



IBIS Open Forum Minutes

Meeting Date: **April 23, 2021**

Meeting Location: **Teleconference**

VOTING MEMBERS AND 2021 PARTICIPANTS

ANSYS	Curtis Clark*
Applied Simulation Technology	(Fred Balistreri)
Broadcom	(Yunong Gan)
Cadence Design Systems	Zhen Mu*
Cisco Systems	(Stephen Searce)
Dassault Systemes (CST)	(Stefan Paret)
Ericsson	(Guohau Wang)
Google	Zhiping Yang*
Huawei Technologies	(Hang (Paul) Yan)
IBM	(Juan Martinez)
Infineon Technologies AG	(Christian Sporrer)
Instituto de Telecomunicações	(Abdelgader Abdalla)
Intel Corporation	Hsinho Wu*, Michael Mirmak*
Keysight Technologies	Radek Biernacki*, Fangyi Rao
Marvell	Steve Parker
Maxim Integrated	Tushar Pandey*
Micron Technology	Randy Wolff*, Justin Butterfield
MST EMC Lab	(Chulsoon Hwang)
NXP	(John Burnett)
SerDesDesign.com	(John Baprawski)
Siemens EDA (Mentor)	Arpad Muranyi*, Weston Beal*
SiSoft (MathWorks)	Mike LaBonte*, Walter Katz*
Synopsys	Ted Mido*
Teraspeed Labs	Bob Ross*
Xilinx	(Romi Mayder)
ZTE Corporation	(Shunlin Zhu)
Zuken	(Michael Schäder)
Zuken USA	Lance Wang*

OTHER PARTICIPANTS IN 2021

Achronix Semiconductor	Hansel Dsilva*
Luminous Computing	David Banas*

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 connection information for future IBIS teleconferences is as follows:

Microsoft Teams meeting

Join on your computer or mobile app

[Click here to join the meeting](#)

Join with a video conferencing device

106010980@teams.bjn.vc

Video Conference ID: 114 666 897 5

[Alternate VTC dialing instructions](#)

Or call in (audio only)

[+1 267-768-8015,554664847#](tel:+12677688015554664847) United States, Philadelphia

Phone Conference ID: 554 664 847#

[Find a local number](#) | [Reset PIN](#)

[Learn More](#) | [Meeting options](#)

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.

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 April 2, 2021 IBIS Open Forum teleconference. Bob Ross moved to approve the minutes. Lance Wang seconded the motion. There were no objections.

Randy reviewed ARs from the previous meeting.

1. Steve Parker to add the SPI 2021 logo to the Events page [AR].
Randy reported this had been done.

2. Zhiping Yang to check what image we can add to the Events page for the IEEE EMC+SIPI event [AR].
Randy reported that this had been done. Zhiping had provided an image and Steve had added it to the Events page.
3. Zhiping Yang to get final information on discount codes for the IEEE EMC+SIPI event [AR].
Randy reported that this had been done. Further discussion is in the Summit Planning section.
4. Randy Wolff to contact Informa Markets to get an update on DesignCon summit accommodations [AR].
Randy reported that he had spoken with Suzanne Deffree of Informa Markets. Further discussion is in the Summit Planning section.

ANNOUNCEMENTS, CALL FOR ADDITIONAL AGENDA ITEMS

Randy Wolff noted that a new BIRD, BIRD211.1, had been submitted and would be discussed.

MEMBERSHIP STATUS AND TREASURER'S REPORT

Bob Ross reported that we have 27 members. The quorum for meetings is 7. Cash flow for 2021 is \$19,425 and total adjusted balance for 2021 is \$22,775. These figures are up \$4,800 from the previous meeting and reflect two additional membership payments and one new ibischk7 parser license payment.

Bob said we expect two new membership payments in 2021, and a third new membership is possible but less likely. We also expect a new Touchstone parser source code license payment in 2021. All current member organizations should now have received an invoice for 2021 membership. Current 2020 memberships will expire in May of 2021 if payment is not received by then. Bob reported that 22 members have paid for 2021, and he is following up on the 5 remaining membership renewals.

WEBSITE ADMINISTRATION

Randy Wolff reported for Steve Parker. Randy noted that BIRD211.1 and BIRD212 had been posted. Randy opened the Events page and showed the SPI2021 and EMC+SIPI banners added to their respective summit entries. Bob Ross said he liked the way these banners have clickable links directly to the main conference websites. He suggested we should add something similar for DesignCon once we get their permission. Randy said we should be able to do that soon.

