Channel Specifications Discussions

IEEE P802.3bj

100 Gb/s Backplane and Copper Cable Task Force

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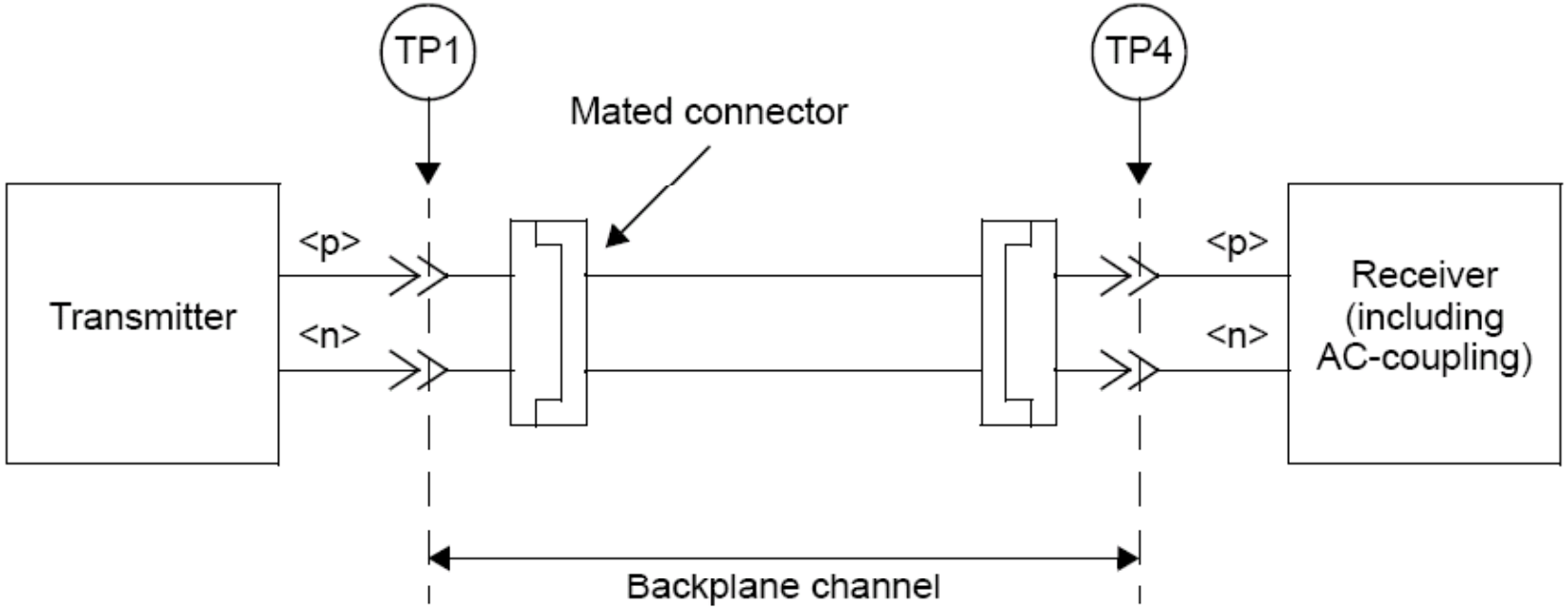
Just a Word

- This presentation discusses channel model specification methodology, not specific parameters or values.

Introduction

- Interconnect Reference Models
  - Differences between Backplane & Cable Assembly
    - Test points
    - Informative (backplane) vs Normative (cable)
  - Differences with MMF test points
- Overview of Channel Specifications
  - Mask Limits?
  - Post Processing?
  - Somewhere in between?

Backplane Interconnect Reference Model



NOTE—<p> and <n> represent the positive and negative traces of the differential pair

