



IBIS Summit at IEEE-SPI Europe Minutes

Meeting Date: **May 10, 2023**

Meeting Location: **27th IEEE Workshop on Signal and Power Integrity, Hosted by the Telecommunications Institute and University of Aveiro, Aveiro, Portugal - Hybrid Live / Teleconference**

VOTING MEMBERS AND 2023 PARTICIPANTS

| | |
|-----------------------------------|--|
| Altair | (JuneSang Lee) |
| AMD (Xilinx) | (Bassam Mansour) |
| Analog Devices (Maxim Integrated) | (Don Greer) |
| Ansys | Curtis Clark, Wei-hsing Huang |
| Applied Simulation Technology | (Fred Balistreri) |
| Aurora System | Dian Yang, Raj Raghuram |
| Broadcom | (Yunong Gan) |
| Cadence Design Systems | Kyle Lake, Jared James, John Philips, Kristoffer Skytte |
| Celestica | (Sophia Feng) |
| Cisco Systems | (Stephen Searce), Hong Wu |
| Dassault Systemes | Stefan Paret, BAI Longfei* |
| GE Healthcare Technologies | (Balaji Sankarshanan) |
| Google | (Hanfeng Wang) |
| Honeywell | Bavish Vazhayil |
| Huawei Technologies | Danilo Di Febo*, Marco De Stefano*, (Hang (Paul) Yan) |
| Infineon Technologies AG | (Christian Sporrer) |
| Instituto de Telecomunicações | (Abdelgader Abdalla), Joana Catarina Mendes* |
| Intel Corporation | Chi-te Chen, Kingler Cai, Michael Mirmak*, Hsinho Wu |
| Keysight Technologies | Ming Yan, Douglas Burns, Fangyi Rao, Pegah Alavi, Hee-Soo Lee, Heidi Barnes |
| Marvell | Steven Parker |
| MathWorks | Graham Kus*, Walter Katz, Kerry Schotz |
| Micron Technology | [Randy Wolff], Justin Butterfield, Akshay Shivaji Chaudhari, Dragos Dimitriu |
| MST EMC Lab | (Chulsoon Hwang), Zhiping Yang, |
| SerDesDesign.com | John Baprawski |
| Siemens EDA | Arpad Muranyi*, Weston Beal*, Matthew Leslie, Mikael Stahlberg, Todd Westerhoff, Scott Wedge, Randy Wolff* |
| STMicroelectronics | Olivier Bayet*, Rahul Kumar*, Raushan Kumar*, Manish-FTM Bansal*, Sameer Vashishtha* |
| Synopsys | Ted Mido, (Tushar Pandey), Wael Dghais* |
| Teraspeed Labs | Bob Ross* |
| Waymo | [Zhiping Yang], (Ji Zhang) |
| ZTE Corporation | (Shunlin Zhu) |
| Zuken | Michael Schäder*, Markus Bücken*, Ralf Brüning* |
| Zuken USA | Lance Wang* |

OTHER PARTICIPANTS IN 2023

| | |
|--|--|
| Alphawave Semi | Adrien Auge, Todd Bermensolo |
| Ciena | Hugues Tournier |
| Hitachi Ltd. | Yutaka Uematsu* |
| Honeywell | Bavish Vazhayil |
| India Institute of Technology | Jai Narayan Tripathi*, Vinod Verma* |
| Nokia | Ramiro Guzman |
| OMNIVISION | Sirius Tsang |
| Signal Edge Solutions | Ben Dannan |
| SI Guys | Donald Telian |
| Socionext, Inc. | Raymond Yakura |
| University of Illinois Urbana-Champaign | Jose Schutt-Aine* |
| University of Tunisia, Electronic Laboratory | Malek Souilem* |
| Unaffiliated | Will Hobbs, Mike LaBonte, Jon Powell, Stephen Peters |

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.

