200. Physical Medium Dependent (PMD) sublayer and medium for passive optical networks, type {25Gtype} and {100Gtype}

200.1 Overview

Clause 200 describes Physical Medium dependent (PMD) sublayer for Ethernet Passive Optical Networks operating at the line rate of 25 Gbps and above.

200.1.1 Terminology and conventions

EPONs operate over a point-to-multipoint (P2MP) topology, also called a tree or trunk-and-branch topology. The device connected at the root of the tree is called an Optical Line Terminal (OLT) and the devices connected as the leaves are referred to as Optical network Units (ONUs). The direction of transmission from the OLT to the ONUs is referred to as the *downstream* direction, while the direction of transmission from the ONUs to the OLT is referred to as the *upstream* direction.

200.1.2 Power budget classes

Clause 200 defines the following power budget classes:

- Low power budget class supports P2MP media channel insertion loss of ≤ 20 dB e.g., a PON with the split ratio of at least 1:16 and the distance of at least 10 km.
- Medium power budget class supports P2MP media channel insertion loss of ≤ 24 dB e.g., a PON with the split ratio of at least 1:16 and the distance of at least 20 km or a PON with the split ratio of at least 1:32 and the distance of at least 10 km.
- High power budget class supports P2MP media channel insertion loss of ≤ 29 dB e.g., a PON with the split ratio of at least 1:32 and the distance of at least 20 km.

200.1.3 Power budgets

Each power budget class is represented by {types of power budgets} power budget as follows:

- {PMD_X} power budget describes symmetric-rate PHY for PON operating at {TBD} Gbps downstream and {TBD} Gbps upstream over a single SMF
- {PMD_Y} power budget describes asymmetric-rate PHY for PON operating at {TBD} Gbps downstream and {TBD} Gbps upstream over a single SMF

Each power budget is further identified with a numeric representation of its class, where a value of 10 represents low power budget, a value of 20 represents medium power budget, and a value of 30 represents high power budget. Thus, the following power budgets are defined in Clause 200:

- {PMD_X}10: symmetric-rate, low power budget,
- {PMD_X}20: symmetric-rate, medium power budget,
- {PMD_X}30: symmetric-rate, high power budget,
- {PMD_Y}10: asymmetric-rate, low power budget,
- {PMD_Y}20: asymmetric-rate, medium power budget,
- {PMD_Y}30: asymmetric-rate, high power budget.

Table 200–1 shows the primary attributes of all power budget types defined in Clause 200.

Table 200–1—Power budgets

Description	Low Power Budget		Medium Power Budget		High Power Budget		Units
Number of fibers	1						–
Nominal downstream line rate							GBd
Nominal upstream line rate							GBd
Nominal downstream wavelength							nm
Downstream wavelength tolerance							nm
Nominal upstream wavelength							nm
Upstream wave-length tolerance							nm
Maximum reach[a]	≥10		≥20				km
Maximum channel insertion loss	20		24		29		dB
Minimum channel insertion loss	5		10		15		dB

[a]A compliant system may exceed the maximum reach designed for given power budget as long as optical power budget and other mandatory optical layer specifications are met.

