



## IBIS Open Forum Minutes

Meeting Date: **February 21, 2020**

Meeting Location: **Teleconference**

### VOTING MEMBERS AND 2020 PARTICIPANTS

ANSYS	Curtis Clark*, Marko Marin, Shai Sayfan-Altman Zilwan Mahmod
Applied Simulation Technology	(Fred Balistreri)
Broadcom	James Church
Cadence Design Systems	Zhen Mu*, Ambrish Varma, Jared James Kumar Keshavan, Ken Willis
Cisco Systems	Stephen Searce, Hong Wu
Dassault Systemes (CST)	Stefan Paret
Ericsson	Anders Ekholm, Sungjoo Yu, Thomas Ahlstrom
Google	Zhiping Yang*, Shuai Jin, Zhenxue Xu
Huawei Technologies	(Hang (Paul) Yan)
IBM	Michael Cohen*
Infineon Technologies AG	(Christian Sporrer)
Instituto de Telecomunicações	(Abdelgader Abdalla)
Intel Corporation	Hsinho Wu*, Michael Mirmak*, Adrien Auge Fernando Mendoza, Taeyoung Kim, Wendem Beyene Oleg Mikulchenko, Nhan Phan, Ifiok Umoh Subas Bastola
Keysight Technologies	Radek Biernacki*, Hee-Soo Lee, Todd Bermensolo Graham Riley, Pegah Alavi, Fangyi Rao Stephen Slater
Marvell	Steve Parker*, Johann Nittmann
Maxim Integrated	Joe Engert, Charles Ganai, Dzung Tran, Yan Liang*
Mentor, A Siemens Business	Arpad Muranyi*, Raj Raghuram, Todd Westerhoff Weston Beal
Micron Technology	Randy Wolff*, Justin Butterfield
NXP	John Burnett
SerDesDesign.com	John Baprawski
SiSoft (MathWorks)	Mike LaBonte*, Walter Katz*, Graham Kus
SPISim	Wei-hsing Huang*
Synopsys	Ted Mido*, Andy Tai
Teraspeed Labs	Bob Ross*
Xilinx	Ravindra Gali
ZTE Corporation	(Shunlin Zhu)
Zuken	Michael Schäder, Kazunari Koga
Zuken USA	Lance Wang

## OTHER PARTICIPANTS IN 2020

Accton	Tariq Abou-Jeyab
Achronix Semiconductor	Hansel Dsilva
Apollo Giken Co.	Satoshi Endo
Kandou Bus	Sherman Chen
KEI Systems	Shinichi Maeda
Kioxia Corporation	Yasuo Otsuka
OmniVision	Sirius Tsang
Qualcomm	Kevin Roselle, Sunil Gupta
Renesas	Genichi Tanaka
RITA Electronics	Takahide Nozaki
SAE ITC	Jose Godoy
Samsung	Wonsuk Choi
San Jose State University	Vincent Tam
Seagate	Preetesh Rathod, Alex Tain, Karthik Chandrasekar Emmanuel Atta
Signal Metrics	Ron Olisar
Silvaco Japan Co.	Yoshiharu Furui
SK Hynix Memory Solutions	Jongchul Shin, Alex Lee, James Yu
Socionext	Matsumura Motoaki, Shinichiro Ikeda Takafumi Shimada
Teradyne	Dongmei Han, Edward Pulscher, Sheri Zhuang Tomoo Tashiro, Paul Carlin, Tao Wang

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
March 13, 2020	627 261 744	Friday1

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

<https://tinyurl.com/IBISfriday-new>

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**

Curtis Clark declared that a quorum was reached.

## **CALL FOR PATENTS**

Randy Wolff called for declaration of any patents or pending patents related to the IBIS, IBIS-ISS, ICM, or Touchstone 2.0 specifications. No patents were declared.