Figure 69B–1—Interconnect reference model

-CRn Interconnect Reference Model

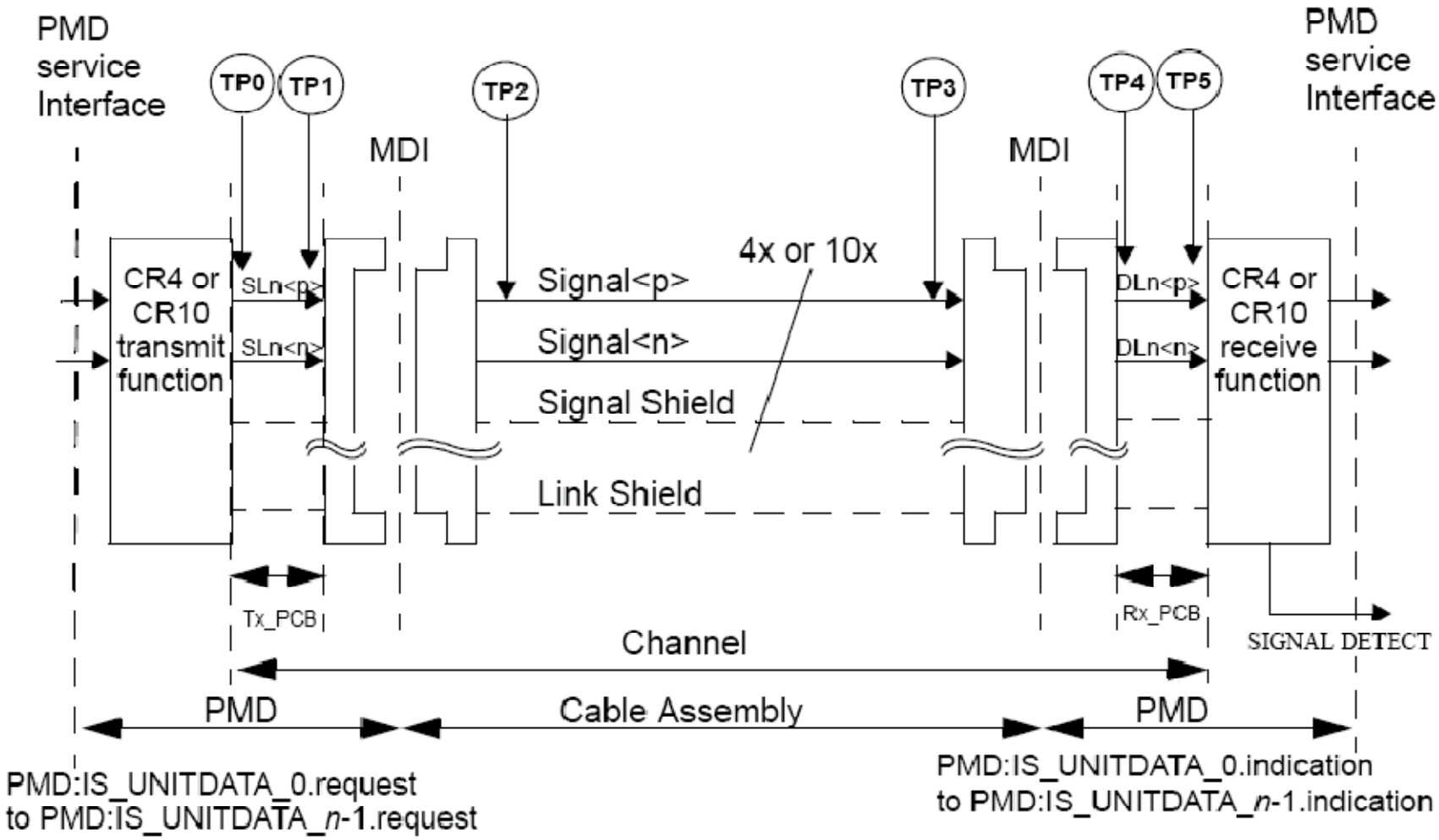


Figure 85–2—40GBASE-CR4 or 100GBASE-CR10 link (half link is illustrated)