Bob said that he had recently asked Steve to add a "version7.1_wip" to the site map as a repository for Editorial task group work related to the development of version 7.1.

MAILING LIST ADMINISTRATION

Mike LaBonte reported that mailing lists were operating smoothly. He is monitoring two addresses that are currently bouncing. He noted that we currently have 461 unique subscriber email addresses across all IBIS lists.

LIBRARY UPDATE

Zhiping Yang reported no new updates to the model library. He said he had engaged in an offline discussion with Chulsoon Hwang, and they wondered whether it would make sense to create an open source IBIS library. He said this is quite popular for software and even hardware design.

Zhiping noted that the current IBIS model library scheme provides links to individual model providers. Model providers maintain their sites, provide support, handle distribution, etc. He said this works fine, but he wondered if an open source repository for some model libraries would be helpful. He said this might increase adoption, make it easier for university students, and help identify and improve modeling issues.

Bob said that our site currently doesn't have an update mechanism for open source type collaboration. He said we do have some open source and freely available syntax examples uploaded to the site. He said we might establish a place where people can upload examples with some standard legal disclaimers.

Zhiping said that GitHub might be a place where we could establish a separate open source collaboration area. He said component libraries could also be hosted this way. Randy Wolff said this could be helpful for educating people with a collection of validated examples of complicated syntax, etc., but he didn't think many companies would be putting their models there. Zhiping noted that a GitHub site could have several levels of authorization and refereeing to guarantee a certain level of quality for the contributed models.

INTERNATIONAL/EXTERNAL ACTIVITIES

- Conferences

SPI2021 – the 25th IEEE Workshop on Signal and Power Integrity (virtual May 10-12, 2021) :

<https://spi2021.uni-siegen.de>

IEEE EMC + SIPI Symposium 2021 (virtual from July 27-August 13, 2021):

<https://www.emc2021.emcss.org>

DesignCon 2021 (August 16-18, 2021, San Jose, CA):

<https://www.designcon.com/>

- Press Update

None.

- Related standards

None. Michael Mirmak said he expected to have an update after the next DASC meeting on May 6th.

SUMMIT PLANNING AND STATUS

- SPI 2021 (May 10-12, 2021 entirely virtual)

Randy Wolff noted that fourth announcement for this summit had recently been sent. The IBIS summit will be held on Wednesday, May 12th, from 4 p.m. to 8 p.m. local time. Bob Ross reported that we have seven presentations planned. There is potentially room for one more.

Randy noted that we will use the Zoom platform since that is what SPI is using. Please register through Lance Wang to get the meeting information and access code. Lance reported that in addition to the presenters we had sixteen attendees registered so far from locations all over the world (Korea, Germany, USA, Norway, Thailand, etc.). He said the virtual event helps people participate from all over the world. Randy said that we will again be recording the virtual summit. Bob noted that SPI itself may only have prerecorded presentations, and he wasn't sure if they would have scheduled timeslots for the talks and live question and answer sessions.

- IEEE EMC+SIPI (July 27-August 13, 2021 virtual)

Randy said we had settled on Thursday, August 12th, morning in the US, 4 p.m. to 8 p.m. in Europe. The summit will be a 4 hour event similar in format to the SPI summit. Zhiping Yang said they were still working on the agenda. Randy said we would eventually formally vote to hold the summit. Bob agreed but noted that there are no costs to host the virtual meeting, other than the Zoom call itself, which Micron is providing.

Zhiping said EMC+SIPI is also organizing an IBIS "Ask the Experts" panel discussion on August 5th. He expects the panel to last about 2 hours, 1:30 to 3:30 EST. Each panelist briefly introduces themselves, then a moderator leads an unstructured question and answer session amongst the panelists and attendees. Bob asked if the panel discussion is only open to people registered for the conference. Zhiping said he wasn't sure, but he noted that for the in-person conferences the panel discussions occur on the exhibit hall floor, and a free exhibition pass is all you need.

- DesignCon 2021 (August 16-18, 2021 planned for in-person)

Randy said he had spoken to Suzanne Deffree of Informa Markets. She said DesignCon will be making more announcements soon. They have had meetings with the San Jose McEnery Convention Center, and it still looks like it will be an in-person event.

Randy said that the Thursday after the event is actually available, and we could do an in-person meeting then if we preferred. The room cost would be covered. However, the audio-visual equipment charges are much more expensive than they were in Santa Clara. Suzanne said to expect about \$9,000. Randy observed that this is a significant cost on top of any food and beverage costs. Randy said the cost of hosting a summit at DesignCon has likely gone up for the long term. Bob said this was significant, and the audio-visual costs alone were close to the usual budget for the entire summit.

