




IEEE P802.3ba 40Gb/s and 100Gb/s Ethernet

Closing Plenary Report

Orlando, FL
March 2008

John D'Ambrosia
jdambrosia@ieee.org



IEEE P802.3ba Task Force Organization

- Task Force Chair:
 - John D'Ambrosia (jdambrosia@ieee.org)
- Chief Editor
 - Ilango Ganga (ilango.s.ganga@intel.com)
- Task Force Secretary
 - George Oulundsen (goulundsen@ofsoptics.com)
- Web Master
 - Frank Chang (ychang@vitesse.com)

- “40GbE SMF PMD” Ad Hoc Chair
 - Alessandro Barbieri (abarbier@cisco.com)
- “Test Point” Ad Hoc Chair
 - Chris Di Minico (CDimi80749@aol.com)

Reflector and Web

- To subscribe to the IEEE P802.3ba Task Force reflector, send an email to:

ListServ@ieee.org

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

***subscribe stds-802-3-hssg <yourfirstname> <yourlastname>
end***

- Send IEEE P802.3ba Task Force reflector messages to:

STDS-802-3-HSSG@listserv.ieee.org

- Task Force web page URL:

http://www.ieee802.org/3/ba/

IEEE P802.3ba Private Area

- URL: <http://www.ieee802.org/3/ba/private/>
 - Username: 802.3ba
 - Password: xxxxxxxx
 - Password is case sensitive

- Write it down...

Task Force Approved Project Documents

- PAR

- http://ieee802.org/3/ba/PAR/par_0308.pdf

- 5 Criteria

- http://ieee802.org/3/ba/PAR/HSSG_5C_0707.pdf

- Objectives

- http://ieee802.org/3/ba/PAR/P802.3ba_Objectives_0308.pdf

Accomplishments for the Week

- Frame Tutorial
 - About 20 Attendees (mix of 802.3ba & others)
 - Thanks to Michelle Turner and David Law
- Review liaisons / communications
 - ISO/IEC JTC 1/SC 25/WG 3
 - OIF (Carrier WG) – informal communication approved
- Ad hocs
 - 40G SMF PMD Ad hoc - Resolved 40G SMF PMD Issue
 - Test Point Ad hoc - Resolved PMD test point locations
- Heard 47 Presentations

Motions for the Week – Chief Editor Appointment

- Move for confirmation of appointment:
 - Ilango Ganga as Chief Editor, IEEE 802.3ba Task Force.

- Approved by voice vote without opposition

40 GbE 10 km SMF PMD

- Proposed added objective was is within scope, but critters were evaluated to ensure they properly reflect project.

IEEE P802.3ba Scope - Define 802.3 Media Access Control (MAC) parameters, physical layer specifications, and management parameters for the transfer of 802.3 format frames at 40 Gb/s and 100 Gb/s.

LMSC 7.2.1 - The WG should periodically review and confirm that the five criteria used to approve its PAR still reflect the state of the project. Should a WG need to modify the responses to the five criteria during development in order to accurately reflect the state of the project, the modified responses shall be submitted to the EC for approval.

Motions for the Week – 40GbE SMF PMD

- Move that the IEEE 802.3ba Task Force adopt the following objective in replacement of existing 40Gb/s Physical Layer objectives:
 - Provide Physical Layer specifications that support 40 Gb/s operation over:
 - at least 10km on SMF
 - at least 100m on OM3 MMF
 - at least 10m over a copper cable assembly
 - at least 1m over a backplane
 - Technical ($\geq 75\%$)
 - Task Force: Y: 124 N: 0 A: 14
 - 802.3 Voters Y: 55 N: 0 A: 9
 - Motion Passes

Motions for the Week – 40GbE SMF PMD

- Move that the IEEE 802.3ba Task Force adopt the modified Broad Market Potential response in barbieri_02_0308.pdf.
 - Technical ($\geq 75\%$)
 - Task Force: Y: 108 N: 1 A: 11
 - 802.3 Voters Y: 55 N: 2 A: 8
 - Motion Passes

