



IBIS Open Forum Minutes

Meeting Date: **May 10, 2024**

Meeting Location: **Teleconference**

VOTING MEMBERS AND 2024 PARTICIPANTS

Altair	(JuneSang Lee)
AMD (Xilinx)	(Bassam Mansour)
Analog Devices	Jermaine Lim-Abroguena
Ansys	Curtis Clark*
Ansys Japan	Satoshi Endo
Applied Simulation Technology	(Fred Balistreri)
Aurora System	(Dian Yang), Raj Raghuram
Broadcom	(Yunong Gan)
Cadence Design Systems	Kyle Lake, Ambrish Varma, Jared James, John Phillips, Kristoffer Skytte
Celestica	(Sophia Feng)
Cisco Systems	(Stephen Searce), Hong-Man Wu
Dassault Systemes	(Stefan Paret)
GE Healthcare Technologies	(Balaji Sankarshanan)
Google	(Hanfeng Wang)
Huawei Technologies	(Hang (Paul) Yan)
Infineon Technologies AG	(Christian Sporrer)
Instituto de Telecomunicações	(Abdelgader Abdalla)
Intel Corporation	Michael Mirmak*, Hsinho Wu*, Kinger Cai, Chi-te Chen
Keysight Technologies	Pegah Alavi, Ming Yan, David Banas, Fangyi Rao, HeeSoo Lee, Heidi Barnes
Marvell	Steven Parker*
MathWorks	Graham Kus*, Walter Katz*
Micron Technology	Justin Butterfield
MST EMC Lab	Chulsoon Hwang*, Zhiping Yang*
Siemens EDA	Weston Beal*, Arpad Muranyi*, Randy Wolff*, Matt Leslie, Scott Wedge, Todd Westerhoff, Zhichao Deng
STMicroelectronics	Anil-Kumar Dwivedi, Bhupendra Singh, Harsh Saini, Hemant Kumar Gangwar, Manda Padma Sindhuja, Manish Bansal, Nitin Kumar, Olivier Bayet, Pawan Verma, Pranav Singh, Rahul Kumar, Raushan Kumar, Shivam Soni, Gaurav Goel
Synopsys	Ted Mido*, (Andy Tai)
Teraspeed Labs	(Tom Dagastino), [Bob Ross]
Waymo	(Feng Wang), [Ji Zhang]
ZTE Corporation	(Zhongmin Wei), (Shunlin Zhu)
Zuken	(Ralf Brüning)
Zuken USA	Lance Wang*

OTHER PARTICIPANTS IN 2024

Alphawave Semi	Adrien Auge, Todd Bermensolo
Applied Logix	Dan Chirpich
Ciena	Hugues Tournier
KEI Systems	Shinichi Maeda
KT Smart Future-Creations	Keita Miyasato
Meta	Ashkan Hashemi
Northrop Grumman Corp.	Will McCaffrey
SAE ITC	Tammy Patton
SI-Clarity	Doug Burns
Signal Edge Solutions	Benjamin Dannan
Si-Guys	Donald Telian
Socionext America	Futoshi Terasawa
Teraspeed Labs	[Bob Ross]
Toyobo Co.	Saki Kawano
University of Illinois Urbana-Champaign	Jose Schutt-Aine

In the list above, attendees present at the meeting are indicated by “*.” Those submitting an email ballot for their member organization for a scheduled vote 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

Roll Call: Graham Kus announced a total of 8 organization members attending with quorum met. Lance Wang announced that at the halfway point of this meeting Randy Wolff would be taking over facilitating the topics.

CALL FOR PATENTS

Lance Wang called for declaration of any patents or pending patents related to the IBIS, IBIS-ISS, ICM, or Touchstone 2.0 specifications.

None were announced.

REVIEW OF MINUTES AND ARs

- April 19, 2024 Minutes
 - o Randy Wolff motioned to accept the minutes, Curtis Clark seconded. There were no objections, the motion passed.
- Lance Wang to reconfirm a model review committee [AR]
 - o Lance sent out an email related model review committee and stated, recently we received a review request about Power PDN models and review. This still seems to be a working issue at present. Lance will give a report when data is available.
- Randy stated other ARs are completed from previous minutes.

