

# IBIS Open Forum Minutes

Meeting Date: **October 22, 2010**

Meeting Location: **Teleconference**

## VOTING MEMBERS AND 2010 PARTICIPANTS

Agilent	Radek Biernacki*, Ming Yan, Fangyi Rao, Gilbert Berger, Amolak Badeasa, Jose Pino, Junaid Khan
AMD	Nam Nguyen
Ansys (Ansoft Corporation)	Danil Kirsanov
Apple Computer	(Matt Herndon)
Applied Simulation Technology	(Fred Balistreri)
ARM	(Nirav Patel)
Cadence Design Systems	Terry Jernberg*, Wenliang Dai, Ambrish Varma
Cisco Systems	Syed Huq, Mike LaBonte*, Tony Penaloza, Huyen Pham, Bill Chen, Ravindra Gali, Zhiping Yang
Ericsson	Anders Ekholm*, Pete Tomaszewski
Freescale	Jon Burnett, Om Mandhana
Green Streak Programs	Lynne Green
Hitachi ULSI Systems	Yutaka Uematsu
Huawei Technologies	(Jinjun Li)
IBM	Adge Hawes, Greg Edlund*
Infineon Technologies AG	Christian Sporrer
Intel Corporation	Michael Mirmak*, Myoung (Joon) Choi, Vishram Pandit, Richard Mellitz
IO Methodology	Lance Wang
LSI	Brian Burdick*
Mentor Graphics	Arpad Muranyi*, Neil Fernandes, Zhen Mu
Micron Technology	Randy Wolff*
Nokia Siemens Networks GmbH	Eckhard Lenski*
Samtec	(Corey Kimble)
Signal Integrity Software	Walter Katz*, Mike Steinberger, Todd Westerhoff, Barry Katz
Sigrity	Brad Brim, Kumar Keshavan, Srdjan Djordjevic, Ben Franklin
Synopsys	Ted Mido, Paul Lo, Geoffrey Ying, Frank Lee
Teraspeed Consulting Group	Bob Ross*, Tom Dagostino
Texas Instruments	Bonnie Baker
Toshiba	Yoshihiro Hamaji
Xilinx	Mike Jenkins
ZTE	(Huang Min)
Zuken	Michael Schaefer, Ralf Bruening

## OTHER PARTICIPANTS IN 2010

Actel	(Prabhu Mohan)
AET, Inc.	Mikio Kiyono
Altera	John Oh, Hui Fu
Avago	Razi Kaw
Bosch Car Multimedia	Rene Steinberg, Patric Kessler
Broadcom	Mohammad Ali
Curtiss-Wright	John Phillips
ECL, Inc.	Tom Iddings
eSilicon	Hanza Rahmai
Exar Corp.	Helen Nguyen
ICT-Lanto	Steven Wong
JEITA	Atsushi Ishikawa
Leading Edge	Pietro Vergine
Magna Design Automation	Anand Ramalingam
Mindspeed	Bobby Altaf
National Semiconductor	Hsinho Wu
NetLogic Microsystems	Eric Hsu, Edward Wu, Antonio Orphanou, Halil Civit
NXP Semiconductors	Gerald Krasemann
Politecnico di Torino	Igor Stievano, Stefano Grivet-Talocia, Piero Triverio, Flavio Canavero
Renesas Technology	Takuji Komeda
Siemens, AG.	Manfred Maurer, Michael Flint
Simberian	Yuriy Shlepnev
Span Systems Corporation	Vidya (Viddy) Amirapu
Summit Computer Systems	Bob Davis
Tabula	David Banas
TechAmerica	(Chris Denham)
Vitesse Semiconductor	Bob McDonough
Independent	AbdulRahman (Abbey) Rafiq, Robert Badal

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 bridge numbers for future IBIS teleconferences are as follows:

Date	Meeting Number	Meeting Password
November 9, 2010 – Asian IBIS Summit in Shenzhen, China – no teleconference		
November 12, 2010 – Asian IBIS Summit in Taipei, Taiwan – no teleconference		
November 15, 2010 – Asian IBIS Summit in Tokyo, Japan – no teleconference		
November 19, 2010	204 170 411	IBIS

For teleconference dial-in information, use the password at the following website:

<https://cisco.webex.com/cisco/j.php?J=204170411>

All teleconference meetings are 8:00 AM to 9:55 AM 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. When calling into the meeting, follow the prompts to enter the meeting ID. For new, local international dial-in numbers, please reference the bridge numbers provided by Cisco Systems at the following link:

[http://www.cisco.com/web/about/doing\\_business/conferencing/index.html](http://www.cisco.com/web/about/doing_business/conferencing/index.html)

NOTE: "AR" = Action Required.