Motions for the Week – 40GbE SMF PMD

- Move that the IEEE 802.3ba Task Force adopt the modified Economic Feasibility response in barbieri_02_0308.pdf.
 - Technical ($\geq 75\%$)
 - Task Force: Y: 110 N: 0 A: 12
 - 802.3 Voters Y: 55 N: 0 A: 4
 - Motion Passes

Motions for the Week – 40GbE SMF PMD

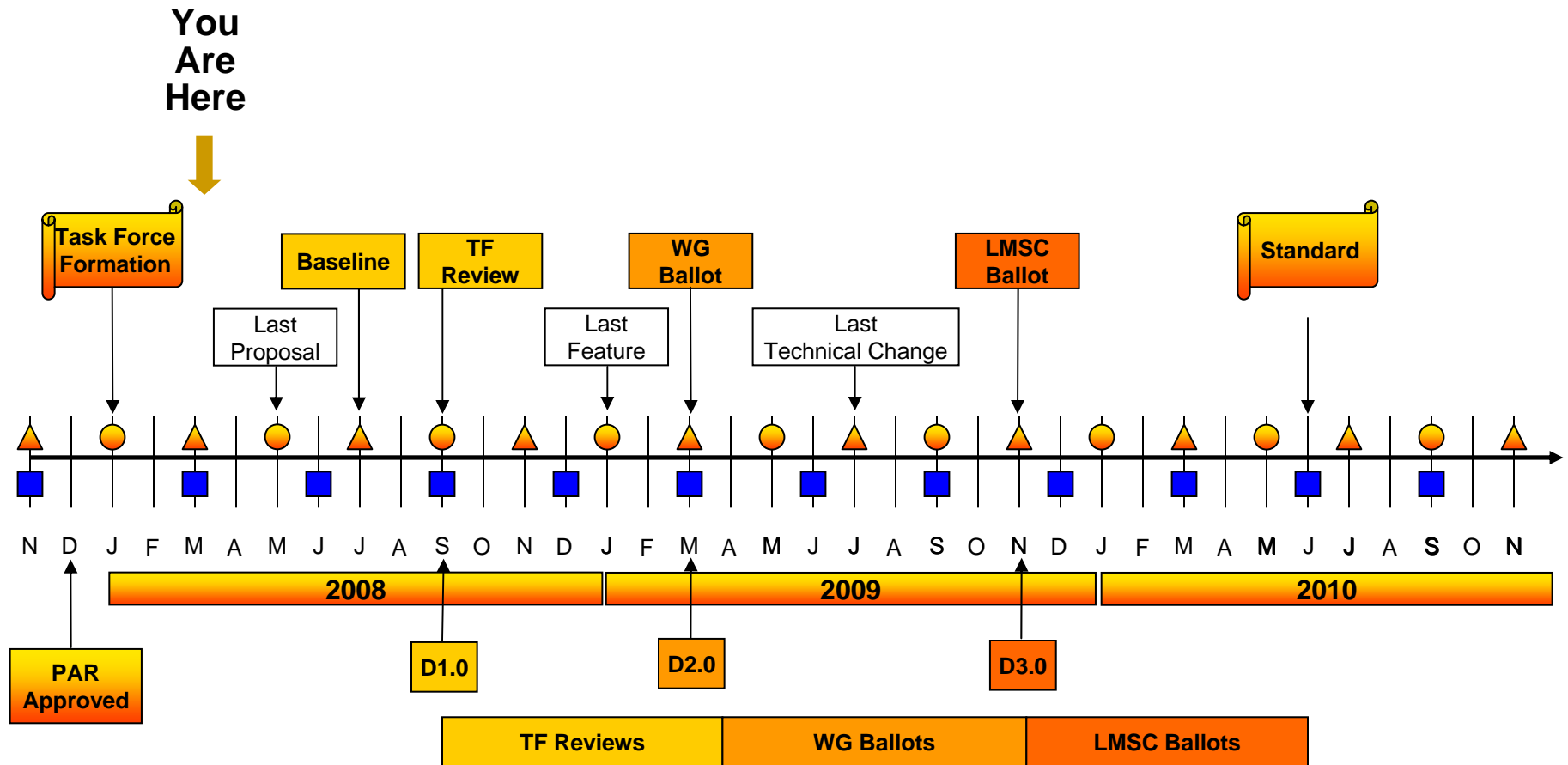
- Move that the IEEE 802.3ba Task Force:
 - Submit the updated project documentation (objectives and 5 Criteria in barbieri_02_0308.pdf) to the 802.3 Working Group for approval.
 - Request that the 802.3 Working Group submit the updated 5 Criteria to the 802 Executive Committee for consideration at the July 2008 Plenary Session.

