802.3dj D2.2 Comment Resolution Electrical Track

Adee Ran (Cisco), 802.3dj Electrical Track Lead Editor
Matt Brown (Alphawave Semi), 802.3dj Chief Editor

Introduction

- This slide package was assembled by the 802.3dj editorial team to provide background and detailed resolutions to aid in comment resolution.
- Specifically, these slides are for the various electrical-track comments.

CA Minimum Loss

Comment 303

CA Minimum Loss Comment #303

Cl **179** *SC* **179.11.2** *P* **441** *L* **39** # 303

Kocsis, Sam — Amphenol

Comment Type **T** *Comment Status* **D** *Minimum loss (E)*

The minimum cable assembly insertion loss of 16dB, may exclude working cables from compliance.

SuggestedRemedy

Adjust the minimum cable assembly insertion loss to a value aligned with working cables as demonstrated in contribution. Contribution to follow at the November plenary.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Pending referenced presentation and CRG discussion.

REJECT.
Reducing the minimum loss has the implication of requiring receiver testing with a lower loss cable. This requires such cables to be generally available for testing purposes, and possibly increases the burden on receivers (shorter is not necessarily easier). There is no indication that such cables are available, nor data to check the feasibility of reference receivers working with such cables.

There are several comments suggesting that available MCBs have lower IL than the reference by about 1 dB, and proposing reduction of the reference. This may be related to the perceived lower IL of cable assemblies (by about 2 dB). However, these comments were not accepted.

There was not consensus to make the suggested change.

Table 179–16—Cable assembly characteristics summary

Description	Reference	Value	Unit
Insertion loss at 53.125 GHz, *ILdd* (max)	179.11.2		
CA-A		19	dB
CA-B		24	dB
CA-C		29	dB
CA-D		34	dB
Insertion loss at 53.125 GHz, *ILdd* (min)	179.11.2	16	dB
Minimum cable assembly ERL[a]	179.11.3	8.25	dB
Differential-mode to common-mode return loss, *RLcd*	179.11.4	Equation (179–20)	dB
Common-mode to common-mode return loss, *RLcc*	179.11.5	Equation (179–12)	dB
Minimum COM	179.11.6	3	dB
Channel signal to common-mode ratio, $SCMR_{CH}$ (min)	179.11.7	20	dB
NOTE—The expected cable assembly reach is 0.5 m for CA-A, 1 m for CA-B, 1.5 m for CA-C, and 2 m for CA-D. Compliant cable assemblies may be longer. The length of a cable assembly does not imply compliance to specifications.			

[a] Cable assemblies with a COM greater than 4 dB are not required to meet minimum ERL.

The comment is similar to Comment #360 against D2P1.

Comment #232 revisits MCB allocation in D2P2.

CA Minimum Loss Comment #303

In D2P2, we do not have any tests for IL$dd_{Ch,min}$. In past projects, the minimum Host has been defined as the MCB, but that is not the case with 3dj.

The resolution for Comment #232 would changed the host channel allocation from 4.45 dB to 3.45 dB.
It is suggested to keep that value as 4.45 dB and instead make IL$dd_{CA,min}$ 14dB, as shown on the right.

Table 179A–3—Minimum Insertion loss budget values at 53.125 GHz

Link Configuration	$ILdd_{CA,min}$ (dB)	$ILdd_{TP0d\text{-}TP2,min}$ (dB)	$ILdd_{TP3\text{-}TP5d,min}$ (dB)	$ILdd_{MTFref}$ (dB)	$ILdd_{Ch,min}$ (dB)
Host-Min to Host-Min	16	8.25	8.25	9.75	13

