Unconfirmed Meeting Minutes: IEEE P802.3dm Asymmetrical Electrical Automotive Ethernet Task Force

March 10-11, 2025
IEEE 802 Plenary, Atlanta, GA USA

Prepared by George Zimmerman

IEEE P802.3dm Task Force meeting convened at **1:16 PM EDT, Monday, March 10, 2025**, by Jon Lewis, IEEE P802.3dm Task Force Chair.

Attendance is listed in Appendix A
Straw Poll Roll Calls listed in Appendix B
Motion Roll Calls are listed in Appendix C

Presentation: https://www.ieee802.org/3/dm/public/0325/agenda_3dm_01b_0325.pdf
Presenter: Jon Lewis, Chair.

Mr. Lewis turned to presentation agenda_3dm_01b_0325.pdf and reviewed the agenda for the meeting.

Approval of Agenda: The chair asked whether there were additions or corrections to the agenda, and there were none. He then considered the following motion:

Motion #1
Move to approve the agenda
M: Ragnar Jonsson
S: Peter Jones
(Procedural > 50%)
MOTION PASSES WITHOUT OBJECTION

He announced that the agenda was approved as posted.

Mr. Lewis then resumed the review of agenda_3dm_01b_0325.pdf, showing the agenda.

Previous Meeting Minutes: The chair announced that the minutes from the Task Force meeting at the IEEE 802.3 Interim January 22-24, 2025 had been posted and asked the group to consider any additions or corrections to them.
The chair additionally informed the group that the February 27, 2025 ad hoc minutes had only been recently posted and would be considered at a later date.

The chair entertained the following motion:
Motion #2

Move to approve:
Task Force minutes from Jan 2025
https://www.ieee802.org/3/dm/public/0125/Unconfirmed_minutes_3dm_0125.pdf

• M: Bob Voss
• S: Rich Boyer
MOTION PASSES BY UNANIMOUS CONSENT

(1:20 PM)

Mr. Lewis then resumed the review of agenda_3dm_01b_0325.pdf

Mr. Lewis noted that there should be no recording or photography without permission.

- Mr. Lewis asked if anyone was attending from the press including those who would run a public blog on this meeting – there were no indications from the group.

The chair discussed the goals of the meeting, and that more presentations had been received than there was time allotted for the meeting, and thanked the group for voluntary postponements and consolidation. He noted that there were 2 presentations that were queued for hearing only if there was time available.

The chair announced that the meeting was being conducted as part of the IEEE 802 plenary meeting series and that registration, including payment of meeting fees, was required for attendees. He further announced that attendance without properly registering is subject to penalties under IEEE 802 rules.

Mr. Lewis then continued review of the presentation, reviewing decorum, goals for the meeting, information for the reflector, private area, and ground rules.

The Chair announced that as this meeting was an electronic Task Force meeting, under 802.3 rules, only working group voters may vote on motions.

Attendance
The chair reminded the group that attendance credit would be taken from IMAT, and that as announced by the 802.3 Working Group Chair, IMAT registration would be for individual slots (AM1, AM2, PM1, and PM2) through the day's meeting.

The chair reminded the group that meeting participants can only claim IMAT attendance credit if they attend 75% of a meeting slot's duration, and that officers may remove IMAT attendance if a participant is found to attend less than 75% of a slot's duration. He further reminded the group of the rules for gaining and maintaining voting rights.

The Chair advised the group that attendance would be taken from IMAT, and that zoom attendance would be used to reconcile the attendance, but IMAT was the official record. He then reminded attendees that they should show their employer & affiliation, and how to set these to make them correct.

IEEE Structure, Policies
Mr. Lewis continued review of the IEEE SA structure, where to find the rules, and asked whether anyone in the room or online had not seen the various policy slides this week. There were no responses. He therefore announced that he would show the slides and summarize.

IEEE SA Patent Policy, Mr. Lewis reviewed slides 0 through 4 of the IEEE SA Patent Policy (slides 15 – 19 in the agenda deck), showed and read aloud slides 1 and 2 of the IEEE SA patent policy from the agenda deck, and made the call for patents on the slide labeled "Ways to Inform IEEE" **(1:31 pm)**.

There was no response to the call for patents at **1:31pm**.
He then showed and read aloud slide 3 of the patent policy, and showed slide 4 of the patent policy.

Other IEEE Policies
Mr. Lewis showed and read aloud the slides on the IEEE SA copyright, Participant behavior (ethics), IEEE individual participation, and fair and equitable consideration policies as shown in the agenda deck. (1:35 PM).

There were no questions.

Mr. Lewis reviewed the standards development process for IEEE and where this Task Force is in the process.

LIAISONS
The chair noted that the Task Force had received a liaison from ASA with the 2.1 version of the ASA specification. The liaised specification has been placed in the 802.3dm private area, as well as linked to from the 802.3 website. He clarified it is actually in the 802.3dm private area.

The liaison itself is at https://www.ieee802.org/3/minutes/mar25/incoming/2025-02-11_ASA_to_IEEE%20_Redacted.pdf .
(1:36PM)
The chair stated that a proposed response would be reviewed during Tuesday's meeting.

Other Procedures
The chair announced that the group would review a potential timeline during closing business discussions.

The chair then also announced guidelines for the meeting and use of meeting times. He indicated that as the group was considering baseline text at this stage that he would be more lenient regarding time limits this time to ensure full and complete discussion.

The Chair completed a review of the presentation, showing the order of presentations. He reviewed each page. There were no changes to the order of presentations.
The chair announced that each presentation, including Q&A had 30 minutes allocated, after which the agenda would move to the next presentation.

PRESENTATIONS

(1:39PM) The Chair then moved to the presentations for the meeting.

