802.3ba PMD test points

802.3ba Test point ad hoc

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Test point Ad hoc chair
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Presentation objectives

- Provide reference information on related 802.3 test points.

- Illustrate possible 802.3ba test points based on existing related 802.3 test points.

Test point ad hoc participants

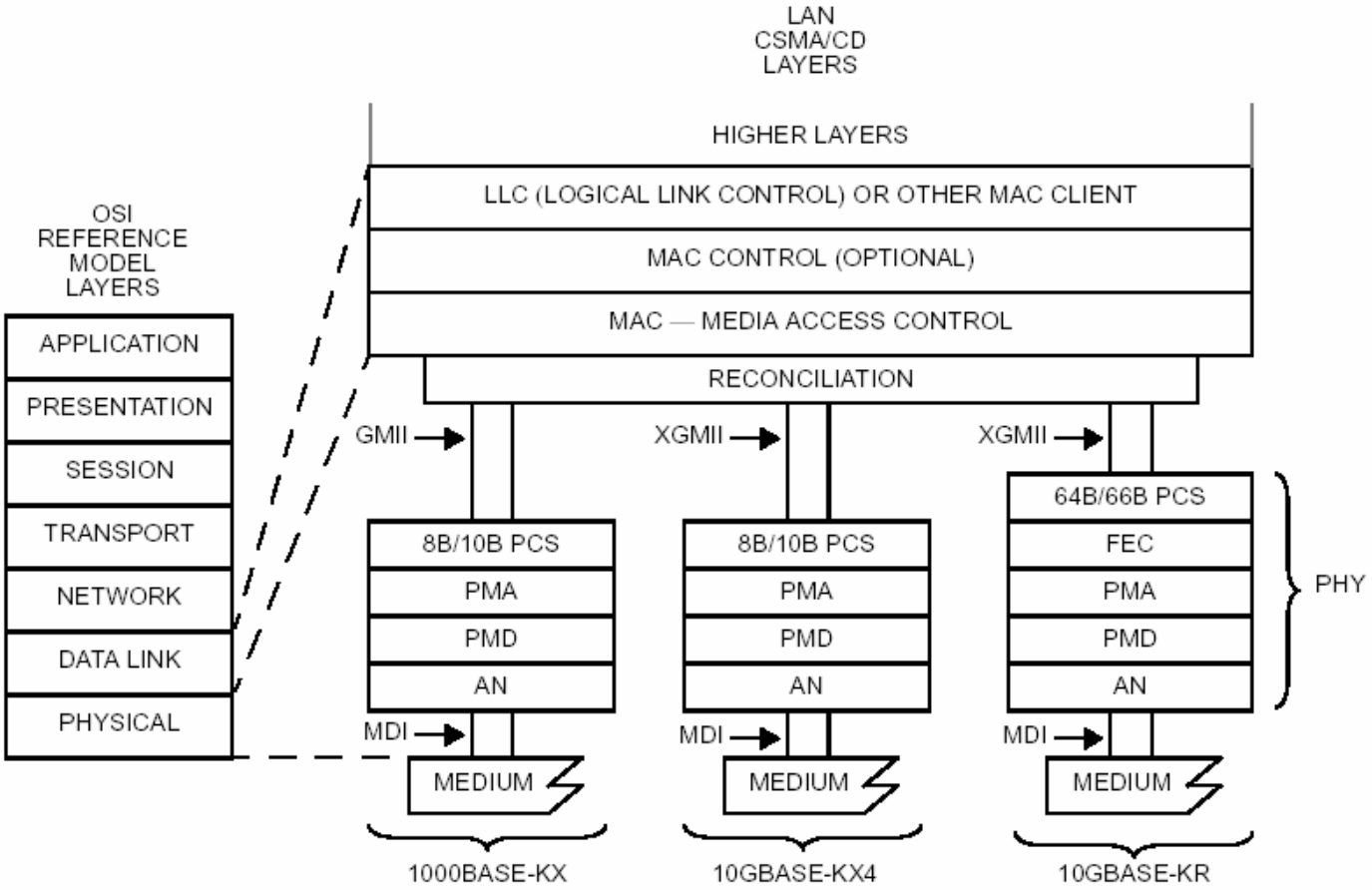
•Marc Dupuis	Tyco Electronics/Madison Cable (x)
•David Helster	Tyco Electronics (x)
•Piers Dawe	Avago Technology (x)
•Tom Palkert	Luxtera (x)
•John Petrilla	Avago Technology (x)
•Stephen Strong	Juniper Networks (x)
•Gourgen Oganessyan	Quellan (x)
•Rita Horner	Avago Technology (x)
•Hugh Barrass	Cisco (x)
•Chris DiMinico	MC Communications (x)
•Norbert Folkens	JDSU
•Vittal Balasubramanian	FCI USA, Inc
•Herb Van Deusen	Gore (x)
•Ronald Nordin	Panduit (x)
•Olindo Savi	Siemon Company
•Albert Vareljian	Altera Corp
•Mike Dudek	JDSU (x)
•Greg McSorley	Amphenol
•Adam Healey	LSI
•Phil Mcclay	Zarlink

Please note (x) indicates ad hoc participant acknowledged support of this report.

802.3ba physical layer specifications TP references

	40 GbE	100 GbE	802.3 test point references
At least 1m backplane	✓		802.3ap - 70.6.1 Link block diagram
At least 10m cu cable	✓	✓	10GBASE-CX4 - 54.5.1 Link block diagram
At least 100m OM3 MMF	✓	✓	1000BASE-X - 38.2.1 PMD block diagram 10GBASE-R/W - 52.4.1 PMD block diagram 10GBASE-LX4 - 53.4.1 PMD block diagram
At least 10km SMF		✓	1000BASE-X - 38.2.1 PMD block diagram 10GBASE-R/W - 52.4.1 PMD block diagram 10GBASE-LX4 - 53.4.1 PMD block diagram
At least 40km SMF		✓	1000BASE-X - 38.2.1 PMD block diagram 10GBASE-R/W - 52.4.1 PMD block diagram 10GBASE-LX4 - 53.4.1 PMD block diagram