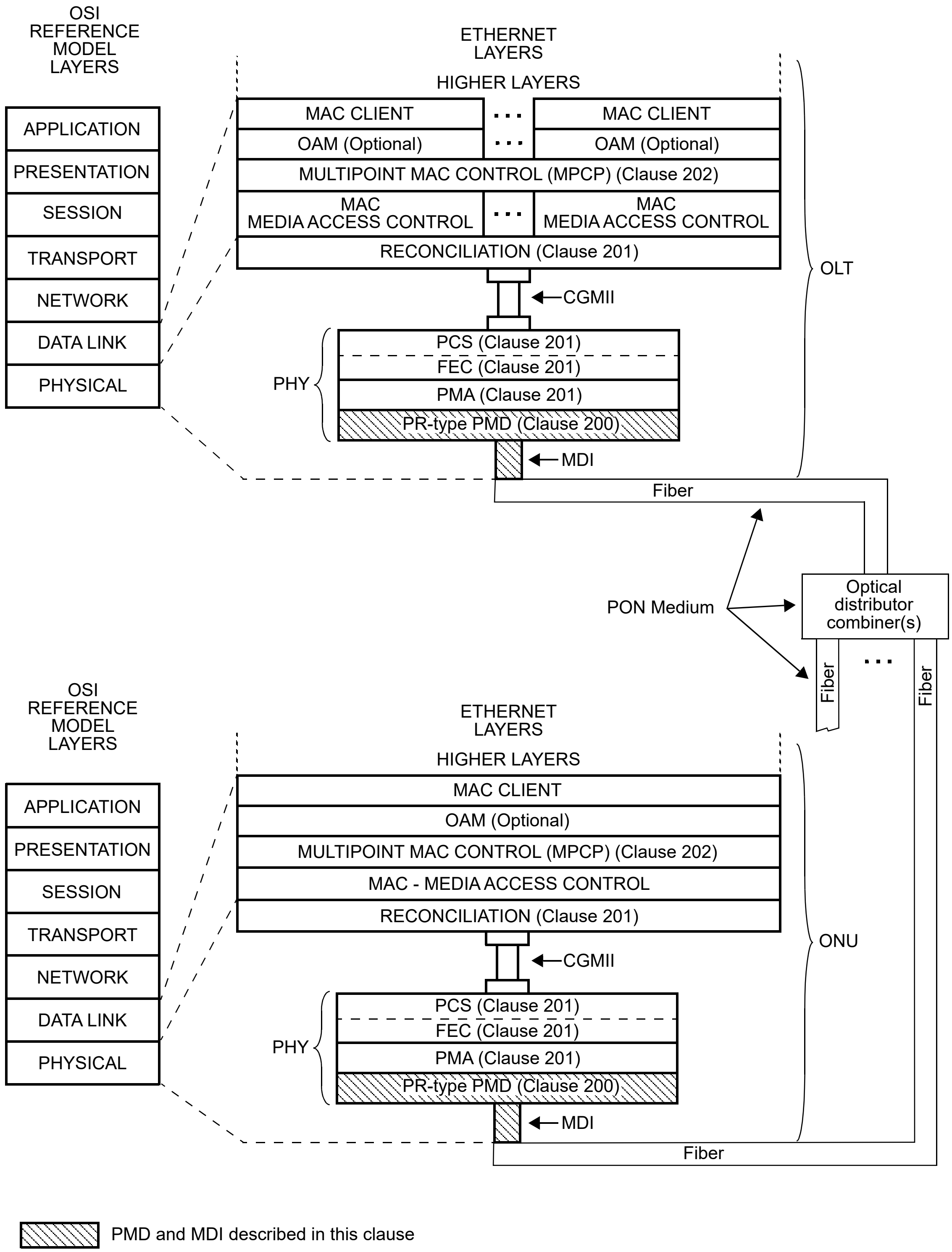
200.1.4 Positioning of PMD sublayer within the IEEE 802.3 architecture

Figure 200–1 depicts the relationships of {NG-EPON} PMD sublayer (shown hatched) with other sublayers and the ISO/IEC Open System Interconnection (OSI) reference model.

200.2 PMD types

The characteristics of the P2MP topology result in significantly different ONU and OLT PMDs. For example, the OLT PMD operates in a continuous mode in the transmit direction (downstream), but uses a burst mode in the receive direction (upstream). On the other hand, the ONU PMD receives data in a continuous mode, but transmits in a burst mode. To differentiate OLT PMDs from ONU PMDs, the OLT PMD name has a suffix “D” appended to it, where D stands for downstream–facing PMD.

Editorial NOTE (to be removed prior to publication): Figure 200-1 is a placeholder right now, to be replaced with updated drawing once complete architecture is available.



CGMII= 100 GIGABIT MEDIA INDEPENDENT INTERFACE
MDI = MEDIUM DEPENDENT INTERFACE
OAM = OPERATIONS, ADMINISTRATION & MAINTENANCE
OLT = OPTICAL LINE TERMINAL
ONU = OPTICAL NETWORK UNIT
PCS = PHYSICAL CODING SUBLAYER
PHY = PHYSICAL LAYER DEVICE
PMA = PHYSICAL MEDIUM ATTACHMENT
PMD = PHYSICAL MEDIUM DEPENDENT

Figure 200–1—Relationship of {NG-EPON} P2MP PMD to the ISO/IEC OSI reference model and the IEEE 802.3 Ethernet model

In the downstream direction, the signal transmitted by the D-type PMD is received by all U-type PMDs. In the upstream direction, the D-type PMD receives data bursts from each of the U-type PMDs.

Clause 200 defines several D-type and several U-type PMDs, that differ in their receive and/or transmit characteristics. Such PMDs are further distinguished by appending a digit after the suffix D or U.

The following OLT PMDs (D-type) are defined in this subclause:

a) Asymmetric-rate D-type PMDs (collectively referred to as {PMD_Y}), transmitting at {TBD} GBd continuous mode and receiving at {TBD} GBd burst mode:
   1) {PMD_Y_D} types
b) Symmetric-rate D-type PMDs (collectively referred to as {PMD_X}), transmitting at {TBD} GBd continuous mode and receiving at {TBD} GBd burst mode:
   1) {PMD_X_D} types

The following ONU PMDs (U-type) are defined in this subclause:

a) Asymmetric-rate U-type PMDs (collectively referred to as 10/1GBASE–PRX–U), transmitting at 1.25 GBd burst mode and receiving at 10.3125 GBd continuous mode:
   1) {PMD_Y_D} types
b) Symmetric-rate U-type PMDs (collectively referred to as 10GBASE–PR–U), transmitting at 10.3125 GBd burst mode and receiving at 10.3125 GBd continuous mode:
   1) {PMD_X_D} types

A specific power budget is achieved by combining an OLT PMD (D-type) with an ONU PMD (U-type) as shown in 200.2.1. Detailed PMD receive and transmit characteristics for D-type PMDs are given in 200.4 and characteristics for U-type PMDs are presented in 200.5. Every PMD has non-overlapping transmit and receive wavelength bands and operates over a single SMF (see {TBD future ANNEX}).

