(Unconfirmed Minutes)
IEEE 802.3 EPON Protocol over a Coax (EPoC) PHY Study Group
March 13-14, 2012,
Hilton Waikoloa, Waikoloa, HI
Chair: Howard Frazier
Recording Secretary: Victor Hou

Tuesday, March 13, 2012

Meeting was called to order by Howard Frazier (Chair) at approximately 9:04 AM HST.

The Chair began following the slides in the file Agenda and General Information (http://www.ieee802.org/3/epoc/public/mar12/agenda_0312.pdf).

Victor Hou was asked by the Chair to be Recording Secretary. Mr. Hou accepted.

Chair continued with agenda and general information slides

Time was taken for all attendees to introduce themselves and their affiliation.

MOTION

The Chair asked for a motion to approve the agenda.

Moved: Kevin Noll

Seconded: Tim Brophy

Approved by voice vote with no opposition.

The Chair asked if there were any comments on the excellent January 2012 Newport Beach minutes prepared by Hesham ElBakoury.

There were no comments.

MOTION

The Chair asked for a motion to approve the January minutes.

Moved: Mark Laubach

Seconded: Steve Shellhammer

Approved by voice vote with no opposition.

The Chair circulated the sign in sheet.

The Chair discussed the Task Force Decorum slide.

The Chair discussed the goals for the meeting:

- Hear presentations.
- Continue work on PAR, 5 Criteria, and Objectives.

The Chair also mentioned the goal of trying to get a PAR approved at July meeting. The PAR would have to be sent to the 802 EC 30 days in advance.

The Chair discussed slides on the following:

- Reflector and Web info
- Ground rules
- Attendance
- IEEE Structure
- Important Bylaws

The Chair asked Steve Shellhammer to read aloud the Patent Policy slides. Mr. Shellhammer read the slides aloud. The Chair performed the Call for Potentially Essential Patents. No response was received.

Chair showed IEEE 802.3 standards process flow diagram slides and comments that a study group usually tries to do objectives first, and then the PAR and 5 Criteria. The hope is to gain approval at July meeting.

Liaisons and Communications—there were none received.

PRESENTATIONS

Presentation: Cable Network Overview (note that agenda had it as Cable System Overview)
Presenter: Matt Schmitt (CableLabs)
See: http://www.ieee802.org/3/epoc/public/mar12/schmitt_01_0312.pdf

Mr. Schmitt said that the presentation has a lot of the same content as the webinar given previous to the meeting. He acknowledged Alberto Campos as primary contributor and a number of MSOs for contributing.

Presentation: MSO Topology Scenarios
Presenter: Edwin Mallette (BrightHouse Networks)
See: http://www.ieee802.org/3/epoc/public/mar12/mallette_01_0312.pdf

Chair calls for 15 minute break at 10:46 AM (Tuesday AM1 ended).

Session (Tuesday AM2) resumes at 11:01 AM.

Presentation: Introduction to Coaxial Plant Operating Conditions and Requirements (note that agenda had the title "Operating conditions under which EPoC is expected to work")
Presenter: Kevin Noll (Time Warner Cable)
See: http://www.ieee802.org/3/epoc/public/mar12/noll_01a_0312.pdf

Mr. Noll said the purpose of the presentation is to provide background and operating assumptions (referencing 3.0 DOCSIS PHY). The slide deck is not a proposal.

Presentation: China NG HFC Key Requirements
Presenter: Yanbin Huang (Broadcom Corporation)
See: http://www.ieee802.org/3/epoc/public/mar12/huang_01_0312.pdf

Mr. Huang stated that he was presenting on behalf of MSOs in China and their positions and opinions on EPOC.

Presentation: IEEE P1904.1 SIEPON Project Overview
Presenter: Alan Brown (Aurora Networks)
See: http://www.ieee802.org/3/epoc/public/mar12/brown_01_0312.pdf

Presentation: DPoE Overview
Presenter: Matt Schmitt (CableLabs)
See: http://www.ieee802.org/3/epoc/public/mar12/schmitt_02_0312.pdf

Presentation: DPoE MEF Services
Presenter: Hesham ElBakoury (Huawei)
See: http://www.ieee802.org/3/epoc/public/mar12/elbakoury_01_0312.pdf

Presentation: Overview of 802.3bf
Presenter: Marek Hajduczenia (ZTE)
See: http://www.ieee802.org/3/epoc/public/mar12/hajduczenia_01_0312.pdf

Presentation: EPoC Architecture, MPCP and DBA
Presenter: Biswanath Mukherjee (UC Davis)
See: http://www.ieee802.org/3/epoc/public/mar12/mukherjee_01_0312.pdf

Close session (Tuesday PM1) at 3:31 PM.