-CRn Model Including Test Boards

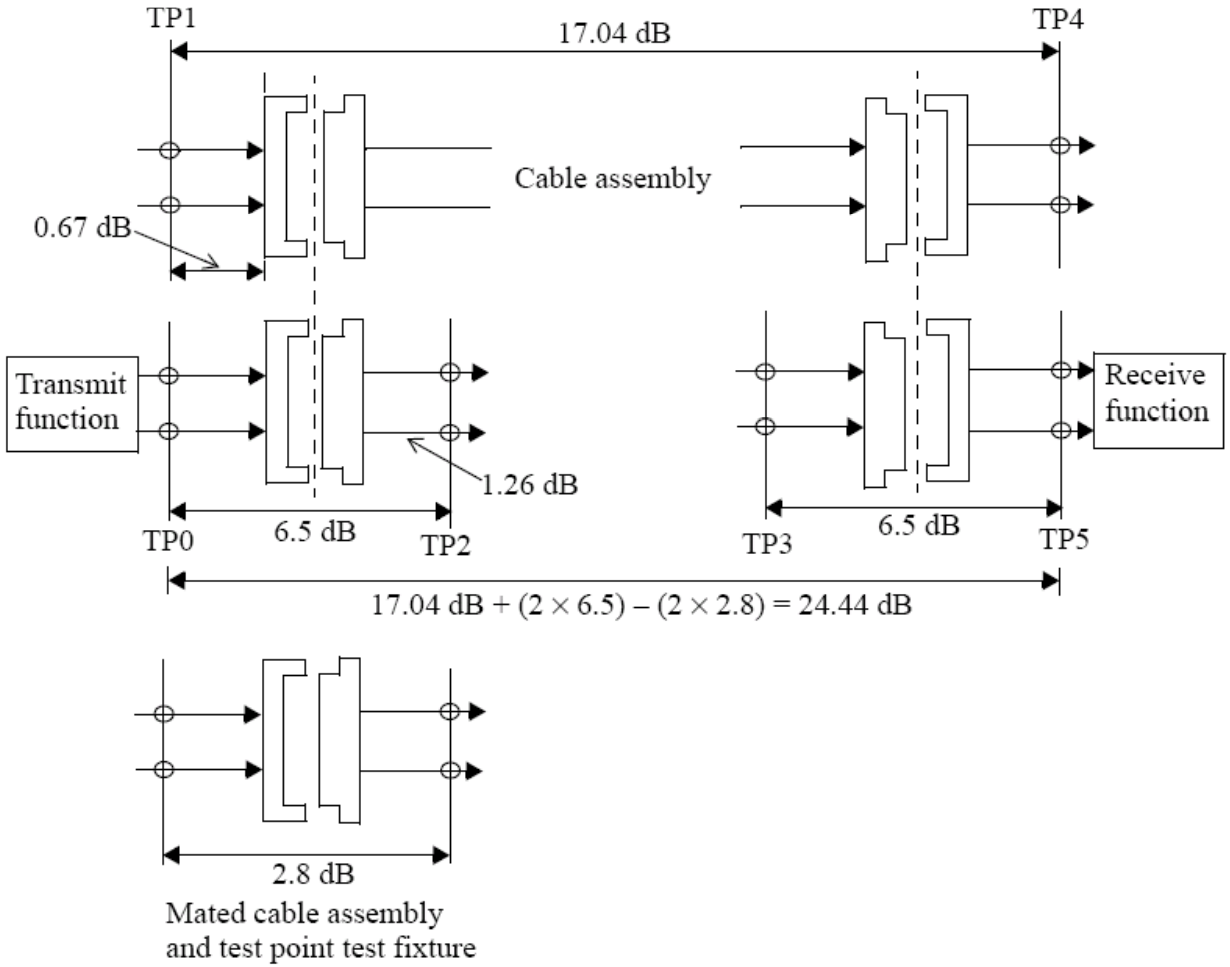


Figure 85A–1—Illustration of channel insertion loss budget at 5.15625 GHz

-CRn AC Coupling

- 85.8.4.5 – AC Coupling
  - AC coupled
    - Style 1 40GBASE-CR4 and 100GBASE-CR10 connectors
      - Receive lanes are ac coupled
      - Coupling capacitors shall be within the plug connectors
      - Part of the cable assembly, between TP3 and TP4 in plug
    - Style 2 40GBASE-CR4 connectors
      - " …. shall be part of the receive function"
  - Noted – may be various methods for AC coupling
  - Low frequency 3dB cutoff less than 50 kHz

