

**(Unconfirmed Minutes)**  
**IEEE 802.3 EPON Protocol over a Coax (EPoC) PHY Study Group**  
**May 15-16, 2012,**  
**Hilton-Minneapolis, Minneapolis MN**  
**Chair: Howard Frazier**  
**Recording Secretary: Peter H Wolff, Mark Laubach**

**Tuesday, May 15, 2012**

Meeting was called to order by Howard Frazier (Chair) at approximately ~9:00 CST

The Chair began following the slides in the file Agenda and General Information (<http://www.ieee802.org/3/epoc/public/may12/>).

Peter H Wolff was asked by the Chair (Howard Frazier) to be Recording Secretary. Mr. Wolff accepted.

Chair continued with agenda and general information slides

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

1. Howard started by Proposing the agenda, rules, patent issues, recap from last meeting and presentations
2. The Chair circulated a signup sheet.
3. **Motion** to approve agenda:
  - a. Howard Frazier proposed the agenda
  - b. Moved by Marek Hajduczenia
  - c. Seconded by Kevin Knoll
  - d. Approved by voice vote without opposition
4. **Motion** to approve prior minutes
  - a. Moved - Allen Brown
  - b. Seconded - Jorge Salinger
  - c. Approved by voice vote without opposition
5. Howard Frazier mentioned that ground rules for the meeting are based on 802.3 Rules
6. Allen Brown read the IEEE Patent rules for this meeting
7. Howard Frazier asked if they are aware of any potential patent claims was performed and no one identified any potential claims
8. Howard Frazier asked the group to read the letter from the Chinese cable operators and SARFT that actually signed it.
  - a. Mr. Rajeev Jain - read the letter from the Chinese to the working group
  - b. EPON + EOC is in China has a non standard EOC that is currently deployed in the last mile in China and very similar to EPOC
  - c. The lack of a unified standard has hampered wide scale deployment of EOC
  - d. The Chinese want a standard that will help proliferate the EPOC standard within China
  - e. Howard proposed to form an ad-hoc group to respond to this letter.
    - i. About 6 people volunteered to work on the ad-hoc group

- ii. The ad-hoc group will come back to the larger group to propose what the response needs to be
  - iii. Allen pointed out that there were only changes in the signature block of the group
  - iv. The ad-hoc group will be come back tomorrow
  - v. Dr. Eugene Dai says that there are substantial differences between the Chinese version and English translated versions. We hope the ENOC in China and EPOC be unified versus even mentioning any chipset.
  - vi. The ad-hoc will meet tonight after the close of this meeting and come back before the end of the meeting.
9. Objectives were discussed and agreed on in Hawaii
  10. Adopted 5 Criteria responses
  11. Goal for this meeting is to take the objectives and five criteria to refine, approve and agree on these items. The starting point will be where we left off from Hawaii.
  12. Jorge Salinger proposed that we switch the order of presentations between him and Sam Chernak. The Chair asked if there were any objections and none were noted to allow Jorge to present first.

## **Presentations:**

### **Presentation: EPoC RF Media Types**

#### **Presenter: Jorge Salinger (Comcast)**

See: [http://www.ieee802.org/3/epoc/public/may12/salinger\\_01\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/salinger_01_0512.pdf)

Key points are where are we going to put the spectrum and how do we do it. It is anticipated that EPOC will not need additional fiber, as DWDM will be used. He thinks that links will be shorter and wants to use baseband lasers.

OCUs will only be deployed in locations with customers. Once OCUs are in place then you can add other customers. EPOC will start with commercial purposes then to residential once they are in place.

The majority of US CATV systems are in the 750MHz range.

Tap plates may be replaced with new ones up to 1.75GHz

Option 3 will include changing tap plates but the costs are not significant since its common that line technicians replace the plates. They first determine if either of the houses are on the phone then they tell them that they are going to interrupt service and change tap plates.

Option 1 and 2 all signals traverse the entire network, Option 3 they only traverse the taps

MSOs have not been able to dynamically allocate spectrum and think this concept is fantastic and allows them to tailor service on an up and down stream basis

Active media would be limited to either 750 MHz or 860 MHz so deploying EPOC should be operated in the passive part of the network where they have considerable more spectrum. Jorge feels that even if it takes two PHYs, it would be very beneficial so that they can operate above and below 1 GHz.

