

Unapproved Minutes

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

Interim Meeting

May 21-23, 2019

Salt Lake City, UT, USA

Prepared by Kent Lusted

# Table of Contents

[Table of Contents](#)

[IEEE P802.3ck 100 Gb/s Electrical Lane Task Force – May 21, 2019](#)

[IEEE P802.3ck 100 Gb/s Electrical Lane Task Force – May 22, 2019](#)

[IEEE P802.3ck 100 Gb/s Electrical Lane Task Force – May 23, 2019](#)

# IEEE P802.3ck 100 Gb/s Electrical Lane Task Force – May 21, 2019

*Prepared by Kent Lusted*

IEEE P802.3ck 100 Gb/s, 200 Gb/s and 400 Gb/s Electrical Interfaces Task Force meeting convened at ~8:05 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/19\\_05/agenda\\_3ck\\_01b\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/agenda_3ck_01b_0519.pdf)

## **Motion #1:**

Move to approve the agenda:

- Moved by: Thananya Baldwin
- Second by: Rich Mellitz
- Passed by voice without opposition

Chair noted that the March 2019 minutes were posted shortly after the meeting. Chair asked if there were any other corrections or modifications to be noted. No one responded.

## **Motion #2:**

Move to approve the March 2019 meeting minutes

- Moved by: Mike Dudek
- Second by: Thananya Baldwin
- 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/19\\_05/agenda\\_3ck\\_01b\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/agenda_3ck_01b_0519.pdf)

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

**IEEE Patent Policy:** Chair reviewed the 4 Patent-related slides contained in the agenda. Chair called 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 requirements for 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 showed links for the approved project documents.

Reviewed the email 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.

**Goals for the meeting:**

- Technical discussions towards baseline consensus
- Adopt baselines where consensus is close or already formed
- Create Draft 1.0 out of this meeting

Chair reviewed the adopted timeline and the impact of unresolved baselines.

Chair noted that a liaison letter was received from the OIF with an attachment. It was posted to [http://www.ieee802.org/3/minutes/may19/incoming/OIF\\_to\\_IEEE\\_802d3\\_CEI\\_112G\\_Apr\\_2019.pdf](http://www.ieee802.org/3/minutes/may19/incoming/OIF_to_IEEE_802d3_CEI_112G_Apr_2019.pdf) and [http://www.ieee802.org/3/private/liaison\\_docs/OIF/OIF\\_to\\_IEEE\\_802d3\\_CEI\\_112G\\_Apr\\_2019\\_att1.pdf](http://www.ieee802.org/3/private/liaison_docs/OIF/OIF_to_IEEE_802d3_CEI_112G_Apr_2019_att1.pdf). It was noted that the next OIF meeting occurs after the IEEE 802.3 July plenary meeting. Chair asked if there was objection to tabling a response the July meeting. There was some discussion and it was agreed to make a decision later in this meeting.

Chair also noted that she received an informal communication from IEEE P370 with a draft of their specification. It was posted in the Task Force private area. [http://www.ieee802.org/3/ck/private/IEEE%20P370%202019-05-17\\_D5\\_with\\_Disclaimer.pdf](http://www.ieee802.org/3/ck/private/IEEE%20P370%202019-05-17_D5_with_Disclaimer.pdf)

Chair reviewed the presentation schedule. Chair noted that she received late presentations from the editors with editorial topics. Chair asked if there was objection to hearing the late presentations within their respective topic areas. It was noted that the late presentations should be dropped if time becomes an issue.

Chair reviewed the future meeting dates.

Future Meetings:

- July 2019 Plenary
  - Week of July 15, 2019 - Vienna, Austria
- September 2019 Interim
  - Week of September 9, 2019 – Indianapolis, Indiana
- November 2019 Plenary
  - Week of November 11, 2019 -- Waikoloa Village, HI, USA

Chair noted that she will not be attending the September and November meetings and that communications should go to the Vice Chair Kent Lusted.

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

Chair reviewed the proposed ad hoc meeting schedule. Chair will announce ad hoc dates over the email reflector.

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

#### **Presentation #1:**

“Editor’s Report”, Matt Brown

See: [http://www.ieee802.org/3/ck/public/19\\_05/brown\\_3ck\\_01\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/brown_3ck_01_0519.pdf)

- Chief Editor and Chair thanked the editorial team for their assistance.

- Draft 0.1 has been implemented as a preliminary view of the draft. It will be posted to the Task Force private area after the private area is set up.