Title: Text for the RL and IL Link Requirements
URL: https://www.ieee802.org/3/dm/public/0325/boyer_sharma-3dm_xx_03-10-25_RevB.pdf
Presenter: Rohit Sharma - Molex & Rich Boyer – Aptiv

Discussion: The presenter discussed a proposal for the RL and IL Link Requirements. During the presentation, the presenter noted that the graphs showing negative values of RL & IL were simply inverted due to the fact that measurements were generally of gain, not loss (e.g., axis labels of "-x" insertion or return loss should be understood as "+x" loss…).
Questions were asked and answered. During questions, it was noted that the insertion loss equation (but not the return loss proposed values) suffered from the same sign inversion as the axes.

(2:07 PM)
The Chair reminded participants to sign into IMAT and log their attendance. He asked if anyone had difficulty logging attendance. None responded.
(2:09 PM)

Title: GMSL-based FDD PHY Simulation Results and Complexity Analysis
URL:https://www.ieee802.org/3/dm/public/0325/GMSLE_FDD_PHY_Simulation_Results_and_PHY_Complexity_rev1p0.pdf

Presenter: Jay Cordaro, Analog Devices
Discussion: The presenter discussed a GMSL-based PHY proposed in the Ad Hoc which was simulated with noise models presented. This analysis combined with GMSL's excellent EMC track record and performance in the market lay the basis for a case for a middle ground PHY between the ACT and TDD proposals which meets Task Force objectives. A detailed complexity analysis is presented (in 55nm) to show the proposed PHY can meet these objectives with less complexity than the current proposals. The presenter included EMC and noise performance for the low-speed receiver in BCI CW noise based on prior contributions to the task force, evaluated by passing error-free frames without use of FEC.
(2:30 PM) The chair announced that given limited time for questions, questioners were limited to 1 minute exchanges.
Questions were asked and answered.

(2:42 PM)
Mr. Lewis turned the chair over to the vice-chair, Ms. Wienckowski at the start of the next presentation.

Title: Simulated Cable Transfer Functions
URL: https://www.ieee802.org/3/dm/public/0325/jonsson_3dm_01_03_10_25.pdf
Presenter: Ragnar Jonsson, Marvell
Discussion: The presentation discussed shared S-parameters for simulated cables, based on realistic cables and to be used with the simDM simulator inputs. These cable parameters are shared to help with simulation and evaluation of different PHY technologies for 802.3dm. He additionally called for measurements to be contributed to use as well. (The presenter noted that some of the S-parameter zip files shared had not been posted as of the presentation time.)
Questions were asked and answered.

(2:54 PM)
Title: Complexity and Integration of TDD Based PHY at the Camera Side
URL: https://www.ieee802.org/3/dm/public/0325/Chini_3dm_02a_0325.pdf
Presenter: Ahmad Chini & Mehmet Tazebay, Broadcom Corporation

Discussion: The presenter discussed an Equalizer design shown with simulation results for a Camera receiver, TDD based solution. Implementation area and power were discussed along with Integration possibilities.
Questions were asked and answered.

(3:26 PM)

At 3:26PM, the Chair announced that it was time for the afternoon break, to resume at 3:47 PM.

Title: Linkup Process for TDD based Asymmetric Camera Link
URL: https://www.ieee802.org/3/dm/public/0325/Chini_3dm_01a_0325.pdf
Presenter: Ahmad Chini & Mehmet Tazebay, Broadcom Corporation
Discussion: The presenter discussed the linkup process for equalization, synchronization and capability exchange for TDD based transceivers.
Questions were asked and answered.

(4:04 PM)

Title: Complexity of TDD vs ACT PHY
URL: https://www.ieee802.org/3/dm/public/0325/Dalmia_3dm_01_03102025.pdf
Presenter: Kamal Dalmia, Aviva Links
Discussion: The presenter analyzed attributes of TDD and ACT PHYs to show the tradeoffs and relative complexities focusing on the startup behavior.
Questions were asked and answered.

During questioning the chair reminded a commenter referring to “we” that participation is by individual. The chair also reminded at least one questioner of the time limits.

(4:34 PM)
The chair gave a break for signing into IMAT and some administrative announcements.

(4:38 PM) Due to a transportation issue, the next scheduled presenter was unavailable, so the chair asked the group if there was objection to skipping forward to the presentations scheduled for the start of the next day. There was no objection.

(4:39 PM)
Title: simDM simulated PHY performance in presence of environmental noise
URL: https://www.ieee802.org/3/dm/public/0325/jonsson_3dm_02_03_10_25.pdf
Presenter: Ragnar Jonsson, Marvell
Discussion: The presentation showed simulation results, generated with the simDM simulation environment and the simulated cables discussed earlier in this meeting. It discussed the impact of environmental noise on PHY performance, including a review of PAM 2 vs. PAM 4 for 2.5 Gbps in the high data rate direction in the presence of 1300 MHz and 3000 MHz RADAR pulses.
Questions were asked and answered.

(5:02 PM)
Title: On Considerations related to Transmit PSD for the Proposed Duplexing Schemes

URL:https://www.ieee802.org/3/dm/public/0325/ahuja_8023dm_01_031025_on_transmit_psd_considerations_for_proposed_duplexing_schemes.pdf
Presenter: Ramanjit Ahuja, Onsemi
Discussion: The presenter discussed the comparison of transmit PSD and power for the TDD, ACT, GMSL-E proposals along with other standards as well as considerations for emissions.
Questions were asked and answered.
(5:30 PM)

Day One Closing Business
The chair briefly reviewed the progress and the revised timeline given the presentations heard. These are shown in a revised version of the agenda deck, agenda_3dm_01c_0325.pdf.
He then discussed the current progress on the potential timeline and his view that the standard would extend into 2027. The Chair voiced a concern on progress and stated that the task force needed to make progress and offered a straw poll to assess where the group was on making key technology choices.