- Technical ($\geq 75\%$)
- Task Force: Y: 121 N: 0 A: 4
- 802.3 Voters Y: 58 N: 0 A: 1
- Motion Passes

Motions for the Week - Timeline

- Move for adoption of timeline in agenda_01_0308 (as modified during the meeting).
- Moved by: Howard Frazier
- Second by: Jeff Lynch
- Technical ($\geq 75\%$)
- Results: Y: 83 N:0 A: 25
- Motion Passes

Task Force Timeline (not adopted)



- agenda_01_0308.pdf as modified during the meeting

Straw Polls this week

- Regarding daw_e_01_0308.pdf, the following should be done:
 - A. IEEE P802.3ba takes this work on as part of the project.
 - B. The work should be done, but not as part of the IEEE P802.3ba project.
 - C. Nothing should be done.
 - D. Further evaluation is necessary.

- Results:
 - A. 23
 - B. 21
 - C. 0
 - D. 38

- Action – Piers Dawe appointed to chair “Statistical Eye Ad Hoc”

Straw Polls – 100GbE 10km SMF PMD

- I believe that a baseline proposal for the 100GE 10km SMF PMD should be based on:
 - A) CWDM grid
 - B) LAN-WDM grid
 - C) I need more information and presentation material before deciding
 - D) I will abstain now and later

- Results:
 - Task Force
 - A - 28
 - B - 49
 - C - 35
 - D - 20
 - 802.3 voters
 - A - 13
 - B - 29
 - C - 19
 - D - 5

Straw Polls – Electrical Interfaces

- I believe the IEEE802.3ba should specify a next-generation XAUI electrical interface (XLAUI / CAUI).
 - A) I agree
 - B) I disagree
 - C) I need more information and presentation material before deciding
 - D) I will abstain now and later

- Results:
 - Task Force
 - A – 26
 - B - 1
 - C - 93
 - D - 6

 - 802.3 voters
 - A – 8
 - B - 0
 - C - 53
 - D - 1

Updated IEEE P802.3ba Objectives

- Support full-duplex operation only
- Preserve the 802.3 / Ethernet frame format utilizing the 802.3 MAC
- Preserve minimum and maximum FrameSize of current 802.3 standard
- Support a BER better than or equal to 10^{-12} at the MAC/PLS service interface
- Provide appropriate support for OTN
- Support a MAC data rate of 40 Gb/s
- Provide Physical Layer specifications which support 40 Gb/s operation over:
 - at least 10km on SMF**
 - at least 100m on OM3 MMF
 - at least 10m over a copper cable assembly
 - at least 1m over a backplane
- Support a MAC data rate of 100 Gb/s
- Provide Physical Layer specifications which support 100 Gb/s operation over:
 - at least 40km on SMF
 - at least 10km on SMF
 - at least 100m on OM3 MMF
 - at least 10m over a copper cable assembly

Motion

- Move that 802.3 approve the proposed revision to IEEE P802.3ba Task Force objectives, as per 0308_ba_close_report.pdf
- Technical ($\geq 75\%$)
- Moved by: John D'Ambrosia
- Second: Mark Nowell
- 802.3 Voters (Y/N/A): 62 / 0 / 4
- Motion Passes

Broad Market Potential (1 of 2)