## **Presentation: Economic Analysis of EPoC**

**Presenter: Sam Chernak**

See: [http://www.ieee802.org/3/epoc/public/may12/chernak\\_01\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/chernak_01_0512.pdf)

Jorge stated that this presentation is to reinforce the economics of EPoC and in the end; EPoC is economically feasible from an MSO perspective.

Jorge Salinger said the analysis starts with what they have been doing over the past 50 years and what they know about the costs of DOCSIS. As a result they can understand the costs of EPoC. DOCSIS have been growing 50% to 60% per year with predictable cost reductions as well. The cost of DOCSIS has been approaching the cost of EPON. Jorge says the cost EPoC will be close to the costs of DOCSIS in the future. Jorge has been modeling the costs using the three use cases presented in EPoC phy. The costs of DOCSIS scales with user consumption. Jorge claims that they are working to improve the costs of DOCSIS. On a per Gig basis, they see scaling down of the costs. Per Sam Chernak, they will have success on the cost reductions as long as history is a good indication of future costs. Cost of CMTS is equivalent to the cost of the OLT and CLT. They expect that the cost of the CM and CNU are going to be the same price. The OCU will be the same cost as a line extender. Costs driven by enclosure, powering etc. and don't think the costs are going to be out of whack. They expect the installation costs to be the same as a line extender today. DPOE is going to increase the cost of the OLT with alignment with the CMTS. If EPoC will be effective for business services and then ultimately residential as well. Sam Chernak said there is no doubt that EPoC has good economic appeal from an MSO perspective under a number of scenarios. The balance of spectrum needed for EPoC is an issue and over the long term due to the deployed STBs need to be address.

There was no consideration given for the potential cost differences associated with either FDD or TDD. It does assume that they will continue to push fiber deeper and Service Group sizes will continue to be reduced.

Paul Nikolich - What does EPoC curve taper mean? Sam claims that he know where DOCSIS is going down at a predictable rate and used that to determine what the EPoC rate will be. Sam said that the costs were normalized in cost per Mb and they modeled subscriber behavior and concurrency and application usage out 10 years.

Ed Boyd - How much does DPOE add to the cost on a percentage basis? Jorge says that DPOE costs are just being able to determine the costs now and do not really know what the costs are going to be but should not be 10x the cost. There are things like certifications and qualifications etc. DPOE did not really figure into the cost model per Sam Chernak. EPON and EPoC assigns some penalties based on the LLIDs and do figure into the costs and causes a comparison to DOCSIS. No DPOE math in the cost model per Sam Chernak.

Alex Liu- How does the need and timing of the Chinese MSOs work? Do you see outside plant aligned with the Chinese plant? Jorge agrees that the Chinese MSO is very similar to his option three but very different in take rate as he expects a higher take in the Chinese MDU versus Business services deployments. When will domestic MSOs use EPoC for residential services?

Mark L - Do you have a sweat spot for time line? Jorge says want to deploy by 2014 - says we will go to daily meetings if necessary.

**Break starting 11:14AM for 15 minutes per the Chair.**

**Session resumed 11:32AM per Chair**

**Presentation: To Bridge for to Repeat in a EPOX Network**

**Presenter: Rick Li (Cortina)**

See: [http://www.ieee802.org/3/epoc/public/may12/li\\_01\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/li_01_0512.pdf)

Presentation is to study the difference between coaxial phys to be considered and the OLT devices widely deployed. Will investigate if the OCU is a bridge or repeater what the impact will be.

Rick is recommending that we should preserve as much of the EPON ecosystem as possible and if we do not the scale use impact could be greater.

**Presentation: EPoC Resouce Allocation**

**Presenter: Juan Montojo (Qualcomm)**

See: [http://www.ieee802.org/3/epoc/public/may12/montojo\\_01a\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/montojo_01a_0512.pdf)

This is a follow up from discussions we had in Hawaii - Downstream, how it operates and assigning resource allocation. Recommend OCU to have an augmented MPCP protocol so new MAC and PHY and address time frequency resource allocation. We should get an architecture diagram that we all agree to.