Straw Poll #1
I would support down-selecting to the following duplexing technique (choose one):
A: TDD (per chini et al presentations)
Or
B : Frequency-overlapped (ACT or GMSLE) (per Jonsson, et al or Cordara presentations)
A: 29/61 B: 31/61 (92 participants in the Zoom call (minus 2 for the chair and the meeting host computer = 90)

The meeting recessed for the day at 5:42PM, to resume at 8:00AM EDT 3/11/2025.

The meeting resumed at 8:02 AM EDT, 3/11/2025
MORNING BUSINESS
Jon Lewis, 802.3dm Task Force Chair, reconvened the meeting at 8:02 AM 3/11/2025. He then briefly reviewed the agenda deck (agenda_3dm_01c_0325.pdf).
The chair reminded the group that there should be no recording or photography without permission, and asked whether there were any members of the press present.
There were no responses (8:05 AM)
The chair then advised the group that attendance is recorded in IMAT and how to do that.
The chair then showed the IEEE Patent Policy slides from the agenda deck and gave the call for patents. There were no responses (8:07AM)
The chair then showed the IEEE copyright policy, participant behavior (codes of ethics and conduct), individual process, and fair and equitable consideration slides from agenda_3dm_01c_0325.pdf. There were no questions.
The chair reviewed the planned presentation schedule for day 2.

He then previewed a proposed liaison response to ASA thanking them for liaising their 2.1 specification.
There were no questions, additions or corrections.

MOTION #3
Move to approve the liaison response to ASA at
https://www.ieee802.org/3/dm/public/0325/0325_802d3_to_ASA_draft_Redacted.pdf
M: Peter Jones
S: Mehmet Tazebay
APPROVED WITHOUT OBJECTION

(8:13 AM)
The Chair then moved to the scheduled presentations, beginning with the one that was bypassed the previous day:

Title: ACT Receiver: The Effect of High-Pass Filter and Poor Hybrid
URL: https://www.ieee802.org/3/dm/public/0325/sedarat_3dm_02_202503.pdf
Presenter: Hossein Sedarat, Ethernovia
Discussion: The presenter responded to concerns raised about HPF effect on the ACT receiver complexity and the PSD of the ACT transmitter. This presentation shows some additional study on these items.
Questions were asked and answered.
During discussion, the chair asked one participant, after multiple prolonged comments, to move further questions to the reflector.

(8:42 AM)
Title: Link Sync Proposal
URL: https://www.ieee802.org/3/dm/public/0325/xxx.pdf
Presenter: William Lo, Axonne
Discussion: The presenter discussed an asymmetrical link sync scheme and also showed some data on how this can work with Crystal-less operation.
<Note – during the presentation, the Mr. Lewis handed the chairing of the meeting to Natalie Wienckoswski, the 802.3dm Vice Chair>
Questions were asked and answered.

(9:10 AM)
Title: On Receiver Considerations for ACT
URL:https://www.ieee802.org/3/dm/public/0325/ahuja_8023dm_01_031025_on_receiver_considerations_for_act.pdf
Presenter: Ramanjit Ahuja, Onsemi
Discussion: The presenter discussed issues around receiver complexity and performance, as well as assumptions about the channel properties for the proposed ACT duplexing.
Questions were asked and answered.
< **Note** – During question and answer, Mr. Lewis resumed his duties chairing the meeting>

(9:37 AM)
Title: Link Synchronization for Crystal-less Camera Links
URL: https://www.ieee802.org/3/dm/public/0325/xxx.pdf
Presenter: Alireza Razavi, Marvell
Discussion: The presenter discussed a new link synchronization method.
There were no questions.
(9:45 AM)

Having completed the scheduled presentations, the chair then reminded the group to log into IMAT.

The chair asked that if anyone was considering straw polls that they forward them to him. Straw polls would be held after the break.
The Chair then asked Ms. Wienckowski, as Chief Editor, to review the state of the draft.

Editor's Report
Title: IEEE P802.3dm Draft 0.3
URL: https://www.ieee802.org/3/dm/private/drafts/P802dm_D0p3.pdf
Presenter: Natalie Wienckowski, IVN Solutions/ Ethernovia (Chief Editor)
The chief editor reviewed the current content in draft 0.3, incorporating decisions from the prior meeting, and highlighting things that need to be filled out.

During discussion, a participant asked what format was needed for inputs. The Working Group chair (Mr. Law) reminded the group that under the rules, the Working Group chair determined the format of the draft for submission to the working group, and he determined it to be frame. Ms. Wienckowski indicated a willingness to take Word (or other word processing) formats for text (rather than acrobat), and Mr. Lewis offered to assist with conversion of drawings to Frame.

At **10:03AM** the Chair indicated it was time for the morning break.

The meeting resumed at **10:32 AM.**

Straw Polls
The Chair then entertained the following straw polls:

Straw Poll #2
I support PAM2 modulation for 2.5G and 5G transmitters
Yes: 53
No:14
(94 participants in the call)
(Note - The straw poll was clarified to mean for BOTH 2.5G and 5G transmitters…)

Straw Poll #3
I support insertion loss limits defined by the equations on slides 5 and 6 of
https://www.ieee802.org/3/dm/public/0125/Zerna_802.3dm_01_250122_IL_RL.pdf
For STP and Coax channels respectively.
Yes: 36
No: 21
(Note – the straw poll was clarified to be only on the equations, not the figures in the referenced contribution)

Straw Poll #4
I support the following duplexing method for 802.3dm (pick one):

1. TDD
2. ACT
3. FDD (proposed under the name GMSLE)

1: 33

2: 25
3: 6
(A questioner asked if he could answer for both 2&3 – the answer was no, pick one)

