Meeting Minutes

Group: IEEE P802.3ca 100G-EPON Task Force

Event: Interim meeting

Date: **From**: 5/23/2017 **To**: 5/25/2017

Location: New Orleans, LA USA

Opening

5/23/2017 9:00:00 AM The meeting was called to order by the Chair. Duane Remein volunteered to serve as recording secretary. The Chair held Introductions and gave the opening report.

Motion #1
Approve the agenda for Task Force meeting to be held May 23-26, 2017 in New Orleans LA located in file http://www.ieee802.org/3/ca/public/meeting_archive/2017/05/agenda_3ca_1_0517.pdf
Moved: Duane Remein Second: Kevin Noll Procedural (> 50%) Motion Passed by voice without opposition

Motion #2
Approve the Minutes for Task Force meeting held March 2017, in Vancouver, BC located in file http://www.ieee802.org/3/ca/public/meeting_archive/2017/03/minutes_unapproved_3ca_0317.pdf
Moved: Duane Remein Second: Glen Kramer Procedural (> 50%) Motion Passed by voice without opposition

The chair reviewed the Task Force Web site / password, IEEE rules, and the IEEE patent policy.

5/23/2017 9:17:00 AM The chair made a call for patents, no response was made.

The Chair reviewed the IEEE Participation guidelines and process. Future meeting polls were taken.

5/23/2017 9:25:00 AM

Presentations

All presentation are shown in the following format

Title Presenter Affiliation
Comment
File name

Received comments against D0.3 Marek Hajduczenia Charter

Reviewed comments against Draft 0.3 and agreed on resolution.
802d3ca_D0_3_received.pdf

Motion #3

Power budget equivalent to PR10 (20 dB) shall not be in scope for 802.3ca.

Moved: Marek Hajduczenia Second: Glen Kramer

For: 24 Against: 2 Abstain: 16
Technical (≥ 75%)
Motion Passed

The challenges of supporting 25G/10G operation
Glen Kramer Broadcom

This presentation provided a summary of difficulties supporting both 10 Gb/s and 25 Gb/s rates in the upstream direction.
kramer_3ca_2_0517.pdf

5/23/2017 10:55:00 AM Break

10Gbps US option for 25G aymmetric PON Dianbo Zhao Huawei Technologies

This presentation provided a possible solution for supporting 10 Gb/s and 25 Gb/s in the upstream direction.
zhao_3ca_2_0517.pdf

MPCP messages Duane Remein Huawei Technologies

This presentation proposed an augmentation to the MPCP message set (Discovery GATE, Register Request, Register and Register Ack) for 100G-EPON.
remein_3ca_2_0517.pdf

MPCP+ messages Duane Remein Huawei Technologies

This presentation proposed an augmentation (Forced Report flag & Sleep Request) to the MPCP message set for 100G-EPON.
remein_3ca_1b_0517.pdf

5/23/2017 12:20:00 PM Lunch, Reconvened at 1:35 PM

/S/ Character Alignment Glen Kramer Broadcom

This presentation proposed deletion of idle characters so as to align /S/ character with Byte 0 of the EQ as opposed to using existing deficit idle count mechanism used in 10G-EPON.
kramer_3ca_1_0517.pdf

LDPC for 100G EPON Dianbo Zhao Huawei Technologies

This presentation provided an analysis of a potential high gain FEC, 16K LDPC, for 100G-EPON.
zhao_3ca_1_0517.pdf

FEC proposal for NGEPON Mark Laubach Broadcom

This presentation provided an analysis of a potential high gain FEC, LDPC (18493, 15677), for 100G-EPON. Also included in this presentation was information on the Gilbert burst noise model.
laubach_3ca_1_0517.pdf

Omega 256 structured interleaver seed code
Mark Laubach Broadcom
Ancillary file accompanying laubach_3ca_1_0517.pdf
laubach_3ca_2_0517.txt

Parity code matrix for LDPC(18493,15677) Mark Laubach Broadcom
Ancillary file accompanying laubach_3ca_1_0517.pdf
laubach_3ca_3_0517.txt

High gain FEC and CDR locking for 25G NRZ
Vincent Houtsma Nokia Bell Labs

This presentation provided an analysis of clock and data recovery for 25G signals and concluded that 25G CDR at high BER (1E-2) may be very difficult.
houtsma_3ca_1_0517.pdf

5/23/2017 3:00:00 PM Break

Evaluation Results on Lock Performance of 10G and 25G CDRs

Daisuke Umeda Sumitomo Electric Industries, LTD.