- Broad sets of applications
 - Multiple vendors and numerous users
 - Balanced cost (LAN versus attached stations)
-
- **Bandwidth requirements for computing and core networking applications are growing at different rates, which necessitates the definition of two distinct data rates for the next generation of Ethernet networks in order to address these applications:**
 - **Servers, high performance computing clusters, blade servers, storage area networks and network attached storage all currently make use of 1G and 10G Ethernet, with significant growth of 10G projected in '07 and '08. I/O bandwidth projections for server and computing applications, including server traffic aggregation, indicate that there will be a significant market potential for a 40 Gb/s Ethernet interface.**
 - **Core networking applications have demonstrated the need for bandwidth beyond existing capabilities and the projected bandwidth requirements for computing applications. Switching, routing, and aggregation in data centers, internet exchanges and service provider peering points, and high bandwidth applications, such as video on demand and high performance computing environments, have demonstrated the need for a 100 Gb/s Ethernet interface.**

Broad Market Potential (2 of 2) [NO MODIFICATIONS]

- Broad sets of applications
 - Multiple vendors and numerous users
 - Balanced cost (LAN versus attached stations)
-
- **There has been wide attendance and participation in the study group by end users, equipment manufacturers and component suppliers. It is anticipated that there will be sufficient participation to effectively complete the standardization process.**
 - **Prior experience scaling IEEE 802.3 and contributions to the study group indicates:**
 - 40 Gb/s Ethernet will provide approximately the same cost balance between the LAN and the attached stations as 10 Gb/s Ethernet.
 - The cost distribution between routers, switches, and the infrastructure remains acceptably balanced for 100 Gb/s Ethernet.
 - **Given the topologies of the networks and intended applications, early deployment will be driven by key aggregation & high-bandwidth interconnect points. This is unlike the higher volume end system application typical for 10/100/1000 Mb/s Ethernet, and as such, the initial volumes for 100 Gb/s Ethernet are anticipated to be more modest than the lower speeds. This does not imply a reduction in the need or value of 100 Gb/s Ethernet to address the stated applications.**

Motion

- Move that 802.3 approve the revised IEEE P802.3ba Task Force Broad Market Potential Criterion per 0308_ba_close_report.pdf
- Technical ($\geq 75\%$)
- Moved by: John D'Ambrosia
- Second: Mark Nowell
- 802.3 Voters (Y/N/A): 69 / 0 / 2
- Motion Passes / Fails

Economic Feasibility

- Known cost factors, reliable data
 - Reasonable cost for performance
 - Consideration of installation costs
-
- The cost factors for Ethernet components and systems are well known. The proposed project may introduce new cost factors which can be quantified.
 - Presentations indicate that for the server market and computing applications, **including server traffic aggregation**, the optimized rate to provide the best balance of performance and cost is 40 Gb/s. For the network aggregation market and core networking applications, the optimized rate offering the best balance of performance and cost is 100 Gb/s.
 - In consideration of installation costs, the project is expected to use proven and familiar media, including optical fiber, backplanes, and copper cabling technology.
 - Network design, installation and maintenance costs are minimized by preserving network architecture, management, and software.

Motion

- Move that 802.3 approve the revised IEEE P802.3ba Task Force Economic Feasibility Criterion, per 0308_ba_close_report.pdf
- Technical ($\geq 75\%$)
- Moved by: John D'Ambrosia
- Second: Mark Nowell
- 802.3 Voters (Y/N/A): 66 / 0 / 2
- Motion Passes

Motion

- Move that the 802.3 Working Group submit the revised IEEE P802.3ba Task Force 5 Criteria (per 0308_ba_close_report.pdf) to the 802 Executive Committee for consideration at the July 2008 Plenary Session.
- Technical ($\geq 75\%$)
- Moved by: John D'Ambrosia
- Second: Mark Nowell
- 802.3 Voters (Y/N/A): voice vote without objection
- Motion Passes

Future Meetings


<http://iee802.org/3/interims/index.html>

- May 2008 Interim
 - Hosted by Linear Technology
 - May 12 – 16
 - Munich, Germany
- July 2008 Plenary
 - July 14 – 18
 - Hyatt Regency Denver at the Colorado Convention Center
 - Denver, CO, USA
- Sept 2008 Interim
 - Hosted by Huawei
 - Sept 15 - 19
 - ChengDu, China
- Nov 2008 Plenary
 - Nov 10 – 13
 - Hyatt Regency Dallas at Reunion
 - Dallas, Tx, USA




Thank You!