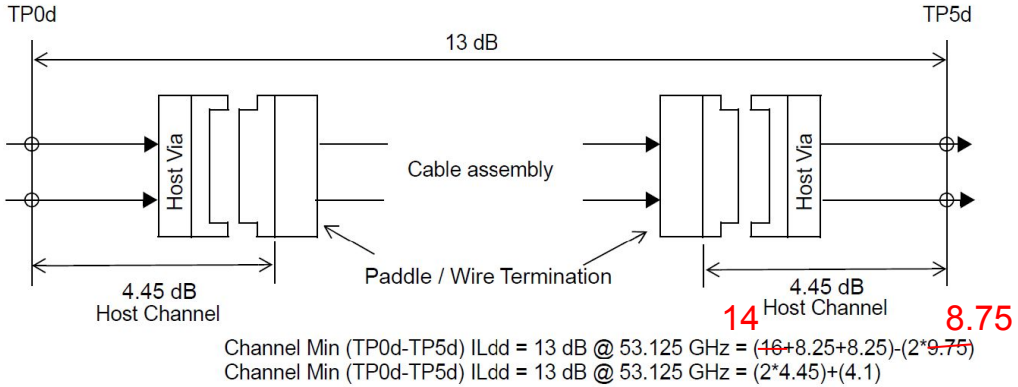


Figure 179A–3— Channel Min (TP0d-TP5d) at 53.125 GHz

Editor's recommendation: AIP (since no new data is presented) ;
Change IL$dd_{CA,min}$ to 14dB, and change appropriate values in 179, and 179A.
Implement with editorial license

CA Minimum Loss Comment #303

There are some ripple effects to this change, related to receiver tolerance testing.

The current tests in Table 179-14 do not really test HL, HN, and HH, but rather CA-B, CA-C, and CA-D.

The details of refining Table 179-14 are beyond the scope of the comment, and changes would be deferred to a future draft.

Table 179–14—Interference tolerance test parameters

Parameter	Test L (low loss) Min	Test L (low loss) Max	Test H (high loss) Min	Test H (high loss) Max	Units
Test pattern	PRBS31Q				
Test channel insertion loss at 53.125 GHz[a]					
Host class HL	15.5	16.5	36.5	37.5	dB
Host class HN	15.5	16.5	31.5	32.5	dB
Host class HH	15.5	16.5	26.5	27.5	dB
Cable assembly insertion loss at 53.125 GHz					
Host class HL	15.5	16.5	33.5	34.5	dB
Host class HN	15.5	16.5	28.5	29.5	dB
Host class HH	15.5	16.5	23.5	24.5	dB
COM[b]	3		3		dB

[a] Insertion loss between the two test references (see Figure 110–3b).
[b] COM is calculated as defined in 179.9.5.3.3. Meeting the test requirements with a lower value of COM demonstrates margin to the specification but is not required for compliance.

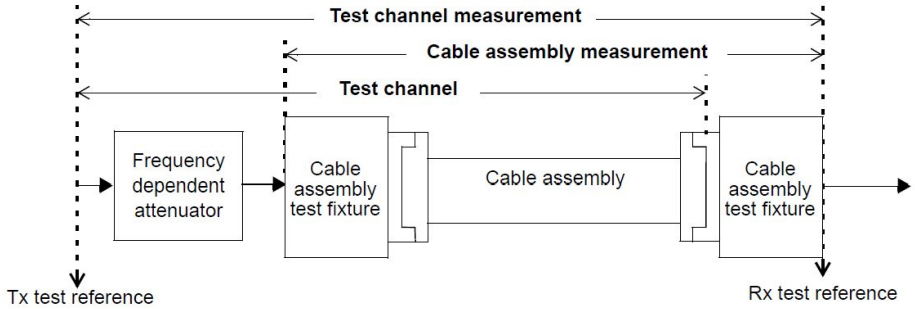


Figure 110–3b—Test channel calibration

Test fixtures

Comment 141

Text fixtures
Comment #141

Cl **179B** *SC* **179B.2.1** *P* **904** *L* **40** # 141

Healey, Adam Broadcom, Inc.