802.3ap Backplane ethernet architectural positioning



AN = AUTO-NEGOTIATION
GMII = GIGABIT MEDIA INDEPENDENT INTERFACE
MDI = MEDIUM DEPENDENT INTERFACE
PCS = PHYSICAL CODING SUBLAYER
FEC = FORWARD ERROR CORRECTION

PHY = PHYSICAL LAYER DEVICE
PMA = PHYSICAL MEDIUM ATTACHMENT
PMD = PHYSICAL MEDIUM DEPENDENT
XGMII = 10 GIGABIT MEDIA INDEPENDENT INTERFACE

Figure 69–1—Architectural positioning of Backplane Ethernet

802.3ap Backplane link block diagram

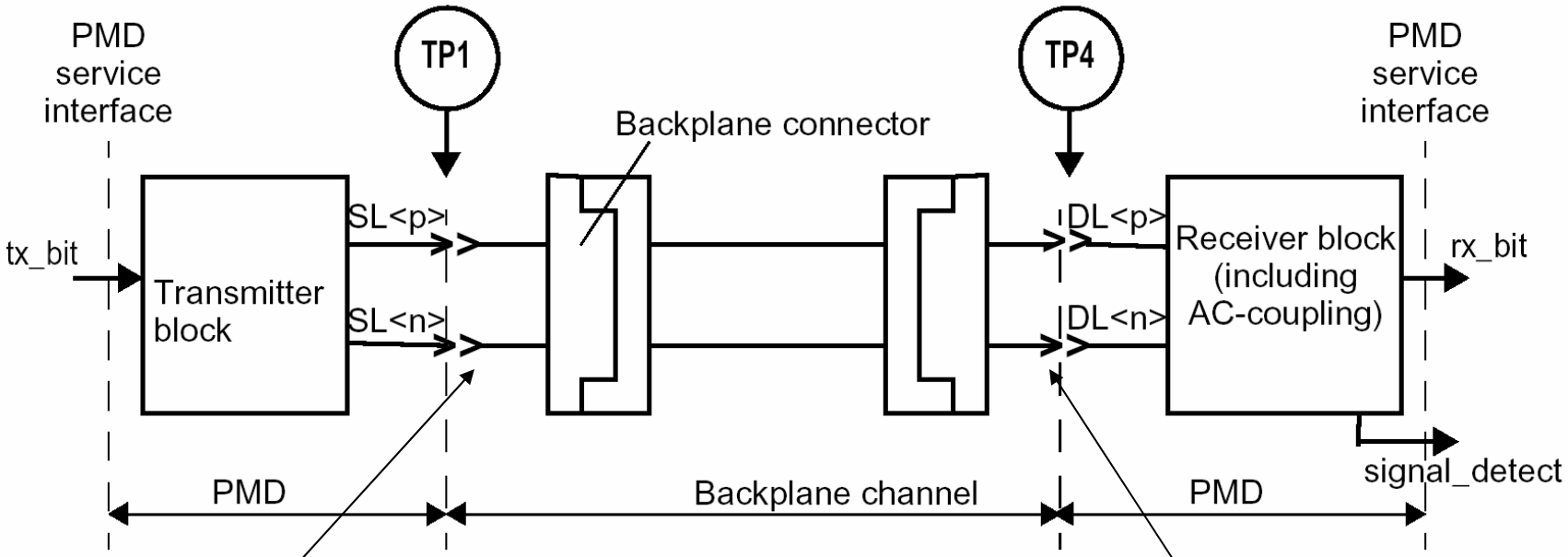


Figure 70–1—Link block diagram

PCB - Tx to connector included in link

The backplane interconnect is defined between test points TP1 and TP4

PCB – connector to Rx included in link

10GBASE-CX4 relationship to OSI reference model

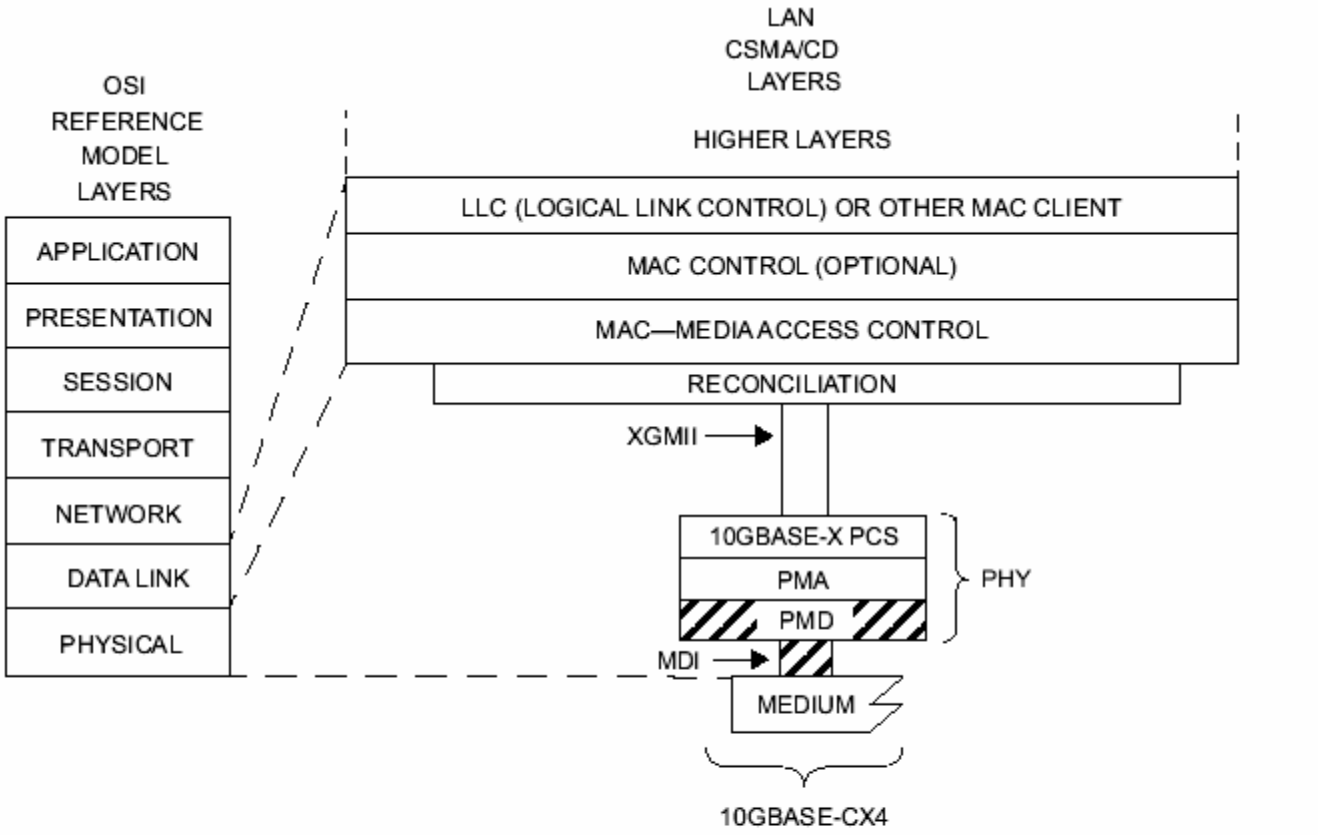


Figure 54–1—10GBASE-CX4 PMD relationship to the ISO/IEC Open Systems Interconnection (OSI) reference model and the IEEE 802.3 CSMA/CD LAN model