**Lunch starting 1:05PM for 55 minutes per the Chair**

**Resume 2:15PM per the Chair**

**Presentation: EPoC Architecture Choices**

**Presenter: Ed Boyd (Broadcom)**

See: [http://www.ieee802.org/3/epoc/public/may12/boyd\\_02\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/boyd_02_0512.pdf)

**Presentation: EPoC Architecture Considerations**

**Presenter: Nicola Varanese (Qualcomm)**

See: [http://www.ieee802.org/3/epoc/public/may12/varanese\\_01a\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/varanese_01a_0512.pdf)

**Presentation: Technical Feasibility of EPOC Time Division Duplex (TDD) Mode**

**Presenter: Steve Shellhammer (Qualcomm)**

See: [http://www.ieee802.org/3/epoc/public/may12/shellhammer\\_01a\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/shellhammer_01a_0512.pdf)

**Presentation: Introduction to TDD**

**Presentation: David Barr (Entropic)**

See: [http://www.ieee802.org/3/epoc/public/may12/barr\\_01\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/barr_01_0512.pdf)

**Presentation: Feasibility of a TDD Mode in EPoC**

**Presentation: David Barr (Entropic)**

See: [http://www.ieee802.org/3/epoc/public/may12/barr\\_02\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/barr_02_0512.pdf)

**Presentation: Passive Coax Media**

**Presentation: David Barr (Entropic)**

See: [http://www.ieee802.org/3/epoc/public/may12/barr\\_03a\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/barr_03a_0512.pdf)

**Motion #**

To start tomorrow morning at 8:00AM with Leo Montreuil's presentation

Approved by voice vote without opposition

**Lunch meeting tomorrow to discuss the Chinese letter**

**Motion**

To move the three presentations we did not do today and start with them tomorrow morning.

Approved by voice vote without opposition

**Break (end of Tuesday) at 7:06PM per the Chair.**

**Wednesday, May 16, 2012**

**David Law, the IEEE 802.3 Working Group Chair, appointed Mark Laubach as Acting Study Group Chair to temporarily perform chair duties for Howard Frazier starting 8:35AM**

**Presentation: EPoC Modulation Orders**

**Presenter: Leo Montreuil (Broadcom)**

See: [http://www.ieee802.org/3/epoc/public/may12/montreuil\\_01\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/montreuil_01_0512.pdf)

## **Break in presentations for announcement about BWA ad-hoc**

### **John D'Ambrosia - Presented the group called the Bandwidth Assessment Ad Hoc (BWA ad-hoc)**

They completed their work on Monday. John is proposing to form another activity to find out what to do for the next speed level. He is going to provide a signup sheet to gather names for those interested in participating. Or you may contact John at his email listed below:

**Contact:** [jdambrosia@force10labs.com](mailto:jdambrosia@force10labs.com)

## **Presentation: Considerations and Recommendations for EPoC Error Performance**

### **Presenter: Thomas Kolze (Broadcom)**

See: [http://www.ieee802.org/3/epoc/public/may12/kolze\\_01a\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/kolze_01a_0512.pdf)

There was a question by Jorge Salinger to find out if we need to have an error rate in our objectives. Mark Laubach says we are going to investigate that issue to determine if it's required by 802.3

**Update:** Per Mark Laubach there was a BER specified for Fiber but not Copper in the Ethernet in the First Mile (EFM) objectives.

It was suggested that we capture the rate of errored packet acceptance for EPoC.

## **Presentation: EPoC Technical Feasibility, Part 2**

### **Presenters: Ed Boyd and Leo Montreuil (Broadcom)**

See: [http://www.ieee802.org/3/epoc/public/may12/boyd\\_01\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/boyd_01_0512.pdf)

## **Announcements from the Acting Chair:**

- **Please continue to use email to address issues**
- **IEEE Lawyers are going to have an 11:15AM meeting relating to relative costs all are invited. This meeting is optional.**

**Break 11:07AM for 15 minutes per the Acting Chair**

**Resume 11:25AM per the Acting Chair**

The Chair stated that Qualcomm removed their presentation

([http://www.ieee802.org/3/epoc/public/may12/montojo\\_02\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/montojo_02_0512.pdf)) from today's agenda.