-SRn Test Points

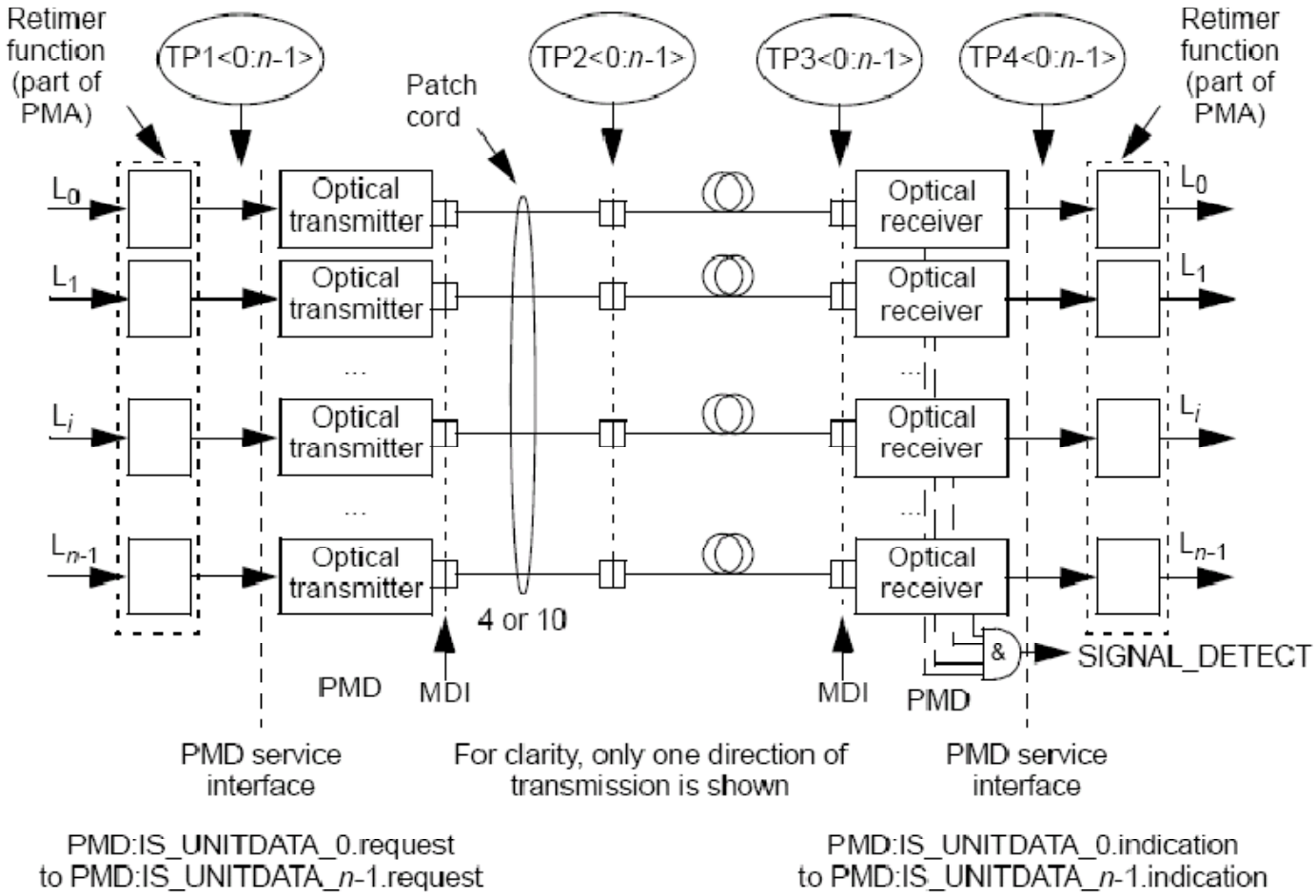
