

Comment: Changes to Test Points

Joel Goergen – Cisco, Beth Kochuparambil – Cisco

Summary: This presentation shares the outcome of the consensus activity surrounding test points and test fixtures.

Supporters

- Rick Rabinovich – Alcatel-Lucent
- Matt Brown – AppliedMicro
- Charles Moore – Avago
- Ali Ghiasi – Broadcom
- Umesh Chandra – Dell
- Yasuo Hidaka – Fujitsu
- Alex Umnov – Huawei
- John Ewen – IBM
- Adee Ran – Intel
- Dave Chalupsky – Intel
- Kent Lusted – Intel
- Rich Mellitz – Intel
- Liav Ben Artsi – Marvell
- Scott Irwin – MoSys
- Pavel Zivny – Tektronix

Update: Consensus Building Activity

- Hosted ongoing discussions to action item accepted at March plenary
 - Resulting from zivny_01_0312 and goergen_01_0312
 - Presenter volunteers to lead, and Chair encourages, off line consensus building on the topic [AC cap/test points].
- 8 calls and numerous email exchanges
- 49 individuals involved from 29 affiliations
 - Adam Healey, Adee Ran, Alex Umnov, Ali Ghiasi, Andy Zambell, Ben Rubovitch, Bengt Kvist, Beth Kochuparambil, Bhavesh Patel, Brian Misek, Charles Moore, Dan Dove, Dariush Dabiri, David Chalupsky, Ed Sayre, Francois Tremblay, Ingvar Karlsson, Joe Pankow, Joel Goergen, John D'Ambrosia, John Lehman, Kent Lusted, Liav Ben Artsi, Madhumitha Rengarajan, Matt Brown, Megha Shanbhag, Merrick Moeller, Mike Dudek, Mike Li, Mohammad Kermani, Mounir Meghelli, Myles Kimmet, Nathan Tracy, Oren Sela, Pavel Zivny, Piers Dawe, Pravin Patel, Rich Mellitz, Rick Rabinovich, Ron Kennedy, Scott Irwin, Umesh Chandra, VasuPathasarathy, Wheling Cheng, Wolfgang Meier, Yasuo Hidaka, Yoav Rozenberg, Yonatan Malkiman, Ziad Hatab
- Reached perceived consensus within group; no additional concerns have surfaced via phone or e-mail that need to be addressed.

Continued calls/e-mails of group resulted in these...

Points of Consensus: Test Points

- Define Test point TP0 at the transmitter BGA and TP5 at the receiver BGA, currently shown as a place holder in the draft, figure 93-2.
- In a suitable annex, describe an implementation with TP0 to TP1, TP2 to TP3, and TP4 to TP5, where 1, 2, 3, and 4 are reference points similarly defined in the cabling test point specifications.
- In a suitable annex (the same annex describing additional test points for reference listed above), recommend an implementation with the capacitor located between TP3/TP4 connector and TP5, maintaining compatibility with 10GBASE-KR and 40GBASE-KR4.

Editor's note (to be removed prior to final publication):

The following link illustration and test point model is a placeholder that was structured to be consistent with the test point nomenclature in dudek_03_0312.pdf.

One direction of a 100GBASE-KR4 link is shown in Figure 93–2.