This presentation provided an analysis of clock and data recovery for 25G signals using commercially available devices. The conclusion is that lock at 1E-2 may be very difficult and the high BER CDR for 100G-EPON needs additional study.
umeda_3ca_1_0517.pdf

Analysis of Multi-channel Crosstalk with SOA as Pre-amplifier in 100G EPON

Dekun Liu Huawei Technologies

This presentation provided an analysis SOA gain in the presence of an interfering signal of varying power (i.e., crosstalk). The conclusion is that for signals with a large power differential there may be a significant crosstalk penalty.
liudekun_3ca_1_0517.pdf

Tilted Power Budgets Frank Effenberger Huawei Technologies

This presentation proposed a 100G-EPON power budget that is tilted (skewed over spectrum) to account for WDM filter losses between the various wavelengths.
effenberger_3ca_1_0517.pdf

SOA pre-amplified upstream signal power in 100G-EPON

Hanhyub Lee ETRI

This presentation provided an analysis of the impact of a high power signal (min insertion loss) on a SOA Preamplified systems for 100G-EPON. The conclusion was that use of an SOA in conjunction with an APD may result in overpowering the APD when receive power is maximum.
lee_3ca_1_0517.pdf

PR30 Link Budget Considerations from a Component Perspective

Ken Jackson Sumitomo

This presentation provided an analysis of the optical budget for 25/50/100G-EPON from the perspective of an optical component vendor.
jackson_3ca_1b_0517.pdf

100G-EPON power budget suggestions Yong Guo ZTE Corporation

This presentation provided a power budget analysis for 100G-EPON and suggested APD sensitivity be increased by 0.8 dB in 25G optical budget. For 100G-EPON DS a further improvement of 1 DB in the APD

is expected and remaining 4 dB gap be made up with a post amp. For the 100G-EPON US an additional improvement o f1 DB in the DML output power is expected and the remaining 4 dB gap be made up with a pre amp.
guo_3ca_2_0517.pdf

Are uncooled optical transceivers for 25Gb/s DS0/US0 practical?

Moonsoo Park OE Solutions America

This presentation suggested restricting 100G-EPON lasers to cooled devices may provide system benefits that outweigh downsides of such a solution.
park_3ca_1_0517.pdf

Some more optical vendors input on 25G transmitters

Dekun Liu Huawei Technologies

This presentation provided vendor feedback on potential optical transmitters for 100G-EPON.
liudekun_3ca_4_0517.pdf

5/23/2017 6:00:00 PM Recessed

5/24/2017 9:03:00 AM Reconvened

PON ONU Requirements in Broadband Networks

Phil Miguelez Comcast

This presentation proposed that the 10G wavelength edge incursion into 100G wavelengths might be minimized due to restricted temperature range operations.
miguelez_3ca_1_0517.pdf

Feasibility analysis of DML with 7nm Pass band

Dekun Liu Huawei Technologies

This presentation provided an analysis of a 7 nm pass band for 100G-EPON transmitters using lasers with heaters only rather than a TEC.
liudekun_3ca_5_0517.pdf

Required Spectrum Mask for 25Gb/s Burst Mode Signal

Moonsoo Park OE Solutions America

This presentation provided an analysis of burst mode transmitter wavelength shift for 25G lasers with varying sized bursts. With the exception of slide 10 all data is for C Band devices.
park_3ca_2b_0517.pdf

25G/10G/1G triple-rate upstream receiver based on single 10G APD/TIA

Vincent Houtsma Nokia Bell Labs

This presentation provided an analysis of a potential triple rate (1/10/25 Gb/s) OLT receiver.
houtsma_3ca_2_0517.pdf

5/24/2017 10:35:00 AM Break, reconvened 11:05 AM.