Resume session (Tuesday PM2) at 3:45 PM.

Presentation: EPoC Architecture with the "Transparency wish"
Presenter: Marek Hajduczenia (ZTE)
See: http://www.ieee802.org/3/epoc/public/mar12/hajduczenia_02_0312.pdf

Presentation: System Vendor's View on EPoC
Presenter: Meiyan Zang (ZTE)
See: http://www.ieee802.org/3/epoc/public/mar12/zang_01_0312.pdf

Presentation: Functional Assumptions, Part Two
Presenter: Mark Laubach (Broadcom Corporation)

See: http://www.ieee802.org/3/epoc/public/mar12/laubach_01_0312.pdf

Presentation: Feasibility issues of EPoC
Presenter: Eugene Dai (Cox)
See: http://www.ieee802.org/3/epoc/public/mar12/dai_01_0312.pdf

Presentation: Limitations of EPON Protocol for EPoC
Presenter: Steve Shellhammer (Qualcomm)
See: http://www.ieee802.org/3/epoc/public/mar12/shellhammer_01_0312.pdf

Close session (Tuesday PM2) at 6:08 PM

Wednesday, March 13, 2012

Resume Wednesday morning (Wednesday AM1) at 9:00 AM.

Presentation: Desirable Features for EPOC
Presenter: Juan Montojo (Qualcomm)
See: http://www.ieee802.org/3/epoc/public/mar12/montojo_01_0312.pdf

Presentation: EPoC TDMA Slot Mapping
Presenter: Ed Boyd (Broadcom)
See: http://www.ieee802.org/3/epoc/public/mar12/boyd_01_0312.pdf

Break at 10:16 AM (end Wednesday AM1)-- 5 minute break

Resume session (Wednesday AM2) 10:24 AM

Presentation: Technical Feasibility
Presenter: Ed Boyd (Broadcom)
See: http://www.ieee802.org/3/epoc/public/mar12/boyd_02_0312.pdf

Presentation: Comparative Economics of HFC and EPoC networks
Presenter: Alex Liu (Qualcomm)
See: http://www.ieee802.org/3/epoc/public/mar12/liu_01_0312.pdf

Presentation: 5 Criteria Responses
Presenter: Jorge Salinger (Comcast)
See: http://www.ieee802.org/3/epoc/public/mar12/salinger_01_0312.pdf

Break (end of Wednesday AM2) at 11:48 AM.

Resume session (Wednesday PM1) at 12:51 PM.

Presentation: Recommended EPOC Objectives
Presenter: Steve Shellhammer (Qualcomm)
See: http://www.ieee802.org/3/epoc/public/mar12/shellhammer_02_0312.pdf

Presentation: Proposed Objectives
Presenter: Kevin Noll (Time Warner Cable)
See: http://www.ieee802.org/3/epoc/public/mar12/noll_02_0312.pdf

Mr. Noll shows a slide of contributors and supporters that are not included in the file uploaded to the server.

MOTIONS BASED ON PROPOSALS OF OBJECTIVES AND FIVE CRITERIA TEXT

In the following, the numbering of motions is with respect to all motions taken on Wednesday afternoon. This numbering does not match the motion numbering that was displayed on the projected screen due to planned motions that were skipped as well as procedural motions that were made.

Kevin Noll sat in front making edits as required.

MOTION #1

Extend the EPoC PHY Study Group until the next plenary session.

Moved: Kevin Noll

Seconded: Jorge Salinger

Procedural (> 50%)

Anyone may vote.

Mr. Osman asked if this motion should be taken up at the end. Mr. Frazier said it makes sense to do it now.

Y:43 N:0 A:0

Motion passes.

