IEEE P802.3ck 100 Gb/s, 200 Gb/s and 400 Gb/s Electrical Interfaces Task Force

Plenary Meeting
July 11-12, 2018
San Diego, CA, USA

Prepared by Kent Lusted

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IEEE P802.3 100 Gb/s Electrical Lane Study Group – July 11, 2018

Prepared by Kent Lusted

IEEE P802.3ck 100 Gb/s, 200 Gb/s and 400 Gb/s Electrical Interfaces Task Force meeting convened at ~8:30 a.m., by Beth Kochuparambil, IEEE 802.3ck Task Force Chair.

Beth welcomed attendees.

Introductions were made.

Chair reviewed agenda in http://www.ieee802.org/3/ck/public/18_07/agenda_3ck_01_0718.pdf

Motion #1:
Move to approve the agenda:
- Moved by: Thananya Baldwin
- Second by: Mark Gustlin
- Passed by voice without opposition

Chair noted that the May minutes were posted shortly after the meeting. Recording Secretary noted that he received no requests for corrections or modifications to the posted minutes. Chair asked if there were any other comments on the minutes. No one responded.

Motion #2:
Move to approved the May 2018 meeting minutes
- Moved by: Thananya Baldwin
- Second by: Nathan Tracy
- Passed by voice without opposition

Chair reminded participants to observe meeting decorum. Called for members of the press. No one indicated. Photography and recording are not permitted.

Chair reviewed the ground rules for the meeting.

Chair reviewed the IEEE structure.

Chair reviewed the Bylaws and Rules slides in
http://www.ieee802.org/3/ck/public/18_07/agenda_3ck_01_0718.pdf

Chair asked if there was anyone unfamiliar with the Bylaws or Rules. No one responded.

IEEE Patent Policy: Chair reviewed the Patent related slides on the 4 slides contained in the agenda. Chair calls for potentially essential patents. No one responded. Chair read the Guidelines for IEEE WG meetings.   No one responded.

Chair advised the WG attendees that:
- The IEEE's patent policy is described in Clause 6 of the *IEEE-SA Standards Board Bylaws*;
- Early identification of patent claims which may be essential for the use of standards under development is strongly encouraged;
- There may be Essential Patent Claims of which the IEEE is not aware. Additionally, the IEEE, the WG, nor the WG chair can ensure the accuracy or completeness of any assurance or whether any such assurance is, in fact, of a Patent Claim that is essential for the use of the standard under development.

No one responded.

Chair reviewed the slide with a statement on the participation in IEEE 802 Meetings. Chair noted that by participating in the IEEE 802 meeting, that participants accept these requirements. Chair asked if there were questions about the participation requirements. No one responded.

Chair reviewed the IEEE 802.3 Standards Process.

Chair reviewed the approved project documents.

Reviewed the reflector and web information for the Task Force in the agenda deck.

Chair reviewed the attendance procedures. Chair reminded participants to sign into the IEEE Meeting Attendance Tool and sign the attendance book.

Chair provided a summary of the Task Force status.

Chair reviewed the adopted objectives.

Goals for the meeting:
- Continue technical discussion leading to baseline proposals
- Lay the ground work for baseline creation

Chair reviewed the Big Ticket items:
- C2M budget and analysis
- COM Architecture

There was a request to have the presentations posted a few work days prior to the start of the meeting. Chair noted that she tries to post presentations on the Thursday prior to the meeting week. The US holiday on Wednesday, 4 July, interfered with this meeting's posting schedule.

Chair reviewed two proposed timelines, slides 22 and 23, in
http://www.ieee802.org/3/ck/public/18_07/agenda_3ck_01_0718.pdf

Chair noted that a liaison from OIF was received. Chair noted that it is a shared draft that is to be restricted to IEEE 802.3 participants only. Chair displayed the attachment (see: http://www.ieee802.org/3/private/liaison_docs/OIF/OIF_to_IEEE_802d3_CEI_112G_Jul_2018_att1.pdf) Chair asked if there was objection to deferring a response until a later meeting when more substantial decisions have been made. No one responded.

Chair reviewed the presentation schedule. Chair noted that there was a request to extend the lunch break to accommodate the World Cup.

Chair reviewed the future meeting dates.

