IEEE 802 Mar 2023

IEEE 802.3 Ethernet WG
Closing Plenary
16 Mar 2023

Joint
IEEE P802.3df / P802.3dj Task Force
Closing Report

IEEE P802.3df Task Force Project information

- **Organization**
  - John D'Ambrosia, Chair, IEEE P802.3df Task Force
  - Mark Nowell, Vice-Chair, IEEE P802.3df Task Force, Optics Track Chair
  - Matt Brown, Chief Editor
  - Mark Gustlin, Architecture & Logic Track Chair
  - Kent Lusted, Electrical Track Chair
- **Task force web and reflector information:**
  - Home page: https://www.ieee802.org/3/df/index.html
  - Reflector Info - https://www.ieee802.org/3/df/reflector.html
    - TF Reflector: stds-802-3-b400g@listserv@ieee.org
    - Logic Reflector: stds-802-3-b400g-logic@listserv@ieee.org
    - Optical Reflector: stds-802-3-b400g-optx@listserv@ieee.org
    - Electrical Reflector: stds-802-3-b400g-elec@listserv@ieee.org
- **Project Documentation –**
  - PAR : https://www.ieee802.org/3/df/proj_doc/IEEE_P802.3df_PAR_11122021.pdf
  - CSD: https://mentor.ieee.org/802-ec/dcn/21/ec-21-0306-00-ACSD-p802-3df.pdf
  - Objectives: https://www.ieee802.org/3/df/proj_doc/objectives_P802d3df_220317.pdf
- **P802.3df TF meeting information may be found on:**
  - Public page: https://www.ieee802.org/3/df/public/index.html
  - 802.3 Calendar: https://www.ieee802.org/3/calendar.html
  - Ad hoc Page: https://www.ieee802.org/3/df/public/adhoc/index.html

IEEE P802.3dj Task Force Project information

- **Organization**
  - John D'Ambrosia, Chair, IEEE P802.3dj Task Force
  - Mark Nowell, Vice-Chair, IEEE P802.3dj Task Force; Chair, Optics Track
  - Kent Lusted, Secretary, Chair, Electrical Track
  - Matt Brown, IEEE P802.3dj Chief Editor
  - Mark Gustlin, Chair, Architecture and Logic Track
- **Task force web and reflector information:**
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    - TF Reflector: stds-802-3-b400g@listserv@ieee.org
    - Logic Reflector: stds-802-3-b400g-logic@listserv@ieee.org
    - Optical Reflector: stds-802-3-b400g-optx@listserv@ieee.org
    - Electrical Reflector: stds-802-3-b400g-elec@listserv@ieee.org
- **Project Documentation –**
  - PAR : https://www.ieee802.org/3/dj/projdoc/P802d3dj_PAR.pdf
  - CSD: https://mentor.ieee.org/802-ec/dcn/22/ec-22-0256-00-ACSD-p802-3dj.pdf
  - Objectives: https://www.ieee802.org/3/dj/projdoc/objectives_P802d3dj_221117.pdf
  - Adopted Timeline: https://www.ieee802.org/3/dj/projdoc/timeline_3dj_230116.pdf

Activities This Week

- IEEE P802.3df
  - Reviewed / generated liaisons
    - OIF 800LR IA Project Update
    - OIF CEI-112-XSR+PAM4 Project
    - ITU-T LS/0/r on the OTN mapping reference point for 800GBASE-R

- IEEE P802.3dj
  - 30 Technical Presentations
  - Decisions
    - Updated Objectives
      - Replaced 800 GbE 10km SMF objective with 2 objectives (802.3 Vote (y/n/a): 63 / 3 / 12)
        - over 1 wavelength over a single SMF in each direction with lengths up to at least 10 km
        - over 4 wavelengths over a single SMF in each direction with lengths up to at least 10 km
      - Added 400GBASE-DR2-2 (802.3 Vote – Unanimous Consent)
        - 400 Gb/s operation over 2 pairs of SMF with lengths up to at least 2 km
    - Other Decisions
      - Completed 1.6 TbE PCS baseline (Motion #3 – Unanimous Consent)
      - Adopted baseline for PMAs with 200 Gb/s per lane signaling (Motion #4 802.3 vote (y/n/a): 69/1/13
      - Adopted baseline for FEC approach for 200GbE / 400 GbE / 800 GbE DR, DR-2, and FR objectives (Motion #5 802.3 vote (y/n/a): 70 / 5 / 15
      - Approved liaisons to OIF and ITU by unanimous consent