Straw Poll #5
I would be in favor of (pick as many as you wish):

A) PAM2 for 2.5G
B) PAM4 for 2.5G
C) PAM2 for 5G
D) PAM4 for 5G

A: 57
B: 19
C: 45
D: 30

MOTIONS:
The Chair then entertained the following motions:
(taken via Direct Vote Live, working group voters only, per 802.3 rules)

MOTION #4
Move to give the editor license to add any necessary references to asymmetric PHYs in Clause 46 and its subclauses.
M: William Lo
S : Alireza Razavi

Y: 50
N: 1
A: 9
MOTION PASSES (Technical >= 75%)

MOTION #5
Move to adopt PAM2 for 2.5G and 5G transmitters
M: Mehmet Tazebay
S: Kamal Dalmia

Y: 33
N: 21
A: 8
MOTION FAILS (Technical >= 75%)

MOTION #6
Move to adopt PAM2 for the 2.5G transmitter
M: Mehmet Tazebay
S: Kamal Dalmia

Y: 49
N: 10
A: 3
MOTION PASSES (Technical >= 75%)
The chair reported he had received no further motions.

(11:14 PM)

Path Forward

The chair then reported on discussions with the working group chair and the chief editor with how to progress the project. He indicated that he would ask the task force to produce multiple drafts. Proponents of each proposal would prepare a draft, and he (and the working group chair) asked proponents of competing proposals not to impede the development of the other draft(s). These drafts would ideally provide clearer options for the task force, and, if the task force could not decide, to be presented as options to the working group.

The Task Force works at the pleasure of the Working Group, and if the task force did not make a selection, the Chair would ask the working group to select a draft for preparation for working group ballot.
In summary, the Chair proposed the following process:

- 2 (or possibly 3) drafts moving forward. Move from pptx to actual baseline text
- Off-cycle teleconference every 2 weeks
- Attempt to select between the two drafts at the May interim
- Attempt to select between the options at the July plenary
- If no selection, the Chair will ask the Working group to select a draft for preparation for WG ballot (in July).
- In preparation for that possibility, a late June/Early July teleconference will be held for the Working Group to review the drafts, with pre-circulation of the drafts in June.
- Working Group vote in July unless there is a path forward

Note: The request in July would be for the WG to select a technical path forward if the TF is not able to. There is no expectation to go to WG ballot out of the July meeting.
Questions were asked and answered.

FUTURE MEETINGS

Proposed interim teleconferences to progress the drafts
March 24
April 17
May 1

There was a possibility of an additional meeting to be held on May 8.

Mr. Lewis reminded the group that the next scheduled face-to-face meeting would be during the IEEE 802.3 interim in New Orleans, LA USA from May 12 to May 16 (exact days for 802.3dm to be announced).

The Chair reminded the group of postponed presentations which could be heard at one of the upcoming ad hocs, if desired by the presenter(s).

The Chair then reminded the group to log attendance on IMAT.

The Vice Chair asked that motions for March 24 would be on presentations that had already been viewed by the task force.

The Chair indicated that the agenda had been exhausted.

Mr. Lewis adjourned the meeting at **12:03PM EDT.**

NOTE: Additional presentations submitted that were postponed:

Title: Insertion Loss, Return Loss, Secondary Reflections, and ISI as it relates to 802.3dm

URL:https://www.ieee802.org/3/dm/public/0325/zimmerman_ILD_3dm_01_03052025.pdf

Presenter: George Zimmerman, CME Consulting

Summary: The presentation discusses an overview of the importance of insertion loss deviation specifications to control secondary reflections in high speed links. The relationship of these specifications to both BASE-T and SERDES specifications in IEEE Std 802.3 is discussed, as well as the impact of not having ILD specifications on the influence of return loss to performance.

Title: Further Power over Coax Analysis

URL: https://www.ieee802.org/3/dm/public/0325/xxx.pdf

Presenter: TJ Houck, Marvell

Summary: The presentation discusses careful filter design to prevent interference between power and data signals while maintaining signal integrity when implementing PoC. This analysis of PoC filter design focused on insertion loss, impedance matching, isolation, and EMC, and evaluated various inductor solution across different frequency ranges.

Title: Exploring EMI Immunity for ACT

: https://www.ieee802.org/3/dm/public/0325/xxx.pdf

Presenter: Alireza Razavi, Marvell

Summary: The presentation discusses emi immunity for ACT and TDD method using the simDM open-code platform.

Title: Link Synchronization for ACT

URL: https://www.ieee802.org/3/dm/public/0325/sedarat_3dm_01_202503.pdf

Presenter: Hossein Sedarat, Ethernovia

Summary: The presentation discusses a traditional PRBS signal for link-synchronization, and studies the options for the length of the PRBS.

Title: Harness Return Loss

URL: https://www.ieee802.org/3/dm/public/0325/xxx.pdf

Presenter: Conrad Zerna, Aviva Links

Summary: The presentation compares several data sources for statements on RL, and offers a conclusion.

Title: How TSN is implemented

URL: https://www.ieee802.org/3/dm/public/0325/xxx.pdf

Presenter: TJ Houck, Marvell

Summary: The presentation discusses an analysis of TDD and ACT TSN (Time-Sensitive Networking) under IEEE 1588. I will explore the advantages and challenges of TDD over ACT, focusing on jitter, latency, and practical design tradeoffs ensuring robust ethernet communication.

Title: Power-Over-Coax complexity and system impact

URL:https://www.ieee802.org/3/dm/public/0325/Zerna_802.3dm_01_250307_PoC_complexity_system.pdf

Presenter: Conrad Zerna, Aviva Links
Summary: The presentation considers complexity of PoC in TDD; including required considerations in the high-speed channel.

