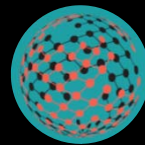




## Towards A Draft 0.1 For P802.3cc

20160504

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# Introduction

1. Assuming P802.3cc can arrive at consensus relatively quickly due to narrow scope and extensive precedent to leverage for optical specs.
2. With above assumption, start exploring what is required in D0.1.
3. Need new clause for 25GBASE-LR and 25GBASE-ER PMDs (see mcdermott\_042716\_25GSMF\_adhoc.pdf).
  - Will contain baseline specifications being discussed, where some items can be left “TBD”
4. Purpose here is to outline work required to write new clause and revise existing clauses.
  - Examined where to add 25GBASE-LR and 25GBASE-ER PMDs in P802.3by/D3.2.

## New PMD Clause TBD. Physical Medium Dependent (PMD) sublayer and medium type 25GBASE-LR and 25GBASE-ER

- The following sections need to be written (follow example of Clause 112):
  - TBD.1 Overview
  - TBD.2 Physical Medium Dependent (PMD) service interface
  - TBD.3 Delay constraints
  - TBD.4 PMD MDIO function mapping
  - TBD.5 PMD functional specifications
  - TBD.6 PMD to MDI optical specifications for 25GBASE-LR and 25GBASE-ER → *baseline specifications will appear here*
  - TBD.7 Definition of optical parameters and measurement methods
  - TBD.8 Safety, installation, environment, and labeling
  - TBD.9 Fiber optic cabling model
  - TBD.10 Characteristics of the fiber optic cabling (channel)
  - TBD.11 Protocol implementation conformance statement (PICS) proforma for Clause TBD, Physical Medium Dependent (PMD) sublayer and medium, type 25GBASE-LR and 25GBASE-ER

# Adding 25GBASE-LR And 25GBASE-ER To P802.3by/D3.2

- Initial list of existing clauses to update:
  1. 1.4 Definitions
  2. 30.5.1.1.2 aMAUType
  3. 45.2.1.6 PMA/PMD control 2 register (Register 1.7)
  4. 45.2.1.7.4 Transmit fault (1.8.11)
  5. 45.2.1.7.5 Receive fault (1.8.10)
  6. 45.2.1.8 PMD transmit disable register (Register 1.9)
  7. 45.2.1.14b 25G PMA/PMD extended ability register (Register 1.19)
  8. 78.1.4 PHY types optionally supporting EEE
  9. 105.1.1 Scope
  10. 105.1.2 Relationship of 25 Gigabit Ethernet to the ISO OSI reference model
  11. 105.1.3 Nomenclature
  12. 105.2 Physical Layer signaling systems
  13. 105.3.5 Physical Medium Dependent (PMD) sublayer
  14. 105.5 Delay constraints
  15. 105.7 Protocol implementation conformance statement (PICS) proforma
  16. 108.7.3 Major capabilities/options
- Details of proposed changes on proceeding slides.

# Clause 1. Introduction

- **1.4 Definitions** - *Insert the following new definitions into the list after 1.4.64h 25GBASE-SR:*
  - **1.4.64i 25GBASE-LR:** IEEE 802.3 Physical Layer specification for 25 Gb/s using 25GBASE-R encoding over single mode fiber, with reach up to at least 10km. (See IEEE Std 802.3, Clause **TBD**.)
  - **1.4.64j 25GBASE-ER:** IEEE 802.3 Physical Layer specification for 25 Gb/s using 25GBASE-R encoding over single mode fiber, with reach up to at least 40km. (See IEEE Std 802.3, Clause **TBD**.)

# Clause 30. Management

- **30.5.1.1.2 aMAUType** – *Insert the following new entries in “APPROPRIATE SYNTAX” after 25GBASE-SR:*
  - 25GBASE-LR      25GBASE-R PCS/PMA over single mode fiber PMD, with reach up to at least 10km, as specified by Clause **TBD**
  - 25GBASE-ER      25GBASE-R PCS/PMA over single mode fiber PMD, with reach up to at least 40km, as specified by Clause **TBD**

# Clause 45. Management Data Input/Output (MDIO) Interface

- **45.2.1.6 PMA/PMD control 2 register (Register 1.7)** – *Add the indicated rows of Table 45-7 for 25G PMA/PMD selection before 25GBASE-SR PMA/PMD*

**Table 45-7 – PMA/PMD control 2 register bit definitions**

Bit(s)	Name	Description	R/W <sup>a</sup>
1.7.5:0	PMA/PMD type selection	5 4 3 2 1 0 1 1 1 1 0 1 = 25GBASE-ER PMA/PMD 1 1 1 1 0 0 = 25GBASE-LR PMA/PMD 1 1 1 0 1 1 = reserved	R/W

<sup>a</sup>R/W = Read/Write, RO = Read only

# Clause 45. Management Data Input/Output (MDIO) Interface

- **45.2.1.7.4 Transmit fault (1.8.11)** – *Insert the following new rows into Table 45-9 after 25GBASE-SR*