The Chair proposed that we listen to three more presentations then break for lunch. All approved by voice vote without opposition.

**The Chair, Mark Laubach, did not want to Chair and be a presenter so he asked Kevin Noll to be the Chair for this agenda item and Mark accepted.**

**Presentation: Task Force work load and diligence on proposed extra effort**

**Presenter: Mark Laubach (Broadcom)**

See: [http://www.ieee802.org/3/epoc/public/may12/laubach\\_01\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/laubach_01_0512.pdf)

Jorge Salinger - Comcast, would like the standards schedule to be more aggressive and propose to get a standard completed by next year not 2014. He believes we should go to a monthly meeting plan, and will take that up with Howard Frazier. The temporary Chair agreed to address this with Howard Frazier. Jorge is an advocate of TDD and as an operator - his interest is in a product outcome not technical implementation of TDD or FDD. He would like operation below and above 1 GHz in a way that would work through amplifiers if possible.

**Chairmanship passed to Mark Laubach at 12:05 AM.**

**Kevin Noll asked to use the latest version of his presentation that has been sent out via email. Approved by voice without opposition.**

**The Chair asked all attendees if anyone was not familiar with the IEEE Patent policy. No one in the audience voiced non-familiarity.**

**Presentation: Proposed Objectives**

**Presenter: Kevin Noll (TWC)**



Adobe Acrobat  
Document

See: noll\_01-A\_0512.pdf

For prior version see: [http://www.ieee802.org/3/epoc/public/may12/noll\\_01\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/noll_01_0512.pdf)

**Presentation: The 5 Criteria for EPoC**

**Presenter: Jorge Salinger (Comcast)**

See: [http://www.ieee802.org/3/epoc/public/may12/salinger\\_02\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/salinger_02_0512.pdf)

## **Presentation: PAR Wording**

**Presenter: Steve Shellhammer (Qualcomm)**

See: [http://www.ieee802.org/3/epoc/public/may12/shellhammer\\_02\\_0512.pdf](http://www.ieee802.org/3/epoc/public/may12/shellhammer_02_0512.pdf)

There is a revised version of this presentation that could not be posted to the server due to size limitations. Steve provided the updated excerpts below:

SG,

Since I was unable to email out the update on the PAR wording slides to the reflector, due to the 5 kB limit, I have extracted the text from the presentation and have included it in this email.

Steve

### 2.1 Project Title

... Amendment – Physical layer specification and EPON multipoint control protocol extensions, for EPON protocol operation on coaxial cable plants.

### 5.2 Project Scope

This project adds an RF physical (PHY) layer specification to the IEEE 802.3-2008 standard for operation over coaxial cable plants. The PHY layer specification includes both continuous and burst modes while supporting operation on both amplified and passive cable plants. The project specifies extensions to both MPCP and OAM to support the RF PHY operation, as needed. The PHY layer will support upstream and downstream data rates of up to 10 Gb/s.

### 5.4 Purpose

The purpose is to develop an RF PHY layer specification, with MPCP and OAM extensions, to extend the EPON protocol for operation on coaxial cable plants.

5.5 Need In many deployments it would be cost effective to run EPON on fiber part-way to the customer and EPOC over coax cable the remainder of the way. Therefore, there is a need for an RF PHY layer for running the EPON protocol on a coaxial cable plant.

### 5.6 Stakeholders

Stakeholders include, but are not limited to, cable industry multiple system operators (MSOs), original equipment manufacturers (OEMs) and semiconductor manufacturers.