200.2.1 Mapping of PMDs to power budgets

The power budget is determined by the PMDs located at the ends of the physical media. This subclause describes how PMDs may be combined to achieve the power budgets listed in Table 200–1.

200.2.1.1 Symmetric-rate, {PMD_X} power budgets ({NG} type)

Table 200–2 illustrates recommended pairings of symmetric-rate ONU PMDs with symmetric-rate OLT PMDs to achieve the power budgets as shown in Table 200–1.

Table 200–2—PMD – power budget mapping for symmetric-rate {NG}–type power budgets

		OLT PMDs			
ONU PMDs					

200.2.1.2 Asymmetric-rate, {PMD_Y} power budgets ({NG} type)

Table 200–3 illustrates recommended pairings of asymmetric-rate ONU PMDs with asymmetric-rate OLT PMDs to achieve the power budgets as shown in Table 200–1.

Table 200–3—PMD – power budget mapping for asymmetric-rate {NG}–type power budgets

		OLT PMDs			
ONU PMDs					

200.3 PMD functional specifications

The {NG-EPON type} PMDs perform the transmit and receive functions that convey data between the PMD service interface and the MDI.

200.3.1 PMD service interface

The following specifies the services provided by Clause 200 PMDs. These PMD sublayer service interfaces are described in an abstract manner and do not imply any particular implementation.

The PMD Service Interface supports the exchange of a continuous stream of bits, representing 64B/66B blocks, between the PMA and PMD entities. The PMD translates the serialized data received from the compatible PMA to and from signals suitable for the specified medium. The following primitives are defined:

— PMD_UNITDATA.request
— PMD_UNITDATA.indication
— PMD_SIGNAL.request
— PMD_SIGNAL.indication

200.3.1.1 Delay constraints

{TBD}

200.3.1.2 PMD_UNITDATA.request

This primitive defines the transfer of a serial data stream from the Clause 201 PMA to the PMD.

{TBD, depending on the structure of PMA}

200.3.1.3 PMD_UNITDATA.indication

This primitive defines the transfer of data from the PMD to the Clause 201 PMA.

{TBD, depending on the structure of PMA}

200.3.1.4 PMD_SIGNAL.request

{TBD, depending on the structure of PMA}

200.3.1.5 PMD_SIGNAL.indication

{TBD, depending on the structure of PMA}

200.3.2 PMD block diagram

The PMD sublayer is defined at the eight reference points shown in Figure 200–2 for {NG-EPON} PMDs.

For {NG-EPON} PMDs, test points TP1 through TP4 refer to the downstream channel, while test points TP5 through TP8 refer to the upstream channel. In the downstream channel, TP2 and TP3 are compliance points, while in the upstream channel TP6 and TP7 are compliance points. TP1, TP4, TP5, and TP8 are reference points for use by implementers. The optical transmit signal is defined at the output end of a patch cord (TP2 for the downstream channel and TP6 for the upstream channel), between 2 m and 5 m in length, of a fiber type consistent with the link type connected to the transmitter. Unless specified otherwise, all transmitter measurements and tests defined in 200.7 are made at TP2 or TP6. The optical receive signal is defined at the output of the fiber optic cabling (TP3 for the downstream channel and TP7 for the upstream channel) connected to the receiver. Unless specified otherwise, all receiver measurements and tests defined in 200.7 are made at TP3 or TP7.

The electrical specifications of the PMD service interface (TP1 and TP4 for the downstream channel and TP5 and TP8 for the upstream channel) are not system compliance points (these are not readily testable in a system implementation).

200.3.3 PMD transmit function

{TBD, depending on the structure of PMA}

200.3.4 PMD receive function

{TBD, depending on the structure of PMA}

200.3.5 PMD signal detect function

200.3.5.1 ONU PMD signal detect

{TBD, depending on the structure of PMA}

200.3.5.2 OLT PMD signal detect

The response time for the PMD Signal Detect function for the burst mode upstream signal may be longer or shorter than a burst length; thus, it may not fulfill the traditional requirements placed on Signal Detect. PMD_SIGNAL.indication is intended to be an indicator of optical signal presence. The signal detect function in the OLT may be realized in the PMD or the Clause 201 PMA sublayer.