Randy said there was still the possibility of holding the summit as a half-day event on Monday. This would overlap with DesignCon itself, but might reduce costs. For meal planning, Randy noted that if you have an all-access pass to DesignCon you'd get lunch on Monday and a welcome breakfast. They will want people to eat in the huge dining hall, but small break food would be okay in a meeting room. Randy thought the labor charges to set up the room might be reduced on Monday as well, relative to Thursday. Randy to check with Informa Markets on the

costs to hold a meeting on Monday [AR].

QUALITY TASK GROUP

Mike LaBonte reported that the group meets on Tuesdays at 9:00 a.m. PT. Note that this new time is one hour later than before. The group continues to plan for the next ibischk release. He said the legal work on the ibischk7.1 parser was going well, and Bob Ross had gotten the contract reviewed and approved by SAE ITC legal. They expect to be ready to get a quote soon.

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 meets on Tuesdays at 12:00 p.m. PT. The group continues to discuss improvements to the AMI flow for redrivers. He said the discussions seem to have finally converged on the new BIRD211.1 being introduced today. The group appears comfortable with this proposal over earlier proposals like BIRD166, BIRD190, BIRD210. Arpad said he expected final editorial wordsmithing of BIRD211.1 in upcoming ATM meetings, and then the group can move on to a PAMn proposal.

Task group material can be found at:

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

INTERCONNECT TASK GROUP

Michael Mirmak reported that the Interconnect task group remains suspended. Its former timeslot is being used by the Editorial task group.

Task group material can be found at:

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

EDITORIAL TASK GROUP

Michael Mirmak reported that the group now meets at 8:00 a.m. PT on Wednesdays. They have integrated all of the approved BIRDs in the latest IBIS 7.1 draft. They are waiting for any other approved BIRDs (e.g., BIRD211.x) to come through, and in the meantime they are trying to make minor clarifications and language tweaks. The hope is to have an IBIS 7.1 ready for approval around mid-year. Arpad Muranyi asked when and how we will decide the cutoff and what BIRDs will be in IBIS 7.1. Randy Wolff said the Open Forum will soon hold a vote on what BIRDs will be included in IBIS 7.1. He said that everyone was waiting for the Redriver flow fix (BIRD211.x).

Task group material can be found at:

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

NEW ADMINISTRATIVE ISSUES

- Annual Election of Officers

Randy Wolff noted that the nomination period will begin on May 17th. He asked people to think about whether they would like to be on the board, nominate someone, etc. He said we will discuss it more at the next meeting. Radek Biernacki said he was willing to serve as the returning officer again.

BIRD211.1: NEW REDRIVER FLOW

Walter Katz introduced and reviewed the new revision BIRD211.1. He said the process of correcting the Redriver flow had been an interesting struggle, which had started in April of 2014 and gone through many iterations. He said he thought the process had finally converged on a solution that makes everyone happy.

Walter reviewed two block diagrams at the start of the Definition of the Issue section of the BIRD. The first shows a block diagram of the entire system simulation. Walter noted that the terms Ch-1 and Ch-2 are now being used instead of upstream and downstream. He said that multiple repeaters could be cascaded. The second block diagram shows the flow of information in the IBIS 7.0 Redriver statistical flow. The problem with it is that the output of Rx1's AMI_Init is convolved with the output of Rx2's AMI_Init. So Rx2's AMI_Init is deprived of the full upstream response and can't optimize properly. Walter said this problem had been recognized many years ago by Redriver model providers. There have been many proposals to fix it over the years.

Walter then reviewed the block diagrams showing three possible flows with the new BIRD. The first flow is the default flow fix for the IBIS 7.0 issue. Everything is the same as the IBIS 7.0 flow, except that the output of Rx1's AMI_Init is convolved with the output of Tx2's AMI_Init, and the result is passed into Rx2's AMI_Init.

The second flow supports a class of problems where the Tx2's AMI_Init would like to have the cumulative response of everything upstream as well, not just the response of its direct downstream channel. This is what an electrical channel simulation would need so that the Tx2 would have all the information needed to optimize at the Rx2 location.

The third flow supports a class of problems where the Tx2's AMI_Init would like to have the cumulative response of everything upstream, and the direct downstream channel's response, but as separate columns in the impulse matrix. This is a useful scenario for optical channels, and the tool would have to add an additional column to the impulse_matrix.