PLACEHOLDER

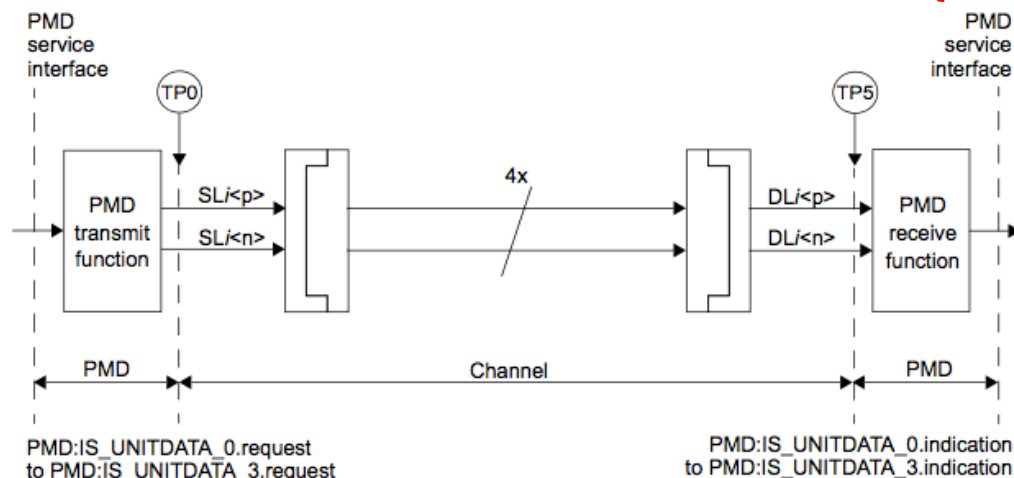


Figure 93–2—100GBASE-KR4 link (one direction is illustrated)

Current Link Diagram: Excerpts from Draft 1.0

94.3.6.1 Link block diagram

One direction of a 100GBASE-KP4 link is shown in Figure 94–4.

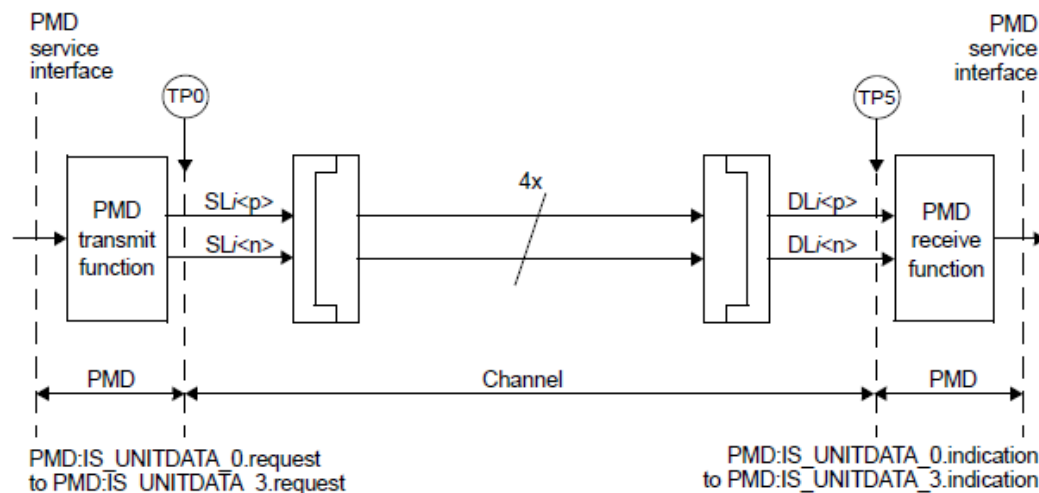


Figure 94–4—100GBASE-KP4 link (one direction is illustrated)

