

# IEEE liaison report

Apr 9 2020

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# IEEE 802.3 Task Forces, Study Groups, CFIs

- P802.3ca 25 Gb/s and 50 Gb/s-Ethernet Passive Optical Networks Task Force
- P802.3cg 10 Mb/s Single Pair Ethernet Task Force
- P802.3ch Multi-Gig Automotive PHY Task Force
- P802.3ck 100 Gb/s per Lane Electrical Task Force
- ~~P802.3cm Next Generation 400 Gb/s Ethernet over Multimode Fiber Task Force~~
- ~~P802.3cn 50 Gb/s, 200 Gb/s, and 400 Gb/s over single mode fiber Task Force~~
- P802.3cp Bidirectional 10 Gb/s, 25 Gb/s, and 50 Gb/s Optical Access PHYs Task Force
- P802.3cq Power over Ethernet over 2 Pairs (Maintenance #13) Task Force
- P802.3cr Isolation (Maintenance #14) Task Force
- P802.3cs Ethernet Access PMDs for Central Office Consolidation Task Force
- P802.3ct 100 Gb/s Ethernet over DWDM systems Task Force
- P802.3cu 100 Gb/s per lane optical PHYs for 100 GbE and 400 GbE Task Force
- P802.3cv Power over Ethernet 4 Pairs (Maintenance #15) Task Force
- (P802.3cw 400 Gb/s Ethernet over DWDM systems Task Force)
- (P802.3cx) Improving PTP Timestamping Accuracy Study Group
- (P802.3cy) Greater than 10 Gb/s Automotive Ethernet Electrical PHYs Study Group
- (P802.3cz) Multi-Gigabit Automotive Optical PHY Study Group
- (P802.3da) 10SPE Multidrop Enhancements Study Group
- (P802.3db) 100 Gb/s Wavelength Short Reach PHYs Study Group
- New Ethernet Applications Ad Hoc

# P802.3ck 100 Gb/s per lane Electrical Task Force

## Adopted Objectives (1 of 2)

- Support a MAC data rate of 100 Gb/s, 200 Gb/s, and 400 Gb/s
- Support full-duplex operation only
- Preserve the Ethernet frame format utilizing the Ethernet MAC
- Preserve minimum and maximum FrameSize of current IEEE 802.3 standard
- Support the existing bit error ratios (BERs) at the MAC/PLS service interface (or the frame loss ratio equivalent) for 100 Gb/s, 200 Gb/s, and 400 Gb/s Ethernet
- Define a single-lane 100 Gb/s Attachment Unit interface (AUI) for chip-to-module applications, compatible with PMDs based on 100 Gb/s per lane optical signaling
- Define a single-lane 100 Gb/s Attachment Unit Interface (AUI) for chip-to-chip applications
- Define a single-lane 100 Gb/s PHY for operation over electrical backplanes supporting an insertion loss  $\leq 28$  dB at 26.56 GHz.
- Define a single-lane 100 Gb/s PHY for operation over twin-axial copper cables with lengths up to at least 2m

# P802.3ck 100 Gb/s per lane Electrical Task Force

- 10<sup>th</sup> Task Force meeting 11-13 November 2019, Waikoloa, Hawaii
  - Meeting Materials: [http://ieee802.org/3/ck/public/19\\_11/index.html](http://ieee802.org/3/ck/public/19_11/index.html)
  - Meeting Minutes: [http://ieee802.org/3/ck/public/19\\_11/minutes\\_3ck\\_1119\\_unconfirmed\\_v3.pdf](http://ieee802.org/3/ck/public/19_11/minutes_3ck_1119_unconfirmed_v3.pdf)
- 11<sup>th</sup> Task Force meeting 21-23 January 2020, Geneva, Switzerland
  - Meeting Materials: [http://ieee802.org/3/ck/public/20\\_01/index.html](http://ieee802.org/3/ck/public/20_01/index.html)
  - Meeting Minutes: [http://ieee802.org/3/ck/public/20\\_01/minutes\\_3ck\\_0120\\_unapproved.pdf](http://ieee802.org/3/ck/public/20_01/minutes_3ck_0120_unapproved.pdf)
- Adopted a dual-FEC mode for 100G, allowing the option of interleaved FEC for difficult channels, with Clause 91 being the default
- Adopted additional baselines for Chip-to-Module, Copper Cable and Backplane interfaces.
- Authorized the editors in the November plenary to produce Draft 1.0 for the formal start of Task Force review.
- Resolved 244 comments against Draft 1.0 in January interim and agreed to produce Draft 1.1 for continued Task Force review