## **REVIEW OF MINUTES AND ARS**

Randy Wolff called for comments on the minutes of the December 13, 2019 IBIS Open Forum teleconference. Review of these minutes had been deferred at the previous meeting. Radek Biernacki moved to approve the minutes. Bob Ross seconded the motion. There were no objections.

Randy Wolff called for comments on the minutes of the January 10, 2020 IBIS Open Forum teleconference. Mike LaBonte moved to approve the minutes. Bob Ross seconded the motion. There were no objections.

Randy Wolff called for comments on the minutes of the January 31, 2020 IBIS Summit at DesignCon. Bob Ross moved to approve the minutes. Ted Mido seconded the motion. There were no objections.

Randy reviewed ARs from the previous meeting.

1. Randy Wolff to send a vote solicitation email for the IEEE SPI IBIS Summit [AR].  
Randy reported that this had been done.
2. Lance Wang to contact previous leadership of the China Regional Forum to discuss a restart plan [AR].  
Randy reported that this had been done. Randy had subsequently sent an email to the Open Forum regarding the restart of the China Regional Forum. Kevin Li is leading the restart. There is a WeChat group for the forum. They will meet monthly. Kevin Li will be sending details, and interested parties may join the email reflector or the WeChat group. Randy noted that he will work with SAE ITC to get a new webex meeting setup for the forum [AR].
3. Randy Wolff to send a vote solicitation email for BIRD197.7 [AR].  
Randy noted that this had been done.
4. Bob Ross to update the status of BUG209 on the webpage [AR].  
Bob reported that this had been done.

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

Bob Ross noted that SerDesDesign.com is a new member, and John Baprawski is their primary

contact.

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

Bob Ross reported that we now had 27 members in 2020. Thus far, eleven organizations have paid for 2020 membership (10 renewals, and one new member). Existing members will carry over through May of 2020, and their membership will end then unless they renew for 2020. We have \$2,078 cash flow for 2020 and a \$3,338 adjusted balance for 2020. These balances reflect the fact that the \$8,922 DesignCon Summit expenses have been paid. Bob noted that we need SAE ITC to finalize its Extra Charges so we can close the books for 2019.

Bob noted that we expect one more parser payment and more membership renewals. He noted two possible issues with the 2020 membership invoices that had been sent out by SAE ITC. The first is that the invoices do not contain bank transfer information. This can be a problem, especially for international organizations. The second is that the invoices have the IBIS logo on top. This is fine, but we have sometimes run into confusion about whether SAE or SAE ITC is the qualified vendor for the purchase order. IBIS is not a likely to be a qualified vendor, and it may be an issue for some member organizations. Please contact Bob if there are any accounting issues related to your organization's renewal.

## **WEBSITE ADMINISTRATION**

Steve Parker reported that the website was up to date with respect to ATM, Interconnect, and Quality task group minutes and documents. He noted that a page for the China Regional Forum had been added. He noted that the agenda pages for the 2019 IBIS Asian Summits now contained links to their meeting minutes. He also noted that he had updated Marvell's logo on the IBIS home page.

## **MAILING LIST ADMINISTRATION**

Mike LaBonte reported that mailing lists were operating smoothly. He noted that drops continue to slightly outpace new joins. He noted that we are starting to get a bit more spam at [info@ibis.org](mailto:info@ibis.org), but it is not bad and still much better than when it was first set up.

## **LIBRARY UPDATE**

No update.

## **INTERNATIONAL/EXTERNAL ACTIVITIES**

- Conferences

24<sup>th</sup> IEEE Workshop on Signal and Power Integrity (SPI 2020)

<https://spi2020.uni-siegen.de/>

2020 IEEE International Symposium on EMC + SIPI (July 27-31, Reno, NV)

Bob Ross noted that we had been contacted about possibly holding an IBIS Summit or other IBIS event in conjunction with the symposium. Further discussion is in the Summit Planning and Status section of these minutes.

<https://www.emc2020.emcss.org/>

- Press Update  
None.

