(Approved 03 September 2013)
IEEE P802.3bn EPoC PHY Task Force
July 16-18, 2013,
ITU, Geneva, Switzerland
Chair: Mark Laubach
Recording Secretary: Duane Remein

Summary:

The P802.3bn EPOC Task Force met for two and one half days in Geneva, Switzerland. A total of 25 presentations were reviewed and 19 Technical motions were passed; including 2 baseline proposals. A summary of decisions can be viewed at decisions and baseline proposals.

Tuesday, 16 July 2013

9:00 AM – The Chair called the Task Force meeting to order and reviewed meeting procedures unique to the Geneva Venue.

Motion# 1

Move to approve minutes from 15-17 May 2013, Victoria, BC meeting:
unconfirmed_minutes_3bn_01c_0513.pdf
Moved: Marek Hajduczenia
Second: Victor Hou
Procedural (>50%)
Motion Passed by voice without opposition

The Chair reviewed meeting decorum, goals, reflector, web site (private & public), ground rules, and IEEE structure.

The Chair presented the IEEE patent policy ("slide 1" to "slide 4") and made a call for essential patents. No response was made to the call for patents. The Chair noted that the IEEE SA lists LOA's on the PATCOM web site.

The Chair reviewed other guidelines, the definition of affiliations, and attendance tools, and then held introductions. The TF briefly discussed the eStraw Poll tool and how to encourage members to participate in future Polls. The Chair reviewed technical decisions / baseline motions approved to date and Consensus Challenge items (noting that the TF will update this list before adjourning). The TF timeline was reviewed, noting the possibility of scheduling additional face to face meetings to advance baseline material and make needed technical decisions. The Chair noted that the meeting agenda by day was available on line from the public web site.

Motion# 2

Move to approve the amended agenda for this meeting.
Moved: Duane Remein
Second: Jorge Salinger
Procedural (>50%)
Motion Passed by voice without opposition

Presentations:

Opening report: ~~RF Spectrum ad hoc~~ TDD sub-Task Force — Steve Shellhammer (Qualcomm)
Reviewed activities of ad hoc since Victoria meeting and previewed candidate motions for this meeting.

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Opening report: PHY Link ad hoc — Mark Laubach (Broadcom)
Reviewed activities of ad hoc since Victoria meeting and previewed candidate motions for this meeting.

Mark Laubach resumed the Chair

Editors Report / Draft 0.1 Overview — Duane Remein (Huawei)
Brief overview of D0.10 draft. See material in private web site: P802d3bn_d01.pdf.

Comment Submission Tool — Wael Diab (Broadcom)
Short tutorial on how to submit comments using the comment tool.

PMD and PMA Proposed Specification Text, Cyclic Prefix — Saif Rahman, Joe Solomon (Comcast)
Review of proposed Clause 100 outline and several related text proposals. There was significant discussion on the Cyclic Prefix tables [*rev 02*] presented and the Chair encouraged interested individuals to work offline on a consensus solution. Also see solomon_3bn_02b_0713.pdf [*rev 02b*] and solomon_3bn_03_0713.pdf.

EPoC PCS Status Update (Clause 101) — Marek Hajduczenia (ZTE)
Brief overview of Clause 101 including material of missing big ticket items.

Some possible MDIO Field definitions for EPoC — Duane Remein (Huawei)
A brief overview of some potential MDIO registers.

Duane Remein assumed the Chair while Mark Laubach was presenting

Topics on Channel Architecture — Mark Laubach (Broadcom)
A discussion of how to reference and provision the various OFDM, Channel, and PLC parameters. Also examined how to meet our objectives in terms of the number of OFDM channels needed.

Mark Laubach resumed the Chair

EPoC Frame Error Ratio (FER) objectives — Marek Hajduczenia (ZTE), Peter Anslow (Ciena)
This presentation suggested a change in the existing objective on Frame Error Ratio and an addition of an objective addressing mean time to false frame acceptance.

Performance estimation of CRC With LDPC codes — Rich Prodan, BZ Shen (Broadcom)
A bound for probability of an undetected error using CRC was presented. The probability of an undetected error should be less than ~ 1E-18 below this threshold. It suggested that adding a CRC32 in the FEC code word would provide significant additional error detection capability.

EPoC Downstream Pilot Proposal
Avi Kliger (Broadcom), Christian Pietsch (Qualcomm), Joe Solomon (Comcast)
This presentation provided additional details on continuous pilots proposed for both FDD and TDD.

The Chair adjourned the meeting for about 1 hour to allow interested parties to attend the NGEPON ad hoc committee meeting.

EPOC upstream modulation profiles — Eugene Dai (Cox), Hal Roberts (Calix)
The point of this presentation was to examine the benefits of MMP. Conclusions are that only one profile is needed per CNU while different CNUs may need different profiles.