# P802.3ck 100 Gb/s per lane Electrical Task Force

## Adopted Objectives (2 of 2)

- Define a two-lane 200 Gb/s Attachment Unit interface (AUI) for chip-to-module applications, compatible with PMDs based on 100 Gb/s per lane optical signaling
  - Define a two-lane 200 Gb/s Attachment Unit Interface (AUI) for chip-to-chip applications
  - Define a two-lane 200 Gb/s PHY for operation over electrical backplanes supporting an insertion loss  $\leq 28$  dB at 26.56 GHz.
  - Define a two-lane 200 Gb/s PHY for operation over twin-axial copper cables with lengths up to at least 2m
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- Define a four-lane 400 Gb/s Attachment Unit interface (AUI) for chip-to-module applications, compatible with PMDs based on 100 Gb/s per lane optical signaling
  - Define a four-lane 400 Gb/s Attachment Unit Interface (AUI) for chip-to-chip applications
  - Define a four-lane 400 Gb/s PHY for operation over electrical backplanes supporting an insertion loss  $\leq 28$  dB at 26.56 GHz.
  - Define a four-lane 400 Gb/s PHY for operation over twin-axial copper cables with lengths up to at least 2m

# P802.3ck 100 Gb/s per lane Electrical Task Force

## C2M comments from March Teleconferences

- DFE tap weights set to bmax (1:4): 0.4, 0.15, 0.1, 0.1
  - The group will probably set min and max values in the future
- $\eta_0 = 4.1 \times 10^{-8}$
- Comment to replace TBD with 6.5ps rise time was accepted and then re-addressed and rejected to give the group more time to evaluate.
- ERL sections added for host input, module input and module output.
- ERL specs will remain TBD until the group can review impacts of proposed ERL parameter changes. (See next page)

# P802.3ck 100 Gb/s per lane Electrical Task Force

## C2M comments from March Teleconferences

- ERL parameter changes:

### Consensus Discussion...

Clause/Annex	Type	$\beta_x$	$\rho_x$	N	$N_{bx}$	ERL Preso/comments
162.9.3.4	Tx Host	0	0.618	800	0	TBD/ 11(#128)/ 11(#10003&#10009)
162.9.4.5	Rx Host	0	0.618	800	0	TBD/ 11(#129&#131)/ 11(#10010&#10011)
162.11.3	CA	0	0.618	7000	0	TBD/ 13.5(#10012&#10013)
163.9.1.1	Tx Chip	0	0.618	200	TBD	TBD
163.9.2.1	Rx Chip	0	0.618	200	TBD	TBD
163.10.2	Channel	0	0.618	3500	TBD	TBD
120F.3.1.1	Tx Chip	0	0.618	200	TBD	TBD
120F.3.2.1	Rx Chip	0	0.618	200	TBD	TBD
120F.4.3	Channel	0	0.618	2000	TBD	TBD/ 14.5(#90)
120G.3.1.3	Host/Module	0	0.618	800	0	TBD/ 11.5 (TP1/TP4 #121&#123)/ 10.5 (TP1a/TP4a #118&#120&#122)

# P802.3cu 100 Gb/s per lane Optical PHYs Task Force

- Working Group ballot complete on D2p0
  - Resolving comments on conf calls
  - Proposals for updated 6km reach
- Discussion about the effects of the changes related to removing 10LogCeq specs.
- Proposal to add overshoot spec. and measurement method.



# P802.3cu 100 Gb/s per lane Optical PHYs Task Force

## Adopted objectives – Page 1/2

- Support a MAC data rate of 100 Gb/s
- Support a MAC data rate of 400 Gb/s
- Support full-duplex operation only
- Preserve the Ethernet frame format utilizing the Ethernet MAC
- Preserve minimum and maximum FrameSize of current IEEE 802.3 standard
- Provide appropriate support for OTN
- Support a BER of better than or equal to  $10^{-12}$  at the MAC/PLS service interface (or the frame loss ratio equivalent) for 100 Gb/s operation
- Support a BER of better than or equal to  $10^{-13}$  at the MAC/PLS service interface (or the frame loss ratio equivalent) for 400 Gb/s operation

