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Comments from the Editors

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EFM PON Clauses

a short review

- Two Primary Technical Clauses covering PON
 - Clause 60. Physical Medium Dependent (PMD) sublayer and medium, type 1000BASE-PX10 and 1000BASE-PX20 (long wavelength passive optical networks)
 - Clause 65. Extensions of the Reconciliation Sublayer (RS) and Physical Coding Sublayer (PCS) / Physical Media Attachment (PMA) for 1000BASE-X for multipoint links and forward error correction

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Clause 60

- 60.1 Overview .
- 60.2 PMD functional specifications
 - 60.2.1 PMD block diagram
 - 60.2.2 PMD transmit function
 - 60.2.3 PMD receive function
 - 60.2.4 PMD signal detect function
 - 60.2.5 PMD transmit enable function for ONU
- 60.3 PMD to MDI optical specifications for 1000BASE-PX10-D and 1000BASE-PX10-U
 - 60.3.1 Transmitter optical specs
 - 60.3.2 Receiver optical specs
- 60.4 PMD to MDI optical specifications for 1000BASE-PX20-D and 1000BASE-PX20-U
 - 60.4.1 Transmit optical specs
 - 60.4.2 Receiver optical specs
- 60.5 Illustrative 1000BASE-PX10 and 1000BASE-PX20 channels and penalties (informative)
- 60.6 Jitter at TP1-4 for 1000BASE-PX10 and 1000BASE-PX20 (informative)

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Clause 60 (cont)

- 60.7 Optical measurement req.
- 60.7.1 Frame based test patterns
- 60.7.2 Wavelength and spectral width mea.
- 60.7.3 Optical power mea.
- 60.7.4 Extinction ratio mea.
- 60.7.5 OMA mea. (informative)
- 60.7.6 OMA relationship to extinction ratio and power mea. (informative)
- 60.7.7 Relative intensity noise optical modulation amplitude (RIN15OMA)
- 60.7.8 Transmitter optical waveform (transmit eye)
- 60.7.9 Transmitter and dispersion penalty (TDP)
- 60.7.10 Receive sensitivity mea.
- 60.7.11 Stressed receive conformance test
- 60.7.12 Jitter mea. (informative)
- 60.7.13 Other mea.
 - 60.7.13.1 Laser On/Off timing mea.
 - 60.7.13.2 Receiver settling timing mea. (informative)
- 60.8 Environmental, safety, and labeling
- 60.9 Characteristics of the fiber optic cabling
 - 60.9.1 Fiber optic cabling model
 - 60.9.2 Optical fiber and cable
 - 60.9.3 Optical fiber connection
 - 60.9.4 Medium Dependent Interface (MDI)
- 60.10 Protocol implementation conformance (PICS)

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Clause 65

- 65.1 Extensions of the Reconciliation Sublayer (RS) for point-to-point emulation
 - 65.1.1 Overview
 - 65.1.2 Principle of operation
 - 65.1.3 Functional specifications
- 65.2 Extensions of the physical coding sublayer for data detection & forward error correction
 - 65.2.1 Overview
 - 65.2.2 Burst-mode operation
 - 65.2.2.1 Principle of operation
 - 65.2.2.2 Detailed functions and state diagrams
 - 65.2.2.3 State Diagrams
 - 65.2.3 Forward error correction
 - 65.2.3.1 FEC code
 - 65.2.3.2 FEC frame format
 - 65.2.3.3 FEC sublayer operation
 - 65.2.3.4 Detailed functions
 - 65.2.3.5 State diagrams
 - 65.2.3.6 Error monitoring capability
- 65.3 [Extensions to PMA for 1000BASE-PX](#)
 - 65.3.1 Extensions for 1000BASE-PX-U
 - 65.3.1.1 PMA sublayer interfaces
 - 65.3.1.2 Loop-timing specs for ONUs
 - 65.3.2 Extensions for 1000BASE-PX-D
 - 65.3.2.1 CDR lock timing mea.
 - 65.3.3 Delay variation requirements
- 65.4 Protocol implementation conformance statement (PICS)

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- The editors propose to add two new clauses:
 - Clause “A” Physical Medium Dependent (PMD) sublayer and medium, type **PMD#1**, **PMD#2** and **PMD#3** (long wavelength passive optical networks)
 - Clause “B” Extensions of the Reconciliation Sublayer (RS) and Physical Coding Sublayer (PCS) / Physical Media Attachment (PMA) for **PMA#1** and **PMA#2** for multipoint links and forward error correction

Note: We may want to drop the parenthetical “(long wavelength passive optical networks)”. This appears to be a carry over from Clause 52 that referred to 850 nm (short wavelength), 1310 nm (long wavelength) and 1550 nm (very long wavelength) PMDs.