The value of the SIGNAL_DETECT parameter shall be generated according to the conditions defined in Table 200–4 for PMDs defined in Clause 200. The {NG-EPON} PMD receiver is not required to verify whether a compliant {NG-EPON} signal is being received.

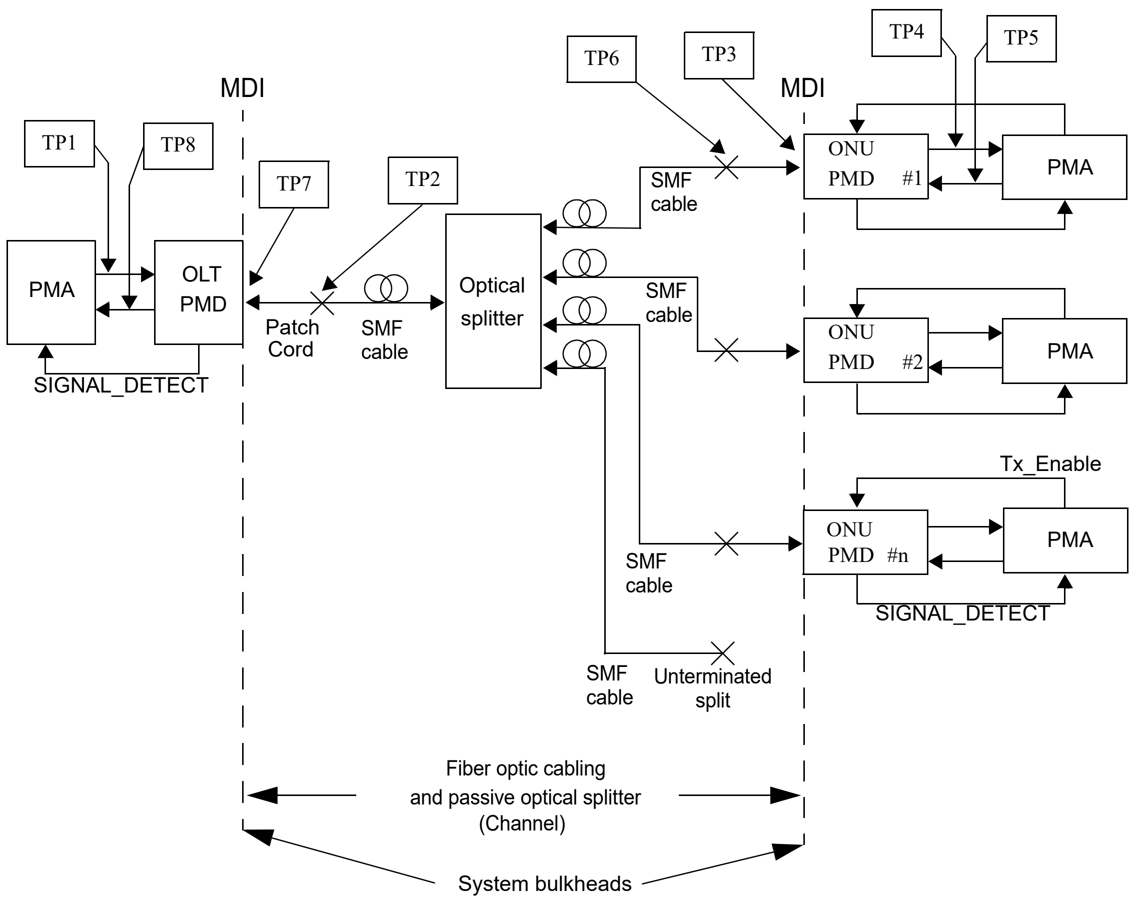


Figure 200–2—10GBASE–PR and 10/1GBASE–PRX block diagram

200.3.5.3 {NG-EPON} Signal detect functions

The Signal Detect value definitions for Clause 200 PMDs are shown in Table 200–4.

Table 200–4—SIGNAL_DETECT value definitions for Clause 200 PMDs

PMD type	Receive conditions	SIGNAL_DETECT value
{NG-EPON} PMD	Average input optical power ≤ Signal Detect Threshold (min) in Table {TBD} at the specified receiver wavelength	FAIL
	Average input optical power ≥ Receive sensitivity (max) in Table {TBD} with a compliant signal input at the specified receiver wavelength	OK
	All other conditions	Unspecified

200.3.6 PMD transmit enable function for ONU

PMD_SIGNAL.request(tx_enable) is defined for all ONU PMDs specified in Clause 200. PMD_SIGNAL.request(tx_enable) is asserted prior to data transmission by the ONU PMDs.

200.4 PMD to MDI optical specifications for {NG-EPON} OLT PMDs

This subclause details the PMD to MDI optical specifications for {NG-EPON} OLT PMDs, as specified in 200.2. Specifically, 200.4.1 defines the OLT transmit parameters, while 200.4.2 defines the OLT receive parameters.