MOTION #2

Adopt objective #1 as shown in noll_02a_0312.pdf:

Specify a PHY to support subscriber access networks using the EPON protocol and operating on point-to-multipoint RF distribution plants comprised of all-coaxial cable or hybrid fiber/coaxial media.

Moved: Jorge Salinger

Seconded: Ed Mallette

Y: 45 N: 0 A: 0

Motion passes.

MOTION #3

Adopt objective #2 as shown in noll_02a_0312.pdf:

Maintain compatibility with 1G-EPON and 10G-EPON, as currently defined in IEEE Std. 802.3 with minimal augmentation to MPCP and/or OAM if needed to support the new PHY.

Y: 41 N: 0 A: 2

Motion passes.

Discussion started with an attempt to adopt objective #3 as shown in noll_02a_0312.pdf. Eventually the motion arrived at the following text:

The baseline coaxial cable plant operating characteristics for the PHY, except frequency plans, shall be defined as in accepted international specifications for transmission of digital signals over coaxial cable networks, including:

--RF channel assumptions (Section 5.2) found in DOCSIS 3.0 PHY (CM-SP-PHY3.0)

--European modifications (Annex B.5.2) found in DOCSIS 3.0 PHY (CM-SP-PHY3.0)

--SCTE40-2011

Moved: Tim Brophy

Seconded: Rich Prodan

However, extensive discussion and attempts at revision followed with no apparent sign of convergence.

MOTION #4

Procedural motion to bring a motion based on objective #3 at the next meeting.

Moved: Rich Prodan

Seconded: Jorge Salinger

Unanimously approved by voice vote.

Motion passes.

Break at 2:53 PM (end of Wednesday PM1). Chair said to be back at 3:10 PM.

Wednesday PM2 session started at 3:13 PM.

Mr. Frazier suggested that given that we could not pass objective 3 in noll_02a_0312.pdf, objective 4 would be difficult. He suggested to move ahead (i.e., skip over objective 4) and to recognize that plant conditions and assumptions are work still to be done.

MOTION #5

Adopt objective # 5 as shown in noll_02a_0312.pdf:

> PHY to support symmetric and asymmetric data rate operation.
>
> Moved: Kevin Noll
>
> Seconded: Marek Hajduczenia
>
> Technical (≥ 75%)
>
> Anyone may vote
>
> Y: 40 N: 0 A: 1
>
> Motion passes.

Discussion moved to objective #6 in noll_02a_0312.pdf

Mr. Shellhammer said the wording does not assume FDD.

Mr. Noll said that all the objectives in the contribution are silent on FDD and TDD.

Mr. Powell said that we need upstream and downstream in the wording.

Mr. Barr suggested paired or unpaired wording.

Mr. Prodan suggested "bidirectional transmission."

MOTION #6

> Adopt objective #6 as shown in noll_02a_0312.pdf
>
> PHY to support symmetric and asymmetric spectrum assignment for bidirectional transmission.
>
> Moved: Jorge Salinger
>
> Seconded: Valentin Osman
>
> Technical (≥ 75%)
>
> Anyone may vote.

Y: 42 N: 0 A: 0

Motion passes.

Discussion moved to objective #7 in noll_02a_0312.pdf: PHY to support independent configuration of upstream and downstream channel operating parameters. After brief discussion, the objective is reworded.

MOTION #7

Adopt objective # 7 as shown in noll_02a_0312.pdf

PHY to support independent configuration of upstream and downstream transmission operating parameters.

Moved: Matt Schmitt

Seconded: Marek Hajduczenia

Technical (≥ 75%)

Anyone may vote.

Y: 44 N: 0 A:0

Motion passes.

Discussion moves to objective #8 in noll_02a_0312.pdf: PHY to coexist with other communication channels carried on the same medium.

Kevin Noll rewords to: "PHY to be interoperable in the cable spectrum assigned for EPOC interoperation while the balance of the cable spectrum is occupied by any combination of television and other signals." Later, an additional reword is made to arrive at motion text.

MOTION #8

Adopt objective # 8 as shown in noll_02a_0312.pdf

PHY to operate in the cable spectrum assigned for its operation without causing harmful interference to any signals or services carried in the remainder of the cable spectrum.

Moved: Tom Kolze

Seconded: Kevin Noll

Technical (≥ 75%)

Anyone may vote.