Future Meetings:
- September 2018 Interim
    - Week of September 9, 2018 -- Spokane, WA, USA
- November 2018 Plenary
    - Week of November 11, 2018 - Bangkok, Thailand
- January 2019 Interim
    - Week of January 14, 2019 - TBA

Anyone interested in hosting a meeting should contact the Chair or Steve Carlson.

Chair announced that there will be hoc meetings before the September interim meeting. The ad hocs will be coordinated with the P802.3cd Task Force. The first meeting is tentatively scheduled for July 25. Details will be announced over the email reflector.

Presentation #1:
"RS Symbol Muxing Option for 802.3ck", Mark Gustlin
See: http://www.ieee802.org/3/ck/public/18_07/gustlin_3ck_01_0718.pdf
- Clarifying questions were asked and answered.

Presentation 2:
"Server NIC Trace Lengths", Kent Lusted
See: http://www.ieee802.org/3/ck/public/18_07/lusted_3ck_01a_0718.pdf
- Kent noted that he was giving the presentation as a Task Force participant, not as the Recording Secretary or Task Force Vice-Chair.
- Clarifying questions were asked and answered

- There was a request for LAN on motherboard trace lengths.

Break at ~9:40 a.m. Resumed at ~10:00 a.m.

Presentation #3:
"100Gb/s C2M Channel Simulation", Toshiaki Sakai
See: http://www.ieee802.org/3/ck/public/18_07/sakai_3ck_01_0718.pdf
- There is a reflection in the BGA region due to the breakout limitations of the package.
- The analysis uses the contributor's own reference receiver; the model is on page 29.
- The EH5 and EW5 on slide 21 include the package and Cd.
- Discussed the need to study the impact of the different 8-lane connectors.

Presentation #4:
"100Gb/s/lane Chip-to-Module Interface Simulation Analysis", Adam Healey
See: http://www.ieee802.org/3/ck/public/18_07/healey_3ck_01b_0718.pdf
- Updated version '01a' with more channel descriptions. Chair asked if there was objection. No one responded.
- Updated version '01b' with corrections to the results due to a copy/paste error in the 01a creation.
- The HCB is implied in all of the channels listed, but not explicitly called out.

Chair reminded participants to sign into the IEEE Meeting Attendance Tool and sign the attendance book.

Break at ~11:50 a.m. Resumed at ~1:40 p.m. after the end of the World Cup Game between England and Croatia.

Chair reminded participants to sign into the IEEE Meeting Attendance Tool and sign the attendance book.

Chair asked participants to hold questions on the Ghiasi and Lim presentations to the end of both presentations.

Presentation #5:
"Dual Port Type MDI", Ali Ghiasi
See: http://www.ieee802.org/3/ck/public/18_07/ghiasi_3ck_01a_0718.pdf
- Discussed the challenges of using COM for host normative specification.

Presentation #6:
"100GEL C2M Channel Reach Update", Jane Lim
See: http://www.ieee802.org/3/ck/public/18_07/lim_3ck_01b_0718.pdf

- Updated version '01b' with additional supporters
- The BER target of 1E-6 is based on the author's requirement to have margin over the 1E-5 PMD requirement.
- BGA pitch assumption is 1mm.
- The routing assumption has 256 lanes.

Chair reviewed the plans for the rest of the day: discussion and straw polls.

Straw Poll #1:
I would support the port type direction of…

  A: Universal port only (interoperable Optical and passive DAC)
  B: Asymmetric ports (two different host loss for each end of the cable - IE: A side, B side)
  C: Dual Ports (optics only port and interoperable Optical/DAC - IE: Port Type 1, Port Type 2)
  D: Universal C2M port only (interoperable Optical and active copper cable)
  E: More information

(chicago rules)
A: 26 B: 17 C: 34 D: 13 E: 46
Room count 94

During the discussion of straw poll #1, the Chair provided the following interpretation:
- Universal port only is intended to mean that a port can support optical modules and passive copper cable, and that the host loss is likely limited by the copper cable
- Asymmetric port is intended to mean that one end of a link would have more host loss than the other.
- Dual ports is intended to mean that there are 2 types of ports: one that supports optics only and one that supports passive cable and optics
- C2M port only means that there is no passive copper cable support.

Break at ~3:30 p.m. Resumed at ~3:45 p.m.

Chair asked participants to send straw poll requests to her and the Vice-Chair for tomorrow's meeting.