Proposed Comment To The Floor

Comment Type: FLOOR Cl: 93 SC: 93.7.1 P: 128 L: 3

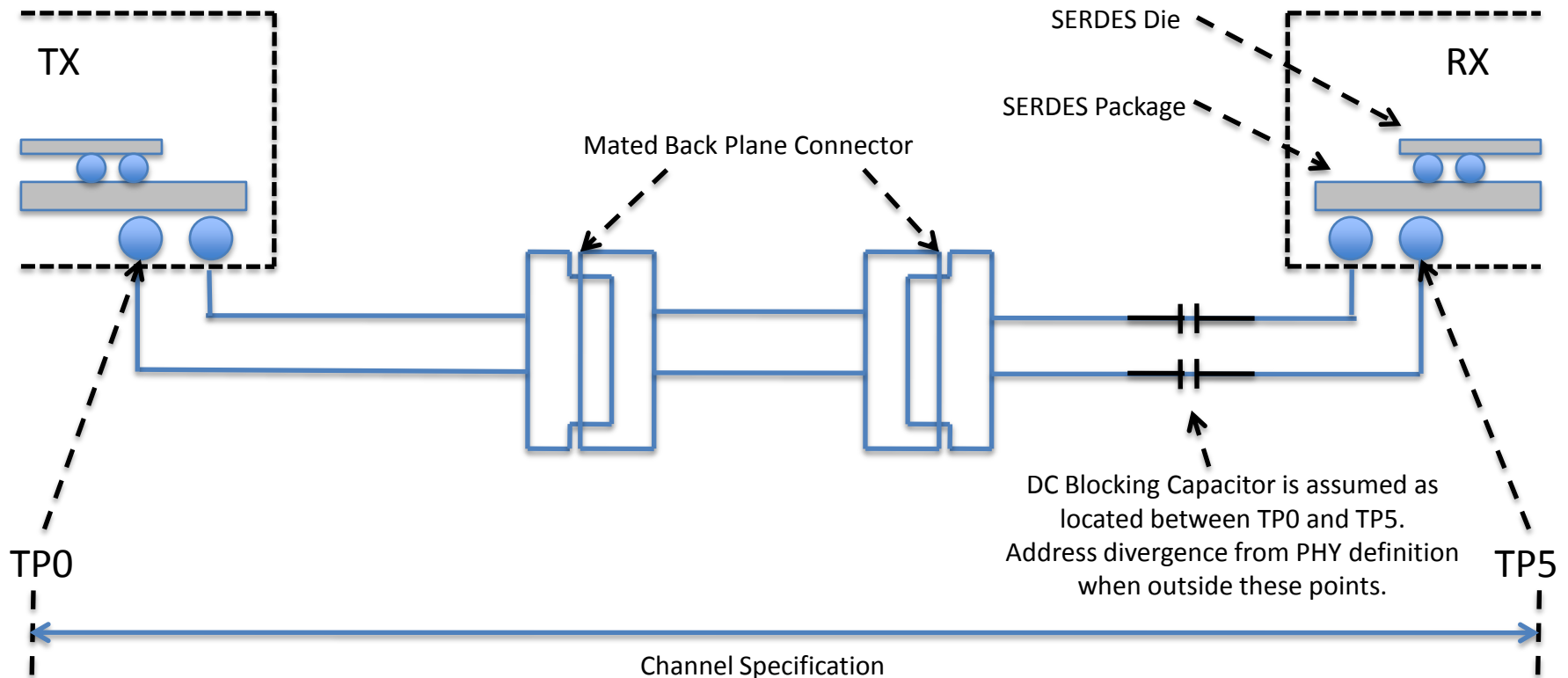
- **Clause 93 link diagram and editor's note in draft 1.0 are place holders. Additionally, clarification is missing from figure.**
- Suggested Remedy
 - Remove editor's note
 - Replace Figure 93-2 with the attached figure
 - Add and reference link diagram in an annex with additional test points (attached figure)
- Other comments on link diagrams: #212 by Mike Dudek, #167 by Piers Dawe