Y: 43 N:0 A:0

Motion passes.

The Chair asked if anyone has another objective to propose. No one had any additional objectives. The Chair stated that additional objectives can be proposed in the future.

Discussion now moved to the 5 Criteria. In order to save time, the Chair suggested that if one objects to text, suggest removing it as opposed to wordsmithing.

Mr. Salinger sat up in front maintaining current text of the motions showing up on the screen.

Discussion moved to the response for the "Broad Market Potential" criterion. Proposed motion is: "Adopt the text of the response to the "Broad Market Potential" criterion as captured in salinger_01a_0312.pdf as the basis for further work."

Mr. Shellhammer asked if the motion and additional motions means that the study group accepts the text.

The Chair said the intent is to start with this text and that further work on the 5C starts with this text. It will take 75% agreement to make further changes.

Mr. Prodan offered a rewording.

MOTION #9

Adopt the text of the response to the "Broad Market Potential" criterion as captured in salinger_01a_0312.pdf as the basis for further work:

"Broad sets of applicability"

- The proposed project would result in a new PHY with the widest possible applicability.
- Given the success of DOCSIS-based services, service providers are looking for cost-effective, high performance means to provide higher data capacity, addressing their growing CapEx and OpEx, market competition and future proofing their existing coaxial plant, while expanding service portfolios for business and residential customers.
- Service providers have seen an unabated growth in both offered capacity and consumption of broadband IP services over the course of over 15 years for residential and recently business services.

"Multiple vendors and numerous users"
"Balanced costs (LAN versus attached stations)"

- Interest and support from a worldwide array of operators, system vendors, optical and RF component manufacturers, and silicon suppliers has already been achieved
- The proposed project will result in the use of the existing EPON architecture by extending its capabilities to support point-to-multipoint access networks using mixed fiber-optic and coaxial cabling technologies
- This approach will allow the project to optimize the cost balance between the network infrastructure components and attached stations in the cable network

Moved: Marek Hajduczenia

Seconded: Matt Schmitt

Technical (≥ 75%)

Anyone may vote

Y: 42 N: 0 A:0

Motion passes.

Discussion moved to Compatibility.

MOTION #10

Adopt the text of the response to the "Compatibility" criterion as captured in salinger_01_0312a.pdf as the basis for further work:

"Compatibility with IEEE Std 802.3"

- As an amendment to current IEEE Std 802.3, the proposed project will remain in conformance with the IEEE 802 Overview and Architecture, as well as the bridging standards IEEE Std 802.1D and IEEE Std 802.1Q.
- Moreover, the proposed project will build on 1G-EPON and 10G-EPON architecture, extending coverage of EPON MultiPoint Control Protocol (MPCP) to mixed outside plant, comprising optical fiber and coaxial cable.

"Conformance with the IEEE Std 802.3 MAC"
"Managed object definitions compatible with SNMP"

- The proposed amendment will conform to the full-duplex operating mode of the IEEE 802.3 MAC, as defined in Annex 4A
- EPoC will reuse the MAC Control and OAM as defined in the current IEEE Std 802.3 for EPON with minimal augmentation, if necessary, while developing new specifications for PCS, PMA and PMD layers.
- The project will include a protocol independent specification of managed objects with SNMP management capability, provided by IEEE Std 802.3.1-2011.

Moved: Jorge Salinger

Seconded: Ed Mallette

Technical (≥ 75%)

Anyone may vote

Y: 40 N: 0 A:1

Motion passes.

Discussion moved to "Distinct Identity" and the proposed motion.

Chair said that it will be tough to consider FDD and TDD as one PHY. It will be tough to consider OFDM and QAM as one PHY.

Mr. Kolze asked what about DS and US PHY? Are they two separate PHYs?

Mr. Frazier said that, by precedent, US and DS PHYs in some standards are considered one PHY, e.g., with EPON.

MOTION #11

Adopt the text of the response to the "Distinct Identity" criterion as captured in salinger_01_0312a.pdf as the basis for further work.

