802.3dj
Proposal for additional optical objective: 400GBASE-DR2-2

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Supporters

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- Jose Castro (Panduit)
- Piers Dawe (Nvidia)
- Pavel Zivny (Tektronix)
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802.3 df/dj Objectives

Ethernet Rate	Assumed Signaling Rate	AUI	Cu Cable	MMF 50m	MMF 100m	SMF 500m	SMF 2km	SMF 10km	SMF 40km
200 Gb/s	200 Gb/s	Over 1 lane	Over 1 pair			Over 1 Pair	Over 1 Pair		
400 Gb/s	100 Gb/s						400GBASE-DR4-2		
	200 Gb/s	Over 2 lanes	Over 2 pairs			Over 2 Pair			
800 Gb/s	100 Gb/s	Over 8 lanes	Over 8 pairs	800GBASE-VR8	800GBASE-SR8	800GBASE-DR8	800GBASE-DR8-2		
	200 Gb/s	Over 4 lanes	Over 4 pairs			Over 4 pairs	1) Over 4 pairs 2) Over 4 λ's		
	TBD							Over single SMF in each direction	Over single SMF in each direction
1.6 Tb/s	100 Gb/s	Over 16 lanes							
	200 Gb/s	Over 8 lanes	Over 8 pairs			Over 8 pairs	Over 8 pairs		

Potential new objective

- Previously raised in welch_3dj_01a_230202
- 400 Gb/s objective with extended reach to 2km for parallel (two fibers per direction) SMF
- Companion to other 200G/L 2km single wavelength objectives/standards
  - No additional technical work
  - But some editorial work
- Industry demand for various breakout/reach options of single wavelength solutions common, with rate vs. radix variances common across different network tiers
  - Lower network tiers tend to favor radix over rate
  - Higher network tiers tend to favor rate over radix
  - Optics penetration closer to the server likely to accelerate this trend
  - Multi-port optics are already seeing broad adoption (ie, 2x400G modules)
- The addition of “400GBASE-DR2-2” makes the standard portfolio complete
  - Such operating mode is likely to be offered anyway, this ensures a common specification in the industry

What is being proposed?

What this objective targets

Ethernet Rate	Assumed Signaling Rate	AUI	Cu Cable	MMF 50m	MMF 100m	SMF 500m	SMF 2km	SMF 10km	SMF 40km
200 Gb/s	200 Gb/s	Over 1 lane	Over 1 pair			Over 1 Pair	Over 1 Pair		
400 Gb/s	100 Gb/s						400GBASE-DR4-2		
	200 Gb/s	Over 2 lanes	Over 2 pairs			Over 2 Pair	*Over 2 Pair (?)*		
800 Gb/s	100 Gb/s	Over 8 lanes	Over 8 pairs	800GBASE-VR8	800GBASE-SR8	800GBASE-DR8	800GBASE-DR8-2		
	200 Gb/s	Over 4 lanes	Over 4 pairs			Over 4 pairs	1) Over 4 pairs 2) Over 4 λ's		
	TBD							Over single SMF in each direction	Over single SMF in each direction
1.6 Tb/s	100 Gb/s	Over 16 lanes							
	200 Gb/s	Over 8 lanes	Over 8 pairs			Over 8 pairs	Over 8 pairs		

Interest in adding an objective was tested

Straw Poll #9

I would support adding the objective “Define a physical layer specification that supports 400 Gb/s operation over 2 pairs of SMF with lengths up to at least 2km”

Y: 76, N: 11, NMI: 23

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From February 7, 2023 meeting

https://www.ieee802.org/3/dj/public/23_01/motions_3dfdj_a_2301.pdf

Procedural considerations

Step 1) Confirm that adding objective is within project scope and aligns with current adopted CSD

- PAR: https://www.ieee802.org/3/dj/projdoc/P802d3dj_PAR.pdf
- CSD: https://mentor.ieee.org/802-ec/dcn/21/ec-21-0306-00-ACSD-p802-3df.pdf

Step 2) Adopt objective in Task Force

Step 3) Adopt objective in 802.3 Working Group

Step 4) back to work in Task Force…

PAR and CSD

PAR

- **5.2.b Scope of the project:** Define Ethernet MAC parameters for 1.6 Tb/s. Define physical layer specifications, and management parameters for the transfer of Ethernet format frames at 800 Gb/s and 1.6 Tb/s over copper and single-mode fiber physical medium dependent (PMD) sublayers based on 200 Gb/s or greater per lane signaling technologies.
  Using these new definitions for 800 Gb/s and 1.6 Tb/s, define physical layer specifications and management parameters for the transfer of Ethernet format frames at 200 Gb/s and 400 Gb/s, when applicable.

CSD

- No identified impact to current responses. Some highlights:
- Technical Feasibility: *The proposed project will build on the array of Ethernet component and system design experience, and the broad knowledge base of Ethernet network operation.*
  - *…For example, some combination of the following approaches could be used to address 800 Gb/s and 1.6 Tb/s Ethernet, as well as to address reduced lane count solutions for 200 Gb/s and 400 Gb/s Ethernet: pulse-amplitude modulation, parallel transmission techniques,…*
- Economic Feasibility: "*The deployment of 800 Gb/s and 1.6 Tb/s Ethernet standards and derivatives at 200 Gb/s and 400 Gb/s will allow economies of scale to reduce cost for all solutions.*"

No identified issues for adding this objective found with our existing PAR and CSD language

Proposed Motion

Move to adopt the following objective:

- Define a physical layer specification that supports 400 Gb/s operation over 2 pairs of SMF with lengths up to at least 2 km

Thanks