### 8.1 Explanatory Notes

#### Section 2.1

EPON is an acronym for Ethernet over Passive Optical Networks

#### Section 5.2



RF is an acronym for radio frequency MPCP is an acronym for multipoint control protocol OAM is an acronym for Operation, Administration and Management

**Lunch Break 12:32PM for 60 minutes per the Acting Chair**

**Resumed Meeting at 1:45PM –**

**David Law, the IEEE 802.3 Working Group Chair, appointed Marek Hajduczenia as Acting Study Group Chair to temporally perform chair duties for Howard Frazier starting 1:45PM**

**Starting with Working Group Objectives - discussion and presentation with Kevin Noll (TWC) as presenter**

Kevin Noll sat in front making real time updates and edits to the Objectives

*[Secretary/Editor note: where text was red it was changed to underlined black in these minutes.]*

**Objective 1 (Not a Proposed Modification)**

- Specify at least one PHY to support subscriber access networks using EPON protocol and operating on point-to-multipoint RF distribution plants comprised of all-coaxial cable of hybrid fiber/coaxial media.
- **Alternative Below:**
- Specify a PHY to support subscriber access networks using EPON protocol and operating on point-to-multipoint RF distribution plants comprised of all-coaxial cable of hybrid fiber/coaxial media.

**Objective 2 - no proposed changes**

**Objective 3 (New)**

Develop a channel model within an in overall coaxial network operating model describing the required plant conditions under which the PHY is expected to operate on the coaxial cable plant.

**Alternative** - Define required plant conditions within an overall coaxial-network operating model. Then put this in **Objective 4**.

John D’Ambrosia noted that this working group should refrain from specifying that a channel model will be created as part of the objectives so it is unnecessary to specify it in this objective. This objective will potentially limit the scope as seen by 802.3 obliging us to conform to this objective.

**Objective 4**

Provide a physical layer specification that is capable of

- A baseline data rate of 1 Gb/s at the MAC/PLS service interface when transmitting in 120 MHz, or less, of assigned spectrum under defined baseline plant conditions;

- A data rate lower than the baseline rate when transmitting in less than 120 MHz of assigned spectrum or under poorer than defined plant conditions;
- A data rate higher than the 1 Gb/s baseline data rate and up to 10 Gb/s when transmitting in assigned spectrum and in channel conditions that permit;

**Objectives 5, 6, 7, 8** previously adopted - so unchanged at this time.

**Objective 9** (Final Version after two straw polls below)

- PHY to have a BER at the upstream and downstream receivers *under defined plant conditions and configurations* better than or equal to  $10^{-10}$  at the MAC/PLS service interface
- Downstream Frame Error Rate  $\leq 10^{-6}$
- Upstream Frame Error Rate  $\leq 10^{-4}$

Straw Poll #1

- As an Option, in minimally impaired upstream, Upstream Frame Error Rate  $\leq 10^{-6}$  OR Upstream Bit Error Rate  $\leq 10^{-8}$  with Goal of Upstream Bit Error Rate  $\leq 10^{-10}$

Remove the text as above from objective 9

Y: 28, N: 0, A: 1

Poll Passes

**Straw Poll #2**

Remove text in *italics* from:

- Downstream Packet Error Rate  $\leq 10^{-6}$  OR *Downstream Bit Error Rate  $\leq 10^{-8}$  with Goal of Downstream Bit Error Rate  $\leq 10^{-10}$*
- Upstream Frame Error Rate  $\leq 10^{-4}$  OR *Upstream Bit Error Rate  $\leq 10^{-6}$*

Y: 30, N: 3, A: 1

Poll passes

### Change of Secretary

Wednesday, May 15 3:27PM - Mark Laubach assumed role of Secretary

3:27PM Marek took a 10 minute break

3:36PM Marek resumed meeting

**Straw Poll #3**

Matt Schmitt requested a straw poll that we: "Completely remove Objective 9".

Y: 2, No: 22, A: 2  
Poll passes

### Discussion of Objective 9

Question from floor: at MAC/PLS is assumed to be post FEC. Everyone agreed.  
Kevin Knoll: friendly amendment? put upstream FER back in [rejected]

Rich Prodan called the question at 4:05PM

#### Motion #

Accept Objective 9 as:

“PHY to have a downstream frame error ratio better than  $10^{-6}$  at the MAC/PLS service interface.”