Presentation #7:
"Lower Power 100G PAM4 Receiver Alternative Based on Balanced Equalization Approach", Jeff Twombly
See: http://www.ieee802.org/3/ck/public/18_07/twombly_3ck_01a_0718.pdf
- Updated '01a' with additional channel information on a 30dB channel.
- There was a request to normalize the tap weights.

- Discussed the challenge of conformance testing a transmitter with a large number of taps.
- It was noted that the TX tap weights are currently determined experimentally thru BER optimization.

Presentation #8:
"Reference Architecture Proposals and Channel Data", Rich Mellitz and Howard Heck
See: http://www.ieee802.org/3/ck/public/18_07/mellitz_3ck_01_0718.pdf
- There was a request to run the experiments on more cable channels.
- It was noted that the RXFFE is after the CTLE in the Annex 93A flow diagram.

Chair announced a start time of 8:45 a.m on Thursday.

Chair noted that she had asked Matt Brown to prepare a contribution with an editorial considerations. Chair asked if there was opposition to hearing it. No one responded. Chair noted that Matt Brown had accepted the offer to be the Chief Editor.

Chair reviewed the plans for Thursday: editorial consideration presentation, discuss timelines, discussion & straw polls, and next steps.

Attendance straw polls:
- I will attend the IEEE 802.3ck meetings at the September interim in Spokane, WA, USA (week of September 10, 2018)
  Y: 50 , M: 17
- I will attend the IEEE 802.3ck meetings at the November Plenary in Bangkok, Thailand (week of November 11, 2018)
  Y: 34 , M: 23

Break for the day at ~5:15 p.m.

IEEE P802.3 100 Gb/s Electrical Lane Study Group – July 12, 2018

Prepared by Kent Lusted

IEEE P802.3ck 100 Gb/s, 200 Gb/s and 400 Gb/s Electrical Interfaces Task Force meeting convened at ~8:45 a.m., by Beth Kochuparambil, IEEE 802.3ck Task Force Chair.

Beth welcomed attendees.

Presentation #9:
"Editorial Considerations", Matt Brown
See: http://www.ieee802.org/3/ck/public/18_07/brown_3ck_01_0718.pdf
- Discussed that the AUIs could be a single proposal.
- It was noted that a baseline proposal for PCS & PMA should be added to the list.
- Discussed the potential draft impact of an AUI training protocol.

Chair reminded participants to sign the attendance book.

Presentation #10:
"Timeline Discussion", Beth Kochuparambil
See: http://www.ieee802.org/3/ck/public/18_07/kochuparambil_3ck_01_0718.pdf
- Reviewed three potential timelines.
- Chair indicated that the timeline would be considered in either September or November.

Adee Ran provided an overview of straw polls that he wanted to take.

Straw Poll #2:
For the chip-to-module host package model, we should consider trace lengths up to
        A: 15 mm
        B: 20 mm
        C: 25 mm
        D: 30 mm
        E: need more information
(Chicago rules)
A: 6, B: 6, C: 9, D: 20, E: 28

There were several oppositions to proceeding with the straw polls due to a lack of information on each option.

Break at ~9:55 a.m. Resume at ~10:35 a.m.

Adee Ran noted changes to the straw polls back on feedback during the break.

Straw Poll #3:
For the chip-to-module electrical host transmitter I would support:
        A: Fixed equalization (as in 120E)

B: Programmable equalization controlled by management (as in 120D)

C: Programmable equalization with a training/startup protocol (as in 136)

D: Need more information

(Chicago Rules)

A: 3, B: 6,   C: 1, D: 47

Room count: 65

Straw Poll #4:

For the C2M Module reference receiver I would support

A: CTLE + DFE/FFE suitable for handling the C2M channel (i.e. symmetrical specs for host and module)

B: CTLE only , with long FFE in the host TX (i.e. asymmetric specs)

C: Need more information

(choose one)

A: 4, B: 3,   C: 45

Adee Ran noted that he intends to send an email to the reflector requesting a list of the information participants would like to have.

Chair displayed a list of action items and topics that the Task Force needs to address. Chair noted that she will be reaching out to participants to champion baselines and address the action items. There were requests to add:

- More power analysis for all interfaces and PHY types, not just C2M.
- COM reference receiver and optimization flows
- Determine feasibility of COM parameters for silicon and packages
- Package crosstalk.