Proposed Comment To The Floor

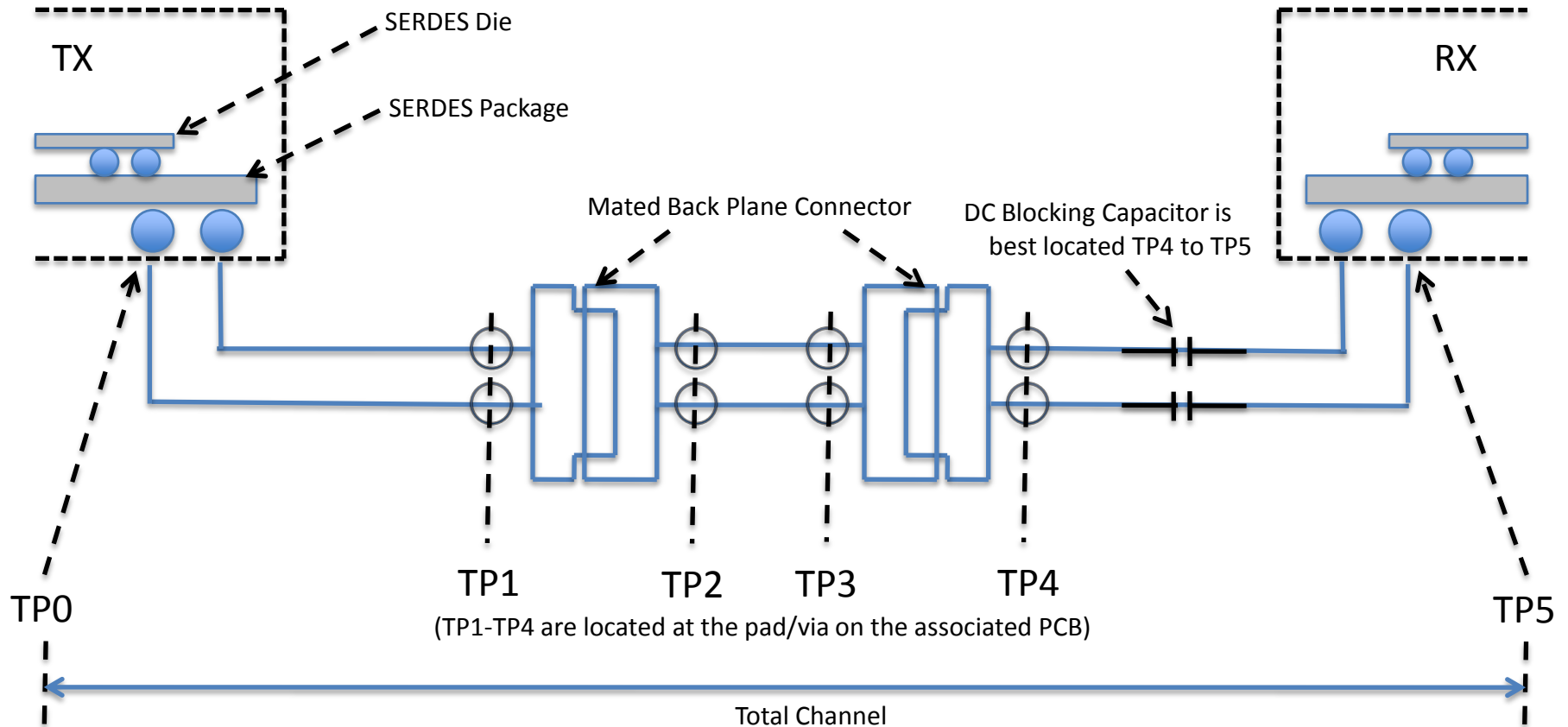
Comment Type: FLOOR Cl: 94 SC: 94.3.6.1 P: 157 L: 3

- **Clause 94 link diagram is missing clarification in figure.**
- Suggested Remedy
 - Replace Figure 94-4 with the attached figure
 - Reference annex for link diagram of additional test points, if desired for implementation,
- Other comments on link diagrams: #212 by Mike Dudek, #167 by Piers Dawe

Replacement for Figure 93-2 & Figure 94-4



Additional Test Point Figure for Annex



Current TX/RX Test Points: Excerpts from Draft 1.0

93.8.1 Transmitter characteristics

Transmitter characteristics measured at TP0 are summarized in Table 93–4.

Table 93–4—Summary of transmitter characteristics at TP0

93.8.2 Receiver characteristics

Receiver characteristics measured at TP5 are summarized in Table 93–6.

Table 93–6—Summary of receiver characteristics at TP5

94.3.11 PMD Transmitter electrical characteristics

Transmitter characteristics measured at TP0 are summarized in Table 94–4.

Table 94–4—Summary of transmitter characteristics at TP0a

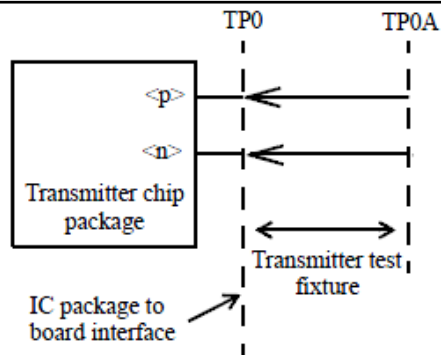


Figure 94–5—Transmitter test fixture and test points.

