Approved Minutes

IEEE P802.3db 100 Gb/s, 200 Gb/s, and 400 Gb/s Short Reach Fiber Task Force Ad Hoc Meeting

Webex Meeting
June 25, 2020
Prepared by Mabud Choudhury

Group Name: IEEE P802.3db 100 Gb/s, 200 Gb/s, and 400 Gb/s Short Reach Fiber Task Force
Date/Location: Thursday, June 25, 2020. Webex meeting.
Chair: Robert Lingle, Jr, affiliated with OFS
Recording Secretary: Mabud Choudhury, affiliated with OFS
Meeting Participants: Attendance is listed in Appendix A (49 attendees)

Call to order:
IEEE P802.3db 100 Gb/s, 200 Gb/s, and 400 Gb/s Short Reach Fiber Task Force (TF) Ad Hoc WebEx meeting was convened at 12:02 PM Eastern Daylight Time (EDT/ UTC -4), Thursday, May 7, 2020 by Robert Lingle, Jr., P802.3db TF Chair.

Mr. Lingle welcomed attendees. He requested that each attendee indicate their name and employer/affiliation in an e-mail to the ad hoc recording secretary: Mabud Choudhury (mchoudhury@ofsoptics.com) for the meeting minutes.

Chair's Presentation:
Title: "Agenda and General Information"
Presenter: Robert Lingle, Jr. (OFS)
lingle_3db_adhoc_01_062520.pdf

Mr. Lingle then proceeded with reviewing the **Agenda** and asked if there any modifications, additions or deletions? There were none.
12:03 PM: The agenda was approved by the Task Force without opposition. **Approved Agenda:**

- Meeting Attendance and Webex
- Approve Agenda
- Reflector and Web
- IEEE
    - Call for Patents. IEEE Patent Policy reminder: http://www.ieee802.org/3/patent.html
    - IEEE Copyright reminder: https://standards.ieee.org/ipr/index.html
    - IEEE Participant reminder: http://www.ieee802.org/devdocs.shtml
- Discussion of items the TF should address
- Presentations
    - "PCS, FEC and PMA Overview"- Mark Gustlin, Kent Lusted
    - "Angled Multimode Connectors and PAM4 Signaling"- Earl Parsons, James Young
    - "Towards technical feasibility of 100 Gb/s per lane optical PMDs supporting 100 m OM4 MMF"- Jonathan Ingham, Ramana Murty
- Future Meetings

Mr. Lingle showed the links to the IEEE P802.3db Task Force webpage, ad hoc page, and the email reflector.

Chair inquired if there were new participants who were unfamiliar with IEEE SA meeting policies and guidelines. No one indicated that they were unfamiliar with guidelines/policies

12:06 PM: Chair reviewed **"Call for potential Essential Patent Claims"** slides 5-6 of lingle_3db_adhoc_01_062520.pdf . There was no response to a "Call for Patents" on the Ad Hoc.
IEEE Patent Policy reminder: http://www.ieee802.org/3/patent.html

IEEE SA Copyright Policy: Mr. Lingle provided overview of slide 7 of lingle_3db_adhoc_01_062520.pdf entitled "IEEE SA Copyright Policy"
IEEE Copyright reminder: https://standards.ieee.org/ipr/index.html

IEEE SA Participation Policy: Mr. Lingle showed the participation policy slide 8 of lingle_3db_adhoc_01_062520.pdf .
IEEE Participant reminder: http://www.ieee802.org/devdocs.shtml

Contribution #1:
Title: "PCS, FEC and PMA Overview"
Presenter: Mark Gustlin (Cisco)
gustlin_3db_adhoc_01_062520.pdf

- Presentation describes the PCS/FEC/PMA architectures that are in use at 100Gb/s per lane today for re-use by P802.3db Task Force.
- Proposed Motions (for next P802.3db Interim meeting):
    - Adopt Clause 119 as the PCS/FEC and Clause 120 as the PMA for all 200 Gb/s and 400Gb/s PHYs for this project
    - Adopt Clause 82 as the PCS, Clause 91 as the FEC (RS544), and Clause 135 as the PMA for all 100 Gb/s PHYs for this project
- Technical discussion followed
- Topics discussed included:
    - Error statistics being sufficiently random. Evaluate PMD specs, burst error propagation. Evaluate DFE, large taps, work in P802.3ck. Consider breakout: 2x400G and 8x100G. Error budgets 200G vs. 400G vs. 100G. Clause 135.5.72 for 200G and 400G. Possibility of using stronger FEC. Clause 91 FEC (RS544) is requirement.
- Clarifying questions asked and answered
- Author welcomed feedback from the group.