List updated with the Task Force feedback and posted in:

http://www.ieee802.org/3/ck/public/18_07/kochuparambil_3ck_02a_0718.pdf

Chair asked participants to review the list, find items of interest, and make a contribution.

Adee Ran posed questions to the Task Force. For package length, participants wanted more information on host side high/low density examples, trace route assumptions & conditions, example package S-param max/min. For equalization control & asy/sym electrical specs for C2M, participants wanted more information on environmental effects on channel variance & training impact, training time expectations, cost/power tradeoffs, system benefits/impacts.

Chair reviewed the future meeting locations. Chair noted that ad hocs will be announced over the email reflector soon.

Chair reminded participants to sign the attendance book.

Chair noted that the agenda was complete.

Motion #3:
Move to adjourn.
M: Dave Ofelt
S: Jeff Slavick
Procedural (>50%)
Passes by voice

Meeting ended at ~11:30 a.m.

Attendees

P802.3ck 100GEL Task Force, July 2018				11-Jul-18	12-Jul-18
Last Name	First Name	Employer	Affiliation	Wednesday	Thursday
Anslow	Pete	Ciena Corporation	Ciena Corporation	x	x
Baca	Rich	Microsoft	Microsoft	x	x
Balasubramonian	Venugopal	Marvell	Marvell	x	x
Baldwin	Thananya	Keysight Technologies	Keysight Technologies	x	x
Baumgartner	Steven	Global Foundries	Global Foundries	x	x
Beauregard	Francois	Belden	Belden	x	x
Booth	Brad	Microsoft	Microsoft	x	
Bouda	Martin	Fujitsu	Fujitsu	x	x
Braun	Ralf-Peter	Deutsche Telekom	Deutsche Telekom		x
Brooks	Paul	Viavi Solutions	Viavi Solutions	x	x
Brown	Matt	MACOM	MACOM	x	x
Butter	Adrian	Global Foundries	Global Foundries	x	x
Cady	Ed	Luxshare	Luxshare	x	x
Calvin	John	VTM	VTM	x	x
Carlson	Craig	Cavium	Cavium	x	x
Chalupsky	David	Intel	Intel	x	
Chang	Jacky	HPE	HPE	x	x
Chen	C. C. David	Applied Optoelectronics	Applied Optoelectronics	x	x
Chuang	Keng Hua	HPE	HPE	x	x
Coenen	Robert	Interoptic	Interoptic	x	x
Cui	Zhenwei	Huawei	Huawei	x	x
Dawe	Piers	Mellanox	Mellanox	x	x
DiMinico	Christopher	MC Communications/Panduit	MC Communications/Panduit	x	x
Dudek	Mike	Marvell Technologies	Marvell Technologies	x	x
Estes	Dave	Spirent Communications	Spirent Communications	x	

Filip	Jan	Maxim Integrated	Maxim Integrated	x	
Ghiasi	Ali	Ghiasi Quantum, Huawei	Ghiasi Quantum, Huawei	x	
Gopalakrishnan	Karthik	Inphi	Inphi	x	
Gorshe	Steve	microsemi	microsemi		x
Gustlin	Mark	Xilinx	Xilinx	x	x
Hajduczenia	Marek	Charter	Charter		x
Hasharom	Kobi	Dust Photonics	Dust Photonics	x	
Haynes	Hayden	UNH-IOL	UNH-IOL	x	
Healey	Adam	Broadcom Limited	Broadcom Limited	x	x
Heck	Howard	Intel	Intel	x	x
Hegde	Raj	Broadcom	Broadcom	x	x
Holden	Brian	Kandou Bus	Kandou Bus	x	x
Horner	Rita	Synopsys	Synopsys	x	x
Ingham	Jonathan	Foxconn Interconnect Technology	Foxconn Interconnect Technology		x
Ishibe	Kazuhiko	Anritsu	Anritsu	x	x
Jackson	Ken	Sumitomo	Sumitomo	x	x
Jimenez	Andrew	Anixter	Anixter	x	
Kabra	Lokesh	Synopsys	Synopsys	x	
Kareti	Upen Reddy	Cisco	Cisco	x	x
Kimber	Mark	Semtech	Semtech	x	x
Kiuchi	Hideki	JAE	JAE	x	x
Kochuparambil	Beth	Cisco	Cisco	x	x
LeCheminant	Greg	Keysight Technologies	Keysight Technologies		x
Lee	JuneHee	Samsung	Samsung	x	
Levin	Alex	Microsoft	Microsoft	x	x
Lewis	Dave	Lumentum	Lumentum	x	x
Li	David	Hisense	Hisense	x	x
Li	Mike	Intel	Intel	x	x
Liang	Yongxuan	AOI	AOI	x	

