IEEE Extended EPON Power Budget Study Group

8-10 November 2011
Atlanta, GA, USA

Minutes

Chair: Marek Hajduczenia

Recording Secretary: Alan M. Brown

All times local to Atlanta (Eastern Standard, UTC/GMT-5)

Tuesday 8 November
09:00: Call to order and introduction

This is second meeting of this Study Group.
Alan M. Brown "volunteered" to be recording secretary for this meeting.

Marek presented his opening report, including these topics:
- SG Decorum – no cameras, no audible cell phones, etc.
- Goals for meeting; questions solicited and none received
- E-mail reflector and web
- Introductions and declaration of affiliation
- IEEE ground rules and IEEE-SA guidelines for meetings
  - Announcement: Anyone in the room may speak or vote
  - Patent policy was not discussed in detail, but was referenced
- Overview of standard process; questions solicited and none received
- Study Group function and overview of goals
  - SG will need to solicit extension from 802.3 this meeting
- Minutes from 2011 September meeting
  - Could not yet vote to accept since there was confusion about posted link
- Proposed agenda for this multi-day meeting

Motion #1
Approve agenda for 2011 November meeting of ExEPON SG, as shown in ExEPON_1111_opening.pdf, slide 20.
Moved by: Ed Mallette
Seconded by: Duane Remein
(Procedural Motion, 50%)
Motion passes by voice vote without opposition

(opening report continued)
- Attendance recording
  - Announcement: EPON SG meeting and Bandwidth Assessment ad hoc meeting do not count toward IEEE meeting credit, but are included in the IMAT meeting list for record keeping.
- Future meetings:
  - 2011.11 802 Plenary Meeting (this meeting)

- Hyatt Regency Atlanta, Atlanta, GA, USA
- November 6-11, 2011
- o 2012.01 802.3 Interim Meeting
  - Fairmont Newport Beach, Newport Beach, CA, USA
  - January 23 - 27, 2012
- o 2012.03 802 Plenary Meeting
  - Hilton Waikoloa Village, Big Island, Hawaii, USA
  - March 12-15, 2012
- o 2012.05 802.3 Interim Meeting
  - location TBD
  - Week of May 14, 2012

09:35: 5 Criteria: Market Potential

Presenter: Ed Mallette (BrightHouse Networks)
Ed presented a perspective of broad market potential.
A question was raised (and left unresolved) about how IEEE might handle the conflicting existing market? Example, with 1.2 M deployed ports of PX20+/PX-20E EPON (both ONU and OLT), how would we pick among the (at least) two vendor-specified market solutions?
Marek expressed that his presentation on Objectives might have bearing on the current presentation.

Chair asked whether there were any objections examining the post-deadline contribution ExEPON_1111_hajduczenia_1.pdf. No objections were noted.

10:00: project objectives ... how far, how long ...

Presenter: Marek Hajduczenia (ZTE Corporation)
Marek presented a perspective of project objectives.
Ensuing SG discussion with active editing of proposal resulted in apparent SG consensus on proposed *Project Objectives*. No vote was taken.

10:42 – 10:55: Coffee Break

10:55: Discussion on Market Potential

Ed Mallette has made changes to his last three slides based on the discussion, and presented them again. After discussion, Ed took an AI to generate updates to his contribution and distribute it to SG on the reflector by the end of the day tomorrow.

11:05: 5 Criteria: Distinct Identity

Presenter: Marek Hajduczenia (ZTE Corporation)
Marek presented a perspective of distinct identity.
Ensuing SG discussion with active editing of proposal resulted in apparent SG consensus on proposed *Five Criteria: Distinct Identity*. No vote was taken.

11:15: 5 Criteria: Compatibility

Presenter: Marek Hajduczenia (ZTE Corporation)
Marek presented a perspective of compatibility.
Ensuing SG discussion with active editing of proposal resulted in apparent SG consensus on proposed *Five Criteria: Compatibility*. No vote was taken.

11:28: A joint 802.1/802.3 meeting conflicts with our published start time tomorrow. An informal poll found a number of people interested in attending the meeting; thus, we changed our agenda to delay the start of our meeting until 10:30. Marek will distribute information about the joint meeting on the reflector before the meeting.