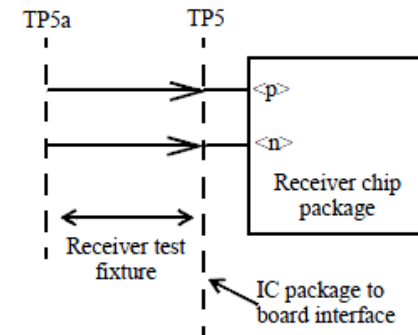


Figure 94–9—Receiver test fixture and test points.

94.3.12 PMD Receiver electrical characteristics

Receiver characteristics measured at TP5 are summarized in Table 94–6.

Table 94–6—Summary of receiver characteristics at TP5

Comment #84 by Charles Moore

CI 93	SC 93.8.1	P 130	L 50	# 84
Moore, Charles		Avago Technologies		
Comment Type	TR	Comment Status	X	
TP0 is inaccessible for measurement. We need to add a test point TP0A, connected to TP0 through a specified channel.				
SuggestedRemedy				
change line:				
"Transmitter characteristics measured at TP0 are summarized in Table 93–4."				
to				
"Transmitter characteristics measured at TP0A are summarized in Table 93–4."				
Add definition of TP0A to be connected to Tx Under test by a channel with:				
1.3dB <IL at Nyquist < 1.6dB				
Return loss > 15dB 10MHz to 15 GHz				
Proposed Response		Response Status	O	

- Alternate Suggested Remedy
 - Add attached figure (incorporating TP0a)
 - Update 93.8.1 label and description – as Charles recommends
 - Update Table 93-4 label
 - Leave loss and return loss for TP0 to TP0a as TBD for further discussion

Proposed Comment To The Floor

Comment Type: FLOOR Cl: 93 SC: 93.8.2 P: 136 L: 3

- **RX verification at TP5 has limited accessibility for measurement; TP5a could be placed after a specified channel**
- Suggested Remedy
 - Add attached figure (incorporating TP5a)
 - Update 93.8.2 label and description to “TP5 or TP5a”
 - Update Table 93-6 label and add column of test point for each test.
 - Leave loss and return loss for TP5 to TP5a as TBD for further discussion
- Other comments on TX/RX Test Points: #212 by Mike Dudek, #167 by Piers Dawe

Comment #106 by Charles Moore

CI 94	SC 94.3.11	P160	L 3	# 106
Moore, Charles		Avago Technologies		
Comment Type	TR	Comment Status X		
TP0 is inaccessible for measurement. Usetest point TP0A, connected to TP0 through a specified channel.				
SuggestedRemedy				
change line:				
"Transmitter characteristics measured at TP0 are summarized in Table 93-4."				
to:				
"Transmitter characteristics measured at TP0A are summarized in Table 93-4."				
Proposed Response		Response Status O		