ANNOUNCEMENTS, CALL FOR ADDITIONAL AGENDA ITEMS

Lance Wang called for any new announcements.

Graham Kus suggested that moving forward, that at least 1 designated Officer or Representative be provided travel to each IBIS Summit- even though it may require a nominal increase in Dues. This is in light of both industry trends towards more restrictive travel, as well as our own IBIS Open Forum budgetary planning purposes. Also, peer organizations such as OIF, IEEE, and JEDEC hold hybrid Summit-style meetings, requiring Officer attendance in-person, and those Dues are much higher than IBIS. Randy Wolff expressed agreement to the principle of providing travel for a designated IBIS Officer and observed it does seem to be an industry trend and that budgeting may become more detailed moving forward.

MEMBERSHIP STATUS AND TREASURER'S REPORT

Randy Wolff reported that we have 1 more member renewal completed for a total of 22. 4 payments are in progress. 3 current members do not plan to renew for 2024.

We still have 29 members with a quorum of 8. Memberships will expire Monday, June 3 if payment is not received by then.

The SAE ITC 2023 assessment has not been reported yet. A payment to Graham Kus for DesignCon expenses has been made. A 2,000 Euro payment for SPI IBIS Summit is approved by SAE ITC and payment is in progress. A payment to Randy Wolff to reimburse for flowers for the Ross family is completed. A payment to Steve Parker for website expenses is in progress.

\$9,318 Balance for 2024

\$17,868 Adjusted Balance for 2024 (adding the 2024 IBIS membership renewals received in 2023, indicated by "(7)")

WEBSITE ADMINISTRATION

Steven Parker reported on Python Anywhere services. Randy Wolff asked what next plan was for Python Service. Steven reported the IBIS Open Forum Minutes would be the next target, involving migration of some 20 years of Minutes, which go back to mid-1990's - it is a goal they

be preserved. In the meantime, plan is to roll out for the various Task Groups, such as Quality and Editorial, and then this way the Chairs can keep them up for to be more current. After that, it could be deployed for Open Forum Minutes for the next meeting.

Lance Wang asked for any questions. None were asked.

Link: <https://ibis.org/>

MAILING LIST

Curtis Clark reported most activity has been people changing organizations but maintaining subscription. Some bounces to be still cleaned up. Otherwise, things are going smoothly.

Lance Wang asked for any questions. None were asked.

LIBRARY UPDATE

Lance Wang reported for Zhiping Wang there were no updates.

Lance asked if there were any problems or issues with IBIS model library.

None were reported.

INTERNATIONAL/EXTERNAL ACTIVITIES

IEC 63055/IEEE 2401, JEITA "LPB:"

- Michael Mirmak was not yet present. No updates were reported.

Press Updates:

- Randy Wolff reported that Janet O'Neil puts together IEEE EMC Society magazine and asked for small description of the IBIS Summit and agenda at the IEEE EMC-SIPI event in August 2024. We sent her some details in this regard.
- Lance Wang asked for any other updates. None were reported.

Related Standards:

- No updates were reported.

University Relations

- Chulsoon Hwang reported that can be introducing IBIS in the coursework at MST. Many things are being cleared to facilitate this. He stated being aware of the classes developed by Arpad Muranyi, but syllabus topics may need to be tailored for the MST environment. Chulsoon stated will be working with Zhiping Yang on this effort. Graham Kus offered editorial support if needed.

SUMMIT PLANNING AND REVIEW

Hybrid European IBIS Summit at SPI 2024

Location:

- SPI 2024: May 12-15, 2024, Lisbon, Portugal.
- IBIS Summit: May 15, 14:00-18:00 (09:00-13:00 US Eastern Time).
- The plan of record is to hold the IBIS Summit Wednesday afternoon, after SPI closes.
- **Anyone that wishes the link for the US can email Randy Wolff to get the Microsoft Teams Meeting Link for remote access.**

IBIS Summit Sponsors:

- SPI 2024
- Zuken

Notes:

- Lance Wang reported that Randy Wolff will be doing the setup for online. 29 People are scheduled to attend. Also, many registered to attend remotely from ST Microelectronics, Analog Devices, and from various locations such as India and the Philippines.
- Some presentations are still to be yet received.
- Estimate 9 total presentations.