# P802.3cu 100 Gb/s per lane Optical PHYs (future) Task Force

## Adopted objectives – Page 1/2

- Define a single-wavelength 100 Gb/s PHY for operation over SMF with lengths up to at least 2 km
- Define a single-wavelength 100 Gb/s PHY for operation over SMF with lengths up to at least 10 km
- Define a four-wavelength 400 Gb/s PHY for operation over SMF with lengths up to at least 2 km
- Define a four-wavelength 400 Gb/s PHY for operation over SMF with lengths up to at least ~~10~~6 km

IEEE liaison report  
IEEE Std 802.3cm<sup>TM</sup>-2020  
OMEGA Study Group  
100GSR Study Group  
April 7 2020  
Mabud Choudhury

# IEEE 802.3 Task Forces, Study Groups, CFIs

- P802.3cm Next Generation 400 Gb/s Ethernet over Multimode Fiber Task Force - IEEE Std 802.3cm™-2020
- (P802.3cz) Multi-Gig Automotive Optical PHY Study Group
- (P802.3db) 100 Gb/s Wavelength Short Reach PHYs Study Group

# P802.3cm – Next generation 400 Gb/s MMF PHYs Task Force

- Approved by the Standards Board on 30 January 2020. This project is complete!
- IEEE Std 802.3cm™-2020 “Amendment 7: Physical Layer and Management Parameters for 400 Gb/s over Multimode Fiber” published March 2020 – now available!
- 400GBASE-SR8, 25GBd PAM4, 850 nm, 70 m OM3, 100 m OM4/OM5
- 400GBASE-SR4.2, 25GBd PAM4, 850 nm & 910 nm BiDi, 70 m OM3, 100 m OM4, 150 m OM5

# (P802.3cz) Multi-Gigabit Automotive Optical PHY Study Group

- First Study Group meeting 9 September 2019, Indianapolis, IN
  - Meeting Materials: [http://ieee802.org/3/OMEGA/public/sep\\_2019/index.html](http://ieee802.org/3/OMEGA/public/sep_2019/index.html)
  - Meeting Minutes: [http://ieee802.org/3/OMEGA/public/sep\\_2019/minutes\\_OMEGA\\_1\\_0919.pdf](http://ieee802.org/3/OMEGA/public/sep_2019/minutes_OMEGA_1_0919.pdf)
- Second Study Group meeting 20-21 January 2020, Geneva, Switzerland
  - Meeting Materials: [http://ieee802.org/3/OMEGA/public/jan\\_2020/index.html](http://ieee802.org/3/OMEGA/public/jan_2020/index.html)
  - Meeting Minutes: [http://ieee802.org/3/OMEGA/public/jan\\_2020/Minutes\\_OMEGA\\_01\\_0120.pdf](http://ieee802.org/3/OMEGA/public/jan_2020/Minutes_OMEGA_01_0120.pdf)
- Initial discussions held in September interim – more work required to develop PAR, CSD and Objectives.
- Developed [PAR](#), [CSD](#), and [Objectives](#) in January interim. Intending to request 802.3 Working Group approval. Draft Objectives still not approved by SG.
- If July plenary meeting (in-person or via teleconference/web with WG motions) happens, earliest date for project to move to Task Force is either September 2020 or November 2020.

# (P802.3cz) Multi-Gig Automotive Optical PHY Study Group Adopted Objectives (1 of 2)

1. Preserve the IEEE 802.3/Ethernet frame format at the MAC client service interface
2. Preserve minimum and maximum frame size of the current IEEE 802.3 standard
3. Support full duplex operation only
4. Define optional startup procedure which enables the time from power\_on=FALSE to a state capable of transmitting and receiving valid data to be less than 100ms
5. Support data rates of 2.5 Gb/s, 5 Gb/s, 10 Gb/s, 25 Gb/s, 50 Gb/s and 100 Gb/s at the MAC/PLS service interface
6. Support optional Energy Efficient Ethernet optimized for automotive application
7. Support operation in automotive environments (e.g., EMC, temperature)
8. Do not preclude meeting FCC and CISPR EMC requirements