Appendix A: Attendees at the IEEE P802.3dm Asymmetrical Electrical Automotive Ethernet Task Force Meeting, March 10-11, 2025

Name	Employer	Affiliation	3/10 IMAT	3/10 Zoom	3/11 IMAT	3/11 Zoom
Agarwal, Uttam	Texas Instruments Inc.	Texas Instruments Inc.	1	X	2	X
Ahuja, Ramanjit	ON Semiconductor	ON Semiconductor	2	X	2	X
Aronson, Joseph	Texas Instruments Inc.	Texas Instruments Inc.	1	X	2	X
Baggett, Tim	Microchip Technology, Inc.	Microchip Technology, Inc.	2	X	2	X
Bar-Niv, Amir	Aquantia Corp	Marvell			2	X
Beauregard, Francois	Belden Canada ULC	Belden	2	X	1	X
Benyamin, Saied	Ethernovia	Ethernovia	2	X	2	X
Boyer, Rich	Aptiv - Signal and Power Solutions	Aptiv Signal and Power Solutions	2	X	2	X
Brandt, David	Rockwell Automation	Rockwell Automation	1	X		X
Brychta, Michal	Analog Devices Inc.	Analog Devices Inc.	2	X	2	X
Chang, Jae-yong	Keysight Technologies Inc	Keysight Technologies Inc	2	X	2	X
Chimento, Nicholas		Analog Devices Inc.	2	X	1	X
Chini, Ahmad	Broadcom Corporation	Broadcom Corporation	2	X	2	X
Cordaro, Jay		Analog Devices Inc.	2	X	2	X
Cui, Yaoshen	TP-Link Systems Inc.	TP-Link Systems Inc.			1	X
Dalmia, Kamal	Aviva Links Inc	Aviva Links Inc	2	X	2	X
de Koos, Andras	Microchip Technology Inc	Microchip Technology Inc			2	X
Donahue, Curtis	Rohde & Schwarz	Rohde & Schwarz	2	X	2	X
Estrakh, Daniel	Valens Semiconductor	Valens Semiconductor	2	X	2	X
Fellhauer, Felix	Robert Bosch GmbH	Robert Bosch GmbH	2	X	2	X
Ferretti, Vincent	Corning Incorporated	Corning Incorporated	2		2	
Fuller, Paul		Marvell	2	X	2	X
Ganesan, Aravind	Texas Instruments Inc.	Texas Instruments Inc.	2	X	2	X
Gauthier, Claude	NXP Semiconductors	NXP Semiconductors		X	2	X
Gilb, James	General Atomics Aeronautical Systems, Inc.	General Atomics Aeronautical Systems, Inc.	2			
Goel, Sachin	Aviva Links Inc	Aviva Links Inc	2	X	2	X
Gopal, Amrit	Ford Motor Company	Ford Motor Company	2	X	2	X
Gorshe, Steven Scott	Microchip Technology, Inc.	Microchip Technology, Inc.	2	X	2	X
Goto, Hideki	Toyota Motor Corporation	Toyota Motor Corporation	2	X	2	X
Graba, James	Broadcom Corporation	Broadcom Corporation	2	X	2	X
Graber, Steffen	Pepperl+Fuchs SE	Pepperl+Fuchs SE	2	X	2	X
Gupta, Ajeya		General Motors Company	2	X	2	X
Hogenmueller, Thomas	Robert Bosch GmbH	Robert Bosch GmbH	2	X	2	X
Hoshino, Masayuki		Continental Automotive	2	X	2	X
Houck, TJ	Marvell Semiconductor, Inc.	Marvell	2	X	2	X
Hu, Mark		Aptiv	1	X	1	X
HYAKUTAKE, YASUHIRO	Orbray Co., Ltd.	Orbray Co., Ltd.	2	X	2	X

Name	Employer	Affiliation	3/10 IMAT	3/10 Zoom	3/11 IMAT	3/11 Zoom
Jones, Chad	Cisco Systems, Inc.	Cisco Systems, Inc.	2	X	2	X
Jones, Peter	Cisco Systems, Inc.	Cisco Systems, Inc.	1	X	2	X
Jonsson, Ragnar	Marvell Semiconductor, Inc.	Marvell	2	X	2	X
Kabra, Lokesh	Synopsys, Inc.	Synopsys, Inc.	2		2	
Kagami, Manabu	Nagoya Institute of Technology	Nagoya Institute of Technology (NITech)	2	X	2	X
Kapoor, Samay	Aviva Links	Aviva Links Inc.	2	X	2	X
Kikuta, Tomohiro	Orbray Co., Ltd.	Orbray Co., Ltd.	2	X	2	X
Kim, Yongbum	Tenstorrent	General Motors Company	1	X	2	X
Kleinwaechter, Mathias	in-tech GmbH	in-tech GmbH	2	X	2	X
Kock, Joerg	NXP Semiconductors	NXP Semiconductors	2	X	2	X
Kotani, Yasuhiro	DENSO	DENSO	2	X	2	X
Lackner, Hans	QoSCom GmbH	QoSCom GmbH	2	X	2	X
Lasry, Ariel	Qualcomm Technologies, Inc	Qualcomm Technologies, Inc	2	X	2	X
Law, David	Hewlett Packard Enterprise	Hewlett Packard Enterprise			2	
Lee, Ching-Yen		Realtek Semiconductor Corp.	2	X	2	X
Lewis, Jon	Dell Technologies	Dell Technologies	2	X	2	X
Lin, YK		Realtek Semiconductor Corp.	2	X	2	X
Lo, William	Axonne Inc.	Axonne Inc.	2	X	2	X
Long, Richard		TE Connectivity	2	X	2	X
Lou, Wei		Broadcom Corporation	2	X	2	X
Maguire, Valerie	Copperopolis	Copperopolis, affiliated with CME Consulting and Cisco	2	X	2	X
Martino, Kjersti	Inneos	Inneos	2	X	2	X
Matheus, Kirsten	BMW Group	BMW Group	2	X	2	X
McClellan, Brett	Marvell Semiconductor, Inc.	Marvell Semiconductor, Inc.	2	X	2	X
Murray, Brian	Analog Devices Inc.	Analog Devices Inc.			2	X
Ng, Hiok Tiaq	Aviva Links Inc.	Aviva Links Inc; Aviva Links Inc.	2	X	2	X
NIIHARA, YOSHIHIRO	Fujikura Ltd.	Fujikura Ltd.	2	X	2	X
Oberg, Mats	Marvell Semiconductor, Inc.	Marvell	2	X	2	X
Parthasarathy, Vasu	Broadcom Corporation	Broadcom Corporation			1	
Paul, Michael	Analog Devices Inc.	Analog Devices	2	X	2	X
Pineda, Luis	LP Tech Advisors, LLC	LP Tech Advisors, LLC; 7Rays/Ethernovia/Samsung/OneNav	2	X	2	X
Pischl, Neven	Broadcom Corporation	Broadcom Corporation	2	X	2	X
Razavi, Alireza	Marvell	Marvell	2	X	2	X
Reinhard, Michael	SEI Automotive Europe GmbH	SEI Automotive Europe GmbH	2	X	2	X
Savi, Olindo	Hubbell Incorporated	Hubbell Incorporated			1	X

