(Unconfirmed Minutes)
IEEE P802.3bn EPoC PHY Task Force
September 27-28, 2012,
ITU, Geneva, Switzerland
Chair: Mark Laubach
Recording Secretary: Duane Remein

Opening

9:08 AM The Working Group chair (David Law) opened the meeting and nominated Mr. Mark Laubach as Task Force Chair. Mark briefly spoke to the TF.

Motion #1

Vote to ~~af~~confirm Mark Laubach as the TF Chair.

Alan Brown requested a Roll Call vote; the WG Chair granted the request

Moved: Steve Shellhammer
Second : Marek Hadjuczenia

802.3 Voter Roll Call Results

Abaye, Ali	-	Bugg, Mark	-
Abbas, Ghani	-	Busse, Robert	-
Abbott, John	-	Carlson, Steve	-
Allard, Michel	Abstain	Carroll, J. Martin	-
Amleshi, Peerouz	-	Chadha, Mandeep	-
Anderson, Jon	-	Chalupsky, David	-
Anslow, Peter	-	Chang, Frank	-
Balasubramanian, Koussalya	-	Chang, Fuhlim	-
Baldwin, Thananya	-	Chen, Chung-Jue	-
Barnett, Barry	-	Cheng, Wheling	-
Barr, David	Abstain	Chou, Joseph	-
Barrass, Hugh	Approve	Choudhury, Golam	-
Beaudoin, Denis	-	Cideciyan, Roy	-
Belopolsky, Yakov	-	Cole, Christopher R.	-
Bennett, Michael	-	Cui, Kai	-
Bhatt, Vipul	-	Dai, Eugene	Approve
Bhoja, Sudeep	-	Dambrosia, John	Approve
Bliss, William	Approve	Dawe, Piers	-
Booth, Brad	-	Diab, Wael	Approve
Boyd, Edward	Approve	Diminico, Chris	-
Braun, Ralf-Peter	-	Donahue, Curtis	-
Breuer, Dirk	-	Donnay, Beth	-
Brophy, Timothy	Approve	Dove, Dan	-
Brown, Alan	Approve	Dudek, Mike	-
Brown, Kevin	-	Dwelley, David	-
Brown, Matthew	-	Elbakoury, Hesham	Approve
		Estes, David	-

Ewen, John	-	Li, Mike Peng	-
Farhoodfar, Arash	-	Lingle, Robert	-
Flatman, Alan	-	Liu, Alexander	-
Frazier, Howard	-	Lusted, Kent	-
Ganga, Ilango S.	-	Lutz, Sharon	-
Ghiasi, Ali	-	Maguire, Valerie	-
Giannakopoulos, Dimitrios	-	Maki, Jeffery J.	-
Goergen, Joel	-	Mallette, Edwin	Approve
Grimwood, Michael	-	Marris, Arthur	-
Grow, Robert	-	Matsuda, Shougo	-
Gundubogula, Sudhakar	-	Mcclay, Phil	-
Gustlin, Mark	-	McCormack, Michael S.	-
Hajduczenia, Marek	Approve	Mcdermott, Thomas	-
Hamano, Hiroshi	-	McDonough, John	-
Hammond, Bernie	-	McNarney, Martin	-
Healey, Adam	-	Meghelli, Mounir	-
Heath, Jeffrey	-	Mei, Richard	-
Hidaka, Yasuo	-	Meier, Wolfgang	-
Hou, Victor	-	Mellitz, Richard	-
Huang, Xi	-	Misek, Brian	-
Irwin, Scott	-	Moeller, Merrick	-
Ishida, Osamu	-	Montreuil, Leo	Approve
Isono, Hideki	-	Moore, Charles	-
Iwadate, Hirotake	-	Muller, Shimon	-
Jain, Rajeev	-	Nikolich, Paul	Approve
Jewell, Jack	-	Nishihara, Susumu	-
Jiang, Hongtao	-	Noll, Kevin	Approve
Jiang, Wenbin	-	Nordin, Ronald	-
Jimenez, Andrew	-	Northcott, Philip	-
Kasturia, Sanjay	-	Nowell, Mark	-
Kawatsu, Yasuaki	-	Ofelt, David	-
Kim, Yong	Approve	Ossman, Valy	-
Kimmitt, Myles	-	Palkert, Tom	-
King, Jonathan	-	Panguluri, Sesha	-
Kipp, Scott	-	Park, Jisang	-
Kodama, Satoshi	-	Parthasarathy, Vasu	-
Kolesar, Paul	-	Patel, Pravin	-
Kolze, Tom	-	Pepeljugoski, Petar	-
Kono, Masashi	-	Pepper, Gerald	-
Kosanovich, Keith	-	Perrie, Randy	-
Kramer, Glen	Approve	Petrilla, John	-
Kvist, Bengt	-	Pimpinella, Rick	-
Lackner, Hans	-	Powell, William	Approve
Lamb, Lowell	Approve	Prodan, Richard	Approve
Larsen, Wayne	-	Rabinovich, Rick	-
Latchman, Ryan	-	Rahman, Saifur	Abstain
Laubach, Mark	-	RAN, ADEE	-
Law, David	-	Remein, Duane	Approve
Le Cheminant, Greg	-	Ressl, Michael	-
Lewis, David	-	Riani, Jamal	-