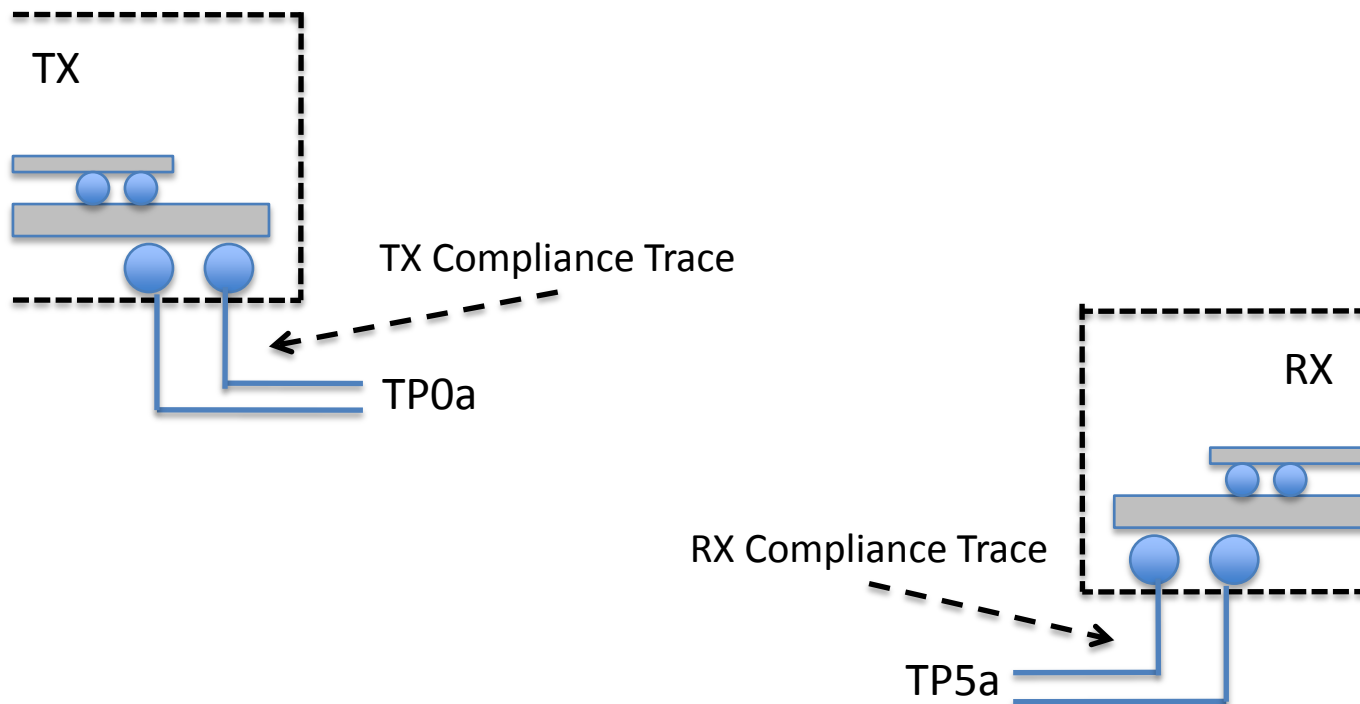
- Alternate Suggested Remedy
 - Replace Figure 94-5 with the attached figure
 - Update 94.3.11 label and description
 - Update Table 94-4 label
 - Leave loss and return loss for TP0 to TP0a as TBD for further discussion

Comment #104 by Charles Moore

CI 94	SC 94.3.12	P167	L 2	# 104
Moore, Charles		Avago Technologies		
Comment Type	T	Comment Status	X	
TP5 is inaccessible for measurement. Usetest point TP5A, connected to TP0 through a specified channel.				
<i>SuggestedRemedy</i>				
change line:				
"Receiver characteristics measured at TP5 are summarized in Table 93–4."				
to:				
"Receiver characteristics measured at TP5A are summarized in Table 93–4."				
Proposed Response	Response Status O			

- Alternate Suggested Remedy
 - Replace Figure 94-9 with the attached figure
 - Update 94.3.12 label and description
 - Update Table 94-6 label and add column of test point for each test.
 - Leave loss and return loss for TP5 to TP5a as TBD for further discussion

Additions/Replacements for TX/RX Verification Test Points



Thank you to the consensus group
for your diligence and participation!

backup slides are attached

Comment #212

CI 92	SC 92.7.1	P90	L 48	# 212
Dudek, Mike		QLogic		
Comment Type	T	Comment Status	X	
In table 92-4 The Test points TP0 to TP1 and TP4 to TP5 don't match the description. There are no mated connector pairs between eg TP0 and TP1				
SuggestedRemedy				
Change the test points on this row from TP1 to TP2 and from TP4 to TP3				
Proposed Response	Response Status		O	

Comment #167

CI 92	SC 92.8.3.4	P 100	L 33	# 167
Dawe, Piers		IPtronics		
Comment Type	E	Comment Status	X	
Editor's note (to be removed prior to final publication) says "In Annex 92A, the insertion loss from TP0 to TP2 or from TP3 to TP5 is 10 dB at 12.8906 GHz. I think it's actually eq 92-14, not Annex 92A. Also, it is useful information in the longer term.				
<i>Suggested Remedy</i>				
Change to an enduring informative NOTE--The maximum insertion loss from TP0 to TP2 or from TP3 to TP5 is 10 dB at 12.8906 GHz. Similarly for 92.8.3.7 Test fixture insertion loss, 92.10.8 Cable assembly test fixture, and 92.10.9.1 Mated test fixtures insertion loss.				
Proposed Response		Response Status	O	

