesignCon Summit about his technique for working with rise/fall asymmetry. Bob asked Ted if he might give a presentation at the DesignCon IBIS Summit. Ted was not sure if he would be able to attend yet.

**BIRD197: NEW AMI RESERVED PARAMETER DC\_OFFSET**

Walter Katz introduced the BIRD. He noted DDR5 is not what IBIS-AMI was originally designed for, with several differences including being single-ended signaling. This BIRD specifically addresses the problem of single-ended signaling. With the input to the AMI model being an impulse response, the common mode voltage is lost, and the AMI model may want to know that voltage level. The EDA tool can calculate this value as the average of the high and low voltage levels of the step response, and this value can then be passed into the model. The value in the model’s .ami file can be a placeholder, and this value can be replaced by the EDA tool to be passed into the DLL.

Bob Ross noted some editorial comments needing to be addressed for a BIRD197.1 revision. Mike LaBonte asked about the use of DC\_Offset by the AMI\_GetWave function. Walter noted that the model can use the value to shift the waveform internally. The output of AMI\_GetWave should still be a differential output. The input to the RX model is still a differential waveform as well. Walter noted comments are welcome for incorporation into a BIRD197.1.

**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 there are no new bugs for IBISCHK6.1.5. We are waiting for the official parser release. He expected this sooner, but he has not received it from the developer. Bugs 190-201 are covered, and this provides a new baseline for the IBISCHK7.0 parser. Bob expects the release sometime in the next two weeks.

**NEW TECHNICAL ISSUES**

None.

**NEXT MEETING**

The next IBIS Open Forum teleconference meeting will be held on December 21, 2018. The following IBIS Open Forum teleconference meeting is tentatively scheduled on January 11, 2019.

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

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**NOTES**

IBIS CHAIR: Mike LaBonte

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This meeting was conducted in accordance with ANSI guidance.

All inquiries may be sent to 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 and/or ibis-users@freelists.org email lists (formerly ibis@eda.org and ibis-users@eda.org).
* To subscribe to one of the task group email lists: ibis-macro@freelists.org, ibis-interconn@freelists.org, or 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](http://www.ibis.org/%20bugs/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>

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/bugsplt.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 for more information on previous discussions and results:

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

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**SAE STANDARDS BALLOT VOTING STATUS**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Organization** | **Interest Category** | **Standards Ballot Voting Status** | **November 12, 2018** | **November 14, 2018** | **November 16, 2018** | **November 30, 2018** |
| ANSYS | User | Inactive | X | - | - | - |
| Applied Simulation Technology | User | Inactive | - | - | - | - |
| Broadcom Ltd. | Producer | Inactive | - | - | - | - |
| Cadence Design Systems | User | Active | X | X | X | X |
| Cisco Systems | User | Inactive | - | - | - | - |
| CST | User | Inactive | - | - | - | - |
| Ericsson | Producer | Active | X | X | X | - |
| GLOBALFOUNDRIES | Producer | Inactive | - | - | - | X |
| Huawei Technologies | Producer | Inactive | - | - | - | - |
| IBM | Producer | Inactive | - | - | - | - |
| Infineon Technologies AG | Producer | Inactive | - | - | - | - |
| Intel Corp. | Producer | Active | - | X | X | X |
| IO Methodology | User | Inactive | - | X | - | X |
| Keysight Technologies | User | Inactive | X | - | - | X |
| Maxim Integrated | Producer | Inactive | - | - | - | - |
| Mentor, A Siemens Business | User | Active | X | X | - | X |
| Micron Technology | Producer | Inactive | X | - | - | X |
| NXP | Producer | Inactive | - | - | - | - |
| Raytheon | User | Inactive | - | - | - | - |
| SiSoft  | User | Active | X | X | X | X |
| Synopsys | User | Active | X | X | - | X |
| Teraspeed Labs | General Interest | Inactive | - | - | - | X |
| Xilinx | Producer | Inactive | - | - | - | - |
| ZTE Corp. | User | Inactive | - | X | - | - |
| 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.