Editorial Impact of Multiple Families / PCS / PMAs

Supporting Material – Comments #65 & 66

John D'Ambrosia, Futurewei, U.S. Subsidiary of Huawei

23 May 2023

Comments Being Addressed

- **Comment #65 –**
  - Comment - 400GbE will have multiple PCSs and PMAs with the introduction of 400GBASE-ZR. The PCS and PMA associated with 400GBASE-R PMDs has been renamed to 400GBASE-R PCA and 400GBASE-R PMA, respectively.
  - Suggested Remedy - Change all instances in text and figures of PCS and PMA in the document that are relevant to 400GBASE-R PMDs to "400GBASE-R PCS" and "400GBASE-R PMA"

- **Comment #66 –**
  - Comment - Given progress of 800G in IEEE P802.3dj with the creation of a single lambda solution at 10km, it is assumed that there will be a PCS related to coherent optical signaling that will be different than the PCS for other 800GBASE-R PMDs. Therefore, it is anticipated that there will be multiple PCSs and PMAs at 800G.
  - Suggested Remedy - Modify "PCS" to be "800GBASE-R PCS" throughout document in all text and figures with editorial license. Modify "PMA" to be "800GBASE-R PMA" throughout document in all text and figures with editorial license.

Introduction

- During IEEE P802.3cw it was noted that 400GBASE-ZR is not part of the 400GBASE-R family
  - Different PCS (Clause 155) than 400GBASE-R (Clause 119)
- As part of IEEE P802.3cw (D2.1) 400GBASE-ZR has now been separated from 400GBASE-R
- This has taken a lot of effort to retro-fit in the existing IEEE 802.3 standard
- We should strive to avoid creating this issue for the future IEEE 802.3 standard and future 800 GbE / 1.6 TbE amendments to have to address
- Comment #65 Suggested remedy –
  - Change all instances in text and figures of PCS and PMA in the document that are relevant to 400GBASE-R PMDs to "400GBASE-R PCS" and "400GBASE-R PMA"
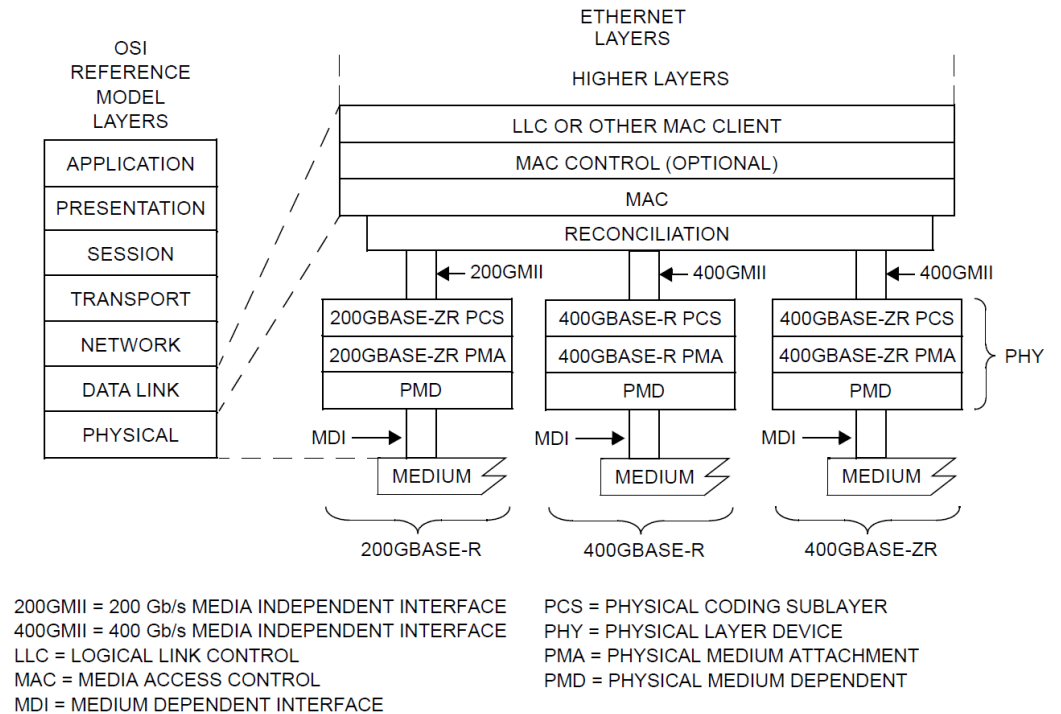

Figure 116–1—Architectural positioning of 200 Gigabit and 400 Gigabit Ethernet

IEEE P802.3cw D2.1

"Family" Definitions

- ## 200GBASE-R (per 802.3-2022)

  - 1.4.108 200GBASE-R: An IEEE 802.3 family of Physical Layer devices using the physical coding sublayer defined in Clause 119 for 200 Gb/s operation. (See IEEE Std 802.3, Clause 119.)