Comment Type **T** *Comment Status* **D** *test fixtures (E)*

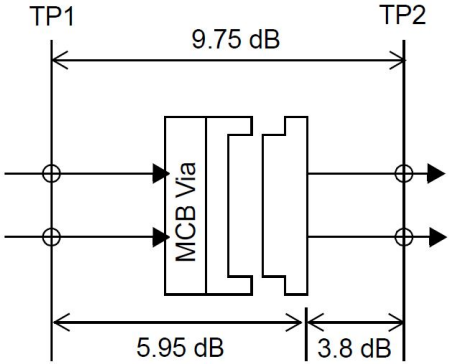
For the TP2/TP3 test fixture, the reference point is defined to be the "center of the edge connector pad". In 179B.3.1, it is stated that the reference point for the cable assembly test fixture is the "mating point of the MDI connector". There is a note in 179B.4.2 that states the reference insertion loss for the mated test fixture is the sum of the reference insertion losses for the TP2/TP3 test fixture and cable assembly test fixture. This suggests that the "center of the edge connector pad" and the "center of the edge connector pad" are the same reference point. If this is the case, then the same name/description should be used in both instances.

SuggestedRemedy

Call the reference point either "center of the edge connector pad" or "mating point of the MDI connector" consistently in both 179B.2.1 and 179B.3.1. Consider adding a note to Figure 179A-1 to describe the this reference point since the illustrations do not clearly show it.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
The commenter points out a nomenclature conflict that must be remedied. The use of "mating poing of the MDI connector" is most appropriate to apply to both instances. For completeness, the editorial team will prepare a detailed proposed response for the CRG to review.



Mated test fixtures

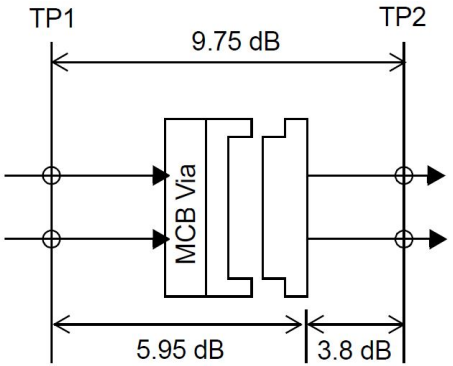
Text fixtures
Comment #141

179B.2.1

The TP2 or TP3 test fixture reference insertion loss is defined as the insertion loss between the reference plane of the coaxial connector and the center of the edge connector pad. The reference insertion loss is defined by Equation (179B–1) and illustrated by Figure 179B–1. The effects of differences between the insertion loss of an actual test fixture and the reference insertion loss are to be accounted for in the measurements.

179B.3.1

The cable assembly test fixture reference insertion loss is defined as the insertion loss between the reference plane of the coaxial connector and the mating point of the MDI connector. The reference insertion loss is defined by Equation (179B–2) and illustrated by Figure 179B–1. The effects of differences between the insertion loss of an actual test fixture and the reference insertion loss are to be accounted for in the measurements.



Mated test fixtures

Editor's recommendation:
Change the highlighted text in 179B.2.1 (TP2 or TP3 test fixture) to "mating point of the MDI connector".

Text fixtures
Comment #407, #408

Cl **179B** *SC* **179B.1** *P* **904** *L* **13** # 407

Swenson, Norman Nokia, Point2

Comment Type **E** *Comment Status* **D** *(B1) (E)*

This is the normative clause that defines the TP2 or TP3 test fixtures. The test fixtures assume an MDI connector, a PCB board, and a coaxial connector enabling connection to test equipment, but that is not stated anywhere.