#### **Presentation #2:**

“KR Preliminary Draft Report”, Phil Sun

See: [http://www.ieee802.org/3/ck/public/19\\_05/sun\\_3ck\\_02a\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/sun_3ck_02a_0519.pdf)

- Discussed the desire for a combined baseline that has a complete proposal, rather than adopting individual pieces. It would be easier for the editorial team to implement.

#### **Presentation #3:**

“Baseline proposal for Receiver Noise Model in COM for KR/CR”, Mau-Lin Wu

See: [http://www.ieee802.org/3/ck/public/19\\_05/wu\\_3ck\\_01a\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/wu_3ck_01a_0519.pdf)

- Updated version ‘01a’ with typo fix. No objection.
- Discussed the various options on slide 13 and the impact to COM on slide 6.

#### **Presentation #4:**

“Working Towards an ERL Baseline”, Rich Mellitz

See: [http://www.ieee802.org/3/ck/public/19\\_05/mellitz\\_3ck\\_02a\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/mellitz_3ck_02a_0519.pdf)

- Updated version ‘02a’ with typo fixes and additional supporters.
- On slide 4, the Cd was 110fF for the plot. The Cp was 87 fF.
- Discussed the ERL value for devices.
- On slide 12, the reference receiver used was the 5-tap FFE without DFE.

Break at ~9:55 a.m. Resumed at ~10:15 a.m.

#### **Presentation #5:**

“Backplane COM Analysis for Reference RX Baseline”, Howard Heck

See: [http://www.ieee802.org/3/ck/public/19\\_05/heck\\_3ck\\_01\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/heck_3ck_01_0519.pdf)

- Discussed the max bank span range and its ending point. Author to confirm.
- Discussed the channel connector assumptions and potential to improve the channels.
- There was a request to examine the data to assess which channels used the proposed values on slide 20.

#### **Presentation #6:**

“A Look into Reference Receiver Choice for 100G KR Channels”, Upen Reddy Kareti

See: [http://www.ieee802.org/3/ck/public/19\\_05/kareti\\_3ck\\_01b\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/kareti_3ck_01b_0519.pdf)

- Updated version ‘01a’ with technical changes including new data. No response.
- Debated the use of the value of Cd = 70 fF.

- There was a request to include a decoder table of the RefEq row used on slides 5-10. (Completed in version '01b')

**Presentation #7:**

“Floating Tap Incorporation Proposal for Annex 93A”, Rich Mellitz

See: [http://www.ieee802.org/3/ck/public/19\\_05/mellitz\\_3ck\\_01c\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/mellitz_3ck_01c_0519.pdf)

- Updated '01c' with additional supporters. No objection.
- A trial version of COM code that supports the floating taps is available by email request.

Chair reviewed the plans for the remainder of the day: remaining backplane presentations and straw polls, then copper cable presentations and straw polls.

Break at ~11:40 a.m. Resumed at ~1:15 p.m.

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

**Presentation #8:**

“106 Gbps LR/BP COM Investigation (IV)”, Mike Li

See: [http://www.ieee802.org/3/ck/public/19\\_05/li\\_3ck\\_01\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/li_3ck_01_0519.pdf)

- Discussed the power implications of a larger number of receiver taps.
- On slide 6, the red line is the number of fixed taps listed on the x-axis plus 4 floating taps.

**Presentation #9:**

“Annex 93A Proposed Updates”, Howard Heck

See: [http://www.ieee802.org/3/ck/public/19\\_05/heck\\_3ck\\_02\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/heck_3ck_02_0519.pdf)

- The presentation was a late request from the Chief Editor to summarize the open areas to resolve for technical completeness. No objection.
- There was a request to add instructions on how to handle Sv when it is not defined in a table.

**Presentation #10:**

“Backplane Observations”, Beth Kochuparambil

See: [http://www.ieee802.org/3/ck/public/19\\_05/kochuparambil\\_3ck\\_01\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/kochuparambil_3ck_01_0519.pdf)

- Summarizes conversations from the backplane presentations reviewed at the meeting.

Chair encouraged offline discussion on the topic and help with straw polls. The backplane topic would be discussed more on Thursday.

Chair asked for a show of hands on incorporating RX noise in COM: keep the existing format (eta\_0) vs. a new term. Chair indicated that there was much stronger support for staying with the existing eta\_0 format.

In regards to Straw Poll #1, Mau-Lin clarified that option A was the current value in the adopted baseline for P802.3ck and option C was the same value as the IEEE 802.3cd tables.