WELCOME

Randy Wolff, (Siemens EDA, USA)

Chair, IBIS Open Forum

Note: this summit has been recorded and these minutes contain recording timestamp indices, where the recording itself is available at the following link:
https://ibis.org/summits/may23/summit_recording.mp4

Randy Wolff introduced himself as the Chair of the IBIS Open Forum based out of Boise ID USA, representing Siemens EDA. Randy declared the start of the IBIS Summit meeting after the conclusion of the IEEE SPI 2023 27th IEEE Workshop on Signal and Power Integrity, Aveiro, Portugal on May 7-10, 2023. He suggested that the conference was very instructive and expressed thanks to the IEEE along with the SPI workshop for support and helping to organize a meeting room and catering. He also expressed thanks to the Telecommunications Institute and the University of Aveiro, along with IBIS Summit Sponsors, Siemens and Zuken, for their generous support with sponsoring the meeting facility, technical aspects, and refreshments for attendees of the IBIS Summit.

Randy outlined that the meeting would begin with the Chair's Report along with presentations for the remainder of the afternoon, along with a break at 4pm local time with a planned conclusion at 6pm local time. Randy demonstrated the IBIS Website (www.ibis.org) and outlined the utilities available there.

IBIS CHAIR'S REPORT

Randy Wolff, (Siemens EDA, USA)

Chair, IBIS Open Forum

Randy reported IBIS Open Forum membership as 30 member organizations and expressed this as fairly representative of the median amount of members for the previous years. Membership begins in January with until end of May to renew to remain current. The IBIS Open Forum provides a number of different types of membership: an Organization Membership, an Academic Institution Membership (half dues, \$450, vs. Industrial full dues of \$900 annually), so that students have access to task groups and contributing to technical work groups. This includes voting and access to regular updates to the IBIS specification which occurs every 1 to 2 years. The Officers serve terms which run May to June or June to May every year, and there are upcoming nominations May 17th, 2023. Any position is open across the globe, including access capabilities with hybrid attendance across time zones. Randy introduced the online-attending Officers as an example of the Hybrid-meeting attendance model.

Randy introduced the task groups – Quality Task Group, Advanced Technology Task Group, Interconnect Task Group, and Editorial Task Group.

Randy outlined each role of each Officer, and how they present or impalement working updates to the IBIS specification in the venue of the IBIS Open Forum meetings, where BIRDS are proposed for consideration or discussion, and then votes are held by live or email ballot.

Randy outlined the IBIS Summit Schedule for US, Europe, China, and Japan which are typically each held annually at different points of the calendar year, providing an IBIS Summit schedule that is every few months.

Randy introduced a point of order, that SAE ITC represents the parent body of IBIS Open Forum, and provides legal status support, as well as legal and business operation and utility.

Randy stated that in addition to Officers, there are individuals who are separately serving terms as Chair for each of the IBIS task groups. Randy outlined each task group in detail and listed their Chairs as follows:

- Advanced Technology Modeling Task Group
Chair: Arpad Muranyi
- Editorial Task Group
Chair: Michael Mirmak
- Interconnect Task Group
Chair: Michael Mirmak
- Quality Task Group
Chair: Bob Ross

Randy then shared that IBIS is celebrating 30 years since ratification of 1.0 IBIS specification. Also, IBIS specification 7.2 along with IBISCHK parser 7.2 is now available.

Randy expressed something about where IBIS is going and current topics:

- Expanded System-Level Perspective
Clock-Data relationships in source-synchronous bus (DDRx, NAND Flash, etc.)
- Power Integrity focused modeling
Such as chip-level buffer effects
- Multi-level analog buffer modeling
Such as PAM-n modulation
- Interconnect modeling
Especially Touchstone file specification revision for S-Parameter data
- What else could we be considering? Ideas are welcome!

Randy went on to express that hybrid is ongoing support, especially participation, especially encouraging papers and presentations, with a summary of the task groups and expressed support is available for editorial and fostering ideas through official ratification channels.

Randy outlined the Nominations of IBIS officers is in May each year: New board position start mid-June, potential exists to modernize board positions. Randy expressed encouragement to mentor and bring in new people to the organization, and how to involve the community and foster ongoing development.