More information is available at the following link:

<https://spi2024.av.it.pt/ibis-summit/>

IEEE EMC+SIPI 2024 IBIS Summit

Location:

- August 5-9, 2024 in Phoenix, AZ.

Notes:

- Estimate approximately half-day Summit, similar count of 7-10 presentations.
- Presentation proposals are welcome.
- A room and refreshments are planned to be provided for IBIS Summit attendees.
- Details regarding logistics for date and time to follow and expected by next meeting.

IBIS Summit Sponsors:

- Sponsors to be announced.

More information is available at the following link:

<https://www.emc2024.org/>

QUALITY TASK GROUP

Randy Wolff reported as acting Chair of this group. He reported there was 1 meeting this week, attendees finished updates to Touchstone Parser to wrap up that project. Also getting MAC/Apple executables created for Touchstone 2.1.0. Otherwise not much active discussion. Randy noted that meetings are cancelled next week, so the next upcoming meeting would be Tuesday May 21st, 2024.

The Quality Task Group meets every Tues Morning at 9am Pacific.

Note: The Quality Task Group checklist and other documentation can be found at:

https://ibis.org/quality_wip/

ADVANCED TECHNOLOGY MODELING TASK GROUP

Arpad Muranyi reported that the group has been cancelling meetings recently due light workload and low attendance. The Meeting time is normally Tuesday Pacific. The previous few meetings were to discuss Michael Mirmak's proposals. This includes the addition to Clock_Pins keyword and the proposal is to make some additions to that keyword.

Lance Wang asked if there were questions. None were asked.

Note: Task group material can be found at:

https://ibis.org/macromodel_wip/

INTERCONNECT TASK GROUP

Arpad Muranyi reported on behalf of Michael Mirmak, that TSIRD7.1 (Pole-Residue proposal) was prepared and submitted to the IBIS Open Forum. Arpad stated that a request was made by one of Lance Wang's colleague at Zuken to show the Residue_at_infinity sub parameter in an equation. The original equation was replaced with a new equation which includes this sub parameter as well as the "Asymptote" sub parameter. The name of the Residue_at_infinity sub parameter was changed to Constant_at_infinity. Several additional editorial changes were made to make the terminology more consistent. These changes, however, are not technical only editorial. Arpad requested a careful review from the experts to ensure that this proposal would become useful for the industry. The IBIS Open Forum may be voting on it soon..

Arpad reported that another subject is Port Mapping with 2 proposals. One proposal is from Walter Katz and the other is from Arpad. The format has to be discussed, as to which format is preferred.

Lance Wang asked for questions. None were asked.

EDITORIAL TASK GROUP

Michael Mirmak was yet not present. There were no updates reported.

Note: Task group material can be found at:

https://ibis.org/editorial_wip/

NEW ADMINISTRATIVE ISSUES

Lance Wang started the discussion about the upcoming IBIS Officer election process and that Arpad Muranyi would act as Returning Officer. Arpad stated he is prepared to send emails regarding nominations, and the plan is to have those by end of May 2024, with voting by mid-June 2024. Lance thanked Arpad for being the Returning Officer. Randy Wolff stated he would keep track of the member renewals in the meantime.

ROLL CALL

Lance Wang stated he would be leaving the meeting at this point with Randy Wolff facilitating.

Mid-meeting roll call: Graham Kus reported 7 attendees due to Zuken dropping off the call, however Lance Wang cast a vote ahead of time regarding TSIRD8 as Yes. A quorum was met regarding this vote.

TECHNICAL DISCUSSION

No new items.

