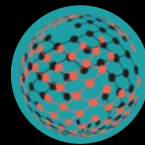# Towards D0.1 For P802.3cc

20160615

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Introduction

1. New clause for 25GBASE-LR and 25GBASE-ER PMDs

   - New clause number will be either 114 or 115.

   - D0.1 will use 200 as dummy clause.

2. Purpose is to outline work required to write new clause and revise existing clauses.

   - Examine where to add 25GBASE-LR and 25GBASE-ER PMDs in P802.3by/D3.2.

   - D0.1 can leave some parameters "TBD"

Outline Of New Clause 200 - 25GBASE-LR, 25GBASE-ER

- The following sections need to be written (follow example of Clause 88):
  - 200.1   Overview
  - 200.2   Physical Medium Dependent (PMD) service interface
  - 200.3   Delay constraints
  - 200.4   PMD MDIO function mapping
  - 200.5   PMD functional specifications
  - 200.6   PMD to MDI optical specifications for 25GBASE-LR and 25GBASE-ER → *baseline specifications will appear here*
  - 200.7   Definition of optical parameters and measurement methods
  - 200.8   Safety, installation, environment, and labeling
  - 200.9   Fiber optic cabling model
  - 200.10   Characteristics of the fiber optic cabling (channel)
  - 200.11   Protocol implementation conformance statement (PICS) proforma for Clause 200, Physical Medium Dependent (PMD) sublayer and medium, type 25GBASE-LR and 25GBASE-ER

Clauses Needing Revision
(follow P802.3by/D3.2)

- 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 the following slides.

Clause 1. Introduction

- **1.4 Definitions** - *Insert the following new definitions into the list after 1.4.64h 25GBASE-SR inserted by IEEE Std 802.3by-201x:*
  - **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 10 km. (See IEEE Std 802.3, Clause 200.)
  - **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 40 km. (See IEEE Std 802.3, Clause 200.)

Clause 30. Management

- **30.5.1.1.2 aMAUType** – *Insert the following new entries in the "APPROPRIATE SYNTAX" section of 30.5.1.1.2 after 25GBASE-SR as inserted by IEEE Std 802.3by-201x:*

    - 25GBASE-LR   25GBASE-R PCS/PMA over single-mode fiber PMD, with reach up to at least 10 km, as specified by Clause 200

    - 25GBASE-ER   25GBASE-R PCS/PMA over single-mode fiber PMD, with reach up to at least 40 km, as specified by Clause 200

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*

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

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

[a]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 as inserted by IEEE Std 802.3by-201x*

Table 45-9 – Transmit fault description location

PMA/PMD	Description location
25GBASE-LR, 25GBASE-ER	Clause 200.5.10

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 as inserted by IEEE Std 802.3by-201x*

Table 45-10 – Receive fault description location

PMA/PMD	Description location
25GBASE-LR, 25GBASE-ER	Clause 200.5.11

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 as inserted by IEEE Std 802.3by-201x*

Table 45-12 – Transmit disable description location

PMA/PMD	Description location
25GBASE-LR, 25GBASE-ER	Clause 200.5.7

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

Bit(s)	Name	Description location	R/W[a]
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 45.2.1.14b.a and 45.2.1.14b.b before 45.2.1.14b.1 (as inserted by IEEE Std 802.3by-201x) as follows:*

  - **45.2.1.14b.a 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.b 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 as inserted by IEEE Std 802.3by-201x*

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

PHY or interface type	Clause
25GBASE-LR	107, 108, 109, 200
25GBASE-ER	107, 108, 109, 200

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 200 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 new rows for 25GBASE-LR and 25GBASE-ER in Table 105-1 (as inserted by IEEE Std 802.3by-201x) after the row for 25GBASE-SR as follows (unchanged rows not shown):*

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 10 km (See Clause 200).
25GBASE-ER	125 Gb/s PHY using 25GBASE-R encoding over duplex single-mode fiber with a reach of at least 40 km (See Clause 200).

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	200
	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 200.

Clause 105. Introduction to 25 Gb/s networks

- **105.5 Delay constraints** – *Insert new rows for 25GBASE-LR and 25GBASE-ER in Table 105-3 (as inserted by IEEE Std 802.3by-201x) after the row for 25GBASE-SR as follows (unchanged rows not shown):*

Table 105-3 – Sublayer delay constraints

Sublayer	Maximum (bit time)[a]	Maximum (pause_quanta)[b]	Maximum (ns)	Notes [c]
25GBASE-LR PMD	512	1	20.48	See 200.3.1
25GBASE-ER PMD	512	1	20.48	See 200.3.1

[a] 1 bit time (BT) is equal to 40 ps. (See 1.4.117 for the definition of bit time.)
[b] 1 pause_quantum is equal to 20.48 ns. (See 31B.2 for the definition of pause_quanta.)
[c] 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 200, 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 rows for *LR and *ER after *SR in the table in 108.7.3 as follows (unchanged rows not shown):*

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 [ ]