# (P802.3cz) Multi-Gig Automotive Optical PHY Study Group Adopted Objectives (2 of 2)

9. Define the performance characteristics of an automotive link segment and an optical PHY to support 2.5 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m on at least one type of automotive optical cabling.
10. Define the performance characteristics of an automotive link segment and an optical PHY to support 5 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m on at least one type of automotive optical cabling.
11. Define the performance characteristics of an automotive link segment and an optical PHY to support 10 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m on at least one type of automotive optical cabling.
12. Define the performance characteristics of an automotive link segment and an optical PHY to support 25 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m on at least one type of automotive optical cabling.
13. Define the performance characteristics of an automotive link segment and an optical PHY to support 50 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m on at least one type of automotive optical cabling.
14. Define the performance characteristics of an automotive link segment and an optical PHY to support 100 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m on at least one type of automotive optical cabling.
15. Support a Bit Error Ratio better than or equal to  $10^{-12}$  at the MAC/PLS service interface (or the frame loss ratio equivalent)



# (P802.3db) 100 Gb/s Wavelength Short Reach PHYs Study Group

- First Study Group meeting 23-24 January 2020, Geneva, Switzerland
  - Meeting Materials: <http://www.ieee802.org/3/100GSR/public/Jan20/>
  - Meeting Minutes: [http://www.ieee802.org/3/100GSR/public/Jan20/unapproved\\_meeting\\_minutes\\_100GSR\\_01\\_0120.pdf](http://www.ieee802.org/3/100GSR/public/Jan20/unapproved_meeting_minutes_100GSR_01_0120.pdf)
- Adopted a [PAR](#), [CSD](#), and [Objectives](#) at January interim, had intended to ask for 802.3 approval at the March plenary – meeting canceled due to COVID-19.
- If we have July plenary (in-person or via teleconference/web), earliest date for project to move to Task Force is either September 2020 or November 2020.
- There is a teleconference/web SG interim meeting scheduled for May 13, 2020 (in-person May 802.3 WG interim cancelled)
- When approved, this is anticipated to become the IEEE P802.3db Task Force

# (P802.3db) 100 Gb/s Wavelength Short Reach PHYs

## Adopted Objectives (1 of 2)

1. Support a MAC data rate of 100 Gb/s, 200 Gb/s and 400 Gb/s
2. Support full-duplex operation only
3. Preserve the Ethernet frame format utilizing the Ethernet MAC
4. Preserve minimum and maximum FrameSize of current IEEE 802.3 standard
5. Provide appropriate support for OTN
6. Support a BER of better than or equal to  $10^{-12}$  at the MAC/PLS service interface (or the frame loss ratio equivalent) for 100 Gb/s operation
7. Support a BER of better than or equal to  $10^{-13}$  at the MAC/PLS service interface (or the frame loss ratio equivalent) for 200 Gb/s and 400 Gb/s operation

# (P802.3db) 100 Gb/s Wavelength Short Reach PHYs

## Adopted Objectives (2 of 2)

8. Define a physical layer specification that supports 100 Gb/s operation over 1 pair of MMF with lengths up to at least 50 m  
Support full-duplex operation only
9. Define a physical layer specification that supports 200 Gb/s operation over 2 pairs of MMF with lengths up to at least 50 m
10. Define a physical layer specification that supports 400 Gb/s operation over 4 pairs of MMF with lengths up to at least 50 m

# (P802.3db) 100 Gb/s Wavelength Short Reach PHYs

Possible additional objectives being studied

- Propose adding an objective for intra-rack and active cable applications
  - Define a physical layer specification that supports 100 Gb/s operation over 1 pair of MMF with lengths of up to at least 20 m.
  - Proposed 940 nm to leverage 3D sensing (3DS) VCSEL volumes. So possible low-cost, not long reach, but non-backward compatible very short reach.
- 200G-DR2 Considerations
  - Proposed SMF objective (allowed within scope of 100GSR project).

# New Ethernet Applications (NEA) Ad Hoc

- BWA2 report complete
- Next conf call: April 30 10am-12noon EDT

# Future Meetings

Meeting	Location	Dates
IEEE 802 plenary	Atlanta, GA (No face to face)	15-20 March 2020
IEEE 802.3 interim	Pasadena, CA (No face to face)	18-22 May 2020
IEEE 802 plenary	Montreal, QC, Canada	13-16 July 2020
IEEE 802.3 interim	Kansas City	21-25 September 2020
IEEE 802 plenary	Bangkok, Thailand	9-12 November 2020
IEEE 802.3 interim	TBD	January 2021
IEEE 802 plenary	Denver, CO	14-18 March 2021
IEEE 802.3 interim	TBD	May 2021

Upcoming meeting details at:

<http://ieee802.org/3/interims/index.html>