

Moving Forward

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Chair, IEEE P802.3bs 400 GbE Task Force

IEEE 802.3 Jan 2015 Interim
Atlanta, GA, USA

Task Force Chair

- **IEEE 802.3 WG Operating Rules**

3.4 Operation of the Task Force

The operation of the TF has to be balanced between democratic procedures that reflect the desires of the TF members and the TF Chair's responsibility to produce a draft standard, recommended practice, or guideline in a reasonable amount of time for review and approval by the WG.

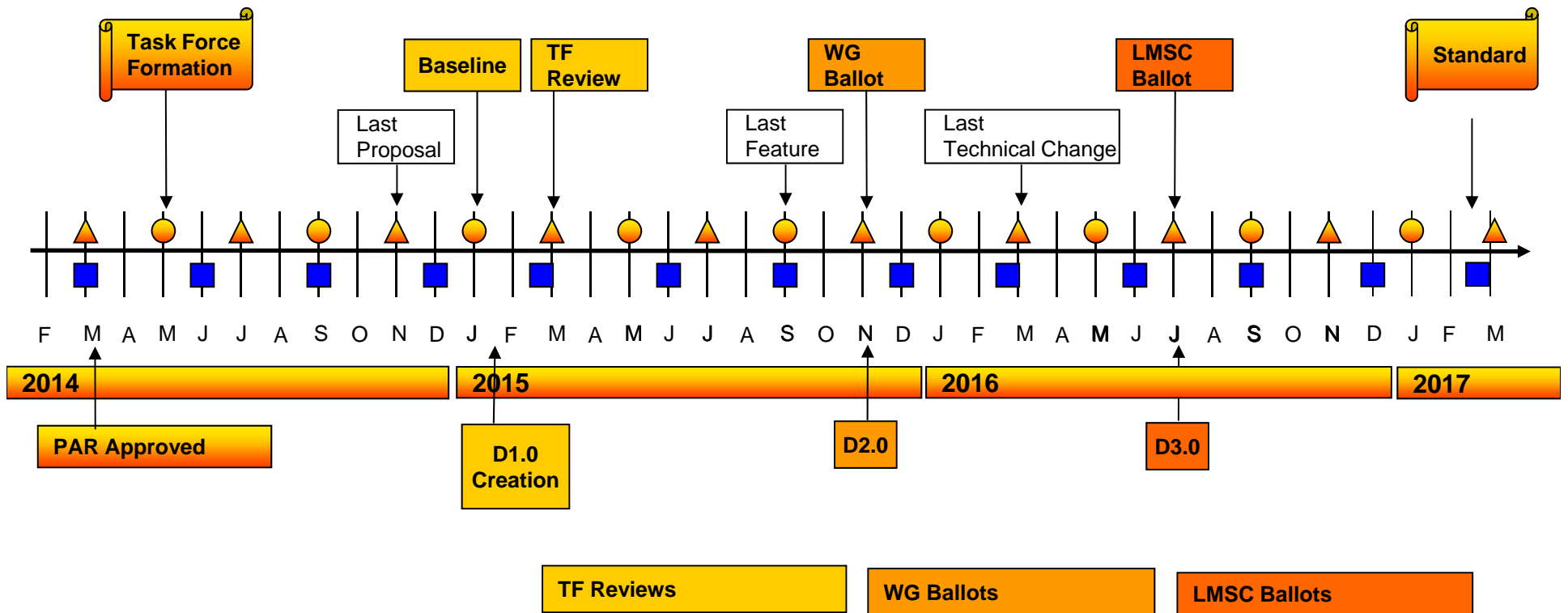
3.4.3 Task Force Chair's Responsibilities

The main responsibility of the TF Chair is to ensure the production, and to guide through the approval and publication process, a draft standard, recommended practice or guideline, or revision to an existing document as defined by the relevant PAR.