- Related standards

IEC 63055/IEEE 2401, JEITA “LPB”

Randy Wolff noted that JEITA had provided an update on IEEE 2401 at the DesignCon IBIS Summit.

JEDEC JESD204C.1

Randy noted during the previous Open Forum teleconference that he had been contacted by the chairperson of this task group. They are asking for permission to reproduce portions of IBIS 7.0 section 10.3. This section contains the AMI parameter definition file structure, and they would like to use it verbatim or with minor changes. Randy noted that he had forwarded the request to SAE ITC, since they hold the copyright. He had since heard back from SAE ITC legal via Jose Godoy. SAE ITC legal had provided a document with terms and conditions for using text from IBIS specification. Randy noted that he had forwarded the document to the chairperson of JESD204C.1 so they could review it. Randy said he would provide an update at the next meeting if he heard back from them [AR]. Bob Ross asked if there were any unusual terms and conditions. Randy said he would forward the document to Bob and the rest of the Board so they could review it [AR].

## **SUMMIT PLANNING AND STATUS**

- DesignCon 2020 Summit (January 31, 2020)

Randy Wolff noted that turnout had been great. We had 87 attendees from 39 organizations. Randy thanked the sponsors Cadence, Keysight, and Synopsys. Randy thanked Bob Ross for again handling the presentation reviews, putting together the agenda, and working out the logistics. Randy thanked Lance Wang for handling summit registration and Justin Butterfield for taking good minutes. Randy noted one final item in our barter agreement with Informa Markets. Randy will provide them with a list of summit attendees [AR]. Randy noted that Informa Markets wants to cross check and see if most summit attendees also attended DesignCon. Randy noted that he thinks most if not all summit attendees also attended DesignCon.

Bob noted that Ballroom G, a larger room than we had used in the past, had worked out nicely. Randy agreed that the new room had worked out well and helped out with the food arrangements too. Bob and Randy said we would plan to ask for that room next year. Bob and Randy noted that there were 13 presentations and the entire day was full.

- IEEE SPI Summit 2020

Bob moved to hold an IBIS Summit at SPI on May 20, 2020 at a cost not to exceed \$2,500. Bob noted that €1,500 was the cost of our sponsorship of SPI. He noted that IBIS was already

listed as a sponsor on their webpage. He also noted that Zuken would sponsor the IBIS Summit, and Michael Schäder would help with logistics. Mike LaBonte seconded. There were no objections.

The roll call vote tally was:

ANSYS – yes  
Cadence – yes  
Google – not present  
IBM – yes  
Infineon – yes (by email)  
Intel – yes  
Keysight – yes  
Marvell – yes  
Maxim – yes  
Mentor – yes  
Micron – yes  
SiSoft – yes  
SPISim – yes  
Synopsys – yes  
Teraspeed Labs – yes

The roll call vote concluded with a vote tally of Yes – 14, No – 0, Abstain – 0. The vote passed.

Bob noted that he and Lance Wang could serve as contacts as in the past. He asked Steve Parker to update the website to reflect the approved status of the summit [AR].

- IEEE EMC + SIPI Symposium (July 27-31, Reno, NV)

Bob noted that Zhiping Yang is an officer on the planning committee for this event, and he had approached Bob to ask if IBIS would be interested in holding an IBIS summit along with this conference. Bob noted that Zhiping is a long time supporter of IBIS. Bob said he was interested in working with Zhiping if there was enough interest from the group. Bob noted that Zhiping was waiting to hear back from the organizers of the Standards Week portion of the event to see if they want to pull an IBIS meeting into the Standards Week.

Bob noted that Ross Carlton is co-chair of Standards Week, and he had stated that their program is full, and they don't have room for a formally scheduled meeting. Randy noted that one of the things Zhiping had mentioned as part of an IBIS meeting was a one or two hour IBIS overview to draw in new participants. Randy said it might be too late to consider a formal summit, and Bob agreed that it might be possible to do something without the overhead of a formal IBIS Summit. Michael Mirmak said it would be nice to know what type of overview they wanted: basic IBIS, IBIS AMI, something focused on a particular technology, etc.

