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# **IEEE 802.3 40Gb/s SMF PMD Study Group**

Opening Plenary Report

Orlando, FL

March 15th, 2010

Mark Nowell, Chair  
[mnowell@ieee.org](mailto:mnowell@ieee.org)

# 40GE SMF PMD Study group organization

Chair: Mark Nowell ([mnowell@ieee.org](mailto:mnowell@ieee.org))

Web Master: John D'Ambrosia ([jdambrosia@ieee.org](mailto:jdambrosia@ieee.org))

Recording Secretary: TBD

Editor: TBD

# Reflector and Web

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- To subscribe to the IEEE 802.3 40GE SMF PMD Study Group reflector, send an email to:

***ListServ@ieee.org***

with the following in the body of the message (do not include “<>”):

***subscribe stds-802-3-40GSMF <yourfirstname> <yourlastname>  
end***

- Send IEEE 802.3 40GE SMF Study Group reflector messages to:  
***STDS-802-3-40GSMF@listserv.ieee.org***

- Study Group web page URL:

***<http://www.ieee802.org/3/40GSMF/>***

# Interim Meetings

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- Jan 28-29<sup>th</sup>, 2010, New Orleans, LA
  - Hosted by Applied Micro
- 52 attendees
- 14 presentations.
- Significant leverage from much of the HSSG and 802.3ba work on 40GE serial.
- Significant consensus as demonstrated by numbers of co-authors and supporters.
- 3 Straw polls, 9 motions
  - SG adopted objectives, 5 criteria responses and PAR response.

# Interim meeting progress – Straw Polls

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## Straw Poll #1:

I would support a project to specify a 40 Gb/s Ethernet SMF PMD with objectives as proposed in dambrosia\_01\_0110.pdf

All in the room: Y: 39/N: 0/A: 0

802.3 voters: Y: 29/N: 0/A: 1

## Straw Poll #2

I believe that Broad Market Potential has been demonstrated for 40 Gb/s Ethernet optimized for client applications in the carrier environment.

All in the room: Y: 33/N: 0/A: 2

802.3 voters: Y: 27/ N: 0/ A: 0

## Straw Poll #3

I believe that Economic Feasibility has been demonstrated for 40 Gb/s Ethernet optimized for client applications in the carrier environment.

All in the room: Y: 35/ N: 0/ A: 1

802.3 voters: Y: 26/N: 0/A: 0

# Interim meeting progress – Motions

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## Motion #1

Move that the Study Group adopt the objectives in slide 3 of dambrosia\_01a\_0110.pdf

M: John D'Ambrosia

S: Pete Anslow

Technical  $\geq 75\%$

All in the room: 802.3 voters

Y: 30

Y: 21

N: 0

N: 0

A: 0

A: 0

Motion passes

# Objectives

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- Preserve the IEEE 802.3 / Ethernet frame format utilizing the IEEE 802.3 MAC
- Preserve minimum and maximum FrameSize of current IEEE 802.3 standard
- Support a BER better than or equal to  $10^{-12}$  at the MAC/PLS service interface
- Support a MAC data rate of 40 Gb/s
- Use the 40GBASE-R PCS and PMA
- Use only existing electrical and logical interfaces from IEEE Std 802.3 as modified by IEEE P802.3ba
- Provide Physical Layer specification which support 40 Gb/s operation over at least 2 km on SMF.
- Provide optical compatibility with existing carrier 40Gb/s client interfaces (OTU3/STM-256/OC-768/40G POS).

# Interim meeting progress – Motions

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## Motion #2

Move that the Study Group adopt the Broad Market Potential response in slide 2 of trowbridge\_02a\_0110.pdf.

M: Andy Ambrose                      S: John D'Ambrosia

Technical ≥ 75%

All in the room: Y:32/N:0/A:0                      802.3 voters: Y:22/N:0/A:0

Motion passes

## Motion #3

Move that the Study Group adopt the Compatibility response in slide 3 of trowbridge\_02a\_0110.pdf.

M: Steve Trowbridge                      S: John McDonough

Technical ≥ 75%

All in the room: Y:34/N:0/A:0                      802.3 voters: Y:23/N:0/A:0

Motion passes



# Interim meeting progress – Motions

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## Motion #4

Move that the Study Group adopt the Distinct Identity response in slide 4 of trowbridge\_02a\_0110.pdf

M: Pete Anslow

S: Jon Anderson

Technical  $\geq 75\%$

All in the room:

Y:34/N:0/A:0

802.3 voters: Y:23/N:0/A:0

Motion passes

## Motion #5

Move that the Study Group adopt the Technical Feasibility response in slide 5 of trowbridge\_02a\_0110.pdf

M: Jon Anderson

S: Steve Trowbridge

Technical  $\geq 75\%$

All in the room:

Y:35/N:0/A:0

802.3 voters: Y:23/N:0/A:0

Motion passes

## Motion #6

Move that the Study Group adopt the Economic Feasibility response in slide 6 of trowbridge\_02a\_0110.pdf.