Contribution #2:
Title: "Angled Multimode Connectors and PAM4 Signaling"
Presenter: Earl Parsons (CommScope)
parsons_3db_adhoc_01_062520.pdf

- Presented:
    - Data from 50G PAM4 experiments to inform decisions for 100G PAM4 and .3db objectives
    - UPC connectors do support SR8 transmission if they are standards-compliant (i.e. are clean and have compliant end-face geometry)

    - UPC connectors with low RL due to air gap can degrade system performance
    - Using APC connectors reduces the risk of poor performance by offering higher return loss (RL), even in the presence of an air gap
    - Recommend we allow APC in .3db
- Technical discussion followed.
- Topics discussed included:
    - UPC vs. APC for duplex LC, for MPO, at MDI only, for all connectors? Relative cost difference between UPC vs. APC. SM tolerance ferrule vs. MM tolerance ferrule relative cost difference. How representative is channel evaluated of real channel? Extremely worst case? Real customer in field required APC – may or may not be representative. Possibly allow both UPC and APC for .3db. Methodology of structural reflectance. Tools in .3bs website. Further study of interaction of reflectance. Temperature dependence advantage for APC – fewer burst errors. MPO-16 impacts 8 channels vs. duplex LC impacts only 1 channel. For MT ferrules, angled vs. flat less cost driver than MM vs. SM. For MPI, need isolate back reflectance – perhaps input from coherent colleagues. Laser physics - invite experts affiliated with VCSELs to present. Quality of transmitter used. More issues with PAM4 than NRZ.
- Author welcomed feedback from the group
- Clarifying questions asked and answered

Contribution #3:
Title: "Towards technical feasibility of 100 Gb/s per lane optical PMDs supporting 100 m OM4 MMF"
Presenter: Jonathan Ingham (Broadcom)
ingham_3db_adhoc_01a_062520.pdf

- Presented:
    - Motivation to exceed 50 m minimum reach
    - Wavelength, PCS/FEC/PMA reuse.
    - Simulation block diagram and parameters, VCSEL model, EMB, simulation results
    - Experimental set-up and results
    - Key conclusion: 100 m OM4 is suggested as a target for a baseline proposal, enabling broad market potential for switch-to-switch applications. 60 m may be an appropriate corresponding target for OM3
- Technical discussion followed.
- Topics discussed included:
    - Support tightening spectral width – 0.5nm starting point. RIN. TDECQ – simulation with worst case fiber. Aggregate bandwidth of 23.98 GHz – roughly twice .3cd. Fixed FIR. -0.3 FFE (slide 9) 25% overshoot. Pattern generator setting – no additional pulse shaping. Gaussian pulse shaping. Slide 9, zero-dispersion currently in spec for OM3/OM4 should be same as for OM5. Typical VCSEL room temperature – run at high temperature for simulations. VCSEL experiments run at high temperature. Very carefully evaluate for 100 m switch-switch vs. 30 m sever-switch attachment in terms of cost impact/economic feasibility.
- Author welcomed feedback from the group
- Clarifying questions asked and answered
- Presentation was updated (above link) to update supporter list.

Future meetings:

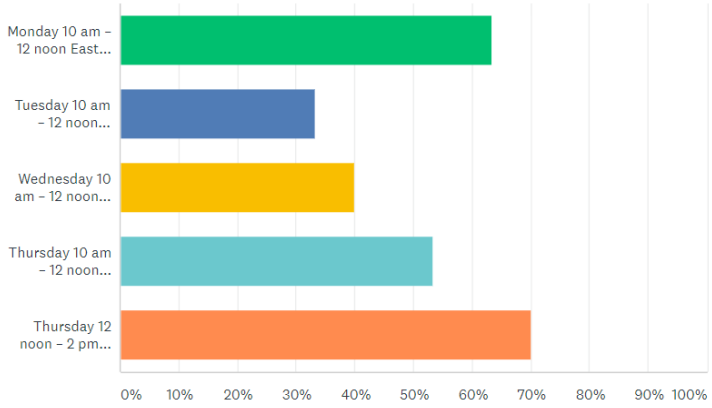
- See: http://ieee802.org/3/calendar.html and http://ieee802.org/3/interims/index.html
- P802.3db TF Ad Hoc Teleconferences are currently scheduled:

Biweekly on Thursdays at 12 Noon to 2 pm Eastern US (EDT/UTC -4):
http://www.ieee802.org/3/db/public/adhoc/index.html
Next meeting Thursday, July 9, 12 Noon to 2 pm Eastern US (EDT/UTC -4)

- P802.3db TF Interim Teleconference:

Tuesday, July 14, 10 am to 12 noon Eastern US (EDT/UTC -4),
During 802.3 WG Plenary Teleconference Weeks (July 13 – July 23)

Mr. Lingle reviewed poll results for alternative times for TF ad hoc meetings:



ANSWER CHOICES	RESPONSES	
Monday 10 am – 12 noon Eastern Daylight Time (EDT) / 2 pm – 4 pm Universal Time (UTC) time	63.33%	19
Tuesday 10 am – 12 noon Eastern Daylight Time (EDT) / 2 pm – 4 pm Universal Time (UTC) time	33.33%	10
Wednesday 10 am – 12 noon Eastern Daylight Time (EDT) / 2 pm – 4 pm Universal Time (UTC) time	40.00%	12
Thursday 10 am – 12 noon Eastern Daylight Time (EDT) / 2 pm – 4 pm Universal Time (UTC) time	53.33%	16
Thursday 12 noon – 2 pm Eastern Daylight Time (EDT) / 4 pm – 6 pm Universal Time (UTC) time	70.00%	21
Total Respondents: 30		

Based on the poll results, the Ad Hoc meetings will remain biweekly, Thursday, 12:00 Noon – 2:00 PM EDT/UTC-4.

The Study Group Ad Hoc meeting was adjourned at 2:12 PM EDT/ UTC -4, Thursday, June 25, 2020.

Next Meeting:
Scheduled (pending contributions) P802.3db TF ad hoc Webex meeting for Thursday, July 9, 2020 at 12:00 noon – 2:00 PM EDT/UTC -4.

Appendix A: Attendees at the IEEE 802.3 100 Gb/s Wavelength Short Reach PHYs Study Group WebEx Ad Hoc Meeting, 25 June 2020.

49 individuals attended on Thursday, 25 June 2020, 12:02 PM – 2:12 PM EDT/UTC -4

	Last Name	First Name	Employer	Affiliations
1	Abbott	John	Corning Incorporated	Corning Incorporated
2	Akbaba	Enis	Maxim Integrated	Maxim Integrated
3	Baoman	Luan	II-VI	II-VI
4	Bhatt	Vipul	II-VI	II-VI
5	Bruckman	Leon	Huawei	Huawei
6	Castro	Jose	Panduit	Panduit
7	Chalupsky	David	Intel	Intel
8	Chang	Frank	Source Photonics	Source Photonics
9	Chen	Chan Chih (David)	AOI (Applied Optoelectronics, INC.)	AOI
10	Choudhury	Mabud	OFS	OFS
11	Dawe	Piers	NVIDIA	NVIDIA
12	De Keulenaer	Timothy	NVIDIA	NVIDIA
13	Ferretti	Vince	Corning	Corning
14	Ghiasi	Ali	Ghiasi Quantum	Ghiasi Quantum
15	Gustlin	Mark	Cisco	Cisco
16	He	Xiang	Huawei	Huawei
17	Ingham	Jonathan	Broadcom	Broadcom
18	Jackson	Kenneth	Sumitomo Electric	Sumitomo Electric
19	Kamino	John	OFS	OFS
20	Kim	Inho	Marvell	Marvell
21	LeCheminant	Greg	Keysight Technologies	Keysight Technologies
22	Ledentsov	Nikolay N.	VI Systems GmbH	VI Systems GmbH
23	Lewis	David	Lumentum	Lumentum
24	Lingle, Jr.	Robert	OFS	OFS
25	Lusted	Kent	Intel	Intel
26	Lyubomirsky	Ilya	Inphi	Inphi
27	Maki	Jeffrey	Juniper Networks	Juniper Networks
28	Malicoat	David	Malicoat Networking Solutions	Senko Advanced Components
29	Marques	Flávio	Furukawa Electric LatAm S.A.	Furukawa Electric LatAm S.A.
30	Mitcheltree	Tom	US Conec	US Conec
31	Murty	Ramana	Broadcom	Broadcom
32	Nicholl	Gary	Cisco	Cisco
33	Parsons	Earl	CommScope	CommScope
34	Pham	Phong	KITCO Fiber Optics	KITCO Fiber Optics
35	Piehler	David	Dell Technologies	Dell Technologies
36	Radhamohan	Rajesh	MaxLinear Inc.	MaxLinear Inc.
37	Shen	Zuowei	Google	Google

38	Shubochkin	Roman	OFS	OFS
39	Sorbara	Massimo	GlobalFoundries	GlobalFoundries
40	Stassar	Peter	Huawei	Huawei
41	Swanson	Steve	Corning Incorporated	Corning Incorporated
42	Thompson	Lance	II-VI	II-VI
43	Ulrichs	Ed	Source Photonics	Source Photonics
44	Vanderlaan	Paul	UL LLC	UL LLC
45	Wang	Ruoxu	Huawei	Huawei
46	Welch	Brian	Cisco	Cisco
47	Westbergh	Petter	II-VI	II-VI
48	Young	Dianna	Corning Incorporated	Corning Optical Fiber and Cable
49	Young	James	CommScope	CommScope