Zhiping joined the teleconference. He noted that there is definitely long term interest in doing something with IBIS, but he agreed that the schedule for this year's symposium is already pretty full. He said the steering committee had met the day before, but he had not yet heard anything back from them on any proposed IBIS involvement. In terms of future meetings, Zhiping noted

that every three or four years they have an international version of the conference as well. For example, in 2021 there will be meetings in Raleigh, NC and Glasgow, Scotland. In 2022 the conference will be in Spokane, WA, and in 2023 it will be in Grand Rapids, MI. Randy asked Zhiping to send us the details of future scheduled meetings, and IBIS can see what it wants to plan for them. Zhiping said he would send future conference information to Bob and Randy.

Bob asked if plans would be for an IEEE event or an IBIS Open Forum controlled event at which everything is public (presentations, etc.). Zhiping said he thought the conference was open to either possibility. He noted that Bob has ongoing email exchanges with the interested parties.

Bob said that we will not plan to do anything formal at this year's conference. However, we could possibly send someone to give a brief presentation or tutorial. He noted that we already have some overlap, with some IBIS members expecting to attend the conference. Zhiping will follow up with Bob on any requests or plans for an IBIS presentation.

### **QUALITY TASK GROUP**

Mike LaBonte reported that the group is meeting on Tuesdays at 8:00 a.m. PT. The group continues to focus on ibischk. Recently discussions have been focused on BUG207 and BUG210. Mike also noted that there had been past discussion of a possible IBIS-ISS parser. He reported that a request had been sent to Atul Agarwal, the ibischk parser developer, for a quote on an IBIS-ISS parser. They have not yet heard back.

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 meets on Tuesdays at 12:00 p.m. PT. The group had recently been discussing a variety of topics including Fangyi Rao's proposal for a new GetWave() type function for clock forwarded DDR simulations, additional BCI protocols for AMI statistical flow, and sampling related questions for the AMI statistical flow.

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 meets at 8:00 a.m. PT on Wednesdays. He noted that the EMD proposal had been submitted as BIRD202, and that they currently are maintaining a bin list of changes to be made to a BIRD202.1. He noted that most of the changes are relatively simple. Following up on Mike LaBonte's mention of IBIS-ISS, he noted that after EMD revisions are complete the task group will return to Touchstone and issues that have come up in recent summits.

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 the task group remains suspended.

Task group material can be found at:

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

## **NEW ADMINISTRATIVE ISSUES**

None.

### **BIRD202: ELECTRICAL DESCRIPTIONS OF MODULES**

Randy Wolff noted that Bob Ross had introduced the new BIRD at the DesignCon Summit, but this was its official introduction at an Open Forum meeting.

Walter Katz summarized the newly introduced BIRD. He noted that IBIS 7.0 (specifically BIRD189) had allowed the use of IBIS-ISS and Touchstone for package and on-die interconnect models. He noted that a package in IBIS 7.0 is limited to one chip connected to a whole bunch of pins. EMD extend that, and it should replace the existing EBD (electrical board description). He noted that EBD is limited to connections between a board's connector and components on the electrical board. EMD allows those connections plus connections between the components of the electrical module. EBD used a path format that is not broadband and not coupled. EMD allows broadband IBIS-ISS and Touchstone including coupling and power distribution.

Walter noted that he thought most of the details were done. He said he'd created a prototype program that creates an EMD file from a board file. He also created a prototype parser for the EMD file. During that process he'd come up with some issues to be discussed in Interconnect task group as part of BIRD202.1. For next gen systems, e.g. 112Gbps, instead of having a line card with components on a PCB, we may see that they will all be on a module. You cannot have 40 inch connections at 56GHz. So, components will all be in modules, and if you want to simulate connections inside and between modules then EMD will allow accurate interconnect models.