A new Reserved Parameter, Tx_Impulse_Input specifies the contents of the impulse_matrix and which of the three flows is used. Its proposed values are:

"IBIS7.0" – specifies the corrected legacy flow (first flow). This is the default if the parameter

does not exist.

“Combined” – specifies the second flow. The cumulative upstream and direct downstream responses are convolved, and the result is passed into Tx2’s AMI_Init.

“Separate” – specifies the third flow. The EDA tool provides the Ch-2 response as a separate column in the impulse_matrix passed into Tx2’s AMI_Init.

“DoNotCare” – Walter said this actually applies to most existing Tx models. They are typically LTI, and may have FFE, and don’t optimize. In this case the response passed to the Tx’s Init doesn’t matter, as long as the EDA tool keeps track of everything.

Walter said the new proposal preserves the existing (corrected) flow for all models. Unless your Tx model is in one of the special cases (e.g., optical channel simulation) you don’t need the new parameter at all.

Walter also said that it is difficult to maintain the existing flow descriptions, even for the single channel non-repeater flows. He said he had rewritten those to combine the statistical and time-domain flows into one. The first 3 steps apply to both statistical and time-domain, then statistical stops after step 4. Time domain may use step 4, or it may proceed from step 3 directly to step 5 and continue. Walter noted that the Redriver and Retimer flows had also been rewritten, with some steps broken out into multiple cases depending on the value of Tx_Impulse_Input.

Arpad Muranyi said he hoped the proposal could be reviewed in more detail in the upcoming ATM meeting to make sure the wording is all cleaned up. He said ATM agreed with the flow. Radek Biernacki said there might still be discussion about whether the second flow is needed. Arpad and Walter said existing models that don’t need two separate inputs but would like the combined response would have to be rewritten if we didn’t have the second flow.

Arpad asked if this BIRD was the last one holding up IBIS 7.1. He and Walter suggested we could attempt to fast track the vote. Walter moved to schedule a vote on the BIRD at the May 14, 2021 IBIS Open Forum teleconference. Arpad seconded. There were no objections. Randy to send an email to the Open Forum announcing the vote [AR].

Bob Ross noted that it may well be a BIRD211.2 that is submitted for the vote, but this is fine if it’s submitted two weeks prior to the next meeting. He said it’s important that we get this right. Walter agreed that the vote could be cancelled if the next ATM meeting’s review found non-trivial changes were required.

BIRD212: CLARIFICATION OF PAM4_UPPERTHRESHOLD, PAM4_CENTERTHRESHOLD, PAM4_LOWERTHRESHOLD

Hansel Dsilva introduced the BIRD. He said that with the introduction of the DC_Offset parameter (BIRD197.7), there was the potential for confusion as to when PAM4 thresholds are applied. The proposed change is to add the qualifier “zero voltage-centered” to describe the signal against which the thresholds are compared.

Usage Rules: The EDA tool uses these voltages in conjunction with Rx clock information to detect which of the four PAM4 symbols a waveform represents when the zero voltage-centered signal is sampled:

Walter Katz said this possible confusion was an issue now that PAM4 is being used for single-ended technologies. Arpad Muranyi and Randy Wolff agreed and said this is just a clarification of the wording, not a technical change.

Bob Ross moved to schedule a vote on the BIRD at the May 14, 2021 IBIS Open Forum teleconference. Arpad seconded. There were no objections. Randy to send an email to the Open Forum announcing the vote [AR].

BIRD210: NEW REDRIVER AMI FLOW

Randy Wolff said this BIRD is expected to be replaced by the compromise BIRD211.1, and this one will likely be rejected eventually. Arpad Muranyi said he thought Fangyi Rao had been okay with BIRD211.1 at the ATM meetings. Bob Ross moved to table BIRD210. Arpad seconded. There were no objections.

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 AND TSCHK PARSER AND BUG STATUS

Bob Ross reported that the draft contract for ibischk7.1 has approximately 47 pages of technical content. He said SAE ITC legal had said they had minor updates, but they had added 7 new terms to it (terms 19 through 25). He said the Quality task group had to review them, and that SAE ITC legal had made some editorial comments with which the task group might not agree. Bob said the contract is nearly ready to go, and BIRD211.x would have a minor effect since it only introduces one new Reserved Parameter. Bob said the intent is to try and get the parser development started before IBIS 7.1 is ratified.