11:30: Adjourn for the day (early because two presenters have not yet arrived to the meeting)

Wednesday 9 November
10:45: Meeting resumes

Motion #2
Approve minutes of September 2011 meeting as recorded in ExEPON_1109_minutes_unapproved.pdf and post them online as ExEPON_1109_minutes_approved.pdf.
Moved by: David Li
Seconded by: Duane Remein
(Procedural Motion, >50%)
Motion passes by voice vote without opposition

Marek stated that he would post:
- Opening report
- Post-deadline contribution from David Piehler –Notes on EPON extender boxes and EPON PMDs

10:50: Cost Comparison of the 10G-EPON PMDs

Presenter: David Li (Hisense-Ligent)
Presented and discussed the relative cost evolution of PON optics.
On slide 6 (Downstream Link Budget), the suppliers are not consistent when publishing end-of-life specifications, but generally are published with 1 dB margin. 10G-EPON data includes FEC active.
On slide 8 (Extended 10G-PON Cost Estimation), power budgets are without FEC. Also, industrial temperature versions may be more difficult to reach some of these extended class values. Some in room suggest cost of two highest rows of extended class would be multiples higher. Some believe that customers seem to prefer XFP package for 10G-EPON at OLT, but many optics are still larger.
On slide 4, this data is for PRX ONU transceiver (not symmetric), though presenter states similar trend that some in SG doubt, especially since symmetric versions were hand made up through 2009.

One slide 8, it may be useful to see similar data for 1G-EPON, so we can consider costs for components with similar loss budgets.

During discussion, David also showed his presentation from prior meeting Current Status of the 10G-EPON Power Budget and Improvement, slides 7 through 10.

There was much discussion about conditions of and interpretations of data presented (e.g., boundary conditions, voltage conditions, temperature conditions, what components exist today vs speculative future, channel insertion loss vs. loss budget), and whether additional data is required

12:08 – 13:10: lunch break

13:10: Target Specifications of Extended 10G-EPON PMDs

Presenter: David Li (Hisense-Ligent)
Presented and discussed a proposal for specifications (e.g., power budget, channel insertion loss, transmit power, sensitivity) for 10G-EPON OLT PMDs. In this proposal, the increment between power levels is 3 dB, which is not enough to add an additional level of splits (need 3.5 dB). The IEEE standard TDP (transmitter and dispersion penalty) values are guaranteed to work at 20 km, but for longer distances would need to be increased. Should we be aiming higher (such as 60 km like GPON)?

Chair asked whether there were any objections examining the contribution with post-deadline changes, posted as ExEPON_1111_xu_1a.pdf. No objections were noted.

13:30: Proposal for Extended EPON PMD (revision with technical changes)

Presenter: Jidong Xu (ZTE Corporation)
Presented and discussed market requirements for longer distance PON and higher-split ratio for PON, and proposes power budget classes to meet these requirements. Also, discussion that SG will need to propose for PAR customer requirements (e.g., 40 km reach with 1x64 split without reach extender amplifier), but we will need to discuss specifics (e.g., loss budgets) to understand feasibility of proposed customer requirements.

Chair asked whether there were any objections examining the post-deadline contribution, posted as ExEPON_1111_piehler_1.pdf. No objections were noted.

14:20: Notes on EPON extender boxes and EPON PMDs

Presenter: David Piehler (Neophotonics)
Presented and discussed impact of link extension architectures on PMDs. On slide 4 is error; line 2 should read "optical to electrical to optical". Presenter commented that if extenders are used, no changes are needed at PMD; but, carriers may get confused by MAC information forwarding (e.g., rate-select and reset).

Chair asked whether there were any objections examining the post-deadline contribution, posted as ExEPON_1111_li_2.pdf. No objections were noted.

14:45: 10G EDC For Extended Reach in SMF: Both Down- & Up-stream

Primary author: Frank Chang (Vitesse)
Presenter: David Li (Hisense-Ligent)
Presented and discussed possibility of Electronic Dispersion Compensation (EDC) to attain extended reach of PON.
(Note: SG accepted for discussion this presentation that was received post-deadline)

15:00– 15:15: coffee break

15:15: Discussion of Loop Length Distribution

Martin Carroll (Verizon) was invited by Marek to discuss loop length distribution graphs that were presented several years ago. Reference http://www.ieee802.org/3/efm/public/sep01/brown_1_0901.pdf (see slide 24) as forwarded to reflector today by Glen Kramer (Broadcom). Loop lengths vary greatly among operators.

15:35: Discussion of Project Objectives

Marek presented a revision of Project Objectives (two slides) that takes into account discussions so far.
Ensuing SG discussion with active editing of proposal resulted in apparent SG consensus on proposed *Project Objectives*.

