802.3av

Comments from the Editors

Duane Remein
Marek Hajduczenia

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

EFM

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)

EFM

Clause 60 (cont)

60.1 Overview

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)

EFM

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)

802.3av

- 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.

802.3av

Clause “A”

A.1	Overview .
A.2	PMD functional specifications
A.2.1	PMD block diagram
A.2.2	PMD transmit function
A.2.3	PMD receive function
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
A.4	PMD to MDI optical specifications for PMD#2
A.4.1	Transmit optical specs
A.4.2	Receiver optical specs
A.5	Illustrative PMD#1 and PMD#2 channels and penalties (informative)
A.6	Jitter at TP1-4 for PMD#1 and PMD#2 (informative)

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)

802.3av

Clause “A” (cont)

60.1 Overview .

A.7	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)

802.3av 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

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?

802.3av

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

802.3av

Thank you for your attention.

Any Questions?