**Straw Poll #1:**

I would support Eta\_0 value of:

A:  $0.82e-8 \text{ V}^2/\text{GHz}$

B:  $1.23e-8 \text{ V}^2/\text{GHz}$

C:  $1.64e-8 \text{ V}^2/\text{GHz}$

D: others

(choose one)

A: 13 B: 22 C: 0 D: 0

**Presentation #11:**

“2m QSFP-DD Update & Loss Budget Proposal”, Tom Palkert

See: [http://www.ieee802.org/3/ck/public/19\\_05/palkert\\_3ck\\_01b\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/palkert_3ck_01b_0519.pdf)

- Updated version ‘01b’ with typo fixes and supporters. No objection.
- It was noted that the 26 AWG cables do work in the QSFP-DD form factor.
- There was concern that the COM calculations for the cable assembly were optimistic.

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

Break at ~3:05 p.m. Resumed at ~3:30 p.m.

**Presentation #12:**

“Considerations for 802.3ck Test Fixture Specification”, Chris Diminico

See: [http://www.ieee802.org/3/ck/public/19\\_05/diminico\\_3ck\\_01\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/diminico_3ck_01_0519.pdf)

- Discussed the mated fixture insertion loss proposal on slide 5.

**Presentation #13:**

“100G CR End-to-End Channel Analysis”, Jane Lim



See: [http://www.ieee802.org/3/ck/public/19\\_05/lim\\_3ck\\_01\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/lim_3ck_01_0519.pdf)

- On slide 6, the case1 and case2 refers to the Annex 93A package trace length combinations.
- Discussed the need to rerun COM with the proposed parameter changes.

#### **Presentation #14:**

“Representing Discontinuities for CR Host Board”, Mike Dudek on behalf of Liav Ben-Artsi

See: [http://www.ieee802.org/3/ck/public/19\\_05/benartsi\\_3ck\\_01\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/benartsi_3ck_01_0519.pdf)

- Discussed that the figure on slide 3 is intended to represent an ideal MCB, not a real host system.

Chair summarized the current status of the copper cable PHY based on the last few presentations: progress has been made and people are working offline to build consensus.

#### **Motion #3:**

Move to:

- Use Clause 136 (with editorial discretion) as a template for the draft, assuming that this will be modified per any future baseline adoption.

M: Matt Brown

S: Chris Diminico

Technical (>=75%)

It was noted by participants (including a member from 802 leadership) that motion #3 was not needed because the editors have the authority to do so without a motion. Editors may write the draft as they see fit given the technical details of baselines.

#### **Motion #4:**

Move to table motion #3

M: Piers Dawe

S: James Gilb

Procedural (>50%)

Y: 14 N: 13 A: 17

Results: passes @ 4:56 p.m.

#### **Straw Poll #2:**

Do you support the structure (values TBD) proposed in benartsi\_3ck\_01\_0519 as a replacement for the “include PCB section” of the COM model for 100GBASE-CR1, 200GBASE-CR2, and 400GBASE-CR4.

Y, N, Need more information

After discussion in the room, Straw Poll #2 was withdrawn by the requestor.

**Presentation #15:**

“Next Step on 100G C2C-S and C2C-L”, Ali Ghiasi

See: [http://www.ieee802.org/3/ck/public/19\\_05/ghiasi\\_3ck\\_02\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/ghiasi_3ck_02_0519.pdf)

- The 4 dB loss assumption on page 7 was based on a change in the package size for retimers vs. big ASIC devices.
- Discussed the various application usage models.

**Presentation #16:**

“Channel Models for 100 Gb/s, 200Gb/s, 400 Gb/s C2C AUI”, Brandon Gore

See: [http://www.ieee802.org/3/ck/public/19\\_05/gore\\_3ck\\_01a\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/gore_3ck_01a_0519.pdf)

- Updated ‘01a’ with a typo correction on slide 3.
- There was a request for analysis with c(-3) to see if the number of DFE taps would be reduced.
- The channel contributions are posted on the Task Force website at <http://www.ieee802.org/3/ck/public/tools/index.html>

Chair encouraged offline consensus building on backplane and copper cable PHYs.

Chair reminded participants to sign into the attendance book. Chair reminded participants that the Wednesday start time was 8:30 a.m.

Break for the day at ~6:05 p.m.

# IEEE P802.3ck 100 Gb/s Electrical Lane Task Force – May 22, 2019

*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.

Chair welcomed attendees.

Chair reminded participants to send straw poll requests to her and the Vice-Chair.

Chair asked if there was opposition to hearing the late presentation “C2M Preliminary Draft Report” from Matt Brown. No one responded.

