IEEE 802.3 NGMMF Study Group: Inaugural Telecon

Robert Lingle Jr., Acting Chair

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

Employer & Affiliation: OFS

December 05, 2017

Web Meeting & Call-in Information

Click below and we will call you to join the meeting:

(Note: some users outside the US have complained that the dial-me feature for audio bridge does not work when clicking the link below, requiring you to dail-in to the audio bridge manually using one of the numbers listed below or at the website if your country is not listed.)

Audio & Web Meeting: https://core.callinfo.com/callme/?ac=7985015&ap=8007682983&role=p&mode=ad

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1. Dial-In:

-
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Agenda

- Please record attendance with employer & affiliation to Mabud mchoudhury@ofsoptics.com

- Approval of Agenda

- IEEE 802 Participation

- Pre-PAR Patent Policy

- Study Group Kick Off
  - Information
  - Scope
  - Study Group Phase
  - Objectives
  - PAR to be discussed at future meeting

- "Review of Criteria for Standards Development" by George Zimmerman

- Preparation for September Interim

Participation in IEEE 802 Meetings

Participation in any IEEE 802 meeting (Sponsor, Sponsor subgroup, Working Group, Working Group subgroup, etc.) is on an individual basis

- Participants in the IEEE standards development individual process shall act based on their qualifications and experience. (https://standards.ieee.org/develop/policies/bylaws/sb_bylaws.pdf section 5.2.1)

- IEEE 802 Working Group membership is by individual; "Working Group members shall participate in the consensus process in a manner consistent with their professional expert opinion as individuals, and not as organizational representatives". (subclause 4.2.1 "Establishment", of the IEEE 802 LMSC Working Group Policies and Procedures)

- Participants have an obligation to act and vote as an individual and not under the direction of any other individual or group. A Participant's obligation to act and vote as an individual applies in all cases, regardless of any external commitments, agreements, contracts, or orders.

- Participants shall not direct the actions or votes of any other member of an IEEE 802 Working Group or retaliate against any other member for their actions or votes within IEEE 802 Working Group meetings, see https://standards.ieee.org/develop/policies/bylaws/sb_bylaws.pdf section 5.2.1.3 and the IEEE 802 LMSC Working Group Policies and Procedures, subclause 3.4.1 "Chair", list item x.

By participating in IEEE 802 meetings, you accept these requirements. If you do not agree to these policies then you shall not participate.

(Latest revision of IEEE 802 LMSC Working Group Policies and Procedures: http://www.ieee802.org/devdocs.shtml)

Guidelines for IEEE-SA Meetings

- **All IEEE-SA standards meetings shall be conducted in compliance with all applicable laws, including antitrust and competition laws.**

- **Don't discuss the interpretation, validity, or essentiality of patents/patent claims.**

- **Don't discuss specific license rates, terms, or conditions.**

  - Relative costs, including licensing costs of essential patent claims, of different technical approaches may be discussed in standards development meetings.

    - Technical considerations remain primary focus

- **Don't discuss or engage in the fixing of product prices, allocation of customers, or division of sales markets.**

- **Don't discuss the status or substance of ongoing or threatened litigation.**

- **Don't be silent if inappropriate topics are discussed… do formally object.**

If you have questions, contact the IEEE-SA Standards Board Patent Committee Administrator at patcom@ieee.org or visit http://standards.ieee.org/about/sasb/patcom/index.html

See *IEEE-SA Standards Board Operations Manual*, clause 5.3.10 and "Promoting Competition and Innovation: What You Need to Know about the IEEE Standards Association's Antitrust and Competition Policy" for more details.

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

Getting Started

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

Scope

- SG chartering motion

- Move that the IEEE 802.3 Ethernet Working Group authorizes the formation of a study group to develop a Project Authorization Request (PAR) and Criteria for Standards Development (CSD) responses for "Next-generation 200 Gb/s and 400 Gb/s PHYs over fewer MMF pairs than in existing Ethernet projects and standards."

- What are we given permission to do?
  - Consider 200 Gb/s links over < 4 pairs MMF (as in 802.3cd)
  - Consider 400 Gb/s links over < 16 pairs MMF (as in 802.3bs)
  - Study changes to PCS, coding, FEC, etc., though this may only be a PMD project
  - We are not restricted to a specific lane rate
  - We cannot consider, as examples, 100 or 800 Gb/s links