The operating ranges for {XXX} power budget classes are defined in Table 200–1. A {XXX} compliant transceiver operates over the media types listed in Table 200–5 according to the specifications described in 200.9. A transceiver which exceeds the operational range requirement while meeting all other optical specifications is considered compliant.

NOTE—The specifications for OMA have been derived from extinction ratio and average launch power (minimum) or receiver sensitivity (maximum). The calculation is defined in 58.7.6.

200.4.1 Transmitter optical specifications

{TBD}

200.4.2 Receiver optical specifications

{TBD}

200.5 PMD to MDI optical specifications for {NG-EPON} ONU PMDs

This subclause details the PMD to MDI optical specifications for {NG-EPON} ONU PMDs, as specified in 200.2. Specifically, 200.5.1 defines the ONU transmit parameters, while 200.5.2 defines the ONU receive parameters.

The operating ranges for {XXX} power budget classes are defined in Table 200–1. A {XXX} compliant transceiver operates over the media types listed in Table 200–5 according to the specifications described in 200.9. A transceiver which exceeds the operational range requirement while meeting all other optical specifications is considered compliant.

NOTE—The specifications for OMA have been derived from extinction ratio and average launch power (minimum) or receiver sensitivity (maximum). The calculation is defined in 58.7.6.

200.5.1 Transmitter optical specifications

{TBD}

200.5.2 Receiver optical specifications

{TBD}

200.6 Definitions of optical parameters and measurement methods

When measuring jitter at TP1 and TP5, it is recommended that jitter contributions at frequencies below receiver corner frequencies (i.e., {TBD}) are filtered at the measurement unit. The following subclauses describe definitive patterns and test procedures for certain PMDs of this standard. Implementers using alternative verification methods should ensure adequate correlation and allow adequate margin such that specifications are met by reference to the definitive methods. All optical measurements, except TDP and $RIN_{15}OMA$ shall be made through a short patch cable between 2 m and 5 m in length.

200.6.1 Insertion loss

Insertion loss for SMF fiber optic cabling (channel) is defined at {TBD, NG-EPON wavelengths}, depending on the particular PMD. A suitable test method is described in ITU–T G.650.1.

200.6.2 Allocation for penalties in {NG-EPON} PMDs

{TBD}

200.6.3 Test patterns

{TBD}

200.6.4 Wavelength and spectral width measurement

The center wavelength and spectral width (RMS) shall meet the specifications when measured according to TIA-455-127-A under modulated conditions using an appropriate PRBS or a valid {NG-EPON} signal, or another representative test pattern.

NOTE—The allowable range of central wavelengths is narrower than the operating wavelength range by the actual RMS spectral width at each extreme.

200.6.5 Optical power measurements

Optical power shall meet specifications according to the methods specified in ANSI/EIA-455-95. A measurement may be made with the port transmitting any valid encoded 64B/66B data stream.

200.6.6 Extinction ratio measurements

The extinction ratio shall meet the specifications when measured according to IEC 61820-2-2 with the port transmitting a repeating idle pattern /I2/ ordered set (see 36.2.4.12) or valid {NG-EPON} signal, and with minimal back reflections into the transmitter, lower than –20 dB. The test receiver has the frequency response as specified for the transmitter optical waveform measurement.

200.6.7 Optical modulation amplitude (OMA) test procedure

{TBD, depending on whether OMA is used in NG-EPON at all}

200.6.8 Relative intensity noise optical modulation amplitude (RIN_xOMA) measuring procedure

{TBD, need to confirm whether RIN measurements are applicable at all}

200.6.9 Transmit optical waveform (transmit eye)

The required transmitter pulse shape characteristics are specified in the form of a mask of the transmitter eye diagram as shown in {TBD} for upstream direction of {NG-EPON} PMD and {TBD} for downstream direction of {NG-EPON} PMD.

{TBD}

200.6.10 Transmitter and dispersion penalty (TDP)

TDP measurement tests transmitter impairments, including chromatic dispersion effects, due to signal propagation in SMF used in PON. Possible causes of impairment include intersymbol interference, jitter, and RIN. Meeting the separate requirements (e.g., eye mask, spectral characteristics) does not in itself guarantee the TDP. The TDP limit shall be met. For 10 Gb/s PHYs, TDP is measured as defined in 52.9.10 with an optical channel that meets the requirements listed in {TBD}.