M: Sam Sambasivan

S: John D'Ambrosia

Technical  $\geq 75\%$

All in the room:

Y:33/N:0/A:0

802.3 voters: Y:23/N:0/A:0

Motion passes

# 5 Criteria responses

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5 Criteria responses adopted by the 40Gb/s Ethernet SMF Study group can be found at:

[http://www.ieee802.org/3/40GSMF/40GESMF\\_SG\\_5C\\_responses\\_0110.pdf](http://www.ieee802.org/3/40GSMF/40GESMF_SG_5C_responses_0110.pdf)

# Broad Market Potential

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- a) **Broad sets of applicability.**
  - b) **Multiple vendors and numerous users.**
  - c) **Balanced costs (LAN versus attached stations).**
- There is a significant and growing deployment of 40G serial interfaces in carrier networks and in access to carrier networks. Quantitative presentations have been made to the IEEE 802.3 40Gb/s Ethernet Single-mode Fibre PMD Study Group indicating significant market opportunity.
  - A growing share of the traffic in carrier networks is comprised of Ethernet and Ethernet services. Alternative technologies such as 40G POS (packet over SONET) are deployed in today's networks due to the lack of a serial Ethernet 40G interface
  - 88 participants attended the 40Gb/s Ethernet Single-mode Fibre Call for Interest. 40 people from 34 companies indicated they would participate in the project. 61 indicated this is the right time to start, with nobody opposed. This level of commitment indicates that a standard will be supported by multiple vendors.
  - The target market for the 40Gb/s SMF PMD is carrier networks and access to carrier networks, for which volumes may be more modest than those for lower speed or intra-data center targeted PMDs. This does not imply a reduction in the need or value of the 40 Gb/s SMF PMD to address the stated applications. Overall costs are minimized through reductions in operational expense (including network design, installation and maintenance) by enabling common modules to be used for 40GbE/ OC-768/STM-256/OTU3. The size of the carrier SMF market is comparable to that of the data center SMF market.

# Compatibility

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- **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.**
- **Compatibility with IEEE Std 802.3**
- **Conformance with the IEEE Std 802.3 MAC**
- **Managed object definitions compatible with SNMP**
- As an amendment to IEEE Std 802.3 as amended by the IEEE P802.3ba project, the proposed project will remain in conformance with the IEEE 802 Overview and Architecture, the bridging standards IEEE Std 802.1D and IEEE Std 802.1Q and clause 80 introduced by IEEE P802.3ba.
- As an amendment to IEEE 802.3, the proposed project will follow the existing format and structure of IEEE 802.3 MIB definitions by providing a protocol-independent specification of managed objects. The MDIO interface is expected to be a strict subset of what is specified in IEEE P802.3ba for 40GBASE-LR4.
- Utilizing the same MAC, PCS, and PMA as 40GBASE-LR4, the new PMD maintains the same relationship to IEEE Std 802.3 as IEEE P802.3ba 40 Gb/s PMDs. Using the same PCS as IEEE P802.3ba 40Gb/s PMDs allows the same ITU-T G.709 mapping into OPU3 (the OTU3 payload) to be used.
- The proposed amendment will conform to the full-duplex operating mode of the IEEE 802.3 MAC.
- The project will include a protocol independent specification of managed objects with SNMP management capability to be provided in the future by an amendment to the yet-to-be-approved IEEE P802.3.1.

# Distinct Identity

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- a) **Substantially different from other IEEE 802 standards.**
- b) **One unique solution per problem (not two solutions to a problem).**
- c) **Easy for the document reader to select the relevant specification.**
- d) **Substantially different from other IEEE 802.3 specifications/solutions.**
  - The proposed amendment is an upgrade path for IEEE 802.3 users, based on the IEEE 802.3 MAC.
  - There are IEEE 802.3 users who currently use a single device to provide 10GbE/OTU2/STM-64/OC-192 optical interfaces. This proposed amendment would be the only 40 Gb/s Ethernet standard that provides optical specifications that are compatible with existing carrier 40 Gb/s client interfaces (OTU3/STM-256/OC-768/40G POS) and would provide an upgrade path for these users to 40 Gb/s.
  - The proposed amendment to the existing IEEE 802.3 standard will be formatted as a new clause, making it easy for the reader to select the relevant specification.

# Technical feasibility

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**a) Demonstrated system feasibility.**

**b) Proven technology, reasonable testing.**

**c) Confidence in reliability.**

- The operation of Ethernet at 40 Gb/s with the exception of a 40 Gb/s serial PMA/PMD has been established by IEEE P802.3ba.
- The principle of building serial 40 Gb/s optical PMDs and SERDES has been proven both technically and operationally feasible by the deployment of ITU-T/SONET OTU3/STM-256/OC-768 optical transport interfaces in carrier networks.
- The technology to be utilized in the proposed project has been demonstrated to be feasible through the work of previous IEEE 802.3 standards activities and the implementations of ITU-T Recommendations including 40G VSR from G.693. It is recognized that these relevant technologies have advanced since the inception of work on related standards.
- The reliability of Ethernet components and systems in the target environments can be projected with a high degree of confidence based on existing 40 Gb/s deployment experience.