10GBASE-CX4 Link diagram

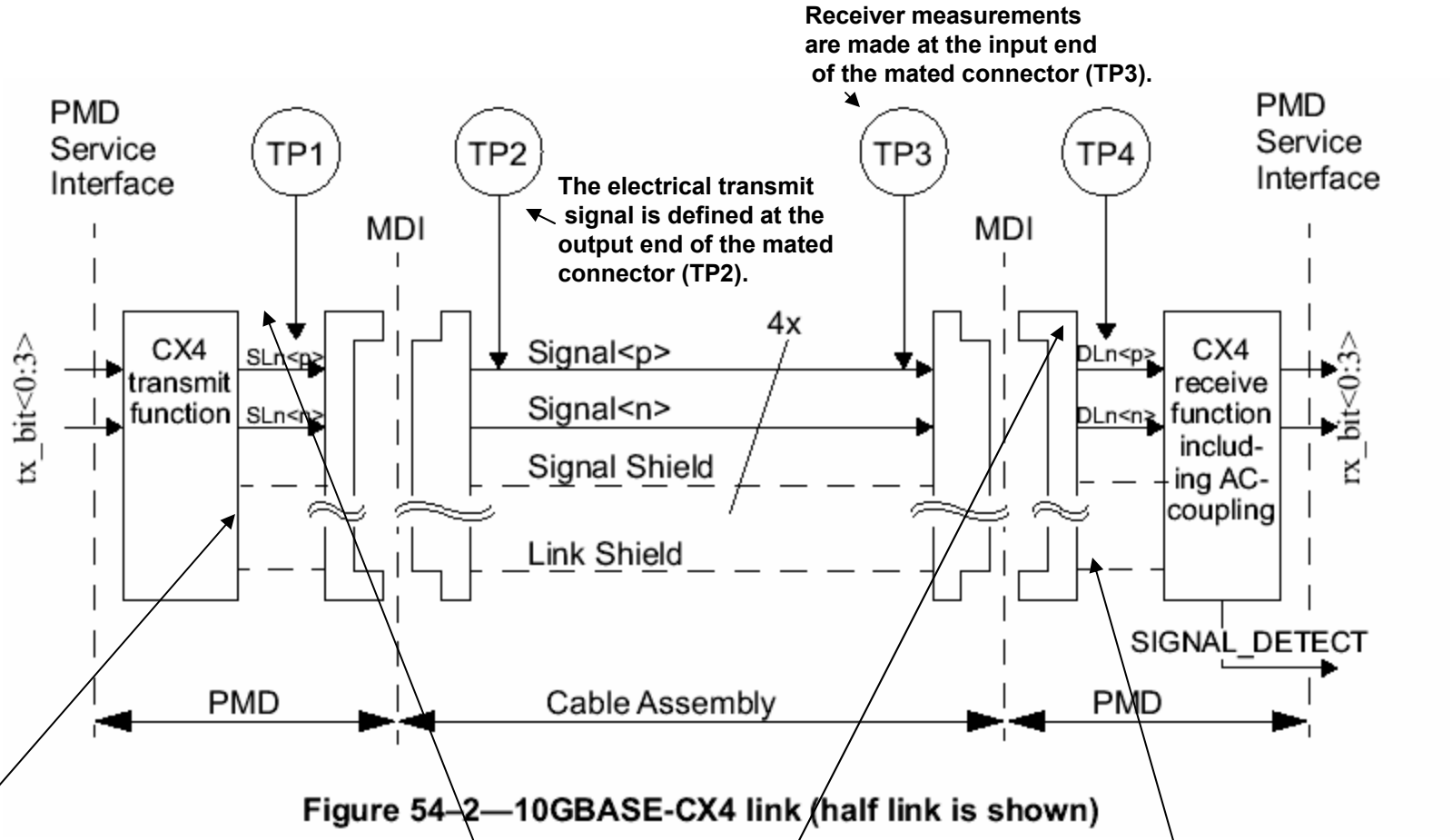


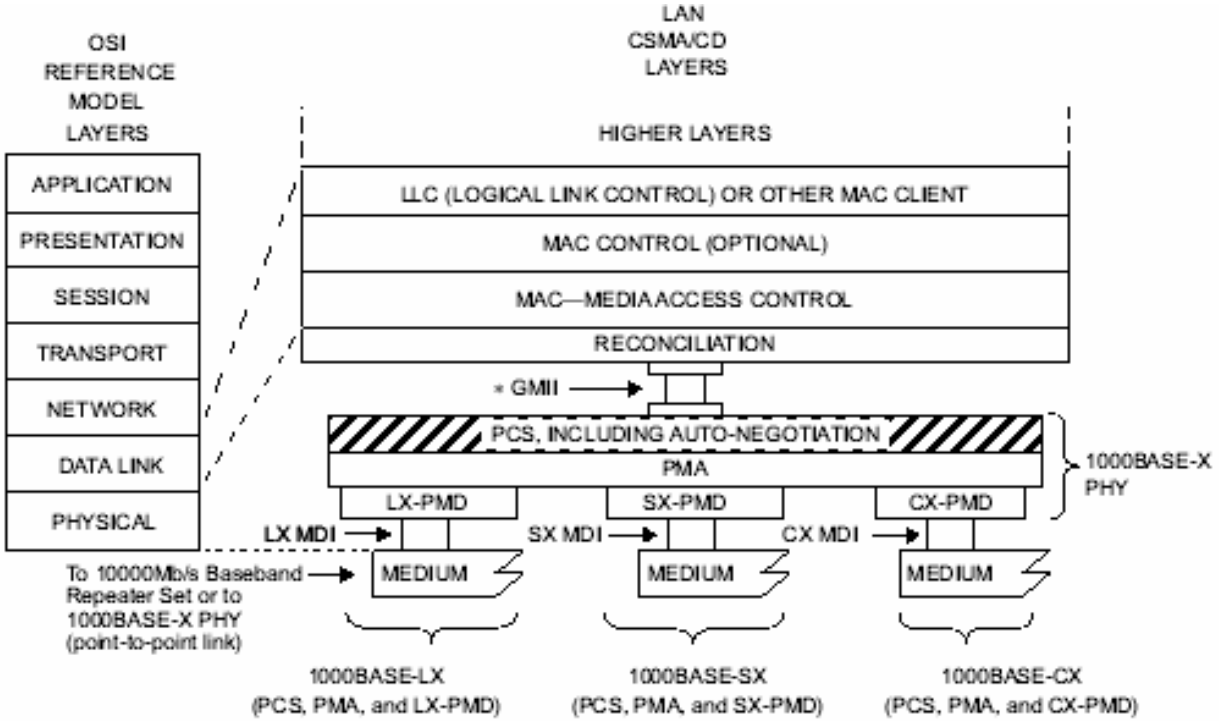
Figure 54–2—10GBASE-CX4 link (half link is shown)

PCB - Tx to connector not included in 10GBASE-CX4 link (2 in of FR4 assumed).

All cable assembly measurements are to be made between TP1 and TP4 as shown in Figure 54–2.

PCB – connector to Rx not included in 10GBASE-CX4 link (2 in of FR4 assumed)

1000BASE-X relationship to OSI reference model



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GMII=GIGABIT MEDIA INDEPENDENT INTERFACE
PCS=PHYSICAL CODING SUBLAYER
PMA=PHYSICAL MEDIUM ATTACHMENT
PHY=PHYSICAL LAYER DEVICE
PMD=PHYSICAL MEDIUM DEPENDENT
LX-PMD=PMD FOR FIBER—LONG WAVELENGTH, Clause 38
SX-PMD=PMD FOR FIBER—SHORT WAVELENGTH, Clause 38
