



## IBIS Hybrid European Summit at SPI 2024 Minutes

Meeting Date: **May 15, 2024**

Meeting Location: **Lisbon, Portugal**

### VOTING MEMBERS AND 2024 PARTICIPANTS

Altair	(JuneSang Lee)
AMD (Xilinx)	(Bassam Mansour)
Analog Devices	Jermaine Lim-Abroguena*, Toni Rose Racelis*, Christine Bernal*, Prachi Shukla*, Aprille Hernandez-Loyola*, Francis Ian Calubag*, Marvin Sinues*, Vincent Paul Sabillo*, Esther Grace Falate*, Keshav Mehrotra*
Anslys	Curtis Clark*, Marco Occhiali*
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*, David Duque*
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*, Jiahuan Huang*
SI-Clarity	Doug Burns*
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, Manisha Bisht*, Charul Sharma*, Manish Bansal*, Mihir Pratap*
Synopsys	Ted Mido*, (Andy Tai), Luis Simoes*, Pedro Monteiro*, Luis Neves*, António Eustáquio*, Diogo Coelho*, Nuno Lima*, Alexandre Brito*
Teraspeed Labs	(Tom Dagastino), [Bob Ross]
Waymo	(Feng Wang), [Ji Zhang]
ZTE Corporation	(Zhongmin Wei), (Shunlin Zhu)
Zuken	(Ralf Brüning), Markus Bucker*
Zuken USA	Lance Wang*

## OTHER PARTICIPANTS IN 2024

Alphawave Semi	Adrien Auge, Todd Bermensolo
Anacom	Filipe Saraiva*
Applied Logix	Dan Chirpich
Ciena	Hugues Tournier
Hirel Logic	Jason Riddley*
HRL Laboratories	John Carlson*
Hitachi Ltd.	Yutaka Uematsu*
KEI Systems	Shinichi Maeda
KT Smart Future-Creations	Keita Miyasato
Meta	Ashkan Hashemi
Northrop Grumman Corp.	Will McCaffrey
Samsung Electronics	Jun-Bae Kim*
SAE ITC	Tammy Patton, Rich Demary
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

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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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## SUMMIT MINUTES - SUMMARY AND LINKS

The 2024 IBIS European Summit was held both online and in-person at SPI 2024 in Lisbon, Portugal.

The notes below capture some of the content and discussions. A summit recording has been made available in 2 parts where time index is relative to the beginning of each part. The meeting presentations and other documents are available at this link:

Link: <https://ibis.org/summits/may24/>

## OFFICIAL OPENING AND AGENDA

(Start 00:00:00, To 00:04:00. *Note: beginning of recording 1 of 2*)

Lance Wang introduced himself as the Chair of the IBIS Open Forum. He thanked the Sponsor of the Summit, Zuken, and expressed thanks to IEEE SPI (workshop on Signal and Power Integrity) and expressed appreciation for the facilities provided for this IBIS Summit.

Lance welcomed attendees and outlined the IBIS Summit Agenda. A copy of the agenda is available at this link:

Link: <https://ibis.org/summits/may24/>

## IBIS CHAIR'S REPORT

Lance Wang (Zuken, USA)

(Chair, IBIS Open Forum)

(Start 00:04:20, To 00:25:30)

Lance presented on the following:

- 29 IBIS Members
  - Fairly stable around approximately 30 members over many years.
- Roster of IBIS Officers June 2023 - May2024
  - Summary of elected individuals representing organizations on board
  - IBIS is nearing the 2024 Officer Elections, any interested may run for positions, please contact IBIS Open Forum. New officers will be in June 2024. Arpad Muranyi mentioned that the nomination process begins in 2 days and the election will conclude in mid-June. Arpad is Returning Officer to manage the election.
  - Lance took a few moments to remember Bob Ross, as he had passed away due to illness during his term. Bob had served over many years as Chair and other officer positions and worked to support the Parser over many years also. There would be consideration of a Bob Ross scholarship for students to be proposed in the future.
- IBIS Meetings (weekly teleconferences)
- IBIS Open Forum teleconference every 3 weeks (Fridays, 08:00 PT)
- IBIS Summit meetings (USA and international)
  - DesignCon, IEEE SPI, IEEE EMC+SIPI, Shanghai, Tokyo (JEITA-organized)
- Participants: ~290 in 2023 (~280 in 2022)
  - Participants listing
- SAE Industry Technologies Consortia is the parent organization of the IBIS Open Forum
  - SAE ITC provides financial, legal, and other services to the IBIS Open Forum:

- Link: <https://www.sae-itc.com/>
- SAE ITC representatives: Tammy Patton, Phyllis Gross, and Rich Demary
- Task Groups
  - Advanced Technology Modeling (ATM) task group (Tuesdays, 12:00 PT)
    - Chair: Arpad Muranyi, Siemens EDA
    - [https://ibis.org/atm\\_wip/](https://ibis.org/atm_wip/)
    - Develop non-interconnect technical BIRDs
  - Editorial task group (Suspended)
    - Chair: Michael Mirmak, Intel
    - [https://ibis.org/editorial\\_wip/](https://ibis.org/editorial_wip/)
    - Produce IBIS specification documents
  - Interconnect task group (Wednesdays, 08:00 PT)
    - Chair: Michael Mirmak, Intel
    - [https://ibis.org/interconn\\_wip/](https://ibis.org/interconn_wip/)
    - Develop on-die/package/module/connector interconnect modeling BIRDs
  - Quality task group (Tuesdays, 09:00 PT)
    - Acting Chair: Randy Wolff, Siemens EDA
    - [https://ibis.org/quality\\_wip/](https://ibis.org/quality_wip/)
    - Oversee IBISCHK parser testing and development
- IBIS Milestones
  - Various accomplishments and industry-associated activities
- Other Work
  - IBIS work includes governing Touchstone 1.0 and Touchstone 2.1 specifications
  - IBISCHK: IBIS file syntax parser
  - TSCHK2: Touchstone file syntax parser
  - Both have freely available executables
  - Both source code by subscription if embedding in EDA tool
- BIRD description (Buffer Issue Resolution Document)
  - Summary of present BIRDs considered for adoption
- TSIRD description (Touchstone Issue Resolution Document)
  - Summary of present TSIRDs considered for adoption
- BUGs
  - How to submit bug reports for IBISCHK and TSCHK/TSCHK2
  - Summary of present BUGs considered for resolution
- Recent and Future Developments in IBIS
- IBIS Website Resources
  - Link: <https://www.ibis.org>

Lance asked for questions. None were asked.

## **ACCURATE IBIS MODEL FOR IO PADS HAVING FLOATING RAIL ESD ARCHITECTURE**

Manish Bansal (STMicroelectronics, India)

Mihir Pratap Singh (STMicroelectronics, India)

Rahul Kumar (STMicroelectronics, India)

Raushan Kumar (STMicroelectronics, India)

[Presented by Manish Bansal]

(Start 00:25:30, To 00:35:10)

The presentation covered the following:

- Introduction
- About ESD Architectures
- Problem Description
- Solution and Results
- Q+A session
  - Note: See recording for detailed slides and Q+A discussion.

## **ACCURATE SI ANALYSIS UNDER OVERCLOCKING CONDITIONS**

Michael Schaefer (Zuken, Germany)

Mariusz Faferko (Zuken, Germany)

Markus Buecker (Zuken, Germany)

[Presented by Markus Buecker]

(Start 00:40:00, To 01:07:00)

The presentation covered the following:

- Introduction
  - Output Buffer Modeling
  - What is Overclocking?
  - Effects of Overclocking
- Dealing with Initial Delays
  - Considering power-aware buffer models
- Dealing with Overclocking
  - Switching characteristics
- Results and Summary
- Q+A session
  - Note: See recording for detailed slides and Q+A discussion.

## **IMPACT OF PORT TYPE IN S-PARAMETER EXTRACTION OF PACKAGE AND PCB HIGH-SPEED INTERCONNECTIONS**

Marco Occhiali (Ansys, Italy)

Aurora Sanna (STMicroelectronics, Italy)

Simona Cucchi (STMicroelectronics, Italy)

[Presented by Marco Occhiali]

(Start 01:08:30, To 01:24:00)

The presentation covered the following:

- Introduction
  - What is a BGA (Ball Grid Array) Package?
- S-Parameters and Port Types
- Comparison – Coaxial vs. Circuit Ports – Default Setup Differences
- Results
  - With and Without PEC Plane
  - Does This Happen on a PCB as Well?
- Summary
- Q+A session
  - Note: See recording for detailed slides and Q+A discussion.

## **USB 3.0 IBIS-AMI MODEL CONSTRUCTION BASED ON MEASUREMENT AND NEURAL NETWORK**

Jiahuan Huang (MST EMC Lab, USA)

Joonho Joo (MST EMC Lab, USA)

Hank Lin (ASUS, Taiwan)

Bin-Chyi Tseng (ASUS, Taiwan)

Will Chan (ASUS, Taiwan)

Chulsoon Hwang (MST EMC Lab, USA)

[Presented by Jiahuan Huang]

(Start 01:24:30, To 01:26:00)

- Lance Wang introduced the presentation, but the presenter was not in attendance.
- Lance announced the next presentation would proceed in the meantime.

## **UPDATE ON BIRD226: PSIJ SENSITIVITY**

Kinger Cai (Intel, USA)

Fern Nee Tan (Intel, Malaysia)

Chi-te Chen (Intel, USA)

Michael Mirmak (Intel, USA)

[Presented by Kinger Cai]

(Start 01:26:30, To 01:53:15)

The presentation covered the following:

- Executive Summary
  - BIRD226 focuses on including all PSIJ contributions.
- Major Steps
  - SI simulation setup
  - PI noise considerations
  - Jitter impact considerations
  - Power rail jitter impact vs. IO interface (Eye diagram superposition)
- PSIJ Sensitivity Derivation
  - Theory and Equations presented
- [PSIJ Sensitivity] Definition in IBIS
- [PSIJ Sensitivity Signal] Definition in IBIS
- Quick IP Selection facilitated by [PSIJ Sensitivity]
- Advantages of BIRD226 in IP design flow
- Takeaways
- Q+A session
  - Note: See recording for detailed slides and Q+A discussion.