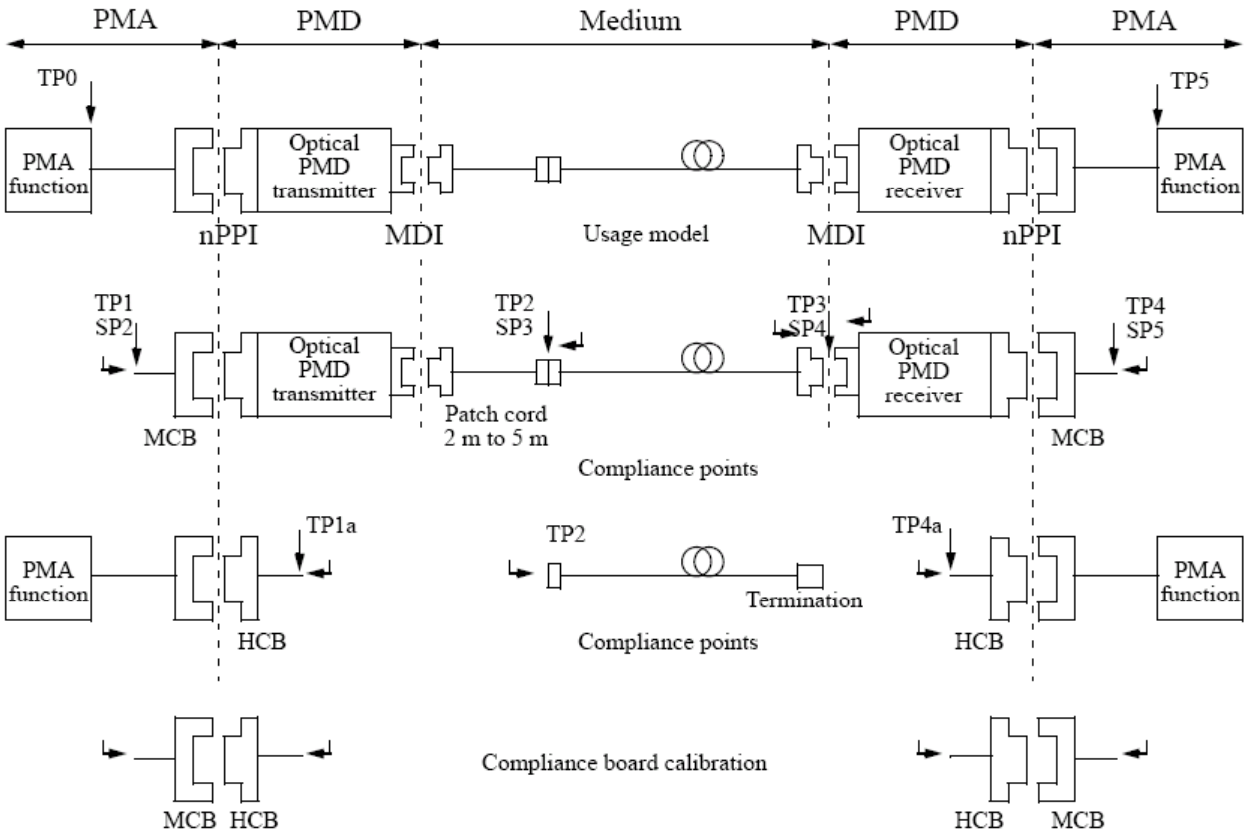