***IRDS ELIGIBLE FOR VOTE**

TSIRD7.1: Standardized Pole-Residue Representation of Touchstone Data

Arpad Muranyi said that he will give a presentation on TSIRD7.1 in the upcoming IBIS Summit remotely. Please reference TSIRD7.1 for details. Arpad reported on behalf of Michael Mirmak, that it was discovered that the IEEE 370 specification includes Poles and Residues. TSIRD 7.1 and IEEE 370 are almost identical, but IEEE 370 doesn't seem to cover Y and Z parameters. Since the variable G at the end of the equation in TSIRD 7.1, representing Asymptote, can only exist with Y and Z parameters, it is not included in IEEE 370. While the IEEE notation is slightly different, e.g., they use angular frequency and star-notation for complex conjugates, the equations appear to be equivalent.

Arpad stated the rules and requirements are the same - e.g., having poles only in the left-hand side guarantees stability. One difference seems to be that TSIRD 7.1 prohibits duplicate poles (unless they are offset by a small amount), which doesn't seem to be mentioned in IEEE 370.

Link: <https://app.ibis.org/tsirds/>

BIRD230.1: Adding a Definitions Section to IBIS

Michael Mirmak (who had joined the meeting) reported, it has been discussed that one of the issues was creating a new chapter and instead has made it a subsection of Chapter 3, to avoid significant re-ordering of the entire document. And it will be Section 3.3. The technical content has not changed.

Walter Katz motioned to schedule a vote in next IBIS Open Forum meeting. Weston Beal seconded. There were no objections. The motion passed. Randy Wolff took an action to inform Lance Wang to place on Vote Calendar [AR].

Link: <https://ibis.org/birds/>

BIRD231: Clarifications on AMI Block Concepts

Randy Wolff asked if there were comments. Michael Mirmak stated there had been no comments received. Michael motioned to schedule a vote. Arpad Muranyi seconded. No objections were made. The motion passed. Randy took an action to inform Lance Wang to place on Vote Calendar [AR].

Link: <https://ibis.org/birds/>

NEW AND REVISED *IRDS

No new updates reported.

***IRDS SCHEDULED FOR VOTE**

TSIRD8:

Randy Wolff summarized the TSIRD8 contents per its link on the IBIS website. Arpad Muranyi stated we had no comments received. He stated as a summary, the goal is to make it possible to write everything that is currently on the option line with keywords instead if this is approved. Randy asked for any other comments. None were made.

Walter Katz motioned to vote on this TSIRD. Arpad Muranyi seconded. There were no objections. The motion passed. A roll call Vote was held.

Randy stated Can vote Yes, No, Abstain.

Ansys – Yes

Intel – Yes

Marvell – Yes

MathWorks – Yes

MST – Yes

Siemens EDA – Yes

Synopsys – Yes

Zuken – Yes

Graham Kus reported the ballot results as: 9 Yes votes, 0 No votes, 0 abstains.

Randy Wolf announced that the TSIRD8 ballot vote passed. Randy took an action to notify Lance Wang [AR].

TABLED *IRDS

BIRD220: Pre-driver PSIJ Sensitivity keyword

Randy Wolff invited Chulsoon Wang for a quick discussion on this topic. Randy suggested for example, it may need to re-brought into ATM Task Group, as there were some technical questions that arose while EDA companies revisited the BIRD. The issue is that there can be if there is more than 10% variation, instability occurs. Once we have a solution, we can bring to the ATM group and discuss there again. Randy suggested any slides could be helpful in devoting time in ATM for feedback. Chulsoon suggested it could be in June 2024 when this topic returns to the ATM Task Group. Randy suggested reaching out to Arpad Muranyi when ready to put it on the ATM agenda.

Randy asked for any more comments. None were reported.

Link: <https://ibis.org/birds/bird220.docx>

IBISCHK AND TSCHK PARSER AND BUG STATUS

No new bugs reported.

NEW TECHNICAL ISSUES

IBIS 8.0

Randy Wolff reported having some discussion of next version of IBIS. Randy noted that Michael Mirmak prepared a slide summarizing BIRDs for IBIS7.3 vs. IBIS8.0, and suggested these could be used to support fielded comments about whether to cut off technical development to move to new version.