Bob noted that it was similar to BIRD189. Walter said what BIRD189 did was allow wrappers for subcircuits that already existed for packages. A similar approach was taken for BIRD202, but there were differences in details such as the way you define terminals inside a package vs. inside a module. Randy noted that the Interconnect task group will be working toward BIRD202.1, and it will then be reintroduced in the Open Forum. Walter moved to table BIRD202. Bob seconded the motion. There were no objections.

### **BIRD197.7: NEW AMI RESERVED PARAMETER DC\_OFFSET**

Walter Katz noted that this had been the subject of many discussions while it was being drafted, and the most recent discussion has been about thoroughly cleaning up the examples. Walter



moved to approve BIRD197.7 to be included in an upcoming version of IBIS. Bob Ross seconded the motion. There were no objections.

The roll call vote tally was:

ANSYS – yes  
Cadence – yes  
Google – abstain  
IBM – yes  
Intel – yes  
Keysight – yes  
Marvell – yes  
Maxim – yes  
Mentor – yes  
Micron – yes  
SiSoft – yes  
SPISim – yes  
Synopsys – yes  
Teraspeed Labs – yes

The roll call vote concluded with a vote tally of Yes – 13, No – 0, Abstain – 1. The vote passed.

Randy Wolff gave Steve Parker an AR to update the status of BIRD197.7 on the website [AR].

#### **BIRD201: BACK-CHANNEL STATISTICAL OPTIMIZATION**

Walter Katz noted that discussion of this was on hold in the ATM task group, and we are waiting for comments. He asked that members review it and provide feedback via email, ATM, or here in the Open Forum. Walter suggested that it could be left in its current state for a few meetings while waiting for comments.

#### **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.

#### **BIRD198: KEYWORD ADDITIONS FOR ON DIE PDN (POWER DISTRIBUTION NETWORK)**

## MODELING

Discussion was tabled.

### IBISCHK PARSER AND BUG STATUS

BUG207 had been left unclassified while it was discussed in the Quality task group, and Bob Ross reported that they had come to a decision. He noted that BUG207 relates to a change in the checking of Submodels. He noted that current behavior of the parser is that only the main Model without the Submodel is considered when the parser checks for endpoint agreement of the  $v(t)$  data and the static I/V tables. He said that BUG207 proposed a special case for a Submodel for an on-die terminator clamp in driver mode. Bob said he had not considered it a bug because the parser's current behavior is consistent for all Submodels, and it had been that way since IBIS 3.0. He said the Quality group had determined that it would be classified as Will Not Fix. Bob moved to classify it as Annoying, Low Priority, and Will Not Fix and to close BUG207. Walter Katz seconded the motion. There were no objections.

Randy Wolff noted that they had determined that there was an easy workaround for BUG207. The model maker could include the characteristics of the on-die terminator in a POWER Clamp or GND Clamp table in the top level Model. Given the workaround and a clear description of how ibischk should be functioning and checking the top level Model, they determined there was nothing to fix in the ibischk parser. He noted that BUG207 at least documents the special case.

Radek Biernacki noted his comment from an earlier meeting that BUG207 is an issue with missing information about how the  $v(t)$  data in the model was gathered, but the specification is currently silent on this issue. He suggested that if that additional piece of information was added to the standard, then there would be no question of how the parser interprets the data. He did not object to closing BUG207, but suggested we address the ambiguity with a specification change. Bob said what was missing was an explicit statement in the specification that all Submodel information is in addition to what is included in the top level Model. He suggested a BIRD could be drafted to correct this. Randy suggested that the Quality task group add it to their agenda and consider the best solution. Mike LaBonte agreed to add it to the Quality task group's agenda.

