



## IBIS Open Forum Minutes

Meeting Date: **November 4, 2022**

Meeting Location: **2022 Virtual Asian IBIS Summit - China**

### VOTING MEMBERS AND 2022 PARTICIPANTS

AMD (Xilinx)	(Bassam Mansour)
Analog Devices (Maxim Integrated)	Tushar Pandey, Jermaine Lim, Rolynd Aquino, Aprille Hernandez-Loyola, Janchris Espinoza, Francis Ian Calubag, Toni Rose Racelis, Thi Nhu Quynh Nguyen
ANSYS	Curtis Clark
Applied Simulation Technology	(Fred Balistreri)
Aurora System	Dian Yang
Broadcom	(Yunong Gan), Jim Antonellis
Cadence Design Systems	Zhen Mu, Jared James, Ken Willis, Kyle Lake
Celestica	(Sophia Feng)
Cisco Systems	Stephen Scarce
Dassault Systemes	(Stefan Paret), Longfei Bai
Google	Hanfeng Wang , Jianmin Zhang
Huawei Technologies	Hang (Paul) Yan*, Su Li*, Yiran Lei*, Zixin Song*
Infineon Technologies AG	(Christian Sporrer)
Instituto de Telecomunicações	(Abdelgader Abdalla)
Intel Corporation	Hsinho Wu, Michael Mirmak, Jingbo Li, Liwei Zhao, Chi-te Chen, Kinger Cai*, Chuanyu Li*
Keysight Technologies	Ming Yan, Fangyi Rao, Majid Ahadi Dolotsara, Pegah Alavi, Saish Sawant, [Radek Biernacki]
Luminous Computing	(David Banas)
Marvell	Steven Parker
MathWorks	Graham Kus, Walter Katz, [Mike LaBonte]
Micron Technology	Randy Wolff*, Aniello Viscardi, Justin Butterfield, Dragos Dimitriu, Cheng Zhang*, Chunqiang Weng*, Hongyan Li*, Tree Li*
MST EMC Lab	Chulsoon Hwang, Hanyu Zhang, Haran Manoharan, Jiahuan Huang, Junho Joo, Reza Yazdani, Seunghun Ryu, Seungtaek Jeong, Xiangrui Su, Xu Wang, Yuanzhuo Liu, Zhekun Peng, Yifan Ding*
SerDesDesign.com	John Baprawski
Siemens EDA	Arpad Muranyi, Weston Beal, Amin Maher, Scott Wedge, Steve Kaufer, Todd Westerhoff, Vladimir Dmitriev-Zdorov, Ken Cantrell
STMicroelectronics	Olivier Bayet
Synopsys	Ted Mido, Xuefeng Chen*, Yuyang Wang*, Jinghua Huang*
Teraspeed Labs	Bob Ross*
Waymo	Zhiping Yang
ZTE Corporation	Jian Huang*, Ming Zheng*, Changgang Yin*, Dongdong Ye*, Zhongmin Wei*
Zuken	(Michael Schäder)

Zuken USA

Lance Wang\*

## OTHER PARTICIPANTS IN 2022

Altair

Amazon Lab126

ASUSTek Computer

Blue Ocean Smart System

Ciena

Cornelis Networks

De Montfort University

GE HealthCare

Honeywell

IBM

Imperial College, UK

Mercury Systems

National Central University, Taiwan

New H3C Technologies Co.