Michael Mirmak shared slides regarding IBIS version vs. BIRDs count. Michael stated a key question was when to switch over to a new IBIS version. He stated there was no goal to have any motions made today, but to seed the ground with data to support discussion for when the next version of IBIS should occur. The issue mostly has to do with Parser Development which contingent on major IBIS versions, and then Licensee fees coming in to fund that effort. Michael showed slides where the next proposal would be a motion for IBIS8.0 and which BIRDs would be included in that new version. Some 2 of the BIRDs are significant, both in size and keywords that would have to be supported in the Parser. The 4 listed in the main slide grey box have not been approved (which were 220, 230.1, 231). He said again, there are no motions today, but want to provide data to get people discussing whether these should be IBIS8.0 or IBIS7.3.

Randy reported there were some discussions in ATM Task Group, and in general it was agreed to move to IBIS8.0 and in fact could have skipped IBIS7.2 as those BIRDs were significant changes. He said at this point it seems appropriate to move to IBIS8.0 given our rules for technical content and sub versions. The Parser Development was the issue at the time, but going to version 8.0 means that new IBIS Parser can be licensed when completed.

Walter Katz agreed it should be major version IBIS8.0, and the issue he suggested to consider would be to determine which of the 4 BIRDs would be included. Or perhaps include some of the other BIRDs (approved BIRDs: 223.1, 224, 225, 226, 227, 228 and 229.1).

Weston Beal reported that some of these BIRDs do not change the Parser.

Walter reported that BIRD220 still has some open issues, and should be prepared- but if not ready in time, then except for BIRD220, the remainder of the BIRDs could move into IBIS8.0.

Michael asked if we should keep BIRD220 open for any issues closed for BIRD220.1? Nothing should stop us from version IBIS8.0, and could roll it in at that point. Arpad Muranyi suggested the rate we are going it may not be expected to be done quickly. Randy suggested we are ready to move forward and not include BIRD220. But if something happens in the timeframe while still in Editorial then version IBIS8.0 it could be included at that point during the window.

Link: <https://www.ibis.org>

Touchstone 3.0

Michael Mirmak reported that there was no way to determine in Touchstone files whether they describe a passive interconnect or an active device or a mixture of both. Also, there was no indication about arrangement of ports. For example, should the relationship between Port 1 and Port 2 should it be Insertion Loss? Michael stated that for some time, EDA industry has been demanding information in the file that is machine-readable, what the expectation should be, and what relationship between components should be, interconnect or device or something else.

Michael reported that The two proposals from Interconnect Task Group, are identified in HL and Y. They are remarkably similar examples in some aspects, some features are supported or included, simply identifying are these interconnect or not, what the relationship of Ports should be. In essence:

HL Proposal by Arpad Muranyi:

- Transistor Example
- Simple S4P Example

Y Proposal by Walter Katz:

- Transistor Example
- Simple Package Example (sNp / Interconnect)

Other Proposal Topics:

- C-Comp Model
- EMD files
- Other Interconnects working with Existing IBIS Functions and Keywords

Michael stated, the reason to bring up during an IBIS Summit is to discuss the priorities. Does the Industry want to see the types of Hooks to integrate Touchstone into EMD models and C_COMP and other metrics? Do we want to have schematic test probe documentation up to including Swathing? Michael stated the goal was to get updates from IBIS participants about details they are looking to find available. What has to be included? Or does a wrapper file be acceptable (which Michael noted, has been a background proposal for years). Some IEEE 2401 LPB, etc. And IEEE 370, and JEDEC JEP-30, etc.

Arpad suggested it was more of a general question about syntax. Michael expressed no objection, but wanted to ask if there was anything missing from the proposal or requirements. Arpad stated it is true that there is not everything in this list, but agrees some items on the Y list are important. He expressed that the syntax of his proposal could be extended to support the same list. Walter suggested re-ordering slides to accommodate. It was agreed that syntax can be extended.

Note: Please refer to the link for details.