{TBD, if we end up using modulation which relies on ISI, we may have to update the text in this section quite a bit, to specify the minimum ISI level that is required and maximum allowable ISI levels. To be updated when more details of the PHY are known}

200.6.11 Receive sensitivity

{TBD}

200.6.12 Stressed receiver conformance test

{TBD}

200.6.13 Jitter measurements

{TBD}

200.6.14 Laser on/off timing measurement

{TBD, individual values will have to be examined and adapted to 100G-EPON}

The laser on/off timing measurement procedure is described in 60.9.13.1 with the following changes:

a) T_{on} is defined in 60.9.13.1.1, and its value is less than 512 ns (defined in Table 75–8 and Table 75–9).
b) $T_{receiver\_settling}$ is defined in 60.9.13.2.1, and its value is defined in Table 75–6 and Table 75–7.
c) T_{CDR} is defined in 76.4.2.1, and its value is less than 400 ns.
d) $T_{code\_group\_align}$ is defined in 36.3.2.4, and its value is less than 4 ten bit code–groups for 1 Gb/s PHYs, and is defined as 0 for 10 Gb/s PHYs.
e) T_{off} is defined in 60.9.13.1.1, and its value is less than 512 ns (defined in Table 75–8 and Table 75–9).

200.6.15 Receiver settling timing measurement

200.6.15.1 Definitions

$T_{receiver\_settling}$ is denoted as the time beginning from the time that the optical power in the receiver at TP7 reaches the conditions specified in 200.6.12 and ending at the time that the electrical signal after the PMD at TP8 reaches within 15 % of its steady state parameter (average power, jitter) (see {TBD}). $T_{receiver\_settling}$ is presented in Figure 200–3. The data transmitted may be any valid 64B/66B symbols (or a specific power synchronization sequence). The optical signal at TP7, at the beginning of the locking, may have any valid 64B/66B pattern, optical power level, jitter, or frequency shift matching the standard specifications.

200.6.15.2 Test specification

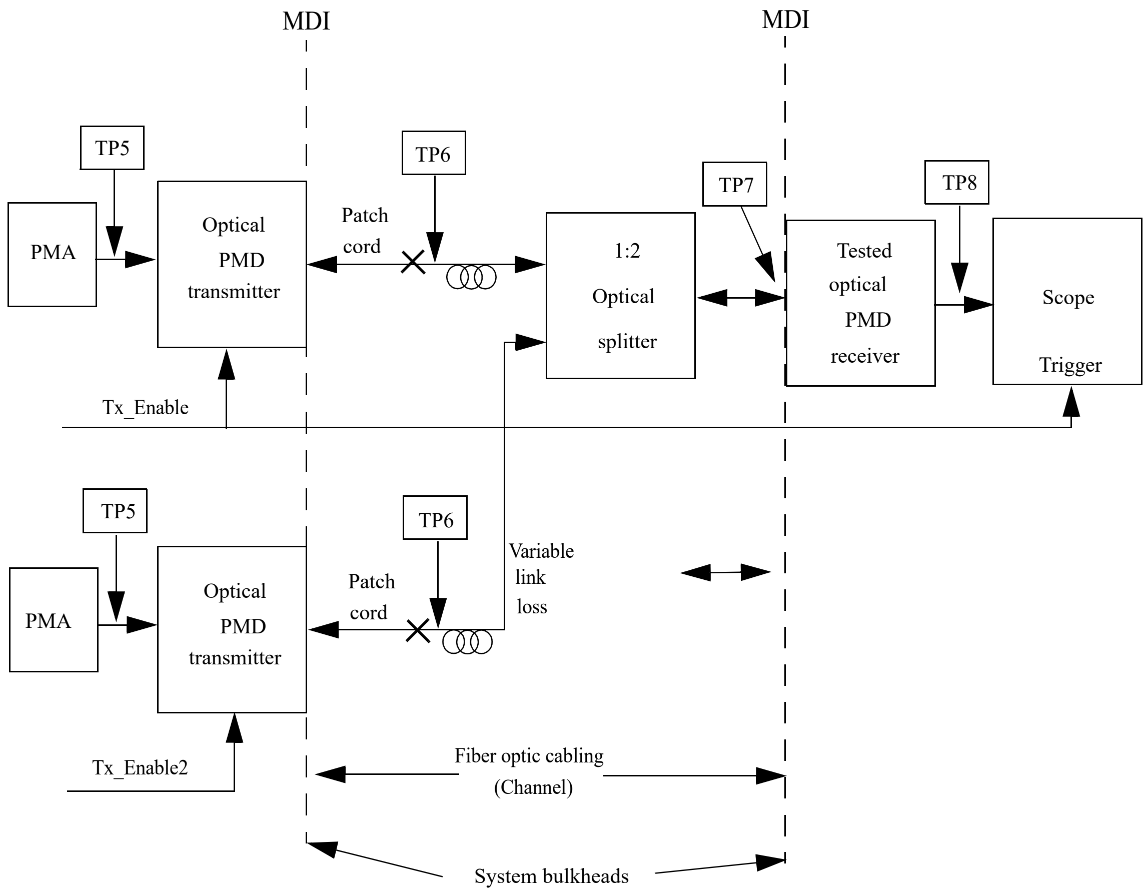


Figure 200–3—Receiver settling time measurement setup

Figure 200–3 illustrates the test setup for the OLT PMD receiver (upstream) $T_{receiver\_settling}$ time. The optical PMD transmitter has well–known parameters, with a fixed known T_{on} time. After T_{on} time the parameters of the reference transmitter, at TP6 and therefore at TP7, reach within 15% of its steady state values as specified in {TBD}.