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## **INTRODUCTIONS AND MEETING QUORUM**

No new participants.

## **CALL FOR PATENTS**

Michael Mirmak called for any patents or pending patents related to the IBIS 3.2, IBIS 4.2, IBIS 5.0, Touchstone 2.0 or ICM 1.1 specifications. No patents were declared.

## **REVIEW OF MINUTES AND ARS**

Randy Wolff called for comments regarding the minutes of the October 1, 2010 IBIS Open Forum teleconference. He noted that Mike LaBonte found a typo in the Quality task group report where "FST1D" should be "FSV1D." The minutes were approved with the noted change.

## **MEMBERSHIP STATUS AND TREASURER'S REPORT**

Michael Mirmak reported that he received a statement from TechAmerica with help from Bob Ross. A couple of items are not recorded, but we are tracking closely with what we expect financially. We are in the black and will have extra funds to spend before the end of the year.

## **WEB PAGE UPDATES**

Michael Mirmak reported that there was a fix to the date for the DAC conference on the website.

## **MAILING LIST ADMINISTRATION**

Mike LaBonte reported that there are 455 subscribers to the two mailing lists. A virus attack in the last week was fended off ok. 49 emails were sent to the combined set of lists in the last month. Michael Mirmak inquired if there was any concern with long term storage of mailing list files. Mike noted there was no immediate concern with storage of files from the mailing lists. He will look into any archiving software that may help in the future.

## **MODEL LIBRARY UPDATE**

No report.

## **MISCELLANY/ANNOUNCEMENTS**

None.

## **OPENS FOR NEW ISSUES**

Bob Ross requested that time be allotted to discuss and classify BUG122 during the ibischk5 bug status discussion.

## **INTERNATIONAL/EXTERNAL ACTIVITIES**

### **- DASC**

Michael Mirmak noted that there is a meeting next week. He does not anticipate any business related to IBIS. The DASC file and e-mail archive may be found at:

<http://www.dasc.org/>

### **- P1735 Encryption**

Michael Mirmak saw a notice that the group is performing some technical testing now. The IEEE Study Group on Encryption web reflector archives are found at:

<http://www.eda-stds.org/ip-encrypt/hm/>

### **-VHDL-AMS Table-Driven Models**

Arpad Muranyi reported that he missed the last meeting. They had a vote on how this specification would be written up. He sent comments to the group about DC operating points related to frequency tables. More information can be found at:

[http://www.eda.org/twiki/bin/view.cgi/P10761/ProjectsArea#Table\\_driven\\_Modeling\\_Champion\\_J](http://www.eda.org/twiki/bin/view.cgi/P10761/ProjectsArea#Table_driven_Modeling_Champion_J)

### **-Conferences**

The IEEE Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS) is October 24-27, 2010 in Austin, Texas. There is one presentation by SiSoft related to IBIS-AMI models. More information can be found at the following link:

<http://epeps.ece.illinois.edu/>

EMCCompo2011, the 8<sup>th</sup> International Workshop on Electromagnetic Compatibility of Integrated Circuits, will be held in Dubrovnik, Croatia November 6-9, 2011. Organizers of the event have contacted the IBIS Open Forum to see if there is interest in having a tutorial session on IBIS. More information can be found at:

<http://www.emccompo2011.org>

-Press Update  
None.

## **TECHAMERICA STATUS**

Michael Mirmak reported that the TechAmerica technical writer has begun working on updating the IBIS specification. He prepared preliminary documentation on how he would update the IBIS specification to a new style format. Michael showed the document that includes a table of contents, removes the “[” characters, adds titles to sections, etc. Fonts have been updated with actual IBIS examples remaining in Courier font. The document for review and comment is available at:

[http://www.eda.org/ibis/reformat\\_wip/IBIS\\_5%200\\_sample\\_pages.pdf](http://www.eda.org/ibis/reformat_wip/IBIS_5%200_sample_pages.pdf)