What is Available: Test Points

72.6.1 Link block diagram

For purposes of system conformance, the PMD sublayer is standardized at test points TP1 and TP4 as shown in Figure 72–1. The transmitter and receiver blocks include all off-chip components associated with the respective block. For example, external AC-coupling capacitors, if required, are to be included in the receiver block.

The electrical path from the transmitter block to TP1, and from TP4 to the receiver block, will affect link performance and the measured values of electrical parameters used to verify conformance to this standard. Therefore, it is therefore recommended that this path be carefully designed.

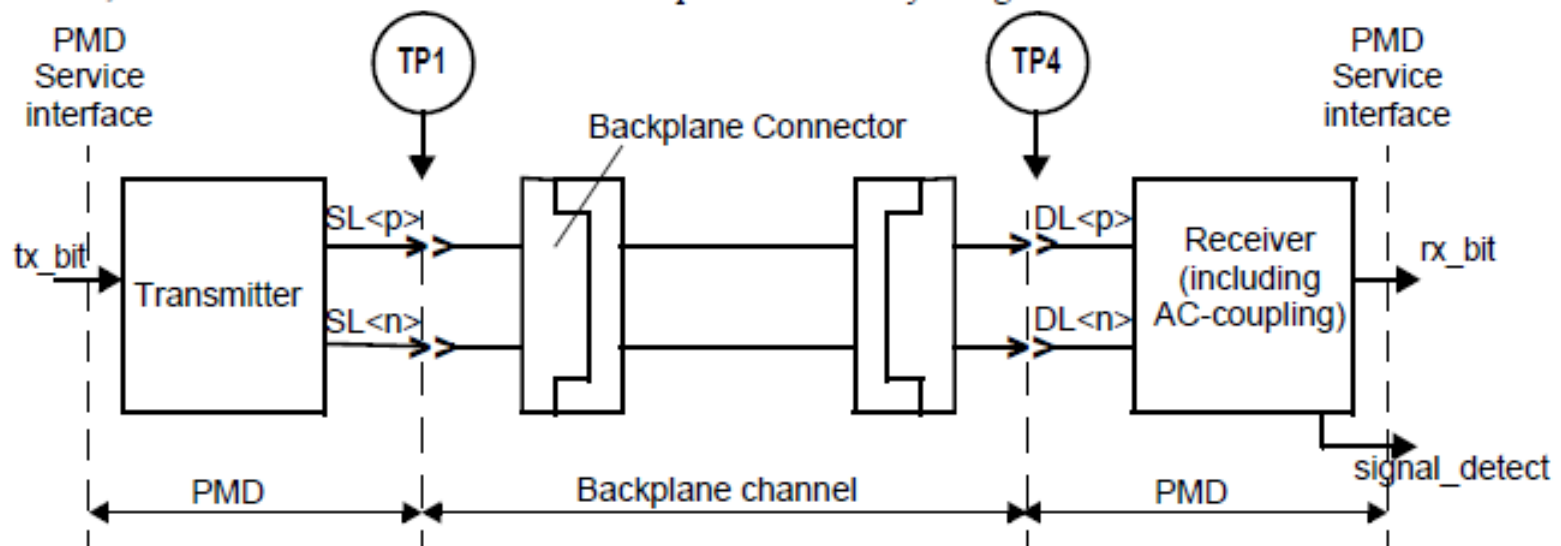


Figure 72–1—Link block diagram

72.7.1 Transmitter characteristics

Transmitter characteristics at TP1 are summarized in Table 72–6 and detailed in 72.7.1.1 through 72.7.1.11.

72.7.2 Receiver characteristics

Receiver characteristics at TP4 are summarized in Table 72–9 and detailed in 72.7.2.1 through 72.7.2.5.