Link: https://www.ibis.org/interconnect_wip/

NEXT MEETING AGENDA AND SCHEDULING

Randy Wolff stated the next IBIS Open Forum meeting would be held as a teleconference meeting on May 31, 2024. The following meeting would be held June 21, 2024.

Graham Kus motioned to adjourn. Arpad Muranyi seconded the motion. The meeting adjourned.

NOTES

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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 or unsubscribe from the official ibis@freelists.org and/or ibis-users@freelists.org email lists (formerly ibis@eda.org and ibis-users@eda.org):
 - <https://www.freelists.org/list/ibis>
 - <https://www.freelists.org/list/ibis-users>
- To subscribe to or unsubscribe from one of the Task Group email lists: ibis-macro@freelists.org, ibis-interconn@freelists.org, ibis-editorial@freelists.org, or ibis-quality@freelists.org:
 - <https://www.freelists.org/list/ibis-macro>
 - <https://www.freelists.org/list/ibis-interconn>
 - <https://www.freelists.org/list/ibis-editorial>
 - <https://www.freelists.org/list/ibis-quality>
- 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: ibischk7, tschk2, icmchk1, s2IBIS, s2IBIS2 and s2iplt.

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

<https://ibis.org/bugs/ibischk/>
<https://ibis.org/bugs/ibischk/bugform.txt>

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

<https://ibis.org/bugs/tschk/>
<https://ibis.org/bugs/tschk/bugform.txt>

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

<https://ibis.org/bugs/icmchk/>
https://ibis.org/bugs/icmchk/icm_bugform.txt

To report s2IBIS, s2IBIS2 and s2iplt bugs, use the Bug Report Forms which reside at:

<https://ibis.org/bugs/s2IBIS/bugs2i.txt>
<https://ibis.org/bugs/s2IBIS2/bugs2i2.txt>
<https://ibis.org/bugs/s2iplt/bugsplt.txt>

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

<https://ibis.org/>

Check the IBIS file directory on IBIS.org for more information on previous discussions and results:

<https://ibis.org/directory.html>

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

SAE STANDARDS BALLOT VOTING STATUS (attendee X; absent -)

Organization	Interest Category	Standards Ballot Voting Status	Mar 8, 2024	Mar 29, 2024	Apr 19, 2024	May 10, 2024
Altair	User	Inactive	-	-	-	-
AMD (Xilinx)	Producer	Inactive	-	-	-	-
Analog Devices	Producer	Inactive	-	-	-	-
Ansys	User	Active	X	-	-	X
Applied Simulation Technology	User	Inactive	-	-	-	-
Aurora System	User	Inactive	-	-	-	-
Broadcom Ltd.	Producer	Inactive	-	-	-	-
Cadence Design Systems	User	Inactive	X	X	X	-
Celestica	User	Inactive	-	-	-	-
Cisco Systems	User	Inactive	-	-	-	-
Dassault Systems	User	Inactive	-	-	-	-
GE Healthcare Technologies	User	Inactive	-	-	-	-
Google	User	Inactive	-	-	-	-
Huawei Technologies	Producer	Inactive	-	-	-	-
Infineon Technologies AG	Producer	Inactive	-	-	-	-
Instituto de Telecomunicações	User	Inactive	-	-	-	-
Intel Corp.	Producer	Active	X	X	X	X
Keysight Technologies	User	Inactive	-	-	-	-
Marvell	Producer	Active	X	-	X	X
MathWorks	User	Active	X	X	X	X
Micron Technology	Producer	Inactive	-	-	-	-
MST EMC Lab	User	Active	X	X	-	X
Siemens EDA	User	Active	X	X	X	X
STMicroelectronics	Producer	Inactive	-	-	-	-
Synopsys	User	Active	X	X	X	X
Teraspeed Labs	General Interest	Inactive	-	-	-	-
Waymo	User	Inactive	-	-	-	-
ZTE Corp.	User	Inactive	-	-	-	-
Zuken	User	Active	X	X	-	X

= Temporarily not a voting member

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 (voting by email counts as attendance)

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.