SuggestedRemedy

Replace the first paragraph of 179B.1 with the following:
"Transmitter and receiver measurements at TP2 or TP3 for the 200GBASE-CR1, 400GBASE-CR2, 800GBASE-CR4, and 1.6TBASE-CR8 hosts (see Annex 179D) and at TP1a or TP4a (see Figure 176D–4) for the 200GAUI-1, 400GAUI-2, 800GAUI-4, and 1.6TAUI-8 C2M hosts (see Annex 176D), are made utilizing test fixtures. Each such test fixture has an edge connector plug that is compatible with the MDI receptacle on the host board, a coaxial connector for each lane suitable for connection to test equipment, and a PCB connecting the lanes from the edge connector plug to the coaxial connectors. The test fixture reference insertion loss is specified in 179B.2."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
The commenter points out that the draft never explicitly defines the structures in an HCB test fixture. The proposed additional text may be better suited as an addition to 179B.2, as follows:

"The TP2 or TP3 test fixture (also known as Host Compliance Board) is required for measuring the transmitter and receiver specifiations at TP2 and TP3. The test fixture has an edge connector interface that is compatible with the appropriate MDI connector on the Host board, and provides a high-speed electrical path between the MDI connector and the coaxial connector that defines the TP2 or TP3 test point. The TP2 and TP3 test points are illustrated in Figure 179A-1."

Cl **179B** *SC* **179B.1** *P* **904** *L* **13** # 408

Swenson, Norman Nokia, Point2

Comment Type **E** *Comment Status* **D** *(B1) (E)*

This is the normative clause that defines the Cable test fixtures. The test fixtures assume an MDI connector, a PCB board, and a coaxial connector enabling connection to test equipment, but that is not stated anywhere.

SuggestedRemedy

Replace the second paragraph of 179B.1 with the following:
"Cable assembly measurements for the cable assembly types (see Annex 179D) are made between TP1 and TP4 with cable assembly test fixtures at both ends. Each such test fixture has an MDI receptacle compatible with the MDI plug at the end of the cable assembly, a coaxial connector for each lane suitable for connection to test equipment, and a PCB connecting the lanes from the MDI receptacle to the coaxial connectors. The test fixture reference insertion loss is specified in 179B.3. The TP2 or TP3 test fixture and the cable assembly test fixture are specified in a mated state to enable connections to measurement equipment. The reference insertion loss of the mated test fixtures is 9.75 dB at 53.125 GHz using Equation (179B–5)."

Proposed Response *Response Status* **W**

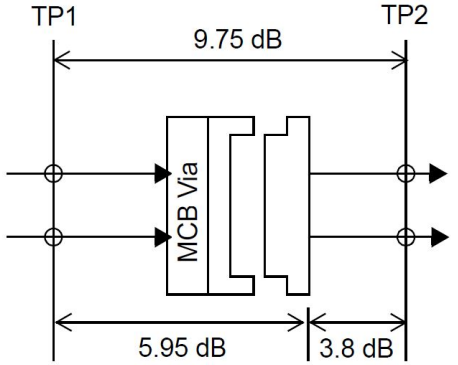
PROPOSED ACCEPT IN PRINCIPLE.
The commenter points out that the draft never explicitly define the structures in an MCB test fixture. The proposed additinal text may be better suited as an addition to 179B.3, as follows:

"The cable assembly test fixture (also known as Module Compliance Board) is required for measuring the cable assembly specifiations in 179.11 and the module specifications in Annex 176D at TP1 and TP4. The test fixture has an MDI connector, and provides a high-speed electrical path between the MDI connector and the coaxial connector that defines the TP1 or TP4 test point. The TP1 and TP4 test points are illustrated in Figure 179-2."

Text fixtures
Comment #407, #408

179B.2 TP2 or TP3 test fixture

The TP2 or TP3 test fixture (also known as Host Compliance Board) is required for measuring the transmitter and receiver specifications at TP2 and TP3. The TP2 and TP3 test points are illustrated in Figure 179A–1.



Mated test fixtures

Editor's recommendation: Change the text in 179B.2 as shown below.