-ibischk

Bob introduced a new BUG216 that had been submitted. The BUG asks whether the parser should worry about integral and floating point values being mixed in the same List of Type UI values. Bob said he wasn't aware of any commercial tools that cared about the difference between integral and float values specified in Type Float or UI. Bob said the definition of the Type Float in the specification allowed for the decimal point to be optional.

Radek Biernacki said the Type is UI, so you should expect floats. Mike LaBonte agreed, but he said the confusion occurs because the definition of Type UI says it can contain float or integer values. Bob said our definition of Float allows integral values anyway. Mike said if we don't make the distinction in the definition of UI we avoid the issue. Radek said the difference between Type UI and Type Float is simply a question of scaling.

Bob moved to classify BUG216 as annoying, low priority, not a bug. He noted that some clarifying text could be added to the specification. Curtis Clark seconded. There were no objections. Bob to update the status of BUG216 [AR]. Randy Wolff said the Quality task group could look at clarifying text in the specification.

NEW TECHNICAL ISSUES

- None.

NEXT MEETING

The next IBIS Open Forum teleconference meeting will be held on May 14, 2021. The following teleconference meeting is tentatively scheduled for June 4, 2021.

The virtual IBIS Summit at the virtual SPI 2021 will be held on May 12, 2021.

Mike LaBonte moved to adjourn. Curtis Clark seconded the motion. The meeting adjourned.

=====

NOTES

IBIS CHAIR: Randy Wolff (208) 363-1764

rwolff@micron.com

Principal Engineer, Silicon SI Group, Micron Technology, Inc.

8000 S. Federal Way

P.O. Box 6, Mail Stop: 01-720

Boise, ID 83707-0006

VICE CHAIR: Lance Wang (978) 633-3388

lance.wang@ibis.org

Solutions Architect, Zuken USA

238 Littleton Road, Suite 100

Westford, MA 01886

SECRETARY: Curtis Clark

curtis.clark@ansys.com

ANSYS, Inc.

150 Baker Ave Ext

Concord, MA 01742

TREASURER: Bob Ross (503) 246-8048

bob@teraspeedlabs.com

Engineer, Teraspeed Labs
10238 SW Lancaster Road
Portland, OR 97219

LIBRARIAN: Zhiping Yang (650) 214-0868

zhipingyang@google.com

Sr. Hardware Manager, Google LLC
1600 Amphitheatre Parkway
Mountain View, CA 94043

WEBMASTER: Steven Parker (845) 372-3294

sparker@marvell.com

Senior Staff Engineer, DSP, Marvell
2070 Route 52
Hopewell Junction, NY 12533-3507

POSTMASTER: Mike LaBonte

mlabonte@sisoft.com

IBIS-AMI Modeling Specialist, SiSoft
1 Lakeside Campus Drive
Natick, MA 01760

This meeting was conducted in accordance with SAE ITC guidelines.

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>

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/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 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	February	March 12,	April 02,	April 23,
			19, 2021	2021	2021	2021
ANSYS	User	Active	X	X	X	X
Applied Simulation Technology	User	Inactive	-	-	-	-
Broadcom Ltd.	Producer	Inactive	-	-	-	-
Cadence Design Systems	User	Active	X	X	-	X
Cisco Systems	User	Inactive	-	-	-	-
Dassault Systemes	User	Inactive	-	-	-	-
Ericsson	Producer	Inactive	-	-	-	-
Google	User	Active	X	X	X	X
Huawei Technologies	Producer	Inactive	-	-	-	-
Infineon Technologies AG	Producer	Inactive	-	-	-	-
Instituto de Telecomunicações	User	Inactive	-	-	-	-
IBM	Producer	Inactive	-	-	-	-
Intel Corp.	Producer	Active	X	X	X	X
Keysight Technologies	User	Active	X	X	X	X
Marvell	Producer	Inactive	X	-	-	-
Maxim Integrated	Producer	Active	-	-	X	X
Micron Technology	Producer	Active	X	X	X	X
MST EMC Lab	User	Inactive	-	-	-	-
NXP	Producer	Inactive	-	-	-	-
SerDesDesign.com	User	Inactive	-	-	-	-
Siemens EDA (Mentor)	User	Active	X	X	X	X
SiSoft	User	Active	X	X	X	X
Synopsys	User	Active	X	X	X	X
Teraspeed Labs	General Interest	Active	X	X	X	X
Xilinx	Producer	Inactive	-	-	-	-
ZTE Corp.	User	Inactive	-	-	-	-
Zuken	User	Active	X	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.