25G DML Wavelength Shift Measurement for 25G EPON ONU Wavelength Shift Estimate with Burst Mode

Huanlin Zhang Applied Optoelectronics, Inc. (AOI)

This presentation provided an analysis of burst mode transmitter wavelength shift with varying sized bursts (all data from O Band devices).
zhang_3ca_1_0517.pdf

A new compromise wavelength plan for 100G EPON

Dekun Liu Huawei Technologies

This presentation proposed YAWaP (Yet Another Wavelength Plan).
liudekun_3ca_2_0517.pdf

100G EPON Wavelength plan comparison Dekun Liu Huawei Technologies

This presentation provided an analysis of three proposed wavelength plans.
liudekun_3ca_3_0517.pdf

5/24/2017 12:03:00 PM Lunch, Reconvened at 1:30 PM

Wavelength Plan Z Frank Effenberger Huawei Technologies

This presentation provided YAWaP with a DS channel at 1350 +10) nm and DS at 1285 (2 nm wide) for low cost 25G; remaining channels were US 232.2 GHz (3nm wide) and DS at 224.90 GHz (2 nm wide) +

1200 THz spacing.
effenberger_3ca_2_0517.pdf

Suppression of Four-Wave-Mixing (FWM) for 100G-EPON

Xiang Liu Futurewei Technologies, Huawei R&D USA

This presentation provided information on a possible solution to 4 wave mixing in 100G-EPON systems.
liuxiang_3ca_1a_0517.pdf

Unified Wavelength Grid and Plan for 100G-EPON

Xiang Liu Futurewei Technologies, Huawei R&D USA

This presentation proposed a fixed wavelength grid for 100G-EPON systems.
liuxiang_3ca_2_0517.pdf

5/24/2017 3:05:00 PM Break, reconvened at 3:30

Selection of 100G-EPON wavelength plan Yong Guo ZTE Corporation

This presentation compares several proposed wavelength plans and proposes YAWaP.
guo_3ca_1_0517.pdf

100G EPON resilience requirements for network transport applications

Eugene Dai Cox Communications

This presentation proposed a YAWaP adding a 5th wavelength to provide protection in a 100G system.
dai_3ca_1_0517.pdf

FEC proposal for NGEPON - update Mark Laubach Broadcom

An update to laubach_3ca_1_0517.pdf, answers two questions asked; relative die size and extent of optimization.
laubach_3ca_4_0517.pdf

Motions & Straw Polls

Motion #4

IEEE P802.3ca Task Force instructs the Editor to produce draft version D0.4 from current draft version D0.3 by incorporating changes as recorded in 802d3ca_D0_3_approved.pdf and other changes as approved during the meeting.

Moved: Marek Hajduczenia Second: Alan Brown

For: 35 Against: 0 Abstain: 1
Technical (≥ 75%)
Motion Passed

Motion #5proposed and tabled by motion #6

Adopt LDPC as the FEC method.

Moved: Mark Laubach Second: Zhao Dianbo

Motion #5 was tabled by Motion #6.

Motion #6

Move to table motion #5.

Moved: Guo Yong Second: Zhang Junwen

For: 15 Against: 12 Abstain: 9
Procedural (>50%)
Motion Passed

Motion #7

Accept the /S/ character alignment method as presented in kramer_3ca_1_0517.pdf

Moved: Glen Kramer Second: Duane Remein

For: 25 Against: 0 Abstain: 11
Technical (≥ 75%)
Motion Passed

Motion #8

The upstream channel format of the asymmetric 25/10G ONU shall be identical to the upstream channel format of the 25/25G ONU with the exception of line rate which shall be 10.3125 GBd.

Moved: Glen Kramer Second: Bill Powell

For: 16 Against: 0 Abstain: 19
Technical (≥ 75%)
Motion Passed

Motion #9

Adopt the proposed definitions for 100G-EPON MPCPDUs shown in remein_3ca_2b_0517.pdf slides 2-4, 7-9.