Graham Kus mentioned that in addition to the IBIS resources at www.ibis.org, email reflectors are available at link www.freelists.org to subscribe to access IBIS Open Forum and IBIS Task Group discussions and view distributed minutes.

Randy expressed that in IBIS, artifacts such as executables are free, parsers are free, however their source code is available for purchase.

Randy opened the floor to questions. There were none asked.

Randy moved on to the next portion of the summit, presentations.

VARIABILITY-AWARE MODELING OF SUPPLY INDUCED JITTER IN CMOS INVERTERS

Author(s): Vinod Kumar Verma (India Institute of Technology, India), Jai Narayan Tripathi (India Institute of Technology, India)

[Presented by Vinod Verma]

Synopsis: Noise and Process Variations in CMOS Inverters, Input-Output Relationship, and Modeling of Jitter

Q+A Session: Bob Ross cited BIRD220, and suggested to review and provide feedback. Randy concurred. Vinod acknowledged it would be instructive.

LIM - A GENERAL PURPOSE SIMULATOR FOR HIGH-SPEED CIRCUIT DESIGN

Author(s): José Schutt-Ainé (University of Illinois, USA), Thong Nguyen (Synclesis, USA), Daniel Shaw (Synclesis, USA)

[Presented by José Schutt-Ainé]

Synopsis: LIM Simulator provides support for Elementary Devices (such as RLC circuit simulation), Independent sources (Current, Voltage, PWL, etc), Dependent Sources (Voltage and Current-controlled sources), Transmission Lines (including lossy, and non-lossy), and Macromodels (Convolution models).

Q+A Session: See recording link.

TOUCHSTONE IMMEDIATE AND LONG-TERM FUTURE

Author(s): Michael Mirmak (Intel Corp., USA)

[Presented by Michael Mirmak]

Synopsis: Discussion of Touchstone file format, used to describe S-Parameter data. A historical perspective is offered on its development, deployment, and eventual adoption under the IBIS Open Forum. Further remarks are made about future feature sets that are currently being discussed regarding development of Touchstone 3.0.

Q+A Session: See recording link.

BREAK

AN ACCURATE IBIS MODELLING TECHNIQUE FOR OPEN DRAIN DRIVERS

Author(s): Rahul Kumar (STMicroelectronics, India), Manish Bansal (STMicroelectronics, India), Raushan Kumar (STMicroelectronics, India)

[Presented by Rahul Kumar]

Synopsis: To support some interfaces such as I2C that require the use of Open Drain Drivers for operation, IBIS modelling techniques are discussed to more accurately model silicon behavior in-circuit, where previous techniques are found insufficient to reach 1% accuracy of correlation to SPICE simulation.

Q+A Session: See recording link.

A NOVEL SIMULATION FLOW FOR DDR5 SYSTEMS WITH CLOCKED RECEIVERS

Author(s): Matthew Leslie (Siemens EDA, USA), Justin Butterfield (Micron Technology, USA), Randy Wolff (Siemens EDA, USA)

[Presented by Randy Wolff]

Synopsis: With the introduction of DDR5 simulation, IBIS-AMI supports clocked AMI flows- this is new implementation for DDR5, an important technology to understand when it comes to operation of IBIS-AMI models in concert with EDA simulation tools. For example, Clock Forwarding is a feature utilized to close simulation between Clock and Address, and between Strobe and Data- all using clocked AMI flows. In addition, DDR5 introduces

equalization and the concept of a “stressed eye” mask for compliance under the JEDEC JESD79-5 standard. See recording for details on this presentation.

Q+A Session: See recording link.

IBIS QUALITY CHECKLIST LEVEL-4 ADDITIONS

Author(s): Weston Beal (Siemens EDA, USA)

[Presented by Weston Beal]

Synopsis: Discussion of IBIS Quality Level Checklist, topics include Component Package requirements, Component Pin-Mapping requirements, Model ISSO Table requirements, Model I-T table requirements, and simulation concerns.