Upstream Resource Block Structuring in EPoC — Syed Rahman (Huawei)
This presentation addressed how nulled sub-carriers should be treated with respect to resource blocks. The conclusion was that nulled sub-carriers would not be part of a resource block and that resource block need not consist of contiguous sub-carriers.

EPOC Upstream Transmission: Resource Blocks Proposal — Avi Kliger, Yitshak Ohana (Broadcom)
This presentation provided additional details on upstream resource blocks. It was suggested that RB's consist of 1, 4 or 8 sub-carriers.

TQ (Time Quanta) Mapping in EPoC — Syed Rahman (Huawei)
This presentation provided a possible method to map TQ's to Time/Freq domain.

The Chair held a brief summary/review of the day's activities and planed actions for the next two days. The meeting recessed for the day at 7:18 PM

Wednesday 7/17 8:00 AM

The Chair called the meeting to order.

EPoC FEC for Passive Coax Plants — Christian Pietsch and Stefan Brueck (Qualcomm)
Presented by Steve Shellhammer (Qualcomm)
This presentation presented additional detail and simulation results on agree FEC codes intended for Node+0.

EPoC FEC for Active Coax Plants — Rich Prodan, BZ Shen (Broadcom)
This presentation proposed a refinement of the FEC code for active plant applications; reducing the number of proposed codes by one (total of 3 codes vs. pervious 4 codes). Simulations were presented

for each proposed code showing no error floor and good convergence at the error rate of interest (FER < 10E-6). This analysis included the impact of burst noise and interleaved depth.

Burst Marker Detection Rate in EPoC — Syed Rahman (Huawei)
This presentation examined the impact of burst marker errors on FER and possible mitigation techniques. It was noted that, in order to properly evaluate the impact of this we need to establish a loss metric at the PHY input (this is interpreted as a min SNR).

EPoC ICI analysis — Duane Remein, Pan Dao (Huawei)
This presentation provided simulation results on ICI in support of presentations on tone reordering (see remein_3bn_02_0513) and multiple simultaneous upstream probing (see rahman_syed_3bn_02a_0513) given in the Victoria meeting. The presentation asserted that a transmitter synchronization requirement should be adopted and if <0.5 ppm then ICI should not be an issue for tone reordering or multiple simultaneous probing. It was pointed out that other functions (time sync) may require a tighter spec for CFO than 0.5 ppm.

PHY Link Channel FEC — BZ Shen, Avi Kliger, Rich Prodan (Broadcom)
This presentation provided simulation results for several FEC codes proposed for PHY-Link. The codes analyzed were BCH (384, 285, t=11), RS (64, 48), and a punctured LDPC (384,288). The conclusion is to use the LDPC (384,288) punctured code. This provides a channel with ~1 Mbps capacity, 270/255 us latency (40/20 us/sym), with operation at 14 dB and 16 dB with AWGN and AWGN + burst noise.

PLC Preamble proposal
Leo Montreuil, Avi Kliger, Rich Prodan (Broadcom), Christian Pietsch, Nicola Varanese (Qualcomm)
This presentation provided simulation results for a proposed 2D preamble for the PHY-Link channel.

Information Carried By the PLC — Avi Kliger (Broadcom), Christian Pietsch, Nicola Varanese (Qualcomm)
This presentation suggested what information needs to be communicated over the PHY-Link channel. It was noted that there will also need to be an indication of the FEC.

The Chair held a short work plan review.

TDD Sub-task Force track

TDD Cycle — Steve Shellhammer (Qualcomm)
Discussion about TDD Cycle time including details on guard, downstream, and upstream time periods. A potential motion on Guard time was reviewed.

RF Spectrum Ad Hoc

Straw Poll #1

Do you support the following statement?
An exclusion sub-band can be characterized by a start sub-carrier index and a number of sub-carriers
Yes - 26
No – 0

Straw Poll #2

Do you support the following statement?
An exclusion sub-band may be mapped onto any of the available OFDM subcarriers within an OFDM channel, with the restriction that there is at least one modulated subcarrier between exclusion sub-bands (for DS).
Yes - 21
No - 1
Abstain – 7

Motion #3

An exclusion sub-band is characterized by a start sub-carrier index and an integer number of sub-carriers
Moved: Steve Shellhammer
Second: Bill Keasler
For: 24
Against: 0
Abstain: 4
Technical (>= 75%)
Motion Passed

Motion #4

In the downstream an exclusion sub-band shall be mappable onto any of the OFDM subcarriers within an OFDM channel, with the restriction that there is at least one modulated subcarrier between exclusion sub-bands.
Moved: Saifur Rahman
Second: Tom Kolze
For: 21
Against: 1
Abstain: 6
Technical (>= 75%)
Motion Passed

Motion #5

In the downstream, there shall be at most 16 exclusion sub-bands in a single 192-MHz OFDM channel.
Moved: Jorge Salinger
Second: Bill Keasler
For: 23
Against: 1
Abstain: 5
Technical (>= 75%)
Motion Passed

EPoC RF Spectrum for FDD — Mark Laubach (Broadcom)
This presentation provided a brief suggestion on RF spectrum ranges.