# Economic feasibility

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- a) Known cost factors, reliable data.**
  - b) Reasonable cost for performance.**
  - c) Consideration of installation costs.**
- The cost factors for Ethernet components and systems are well known. The cost factors for 40 Gb/s serial optics are known and understood from carrier deployments.
  - The proposed project will enable carriers to deploy multi-protocol 40GbE/ OC-768/STM-256/OTU3 modules to provide the best balance of performance and cost by:
    - providing backwards compatibility with deployed technology.
    - minimizing OpEx costs due to simplified deployment.
    - leveraging combined volumes to achieve lower Capital Expense (CapEx)
  - The installation costs of single mode fiber are well understood. A 40 Gb/s Serial PMD would enable a single multi-protocol module for carrier applications, simplifying installation and reducing cost.
  - Network design, installation and maintenance costs are reduced by preserving carrier network architecture, management, and software.

# Interim meeting progress – Motions

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## Motion #7

Move that the Study Group adopt the PAR question responses in nowell\_01\_0110.pdf and grant editorial license to the Study Group chair.

M: John D'Ambrosia

S: Steve Trowbridge

Technical  $\geq 75\%$

All in the room: Y:30/N:0/A:0

802.3 voters: Y:21/N:0/A:0

Motion passes



# PAR

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[http://www.ieee802.org/3/40GSMF/40GESMF\\_SG\\_PAR\\_0110.pdf](http://www.ieee802.org/3/40GSMF/40GESMF_SG_PAR_0110.pdf)

**2.1 Title:** Standard for Information technology--Telecommunications and information exchange between systems--Local and metropolitan area networks--Specific requirements Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications Amendment: Physical Layer and Management Parameters for Serial 40 Gb/s Ethernet Operation Over Single Mode Fiber

**5.2 Scope:** The scope of this project is to add a single-mode fiber Physical Medium Dependent (PMD) option for serial 40 Gb/s operation by specifying additions to, and appropriate modifications of, IEEE Std 802.3-2008 as amended by the IEEE P802.3ba project (and any other approved amendment or corrigendum).

# PAR (cont'd)

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**5.3 Is the completion of this standard dependent upon the completion of another standard: Yes If yes please explain:** Yes, this project will define a new PMD, and will build upon the 40Gb/s MAC, PCS sub-layer, PMA sub-layer, logical interfaces, electrical interfaces, and management registers defined in IEEE P802.3ba 40Gb/s and 100Gb/s Ethernet. The IEEE P802.3ba project is near completion with an expected RevCom submittal date of June 2010. The addition of 40Gb/s serial PMD operation to IEEE P802.3ba would result in delays to IEEE P802.3ba that would impact the industry.

**5.4 Purpose:** This project will define a 40 Gb/s serial PMD that supports a link distance of at least 2km over single-mode fiber that is optically compatible with existing carrier 40Gb/s client interfaces (OTU3/STM-256/OC-768/40G Packet over SONET (POS)), which will enable interconnection between equipment in carrier networks or as uplink interconnections from enterprises, data centers, or other network operators into carrier networks.

**5.5 Need for the Project:** The project is needed to provide multiple system operators and telecommunications operators with an IEEE 802.3 Ethernet 40 Gb/s serial PHY that provides optical compatibility with existing carrier 40 Gb/s client interfaces.

**5.6 Stakeholders for the Standard:** Stakeholders identified to date include, but are not limited to, users and producers of systems and components for telecommunications carriers, data centers, networking systems, and multiple system operators (MSOs).

# Interim meeting progress – Motions

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## Motion #8

Move that the Study Group:

Submit the project documentation to the 802.3 Working Group for approval.

Request that the 802.3 Working Group chair pre-submit the PAR and 5 criteria responses to the 802 Executive Committee for consideration at the March 2010 Plenary Session. Should the IEEE 802.3 Working Group not approve the submission at its March 2010 meeting, it will be removed from the IEEE 802 Executive Committee agenda.

Request that the 802.3 Working Group Chair pre-submit the PAR to NesCom for consideration at the March 2010 meeting. Should the IEEE 802.3 Working Group not approve the submission at its March 2010 meeting, it will be removed from the NesCom agenda.

M: Sam Sambasivan

S: Osamu Ishida

Technical ≥ 75%

All in the room: 802.3 voters

Y: 30

Y: 20

N: 0

N: 0

A: 0

A: 0

Motion passes

# Interim meeting progress – Motions

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## Motion #9

Move that the Study Group approve the text in dambrosia\_03\_0110.pdf, with editorial license granted to the Study Group Chair (or his appointed agent) as an informal communication by the Chair to ITU-T Study Group 15

M: John D'Ambrosia

S: Robert Lingle, Jr.

Procedural >50%

Motion passes by voice without opposition

# Plans for this week

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- Review Study Group documentation adopted during Jan Interim meeting
- No technical presentations this week
- Respond to any feedback provided by WG review
  
- Meeting on Wednesday morning @ 9am
  - Curacao 6 meeting room
  
- PAR will be brought forward for consideration by WG on Thursday