Summary Progress @ End of Meeting – Logic (200G/lane)

	AUI		CU Cable	SMF 500m/2km	SMF 10km 4 Wavelength	SMF 10km 1 Wavelength	SMF 40km
Ethernet Rate	**PCS/FEC?**	**PMA?**	**PCS/FEC/PMA?**	**PCS/FEC/PMA?**	**PCS/FEC/PMA?**	**PCS/FEC/PMA?**	**PCS/FEC/PMA?**
200 Gb/s				With many open issues			
400 Gb/s				With many open issues			
800 Gb/s				With many open issues			
1.6 Tb/s				With many open issues			

Adopted baselines

Proposed Baselines

Summary Progress @ End of Meeting

Ethernet Rate	Assumed Signaling Rate	AUI	Cu Cable	SMF 500m	SMF 2km	SMF 10km	SMF 40km
200 Gb/s	200 Gb/s	200GAUI-1 C2C C2M	200GBASE-CR1	200GBASE-DR1	200GBASE-FR1		
400 Gb/s	200 Gb/s	400GAUI-2 C2C C2M	400GBASE-CR2	400GBASE-DR2	400GBASE-DR2-2*		
800 Gb/s	200 Gb/s	800GAUI-4 C2C C2M	800GBASE-CR4	800GBASE-DR4	1. 800GBASE-DR4-2 2. 800GBASE-FR4	800GBASE-LR4*	
	800 Gb/s					800GBASE-LR1*	
	TBD						Over single SMF in each direction IMDD Coherent
1.6 Tb/s	100 Gb/s	1.6TAUI-16 C2C C2M					
	200 Gb/s	1.6TAUI-8 C2C C2M	1.6TBASE-CR8	1.6TBASE-DR8	1.6TBASE-DR8-2		

Adopted baselines

Proposed Baselines

Pending approval of objectives by 802.3WG

WG Motion

- **Move that the IEEE 802.3 Working Group progress the IEEE P802.3df draft to Working Group ballot.**

- **Technical (>=75%)**
- **M: D'Ambrosia**
- **S: Lusted**
- **Results: Y:x N:x A:x**

New Objectives Justification

- 10km SMF: 1 and 4 wavelength objectives

- Distinct Market Use Cases
- IMDD LR4
  - Low-cost (leverages high-volume DR4/FR4 DSP)
  - Standard 10km reach link budget
  - < 10km links
- • Coherent LR1
  - High-performance
  - 10km reach link budget with additional insertion loss
  - <10m links with additional loss, ex. optical switching
  - >10km links
  - legacy fiber links

- 2km over 2 Pairs of SMF: 400GBASE-DR2-2

- Industry demand for various breakout/reach options
  - 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

- Addition of 400GBASE-DR2-2 makes the standard portfolio complete

- Emergence of “dual port” modules

Adopted IEEE P802.3dj Objectives (1 of 2)

- **Non-Rate Specific**
  - 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 a BER of better than or equal to 10 -13 at the MAC/PLS service interface (or the frame loss ratio equivalent)
  - Provide support to enable mapping over OTN
- **200 Gb/s Related**
  - Support a MAC data rate of 200 Gb/s
  - Support optional single-lane 200 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
  - Define a physical layer specification that supports 200 Gb/s operation:
    - over 1 pair of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
    - over 1 pair of SMF with lengths up to at least 500 m
    - over 1 pair of SMF with lengths up to at least 2 km
- **400 Gb/s Related**
  - Support a MAC data rate of 400 Gb/s
  - Support optional two-lane 400 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
  - Define a physical layer specification that supports 400 Gb/s operation:
    - over 2 pairs of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
    - over 2 pairs of SMF with lengths up to at least 500 m
    - **over 2 pairs of SMF with lengths up to at least 2 km**