## **VOTING REPRESENTATIVE LIST**

Randy Wolff presented a spreadsheet showing each member company's primary and secondary contacts as found in the roster page on the IBIS website. It also showed who the usual IBIS Open Forum teleconference attendees are from each member company. Randy noted that many teleconference attendees are not listed as contacts for their respective companies. Michael Mirmak added that he wants those who are usual participants to be listed as primary or secondary contacts to make sure they get TechAmerica ballots. Bob Ross noted that many contacts need to be updated in the roster. Michael suggested that members request by email that they be added as contacts. The spreadsheet is available at:

[http://www.eda.org/ibis/minutes/min2010/m102210\\_docs/Member\\_v\\_Voter\\_2010.pdf](http://www.eda.org/ibis/minutes/min2010/m102210_docs/Member_v_Voter_2010.pdf)

## **CHARTER DISCUSSION**

Michael Mirmak reported that the charter draft is not yet available for review. The charter has not been revised since 1996. Revisions are needed to allow the IBIS Open Forum to take advantage of TechAmerica's new balloting system.

## **IEC APPROVAL ACTIVITIES**

Randy Wolff reported that there was an IEC meeting in Seattle two weeks ago. No representative from IBIS was able to attend the meeting. Randy will contact Chris Denham for an update. He was asked to attend the TC93 meeting. Michael Mirmak noted that Ron Waxman was listed as a US contact for several working groups and may be a good person to contact.

## **SUMMIT STATUS**

-China Summit Planning

The meeting is at the Four Points by Sheraton hotel in Shenzhen on Tuesday, November 9. Lance Wang and Bob Ross are handling the signups. Bob reported that the sixth announcement went out. Ten presentations are planned. The agenda is being developed. The

primary sponsor of the event is Huawei Technologies. Co-sponsors include Agilent Technologies, Ansoft, Cadence Design Systems, Cybernet, Intel, IO Methodology, Mentor Graphics, Signal Integrity Software (SiSoft), Sigrity, Synopsys and ZTE.

#### -Taiwan Summit Planning

The meeting will be held Friday, November 12 at the Sherwood Hotel in Taipei near Intel. Sigrity is assisting with the registration. Bob Ross reported that the sixth announcement went out. 9 presentations are planned. Bob is working with Steven Wong of ICT-Lanto to print the booklets. Vendor tables will be available. The agenda is being developed. Co-sponsors are Agilent Technologies, Avant Technology (IO Methodology), Foxconn, ICT-Lanto, Intel, Sigrity and Synopsys.

#### -Japan Summit Planning

The meeting will be Monday, November 15 at the JEITA headquarters near Tokyo Station. No lunch is planned. Bob reported that 6-7 presentations are planned so far. Bob plans to give Michael Mirmak's chair presentation, as Michael will not attend the meeting. The presentation deadline will be about one week before the meeting. JEITA staff will handle the signups. Vendor tables are likely. Co-sponsors include Cadence, Sigrity and Zuken.

#### -DesignCon 2011 Planning

DesignCon is January 31 – February 3, 2011. The Summit is scheduled for February 3. Michael Mirmak reported that we are waiting for signatures to close on final sponsorship arrangements with UBM, EE Times' parent company. The meeting room is reserved. Bob added that we may prepay expenses with funds from our 2010 budget.

Sponsorship opportunities for all upcoming IBIS summits are available, with sponsors receiving free mentions in the minutes, agenda, and other announcements. Contact the IBIS Board for further details.

### **IBIS QUALITY TASK GROUP**

Mike LaBonte reported that the group is meeting at two week intervals with the next meeting Tuesday, October 26. They plan to discuss a new BIRD being proposed by Anders Ekholm related to Golden Waveforms. The group is still investigating the IEEE FSV specification. They ran into problems specifically in testing the FSV1D software. For now they are holding off on plans to fully describe FSV in the correlation spec, but they find no fault with the method as described by IEEE. They just can't understand it very well until the software works well enough to serve as a learning tool. They also recently discussed goals of the Quality group.

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

[http://www.eda.org/ibis/quality\\_wip/](http://www.eda.org/ibis/quality_wip/)

### **IBIS MODEL REVIEW TASK GROUP**

No update.

## **ADVANCED TECHNOLOGY MODELING TASK GROUP**

Arpad Muranyi reported that the group finished the AMI flow diagram and reference flow discussions. These became BIRD120. The group is now working on editorial and clarification topics. They discussed BIRD119 in the last meeting.