**Table 45-9 – Transmit fault description location**

<b>PMA/PMD</b>	<b>Description location</b>
25GBASE-LR	Clause <b>TBD</b>
25GBASE-ER	Clause <b>TBD</b>



# Clause 45. Management Data Input/Output (MDIO) Interface

- **45.2.1.7.5 Receive fault (1.8.10)** – *Insert the following new entries into “Table 45-10-Receive fault description location” after 25GBASE-SR*

**Table 45-10 – Receive fault description location**

<b>PMA/PMD</b>	<b>Description location</b>
25GBASE-LR	Clause <b>TBD</b>
25GBASE-ER	Clause <b>TBD</b>

# Clause 45. Management Data Input/Output (MDIO) Interface

- **45.2.1.8 PMD transmit disable register (Register 1.9)** – *Insert the following new entries into “Table 45-12-PMD transmit disable register” after 25GBASE-SR*

**Table 45-12 – Transmit disable description location**

<b>PMA/PMD</b>	<b>Description location</b>
25GBASE-LR	Clause <b>TBD</b>
25GBASE-ER	Clause <b>TBD</b>

# Clause 45. Management Data Input/Output (MDIO) Interface

- **45.2.1.14b 25G PMA/PMD extended ability register (Register 1.19)** – *Insert the following new entries into “Table 45-17b” before 25GBASE-SR, updating entry for “Reserved” as shown*

**Table 45-17b – 25G PMA/PMD extended ability register bit definitions**

<b>Bit(s)</b>	<b>Name</b>	<b>Description location</b>	<b>R/W<sup>a</sup></b>
1.19.15:7	Reserved	Value always 0	RO
1.19.6	25GBASE-ER ability	1 = PMA/PMD is able to perform 25GBASE-ER 0 = PMA/PMD is not able to perform 25GBASE-ER	RO
1.19.5	25GBASE-LR ability	1 = PMA/PMD is able to perform 25GBASE-LR 0 = PMA/PMD is not able to perform 25GBASE-LR	RO

# Clause 45. Management Data Input/Output (MDIO) Interface

- *Insert the following new sub-clauses before 45.2.1.14b.1 “25GBASE-SR ability (1.19.4)”*

- **45.2.1.14b.TBD 25GBASE-ER ability (1.19.6)**

When read as a one, bit **1.19.6** indicates that the PMA/PMD is able to operate as a 25GBASE-ER PMA/PMD type. When read as a zero, bit **1.19.6** indicates that the PAM/PMD is not able to operate as a 25GBASE-ER PMA/PMD type.

- **45.2.1.14b.TBD 25GBASE-LR ability (1.19.5)**

When read as a one, bit **1.19.5** indicates that the PMA/PMD is able to operate as a 25GBASE-LR PMA/PMD type. When read as a zero, bit **1.19.5** indicates that the PAM/PMD is not able to operate as a 25GBASE-LR PMA/PMD type.

# Clause 78. Energy-Efficient Ethernet (EEE)

- **78.1.4 PHY types optionally supporting EEE –**  
Insert new rows into Table 78-1 after  
25GBASE-SR

**Table 78-1– Clauses associated with each PHY or interface type**

<b>PHY or interface type</b>	<b>Clause</b>
25GBASE-LR	107, 108, 109, <b>TBD</b>
25GBASE-ER	107, 108, 109, <b>TBD</b>

# Clause 105. Introduction to 25 Gb/s networks

- **105.1.1 Scope** – *Edit first paragraph as shown below.*
  - (Before change) 25 Gigabit Ethernet uses the IEEE 802.3 MAC sublayer, connected through a 25 Gigabit Media Independent Interface (25GMII) to Physical Layer entities such as 25GBASE-CR, 25GBASE-CR-S, 25GBASE-KR, 25GBASE-KR-S, and 25GBASE-SR.
  - (After change) 25 Gigabit Ethernet uses the IEEE 802.3 MAC sublayer, connected through a 25 Gigabit Media Independent Interface (25GMII) to Physical Layer entities such as 25GBASE-CR, 25GBASE-CR-S, 25GBASE-KR, 25GBASE-KR-S, **25GBASE-SR, 25GBASE-LR, and 25GBASE-ER.**

# Clause 105. Introduction to 25 Gb/s networks

- **105.1.2 Relationship of 25 Gigabit Ethernet to the ISO OSI reference model – *Edit bullet c) as shown below***
  - (Before change) The Media Dependent Interface (MDI) as specified in Clause 110 for 25GBASE-CR and 25GBASE-CR-S, in Clause 111 for 25GBASE-KR and 25GBASE-KR-S, or in Clause 112 for 25GBASE-SR uses a single-lane data path.
  - (After change) The Media Dependent Interface (MDI) as specified in Clause 110 for 25GBASE-CR and 25GBASE-CR-S, in Clause 111 for 25GBASE-KR and 25GBASE-KR-S, **in Clause 112 for 25GBASE-SR, or in Clause TBD for 25GBASE-LR and 25GBASE-ER** uses a single-lane data path.