Adopted IEEE P802.3dj Objectives (2 of 2)

- **800 Gb/s Related**
  - Support a MAC data rate of 800 Gb/s
  - Support optional four-lane 800 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
  - Define a physical layer specification that supports 800 Gb/s operation:
    - over 4 pairs of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
    - over 4 pairs of SMF with lengths up to at least 500 m
    - over 4 pairs of SMF with lengths up to at least 2 km
    - over 4 wavelengths over a single SMF in each direction with lengths up to at least 2 km
    - over a single SMF in each direction with lengths up to at least 10 km
    - ~~over a single SMF in each direction with lengths up to at least 40 km~~
    - over 1 wavelength over a single SMF in each direction with lengths up to at least 10 km
    - over 4 wavelengths over a single SMF in each direction with lengths up to at least 10 km
- **1.6 Tb/s Related**
  - Support a MAC data rate of 1.6 Tb/s
  - Support optional sixteen-lane 1.6 Tb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
  - Support optional eight-lane 1.6 Tb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
  - Define a physical layer specification that supports 1.6 Tb/s operation:
    - over 8 pairs of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
    - over 8 pairs of SMF with lengths up to at least 500 m
    - over 8 pairs of SMF with lengths up to at least 2 km

Approved by IEEE 802.3 WG 17 Nov 2022

WG MOTION

- **Move to update the IEEE P802.3dj objectives as noted:**
  1. Replace the following objective:
     - Define a physical layer specification that supports 800 Gb/s operation over a single SMF in each direction with lengths up to at least 10 km

     with the following two objectives:
     - Define a physical layer specification that supports 800 Gb/s operation over 1 wavelength over a single SMF in each direction with lengths up to at least 10 km
     - Define a physical layer specification that supports 800 Gb/s operation over 4 wavelengths over a single SMF in each direction with lengths up to at least 10 km
  2. Add 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

- **Technical (>=75%)**
- **M: D'Ambrosia**
- **S: Nowell**
- **Results: Y:x N:x A:x**

WG Motion

Move that the IEEE 802.3 Working Group approve

- IEEE_802d3_to_ITU_3df_2303_draft_redacted.pdf
- IEEE_802d3_to_OIF_3dj_2303_CMIS_draft_redacted.pdf
- IEEE_802d3_to_OIF_3df_2303_800GLR_draft_redacted.pdf

- **with editorial license granted to the Chair (or his appointed agent) as a liaison communication from the IEEE 802.3 Working Group to ITU-T SG15.**

- **Technical (>=75%)**
- **M: D'Ambrosia**
- **S: Lusted**
- **Results: Y:x N:x A:x**

WG Motion

Move that the IEEE 802.3 Working Group grant approval for the P802.3cw Task Force to meet with P802.3df / P802.3dj Task Forces to take motions during any joint meeting between these task forces only

- Technical (>=75%)
- M: D'Ambrosia
- S: Nowell
- Results: Y:x N:x A:x

Future Meetings

- IEEE P802.3df Ad hocs
  - Logic / Architecture
    - Wed, 26 April 10am to 12:00pm ET.
- IEEE P802.3dj Ad hocs
  - Electrical Ad hoc –
    - Thurs, 06 April, 9:30am to 12:30pm ET
    - Thurs, 20 April, 9:30am to 12:30pm ET
    - Thurs, 04 May, 9:30am to 12:30pm ET
  - Joint Logic / Optics Ad hoc
    - Thurs, 13 April, 10:00am to 12:00pm ET
    - Thurs, 27 April, 10:00am to 12:00pm ET
- Joint IEEE P802.3cw / P802.3df / .3dj TF May 2023 Interim –
  - Week of May 15 – 18, 2023

THANK YOU!