Salinger, Jorge	Approve	Thaler, Pat	Approve
Salunke, Vineet	-	Thompson, Geoffrey	-
sambasivan, Sam	-	Tracy, Nathan	-
Schmitt, Matthew	Approve	Tremblay, Francois	-
Searles, Shawn	-	Trowbridge, Stephen	-
Sela, Oren	-	Ulm, John	-
Shanbhag, Megha	-	Umnov, Alexander	-
Shariff, Masood	-	Vaden, Sterling A.	-
Shellhammer, Stephen	Approve	Valle, Stefano	-
Sheth, Siddharth	-	Vanderlaan, Paul	-
Shrikhande, Kapil	-	VITTAL, BALASUBRAMANIAN	-
Slavick, Jeff	-	Wagner, Robert	-
Solomon, Joe	-	WANG, Zhong Feng	-
Sommers, Scott	-	Warland, Tim	-
Sparrowhawk, Bryan	-	Warren, David	-
Sprague, Edward	-	Winkel, Ludwig	-
St Peter, Matthew	-	Wong, Ching	-
Stassar, Peter	-	Woodruff, Bill	-
Sugawa, Jun	-	Wu, Wendy	-
Suzuki, Ken-Ichi	-	Zambell, Andrew	-
Swanson, Steve	-	zang, meiyan	-
Szczepanek, Andre	-	Zhang, James	-
Tawa, Katsuhisa	-	Zhao, Wenyu	-
TAZEBAY, MEHMET	-	Zimmerman, George	-
Teixeira, Antonio	-	Zivny, Pavel	-

Summary of Roll Call vote

- For: 24
- Against 0
- Abstain 3

The WG Chair turned the meeting over to the newly confirmed chair.

The new Chair (Mark Laubach) appointed Steven Shellhammer as Vice Chair. The Chair also noted that the TF will be operating under 802.3 voter rules and will re-evaluate at the November meeting.

Introductions were held.

Motion #2

Motion to approve the agenda.

Moved: A Brown

Seconded: K Noll

Approved by voice acclamation without opposition.

Motion #3

Motion to approve the minutes from the July meeting.

Moved: Marek Hajduczenia
Seconded: Jorge Salinger
Approved by voice acclamation without opposition.

The chair inquired if there was anyone present from the Press; no one indicated they were. The Chair reviewed Task Force decorum, goal of the meeting, Reflector and WEB area, meeting ground rules, attendance, IEEE structure, IEEE By Laws & Rules.

Call for Patents

The Chair displayed and read the 1 optional and the 4 mandatory Patent slides [25 March 2008 (updated 29 March 2011)].
The Chair made a call for Potentially Essential Patents; there were no responses.

The Chair reviewed affiliation disclosure By-Laws.

The Chair reviewed the IEEE 802.3 Standards Process flow chart. The Chair reviewed the IEEE 802.3 Standards Process flow chart, the PAR, 5 Criteria and Objectives of the TF. The Chair reviewed the typical purpose and structure of Ad Hoc committees. The Chair reviewed the schedule for meeting presentations. Marek H requested that the presentation "Baseline Proposals for EPoC TF" be moved to the end of the day; the request was honors without objections. Marek H requested late presentation "(Major) challenges ahead for EPoC" be added to the agenda at the end of the day.