CX-PMD=PMD FOR 150 Ω BALANCED COPPER CABLING, Clause 39

NOTE—The PMD sublayers are mutually independent.
* GMII is optional.

Figure 37–1—Location of the Auto-Negotiation function

802.3ba PMD test points

1000BASE-X PMD block diagram

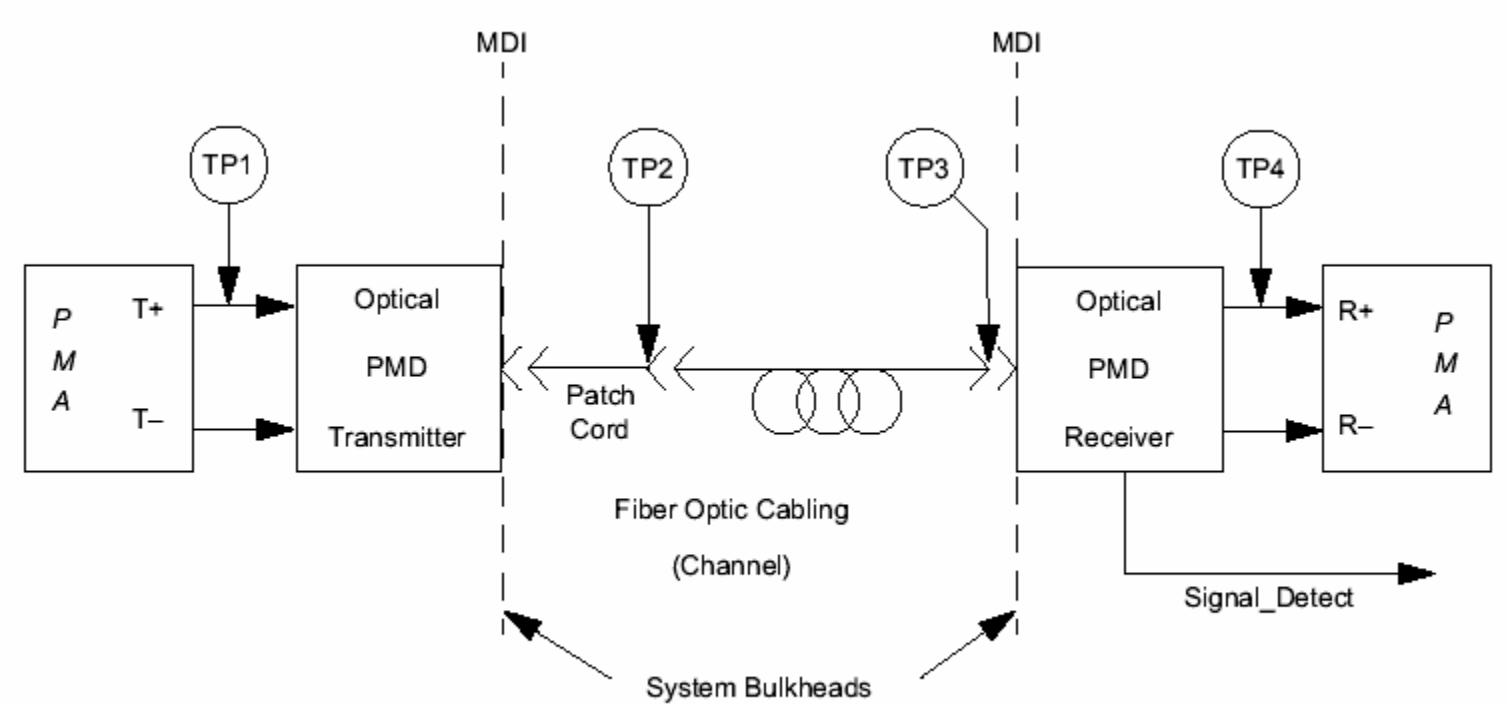


Figure 38–1—1000BASE-X block diagram

•TP1 and TP4 are standardized reference points for use by implementors to certify component conformance. The electrical specifications of the PMD service interface (TP1 and TP4) are not system compliance points (these are not readily testable in a system implementation). It is expected that in many implementations, TP1 and TP4 will be common between 1000BASE-SX, 1000BASE-LX, and 1000BASE-CX (Clause 39).