Define $T_{receiver\_settling}$ time as the time from the Tx_Enable assertion, minus the known T_{on} time, to the time the electrical signal at TP8 reaches within 15% of its steady state conditions.

Conformance should be assured for an optical signal at TP7 with any level of its specified parameters before the Tx_Enable assertion. Especially the $T_{receiver\_settling}$ time must be met in the following scenarios:

— Switching from a ‘weak’ (minimal received power at TP7) ONU to a ‘strong’ (maximal received power at TP7) ONU, with minimal guard band between.
— Switching from a ‘strong’ ONU to a ‘weak’ ONU, with minimal guard band between.
— Switching from noise level, with maximal duration interval, to ‘strong’ ONU power level.

A non-rigorous way to describe this test setup would be (using a transmitter with a known T_{on}).

For a tested PMD receiver with a declared $T_{receiver\_settling}$ time, measure all PMD receiver electrical parameters at TP8 after $T_{receiver\_settling}$ from the TX_ENABLE trigger minus the reference transmitter T_{on}, reassuring conformance to within 15% of its specified steady state values.

200.7 Environmental, safety, and labeling

200.7.1 General safety

All equipment subject to this clause shall conform to IEC 60950–1.

200.7.2 Laser safety

{NG-EPON} optical transceivers shall conform to Hazard Level 1 laser requirements as defined in IEC 60825–1 and IEC 60825–2, under any condition of operation. This includes single fault conditions whether coupled into a fiber or out of an open bore.

Conformance to additional laser safety standards may be required for operation within specific geographic regions.

Laser safety standards and regulations require that the manufacturer of a laser product provide information about the product's laser, safety features, labeling, use, maintenance, and service. This documentation explicitly defines requirements and usage restrictions on the host system necessary to meet these safety certifications.

200.7.3 Installation

It is recommended that proper installation practices, as defined by applicable local codes and regulation, be followed in every instance in which such practices are applicable.

200.7.4 Environment

The {NG-EPON} operating environment specifications are as defined in 52.11, as defined in 52.11.1 for electromagnetic emission, and as defined in 52.11.2 for temperature, humidity, and handling.

See Annex 67A for additional environmental information. Two optional temperature ranges are defined in Table 60–18. Implementations shall be declared as compliant over one or both complete ranges, or not so declared (compliant over parts of these ranges or another temperature range).

200.7.5 PMD labeling

The {NG-EPON} labeling recommendations and requirements are as defined in 52.12.

Defined PMDs are as follows:

— {list NG-EPON PMDs}

Each field-pluggable component shall be clearly labeled with its operating temperature range over which compliance is ensured.

200.8 Characteristics of the fiber optic cabling

The {NG-EPON} fiber optic cabling shall meet the dispersion specifications defined in IEC 60793–2 and ITU–T G.652, or the requirements of Table 200–5 where they differ. The fiber optic cabling consists of one or more sections of fiber optic cable and any intermediate connections required to connect sections together. It also includes a connector plug at each end to connect to the MDI. The fiber optic cabling spans from one MDI to another MDI, as shown in Figure 200–2.

200.8.1 Fiber optic cabling model

The fiber optic cabling model is shown in Figure 200–2.

NOTE—The optical splitter presented in Figure 200–2 may be replaced by a number of smaller 1:n splitters such that a different topology may be implemented while preserving the link characteristics and power budget as defined in Table 75B–1 and Table 75B–2.

The maximum channel insertion losses shall meet the requirements specified in Table 200–1. Insertion loss measurements of installed fiber cables are made in accordance with IEC 61280–4–2:2000. The fiber optic cabling model (channel) defined here is the same as a simplex fiber optic link segment. The term *channel* is used here for consistency with generic cabling standards.

200.8.2 Optical fiber and cable

The fiber optic cable requirements are satisfied by the fibers specified in IEC 60793–2 Type B1.1 (dispersion un–shifted SMF) and Type B1.3 (low water peak SMF), ITU–T G.652 and ITU–T G.657 (bend–insensitive SMF).