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

## **Presentation #17:**

“C2M Preliminary Draft Report”, Matt Brown

See: [http://www.ieee802.org/3/ck/public/19\\_05/brown\\_3ck\\_02\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/brown_3ck_02_0519.pdf)

## **Presentation #18:**

“C2M Simulation Update”, Phil Sun

See: [http://www.ieee802.org/3/ck/public/19\\_05/sun\\_3ck\\_01\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/sun_3ck_01_0519.pdf)

- Discussed the benefits and impacts of a reference receiver with pre-cursor equalization.
- Discussed the difference between the host-to-module and the module-to-host directions. It was noted that more work on the module-to-host direction was needed.
- Discussed the impact of burst errors on the different reference receiver models. Further investigation of errors and precoding was requested.

## **Presentation #19:**

“106Gbps C2M Simulation Updates (III)”, Mike Li

See: [http://www.ieee802.org/3/ck/public/19\\_05/li\\_3ck\\_02a\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/li_3ck_02a_0519.pdf)

- Discussed the impact of RIm on the COM VEC computation.
- Discussed the impact of reflections on the package module insertion loss.

- Rich Mellitz noted that VEC is available in trial version of COM available from him.

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

Break at ~10:25 a.m. Resumed at ~10:45 a.m.

#### **Presentation #20:**

“Options for C2M Reference Equalizer”, Ali Ghiasi

See: [http://www.ieee802.org/3/ck/public/19\\_05/ghiasi\\_3ck\\_01a\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/ghiasi_3ck_01a_0519.pdf)

- Updated version ‘01a’ with technical changes (simulation results with reduced Cd values). No objection.
- On slide 16 and slide 18, the 2nd COM case should be 5T FFE + 1 tap DFE.
- Discussed the use of the TDECQ reference equalizer.
- Correction with missing DFE labels is to be uploaded as ‘01b’

#### **Presentation #21:**

“Alternate 3ck C2M Reference Receiver Proposal”, Karthik Gopalakrishnan

See: [http://www.ieee802.org/3/ck/public/19\\_05/gopalakrishnan\\_3ck\\_01c\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/gopalakrishnan_3ck_01c_0519.pdf)

- It was noted that the DFE tap follows the last RXFFE tap.
- On slide 6, the 4-tap TXFIR was a course sweep. The TXFFE is 2-pre and 1 post tap.
- On slide 6, “5T” is no pre, 4 post. “5T-1pre” is 1 pre, 3 post FFE. “5T-2pre” is 2pre, 2 post.
- It was noted that the SNR needed for BER @ 1E-5 was ~19.5dB.

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

Break at ~11:55 a.m. Resumed at ~1:30 p.m.

#### **Presentation #22:**

“C2M AUI Small Group Update”, Kent Lusted

See: [http://www.ieee802.org/3/ck/public/19\\_05/lusted\\_3ck\\_01\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/lusted_3ck_01_0519.pdf)

- It was noted that there is a typo in posted presentation, proposed straw poll should point to slide 14 (not slide 13)
- Questions about upcoming work on module-to-host direction
- Discussion of grading criteria and assumptions of pre-coding

Kent Lusted asked the Chair if he could display a C2M consensus building document based on lusted\_3ck\_01\_0519 that could later be used as the basis for the next straw poll. Chair asked the Task Force if there was objection. No one responded. Kent Lusted displayed the consensus building document to capture the feedback on the C2M TP1a channel grading feedback. Changes were made and discussed. The resulting document was saved as [http://www.ieee802.org/3/ck/public/19\\_05/lusted\\_3ck\\_02\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/lusted_3ck_02_0519.pdf)

**Straw Poll #3:**

For C2M specifications @ TP1a, I support the pass/TBD/fail grading recommendation “yellow box” on lusted\_3ck\_02\_0519 slide 2?

Y: 52 N: 0 A: 12

For Straw Poll #3, it was noted that all of these channels were done with host pkg of 15mm & 30mm, and module pkg was 8mm... pass means it “passed” BOTH package cases.

Straw poll #4 was previewed

Break at ~ 3:00pm, resumed with straw poll discussion ~3:15pm

**Straw Poll #4:**

For C2M @ TP1a, I support a reference receiver model with a target *performance* similar to:

Option 1: Class A/B = 34

Option 2: Class C/D = 7

Room count: 75

**Attendance Straw Polls:**

I will attend the IEEE 802.3ck meetings at the July Plenary in Vienna, Austria (week of July 15, 2019)

Y: 37 , M: 14

I will attend the IEEE 802.3ck meetings at the September interim in Indianapolis, IN, USA (week of September 9, 2019)

Y: 49 , M: 20

Straw polls on C2M will continue on Thursday to help understand the equalizer options.