10GBASE-LX4 relationship to OSI reference model

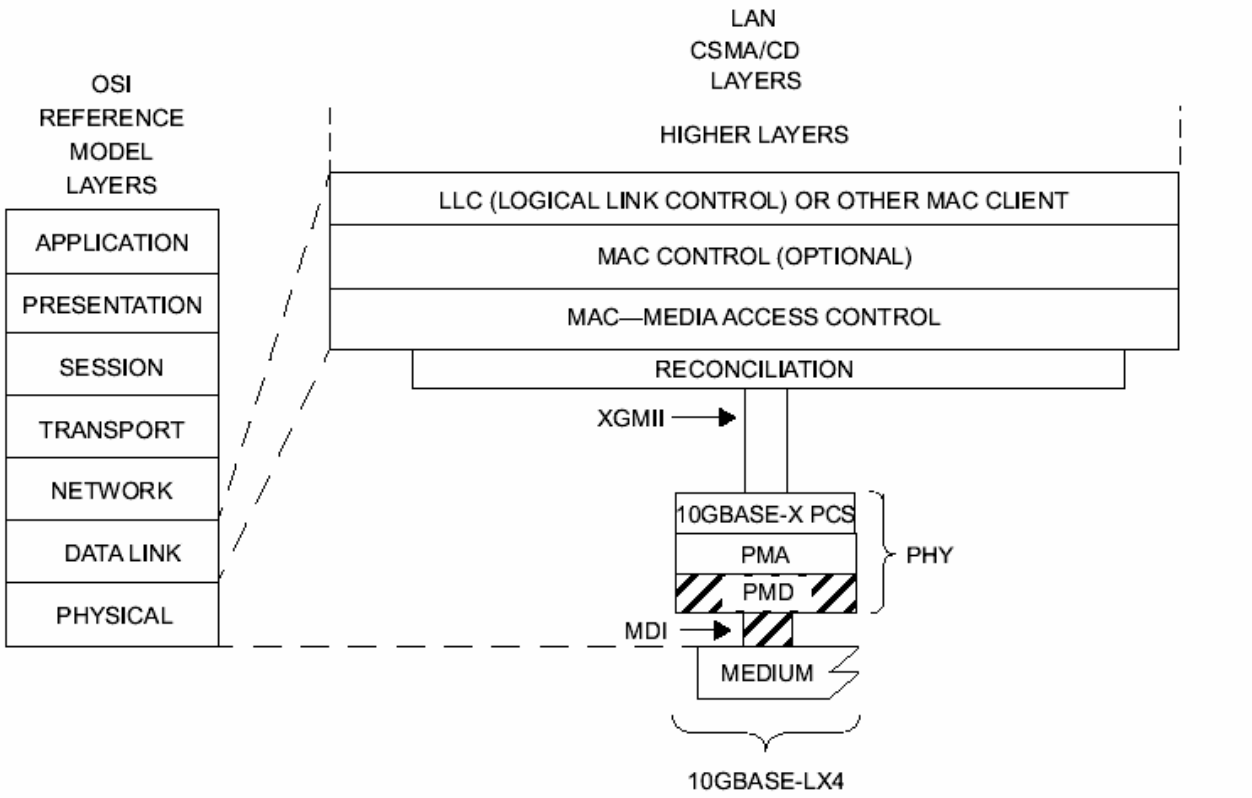
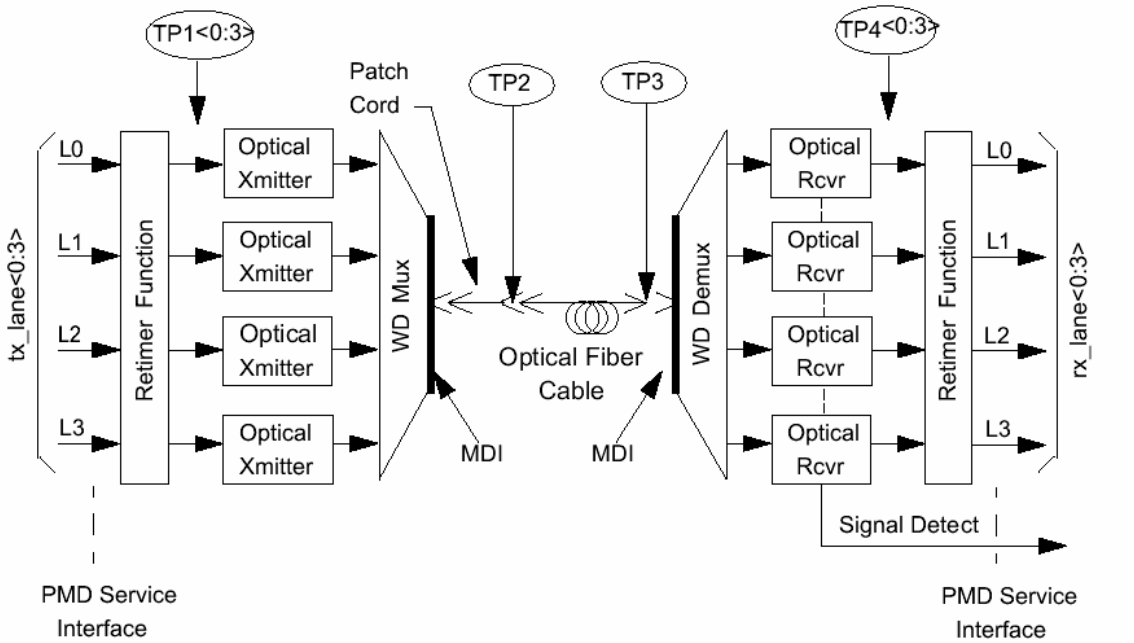