Moved: Duane Remein Second: Glen Kramer

For: 27 Against: 2 Abstain: 4
Technical (≥ 75%)
Motion Passed

Motion #10

Add a Forced Report flag to the GATE message as proposed in remein_3ca_1b_0517.pdf slide 3

Moved: Duane Remein Second: Glen Kramer

For: 28 Against: 0 Abstain: 7
Technical (≥ 75%)
Motion Passed

Motion #11

Move to take motion #5 off the table.

Moved: Glen Kramer Second: Marek Hajduczenia

For: 12 Against: 10 Abstain: 14
Procedural (> 50%)
Motion Passed

Motion #12

Move to amend motion #5 to read: Adopt LDPC as the FEC method. FEC performance analysis shall include both AWGN and the Gilbert-Elliot burst noise model.

Moved: Bill Powell Second: Marek Hajduczenia

For: 20 Against: 7 Abstain: 9
Technical (≥ 75%)
Motion Failed

Motion #13

Move to call the question on motion #5.

Moved: Frank Effenberger Second: Marek Hajduczenia

For: 30 Against: 1 Abstain: 2
Procedural (> 50%)
Motion Passed

Motion #5

Adopt LDPC as the FEC method.

Moved: Mark Laubach Second: Zhao Dianbo

For: 15 Against: 10 Abstain: 10
Technical (≥ 75%)
Motion Failed

5/24/2017 5:55:00 PM Recessed

5/25/2017 9:00:00 AM Reconvened

Motion #14

In the case where one active wavelength channel is inside the zero-dispersion window, polarization control is optionally applied to suppress the FWM impairment.

Moved: Xiang Liu Second: none

The Motion died for lack of a second

Motion #15

The wavelength plan shall align to ITU-T G.694.1 with possible exception of wideband channels.

Moved: Xiang Liu Second: Dekun Liu

For: 3 Against: 17 Abstain: 12
Technical (≥ 75%)
Motion Failed

Straw Poll #1

In order to overcome the channel crosstalk in the shared pre-amplifier in 100G EPON, can you live with the statement: 100G EPON uses the single scheduling domain DBA as shown in liudekun_3ca_1_0517.pdf slide 15?

Yes:	0
No:	19
Abstain/No opinion:	12

Straw Poll #2

Straw poll on wavelength plans. Vote for 1st choice, 2nd choice, and any you hate.

Plan:	**1st**	**2nd**	**Hate it**
Plan A (All WDM):	12	6	0
Plan B (TDM for US0 & USx):	6	5	7
Plan C (Compromise WDM + TDM):	0	8	7
Plan Z (WDM + 20 nm US0):	5	6	6
Plan PA (WDM + Delayed TDM):	3	7	1

Motion #16

Move to accept an O-Band base channel plan that only supports WDM coexistence with 10/10G-EPON.

Moved: Phil Miguelez Second: Alex Umnov

For: 18 Against: 10 Abstain: 4
Technical (≥ 75%)
Motion Failed

Motion #17

Move to accept an O-Band base channel plan that only supports WDM coexistence with 10/10G-EPON with 25G ONUs.

Moved: Ed Walter Second: Alan Brown

For: 18 Against: 8 Abstain: 3
Technical (≥ 75%)
Motion Failed

5/25/2017 10:25:00 AM Took a much needed break, reconvened at 11:00 AM.

The Group had an open discussion regarding wavelength plans. One new idea that was raised was that we consider greenfield and brownfield deployment separately. Reviewed one presentation submitted from the floor.

Wavelength plan to shoot at Marek Hajduczenia Charter

YAWaP featuring a less than 20 nm band targeted for residential use (indoors).
hajduczenia_3ca_2_0517.pdf

Motion #18

Adopt the LDPC(18493,15677) 0.848 rate FEC code and interleaver as presented in laubach_3ca_1_0517.pdf and use of pre-coding for downstream and upstream channels. The Omega 256 seed code as in laubach_3ca_2_0517.txt. The LDPC parity code matrix as in laubach_3ca_3_0517.txt.