Updated 5 Criteria



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Compatibility [NO MODIFICATIONS]

- IEEE 802 defines a family of standards. All standards shall be in conformance with the IEEE 802.1 Architecture, Management, and Interworking documents as follows: 802. Overview and Architecture, 802.1D, 802.1Q, and parts of 802.1f. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with 802. Each standard in the IEEE 802 family of standards shall include a definition of managed objects that are compatible with systems management standards.

- As an amendment to 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.
- As an amendment to IEEE Std 802.3, the proposed project will follow the existing format and structure of IEEE 802.3 MIB definitions providing a protocol independent specification of managed objects (IEEE Std 802.1F).
- The proposed amendment will conform to the full-duplex operating mode of the IEEE 802.3 MAC.
- As was the case in previous IEEE 802.3 amendments, new physical layers specific to either 40 Gb/s or 100 Gb/s operation will be defined.
- By utilizing the existing IEEE 802.3 MAC protocol, this proposed amendment will maintain maximum compatibility with the installed base of Ethernet nodes.

Distinct Identity [NO MODIFICATIONS]

- Substantially different from other IEEE 802 standards
 - One unique solution per problem (not two solutions to a problem)
 - Easy for the document reader to select the relevant specification
-
- **The proposed amendment is an upgrade path for IEEE 802.3 users, based on the IEEE 802.3 MAC.**
 - **The established benefits of the IEEE 802.3 MAC include:**
 - Deterministic, highly efficient full-duplex operation mode
 - Well-characterized and understood operating behavior
 - Broad base of expertise in suppliers and customers
 - Straightforward bridging between networks at different data rates
 - **The Management Information Base (MIB) for IEEE 802.3 will be extended in a manner consistent with the IEEE 802.3 MIB for 10 / 100 / 1000 / 10000 Mb/s operation.**
 - **The proposed amendment to the existing IEEE 802.3 standard will be formatted as a collection of new clauses, making it easy for the reader to select the relevant specification.**
 - **Bandwidth requirements for computing and networking applications are growing at different rates. These applications have different cost / performance requirements, which necessitates two distinct data rates, 40 Gb/s and 100 Gb/s.**

Technical Feasibility [NO MODIFICATIONS]

- Demonstrated system feasibility
- Proven technology, reasonable testing
- Confidence in reliability

-
- **The principle of scaling the IEEE 802.3 MAC to higher speeds has been well established by previous work within IEEE 802.3.**
 - **The principle of building bridging equipment which performs rate adaptation between IEEE 802.3 networks operating at different speeds has been amply demonstrated by the broad set of product offerings that bridge between 10, 100, 1000, and 10000 Mb/s.**
 - **Systems with an aggregate bandwidth of greater than or equal to 100 Gb/s have been demonstrated and deployed in operational networks.**
 - **The proposed project will build on the array of Ethernet component and system design experience, and the broad knowledge base of Ethernet network operation.**

The experience gained in the development and deployment of 10 Gb/s technology is applicable to the development of specifications for components at higher speeds. For example, parallel transmission techniques allow reuse of 10 Gb/s technology and testing.

Component vendors have presented data on the feasibility of the necessary components for higher speed solutions. Proposals, which either leverage existing technologies or employ new technologies, have been provided.

- **The reliability of Ethernet components and systems can be projected in the target environments with a high degree of confidence. Presentations demonstrating this have been provided.**

Economic Feasibility

- Known cost factors, reliable data
 - Reasonable cost for performance
 - Consideration of installation costs
-
- The cost factors for Ethernet components and systems are well known. The proposed project may introduce new cost factors which can be quantified.
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