OVT

Politecnico di Torino

Renesas

Rivos

SAE ITC

SeriaLink Systems

University of Colorado, Boulder, ECEE

University of Illinois

University of L'Aquila

Unaffiliated

Xpedic

Junesang Lee

Askar Hashemi

Hank Lin\*, Daniel Yeh\*, Shih-Yao Lin\*, Hayden

Huang\*, Will Chan\*, Alfred Hu\*, Andries Deroo\*,

Bobson Su\*, Bojyun Chen\*, Harrison Su\*, Jenyung

Li\*, Jimmy Kao\*, Matthew Lu\*, Nick Chen\*, David

Chou\*, Stephen Lee\*, Henry Tsai\*, John Lin\*,

Steven Tsai\*, Vincent Lu\*, William Shih\*, Asher

Lin\*, Jerry Bai, Anthony Tan\*

Junyong Deng\*, Nikki Xie\*

Hugues Tournier, Kaisheng Hu

Champion Kao

Alistair Duffy

Balaji Sankarshanan, Sarah Salvador

Bavish Vazhayil

Greg Edlund

Cong Ling

Vincent Tam

Chiu-Chih Chou, Liu Huang Fu, Bohong Chai,

Remxiang Xu, Kuan Fa, Yanting Li

Zixiao Yang\*

Sirius Tsang

Stefano Grivet Talocia, Tommaso Bradde, Marco

De Stefano, Riccardo Trincherro, Alessandro

Zanco, Antonio Carlucci

Billy Chen\*

Yansheng Wang

José Godoy

Aleksey Tyshchenko, David Halupka

Eric Bogatin

José Schutt-Aine

Fancesco De Paulis

Mike LaBonte

Wei He\*, Zachary Su\*, Jianfeng Xia\*, Yan Ma\*,

Yufeng Dan\*, Zhangmin Zhong\*, Lihua (Lily) Liu\*

In the list above, attendees 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

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[106010980@teams.bjn.vc](mailto: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

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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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## OFFICIAL OPENING

The Virtual Asian IBIS Summit – China was held online. About 57 individuals representing 13 organizations attended.

The notes below capture some of the content and discussions. The meeting presentations and other documents are available at:

<https://ibis.org/summits/nov22a/>

A summit recording has been uploaded and is available by direct link:

[https://ibis.org/summits/nov22a/summit\\_recording.mp4](https://ibis.org/summits/nov22a/summit_recording.mp4)

Randy Wolff declared the start of the Virtual Asian IBIS Summit – China. He welcomed the participants and noted the excellent work done by Bob Ross and Lance Wang in helping to organize the meeting. He outlined that the Summit involved presentations, along with time for questions, and then an open discussion period at the conclusion of the presentations.

## IBIS CHAIR'S REPORT

Randy Wolff (Micron Technology, USA)  
(Chair, IBIS Open Forum)  
(Start 00:03:15, Duration 8:15)

Randy Wolff presented a shortened version of the normal report, skipping some early slides to focus on upcoming work. He announced IBIS Version 7.2 will include BIRD213.1 for PAMn support and BIRD211.4 for major work in flow issues in re-drivers. BIRD217 introduces a new requirement for clocked IBIS-AMI models. BIRD218 will be a simplification to some pin rules in EMD. The Editorial and Advanced Technology Modeling task groups are working on a

clarification BIRD for clock\_times with use of the new clocked IBIS-AMI models. The goal is to approve IBIS 7.2 in late January.

#### Future Work:

Randy showed a slide outlining future work, such as equalization with DDR5, clock/data relationships, and a renewed focus on power integrity such as power supply induced jitter modeling, modeling voltage regulators, and other topics. Randy also said the Interconnect task group has in development a pole-residue format for an upcoming Touchstone 3.0 specification. Also, further improvements to IBIS-ISS, which is a standard SPICE format.

#### Call for Volunteers:

Randy presented a slide calling for volunteers and outlined which roles are available to make contributions and participate in collaboration, as well as the email reflector and website information. He further announced that presentations are always welcome.

#### Official Proceedings:

Randy announced the processes to express a technical idea as part of a Task Group and mentioned that experienced members can assist with formatting and syntax for creating technical proposal documents such as in BIRD format.

#### Website:

Randy presented the website and outlined the available resources provided by the IBIS organization [available at this link: <http://Ibis.org/>].

## **PRESENTATIONS**

### **SPIM (STANDARD PI MODEL) IN IBIS**

CAI, Kinger (Intel Corp., USA)

CHEN, Chi-te (Intel Corp., USA)

Synopsis: Presentation agenda as follows:

- Industry Platform PI Design Challenges
- Platform PI design Architecture Standardization
  - SPIM – Standard Power Integrity Model
  - SPIM stimulus and target definition
  - FASTPI – Platform PI design Framework
- Keywords definition for .spim file in BIRD
- One example .spim file
- FastPI Roadmap
- Next Steps

Presentation was not live, but slides were posted on the IBIS website.