Name	Employer	Affiliation	3/10 IMAT	3/10 Zoom	3/11 IMAT	3/11 Zoom
Schreiner, Stephan	Rosenberger Hochfrequenztechnik GmbH & Co. KG	Rosenberger	1	X	2	X
Sharma, Rohit		Molex Incorporated	2	X	2	X
Shiino, Masato	FURUKAWA ELECTRIC	FURUKAWA ELECTRIC	2	X	2	X
shirani, ramin	Ethernovia	Aquantia	2	X	2	X
sisk, jason	University of New Hampshire InterOperability Laboratory (UNH-IOL)	University of New Hampshire InterOperability Laboratory (UNH-IOL)	2	X	2	X
Stencel, Leonard		TDK Corporation of America	2	X	2	X
Stewart, Heath	Analog Devices Inc.	Analog Devices Inc.			1	X
Sun, jingcong		Motorcomm Electronic Technology Co	2	X	2	X
Sun, Yi		OFS	1	X	1	X
TAKEUCHI, JUNICHI	JAE Electronics, Inc	JAE Electronics, Inc.	2	X	2	X
Tan, Yuxuan	Motorcomm	Motorcomm	2	X	2	X
Tanc, Ahmet		NXP Semiconductors; NXP Semiconductors	2	X	2	X
TAZEBAY, MEHMET	Broadcom Corporation	Broadcom Corporation	2	X	2	X
Thompson, Geoffrey	GraCaSI S.A.	INDEPENDENT	2	X	2	X
Torres, Luisma	Knowledge Development for Plastic Optical Fiber	Knowledge Development for Plastic Optical Fiber	2	X	2	X
Tu, Mike	Broadcom Corporation	Broadcom Corporation	2	X	2	X
Turner, Max	Ethernovia	Ethernovia	1	X	1	X
Vakilian, Kambiz	Broadcom Corporation	Broadcom Corporation	2	X	2	X
Veloso Cauce, Gumersindo	BMW Group	BMW AG; BMW Group	2	X	2	X
Voss, Robert	Panduit Corp.	Panduit Corp.	2	X	2	X
Wang, Shun-Sheng	Realtek Semiconductor Corp.	Realtek Semiconductor Corp.	2	X	2	X
Wienckowski, Natalie	IVN Solutions LLC	IVN Solutions LLC; Ethernovia	2	X	2	X
Wingrove, Michael	Ciena Corporation	Ciena Corporation	1			
Withey, James	Fluke Corporation	Fluke Corporation	2	X	2	X
Wu, Charles		OmniVision Technologies		X	1	X
Wu, Dance	Marvell Semiconductor, Inc.	Marvell Semiconductor, Inc.	2	X	2	X
Wu, Peter	Marvell Semiconductor, Inc.	Marvell Semiconductor, Inc.	2	X	2	X
Zerna, Conrad	Aviva Links Inc	Aviva Links Inc	2	X	2	X
Zhang, Tingting	Huawei Technologies Co., Ltd	Huawei Technologies Co., Ltd	2	X	1	X
Zimmerman, George	CME Consulting, Inc.	CME Consulting/Analog Devices, APL Group, Cisco, Marvell, OnSemi, SenTekSe LLC, Sony	2	X	2	X

ZOOM PARTICIPATION ONLY – NO IMAT RECORD

Name	Employer	Affiliation	Mon IMAT	3/10 zoom	Tues IMAT	3/11 zoom
Haasz, Jodi		IEEE SA		X		X
Kyun, Do		LGE				X
Liu, Hai-Feng		HG Genuine				X
Maru, Sandra		IEEE SA				X
Muma, Scott		Microchip				X
Santulli, Jen		IEEE SA		X		X
Sedarat, Hossein		Ethernovia		X		X
XU, LI		Huawei		X		X
Zhuang, Yan		Huawei		X		X