Motion #4

Move to approve the presentation schedule as amended.

Moved: Marek Hajduczenia
Second: Kevin Noll
Approved by voice acclamation without opposition.

The Chair reviewed the TF time line noting how aggressive it was and necessary notification times, alignment to RevCom and other timing issues. It was noted that the current projection is not aligned with the dates shown in the PAR. There was a desire expressed that the EPoC PHY be aligned with the DOSCIS 3.1 PHY.

Presentations

Baseline Proposals for EPoC TF - the WHAT and the WHY

Marek Hajduczenia ZTE
This presentation was a general presentation on work flow within 802.3 and the concept of baseline proposals.

Developing the EPoC System and Device Specifications as a CL/MSO effort

Jorge Salinger — Comcast

This presentation provided information on CableLabs' system level specification effort.

Bandwidth Assignment method for EPOC

Eugene Dai — Cox

This presentation proposed OFDM DS and OFDMA US. Suggested US RF bandwidth of 5-200MHz, DS RF bandwidth of 300-1100 MHz (possibly in 200 MHz steps for future expansion; 300-500, 300-700, …). There appeared to be a difference in the definition of OFDM and OFDMA within the TF.

EPoC Discover & Registration

Duane Remein — Huawei

This presentation proposed two options for performing Discover & Registration in the EPoC network.

EPoC PHY Link and Auto-Negotiation

Ed Boyd, Avi Kliger — Broadcom

This presentation proposed a method for PHY bring up (Discovery & Registration) in an EPoC network based on Auto-Negation. An ad Hoc "to work on baseline proposal for PHY Link procedure" was proposed in the presentation.

EPoC Downstream Bonding

Ed Boyd, Randy Sharpe, John Ulm, Rob Howald — Broadcom, Alcatel-Lucent, Motorola

This presentation discussed the concept of channel bonding in EPoC, concluding that "PHY Bonding" is preferred and needs a wide spectrum receiver.

OFDMA PHY for EPoC: a Baseline Proposal

Andrea Garavaglia, Christian Pietsch — Qualcomm

This presentation proposed using OFDMA for the EPoC PHY. One comment stated the Echo Delay of the cable plant is expected to be between 3-7 us.

Solutions for a flexible dual-mode TDD/FDD physical layer in EPoC (TDD feasibility Part II)

Nicola Varanese, Andrea Garavaglia — Qualcomm

This presentation proposed a rate adaptation function between the PCS & the PMA.

Straw Poll #1

The EPoC PHY shall include rate adaptation functionality

	802.3 voters	All in room
- Yes:	21	40
- No:	0	0

Straw Poll #2

The EPoC PHY shall include a rate adaptation functionality between PCS and underlying layers (PMA/PMD)

- Allowing the use of bi-directional, fixed-rate interface between PCS and underlying layers (PMA/PMD)

The precise design solution and related details are for further study

	802.3 voters	All in room
- Yes:	2	10
- No:	9	15

EPoC Performance Model – Delay and Efficiency (including Spreadsheet for EPoC Performance Model – Delay and Efficiency)

Andrea Garavaglia, Ed Boyd, Rick Li, Bill Powell, Hesham ElBakoury, David Barr

Qualcomm,Broadcom, Cortina, Alcatel-Lucent, Huawei, Entropic

This presentation discussed the delay model developed in various phone calls involving a number of TF members. The presentation also review a spreadsheet tool developed in conjunction with the model.

EPoC RF Bandwidth Task Force Choices

Steve Shellhammer, Hesham ElBakoury, Ed Boyd, Bill Powell

Qualcomm, Huawei, Broadcom, Alcatel-Lucent

This presentation reviewed the activities of an informal group that discussed the topic of RF bandwidth and how the TF may specify this. The formation of an Ad Hoc committee on RF Bandwidth was proposed.

Baseline Proposals for EPoC TF

Marek Hajduczenia ZTE

This presentation propose that: 1) FEC be used in both US & DS. No specifics on actual FEC, 2) the EPoC PCS use a "bursty" PMA concept, 3) Adopt 10G-EPON PCS as the first-order approximation using RS((255,232) as a placeholder, and 4) Adopt the draft outline shown in EPoC_1209_hajduczenia_2.pdf.