"Substantially different from other IEEE 802 standards"
"Substantially different from other IEEE 802.3 specifications/solutions"
"One unique solution per problem (not two solutions to a problem)"
"Easy for the document reader to select the relevant specification"

- There is no existing 802 standard or approved project appropriate for operation at up to 10 Gb/s over point-to-multipoint mixed outside plant comprising fiberoptic cabling and coaxial cabling topologies, in symmetric and asymmetric configurations.
- The proposed project is an evolutionary extension of the coverage of EPON Multi Point Control Protocol (MPCP) and MAC, specified for IEEE Std. 802.3 EPON, onto hybrid fiber-coax networks
- New PHY will be designed for operation at the data rate of up 10 Gbit/s in symmetric and asymmetric configurations
- The proposed amendment to the existing IEEE Std 802.3 will be formatted as a set of new clauses and changes to existing clauses, making it easy for the document reader to select the relevant specification.

Moved: Mark Laubach

Seconded: Eugene Dai

Technical (≥ 75%)

Anyone may vote.

Y: 41 N: 0 A: 0

Motion passes.

Chair reminded group—if you don't like some text, you can suggest to strike it.

Discussion moved to Technical Feasibility.

Mr. Barr opposed bullet on full cable spectrum tuning.

A straw poll was taken to keep the bullet on full cable spectrum tuning: 28-10 in favor of retaining the bullet.

Mr. Montojo asked why we are including a specific implementation (full cable spectrum tuning).

Mr. Frazier said let's take it out because it gives someone heartburn.

Mr. Salinger said he did not want to take it out because Comcast has a need to put the downstream spectrum anywhere.

Mr. Shellhammer said that full band capture and 10 Gbps need to be demonstrated.

Mr. Kolze says that we should put as much technical feasibility in as possible.

MOTION #12

Motion: Adopt the text of the response to the "Technical Feasibility" criterion as captured in salinger_01a_0312.pdf as the basis for further work.

"Demonstrated System Feasibility"
"Proven Technology"
"Confidence in reliability"

- Widely deployed data transport technology in the form of DOCSIS & Digital Video services demonstrates the capacity of coaxial networks to support multigigabit/Seconded data rates over existing infrastructure when sufficient spectrum is allocated.
- Wideband communication techniques can provide necessary granularity and flexibility of bandwidth assignment in upstream and downstream.
- Millions of successfully deployed and operating 1G-EPON & 10G-EPON devices clearly demonstrate the reliability factor of MAC and PHY layers standardized by 802.3.
- Millions of Cable Modems deployed and operating demonstrate the reliability of high speed data over access cable plants.

Moved: Ed Mallette

Seconded: Bill Powell

Technical (≥ 75%)

Anyone may vote.

Y: 43 N: 0 A: 0

Motion passes.

Discussion moved on to Economic Feasibility and proposed text.

MOTION #13

Adopt the text of the response to the "Economic Feasibility" criterion as captured in salinger_01a_0312.pdf as the basis for further work:

"Known cost factors, reliable data"

- The cost factors for EPON components and systems are well known and there is a broad and healthy industry ecosystem associated with these technologies.
- EPoC components are expected to be similar to those used in EPON, and CNUs developed for RF networks should have comparable, or perhaps lower over time, cost structure as EPON ONUs
- The proposed project might introduce new cost factors which can be quantified and accounted for during the course of the project.
- EPON cost evolution should be directly related to future EPoC cost trends under comparable volumes.

"Reasonable cost for performance"

- EPON has been established as an attractive access technology in terms of cost/performance, capable of operating at 1 Gbps and 10 Gbps speeds.
- This project is intended to bring these benefits to RF access networks comprising a combination of fiber and coax cable.
- EPoC is expected to follow the same cost/performance trend line, established for all major Ethernet technologies developed by 802.3 in the past.
- The resulting PHYs will combine a proven, well-known point-to multipoint network architecture of EPON with mixed outside plant comprising fiber and coax cable to address known cost/performance limitations of other access technologies.

"Consideration of installation costs"

- Installation costs, as well as maintenance and operations costs for the new technology, are expected to be similar when compared with DOCSIS equipment.
  - OLT costs are generally lower than DOCSIS CMTS costs, but installation costs should be comparable
  - CNU costs are expected to be similar to DOCSIS cable modem costs, and installation costs should be comparable
  - Additional outside plant equipment costs should be comparable to other hybrid fiber-coax equipment capital and installation costs
- A combination of high equipment production volumes, broader competition, and simplicity thanks to reuse of EPON protocols and system-level operating principles should further contribute to reduction of equipment and installation costs, especially as compared to existing DOCSIS equipment costs

Moved: Jorge Salinger

Seconded: Ed Boyd

Technical (≥ 75%)

Anyone may vote.