Motion #6

For an FDD system, the EPoC standard shall support operation over the following frequency ranges:
Downstream: 54 MHz to at least 1212 MHz
Upstream: 10 MHz to at least 234 MHz
Actual frequencies in use on the coax will depend on the diplexer, region, etc.
Downstream operation above 1212 MHz to 2610 MHz is for further study.
Moved: Jorge Salinger
Second: Leo Montreuil
For: 23
Against: 0
Abstain: 6
Technical (>= 75%)
Motion Passed

Motion #7

For a TDD system, the EPoC standard shall support operation in a passive cable plant from 10 MHz up to at least 1800 MHz.
Moved: Jorge Salinger
Second: Bill Powell
For: 16
Against: 0
Abstain: 13
Technical (>= 75%)
Motion Passed

Motion #8

Move to:
Adopt the OFDM numerology for downstream and upstream EPoC as shown in rahman_saif_3bn_01_0713.pdf.
Moved: Saifur Rahman
Second: Avi Kliger
For: 21
Against: 0
Abstain: 2
Technical (>= 75%)
Motion Passed

The meeting recessed for the day at 6:30 PM

Thursday 7/18 8:13 AM

The Chair called the meeting to order for the day noting that the IMAT attendance tool is not available until this afternoon. He then reviewed the plan for the day.

Motion #9

Adopt the LDPC (384,288) code for PLC FEC as presented in shen_3bn_01_0713.pdf.
Moved: BZ Shen
Second: Marek Hajduczenia
For: 25
Against: 0
Abstain: 1
Technical (>= 75%)
Motion Passed

Motion #10

Accept the proposed PLC preamble, pages 2, 3, 12, and 13, for inclusion in the PHY Link baseline as presented in montreuil_3bn_01_0713.pdf.
Moved: Leo Montreuil
Second: Avi Kliger
For: 19
Against: 0
Abstain: 6
Technical (>= 75%)
Motion Passed

Motion #11

Move to:
Adopt "PLC Content" presentation as a starting point for inclusion in the PHY Link baseline as in kliger_3bn_01b_0713.pdf.
Moved: Avi Kliger
Second: Bill Keasler
For: 21
Against: 0
Abstain: 5
Technical (>= 75%)
Motion Passed

Motion #12

Adopt solomon_3bn_02b_0713.pdf as baseline.
Moved: Saifur Rahman
Second: Bill Keasler
For: 21
Against: 1
Abstain: 3
Technical (>= 75%)
Motion Passed

Motion #13

Move to:
Adopt EPoC downstream continuous pilots as presented in "EPoC Downstream Pilot Proposal" (kliger_3bn_02a_0713.pdf) as a baseline proposal.
Moved: Avi Kliger
Second: Rich Prodan
For: 25
Against: 0
Abstain: 2
Technical (>= 75%)
Motion Passed

Straw Poll #3

I support the upstream resource block structuring described in slides 8-11 in rahman_syed_3bn_03_0713.pdf.
Yes - 9
No - 7
Abstain - 11
Too soon – 0

Motion #14

Move that a single sub-carrier Resource Block shall be included as a requirement in the upstream specifications (as illustrated in kliger_3bn_03_0713.pdf page 6).
Moved: Avi Kliger
Second: Rich Prodan
For: 27
Against: 0
Abstain: 4
Technical (>= 75%)
Motion Passed

Motion #15

Move to:
Adopt the LDPC codes for active plant EPoC FEC as presented in prodan_3bn_01a_0713.pdf, pages 3, 5, 6, 7, and 8.
Moved: Rich Prodan
Second: BZ Shen
For: 28
Against: 0
Abstain: 3
Technical (>= 75%)
Motion Passed

[*Chair note: the reference file above was updated to prodan_3bn_01b_0713.pdf on 24 July 2013 to correct a typographical error in the matrix for Medium LDPC code. This was announced on the EPoC email reflector and updated on the website.]*

Motion #16

Call the question on Motion 15
Moved: Duane Remein
Second: Edwin Mallette
For: 26
Against: 0
Abstain: 2
Technical (>= 75%)
Motion Passed

Motion #17

Revise the P802.3bn Task Force FER objective (EPoC objectives_update_1115.pdf slide 4 last bullet) per hajduczenia_3bn_01_0713.pdf slide 13, and 17, to read as follows:
PHY to have:
- A downstream Frame Loss Ratio better than 10-6
- An upstream Frame Loss Ratio better than 5x10-5.
Moved: Marek Hajduczenia
Second: Edwin Mallette
For: 10
Against: 12
Abstain: 4
Technical (>= 75%)
Motion Failed

Motion #18

Move to:
Add a new Objective for P802.3bn Task Force:
- MTTFPA at least equal to 1.4 x 10^{10} years.