Task group material can be found at:

[http://www.eda-stds.org/ibis/macromodel\\_wip/](http://www.eda-stds.org/ibis/macromodel_wip/)

## **INTERCONNECT TASK GROUP**

Michael Mirmak reported that the MCP proposal was discussed two weeks ago. They discussed IBIS-ISS in the last meeting. ISS will be a draft 0.7 soon and is nearly finished. Bob Ross noted that Touchstone 2.1 will need to be discussed by the group in the future.

Task group material can be found at:

[http://www.eda.org/ibis/interconnect\\_wip/](http://www.eda.org/ibis/interconnect_wip/)

## **NEW ISSUES**

Bob asked if Michael Mirmak received the budget from TechAmerica for 2011. Michael responded that he did not yet but he will follow up with Chris Denham. The budget schedule may have changed.

## **BIRD113.2: WEAK PULL-UP AND WEAK PULL-DOWN RESISTANCE AND VOLTAGE**

Greg Edlund reported that after discussion in the last meeting, he updated the BIRD to add Weak\_I and Weak\_V parameters that are distinct from the Weak\_I and Weak\_R pair. These new parameters can describe a weak termination that is a FET structure that looks more like a current source than a resistor.

Arpad Muranyi asked how reliable this detection methodology will be if the parameters are optional. Greg noted that he plans to contact his model suppliers and require that they include these parameters. Mike LaBonte noted that these parameters have to be optional, because they should not be included if the device has no weak terminations.

Bob Ross noted that the posted BIRD has corrupted spacing due to the mailer, and it should be updated. Bob described the new parameters. The Weak\_V was maintained along with the new Weak\_I even though Weak\_V is not needed, because it is useful for parsing and analysis.

Walter Katz noted that the use of these new parameters would indicate an issue with termination, but he asked if the effect of these would show up in a simulation's I-V curves and show a problem in simulation. Greg responded that it is not necessarily true that a simulator would see an issue. Bob noted that these weak termination values might show up in the noise of I-V curves and not be modeled properly.

Walter asked what rules would be applied in an IBM parser to indicate that there is an issue with terminations. He asked Greg to publish what their algorithms are as additional information. Greg will prepare this information. Bob noted that he looked at combining all the parameters in a Thevenin equivalent circuit to calculate the quiescent voltage on the signal.

The BIRD will be scheduled for a vote at the next teleconference meeting.

#### **BIRD114.2: IBIS-AMI DEFINITION CLARIFICATIONS**

Arpad Muranyi stated that version 114.2 modified a string definition to be a sequence of ASCII characters enclosed in double quotes (""). The ASCII definition limits the character set allowed in strings. Bob Ross noted that section 3, item 14 could become a moving target, so he suggested fully defining the ASCII rules instead of referencing the IBIS specification (section 3). The reference to section 3 could change. Radek Biernacki thinks we should disallow the negative exponents for integers. He also noted that a 'token' is never defined. Arpad requested that the comments be made in an email.

Arpad motioned that the vote be cancelled on BIRD114.1. The motion was seconded and approved.

#### **BIRD115: CLARIFYING MIN/TYP/MAX IN IBIS-AMI**

Arpad Muranyi stated that the BIRD simply clarifies the typ/min/max definitions of parameters within IBIS-AMI. Walter Katz moved that the BIRD be put up for a vote and this was seconded. Walter also moved for unanimous approval. This was seconded. There were no objections, so the BIRD was approved for inclusion in the next version of the IBIS specification.

#### **BIRD116: ADD IBIS-ISS TO [EXTERNAL MODEL] AND [EXTERNAL CIRCUIT] AS A SUPPORTED LANGUAGE**

Arpad shared a presentation. He compared what IBIS models are capable of in the current specification and what would be desired for IBIS-AMI analog buffer and package modeling. He mentioned some reasons for making IBIS-ISS available for [External Model] and [External Circuit].

IBIS-ISS is also useful for package modeling. The D\_drive signal for differential buffers in [External Model] is single ended, and this may need to be updated to become a differential stimulus into an IBIS-ISS subcircuit if the controlled sources in the IBIS-ISS specification are not sufficient to generate an inverted signal. BIRD116, BIRD117 and BIRD118 work together to support parameterized analog AMI models.