IEEE P802.3bs 400 GbE Objectives

- Support a MAC data rate of 400 Gb/s
- Support a BER of better than or equal to 10^{-13} at the MAC/PLS service interface (or the frame loss ratio equivalent)
- Support full-duplex operation only
- Preserve the Ethernet frame format utilizing the Ethernet MAC
- Preserve minimum and maximum FrameSize of current Ethernet standard
- Provide appropriate support for OTN
- Specify optional Energy Efficient Ethernet (EEE) capability for 400 Gb/s PHYs
- Support optional 400 Gb/s Attachment Unit Interfaces for chip-to-chip and chip-to-module applications
- Provide physical layer specifications which support link distances of:
 - At least 100 m over MMF
 - At least 500 m over SMF
 - At least 2 km over SMF
 - At least 10 km over SMF

IEEE P802.3bs 400GbE Adopted Timeline

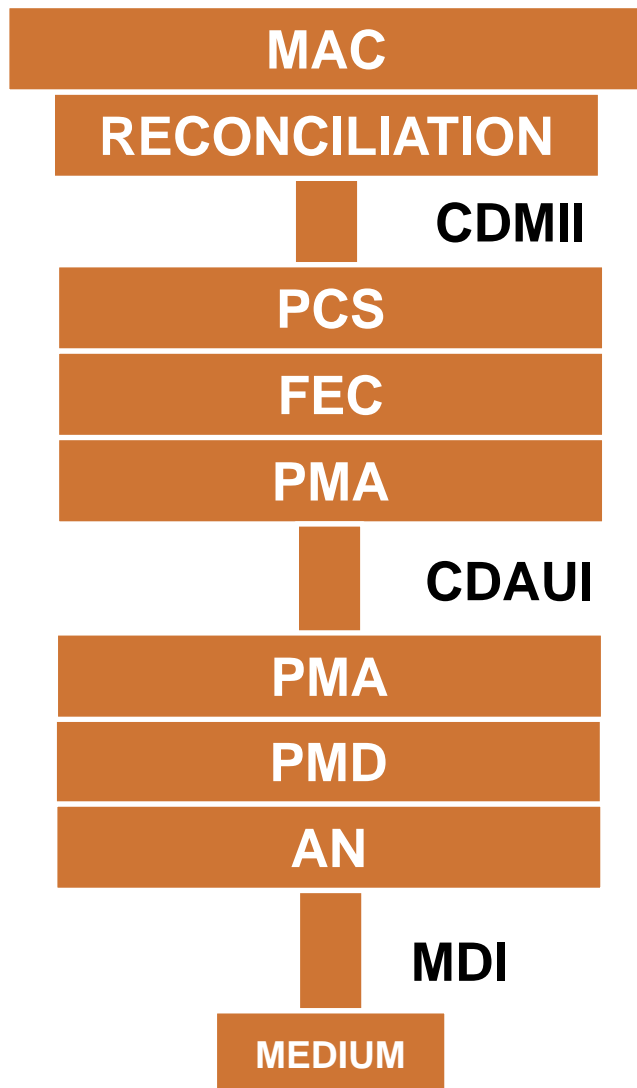


Adopted by IEEE P802.3bs 400GbE Task Force, May 2014 Interim.

Legend

- ▲ IEEE 802 Plenary
- IEEE 802.3 Interim
- IEEE-SA Standards Board

Issues – Bottom Up (dambrosia_3bs_01a_0514)



- Medium- Channel Models
- MDI?
- PMD
 - 16x25G / 8 x50G / 4x100G? (Modulation, Parallelization)
 - Breakout?
- CDAUI / PMA
 - PMA Functionality
 - 802.3ba architecture? Between 2 PMA sublayers?
 - Channel / Connector for module?
 - Signaling characteristics
 - FEC?
 - Per electrical interface? FEC for the entire link?
 - CDAUI: Above / below PCS?
 - Number / placement within layer structure
- FEC (see next slides)
 - Type?
 - Budgeting?
 - Multi-generation considerations
- PCS
 - Similar 802.3ba PCS Structure?
 - Bit versus Block encoding?
 - Embedded FEC Specific to PHY?
- CDMII
 - Extender Sublayer?

Organization of Project Work (dambrosia_3bs_01a_0514)

Logic Functions	Electrical Interfaces	Optical PMDs
<ul style="list-style-type: none"> ■ Amendments to MAC, RS, and MAC PHY interfaces ■ RS and CDGMII ■ Extender Sublayer (CDGXI)? ■ PCS functions ■ PMA functions ■ OTN Compatibility ■ EEE (LLDP) 	<ul style="list-style-type: none"> ■ Extender Sublayer (CDGXI)? ■ Chip-to-chip ■ Chip-to-module ■ Channels characteristics, including connector for chip-to-module 	<ul style="list-style-type: none"> ■ 40GBASE-Sxx (100m) ■ 40GBASE-xxx (500m) ■ 40GBASE-Fxx (2km) ■ 40GBASE-Lxx (10km) ■ MDI(s?) ■ Media characteristics
<p>FEC ARCHITECTURE AND BUDGET</p>		
<ul style="list-style-type: none"> ■ Management related to Logic functions (Clauses 30, 45, etc.) 	<ul style="list-style-type: none"> ■ FEC related to electrical interfaces? ■ Management related to electrical interfaces (Clauses 30, 45, etc.) 	<ul style="list-style-type: none"> ■ FEC related to PMD functions? ■ Management related to PMD functions (Clauses 30, 45, etc.)