Y: 42 N: 0 A: 0

Motion passes.

MOTION #14

[Request that the IEEE 802.3 Working Group]

Authorize the EPoC PHY Study Group to pre-submit a draft PAR and a draft set of 5 Criteria responses to the IEEE 802 EC for consideration at the July plenary session, subject to review and final approval by the IEEE 802.3 Working Group at the July plenary session.

Moved: Marek Hajduczenia

Seconded: Alan Brown

Technical (≥ 75%)

Anyone may vote

Y: 44 N: 0 A: 0

Motion Passes.

Closing Comments

Mr. Frazier reminded everyone that there is a Social tonight—wear your badge.

Next meetings:

May 2012 Hilton Minneapolis

July 2012 Manchester Hyatt, San Diego

Straw polls:

- I will attend the May interim: 33
- I will probably attend the May interim 6
- I probably will not attend the May interim 7
- I will not attend the May interim 2
- I will attend the July plenary: 31
- I probably will attend July plenary: 12
- I probably will not attend July plenary: 2
- I will not attend July Plenary: 0

Chair asked if there is any objection to adjourning the meeting. None voiced.

Close Wednesday PM2 and meeting adjourned at 6:16 PM

EPOC Study Group List of Attendees

Last Name	First Name	Affiliation
Abaye	Ali	Broadcom
Allard	Michel	Cogeco Cable
Arambepola	Bernard	Intel
Barr	David	Entropic Communications
Barrass	Hugh	Cisco
Bevilacqua	John	Comcast
Bliss	Will	Broadcom
Boyd	Ed	Broadcom
Brophy	Tim	Cisco
Brown	Alan	Aurora Networks
Brun	Boris	Harmonic
Carlson	Steve	HSD
Chang	Phillip	Comcast
Chang	Phillip	Comcast
Chou	Joseph	Realtek Semiconductor
Dai	Eugene	Cox
ElBakoury	Hesham	Huawei
Eleniak	Shane	Commscope
Estes	Dave	UNH IOL
Fang	Liming	Huawei
Frazier	Howard	Broadcom
Fu	Zhay	ZTE Corp
Hajduczenia	Marek	ZTE Corp
Hou	Victor	Broadcom
Huang	Chris	Broadcom
Jain	Rajeev	Qualcomm
Joetten	Christoph	Qualcomm
Jugawa	Jun	Hitachi
Kaplan	Chuck	Ciena
Kelsen	Michael	Time Warner Cable
Kinnard	Brian	Commscope
Kolze	Tom	Broadcom
Kramer	Glen	Broadcom
Laubach	Mark	Broadcom
Li	Wen	Finisar
Lin	Rujian	Shanghai Luster Teraband Photonics

Liu	Alex	Qualcomm
Ma	Zhuang	ZTE Corp
Mallette	Edwin	Bright House Networks
Matsuda	Shougo	Hitachi
Montojo	Juan	Qualcomm
Montreuil	Leo	Broadcom
Mukherjee	Biswanath	U.C. Davis
Nikolich	Paul	802 Chair/YASBBV
Nishihara	Susumu	NTT
Noll	Kevin	Time Warner Cable
Ossman	Valy	PMC-Sierra
Pietsch	Christian	Qualcomm
Powell	Bill	Alcatel-Lucent
Prodan	Rich	Broadcom
Rahman	Saifur	Comcast
Remein	Duane	Huawei
Salinger	Jorge	Comcast
Schmitt	Matt	CableLabs
Shellhammer	Steve	Qualcomm
Sherman	Matthew	BAE Systems
Solomon	Joe	Comcast
Suzuki	Ken-Ich	NTT
Teipen	Brian	Adva Optical
Teixeira	Antonio	NSN
Thompson	Geoff	GraCaSI
Turcot	Michel	Commscope
Ulm	John	Motorola Mobility
Vieira	Amarildo	Motorola Mobility
Xu	Jidong	ZTE Corp
Zang	Maggie	ZTE Corp