Figure 53–1—10GBASE-LX4 PMD relationship to the ISO/IEC Open Systems Interconnection (OSI) reference model and the IEEE 802.3 CSMA/CD LAN model

10GBASE-LX4 PMD block diagram

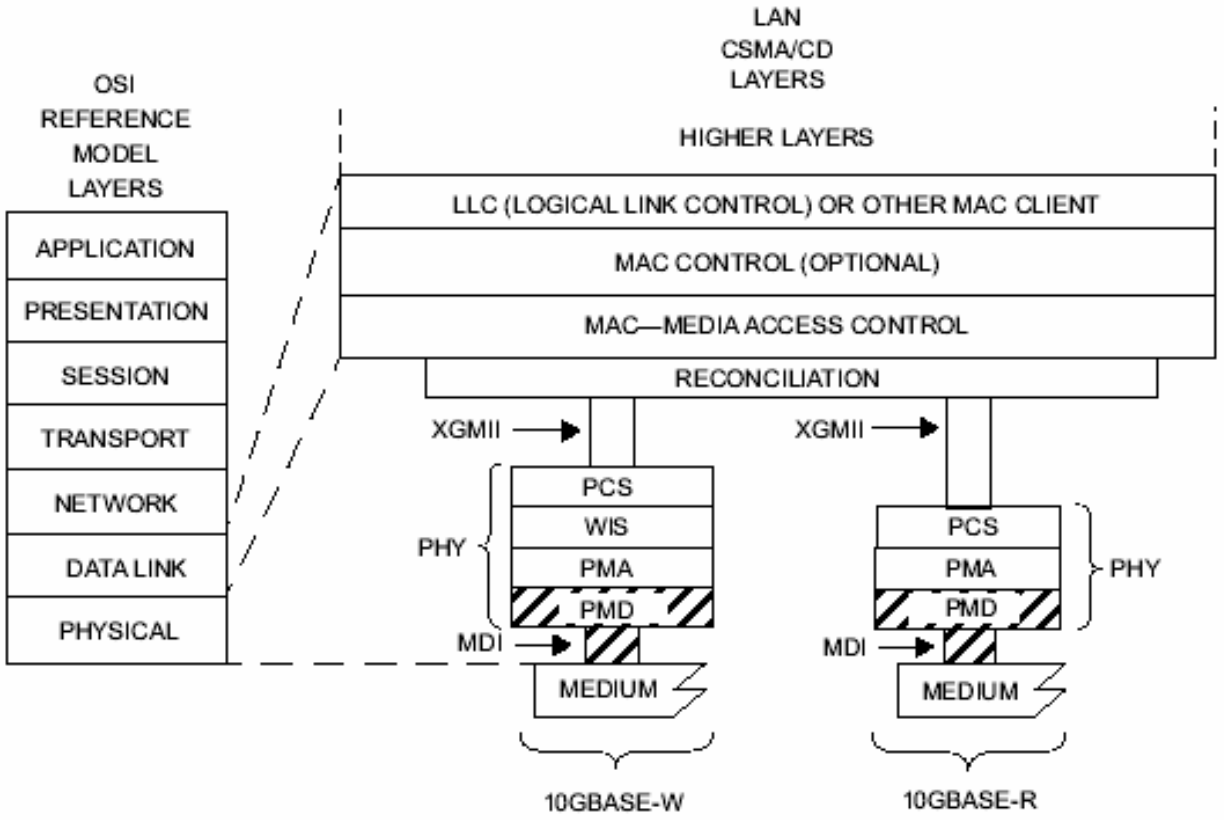


NOTE—Specification of the retimer function is beyond the scope of this standard; however, a retimer may be required to ensure compliance at test points TP2 and TP3.

Figure 53–2—Block diagram for LX4 PMD transmit/receive paths

•TP1 <0:3> and TP4 <0:3> are informative reference points that may be useful to implementers for testing components (these test points will not typically be testable in an implemented system).

10GBASE-S/L/E relationship to OSI reference model



MDI = MEDIUM DEPENDENT INTERFACE
PCS = PHYSICAL CODING SUBLAYER
PHY = PHYSICAL LAYER DEVICE
PMA = PHYSICAL MEDIUM ATTACHMENT
PMD = PHYSICAL MEDIUM DEPENDENT
WIS = WAN INTERFACE SUBLAYER
XGMII = 10 GIGABIT MEDIA INDEPENDENT INTERFACE

Figure 52–1—10GBASE-S, -L, and -E PMDs relationship to the ISO/IEC Open Systems Interconnection (OSI) reference model and the IEEE 802.3 CSMA/CD LAN model