# Clause 105. Introduction to 25 Gb/s networks

- **105.1.2 Relationship of 25 Gigabit Ethernet to the ISO OSI reference model** – *Insert rows below to Table 105-1*

**Table 105-1– 25 Gb/s PHYs**

Name	Description
25GBASE-LR	25 Gb/s PHY using 25GBASE-R encoding over duplex single mode fiber with a reach of at least 10km (See Clause <b>TBD</b> ).
25GBASE-ER	125 Gb/s PHY using 25GBASE-R encoding over duplex single mode fiber with a reach of at least 40km (See Clause <b>TBD</b> ).



# Clause 105. Introduction to 25 Gb/s networks

- **105.1.3 Nomenclature** – *Edit second paragraph as shown below.*
  - (Before change) The term 25GBASE-R refers to a specific family of Physical Layer implementations based upon the 64B/66B data coding method specified in Clause 107. The 25GBASE-R family is composed of 25GBASE-CR, 25GBASE-CR-S, 25GBASE-KR, 25GBASE-KR-S, and 25GBASE-SR.
  - (After change) The term 25GBASE-R refers to a specific family of Physical Layer implementations based upon the 64B/66B data coding method specified in Clause 107. The 25GBASE-R family is composed of 25GBASE-CR, 25GBASE-CR-S, 25GBASE-KR, 25GBASE-KR-S, **25GBASE-SR, 25GBASE-LR, and 25GBASE-ER.**

# Clause 105. Introduction to 25 Gb/s networks

- **105.2 Physical Layer signaling systems** – *Insert new rows and columns into Table 105-2 below row of 25GBASE-SR and to right of column of 25GBASE-SR PMD.*

**Table 105-2– Nomenclature and clause correlation, 25GBASE-R**

Nomenclature	Clause																
	73	74	78	106		107	108	109	109A	109B	110		111		112	TBD	
	Auto-Negotiation	Base-R FEC	EEE	RS	25GMII	25GBASE-R PCS	25GBASE-R RS-FEC	PMA	25GAUI C2C	25GAUI C2M	25GBASE-CR PMD	25GBASE-CR-S PMD	25GBASE-KR PMD	25GBASE-KR-S PMD	25GBASE-SR PMD	25GBASE-LR PMD	25GBASE-ER PMD
25GBASE-LR			O	M	O	M	M	M	O	O						M	
25GBASE-ER			O	M	O	M	M	M	O	O							M

# Clause 105. Introduction to 25 Gb/s networks

- **105.3.5 Physical Medium Dependent (PMD) sublayer** – Change third paragraph as shown below.
  - (Before change) The 25GBASE-R PMDs and their corresponding media are specified in Clause 110, Clause 111, and Clause 112.
  - (After change) The 25GBASE-R PMDs and their corresponding media are specified in Clause 110, Clause 111, **Clause 112, and Clause TBD.**

# Clause 105. Introduction to 25 Gb/s networks

- **105.5 Delay constraints** – *Insert new rows into Table 105-3 as shown.*

**Table 105-3 – Sublayer delay constraints**

<b>Sublayer</b>	<b>Maximum (bit time)<sup>a</sup></b>	<b>Maximum (pause_quanta)<sup>b</sup></b>	<b>Maximum (ns)</b>	<b>Notes <sup>c</sup></b>
25GBASE-LR PMD	512	1	20.48	See TBD
25GBASE-ER PMD	512	1	20.48	See TBD

<sup>a</sup> 1 bit time (BT) is equal to 40 ps. (See 1.4.117 for the definition of bit time.)

<sup>b</sup> 1 pause\_quantum is equal to 20.48 ns. (See 31B.2 for the definition of pause\_quanta.)

<sup>c</sup> Should there be a discrepancy between this table and the delay requirements of the relevant sublayer clause, the sub-layer clause prevails.

# Clause 105. Introduction to 25 Gb/s networks

- **105.7 Protocol implementation conformance statement (PICS) proforma** – Change first paragraph as shown below.
  - (Before change) The supplier of a protocol implementation that is claimed to conform to any part of IEEE Std 802.3, Clause 45, Clause 73, Clause 74, Clause 106 through Clause 112, and related annexes demonstrates compliance by completing a protocol implementation conformance statement (PICS) proforma.
  - (After change) The supplier of a protocol implementation that is claimed to conform to any part of IEEE Std 802.3, Clause 45, Clause 73, Clause 74, Clause 106 through Clause 112, **Clause TBD**, and related annexes demonstrates compliance by completing a protocol implementation conformance statement (PICS) proforma.

# Clause 108. Reed-Solomon Forward Error Correction (RS-FEC) sublayer for 25GBASE-R PHYs

- **108.7.3 Major capabilities/options** – Insert following rows in protocol implementation conformance statement (PICS) for Clause 108 after 25GBASE-SR.

Item	Feature	Subclause	Value/Comment	Status	Support
*LR	25GBASE-LR		Used to form a complete 25GBASE-LR PHY	O	Yes [ ] No [ ]
*ER	25GBASE-ER		Used to form a complete 25GBASE-ER PHY	O	Yes [ ] No [ ]