Decisions Made to Date

Topic Matter	Motion	Reference Presentation
RS / CDMII	Motion #3, July 14: Move to adopt the baseline for the CDMII logical interface as shown in slide 5 of gustlin_3bs_03_0714.pdf .	http://www.ieee802.org/3/bs/public/14_07/gustlin_3bs_03_0714.pdf
Electrical Interfaces (C2C and C2M)	Motion #4, Sept 14: Move to adopt 16 x 25Gb/s and 8 x 50Gb/s as the basis for the lane rates for any optional C2C and C2M electrical interfaces	
	Motion #6, Sept 14: Move to adopt the P802.3bm C2C and C2M specifications with current values (except that the BER requirement is TBD) as a baseline draft for the 16 x 25Gb/s electrical interfaces	
100m MMF	Motion #3, Nov 14: Move to adopt the proposal in slides 6 to 16 in king_3bs_02a_1114.pdf as the baseline proposal for the P802.3bs objective to “provide physical layer specifications which support link distances of at least 100 m of MMF” (400GBASE-SR16)*	http://www.ieee802.org/3/bs/public/14_11/king_3bs_02a_1114.pdf
10km SMF	Motion #4, July 14: Move that 10km 400GbE SMF PMD will use a duplex fiber solution.	

* Motion #3, Nov 14 Minutes needs to update to correct file name. “king_3bs_02a_1114.”

PCS

- Proposal

http://www.ieee802.org/3/bs/public/15_01/gustlin_3bs_02_0115.pdf

- Potential Motion Topics

- Adopt proposal per

http://www.ieee802.org/3/bs/public/15_01/gustlin_3bs_02_0115.pdf?

FEC Related

- Presentation -

http://www.ieee802.org/3/bs/public/15_01/wang_x_3bs_01_0115.pdf

- Potential Motion Topics

- Location? May be resolved by PCS discussion

- RS FEC Candidates

- 100GBASE-KP4?

- Other RS FEC Candidates?

- See wang_x_3bs_01a_0115

PMA

- Presentations

- [gustlin_3bs_02_0115](#)
- http://www.ieee802.org/3/bs/public/15_01/slavick_3bs_01_0115.pdf
- http://www.ieee802.org/3/bs/public/15_01/wang_t_3bs_01_0115.pdf

- Potential Motion Topics

- Adopt PMA Functions except MUXing approach, as detailed in [gustlin_3bs_02_0115](#)?
- Select a MUXing approach?
 - Eliminate any options?

Architecture (including Extender Sublayer)

- Proposals

- http://www.ieee802.org/3/bs/public/15_01/dambrosia_3bs_02_0115.pdf
 - http://www.ieee802.org/3/bs/public/14_11/gustlin_3bs_02a_1114.pdf

- Potential Motion Topics

- Adopt architecture as proposed in http://www.ieee802.org/3/bs/public/15_01/dambrosia_3bs_02_0115.pdf?

EEE

- Presentation

- http://www.ieee802.org/3/bs/public/15_01/marris_3bs_01_0115.pdf

- Potential Motion Topics

- Adopt EEE as defined?

OTN

- Proposal

- http://www.ieee802.org/3/bs/public/15_01/trowbridge_3bs_01_0115.pdf

- Potential Motion Topics

- Adopt as defined?