There may be a need for another BIRD to be able to make a connection to the analog output of an Rx ISS subcircuit, but this depends on how BIRD119 will end up describing that connection. Another BIRD has been submitted to the IBIS Open Forum for IBIS-ISS to be used in [Define Package Model]. Arpad showed several examples of how the analog models described in BIRD119 for Rx and Tx could be implemented using IBIS-ISS under [External Model]. He also showed a couple of examples for how IBIS-ISS can be used for package modeling. Although



these BIRDS work well to describe analog AMI models, they are not limited to AMI modeling only. The BIRDS give IBIS modeling a much needed improvement in general.

Bob Ross moved that further discussion be moved to the end of the meeting if time is available. This was seconded and approved.

Arpad's presentation may be found at:

[http://www.eda.org/ibis/minutes/min2010/m102210\\_docs/IBIS\\_Teleconference\\_2010\\_10\\_22.pdf](http://www.eda.org/ibis/minutes/min2010/m102210_docs/IBIS_Teleconference_2010_10_22.pdf)

#### **BIRD117.1: PARAMETERIZE A\_TO\_D AND D\_TO\_A CONVERTERS**

Discussion on BIRD117.1 is captured in the BIRD116 discussion notes.

#### **BIRD118: ANALOG PARAMETER ASSIGNMENTS**

Discussion on BIRD118 is captured in the BIRD116 discussion notes.

#### **BIRD119: IBIS-AMI NEW RESERVED PARAMETERS**

Walter Katz stated that the original BIRD has been split up into four BIRDS. The first section of BIRD119, now BIRD121, deals with data management and simulation control parameters. The Supporting\_Files parameter adds a list of all the files that are needed including DLLs and other supporting data files. DLLPath allows passing to the DLL a path indicating where it is stored. DLLid is a mechanism to make output files unique. Samples\_Per\_Bit is another new parameter.

Parameters related to the broadband analog model will be in BIRD122. Parameters related to the equivalent-circuit analog model will be in BIRD123. Parameters related to jitter, noise and clock modeling will be in BIRD124.

The BIRDS also replace Tx\_DCD and add keywords for dependency, allowing a dependency table that reduces the number of allowable model configurations.

#### **BIRD120: IBIS-AMI FLOW CORRECTION**

No discussion due to time limitations.

#### **TSCHK2 BUG STATUS**

No new BUGs to report.

#### **IBISCHK5 BUG STATUS**

Bob Ross introduced BUG122. It was found that ibischk5 does not parse Vref values from the [Model Spec] section. It was classified as Moderate severity, Medium priority and Open status.

## **IBISCHK5 UPDATE STATUS**

Bob Ross noted that he expects a release (5.0.4) to evaluate from the developer next week.

## **IBIS-ISS STATUS**

No discussion.

The work in progress document can be found in the following directory:

[http://www.eda.org/ibis/ibis-iss\\_wip/](http://www.eda.org/ibis/ibis-iss_wip/)

## **C\_COMP AND CORNER DISCUSSION**

Not discussed due to time limitations.

## **NEW TECHNICAL ISSUES**

None.

## **NEXT MEETING**

A motion was made to hold the next teleconference meeting November 19. The motion was seconded and approved.

The next IBIS Open Forum summits will be held November 9, 2010 in Shenzhen, China, November 12, 2010 in Taipei, Taiwan and November 15, 2010 in Tokyo, Japan. The next IBIS Open Forum teleconference will be held November 19, 2010 from 8:00 to 10:00 AM US Pacific Standard Time. A vote on BIRD113 is scheduled.

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## **NOTES**

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This meeting was conducted in accordance with the GEIA Legal Guides and GEIA Manual of Organization and Procedure.

The following e-mail addresses are used:

[majordomo@eda.org](mailto:majordomo@eda.org)

In the body, for the IBIS Open Forum Reflector:

subscribe ibis <your e-mail address>

In the body, for the IBIS Users' Group Reflector:

subscribe ibis-users <your e-mail address>

Help and other commands:

help

[ibis-request@eda.org](mailto:ibis-request@eda.org)

To join, change, or drop from either or both:

IBIS Open Forum Reflector ([ibis@eda.org](mailto:ibis@eda.org))

IBIS Users' Group Reflector ([ibis-users@eda.org](mailto:ibis-users@eda.org))

State your request.