Q+A Session: See recording link.

CLOSING REMARKS

Randy thanked everyone for attending, especially thanks to the IBIS summit sponsors, Zuken, Siemens, and the IEEE, as well as the Institute of Telecommunications and the University of Aveiro. Randy expressed appreciation for participation in the IBIS summit. He reminded attendees having mentioned many ways to contact IBIS and participate- and encouraged future participation, especially in light of the interesting topics and problems to solve. He stated we are all looking forward to another European IBIS Summit at Portugal IEEE SPI 2024.

Randy again expressed thanks to everyone in attendance.

The IBIS summit was concluded.

=====

NOTES

IBIS CHAIR: Randy Wolff

randy.wolff@ibis.org

VICE CHAIR: Lance Wang (978) 633-3388

lance.wang@ibis.org

Solutions Architect, Zuken USA

238 Littleton Road, Suite 100

Westford, MA 01886

SECRETARY: Graham Kus

graham.kus@ibis.org

Senior Engineer, The MathWorks, Inc.

3 Apple Hill Drive

Natick, MA 01760

TREASURER: Bob Ross (503) 246-8048

bob@teraspeedlabs.com

Engineer, Teraspeed Labs

10238 SW Lancaster Road

Portland, OR 97219

LIBRARIAN: Zhiping Yang

zhiping.yang@ibis.org

WEBMASTER: Steven Parker (845) 372-3294

sparker@marvell.com

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

POSTMASTER: Curtis Clark
curtis.clark@ansys.com
Ansys, Inc.
400 Fifth Avenue
Suite 500
Waltham, MA 02451

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:

<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/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 (attendee X; absent -)

| Organization | Interest Category | Standards Ballot Voting Status | Mar. 10, 2023 | Mar. 31, 2023 | Apr. 21, 2023 | May 10, 2023 |
|-----------------------------------|-------------------|--------------------------------|---------------|---------------|---------------|--------------|
| Altair | User | Inactive | - | - | - | - |
| AMD (Xilinx) | Producer | Inactive | - | - | - | - |
| Analog Devices (Maxim Integrated) | Producer | Inactive | - | - | - | - |
| Ansys | User | Active | X | X | X | - |
| Applied Simulation Technology | User | Inactive | - | - | - | - |
| Aurora System | User | Inactive | - | - | - | - |
| Broadcom Ltd. | Producer | Inactive | - | - | - | - |
| Cadence Design Systems | User | Active | X | X | X | - |
| Celestica | User | Inactive | - | - | - | - |
| Cisco Systems | User | Inactive | - | - | - | - |
| Dassault Systemes | User | Inactive | - | - | - | X |
| GE Healthcare Technologies | User | Active | - | - | - | - |
| Google | User | Inactive | - | - | - | - |
| Honeywell | User | Active | - | - | X | - |
| Huawei Technologies | Producer | Inactive | - | - | - | X |
| Infineon Technologies AG | Producer | Inactive | - | - | - | - |
| Instituto de Telecomunicações | User | Inactive | - | - | - | X |
| Intel Corp. | Producer | Active | X | X | X | X |
| Keysight Technologies | User | Inactive | - | X | - | - |
| Marvell | Producer | Active | X | X | - | - |
| MathWorks | User | Active | X | X | X | X |
| Micron Technology | Producer | Active | X | X | - | - |
| MST EMC Lab | User | Inactive | - | - | X | - |
| SerDesDesign.com | User | Inactive | - | - | - | - |
| Siemens EDA | User | Active | X | X | X | X |
| STMicroelectronics | Producer | Inactive | - | - | - | X |
| Synopsys | User | Active | X | X | X | X |
| Teraspeed Labs | General Interest | Active | X | X | X | X |
| Waymo | User | Active | X | - | - | - |
| ZTE Corp. | User | Inactive | - | - | - | - |
| Zuken | User | Active | X | 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.