Lim	Jane	Cisco	Cisco	x	x
Liu	Hai-Feng	Intel	Intel	x	x
Liu	Karen	Lightwave Logic	Lightwave Logic	x	x
Lusted	Kent	Intel	Intel	x	x
Maki	Jeffery	Juniper Networks	Juniper Networks	x	x
Malicoat	David	Senko/Aquantia	Senko/Aquantia	x	x
Marques	Flavio	Furukawa Electric	Furukawa Electric	x	x
Marris	Arthur	Cadence	Cadence	x	x
Martin	Arlon	Samtec	Samtec	x	x
Mazzini	Marco	Cisco	Cisco	x	
McMillan	Larry	Western Digital	Western Digital	x	
McSorley	Greg	Amphenol	Amphenol	x	x
Mein	John	Dust Photonics	Dust Photonics	x	
Mellitz	Richard	Samtec	Samtec	x	x
Moritake	Toshiyuki	JAE	JAE	x	
Muller	Shimon	Axalume	Axalume	x	
Murty	Ramana	Broadcom	Broadcom	x	
Nakamoto	Edward	Spirent Communications	Spirent Communications	x	x
Nishimura	Takeshi	Yamaichi Electronics	Yamaichi Electronics	x	
Nolan	John	Marvell	Marvell	x	
Ofelt	David	Juniper Networks	Juniper Networks	x	x
Pachon	Arturo	TE	TE	x	x
Palkert	Tom	Molex - MACOM	Molex - MACOM	x	x
Parthasarathy	Vasu	Broadcom	Broadcom	x	
Pepper	Gerald	Keysight Technologies	Keysight Technologies	x	x
Pimpinella	Rick	Panduit Corp.	Panduit Corp.	x	
Poelstra	Henry	Teledyne Lecroy	Teledyne Lecroy	x	x
Pozzebon	Dino	microsemi	microsemi	x	x
Rabinovich	Rick	Keysight Technologies	Keysight Technologies	x	x

Ran	Adee	Intel	Intel	x	x
Sakai	Toshiaki	Socionext	Socionext	x	x
Sayre	Edward	Samtec	Samtec	x	x
Schube	Scott	Intel	Intel	x	
Sekel	Steve	Keysight Technologies	Keysight Technologies	x	x
Shrikhande	Kapil	Innovium	Innovium	x	x
Slavick	Jeff	Broadcom Limited	Broadcom Limited	x	x
Sluyski	Mike	Acacia Communications	Acacia Communications	x	x
Sommers	Scott	Molex	Molex	x	
Sprague	Ted	Infinera	Infinera	x	x
Stassar	Peter	Huawei	Huawei		x
Stone	Rob	Broadcom	Broadcom	x	x
Sun	Liyang	Huawei	Huawei	x	
Sun	Phil	Credo	Credo	x	x
Tailor	Bharat	Semtech	Semtech	x	
Takahara	Tomoo	Fujitsu Laboratories	Fujitsu Laboratories		x
Takefman	Mike	Inphi	Inphi	x	x
Tamura	Kohichi	Oclaro	Oclaro	x	
Tooyserkani	Pirooz	Cisco	Cisco	x	x
Tracy	Nathan	TE Connectivity	TE Connectivity	x	
Twombly	Jeff	Credo	Credo	x	
Ulrichs	Ed	Source Photonics	Source Photonics	x	x
Welch	Brian	Luxtera	Luxtera	x	
Yang	Mengna	AOI	AOI	x	
Young	James	CommScope	CommScope	x	x
Yuchun	Lu	Huawei	Huawei	x	x
Zambell	Andrew	Amphenol	Amphenol	x	x
Zhang	Geoffrey	Xilinx	Xilinx	x	
Zivny	Pavel	Tektronix	Tektronix	x	x