[ibis-info@eda.org](mailto:ibis-info@eda.org)

To obtain general information about IBIS, to ask specific questions for individual response, and to inquire about joining the EIA-IBIS Open Forum as a full Member.

[ibis@eda.org](mailto:ibis@eda.org)

To send a message to the general IBIS Open Forum Reflector. This is used mostly for IBIS Standardization business and future IBIS technical enhancements. Job posting information is not permitted.

[ibis-users@eda.org](mailto:ibis-users@eda.org)

To send a message to the IBIS Users' Group Reflector. This is used mostly for IBIS clarification, current modeling issues, and general user concerns. Job posting information is not permitted.

[ibis-bug@eda.org](mailto:ibis-bug@eda.org)

To report ibischk parser BUGs as well as tschk2 parser BUGs. The BUG Report Form for ibischk resides along with reported BUGs at:

<http://www.eda.org/ibis/bugs/ibischk/>  
<http://www.eda.org/ibis/bugs/ibischk/bugform.txt>

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

[http://www.eda.org/ibis/tschk\\_bugs/](http://www.eda.org/ibis/tschk_bugs/)  
[http://www.eda.org/ibis/tschk\\_bugs/bugform.txt](http://www.eda.org/ibis/tschk_bugs/bugform.txt)

[icm-bug@eda.org](mailto:icm-bug@eda.org)

To report icmchk1 parser BUGs. The BUG Report Form resides along with reported BUGs at:

[http://www.eda.org/ibis/icm\\_bugs/](http://www.eda.org/ibis/icm_bugs/)  
[http://www.eda.org/ibis/icm\\_bugs/icm\\_bugform.txt](http://www.eda.org/ibis/icm_bugs/icm_bugform.txt)

To report s2ibis, s2ibis2 and s2iplt bugs, use the Bug Report Forms which reside at:

<http://www.eda.org/ibis/bugs/s2ibis/bugs2i.txt>  
<http://www.eda.org/ibis/bugs/s2ibis2/bugs2i2.txt>  
<http://www.eda.org/ibis/bugs/s2iplt/bugspl.txt>

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

<http://www.eigroup.org/ibis/ibis.htm>

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

<http://www.eda.org/ibis/directory.html>

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## IBIS CURRENT MEMBER VOTING STATUS

### I/O Buffer Information Specification Committee (IBIS)

Organization	Interest Category	Standards Ballot Voting Status	August 20, 2010	September 10, 2010	October 1, 2010	October 22, 2010
Advanced Micro Devices	Producer	Active	-	X	X	-
Agilent Technologies	User	Inactive	X	-	-	X
Ansys	User	Inactive	-	-	-	-
Apple Computer	User	Inactive	-	-	-	-
Applied Simulation Technology	User	Inactive	-	-	-	-
ARM	Producer	Inactive	-	-	-	-
Cadence Design Systems	User	Active	X	X	-	X
Cisco Systems	User	Active	X	X	X	X
Ericsson	Producer	Inactive	-	X	-	X
Freescale	Producer	Inactive	-	-	-	-
Green Streak Programs	General Interest	Inactive	-	-	-	-
Huawei Technologies	Producer	Inactive	-	-	-	-
Hitachi ULSI Systems	Producer	Inactive	-	-	-	-
IBM	Producer	Active	X	X	X	X
Infineon Technologies AG	Producer	Inactive	-	-	-	-
Intel Corp.	Producer	Active	X	X	X	X
IO Methodology	User	Active	-	X	X	-
LSI	Producer	Active	X	X	X	X
Mentor Graphics	User	Active	X	X	X	X
Micron Technology	Producer	Active	X	X	X	X
Nokia Siemens Networks	Producer	Active	X	X	-	X
Samtec	Producer	Inactive	-	-	-	-
Signal Integrity Software	User	Active	X	X	X	X
Sigrity	User	Inactive	-	-	-	-
Synopsys	User	Inactive	-	-	-	-
Teraspeed Consulting	General Interest	Active	X	X	X	X
Texas Instruments	Producer	Inactive	-	X	-	-
Toshiba	Producer	Inactive	-	-	-	-
Xilinx	Producer	Inactive	-	-	-	-
ZTE	User	Inactive	-	-	-	-
Zuken	User	Inactive	-	-	-	-

#### CRITERIA FOR 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 TECHAMERICA 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.