**Presentation #23:**

“Error Statistics Analysis on Cable and Backplane Channels”, Xinyuan Wang on behalf of Xiang He

See: [http://www.ieee802.org/3/ck/public/19\\_05/he\\_3ck\\_01a\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/he_3ck_01a_0519.pdf)

- Additional data was added to update “01a”. No objection was made to seeing the updated presentation.
- Discussion about source of burst errors.
- It was noted that errors are PAM4 symbol errors in this presentation
- It was noted that this analysis is simulation based

#### **Presentation #24:**

“Solutions for Multi-Tap DFE Error Propagation (Summary)”, Ilya Lyubumirsky on behalf of Louis Lu

See: [http://www.ieee802.org/3/ck/public/19\\_05/lu\\_3ck\\_01\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/lu_3ck_01_0519.pdf)

- Discussed the DFE tap weight constraints and the error propagation.
- Discussed latency implications of the various options

#### **Presentation #25:**

“100G-CR1/KR1 PCS, FEC and PMA Baseline Proposal”, Ilya Lyubumirsky on behalf of Yan Zhang

See: [http://www.ieee802.org/3/ck/public/19\\_05/zhuang\\_3ck\\_01\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/zhuang_3ck_01_0519.pdf)

- Reviewed and discussed the decision tree on slide 2.
- Discussed various sources of errors.

#### **Presentation #26:**

“Baseline Proposal for 4-lane Interleaved 100G FEC”, Shawn Nicholl

See: [http://www.ieee802.org/3/ck/public/19\\_05/nicholl\\_3ck\\_01b\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/nicholl_3ck_01b_0519.pdf)

- Updated ‘01b’ with additional supporters.

#### **Presentation #27:**

“Inverse RS-FEC Sublayer Overview”, Shawn Nicholl

See: [http://www.ieee802.org/3/ck/public/19\\_05/nicholl\\_3ck\\_02\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/nicholl_3ck_02_0519.pdf)

- Discussed the use cases on slide 5.

#### **Straw Poll #5:**

I support addressing the FEC performance concerns for 100GBASE-CR1/KR1 by:

A: Limiting tap weights enough to reduce FEC performance concerns

B: Implementing interleaved FEC

{pick one}

A: 16 B: 22

Room count: 64

There was a request to repeat straw poll #5 with Chicago rules. There was no opposition.

**Straw Poll #6:**

I support addressing the FEC performance concerns for 100GBASE-CR1/KR1 by:

A: Limiting tap weights enough to reduce FEC performance concerns

B: Implementing interleaved FEC

{Chicago rules}

A: 19 B: 26

Chair outlined the plans for Thursday: straw polls on C2M and package and consider responses to the liaison letters.

There was a request to move the start time to 8:30 a.m. Chair asked for feedback. There was discussion. Chair announced an 8:30 a.m. start time on Thursday.

Chair read a notification regarding the social event.

Break for the day at ~5:25 p.m.

# IEEE P802.3ck 100 Gb/s Electrical Lane Task Force – May 23, 2019

*Prepared by Kent Lusted*

IEEE P802.3ck 100 Gb/s, 200 Gb/s and 400 Gb/s Electrical Interfaces Task Force meeting convened at ~8:35 a.m., by Beth Kochuparambil, IEEE 802.3ck Task Force Chair.

Beth welcomed attendees.

Chair stated that she had not heard feedback on the liaison response. She asked if there was opposition to deferring the response to the July meeting. No one responded.

Chair outlined the plans for the day.

She received a late presentation request from Jeff Slavick on the Link Training topic. She asked if there was objection to hearing the presentation. No one responded.

## **Straw Poll #7:**

At this time, I support the C2M TP1a reference receiver candidate to be:

A: CTLE +4-tap DFE (b1max=0.85)

B: CTLE +5-tap FFE (4 post cursor taps) with 1-tap DFE (b1max=0.5)

C: CTLE 5-tap FFE w/ 1-tap DFE following the FFE

{chicago rules}

A: 10 B: 15 C: 21

Room count: 45

For Straw Poll #7, it was noted that options A & B align with sun\_3ck\_01\_0519 and option C aligns with gopalakrishnan\_3ck\_01\_0519.