Moved: Marek Hajduczenia
Second: Edwin Mallette
For: 26
Against: 0
Abstain: 2
Technical (>= 75%)
Motion Passed

Steve Shellhammer assumed the Chair while Mark attended to other business.

TDD Closing Report

Motion #19

The standard shall support a TDD Guard Time in positive integer multiples of 1.25 us, starting at 1.25 us to at least 10 us.
Moved: Bill Keasler
Second: Saifur Rahman
For: 17

Against: 0
Abstain: 5
Technical (>= 75%)
Motion Passed

Motion #20

The TDD downstream and upstream time windows will be characterized by an integer multiple of the symbol duration, which is equal to the inverse of the sub-carrier spacing plus the cyclic prefix duration.
Moved: Bill Keasler
Second: Saifur Rahman
For: 14
Against: 0
Abstain: 9
Technical (>= 75%)
Motion Passed

Motion #21

The standard shall support a lower TDD frequency band from 10 MHz to 277 MHz
Moved: Jorge Salinger
Second: Saifur Rahman
For: 9
Against: 0
Abstain: 13
Technical (>= 75%)
Motion Passed

Motion #22

The standard shall support an upper TDD frequency band from 750 MHz to 1800 MHz
Moved: Jorge Salinger
Second: Saifur Rahman
For: 11
Against: 0
Abstain: 12
Technical (>= 75%)
Motion Passed

Mark Laubach resumed the Chair

Closing

The Chair reviewed Consensus Challenge Items. OFDM numerology still open including: symbol and cyclic suffix (related to windowing) definitions, and number of OFDM channels (see task force Web page for the Chairs closing report). [*Chair note: The Call for Topics on the website will be updated.*]
The TF needs to provide baseline material (technically complete) at the York meeting.
The Chair polled the group on future meetings.

The meeting was adjourned at 12:20 PM.

Meeting Attendance

The following represents the meeting attendance as initialed in the attendance binder that was passed around the meeting each day. 36 individuals indicated their attendance for this meeting. If an attendee has an affiliation in addition to or different from their Employer for this meeting, it should be so noted.

Lastname	Firstname	Employer	Affiliation (If Different)	Tue	Wed	Thu
Allard	Michel	Cogeco Cable		X	X	X
Arunarthi	Venkat	Cortina Systems		X	X	
Brown	Alan	Aurora Networks		X	X	X
Chandrasekaran	Sri	IEEE				X
Dai	Eugene	Cox		X	X	X
Diab	Wael	Broadcom		X	X	
Dickinson	John	Bright House Networks		X	X	X
ElBakoury	Hesham	Huawei		X	X	X
Goswami	Sanjay	Broadcom		X	X	X
Guangseng	Wu	Huawei		X	X	X
Hajduczenia	Marek	ZTE Corp		X	X	X
Hou	Victor	Broadcom		X	X	X
Keasler	Bill	Ikanos Communications		X	X	X
Kliger	Avi	Broadcom		X	X	X
Kolze	Tom	Broadcom		X	X	X
Laubach	Mark	Broadcom		X	X	X
Lessard	Andre	Commscope		X	X	
Mallette	Edwin	Bright House Networks		X	X	X
Moniot	Pascal	ST Microelectronics		X	X	X
Montreuil	Leo	Broadcom		X	X	X
Nada	Tomoaki	Ikanos Communications		X	X	X
Noll	Kevin	Time Warner Cable		X	X	X
Ohana	Yitshak	Broadcom		X	X	
Powell	Bill	Alcatel-Lucent		X	X	X
Prodan	Rich	Broadcom		X	X	
Rahman	Saifur	Comcast		X	X	X
Rahman	Syed	Huawei		X	X	X
Remein	Duane	Huawei		X	X	X
Salinger	Jorge	Comcast		X	X	X
Schmitt	Matt	CableLabs		X	X	X
Shellhammer	Steve	Qualcomm		X	X	X
Shen	BZ	Broadcom		X	X	X
Suzuki	Ken-Ich	NTT		X	X	X
Tanaka	Keiji	KDDI		X	X	X
Ulm	John	Arris		X	X	X
Zhang	Bing	Xidian University		X	X	
Zhao	Hui	Peking University		X	X	