## **BREAK**

(Start 01:53:18, Conclusion of Recording 1)

- Note: Time indices now reference Recording 2.
- For Recording 2, see Link: <https://ibis.org/summits/may24/>

## **UPDATE ON BIRD223.1: ADD SUPPORT FOR SPIM IN IBIS**

Kinger Cai (Intel, USA)

Chi-te Chen (Intel, USA)

[Presented by Kinger Cai]

(Start 00:00:00, To 00:34:00) (Note: Time index for Recording 2 now beings)

The presentation covered the following:

- Executive Summary
  - Purpose of SPIM model
  - Background
  - Timeline
- Platform PI Design: SPIM- Streamlined PI Model
  - SoC/PKG or a module
- Platform PI Design: Stimulus & Target Definition
- Tree Structure of a .spim File
- Linkage of .spim File to .ibis File
- Example .spim File
  - Supports PI AC Analysis
  - Supports Power DC Analysis
- BIRD223.1 Update from BIRD223
- FastPI (Platform PI Arch. With SPIM) Roadmap
- Next Steps
- Q+A session
  - Note: See recording for detailed slides and Q+A discussion.



## **POLE-RESIDUE DATA FORMAT FOR TOUCHSTONE**

Arpad Muranyi (Siemens EDA, USA)

[Presented by Arpad Muranyi]

(Start 00:35:10, To 01:04:50)

The presentation covered the following:

- Background and motivation
  - File size has increased dramatically over recent years
  - Pole-residue format would serve this purpose well
  - Tool independent standard syntax
- Overview of TSIRD 7.1
  - Proposes 5 new keywords for Touchstone
- New keywords
- The Pole-Residue equation
  - The pole-residue equation of one matrix element
  - Derivation explained with details
- Statistics
  - Example file size comparison of .s4p, .s48p in different formats
  - Presentation of format examples
- Q+A session
  - Note: See recording for detailed slides and Q+A discussion.

## PRIORITIES AND ALTERNATIVES FOR TOUCHSTONE 3.0 PORT MAPPING

Michael Mirmak (Intel Corp., USA)

[Presented by Michael Mirmak]

(Start 01:05:15, To 01:19:00)

The presentation covered the following:

- Problem Statement
  - Given a set of S-parameters that describe a component, there is data
  - Current Touchstone 1.0 and 2.0 does not describe the component
  - What is the relationship between ports (input vs. output)
  - What is the context of this device and how to use it?
  -
- Multiple Proposals for Port Mapping
  - IBIS Interconnect Task Group is considering multiple options
  - Examples of both proposals thus far are included in these slides
  - Detailed information: [https://ibis.org/interconnect\\_wip](https://ibis.org/interconnect_wip)
- Proposed Requirements
  - Define unambiguous connections for simulation
  - Identify Port locations (e.g. xyLayer of PCB)
  - Support automated creation of schematic symbols and test probe locations
  - Support generation and verification
  - Support IEEE 370 data quality features
  - Identify data status (Measured vs. Simulated)
  - Support swathing
  - Support addition of user-defined parameters
- “HL” Proposal Syntax Examples (Proposal 1 of 2 shown)
- “Y” Proposal Syntax Examples (Proposal 2 of 2 shown)
- Your Input is Needed!
  - Michael invited attendees and any interested members to contribute to this ongoing discussion in the IBIS Interconnect Task Group.
- Q+A session
  - Note: See recording for detailed slides and Q+A discussion.

## OPEN DISCUSSION - IBIS OPEN FORUM

(Start 01:19:00, To 01:23:00)

Lance Wang stated that the presentation by MST would be skipped, as their representatives had not yet joined. Please reference the IBIS website to find their presentation when available.

Link: <https://ibis.org/summits/may24/>

Lance Wang announced the conclusion of the papers and announced the start of open discussion.

- Note: See recording for Q+A discussion.

## CLOSING REMARKS

(Start 01:23:00, To 01:24:45)

Lance Wang thanked everyone for attending. Lance announced the meeting was officially adjourned. The meeting adjourned.

## NEXT MEETING

The next IBIS Open Forum teleconference meeting will be held on May 31, 2024. The following IBIS Open Forum teleconference meeting is scheduled for June 21, 2024.

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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 or unsubscribe from 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)):
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  - <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](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/bugspl.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>

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

Organization	Interest Category	Standard s Ballot Voting Status	Mar 29, 2024	Apr 19, 2024	May 10, 2024	May 15, 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	-	-
Celestica	User	Inactive	-	-	-	-
Cisco Systems	User	Inactive	-	-	-	-
Dassault Systems	User	Inactive	-	-	-	X
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	-
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	-
STMicroelectronics	Producer	Inactive	-	-	-	X
Synopsys	User	Active	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.