BUG210 was introduced by Bob. He noted that it had been submitted by Michael Mirmak. The bug related to a Model Selector keyword, but the example IBIS file was actually incorrect. Randy noted that placing Model Selector directly ahead of Diff Pin had caused an apparent problem with Diff Pin, but the actual problem was that Model Selector should not appear inside a Component. The scope of Model Selector is outside of Component. Randy noted that this was properly documented in the spec. Walter noted that the parser saw the Model Selector and therefore concluded that the previous Component definition had ended. This led to the parser complaining about the "Orphan Component keyword", as it was referring to a Diff Pin keyword that was not within a Component. Walter said the parser was working properly.

Michael said he wished the error message had been more helpful, or that the specification had been clearer. He said intuition might not lead one to expect that Model Selector could not appear inside a Component. He said clarifying the specification even further would help, but he would prefer a clearer error message.

Walter noted that for Interconnect keywords he had insisted on <Keyword> and <End

Keyword> pairs to avoid issues like this with the parser having to infer that the Component had ended when it encountered the Model Selector.

Walter suggested a different error message such as “Component keyword Diff Pin is outside of Component” might have been clearer. Bob noted that this was a generic message for many orphaned keywords, and we might not be able to simply change it to be more specific. Radek said we might indicate “incorrect order of keywords”, but he noted that carefully crafting the best message and the best solution would take time. Radek suggested the Quality task group add this to their agenda. Randy agreed. Walter noted that Quality can look into it and that fixing the message would be nice, but he didn’t think a specification change was required. Bob said a specification change might be required too if the scope of Model Selector wasn’t clear. Randy asked Mike LaBonte to add this issue to the Quality task group’s agenda and report back [AR]. The group deferred classification of BUG210 until the Quality task group reports back.

## **NEW TECHNICAL ISSUES**

None.

## **NEXT MEETING**

The next IBIS Open Forum teleconference meeting will be held on March 13, 2020. The following teleconference meeting is tentatively scheduled for April 03, 2020.

Curtis Clark moved to adjourn. Michael Mirmak seconded the motion. The meeting adjourned.

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## **NOTES**

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This meeting was conducted in accordance with SAE ITC guidelines.

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/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>

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

## SAE STANDARDS BALLOT VOTING STATUS

Organization	Interest Category	Standards Ballot Voting Status	December	January	January	February
			13, 2019	10, 2020	31, 2020	21, 2020
ANSYS	User	Active	X	X	X	X
Applied Simulation Technology	User	Inactive	-	-	-	-
Broadcom Ltd.	Producer	Inactive	-	-	X	-
Cadence Design Systems	User	Active	-	X	X	X
Cisco Systems	User	Inactive	-	-	X	-
Dassault Systemes	User	Inactive	-	-	X	-
Ericsson	Producer	Inactive	-	-	X	-
Google	User	Active	-	-	X	X
Huawei Technologies	Producer	Inactive	-	-	-	-
Infineon Technologies AG	Producer	Inactive	-	-	-	X
Instituto de Telecomunicações	User	Inactive	-	-	-	-
IBM	Producer	Inactive	-	-	-	X
Intel Corp.	Producer	Active	X	X	X	X
Keysight Technologies	User	Active	X	X	X	X
Marvell (GLOBALFOUNDRIES)	Producer	Active	X	X	X	X
Maxim Integrated	Producer	Active	-	-	X	X
Mentor, A Siemens Business	User	Active	-	X	X	X
Micron Technology	Producer	Active	X	X	X	X
NXP	Producer	Inactive	-	-	X	-
SerDesDesign.com	User	Inactive	-	-	X	-
SiSoft	User	Active	X	X	X	X
SPISim	User	Active	X	X	X	X
Synopsys	User	Active	X	-	X	X
Teraspeed Labs	General Interest	Active	X	X	X	X
Xilinx	Producer	Inactive	-	-	X	-
ZTE Corp.	User	Inactive	-	-	-	-
Zuken	User	Active	X	X	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.