M: Tom Kolze

S: Victor Hou

Technical ( $\geq 75\%$ )

Y: 18+7 = 25, N: 2+2 = 4, A: 8

Passed. 14 March 2012 4:06PM

### Discussion of Amendment to Objective 9

4:11PM Duane, friendly amendment to change to  $5 \times 10^{-5}$ ? Discussion. Accepted.

4:13PM Chair called motion due to no further discussion

#### Motion #

Amend Objective 9 to add: “PHY to have an upstream frame error ratio better than  ~~$10^{-4}$~~   $5 \times 10^{-5}$  at the MAC/PLS service interface.”

Moved: Tom Kolze

Second: Rich Prodan

Technical ( $\geq 75\%$ )

Y: 21 + 12 = 33, N 0 + 0, A: 2 + 5

Passed. 16 March 2012 4:14PM

### Return to Objective 1

#### Motion #

Modify Objective 1 to read as shown:

“Specify a PHY to support subscriber access networks capable of supporting burst mode and continuous mode operation using the EPON protocol and operating on point-to-multipoint RF distribution plants comprised of either amplified or passive coaxial media.”

Moved: Jorge Salinger

Second: Ed Boyd

Technical ( $\geq 75\%$ )

Y: 20+16 = 36, N: 1, A: 2 + 0

Passed March 16 2012 4:20PM

### Objective 3

#### Motion #

Accept Objective 3 as:

“Define required plant configurations and conditions within an overall coaxial-network operating model”.

Moved: Kevin Noll

Second: John Ulm

Technical ( $\geq 75\%$ )

Y: 24 + 14 = 38, N: 0 + 0, A: 0

Passed 16 March 2012 4:14PM

### Objective 4

Question for clarification by Mark Laubach: on last bullet, it could be interpreted that the downstream and upstream hardware must be capable of supporting 10 Gb/s. Everyone agreed that products may have downstream and/or upstream speeds less than 10 Gb/s, but the standard should include operation to 10 Gb/s.

Question for clarification by Rich Prodan: in the second bullet with respect to the “or” , meaning one or the other or “both”. Everyone agreed.

#### Motion #

Accept Objective 4:

“Provide a physical layer specification that is capable of:

- A baseline data rate of 1 Gb/s at the MAC/PLS service interface when transmitting in 120 MHz , or less, of assigned spectrum under defined baseline plant conditions;
- A data rate lower than the baseline data rate when transmitting in less than 120 MHz or assigned spectrum or under poorer than defined plant conditions;
- A data rate higher than 1 Gb/s baseline data rate and up to 10 Gb/s when transmitting in assigned spectrum and in channel conditions that permit.”

Moved: Matt Schmitt

Second: Kevin Noll

Technical ( $\geq 75\%$ )

Y: 21 + 15 = 36, N: 0, Abstain: 0

Passed 16 March 2012 4:28PM

16:31 Acting Chair Marek declared all Objectives completed.

## Criteria: Broad Market Potential

### Motion #

Accept as the response to Broad Market Potential:

#### **“I. Broad sets of 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 CapEx and OpEx, growing 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 15 years for residential, and recently, business services

- The proposed project would result in a new PHY with the widest possible applicability

#### **II. Multiple vendors and numerous users**

- Interest and support from a worldwide array of operators, system vendors, optical and RF component manufacturers, and silicon suppliers has already been demonstrated at CFI and SG stages

#### **III. Balanced costs (LAN versus attached stations)**

- The proposed project will result in the use of the existing EPON architecture by extending its capabilities to support point-to-multipoint RF distribution plants comprised of either amplified or passive coaxial media.

- This approach will allow the project to optimize the cost balance between the network infrastructure components and attached stations in the cable network.”

Moved by: Jorge Salinger

Seconded by: Tim Brophy

Technical ( $\geq 75\%$ )

Y: 16+15 = 31, N: 0, A: 0

Passed 16 March 2012 4:44PM

## Criteria : Compatibility

### Motion #

Accept as response to Compatibility:

**“IEEE 802 defines a family of standards. All standards should be in conformance with the IEEE 802.1**

**Architecture, Management, and Interworking documents as follows: IEEE 802. Overview and Architecture, IEEE 802.1D, IEEE 802.1Q, and parts of IEEE 802.1F. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1.**

**Each standard in the IEEE 802 family of standards shall include a definition of managed objects that are compatible with systems management standards.**

#### **I. 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 Multi Point Control Protocol (MPCP) to amplified and passive coaxial media.