10GBASE-R and 10GBASE-W PMD block diagram

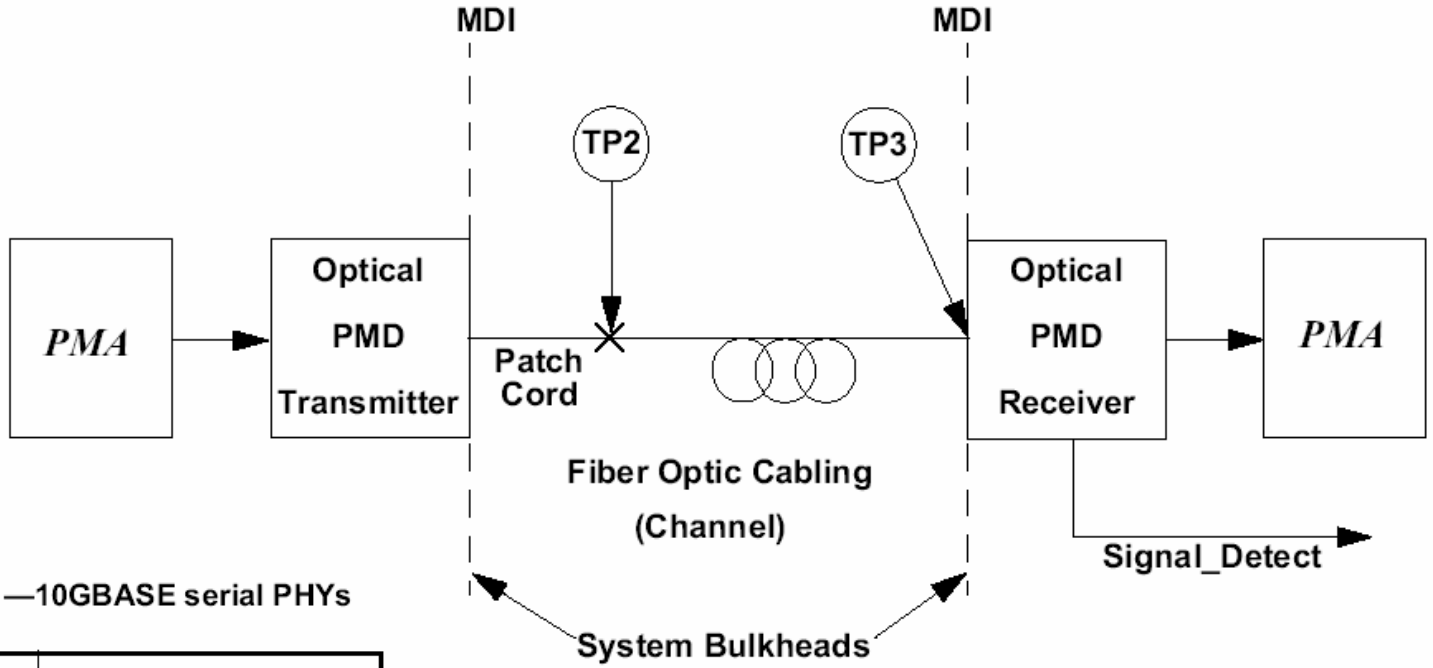
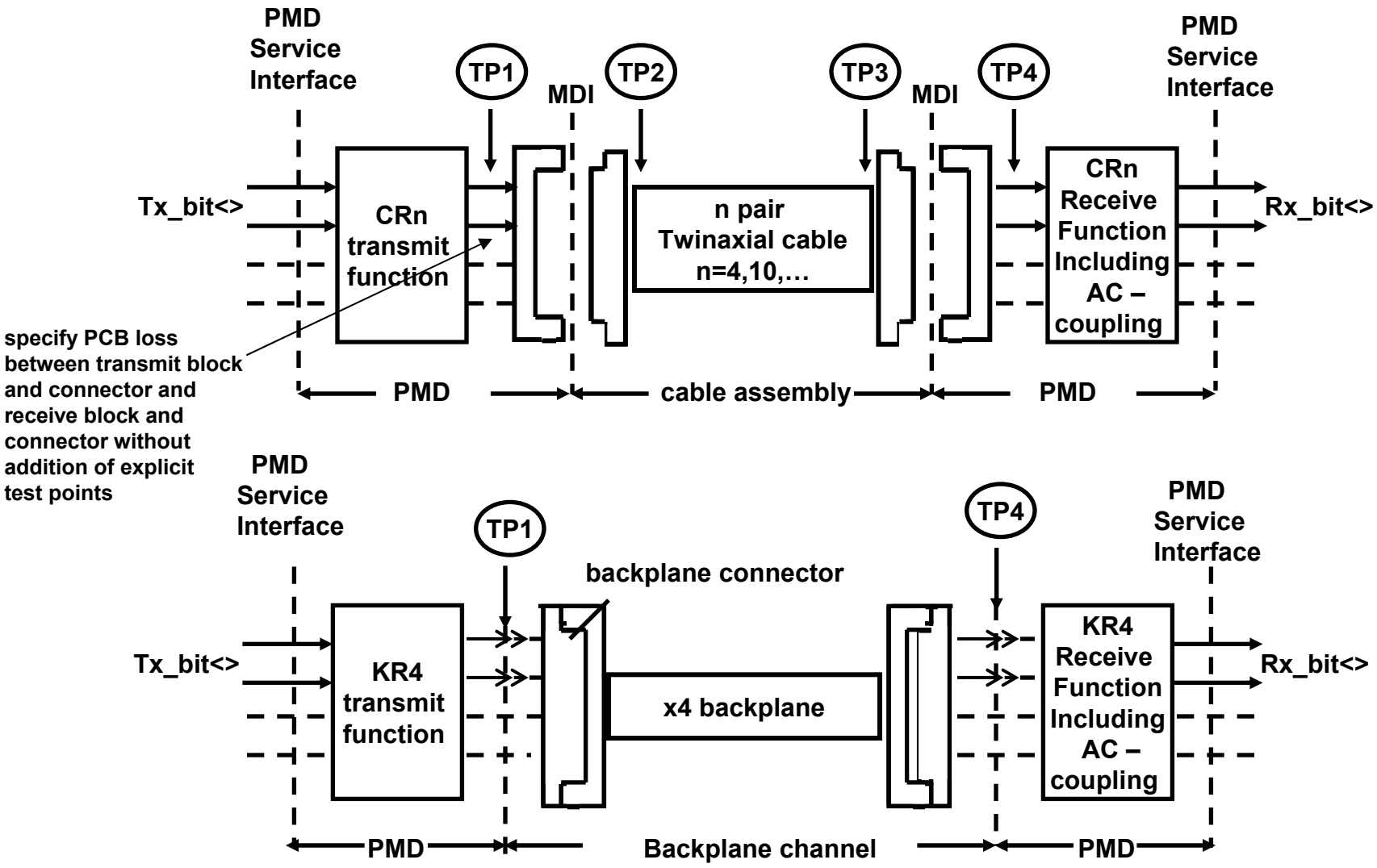