Moved: Mark Laubach Second: Marek Hajduczenia

For: 10 Against: 10 Abstain: 10
Technical (≥ 75%)
Motion Failed

The Chair lead a discussion on work items for future meetings; specifically addressing wavelength plans. The following action items were taken (Assignee / Due):

- Narrowing first channel from 20 nm to something less (Marek Hajduczenia / Jun 8).
- Follow up on Greenfield/Brownfield suggestion (Glen Kramer / Jun 22).
- Investigate SOA cross gain modulation (Dekun Liu, Earl Parsons / Berlin, Jun 22).
- Analyze suitability of >1330 nm wavelength for DML (Frank Effenberger / Jun 22).
- Further investigate FEC presented in laubach_3ca_1_0517.pdf (Mark Laubach / Jun 22).
- Investigate CDR lock at 1E-2 and channel model (Frank Effenberger / Berlin).

Provide additional details on Forced Report (Duane Remein / Berlin).

Motion #19
Move to adjourn
Moved: Duane Remein Second: Mark Hajduczenia Procedural (> 50%) Motion Passed by voice without opposition

5/25/2017 11:57:00 AM Meeting was adjourned.

Attendance

Full Name	Affiliation	23-May	24-May	25-May
Alan Brown	Adtran	x	x	x
Ayla Chang	Huawei	x	x	x
Frank Chang	Inphi	x	x	
David Chen	Applied Opto Electronics Inc	x		
Barry Colella	Source Photonics	x	x	x
Eugene Dai	Cox Communication	x	x	
Kyeong-Hwan Doo	ETRI	x	x	x
Frank Effenberger	Huawei	x	x	x
Yong Guo	ZTE Corp	x	x	x
Marek Hajduczenia	Charter	x	x	x
Ed Harstead	Nokia	x	x	x
Vincent Houtsma	Nokia, Bell Labs	x	x	x
Kenneth Jackson	Sumitomo	x		
John Johnson	Broadcom LTD.	x	x	x
Curtis Knittle	CableLabs	x	x	x
Glen Kramer	Broadcom LTD.	x	x	x
Mark Laubach	Broadcom LTD.	x	x	x
Grey LeCheminant	Keysight Tech	x	x	
Hanhyub Lee	ETRI	x	x	x
David Li	Ligent	x	x	
Dekun Liu	Huawei	x	x	x
Phil Miguelez	Comcast	x	x	x
Kevin Noll	Tibit Communication	x	x	x
Moonsoo Park	OE Solutions America	x	x	x
Earl Parsons	CommScope	x	x	x
Michael Peters	Sumitomo	x	x	x
Bill Powell	Nokia	x	x	x
Duane Remein	Huawei	x	x	x
Naoki Suzuki	Mitsubishi Electric	x		
Steve Swanson	Corning		x	
Ryan Tucker	Charter	x	x	x
Daisuke Umeda	Sumitomo	x	x	x

Alexander Umnov	Corning	x	x	x
Huanlin Zhang	Applied Opto Electronics Inc	x	x	x
Wanquan Peng	Huawei	x	x	x
Qing Xu	Belden	x		
Dianbo Zhao	Huawei	x	x	x
Edward Walter	AT&T	x	x	x
Adrian Young	Leviton	x		
Atul Srivastava	NEL-America	x		
Xiang Liu	Huawei	x	x	x
Hsiu-Che Nang	Applied Opto Electronics Inc	x		
Junwen Zhang	ZTE	x	x	x
Allard van der Horst	Semtech	x	x	x
Natasha Alvarado	IEEE	x		
Yi Wang	Applied Opto Electronics Inc	x		
Bujin Guo	AOI	x	x	
I Lung Ho	AOI	x	x	x
Jonathan Goldberg	IEEE	x		x
Hal Roberts	Calix	x	x	
Scott Schube	Intel	x		
David Claussen	Charter	x	x	
Vchiyame Asami	Mitsubishi Electric	x		
Hassaan Aslan	Max Linear	x		