200.8.3 Optical fiber connection

Table 200–5—Optical fiber and cable characteristics

Description[a]	IEC 60793–2 B1.1, B1.3 SMF, ITU–T G.652, G.657 SMF[b]				Unit
Nominal wavelength[c]					nm
Cable attenuation (max)[d]					dB/km
Zero dispersion wavelength[e]	$1300 \le \lambda_0 \le 1324$				nm
Dispersion slope (max)	0.093				$ps/nm^2 \cdot km$

[a]The fiber dispersion values are normative, all other values in the table are informative.
[b]Other fiber types are acceptable if the resulting ODN meets channel insertion loss and dispersion requirements.
[c]Wavelength specified is the nominal wavelength and typical measurement wavelength. Power penalties at other wavelengths are accounted for.
[d]Attenuation for single-mode optical fiber cables for 1310 nm and 1550 nm is defined in ITU–T G.652. The attenuation values in the 1270 nm and 1577 nm windows were calculated using spectral attenuation modelling method (5.4.4) included in G.650.1 and the matrix coefficients included in Appendix III therein. 1310 nm (0.4 dB/km), 1380 nm (0.5 dB/km) and 1550 nm (0.35 dB/km) attenuation values were used as the input for the predictor model.
[e]See IEC 60793 or ITU–T G.652.

An optical fiber connection as shown in Figure 200–2 consists of a mated pair of optical connectors. The {NG-EPON} PMD is coupled to the fiber optic cabling through an optical connection and any optical splitters into the MDI optical receiver, as shown in Figure 200–2. The channel insertion loss includes the loss for connectors, splices and other passive components such as splitters, see {TBD}.

The channel insertion loss was calculated under the assumption of 14.5 dB loss for a 1:16 splitter/18.1 dB loss for a 1:32 splitter (ITU–T G.671 am 1). Unitary fiber attenuation for particular transmission wavelength is provided in Table 200–5. The number of splices/connectors is not predefined; the number of individual fiber sections between the OLT MDI and the ONU MDI is not defined. The only requirements are that the resulting channel insertion loss is within the limits specified in Table 200–1 and the maximum reach in Table 200–1 is not exceeded. Other fiber arrangements (e.g., increasing the split ratio while decreasing the fiber length) are supported as long as the limits for the channel insertion loss specified in Table 200–1 are observed.

The maximum discrete reflectance for single-mode connections shall be less than –26 dB.

200.8.4 Medium Dependent Interface (MDI)

The {NG-EPON} PMD is coupled to the fiber cabling at the MDI. The MDI is the interface between the PMD and the "fiber optic cabling" as shown in Figure 200–2. Examples of an MDI include the following:

a) Connectorized fiber pigtail
b) PMD receptacle

When the MDI is a remateable connection, it shall meet the interface performance specifications of IEC 61753–1. The MDI carries the signal in both directions for {NG-EPON} PMD and couples to a single fiber.

NOTE—Compliance testing is performed at TP2 and TP3 as defined in 200.3.2, not at the MDI.

200.9 Protocol implementation conformance statement (PICS) proforma for Clause 200, clause title[1]

200.9.1 Introduction

The supplier of a protocol implementation that is claimed to conform to Clause 200, clause title, shall complete the following protocol implementation conformance statement (PICS) proforma.

A detailed description of the symbols used in the PICS proforma, along with instructions for completing the PICS proforma, can be found in Clause 21.

200.9.2 Identification

200.9.2.1 Implementation identification

Supplier[1]	
Contact point for enquiries about the PICS[1]	
Implementation Name(s) and Version(s)[1,3]	
Other information necessary for full identification—e.g., name(s) and version(s) for machines and/or operating systems; System Name(s)[2]	
NOTE 1—Required for all implementations. NOTE 2—May be completed as appropriate in meeting the requirements for the identification. NOTE 3—The terms Name and Version should be interpreted appropriately to correspond with a supplier's terminology (e.g., Type, Series, Model).	

200.9.2.2 Protocol summary

Identification of protocol standard	IEEE Std 802.3xx-201x, Clause 200, clause title
Identification of amendments and corrigenda to this PICS proforma that have been completed as part of this PICS	
Have any Exception items been required? No [ ] Yes [ ] (See Clause 21; the answer Yes means that the implementation does not conform to IEEE Std 802.3xx-201x.)	

Date of Statement	

200.9.3 Major capabilities/options

200.9.4 PICS proforma tables for clause title

200.9.4.1 PMD functional specifications

[1]*Copyright release for PICS proformas:* Users of this standard may freely reproduce the PICS proforma in this subclause so that it can be used for its intended purpose and may further publish the completed PICS.

Item	Feature	Subclause	Value/Comment	Status	Support
					Yes [ ] No [ ]
					Yes [ ]

Item	Feature	Subclause	Value/Comment	Status	Support
					Yes [ ]
					Yes [ ] No [ ]
					Yes [ ] No [ ] N/A [ ]

200.9.4.2 Management functions

Item	Feature	Subclause	Value/Comment	Status	Support
					Yes [ ] N/A [ ]
					Yes [ ] No [ ] N/A [ ]