Prior to the Straw Poll #8, Chair summarized the discussions on Cd over the meeting. She hears concerns from the platform participants with the high value of Cd. She also hears concerns from the serdes participants with a low value of Cd. She seeks to get guidance from the Task Force on a value to align contributions.

For straw poll #8, Chair clarified that the Cd value is not for the C2M module-side IC assumption.

## **Straw Poll #8:**



I would support using a Cd value of 110fF.

Yes: 24 No: 0 Abstain 5

Chair asked participants to use 110fF for their analysis going forward.

Chair noted that during Straw Poll #8, she heard a lot of discussion on going to very small Cd values and proposes the next straw poll. It was to show how much opposition there is to go to smaller Cd values.

**Straw Poll #9:**

I would oppose Cd being less than:

A: 110 fF

B: 100 fF

C: 90 fF

Chair removed the Straw Poll from consideration. She noted that participant feedback was overwhelmingly to explore the termination model improvement.

**Presentation #28:**

“Link training baseline”, Jeff Slavick

See: [http://www.ieee802.org/3/ck/public/19\\_05/slavick\\_3ck\\_01\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/slavick_3ck_01_0519.pdf)

- Discussed the max\_wait\_timer value proposed.

Break at ~10:05 a.m. Resumed at ~10:25 a.m.

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

**Motion #5:**

Move to:

- Adopt Slavick\_3ck\_01\_0519 as the link training baseline with max\_wait\_timer as TBD.

M: Jeff Slavick

S: Zvi Rechtman

Technical (>=75%),

**Motion #6:**

Move to amend motion #5 to read as

- “Adopt Slavick\_3ck\_01\_0519 as the link training baseline with max\_wait\_timer as TBD and the PRBS pattern as TBD .”

M: Mau-Lin Wu  
S: Ali Ghiasi  
Procedural (>50%)  
Y: 7 N: 18 A: 18  
Results: motion fails

Back to motion #5

**Motion #5:**

Move to:

- Adopt Slavick\_3ck\_01\_0519 as the link training baseline with max\_wait\_timer as TBD.

M: Jeff Slavick  
S: Zvi Rechtman  
Technical (>=75%),  
Y: 34 N: 1 A: 9  
Results: passes ~10:43 a.m.

**Straw Poll #10:**

I support the task force effort to define a C2C-L AUI similar to ghiasi\_3ck\_02\_0519.

Yes: 20 No: 8 Abstain: 12

**Straw Poll #11:**

I support the task force effort to define a C2C-S AUI similar to ghiasi\_3ck\_02\_0519 with loss TBD.

Yes: 30 No: 0 Abstain: 9

**Presentation #29:**

“Cable Assembly, MTF, and Channel IL”, Chris Diminico

See: [http://www.ieee802.org/3/ck/public/19\\_05/diminico\\_3ck\\_02\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/diminico_3ck_02_0519.pdf)

- Discussed the baseline proposed on slide 3.
- Discussed the 29dB budget allocation proposal.

**Straw Poll #12:**

I support a TP1-TP4 loss budget of 20dB for CR variants

Yes: 15 No: 4 Abstain: 21

There was a request to combine Straw Poll #12 and #13. It was combined during discussion then separated immediately before voting by the straw poll owner.

**Straw Poll #13:**

I support a TP0-TP5 loss budget of 29dB for CR variants

Yes: 14 No: 13 Abstain: 17

Room count: 48

Chair reviewed the timeline on slide 2 in

[http://www.ieee802.org/3/ck/public/19\\_05/kochuparambil\\_3ck\\_02\\_0519.pdf](http://www.ieee802.org/3/ck/public/19_05/kochuparambil_3ck_02_0519.pdf). Chair noted that timeline plan A was no longer feasible. Chair encouraged participants to build consensus in order to move forward. She encouraged participants to have baseline proposals for the July meeting.

Chair noted that Draft 1.0 will not be published for review at this time. A preliminary draft 0.2 would be posted to the Task Force private area with no formal review process. Feedback should be emailed to the chief editor. Chair provided participants with the Task Force private area password. The draft availability will be announced over the email reflector.

Chair announced ad hocs on June 12, 26, and July 10 at 7am Pacific. Details will be announced over the email reflector.

**Motion #7:**

Move to adjourn.

M: Mike Dudek

S: Thananya baldwin

Procedural (>50%)

Passes by voice without opposition.

Meeting adjourned at ~12:05 p.m.