C2C CDAUI-8 Electrical Interfaces

- Proposals

- Separate proposals for either contained in:

- http://www.ieee802.org/3/bs/public/14_11/goergen_3bs_03a_1114.pdf

- NRZ:

- http://www.ieee802.org/3/bs/public/15_01/palkert_3bs_02_0115.pdf

- PAM4:

- http://www.ieee802.org/3/bs/public/15_01/li_3bs_01_0115.pdf

C2M CDAUI-8 Electrical Interfaces

- Proposals

- Separate proposals for either contained in:

- http://www.ieee802.org/3/bs/public/14_11/goergen_3bs_03a_1114.pdf

- NRZ:

- http://www.ieee802.org/3/bs/public/15_01/palkert_3bs_01_0115.pdf

- PAM4:

- http://www.ieee802.org/3/bs/public/15_01/brown_3bs_01_0115.pdf

CDAUI-8 Electrical Interface Motion Topics

- Adopt one modulation scheme for both C2C and C2M?
- C2C
 - Adopt NRZ?
 - Adopt PAM4?
- C2M
 - Adopt NRZ?
 - Adopt PAM4?

10km SMF PMD

- Proposals

- 8λ X 50G NRZ

- http://www.ieee802.org/3/bs/public/15_01/cole_3bs_01_0115.pdf

- http://www.ieee802.org/3/bs/public/14_11/cole_3bs_03a_1114.pdf

- http://www.ieee802.org/3/bs/public/15_01/kojima_3bs_01_0115.pdf

- http://www.ieee802.org/3/bs/public/14_11/shirao_3bs_01_1114.pdf

- 8λ X 50G PAM4

- http://www.ieee802.org/3/bs/public/15_01/cole_3bs_02_0115.pdf

- http://www.ieee802.org/3/bs/public/14_11/cole_3bs_04a_1114.pdf

- 4λ X 100G DMT

- http://www.ieee802.org/3/bs/public/14_11/takahara_3bs_01_1114.pdf

- http://www.ieee802.org/3/bs/public/15_01/corbeil_3bs_01_0115.pdf

500m SMF PMD

- Proposals

- 400G-PSM4 (4 fibers x 2λ X50G NRZ)

- http://www.ieee802.org/3/bs/public/14_11/cole_3bs_03a_1114.pdf

- 400G-PSM4 (4 fibers x 2λ X50G PAM4)

- http://www.ieee802.org/3/bs/public/14_11/cole_3bs_04a_1114.pdf

- 400G-PSM4 (4 fibers x 1λ X100G PAM4)

- http://www.ieee802.org/3/bs/public/15_01/welch_3bs_01_0115.pdf
 - http://www.ieee802.org/3/bs/public/14_11/welch_3bs_01b_1114.pdf

- 400G-PSM4 (4 fibers x 1λ X100G DMT)

- http://www.ieee802.org/3/bs/public/14_11/lewis_3bs_01a_1114.pdf
 - http://www.ieee802.org/3/bs/public/15_01/corbeil_3bs_01_0115.pdf

2km SMF PMD

- Proposals
 - 8λ X 50G NRZ
 - http://www.ieee802.org/3/bs/public/15_01/cole_3bs_01_0115.pdf
 - http://www.ieee802.org/3/bs/public/14_11/cole_3bs_03a_1114.pdf
 - http://www.ieee802.org/3/bs/public/15_01/kojima_3bs_01_0115.pdf
 - http://www.ieee802.org/3/bs/public/14_11/shirao_3bs_02_1114.pdf
 - 8λ X 50G PAM4
 - http://www.ieee802.org/3/bs/public/15_01/cole_3bs_02_0115.pdf
 - http://www.ieee802.org/3/bs/public/14_11/cole_3bs_04a_1114.pdf
 - 4λ X100G PAM4
 - http://www.ieee802.org/3/bs/public/15_01/lewis_3bs_01_0115.pdf
 - http://www.ieee802.org/3/bs/public/14_11/mason_3bs_01a_1114.pdf
 - 4λ X100G DMT
 - http://www.ieee802.org/3/bs/public/14_11/lewis_3bs_01a_1114.pdf
 - http://www.ieee802.org/3/bs/public/15_01/corbeil_3bs_01_0115.pdf

SMF PMD Motion Topics

- 10km
 - DMT or PAMn approach?
 - Adopt 8x50G PAMn approach?
- 500m
 - Adopt 4 fibers in each direction approach?
 - DMT or PAMn approach?
 - Adopt 4 fibers x 1 λ X100G PAM4?
- 2km
 - Adopt duplex fiber approach?
 - DMT or PAM-n approach?
- Consider together as single motion?
 - 8 λ X50G PAMn for 10km PMD Objective
 - 4 fibers x 1 λ X100G PAM4 500m PMD Objective



THANKS!