Motion #3
Approve the Project Objectives developed by the Extended EPON Study Group, as recorded in ExEPON_1111_objectives.pdf, slides 2 and 3.
Moved by: Alan Brown
Seconded by: David Li
(Technical Motion, >=75%)
Y: 16, N: 1, A: 3
People in the room: 23 (including Chair, who did not vote)
Motion passes by hand vote (all people eligible to vote).
Discussion during motion: we need alignment between market and objectives.

16:00: 5 Criteria: Market Potential (revision a)

Presenter: Ed Mallette (BrightHouse Networks)
This is revised from yesterday's presentation. Blue text represents changes.
Ensuing SG discussion with active editing of proposal resulted in apparent SG consensus on various points for *Five Criteria: Market Potential*. It was observed that we need to reduce to a single slide, so clearly additional offline editing is required.

16:30: 5 Criteria: Technical Feasibility

Presenter: David Li (Hisense-Ligent)
Presented a perspective of technical feasibility.

Ensuing SG discussion with active editing of proposal resulted in apparent SG consensus on various points for *Five Criteria: Market Potential*. It was observed that we received two proposals today suggesting alternative methods (not modifying PMDs) to meet our objectives. Alan Brown volunteered (with help from unnamed others in the SG) to provide suggested language to add to proven technology paragraph for tomorrow.

16:45: 5 Criteria: Distinct Identity

Presenter: Marek Hajduczenia (ZTE Corporation)
Marek presented a revision of distinct identity from yesterday
Ensuing SG discussion with active editing of proposal resulted in apparent SG consensus on proposed *Five Criteria: Distinct Identity*. No vote was taken.

16:55: 5 Criteria: Compatibility

Presenter: Marek Hajduczenia (ZTE Corporation)
Marek presented a revision of compatibility from yesterday.
Ensuing SG discussion with active editing of proposal resulted in apparent SG consensus on proposed *Five Criteria: Compatibility*. No vote was taken.

17:08: Adjourn for the day

Thursday 10 November
08:30: Meeting resumes

The next 802 Executive Committee meeting is in March, so for items not completed today we could close on them at January interim meeting.

08:30: 5 Criteria: Distinct Identity

Marek (as Chair) presented a revision of distinct identity from yesterday. Base document was issued on the reflector this morning as "ExEPON_1109_5Crit_final.ppt". There was ensuing SG discussion with active editing of proposal.

Motion #4
Approve the Distinct Identity criterion, as recorded in ExEPON_1111_5Crit_final.pdf, slide 2.
Moved by: Ed Mallette
Seconded by: Hesham ElBakoury
(Technical Motion, >=75%)
Y: 13, N: 0, A: 0
People in the room: 19 (including Chair, who did not vote)
Motion passes by hand vote (all people eligible to vote).

09:00: 5 Criteria: Compatibility

Marek (as Chair) presented a revision of compatibility from yesterday. The base document was issued on the reflector this morning as "ExEPON_1109_5Crit_final.ppt". There was ensuing SG discussion with active editing of proposal.

Motion #5
Approve the Compatibility criterion, as recorded in ExEPON_1111_5Crit_final.pdf, slide 4.
Moved by: Duane Remein
Seconded by: Ed Mallette
(Technical Motion, >=75%)
Y: 13, N: 0, A: 0
People in the room: 20 (including Chair, who did not vote)
Motion passes by hand vote (all people eligible to vote).

19:15: 5 Criteria: Technical Feasibility

Marek (as Chair) presented a revision of technical feasibility from yesterday. The base document was issued on the reflector this morning as "ExEPON_1109_5Crit_final.ppt". There was ensuing SG discussion with active editing of proposal.

Motion #6
Approve the Technical Feasibility criterion, as recorded in ExEPON_1111_5Crit_final.pdf, slide 6.
Moved by: Alan Brown
Seconded by: Kevin Noll
(Technical Motion, >=75%)
Y: 17, N: 0, A: 0
People in the room: 21 (including Chair, who did not vote)
Motion passes by hand vote (all people eligible to vote).

19:40: Begin development of Project Authorization Request (PAR)

Marek (as Chair) presented the framework for PAR, which he had partially filled-in with proposed responses. The base document was issued on the reflector this morning as "ExEPON_1111_PAR_final.ppt". There was ensuing SG discussion with active editing of proposal. David Law was in the room at various times and occasionally contributed his expertise. No vote was taken.