Straw Poll #3

EPoC PHY shall use Forward Error Correction (FEC) in upstream and downstream directions (mandatory to support). The selection of specific FEC code is for future study at this time.

	802.3 voters	All in room
- Yes:	23	38
- No:	0	0

19:20 the TF recessed.

8:15 The Chair reconvened the meeting.

EPoC FDD Downstream RF Bandwidth – A Baseline Proposal

Steve Shellhammer, Juan Montojo Qualcomm

This presentation proposed a DS FDD RF bandwidth of 192 MHz. How a device would scale (i.e.,

approximate die size and/or power consumption) due to increases in RF bandwidth was examined. Also addressed were concerns about multi-generation coexistence. During discussion it was clear there were disagreements on the scale of die size/power figures but it was agreed there was an increase in complexity for a larger RF bandwidth, it was also agree that memory would scale linearly with RF bandwidth.

Forward Error Correction – A Baseline Proposal

Christian Pietsch, David Barr Qualcomm, Entropic

This presentation proposed: 1) mandatory FEC for both US & DS, 2) FEC to use LDPC, 3) FEC to include both long and short blocks. The presentation included a general discussion of LDPC optimization techniques (code word shortening, puncturing, etc.).

Analysis on estimated SNR values on a generic cable plant

Nicola Varanese and Andrea Garavaglia Qualcomm

This presentation proposed that the PHY support an adaptive modulation and coding schemes (MCS). The presentation initially provided information on SNR figures for2 cable plants followed by simulations for coaxial plants response between 1 and 1.35 GHz.

Power Saving for EPoC

Marek Hajduczenia, Doug Jones, John Dickinson, Kevin A. Noll, Mike Bennett National Laboratory, Wael Diab

ZTE, Comcast, Bright House Networks, Time Warner Cable, Lawrence Berkeley, Broadcom

This presentation proposed support for an optional Power saving mechanisms in EPoC.

Motion #5

Study support for a configurable power saving mechanism for EPoC interface(s). Technical details of a specific solution are for further study.

Moved: Marek Hajduczenia
Second: Ed Mallette

	802.3 voters	All in room
- Yes:	10	14
- No:	2	3
- Abstain:	9	22

Motion ruled technical (>= 75%) by the Chair
Motion Passed

OFDM Symbol size considerations for EPoC

Avi Kliger Broadcom

This presentation reviewed symbol size and cyclic prefix size and factors impacting each. Factors considered included CP overhead, latency, hardware complexity; frequency offset and, phase noise.

[Baseline Proposal for EPoC PHY Layer]

Avi Kliger Broadcom

This presentation proposed a baseline PHY for EPoC with a DS using 800 MHz RF bandwidth between 200-1150 MHz with 16,384 sub-carriers and an US using 200 MHz RF bandwidth below the DS band with 50 kHz sub-carriers.

[FEC for EPoC PHY]

Rich Prodan, Avi Kliger, Tom Kolze, BZ Shen Broadcom

This presentation provided a technical contribution on FEC for US EPoC; an LDPC with a 12000 codeword size. The proposed code uses a set-partition LDPC code on 4-LSB's for all QAM constellations. The code also uses a high rate BCH outer code when the LDCP code word is shortened.

[MPCP Extensions for EPoC]

Lup Ng Cortina

This presentation proposed extensions to MPCP for EPoC to address various functions.

[Adaptive Bit Loading]

Hesham Elbakoury Huawei

This presentation raised various questions on adaptive bit loading and asked if EPoC should use adaptive bit loading in US, DS or both.

[Efficiency Considerations for EPoC PHY Design]

Hesham Elbakoury Huawei

This presentation raised questions on efficiency of EPoC COAX links.

Closing

The Chair reviewed the timeline with the Task Force, stressing target Sponsor Ballot start (Jul 2013). To accomplish this we need a work plan (addressing parallelism, coordination etc.) on how to complete our task as soon as possible. The Task Force discussed the timeline and 802.3 normal and required procedures (baseline & TF Review, last feature add & WG Ballot, last technical change & Sponsor Ballot, etc.). There was some concern that the Task Force could meet WG Ballot by Jul 2013 per plan.