Appendix B: Straw Poll Roll Call Records

Last	First	Affiliation	SP #1	SP #2	SP #3	SP #4	SP #5 (Chicago Rules) PAM2 2.5G	PAM4 2.5G	PAM 2 5G	PAM4 5G
Agarwal	Uttam	Texas Instruments Inc.		Y	N	ACT	X		X	
Ahuja	Ramanjit	Onsemi	A	Y	Y	TDD	X		X	
Aronson	Joseph	Texas Instruments Inc.	B							
Baggett	Tim	Microchip Technology Inc	B			TDD				
Bar-Niv	Amir	Marvell		N	N	ACT		X		X
Benyamin	Saied	Ethernovia	B	Y	N	FDD		X		X
Boyer	Rich	Aptiv	B	N	N	ACT	X	X	X	X
Brychta	Michal	Analog Devices Inc.	B	Y	N	ACT	X		X	
Chang	Jae-yong	Keysight Technologies Inc.	A	Y	Y		X		X	
Chimento	Nick	Analog Devices Inc.	B	Y	N	ACT	X		X	
Chini	Ahmad	Broadcom	A	Y	Y	TDD	X		X	
Cordaro	Jay	Analog Devices Inc.	B	Y	N	ACT	X		X	X
Dalmia	Kamal	Aviva Links	A	Y	Y	TDD	X		X	
de Koos	Andras	Microchip Technology Inc		Y	Y	TDD	X		X	
Estrakh	Daniel	Valens	B	Y	Y	ACT	X	X		X
Fellhauer	Felix	Bosch	B	N	N	ACT	X	X		X
Fuller	Paul	Marvell	B			ACT				
Gauthier	Claude	NXP	A	Y	Y	TDD	X		X	
Goel	Sachin	Aviva Links	A	Y	Y	TDD	X		X	
Gopal	Amrit	Ford Motor Company	B							
Gorshe	Steve	Microchip	A	Y	Y	TDD	X		X	X
Goto	Hideki	Toyota		Y						
Graba	James	Broadcom Corporation	A	Y	Y	TDD	X		X	
Graber	Steffen	Pepperl+Fuchs SE		Y		FDD	X		X	X
Hogenmueller	Thomas	Robert Bosch		Y	N	ACT	X			X
Hoshino	Masayuki	Continental	A	Y	Y	TDD	X		X	X
Houck	TJ	Marvell	B	N	N	ACT		X		X
Hu	Mark	Aptiv		Y		FDD	X			X
Hyakutake	Yasuhiro	Orbray Co., Ltd.	A	Y		TDD	X		X	
Jones	Peter	Cisco Systems, Inc.	B							
Jonsson	Ragnar	Marvell	B	N	N	ACT	X	X		X
Kagami	Manabu	Nagoya Institute of Technology (NITech)	A	Y	Y	TDD	X		X	
Kapoor	Samay	Aviva Links	A	Y	Y	TDD	X		X	
Kikuta	Tomohiro	Orbray Co., Ltd.	A	Y	Y	TDD	X		X	
Kim	Do Kyun	LGE		Y	Y	FDD	X		X	
Kim	Yong	General Motors	B	N		ACT	X		X	X
Kleinwaechter	Mathias	In-Tech GmbH	A	Y	Y	TDD	X			
Kock	Jörg	NXP Semiconductors	A	Y	Y	TDD	X		X	
Kotani	Yasuhiro	Denso				ACT				
Lackner	Hans	QoSCom					X			X
Lasry	Ariel	Qualcomm	B	Y		FDD	X		X	X
Lee	Ching-Yen	Realtek	A	Y	Y	TDD	X		X	
Lin	YK	Realtek		Y	Y	TDD	X		X	
Lo	William	Axonne	B	Y	N	ACT	X	X	X	X
Long	Rich	TE Connectivity	B		Y					
Lou	Wei	Broadcom	A	Y	Y	TDD	X		X	
Martino	Kjersti	Inneos	B							
Matheus	Kirsten	BMW		Y	Y	TDD	X		X	
McClellan	Brett	Marvell	B	N	N	ACT	X	X		X
Murray	Brian	Analog Devices Inc.		Y	N	ACT	X		X	
Ng	Hiok Tiaq	Aviva Links	A	Y	Y	TDD	X		X	
Niihara	Yoshihiro	Fujikura Ltd.	A	Y	Y	TDD	X		X	
Oberg	Mats	Marvell	B	N	Y	ACT		X		X
Paul	Michael	Analog Devices Inc.	B	Y	N	ACT	X		X	
Pineda	Luis	LP Tech Advisors, LLC (Samsung; 7Rays; Ethernovia)				FDD		X		X
Pischl	Neven	Broadcom	A	Y	Y	TDD	X		X	
Razavi	Alireza	Marvell	B	N	N	ACT		X		X
Sedarat	Hossein	Ethernovia	B					X		X

Last	First	Affiliation	SP #1	SP #2	SP #3	SP #4	SP #5 (Chicago Rules) PAM2 2.5G	PAM4 2.5G	PAM 2 5G	PAM4 5G
Sharma	Rohit	Molex LLC		Y	N	ACT	X		X	
Shiino	Masato	Furukawa Electric	A	Y	Y	TDD	X		X	
Shirani	Ramin	Ethernovia	B	N	N	ACT	X	X		X
Sisk	Jason	UNH-IOL						X		X
Sun	Jingcong	Motorcomm	B			ACT	X	X	X	X
Sun	Yi	OFS		Y		TDD	X	X	X	X
Takeuchi	Junichi	JAE	A	Y	Y	TDD	X		X	
Tan	Yuxuan	Motorcomm	B	Y						
Tanc	Korhan	NXP		N	N			X		X
Tazebay	Mehmet	Broadcom	A	Y	Y	TDD	X		X	
Torres	Luisma	KD		N	Y					
Tu	Mike	Broadcom	A	Y	Y	TDD	X		X	
Turner	Max	Ethernovia	B	N	N			X		X
Vakilian	Kambiz	Broadcom	A	Y		TDD	X		X	
Veloso	Gumersindo	BMW	A	Y	Y	TDD	X			
Voss	Robert	Panduit Corp.	B	Y	Y	TDD	X			X
Wang	Frank S.-S. (Shun-Sheng)	Realtek	A	Y	Y	TDD	X		X	
Withey	James	Fluke	B							
Wu	Charles	OmniVision Tech		Y	Y	ACT	X		X	
Wu	Dance	Marvell		Y						
Wu	Peter	Marvell	B	N		ACT	X			X
Xu	Li	Huawei	A							
Zerna	Conrad	Aviva Links	A	Y	Y	TDD	X		X	
Zimmerman	George	CME Cnsltg (ADI#APLGp#Csco#MRVL #ONsm#Sntks#Sony)	B	Y	N					
Total responses			61	67	57	64	57	19	45	30
		Straw Poll #1: A	29							
		Straw Poll #1: B	32							
		Straw Polls #2, #3: Yes		53	36					
		Straw Polls #2, #3: No		14	21					
		Straw Poll #4: ACT				25				
		Straw Poll #4: FDD				6				
		Straw Poll #4: TDD				33				