10:35– 13:40: coffee break

10:40: 5 Criteria: Market Potential

Presenter: Ed Mallette (BrightHouse Networks)
This is revised from yesterday's presentation. The base document was issued on the reflector this morning as "ExEPON_1111_5Crit_Market rev 1.8.ppt". There was ensuing SG discussion with active editing of proposal.

Motion #7

Approve the Market Potential criterion, as recorded in ExEPON_1111_5Crit_final.pdf, slide 8.
Moved by: Alan Brown
Seconded by: Ed Mallette
(Technical Motion, >=75%)
Y: 17, N: 0, A: 1
People in the room: 20 (including Chair, who did not vote)
Motion passes by hand vote (all people eligible to vote).

11:25: [5 Criteria: Economic Feasibility](#)

Marek (as Chair) presented an unchanged version of this presentation as it was originally presented during the September meeting of this Study Group. There was ensuing SG discussion with active editing of proposal.

Motion #8
Approve the Economic Feasibility criterion, as recorded in ExEPON_1111_5Crit_final.pdf, slide 10.
Moved by: Ed Mallette
Seconded by: Valy Ossman
(Technical Motion, >=75%)
Y: 17, N: 1, A: 1
People in the room: 20 (including Chair, who did not vote)
Motion passes by hand vote (all people eligible to vote).

11:45: Review Project Authorization Request (PAR)

David Law presented a re-formatted version of the PAR, based on our earlier efforts, within the *myProject* tool of IEEE. Our project would be 802.3bk, if accepted. There was ensuing SG discussion with active editing of proposal.

Motion #9
Approve the PAR, as recorded in ExEPON_1111_PAR_final.pdf.
Moved by: Kevin Noll
Seconded by: Duane Remein
(Technical Motion, >=75%)
Y: 11, N: 0, A: 0
People in the room: 15 (including Chair, who did not vote)
Motion passes by hand vote (all people eligible to vote).

Motion #10
Grant the SC Chair editorial license to make changes to text of PAR, 5 Critters and Objectives, as approved by Study Group.
Moved by: Marek Hajduczenia
Seconded by: Ed Mallette
(Procedural Motion, >50%)
Motion passes by voice vote without opposition

Motion #11
SG authorizes the Chair to request the extension of the ExEPON Study Group from 802.3 WG for the additional 6 months.
Moved by: Ed Mallette
Seconded by: Meiyan Zang
(Procedural Motion, >50%)
Motion passes by voice vote without opposition

12:19: request for new business

No new business was brought forward

Motion #12
Adjourn
Moved by: Duane Remein
Seconded by: Bill Powell
(Procedural Motion, >50%)
Motion passes by voice vote without opposition

12:20: Adjourn

List of attendees (alphabetically by name)

Name	Affiliation	08.11.2011	09.11.2011	10.11.2011
Alan Brown	Aurora Networks	X	X	X
Antonio Texeira	NSN	X	X	X
Bernie Hammnod	TE Connectivity	X		
Bill Powell	Alcatel-Lucent	X	X	X
David Law	HP			X
David Piehler	NeoPhotonics		X	
Doug Jones	Comcast			X
Duane Remein	Huawei	X	X	X
Edwin Mallette	Bright House Networks	X	X	X
Glen Kramer	Broadcom	X	X	
Hans Lockner	QoSCom			X
Hassaan Asham	Broadcom	X		
Hesham ElBakoury	Huawei	X	X	X
Hiroshi Hamano	Fujitsu Labs		X	
James Zhang	ZTE Corporation		X	
Jidong Xu	ZTE Corporation	X	X	X
Jun Sugawa	Hitachi	X	X	X
Katsuhisa Jawa	Sumitomo Electric	X	X	X
Kenichi Suzuki	NTT	X	X	X
Kevin Noll	Time Warner Cable	X		
Lowell Lamb	Broadcom		X	
Marek Hajduczenia	ZTE Corporation	X	X	X
Mark Laubach	Broadcom			X
Meyian Zang	ZTE Corporation	X	X	
Naoto Saeki	NEC	X	X	
Navid Ghazisaidi	Ericsson	X	X	X
Philip Chang	Comcast	X	X	
Randy Perrie	OneChip Photonics	X		X
Rujian Lin	Shanghai Luster Teraband Photonics	X	X	
Steve Carlson	High Speed Design	X		
Susumu Nishihara	NTT	X	X	X
Wen Li	Finisar		X	