- ## 400GBASE-R (per 802.3-2022)

  - 1.4.141 400GBASE-R: An IEEE 802.3 family of Physical Layer devices using the physical coding sublayer defined in Clause 119 for 400 Gb/s operation. (See IEEE Std 802.3, Clause 119.)

- ## 400GBASE-ZR (per 802.3cw, D2.1)

  - 1.4.144b 400GBASE-ZR: IEEE 802.3 Physical Layer specification for 400 Gb/s dense wavelength division multiplexing (DWDM) PHY using 400GBASE-ZR PCS and PMA encoding, dual polarization 16-state quadrature amplitude modulation (DP-16QAM) modulation, and coherent detection with reach up to at least
  - 80 km. (See IEEE Std 802.3, Clause 155 and Clause 156).

- ## 800GBASE-R (per 802.3df, D2.0)

  - 1.4.184e 800GBASE-R: An IEEE 802.3 family of Physical Layer devices using the physical coding sublayer defined in Clause 172 for 800 Gb/s operation. (See IEEE Std 802.3, Clause 172.)

Overview of PCS Status (prior to May23 Interim)

	802.3df	802.3dj				Future
200 GbE	n/a	200GBASE-R 1 x 200G PMDs (Clause 119)	200GBASE-CR1 1 x 200G PMDs (Clause 119)			
400 GbE	400GBASE-R 4 X 100G PMD (Clause 119)	400GBASE-R 2 x 200G PMDs (Clause 119)	400GBASE-CR2 2 x 200G PMDs (Clause 119)			
800 GbE	800GBASE-R 8 x 100G PMDs (Clause 172)	800GBASE-R 4 x 200G PMDs (Clause 172)	800GBASE-CR4 4 x 200G PMDs (Clause 172)	10km * Over single λ	40km * Over single λ	80km over DWDM?
1.6 TbE	n/a	1.6TBASE-R 8 X 200G PMDs (Clause xxx?)	1.6TBASE-CR8 8 X 200G PMDs (Clause xxx?)			

*   PCS Pending selection of Maniloff / Williams proposal. Could be a 800GBASE-R family member (Maniloff) or new Family (Williams)

Overview of PMA Status

	802.3df	802.3dj			Future
200 GbE	n/a	200GBASE-R • PMA(8:1) • PMA(2:1) • PMA(1:1)			
400 GbE	400GBASE-R 4 X 100G PMD (Clause 120)	400GBASE-R • PMA(16:2) • PMA (2:16) • PMA(4:2) • PMA(2:2)			
800 GbE	800GBASE-R 8 x 100G PMDs (Clause 172)	800GBASE-R • PMA(32:4) • PMA(8:4) • PMA(4:4) • PMA1 Below FEC $_I$	10km * Over single λ Opt #1 – FEC2/PMA Opt #2 – PCS / PMA	40km * Over single λ Opt #1 – FEC2/PMA Opt #2 – PCS / PMA	80km over DWDM?
1.6 TbE	n/a	1.6TBASE-R • PMA(8:8) • PMA(16:8)			

* Pending selection of Maniloff / Williams proposal. Could be a 800GBASE-R family member (Maniloff) or new Family (Williams)

Recommendations

- **For "800GBASE-R PCS"**
  - **Editorial license granted to editors to decide if the specific instance of "800GBASE-R" is**
    - **Specific to 800GBASE-R PCS – use 800GBASE-R**
    - **Not specific to 800GBASE-R - use "PCS"**
- **Should "800GBASE-R" PMA be used in 802.3df?**
  - **Naming for PMA sublayer variants adjacent to PCS needs to be resolved**
  - **PMA sublayer variant adjacent to FEC_{Inner}**
    - **Separate sublayer or part of FEC_{Inner}**
    - **Name?**
  - **If not specific to 800GBASE-R – use "PMA"**
  - **In instances when referring to a specific PMA variant – use that name**

For Discussion

- Should Clause 169 could be structured during 802.3df to enable editorial ease in 802.3dj?
  - Note – there tends to be resistance to renumbering clauses of approved standards, and 802.3df will be approve before 802.3dj
- Example – Service Interface Specification method and notation, Delay Constraints, and Skew constraints will vary with different families and PHY Types

Option #1	Option #2
Option #1	**Option #2**
169.3 Service Interface Specification & Constraints	**169.3 Service Interface Specification method and notation**
169.3.1 800GBASE-R	– **169.3.1 800GBASE-R**
– **169.3.1.1 Service Interface Specification method and notation**	– **169.3.2 New 800G Family (TBD)**
– **169.3.1.2 Delay Constraints**	**169.4**
– **169.3.1.3 Skew Constraints**	– **169.4.1 800GBASE-R**
169.3.2 New 800G Family (TBD)	– **169.4.2 New 800G Family (TBD)**
– **169.3.2.1 Service Interface Specification method and notation**	**169.5**
– **169.3.2.2 Delay Constraints**	– **169.5.1 800GBASE-R**
– **169.3.2.3 Skew Constraints**	– **169.5.2 New 800G Family (TBD)**

- No changes proposed at this time
- Monitor 802.3dj progress