### **IBIS MODEL SIMULATION ACCURACY IMPROVEMENT BY INCLUDING PSIJ**

DING, Yifan (Missouri University of Science and Technology, USA)

SUN, Yin (Zhejiang Lab, PRC)

WOLFF, Randy (Micron Technology, USA)

YANG, Zhiping (Waymo, USA)

HWANG, Chulsoon (Missouri University of Science and Technology, USA)  
[Presented by DING, Yifan (Missouri University of Science and Technology, USA)]  
(Start 00:12:30, Duration 25:15)

Synopsis: Presentation agenda as follows:

- Introduction
  - Accounting for Power Supply Induced Jitter
  - Limitation of the current power-aware IBIS Model
- Jitter Sensitivity Based Modification
  - Ku/Kd Modification Based on PSIJ Sensitivity
- Simulation Validation
  - 8 Stage Inverter Chain with Different Loads
  - DDRx DQ Tx Buffer with Pre-driver with Different Terminals
- Conclusion

Q&A session:

Xuefeng Chen asked about slide 8, whether delta T is a range or just a value. Yifan answered it is a value.

Bob Ross noted on slide 8 that the notation of “Ku/Kd” was not a ratio but an “or”.

### **[PSIJ SENSITIVITY] IN IBIS**

CAI, Kinger (Intel Corp., USA)  
TAN, Fern Nee (Intel Corp., USA)  
CHEN, Chi-te (Intel Corp., USA)  
[Presented by CAI, Kinger (Intel Corp., USA)]  
(Start 00:38:15, Duration 22:00)

Synopsis: Presentation agenda as follows:

- Background
- HSIO architecture: Serial & Parallel
- Status Quo, for jitter analysis
- New system jitter analysis methodology
- [PSIJ Sensitivity] in IBIS
- [PSIJ Sensitivity] application
- Next Steps

Q&A session:

Bob Ross commented that the idea would become a BIRD, and it would be relatively simple from an IBIS specification standpoint, since it would only introduce a small number of keywords.

### **USING IBIS-AMI FOR DDR5 APPLICATIONS**

HE, Wei (Xpeedic, PRC)  
XIA, Jianfeng (Xpeedic, PRC)  
DAN, Yufeng (Xpeedic, PRC)  
ZHANG, Junwei (Xpeedic, PRC)  
SU, Zhouxiang (Xpeedic, PRC).  
[Presented by HE, Wei (Xpeedic, PRC)]

(Start 01:00:30, Duration 27:15)

Synopsis: Presentation agenda as follows:

- Background: Challenges in IBIS-AMI Analysis of DDR5
  - DER in bit-by-bit is a more accurate way to simulate asymmetrical signal edges
  - AMI Reserved Parameter: DC\_offset
  - IBIS 7.1 standard mentions clock jitter based DDR5
  - Significant SSN analysis
- Summary

Q&A session:

No questions.

## **BREAK**

(10 Minutes)

## **112G SERDES SIGNAL SIMULATION AND VERIFICATION**

HUANG, Jian (ZTE Corporation, PRC)

ZHU, Daishan (ZTE Corporation, PRC)

YANG, Zhiwei (ZTE Corporation, PRC)

[Presented by HUANG, Jian (ZTE Corporation, PRC)]

(Start 01:30:15, Duration 14:00)

Synopsis: Presentation agenda as follows:

- Background
- 112G Serdes Signal Simulation
- 112G Serdes Test Verification
- Conclusion

Q&A session:

No questions.

## **BANDWIDTH ANALYSIS OF 224GB/S SERIAL LINKS**

ZHENG, Ming (ZTE Corporation, PRC)

YIN, Changgang (ZTE Corporation, PRC)

[Presented by ZHENG, Ming (ZTE Corporation, PRC)]

(Start 01:45:00, Duration 14:30)

Synopsis: Presentation agenda as follows:

- Overview
- Analysis Method
- Simulation on 224Gb/s per Lane
- Summary

Q&A session:

No questions.