Straw Poll #4

I support the goal of initiating working group ballot in

a) July 2013: 18
b) Nov 2013: 9

(all in room)

The Task Force discussed "Consensus Challenge" items:

RF Bandwidth *
FDD downstream OFDM or OFDMA
DS Bonding approach
Rate adaptation, which layer and how
FEC / Interleaving (error performance) (req. channel model)

MPCP Changes
Adaptive bit rate loading
PHY Link *
Complexity of hardware scaling with RF bandwidth
How we are going to do TDD
Efficiency gain vs. cost
Synchronization in terms of time / frequency (mobile backhaul)
OFDM numerology Symbol size / CP size / FFT size (req. channel model)
Framing structure
MAC layer efficiency
PHY layer efficiency
Energy efficiency
Sub-carrier group
* Ad Hoc topic

Motion #6

Adopt OFDM for Downstream ~~an~~ EPoC PHY
Moved: Steve Shellhammer
Second: Eugene Dai
802.3 voters All in room
- Yes: 19
- No: 0
- Abstain: 2

Motion ruled technical (>= 75%) by the Chair
Motion Passed

Motion #7

Adopt OFDMA for upstream ~~an~~ EPoC PHY
Moved: Eugene Dai
Second: Leo Montreuil
802.3 voters
- Yes: 17
- No: 0
- Abstain: 2

Motion ruled technical (>= 75%) by the Chair
Motion Passed

Motion #8

Adopt LDPC for downstream inner code

- There is no decision on outer code at this time

Moved: Rich Prodan
Second: Leo Montreuil
802.3 voters

- Yes: 18
- No: 0
- Abstain: 3

Motion ruled technical (>= 75%) by the Chair
Motion Passed

Motion #9

Adopt LDPC for upstream inner code

- There is no decision on outer code at this time
- Does not preclude other coding schemes for short packets

Moved: Steve Shellhammer
Second: Jorge Salinger
802.3 voters

- Yes: 9
- No: 7
- Abstain: 4

Motion ruled technical (>= 75%) by the Chair
Motion Failed

Motion #10

Support for exclusion one or more OFDM sub-carriers

Moved: Steve Shellhammer
Second: Eugene Dai
802.3 voters

- Yes: 18
- No: 0
- Abstain: 1

Motion ruled technical (>= 75%) by the Chair
Motion Passed

Motion #11

Support multiple downstream modulation orders up to 4096QAM.
Support multiple upstream modulation orders up to 1024QAM.

Moved: Rich Prodan
Second: Jorge Salinger
802.3 voters

- Yes: 18
- No: 0
- Abstain: 2

Motion ruled technical (>= 75%) by the Chair
Motion Passed

Motion #12

In the downstream use OFDM channels of 192 MHz with OFDM sampling frequency of integer multiples of 10.24 MHz

Moved: Jorge Salinger
Second: Dave Barr
802.3 voters

- Yes: 9
- No: 2
- Abstain: 8

Motion ruled technical (>= 75%) by the Chair
Motion Passed

Motion #13

Move to Call the Question

Moved: Jorge Salinger
Second:

- 802.3 voters
- Yes: 6
- No: 2
- Abstain: (not counted)

Motion ruled procedural (>= 50%) by the Chair
Motion Passed

Motion #14

The standard shall support the ability for higher capacity by combining multiple 192 MHz OFDM channels.

Moved: Jorge Salinger
Second: Rich Prodan

- 802.3 voters
- Yes: 15
- No: 0
- Abstain: 2

Motion ruled technical (>= 75%) by the Chair
Motion Passed

Ad Hoc committees

The Chair discussed and then chartered the following Ad Hoc committees:

RF Spectrum Chaired by Steve Shellhammer. This Ad Hoc is to meet until Nov. 2012 plenary meeting with possible extension. Its purpose/deliverables are to:

- Continue work started in shellhammer_01_0912.pdf,
- Contribute baseline recommendations on RF spectrum issues such as: RF spectral allocation sizes, spectral mask(s), adjacent legacy service (e.g. analog and digital channel) operation requirements for non-interference, spurious noise emission requirements, symmetric and asymmetric spectrum assignment, etc.