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Clause “A”

A.1	Overview .	A.4	PMD to MDI optical specifications for PMD#2
A.2	PMD functional specifications	A.4.1	Transmit optical specs
A.2.1	PMD block diagram	A.4.2	Receiver optical specs
A.2.2	PMD transmit function	A.5	Illustrative PMD#1, PMD#2 and PMD#3 channels and penalties (informative)
A.2.3	PMD receive function	A.6	Jitter at TP1-4 for PMD#1, PMD#2 and PMD#3 (informative)
A.2.4	PMD signal detect function		
A.2.5	PMD transmit enable function for ONU		
A.3	PMD to MDI optical specifications for PMD#1		
A.3.1	Transmitter optical specs		
A.3.2	Receiver optical specs		

Notes:

- 1) Clause “A.3” is repeated for each new PMD
- 2) For equivalent functions ref. Clause 60
- 3) Some informative clauses may be ref. only (shown in gray text)

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Clause “A” (cont)

- A.7^{60.1} Optical measurement req.
- A.7.1 Frame based test patterns
- A.7.2 Wavelength and spectral width mea.
- A.7.3 Optical power mea.
- A.7.4 Extinction ratio mea.
- A.7.5 OMA mea. (informative)
- A.7.6 OMA relationship to extinction ratio and power mea. (informative)
- A.7.7 Relative intensity noise optical modulation amplitude (RIN15OMA)
- A.7.8 Transmitter optical waveform (transmit eye)
- A.7.9 Transmitter and dispersion penalty (TDP)
- A.7.10 Receive sensitivity mea.
- A.7.11 Stressed receive conformance test
- A.7.12 Jitter mea. (informative)
- A.7.13 Other mea.
 - A.7.13.1 Laser On/Off timing mea.
 - A.7.13.2 Receiver settling timing mea. (informative)
- A.8 Environmental, safety, and labeling
- A.9 Characteristics of the fiber optic cabling
 - A.9.1 Fiber optic cabling model
 - A.9.2 Optical fiber and cable
 - A.9.3 Optical fiber connection
 - A.9.4 Medium Dependent Interface (MDI)
- A.10 Protocol implementation conformance (PICS)

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Clause “B”

- B.1 Extensions of the Reconciliation Sublayer (RS) for point-to-point emulation
 - B.1.1 Overview
 - B.1.2 Principle of operation
 - B.1.3 Functional specifications
- B.2 Extensions of the physical coding sublayer for data detection & FEC
 - B.2.1 Overview
 - B.2.2 Burst-mode operation
 - B.2.2.1 Principle of operation
 - B.2.2.2 Detailed functions and state diagrams
 - B.2.2.3 State Diagrams
- B.2.3 Forward error correction
 - B.2.3.1 FEC code
 - B.2.3.2 FEC frame format
 - B.2.3.3 FEC sublayer operation
 - B.2.3.4 Detailed functions
 - B.2.3.5 State diagrams
 - B.2.3.6 Error monitoring capability
- B.3 [Extensions to PMA for PMD#1](#)
 - B.3.1 Extensions for PMD#1-U
 - B.3.1.1 PMA sublayer interfaces
 - B.3.1.2 Loop-timing specs for ONUs
 - B.3.2 Extensions for PMD#1-D
 - B.3.2.1 CDR lock timing mea.
 - B.3.3 Delay variation requirements
- B.4 Protocol implementation conformance (PICS)

Notes:

- 1) Clause “B.3” is repeated for each new PMD
- 2) For equivalent functions ref. Clause 65
- 3) Ref Clause 64 (P2MP MAC)

Some open Issues

- How many PMDs and what do we name them?
- State Machine diagrams – do we follow EFM style or 10G style?
 - (Editors prefer EFM style)
- Others?

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- Question: What do we name these new PMDs?
 - Suggestions
 - 1/10GBASE-PX (distance)
 - 10GBASE-PX (distance)

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Thank you for your attention.

Any Questions?