

IEEE 802.3 NGMMF Study Group Teleconference

Robert Lingle Jr., Acting Chair

IEEE 802.3 Next-gen 200G & 400G PHYs over fewer MMF Pairs Study Group

Employer & Affiliation: OFS

January 16, 2018

Web Meeting & Call-in Information

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Agenda

- Please record attendance with employer & affiliation to Mabud mchoudhury@ofsoptics.com
- IEEE 802 Participation, Pre-PAR Patent Policy
- Approve agenda & 12/18 minutes, review participation slides
- Review couple items on draft PAR – led by Mabud Choudhury (10 min)
- Review draft CSD Responses – led by Mabud Choudhury (60 min)
- Preview any other draft contributions or proposals
- Discussion of possible objectives (15 min)
- Contributions expected in Geneva (10 min)

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This slide set is available
at <https://development.standards.ieee.org/myproject/Public/mytools/mob/preparslides.ppt>

IEEE 802.3 NGMMF SG Information

- Robert Lingle Jr., Acting Chair
- Home Page - <http://www.ieee802.org/3/NGMMF/index.html>
- Reflector Information - <http://www.ieee802.org/3/NGMMF/reflector.html>
- Deadline for requesting presentation was Friday 1/12
 - Slots for 19 presentations at this time, in addition to Chair's Agenda
 - Presentation time may still be requested, based on availability
- A draft of any relative cost analyses should be submitted for review and approval by today; clarification from IEEE-SA has been requested for two contributions submitted so far
- Deadline for receipt of contributions by chair is Thursday 1/18 midnight AOE; Supporters may be added up until the time of presentation

Plan for Geneva

- Would like to pre-submit PAR and CSD Responses before the March meeting, if possible
- Hear contributions on PAR, CSD responses, objectives, including technical feasibility, economic feasibility, broad market potential, and distinct identity
- Take straw polls throughout to identify consensus
- Adopt PAR, CSD responses, and objectives that have consensus on Tuesday, to the degree possible

“Motherhood & Apple Pie” Objectives

- These objectives are typically adopted for projects and are deemed relevant to this project
 1. Support full-duplex operation only
 2. Preserve the Ethernet frame format utilizing the Ethernet MAC
 3. Preserve the minimum and Maximum FrameSize of current Ethernet standard
 4. Provide appropriate support for OTN
 5. Specify optional Energy Efficient Ethernet (EEE) capability
 6. Support a BER of better than or equal to 10^{-13} at the MAC/PLS service interface (or the frame loss ratio equivalent)
 - NOTE the lower BER target value of 10^{-13} was adopted for 200Gb/s and 400 Gb/s Ethernet in 802.3bs and 802.3cd, whereas 10^{-12} has been used for 100 Gb/s and lower speeds

The MMF PMD landscape by fiber count, Baud rate, and modulation format

Technology (per fiber)	1 fiber pair	2 fiber pairs	4 fiber pairs	8 fiber pairs	16 fiber pairs
25G- λ NRZ	25G-SR		100G-SR4		400G-SR16
50G- λ NRZ				400G-SR8	
50G- λ PAM4	50G-SR	100G-SR2	200G-SR4	400G-SR8	
100G- λ PAM4	200G-SR1.2	200G-SR2	400G-SR4		
2x50G- λ PAM4		200G-SR2.2	400G-SR4.2	The module types shown in red would be formally within the scope of the SG, but many would lack technical feasibility or broad market potential	
4x25G- λ NRZ		200G-SR2.4	400G-SR4.4		
4x50G- λ PAM4	200G-SR1.4	400G-SR2.4			
8x50G- λ PAM4	400G-SR1.8				

Existing or in-progress IEEE standard

Multi-Wavelength Nomenclature

SRm.n

m = # fiber pairs

n = # wavelengths

Proposal for specific objectives for this project

Rationale

- Language is intended to maintain the most broad consensus at this stage of the process, to help us to become a TF as soon as possible, in order to begin writing a baseline proposal for an assumed 400GBASE-SR4.2 PMD, which I believe to be time-sensitive.
- Re-uses the traditional 100m reach target without specifying grade of MMF
- Provide a physical layer specification which supports 200Gb/s operation over fewer than 4 pairs of MMF with channel lengths up to at least 100 m.
- Provide not more than two physical layer specifications which support 400Gb/s operation over fewer than 16 pairs of MMF with channel lengths up to at least 100 m.
- Provide a physical layer specification which supports 400Gb/s operation over fewer than 16 pairs of MMF with channel lengths up to at least xx m.
 - [Note: only relevant if a presentation in Geneva creates strong interest in a solution having distinct identity that cannot achieve 100m]

Contributions planned for Geneva

Contributions for Geneva – 19 plus Opening Agenda	Comments
“The Path Forward” (includes motherhood & apple pie objectives proposal)	Robert Lingle, Jr.
“Proposed PMD Progression”	Rick Pimpinella
“Objectives for NG 200G and 400G PHYs”	Steve Swanson
“Draft PAR”	Mabud Choudhury
“Draft CSD responses”	Mabud Choudhury
Establish that existing PCS/FEC clauses for 50G lanes support 200 & 400 Gb/s PMDs operating over fewer fiber pairs (BMP, TF)	Mark Gustlin
“Towards OM3, OM4 Modal Bandwidth Guidance for WDM” (TF)	Paul Kolesar and co-authors
“Wavelength dependent channel performance ” (TF)	Rick Pimpinella
“OM3, OM4, OM5 Modal Bandwidth Over Wavelengths for WDM” (TF)	Paul Kolesar and co-authors
“50 Gbit/s PAM4 beyond 850nm” (TF)	Earl Parsons
Demonstrate TF for 200GBASE-SR1.4	Jonathan King
“In Support of 200G MMF Ethernet PMDs: Broad Market Potential, Economic Feasibility”	James Young
(Slot reserved for 2 nd presentation on 200G duplex, if needed to separate BMP & EF)	James Young
“Channel Cost Analysis” (EF)	Rick Pimpinella
“Technical feasibility of a 400 Gb/s optical PMD supporting four MMF pairs”	Jonathan Ingham
TF for 400GBASE-SR4.2	Jonathan King
BMP, EF, DI for 400GBASE-SR4.2	Presenter TBD
EF, BMP, EF, DI for 400GBASE-SR8	Zuowei Shen
“The need for 100 Gb/s/lane MMF PMDs”	Ali Ghiasi