Notes:

- RF frequency use consistent with Channel Model
- Review relevant sections of CableLabs PHY/DRFI specifications for similar approaches

Evaluation Criteria and Requirements Chaired by Steve Shellhammer. This Ad Hoc is to meet until Jan. 2013 plenary meeting with possible extension. Its purpose/deliverables are to:

- Make recommendations for TF consideration for building “Informal Objectives” and other evaluation criteria and requirements used by the TF in technology selection consensus process, may include tools.
- MSO requirements

Notes:

- Does not duplicate Channel Model activities
- Review prior SG contributions and carry forward any essential informal objective, evaluation criteria, or requirements in recommendations

PHY Link to be chaired by Ed Boyd. This Ad Hoc is to meet until Nov. 2012 plenary meeting with possible extension. Its purpose/deliverables are to:

- Make recommendations for TF consideration for PHY Link “auto-negotiation” and “discovery”

Channel Model to be chaired by Duane Remein. T This Ad Hoc is to o meet until Nov. 2012 plenary meeting with possible extension.

- Its purpose/deliverables are to:
    - Channel Model recommendation for Task Force, including
        - “The Model”, “How to use” documentation, Any tools, templates, etc.
    - Maintains / updates Channel Model for TF use

- Other requirements
    - Does not create "The Model"
    - Act's as focus for input from MSOs: e.g.,
        - North American
        - European
        - China
    - Evaluate need/desire for a channel model informative annex

There was discussion on additional Ad Hoc committees with no decisions made.

Future Meetings

The Chair reviewed upcoming meetings.

Oct 28-29 Interim Hangzhou China
Nov 11-16 Plenary San Antonio Tx
Jan 2013 week of 21st, Interim (location TBD)

The meeting was adjourned at 19:37.

Meeting Attendance

The following represents the meeting attendance as initialed in the attendance binder that was passed around the meeting each day.

Lastname	Firstname	Affiliation	~~Tue~~ Thu	~~Wed~~ Fri
Allard	Michel	Cogeco Cable	X	X
Barr	David	Entropic Communications	X	X
Boyd	Ed	Broadcom	X	X
Brophy	Tim	Cisco	X	X
Brown	Alan	Aurora Networks	X	X
Dai	Eugene	Cox	X	
Diab	Wael	Broadcom	X	
ElBakoury	Hesham	Huawei	X	X
Frazier	Howard	Broadcom	X	
Garavaglia	Andrea	Qualcomm	X	X
Hajduczenia	Marek	ZTE Corp	X	X
Hanna	Charaf	ST Microelectronics	X	X
Hewaviathana	Thushara	Intel	X	X
Howald	Robert	Motorola Mobility	X	X
Jain	Rajeev	Qualcomm	X	
Joetten	Christoph	Qualcomm	X	X
Kinnard	Brian	Commscope	X	X
Kliger	Avi	Broadcom	X	X

Kramer	Glen	Broadcom	X	
Lamb	Lowell	Broadcom	X	
Laubach	Mark	Broadcom	X	X
Li	Xuming	Huawei	X	X
Lin	Rujian	Shanghai Luster Teraband Photonics	X	X
Mallette	Edwin	Bright House Networks	X	X
Matsuda	Shougo	Hitachi	X	X
Montojo	Juan	Qualcomm	X	
Montreuil	Leo	Broadcom	X	X
Ng	Lup	Cortina Systems	X	X
Nikolich	Paul	802 Chair/YASBBV	X	
Noll	Kevin	Time Warner Cable	X	X
Pietsch	Christian	Qualcomm	X	X
Powell	Bill	Alcatel-Lucent	X	X
Prodan	Rich	Broadcom	X	X
Rahman	Saifur	Comcast	X	
Rajkotia	Purva	Qualcomm	X	X
Remein	Duane	Huawei	X	X
Saeki	Naoto	NEC	X	X
Salinger	Jorge	Comcast	X	X
Schmitt	Matt	CableLabs	X	
Shellhammer	Steve	Qualcomm	X	X
Stupar	Patrick	Qualcomm	X	X
Sugawa	Jun	Hitachi	X	X
Sundaresan	Karthik	CableLabs	X	X
Suzuki	Ken-Ich	NTT	X	X
Tajima	Akio	NEC	X	X
Thaler	Patricia	Broadcom	X	X
Varanese	Nicola	Qualcomm	X	X
Zargari	Masoud	Qualcomm	X	X