#### **II. Conformance with the IEEE Std 802.3 MAC**

- 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 PHY specifications.

### **III. Managed object definitions compatible with SNMP**

- The project will include a protocol independent specification of managed objects with SNMP management capability to be provided in the future by an amendment or revision to IEEE Std 802.3.1. “

Motion: Duane Remein

Second: Saif Rahman

Technical ( $\geq 75\%$ )

Y: 18 + 14 = 32, N: 0, A: 0

Passed . 16 March 2012 4:52PM

## **Criteria: Distinct Identity**

### **Motion #**

Accept as response to Distinct Identity:

#### **“I. Substantially different from other IEEE 802 standards**

- There is no existing 802 standard or approved project appropriate for operation up to 10 Gb/s over point-to-multipoint active and passive coax plants in symmetric and asymmetric configurations.

#### **II. One unique solution per problem (not two solutions to a problem)**

- The proposed project is an evolutionary extension of the coverage of Multi Point Control Protocol (MPCP) and OAM, specified for IEEE Std 802.3 EPON, onto coax medium.

- The solution will include a PHY specification.

#### **III. Easy for the document reader to select the relevant specification**

- 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.

#### **IV. Substantially different from other IEEE 802.3 specifications/solutions.**

- See I. above”

Moved: Matt Schmitt

Second: Ed Boyd

Technical ( $\geq 75\%$ )

Y: 18 + 17 = 35, N: 0, A: 0

Passed. 16 March 2012 4:59PM

## **Criteria: Technical Feasibility**

### **Motion #**

Accept as response to Technical Feasibility:

#### **“I. Demonstrated System Feasibility**

- Widely deployed data transport technology in the form of DOCSIS & Digital Video services demonstrates the capacity of coaxial networks to support multi-gigabit/second 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.

#### **II. Proven Technology**

- See I. above

### III. Confidence in reliability

- 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 Boyd  
Second: Bill Powell

Technical ( $\geq 75\%$ )  
Y: 17 + 17 = 34, N: 0, A: 0  
Passed 16 March 2012 5:03PM

### Criteria: Economic Feasibility

#### Motion #

Accept as response to Economic Feasibility:

#### “I. 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 CNU's developed for RF networks should have comparable cost structure as EPON ONU's
- The proposed project might introduce new cost factors which can be quantified and accounted for during the course of the project.

#### II. Reasonable cost for performance

- EPON has been established as an attractive access technology in terms of cost/performance.
- This project is intended to bring these benefits to RF distribution plants comprised of either amplified or passive coaxial media.
- EPoC is expected to follow the same cost/performance trend line, established for all major Ethernet technologies developed by 802.3 in the past.

#### III. Consideration of installation costs

- Installation, maintenance and operations costs for the new technology are expected to be similar to those of DOCSIS equipment.
  - OLT installation costs should be comparable to the DOCSIS CMTS
  - CNU installation costs should be comparable to the cable modem
  - New optical-to-RF equipment installation costs should be comparable to other hybrid fiber-coax amplifier or node installation costs”

Moved: Jorge Salinger  
Second: Hal Roberts

Technical ( $\geq 75\%$ )  
Y: 18 + 19 = 37, N: 0, A: 0  
Passed 16 March 2012 5:08PM

5:09PM: Meeting attendees thank Jorge and Kevin for their efforts

5:10PM IEEE 802.3 Chair David Law requested putting Criteria slide bullets into normal format as part of copyediting prior to presentation to 802.3 WG.

### PAR Contents Review

David Law reviewed IEEE PAR, Wael Diab, member of IEEE-SA NesCom, gave perspective on PAR and PAR approval process.

### **PAR Contents Word Smithing**

David Law led process of working through Title, Task Force Scope, Project Need, and Stakeholders section for the proposed PAR for EPoC.