Appendix C: Motion Roll Call Records

Last	First	Affiliation	Motion 4	Motion 5	Motion 6
Agarwal	Uttam	Texas Instruments Inc.			
Ahuja	Ramanjit	Onsemi	Y	Y	Y
Aronson	Joseph	Texas Instruments Inc.			A
Bar-Niv	Amir	Marvell	Y	N	N
Benyamin	Saied	Ethernovia	Y	N	Y
Boyer	Rich	Aptiv	Y	N	Y
Brychta	Michal	Analog Devices Inc.	Y	Y	Y
Chini	Ahmad	Broadcom	Y	Y	Y
Cordaro	Jay	Analog Devices Inc.	Y	Y	Y
Dalmia	Kamal	Aviva Links	A	Y	
de Koos	Andras	Microchip Technology Inc	A	Y	Y
Donahue	Curtis	Rohde & Schwarz	Y		A
Estrakh	Daniel	Valens	Y	N	Y
Fellhauer	Felix	Bosch	Y	N	Y
Fuller	Paul	Marvell	Y	N	Y
Ganesan	Aravind	Texas Instruments Inc.	Y	A	A
Gauthier	Claude	NXP	A	Y	
Goel	Sachin	Aviva Links	N	Y	Y
Gorshe	Steve	Microchip	Y	Y	Y
Goto	Hideki	Toyota	Y	Y	Y
Graba	James	Broadcom Corporation	Y	Y	Y
Graber	Steffen	Pepperl+Fuchs SE	Y	A	Y
Hoshino	Masayuki	Continental	Y	Y	Y
Houck	TJ	Marvell		N	Y
Hyakutake	Yasuhiro	Orbray Co., Ltd.	Y	Y	Y
Jones	Chad	Cisco Systems, Inc.	Y	N	Y
Jones	Peter	Cisco Systems, Inc.		N	Y
Jonsson	Ragnar	Marvell	Y	N	A
Kabra	Lokesh	Synopsys, Inc.	Y	A	Y
Kagami	Manabu	Nagoya Institute of Technology (NITech)	Y	Y	Y
Kapoor	Samay	Aviva Links	Y	Y	Y
Kikuta	Tomohiro	Orbray Co., Ltd.	Y	Y	Y
Kleinwaechter	Mathias	In-Tech GmbH	A	Y	Y
Kock	Jörg	NXP Semiconductors	Y	Y	Y
Lasry	Ariel	Qualcomm	Y	N	Y
Lo	William	Axonne	Y	N	N
Lou	Wei	Broadcom	Y	Y	Y
Maguire	Valerie	Copperopolis; CME Consulting, Cisco	Y	A	A
Matheus	Kirsten	BMW	Y	Y	Y
McClellan	Brett	Marvell	Y	N	A
Murray	Brian	Analog Devices Inc.	Y	Y	Y
Ng	Hiok Tiaq	Aviva Links	A	Y	Y
Paul	Michael	Analog Devices Inc.	Y	Y	Y
Pineda	Luis	LP Tech Advisors, LLC (Samsung; 7Rays; Ethernovia)	A	N	Y
Pischl	Neven	Broadcom	Y	Y	Y
Razavi	Alireza	Marvell	Y	N	N
Schreiner	Stephan	Rosenberger		A	A
Sedarat	Hossein	Ethernovia	Y	N	N
Sharma	Rohit	Molex LLC	Y		Y
Shiino	Masato	Furukawa Electric	Y	Y	Y
Shirani	Ramin	Ethernovia	Y	N	Y
Stewart	Heath	Analog Devices Inc.		Y	Y
Sun	Jingcong	Motorcomm		A	A
Tan	Yuxuan	Motorcomm	Y	A	A
Tanc	Korhan	NXP	A	Y	Y
Tazebay	Mehmet	Broadcom	Y	Y	Y
Tu	Mike	Broadcom	Y	Y	Y
Turner	Max	Ethernovia	Y	N	Y
Veloso	Gumersindo	BMW	A		
Voss	Robert	Panduit Corp.	Y	Y	Y
Wang	Frank S.-S. (Shun-Sheng)	Realtek	Y	Y	Y

Last	First	Affiliation	Motion 4	Motion 5	Motion 6
Wienckowski	Natalie	IVN Solutions/Ethernovia	Y	N	Y
Withey	James	Fluke	A	A	
Wu	Peter	Marvell	Y	N	A
Zerna	Conrad	Aviva Links	Y	Y	Y
Zimmerman	George	CME Cnsltg (ADI#APLGp#Csco#MRVL#ONsm#Sntks#Sony)	Y	N	Y
Total responses			59	61	61
Total yes			49	32	47
Total no			1	21	4
Total abstain			9	8	10