## Attendees

| Last Name   | First Name  | Employer                | Affiliation             | May 21, 2019 | May 22, 2019 | May 23, 2019 |
|-------------|-------------|-------------------------|-------------------------|--------------|--------------|--------------|
| Anslow      | Pete        | Ciena Corporation       | Ciena Corporation       |              | x            |              |
| Baden       | Eric        | Broadcom                | Broadcom                | x            | x            | x            |
| Baldwin     | Thanya      | Keysight Technologies   | Keysight Technologies   | x            |              |              |
| Baumgartner | Steven      | Avera Semiconductor     | Avera Semiconductor     | x            | x            | x            |
| Braun       | Ralf-Peter  | Deutsche Telekom        | Deutsche Telekom        |              | x            |              |
| Brooks      | Paul        | Viavi Solutions         | Viavi Solutions         | x            | x            |              |
| Brown       | Matt        | MACOM                   | MACOM                   | x            | x            | x            |
| Carlson     | Craig       | Marvell                 | Marvell                 | x            | x            |              |
| Champion    | Bruce       | TE                      | TE                      | x            | x            | x            |
| Chang       | Frank       | Source Photonics        | Source Photonics        | x            | x            |              |
| Chang       | Jacky       | HPE                     | HPE                     | x            | x            |              |
| Chen        | C. C. David | Applied Optoelectronics | Applied Optoelectronics | x            | x            |              |

|                |          |                              |                              |   |   |   |
|----------------|----------|------------------------------|------------------------------|---|---|---|
| Choudhury      | G. Mabud | OFS                          | OFS                          |   | x |   |
| Cole           | Chris    | Finisar                      | Finisar                      |   | x |   |
| Davis          | Mike     | Sicoya                       | Sicoya                       |   | x |   |
| Dawe           | Piers    | Mellanox                     | Mellanox                     | x | x | x |
| Dawson         | Fred     | Chemours                     | Chemours                     |   | x |   |
| Dodge          | Matt     | UNH-IOL                      | UNH-IOL                      | x |   |   |
| Dudek          | Mike     | Marvell Technologies         | Marvell Technologies         | x | x | x |
| Estes          | Dave     | Spirent Communications       | Spirent Communications       | x | x | x |
| Ewen           | John     | Avera Semiconductor          | Avera Semiconductor          | x | x | x |
| Ghiasi         | Ali      | Ghiasi Quantum               | Ghiasi Quantum               | x | x | x |
| Gilb           | James    | GA-ASI, USD, Gilb Consulting | GA-ASI, USD, Gilb Consulting | x | x | x |
| Gong           | Zhigan g | O-net                        | O-net                        |   | x |   |
| Gopalakrishnan | Karthik  | Inphi                        | Inphi                        | x | x | x |
| Gore           | Brandon  | Samtec                       | Samtec                       | x | x | x |
| Gorshe         | Steve    | microsemi                    | Microchip                    |   | x |   |

|               |            |                            |                            |   |   |   |
|---------------|------------|----------------------------|----------------------------|---|---|---|
| Gustlin       | Mark       | Cisco                      | Cisco                      | x | x | x |
| Hajduczenia   | Marek      | Charter                    | Charter                    | x | x | x |
| Healey        | Adam       | Broadcom Inc               | Broadcom Inc               | x | x | x |
| Heck          | Howard     | Intel                      | Intel                      | x | x |   |
| Hegde         | Raj        | Broadcom                   | Broadcom                   | x | x |   |
| Hiroaki       | Kukita     | Yamaichi Electronics       | Yamaichi Electronics       | x | x | x |
| Holden        | Brian      | Kandou Bus                 | Kandou Bus                 | x | x | x |
| Isono         | Hideki     | Fujitsu Optical Components | Fujitsu Optical Components | x | x |   |
| Johnston      | Margaret   | Cadence                    | Cadence                    | x | x |   |
| Kareti        | Upen Reddy | Cisco                      | Cisco                      | x | x | x |
| Kim           | Inho       | Marvell                    | Marvell                    | x | x | x |
| Kimber        | Mark       | Semtech                    | Semtech                    | x | x |   |
| Kochuparambil | Beth       | Cisco                      | Cisco                      | x | x | x |
| Kocsis        | Sam        | Amphenol                   | Amphenol                   | x | x | x |
| Kolesar       | Paul       | CommScope                  | CommScope                  | x | x |   |