#### **Motion #**

- Adopt: the responses to the PAR as captured in law\_1\_0512.pdf
- Request: the IEEE 802.3 Chair to pre-circulate the PAR ahead of the July 2012 IEEE 802 plenary
- Request: the IEEE 802.3 Chair to pre-submit PAR to IEEE-SA NesCom to meet the August 2012 NesCom submittal deadline
- Grant: the IEEE 802.3 Chair, or his designee, editor “license”

Moved: Wael Diab  
Second: Duane Remein

Technical ( $\geq 75\%$ )  
Y: 11 + 15 = 26, N: 0, A: 3  
Passed. 16 March 6:49PM

6:51PM For recording in the minutes by the IEEE 802.3 Working Group Chair: “I consider approval of the 5 criteria by the Study Group the indication that I should progress it through the approval process”.

7:00PM David Law, IEEE 802.3 Working Group Chair, assumed the Chair of the Study Group

### **Discussion of letter from Chinese cable interests**

#### **Motion #**

“To request the Study Group Chair to send an email response along the lines of the approved text in jain\_01\_0512.pdf”

Move: Matt Schmitt  
Second: Wael Diab

Technical ( $\geq 75\%$ )  
Passed by unanimous consent. 16 March 2012 7:11PM



### **Late presentation of “TDD vs FDD”**

7:13PM SG accepted late presentation by Edwin Mallett and others by unanimous consent.

7:18PM Suggestion to follow up on emails and with conference calls as well as bring contributions to next meeting

Presentation file name: mallette\_01\_0512.pdf

### **Adjourn**

Motion to adjourn

Passed by voice vote. 16 March 2012 7:36PM

Lastname	Firstname	Affiliation			Tue	Wed
Allard	Michel	Cogeco Cable			X	X
Baran	Dave	Aurora Networks			X	X
Barr	David	Entropic Communications			X	X
Boyce	Andy	Broadcom			X	X
Boyd	Ed	Broadcom			X	X
Brophy	Tim	Cisco			X	X
Brown	Alan	Aurora Networks			X	X
Chernak	Sam	Comcast			X	
Dai	Eugene	Cox			X	X
Diab	Wael	Broadcom				X
Dickinson	John	Bright House Networks			X	X
Egan	John	Marvell			X	X
ElBakoury	Hesham	Huawei			X	X
Eleniak	Shane	Commscope			X	X
Emmendorfer	Michael	ARRIS			X	X
Fang	Liming	Huawei			X	X
Farhoodfor	Arash	Cortina Systems			X	
Frazier	Howard	Broadcom			X	
Hajduczenia	Marek	ZTE Corp			X	X
Hanna	Charaf	ST Microelectronics			X	X
Hou	Victor	Broadcom			X	X
Howald	Robert	Motorola Mobility			X	X
Jain	Rajeev	Qualcomm			X	X
Jones	Doug	Comcast			X	X
Kinnard	Brian	Commscope			X	X
Kliger	Avi	Broadcom			X	X
Ko	Dylan	Qualcomm			X	X
Kolze	Tom	Broadcom			X	X
Laubach	Mark	Broadcom			X	X
Law	David	HP				X
Li	Rick	Cortina Systems			X	X
Mallette	Edwin	Bright House Networks			X	X
Matsuda	Shougo	Hitachi			X	X
Montejo	Juan	Qualcomm			X	X
Montreuil	Leo	Broadcom			X	X
Nishihara	Susumu	NTT			X	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	X
Remein	Duane	Huawei			X	X
Roberts	Hal	CALIX			X	X
Salinger	Jorge	Comcast			X	X
Schmittt	Matt	CableLabs			X	
Shellhammer	Steve	Qualcomm			X	X

Shulman	Shaul	Intel			X	X
Solomon	Joe	Comcast			X	X
Staniec	Thomas	Unaffiliated			X	X
Sugawa	Jun	Hitachi			X	X
Ulm	John	Motorola Mobility			X	X
Varanese	Nicola	Qualcomm			X	X
Vieira	Amarildo	Motorola Mobility			X	X
Wall	Bill	Cisco			X	X
Wolff	Peter	Titan Photonics			X	X
Zhang	Xifang	ZTE Corp			X	X