Figure 52–2—Block diagram

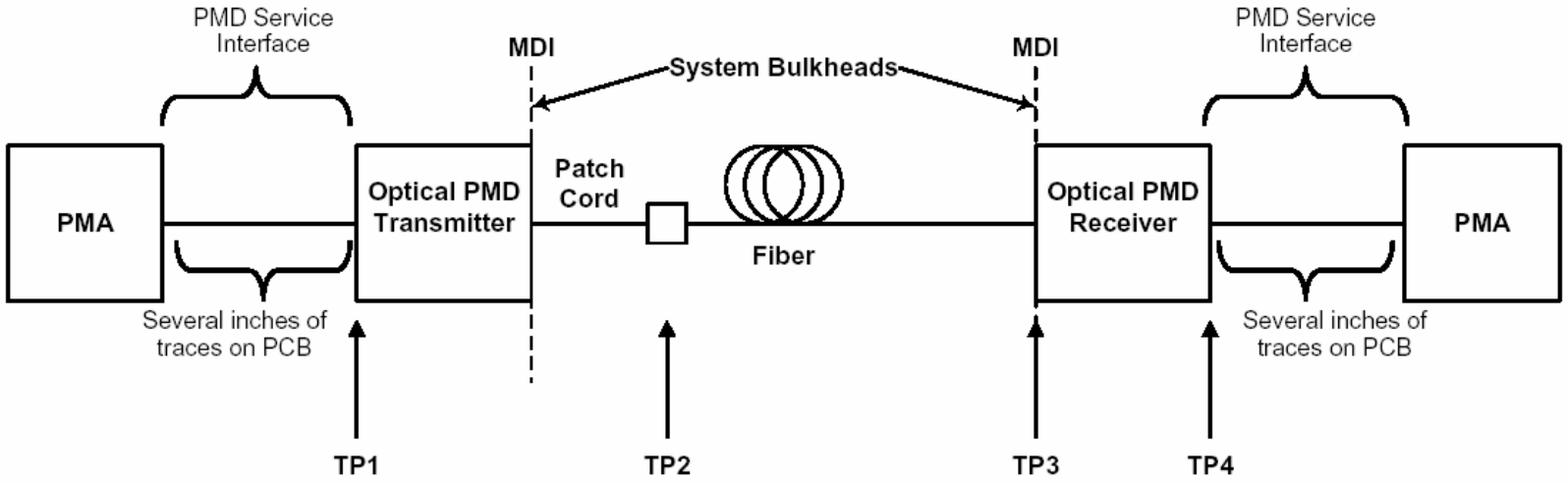
Table 52–1—10GBASE serial PHYs

Name	Description
10GBASE-SR	850 nm Serial LAN PHY
10GBASE-LR	1310 nm Serial LAN PHY
10GBASE-ER	1550 nm Serial LAN PHY
10GBASE-SW	850 nm Serial WAN PHY
10GBASE-LW	1310 nm Serial WAN PHY
10GBASE-EW	1550 nm Serial WAN PHY

802.3ba Cu link diagrams



802.3ba multimode fiber PMD block diagram



- The above block diagram shows relevant elements and interfaces for a link between two PMAs. The patch cord is included for the definition of TP2. Otherwise intermediate fiber connectors are not shown.
- TP1, TP2, TP3 and TP4 are traditional labels in 802.3 for interfaces of a fiber optics link. Here the PMA may be a host ASIC and the PMD may be a fiber optics module.

XAUI and XGXS relationship to OSI reference model

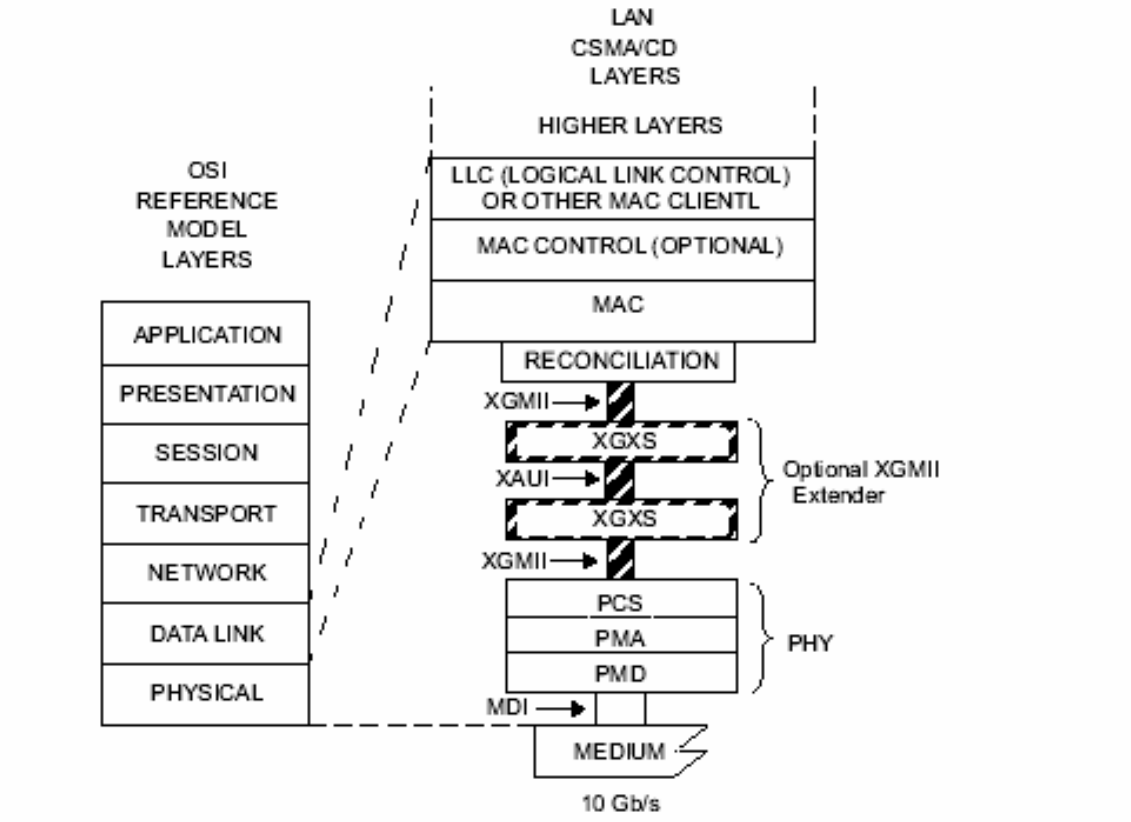


Figure 47–1—XAUI and XGXS relationship to the ISO/IEC Open Systems Interconnection (OSI) reference model and the IEEE 802.3 CSMA/CD LAN model