|             |           |                               |                        |   |   |   |
|-------------|-----------|-------------------------------|------------------------|---|---|---|
| LeCheminant | Greg      | Keysight Technologies         | Keysight Technologies  | x | x |   |
| Li          | Mike      | Intel                         | Intel                  | x | x |   |
| Lim         | Jane      | Cisco                         | Cisco                  | x | x | x |
| Liu         | Karen     | Lightwave Logic               | Lightwave Logic        | x | x |   |
| Lusted      | Kent      | Intel                         | Intel                  | x | x | x |
| Lyubumirsky | Ilya      | Inphi                         | Inphi                  |   | x |   |
| Maki        | Jeffery   | Juniper Networks              | Juniper Networks       |   | x |   |
| Malicoat    | David     | Malicoat Networking Solutions | Senko                  | x | x | x |
| Marris      | Arthur    | Cadence                       | Cadence                | x | x | x |
| McSorley    | Greg      | Amphenol                      | Amphenol               | x |   |   |
| Mellitz     | Richard   | Samtec                        | Samtec                 | x | x | x |
| Moritake    | Toshiyuki | JAE                           | JAE                    |   | x |   |
| Muller      | Simon     | Axalume                       | Axalume                |   | x |   |
| Murty       | Ramana    | Broadcom                      | Broadcom               | x |   |   |
| Nakamoto    | Edward    | Spirent Communications        | Spirent Communications | x | x | x |

|            |        |                       |                       |   |   |   |
|------------|--------|-----------------------|-----------------------|---|---|---|
| Nicholl    | Shawn  | Xilinx                | Xilinx                | x | x | x |
| Oberg      | Mats   | Marvell               | Marvell               | x | x |   |
| Palkert    | Tom    | Molex - MACOM         | Molex - MACOM         | x | x | x |
| Pepper     | Gerald | Keysight Technologies | Keysight Technologies | x |   |   |
| Piehler    | David  | Dell EMC              | Dell EMC              | x | x |   |
| Pozzebon   | Dino   | microsemi             | microsemi             | x | x |   |
| Rabinovich | Rick   | Keysight Technologies | Keysight Technologies | x | x |   |
| Radhamohan | Rajesh | Maxlinear             | Maxlinear             | x | x |   |
| Rechtman   | Zvi    | Mellanox              | Mellanox              | x | x | x |
| Sayre      | Edward | Samtec                | Samtec                | x | x | x |
| Schumaker  | Matt   | TE                    | TE                    | x | x | x |
| Shoval     | Ayal   | Synopsys              | Synopsys              | x | x | x |
| Shrikhande | Kapil  | Innovium              | Innovium              | x | x | x |
| Slavick    | Jeff   | Broadcom Limited      | Broadcom Limited      | x | x | x |
| Sommers    | Scott  | Molex                 | Molex                 | x | x | x |



|            |         |                      |                  |   |   |   |
|------------|---------|----------------------|------------------|---|---|---|
| Sprague    | Ted     | Infinera             | Infinera         |   | x |   |
| Stone      | Rob     | Broadcom             | Broadcom         | x | x |   |
| Summers    | Robert  | Maxim Integrated     | Maxim Integrated | x | x | x |
| Sun        | Phil    | Credo                | Credo            | x | x | x |
| Takahara   | Tomoo   | Fujitsu Laboratories | Fujitsu          |   | x |   |
| Tracy      | Nathan  | TE Connectivity      | TE Connectivity  | x | x | x |
| Trowbridge | Steve   | Nokia                | Nokia            |   | x |   |
| Twombly    | Jeff    | Credo                | Credo            |   | x |   |
| Ulrichs    | Ed      | Source Photonics     | Source Photonics | x | x |   |
| Walker     | Clint   | AlphaWave IP         | AlphaWave IP     | x | x | x |
| Wang       | Derek   | Centee Networks      | Centee Networks  | x | x | x |
| Wang       | Xinyuan | Huawei               | Huawei           | x | x |   |
| Welch      | Brian   | Cisco                | Cisco            | x | x |   |
| Willis     | Paul    | UNH-IOL              | UNH-IOL          | x | x | x |
| Wu         | Mau-Lin | MediaTek             | MediaTek         | x | x | x |

|        |        |                 |                 |   |   |   |
|--------|--------|-----------------|-----------------|---|---|---|
| Wu     | Peter  | Marvell         | Marvell         | x | x |   |
| Wu     | Wendy  | Cadence         | Cadence         | x | x |   |
| Zebian | Sara   | Google          | Google          | x | x | x |
| Zerna  | Conrad | Frauerhofer IIS | Frauerhofer IIS |   | x | x |
| Zhang  | Bo     | Inphi           | Inphi           | x | x |   |
| Zivny  | Pavel  | Tektronix       | Tektronix       | x | x |   |