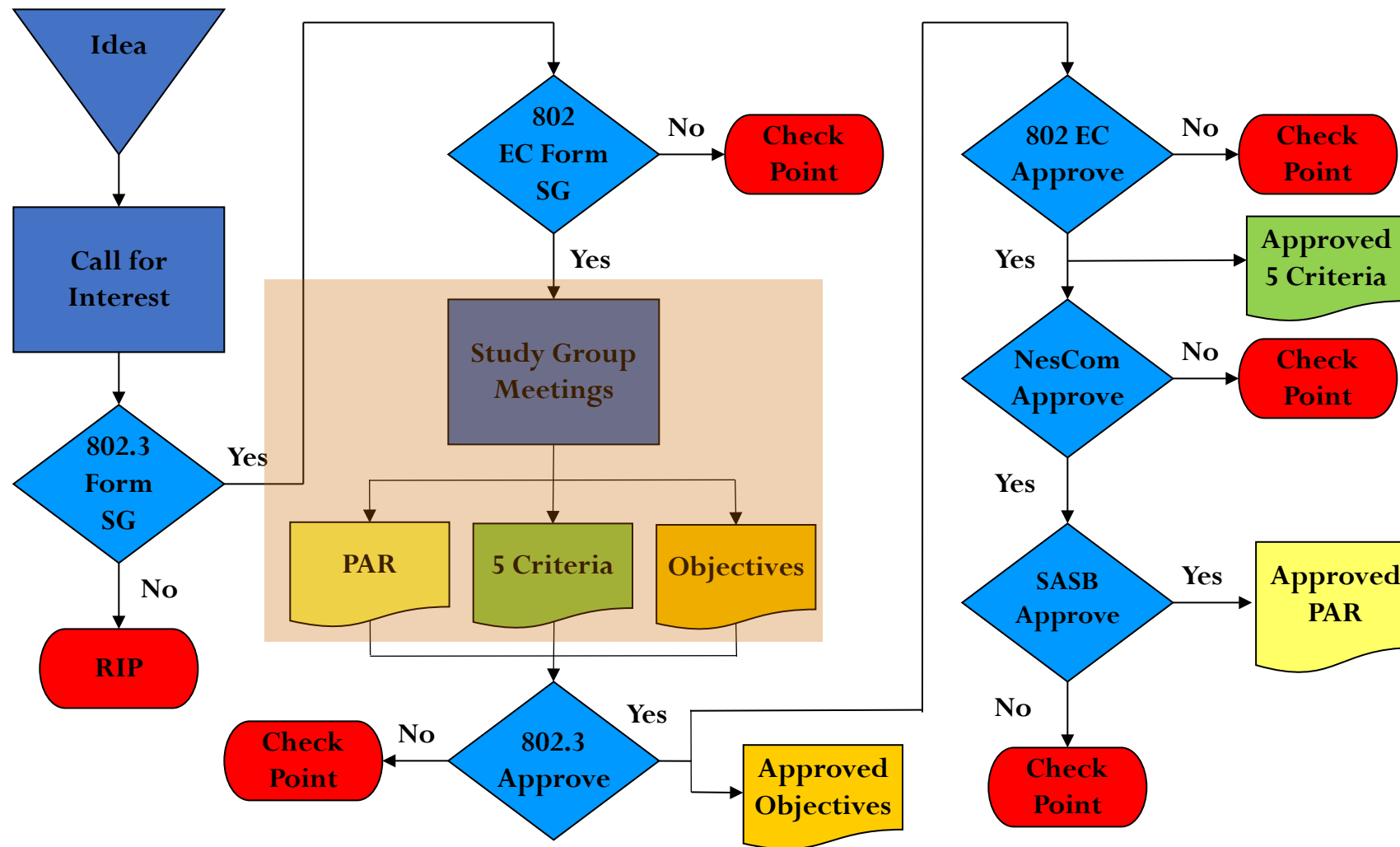# The MMF PMD landscape by fiber count, Baud rate, and modulation format

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	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	
2x50G-λ PAM4		200G-SR2.2	400G-SR4.2		
4x25G-λ NRZ		200G-SR2.4	400G-SR4.4		
4x50G-λ PAM4	200G-SR1.4	400G-SR2.4			

Existing or in-progress IEEE standard

Multi-Wavelength Nomenclature
SRm.n   m = # fiber pairs   n = # wavelengths

Note: At "Check Point", either the activity is ended, or there may be various options that would allow reconsideration of the approval.

Boilerplate Objectives

- There are some objectives that are typically adopted for a project
- Examples
  - Support full-duplex operation only
  - Preserve the Ethernet frame format utilizing the Ethernet MAC
  - Preserve the minimum and Maximum FrameSize of current Ethernet standard
  - Provide appropriate support for OTN
  - Specify optional Energy Efficient Ethernet (EEE) capability
  - 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

MMF Objectives

- 802.3bs - Provide physical layer specifications which support 400 Gb/s operation over at least 100m of MMF (http://www.ieee802.org/3/bs/Objectives_16_0317.pdf)

- 802.3cd - Define single-lane 50 Gb/s PHYs for operation over
  - MMF with lengths up to at least 100m

- 802.3cd - Define a two-lane 100 Gb/s PHY for operation over
  - MMF with lengths up to at least 100m

- 802.3cd - Define 200 Gb/s PHYs for operation over
  - MMF with lengths up to at least 100m (http://www.ieee802.org/3/cd/P802d3cd_objectives_v4.pdf)

- Suggest that we consider including the number of MMF pairs in our objectives, for example:
  - Define a 400 Gb/s PHY for operation over 4 pairs of MMF with lengths up to at least 100m

Contributions for January Interim

This is a contribution-driven process! Participants must support the objectives in which they believe by making (consensus) contributions.

- Objectives

- CSD Response

Next call is 11am Eastern Monday December 18th
- David Law will present on guidelines for discussion of relative cost in 802.3 meetings
- Further discussion of objectives & contributions supporting the objectives & CSD