Figure 86–2—Block diagram for 40GBASE–SR4 and 100GBASE–SR10 transmit/receive paths

-SRn Test Points



HCB = Host Compliance Board
MCB = Module Compliance Board
nPPI = 40 Gb/s or 100 Gb/s Parallel Physical Interface
↳ Instrument "looks" this way (e.g., direction of stimulus)

Figure 86–3—Test points for 40GBASE-SR4 and 100GBASE-SR10

-nPPI AC Coupling

- 86A.4.1 nPPI host to module electrical specifications
  - "… The module electrical input shall be AC coupled, i.e., it shall present a high DC common-mode impedance at TP1. There may be various methods for AC coupling in actual implementations."

- 86A.4.2 nPPI module to host electrical specifications
  - "…. The module electrical output shall be AC coupled, i.e., it shall present a high DC common-mode impedance at TP4. There may be various methods for AC coupling in actual implementations.

CAUI Test Points

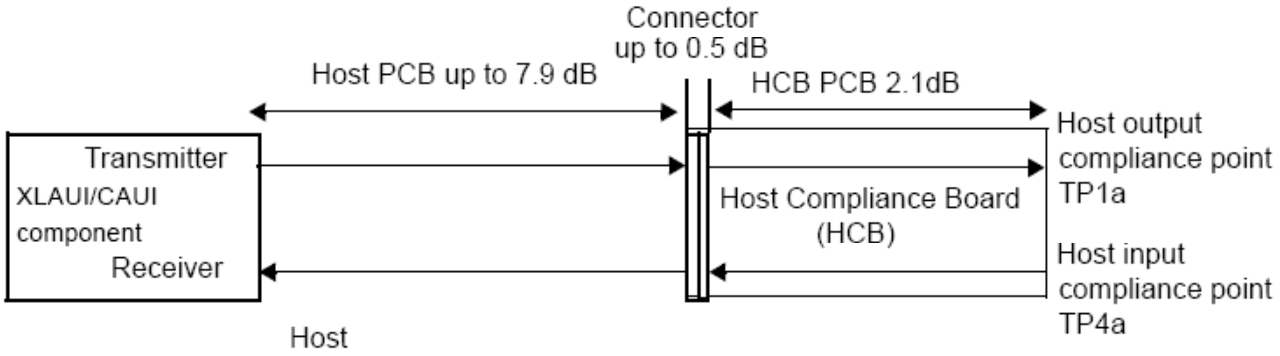


Figure 83B–4—Chip-module HCB insertion loss budget at 5.15625 GHz

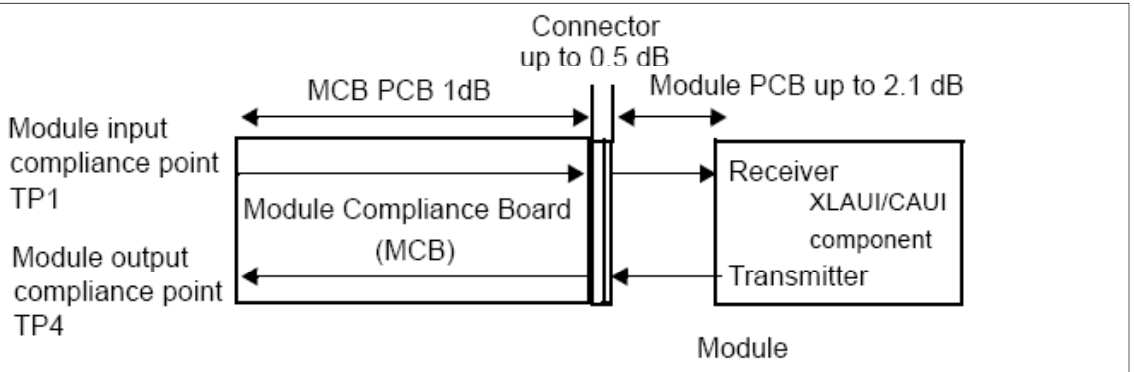


Figure 83B–6—Chip-module with MCB insertion loss budget at 5.15625 GHz

Summary Comparing Test Points

TP	Backplane	CAUI	Cu (Twin-ax) Cabling	MMF (nPPI)
	Fig 69B.1	Figs 83B-4 , 83B-6	Fig 85-2 (85A.1)	Fig 86-2 (86-3)
TP0			@ Tx (6.5dB from TP2 on MCB)	@ PMA 4.4dB host loss max without connector
TP1	@ Tx	@ MCB Loss from connector defined by Ea 83B-4 (1dB)	Host side 0.67dB from connector plug on host	@ MCB Loss from TP1A defined by Eq 86A-6 and 86-7 AC Coupling cap after TP1
TP1A		@ HCB Loss from connector defined by Ea 83B-3 (2.1dB)		@ HCB Loss from TP0 Defined by EQ 86A-15 and 86A-16
TP2			1.26dB from connector on HCB	Patch cord after optical Tx (2-5m)
TP3			1.26dB from connector on HCB	@ cable end to Optical Rx
TP4A		@ HCB Loss from connector defined by Ea 83B-3 (2.1dB)		@ HCB Loss from TP5 Defined by EQ 86A-15 and 86A-16
TP4	@ Rx, which includes AC coupling	@ MCB Loss from connector defined by Ea 83B-4 (1dB)	Host side 0.67dB from connector plug on host Type 1: AC coupling before in connector Type 2: AC coupling part of Rx function	@ MCB Loss from TP4A defined by Eq 86A-6 and 86-7 AC coupling prior to TP4
TP5			@ Rx (6.5dB from TP3 on MCB)	@ PMA 4.4dB host loss max without connector

* Note – all loss #'s at 5.15625 GHz

Overview of channel specifications

Increasing post-processing

Measurement	Annex 69B	Clause 85	moore_01_0311	OIF-CEI-2.0
SDD21 (victim)	Insertion loss mask	Insertion loss mask	Pulse or dibit gain	StatEye
	Fitted attenuation mask	Fitted attenuation		
	Insertion loss deviation mask	Insertion loss deviation mask	Channel noise	
SDD11 (victim)	Return loss mask	Return loss mask		
SDD22 (victim)				
SDD21 (aggressors)	Insertion loss to crosstalk ratio mask	Integrated crosstalk noise	Integrated crosstalk noise	

Decreasing margin allocation in channel budget

[1] http://www.ieee802.org/3/100GCU/public/mar11/moore_01_0311.pdf
[2] http://www.oiforum.com/public/documents/OIF_CEI_02.0.pdf

Issues

- Test Point Commonality for –CR and -KR
  - Consistent with IEEE 802.3 (802.3ap, 802.3ba)?
  - Self consistent within IEEE 802.3bj?
  - Consistent with future optics test point definitions?
- Specification Complexity
  - Mask Limit Based?
  - Complex Post Processing?
  - Somewhere in between?
- Parameters

Other Issues

- Test Board Specifications
- Normative vs Informative Channel Specifications
  - Backplane
  - Cabling
- If needed - Channel definitions for non-FEC and FEC PHYs