## **AI ON SI: DATA EFFICIENT ANALYSIS AND MANUFACTURING PROCESS VARIATION ANALYSIS**

LEI, Peizhi (University of Electronic Science and Technology of China [UESTC], PRC)

WANG, Cong (University of Electronic Science and Technology of China [UESTC], PRC)

ZHENG, Jie (University of Electronic Science and Technology of China [UESTC], PRC)

CHEN, Jienan (University of Electronic Science and Technology of China [UESTC], PRC)

LEI, Yiran (Huawei Technologies Co., PRC)

LI, Su (Huawei Technologies Co., PRC)

[Presented by LI, Su (Huawei Technologies Co., PRC)]

(Start 02:00:15, Duration 31:15)

Synopsis: Presentation agenda as follows:

- Background: AI in signal integrity
- Challenges
- Application 1: Manufacturing process variation analysis
- Application 2: Data efficient signal integrity analysis
- Conclusion

Q&A session:

Xuefeng Chen asked about slide 7 on how DDQN picks the enhanced samples. Su Li answered that DDQN will find an X, first putting it into two DNNs to find if outputs are close. If yes, it is trained; if not, it will be in the training list next. This way will save a lot of training cases.

## **K.T. WANG (WANG ALGEBRA) - UPDATED EXPANDED HISTORY**

ROSS, Bob (Teraspeed Labs, USA)

LING, Cong (Imperial College, UK)

Synopsis: Presentation agenda as follows:

- Wang Algebra
- T-coils
- Wang's Biography
- References

Presentation was not live, but slides were posted on the IBIS website.

## **OPEN DISCUSSION AND CLOSING REMARKS**

(Start 02:31:45, Duration 1:45)

Randy Wolff thanked presenters and attendees. He encouraged people to volunteer to help in the work of advancing the IBIS specification. He also hoped to see everyone in person in a future summit.

## **NEXT MEETING**

The next IBIS Open Forum teleconference meeting will be held on November 18, 2022. The following IBIS Open Forum teleconference meeting is tentatively scheduled for December 9, 2022.

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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.



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- 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:

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<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>

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

Organization	Interest Category	Standards Ballot Voting Status	Sept. 9, 2022	Sept. 30, 2022	Oct. 21, 2022	Nov. 4, 2022
AMD (Xilinx)	Producer	Inactive	-	-	-	-
Analog Devices (Maxim Integrated)	Producer	Inactive	-	-	-	-
ANSYS	User	Active	X	X	X	-
Applied Simulation Technology	User	Inactive	-	-	-	-
Aurora System	User	Active	-	-	-	-
Broadcom Ltd.	Producer	Inactive	-	-	-	-
Cadence Design Systems	User	Inactive	X	X	-	-
Celestica	User	Inactive	-	-	-	-
Cisco Systems	User	Inactive	-	-	-	-
Dassault Systemes	User	Inactive	-	-	-	-
Google	User	Inactive	-	-	-	-
Huawei Technologies	Producer	Inactive	-	-	-	X
Infineon Technologies AG	Producer	Inactive	-	-	-	-
Instituto de Telecomunicações	User	Inactive	-	-	-	-
Intel Corp.	Producer	Active	X	X	X	X
Keysight Technologies	User	Inactive	X	-	-	-
Luminous Computing	General Interest	Inactive	-	-	-	-
Marvell	Producer	Inactive	-	-	X	-
MathWorks	User	Active	X	X	X	-
Micron Technology	Producer	Active	X	X	X	X
MST EMC Lab	User	Inactive	-	-	-	X
SerDesDesign.com	User	Inactive	-	-	-	-
Siemens EDA (Mentor)	User	Active	X	X	X	-
STMicroelectronics	Producer	Active	X	X	X	-
Synopsys	User	Active	X	X	X	X
Teraspeed Labs	General Interest	Active	X	X	X	X
Waymo	User	Active	X	X	X	-
ZTE Corp.	User	Inactive	-	-	-	X
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.