The TP2 or TP3 test fixture (also known as Host Compliance Board) is required for measuring the transmitter and receiver specifications at TP2 and TP3. The test fixture has an edge connector interface that is compatible with the appropriate MDI connector on the Host board, and provides a high-speed electrical path between the MDI connector and the coaxial connector that defines the TP2 or TP3 test point. The TP2 and TP3 test points are illustrated in Figure 179A-1.

The TP2 or TP3 test fixture is also used in AUI-C2M testing for host input and output compliance. The TP2 and TP3 test points correspond to the Annex 176D test points TP1a and TP4a, respectively. The TP1a and TP4a test points are illustrated in Figure 176D-4.

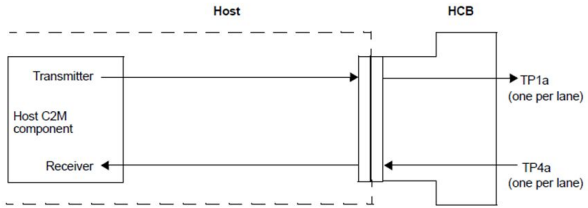


Figure 176D–4—Host compliance points

NOTE 1—TP1a and TP4a correspond to the Clause 179 test points TP2 and TP3, respectively.

Text fixtures
Comment #407, #408

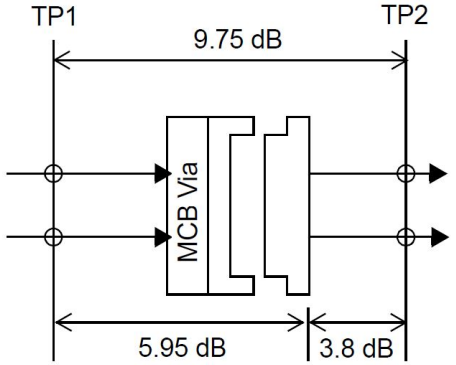
179B.3 Cable assembly test fixture

The cable assembly test fixture (also known as Module Compliance Board) is required for measuring the cable assembly specifications in 179.11 at TP1 and TP4. The TP1 and TP4 test points are illustrated in Figure 179–2.

Editor's recommendation: Change the text in 179B.3 as shown below.

The cable assembly test fixture (also known as Module Compliance Board) is required for measuring the cable assembly specifications in 179.11 and the module specifications in Annex 176D at TP1 and TP4. The test fixture has an MDI connector, and provides a high-speed electrical path between the MDI connector and the coaxial connector that defines the TP1 or TP4 test point. The TP1 and TP4 test points are illustrated in Figure 179-2.

The cable assembly test fixture is also used in AUI-C2M testing for module input and output compliance. The TP1 and TP4 test points for AUI-C2M testing are illustrated in Figure 176D-5.



Mated test fixtures

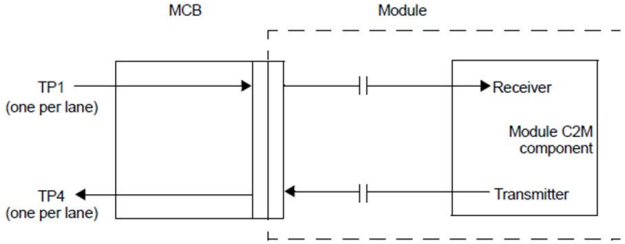


Figure 176D–5—Module compliance points

MDI lane mapping

Comment 183

MDI lane mapping
Comment #183

Cl **179C** *SC* **179C.1** *P* **916** *L* **3** # 183

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **D** *PMD Mapping (E)*

Annex 180A provides normative requirements for which fibers should be used when connectors are not fully utilized. Whereas for the equivalent situation for CR there is just a "recommendation" with the use of "should"

SuggestedRemedy

Change "When an MDI connector is not fully utilized the lower PMD numbers in Table 179C–2 should be used." to "When an MDI connector is not fully utilized the lower PMD numbers in Table 179C–2 shall be used"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
The commenter points out the misalignment for PMD mapping requirements in the optical modules compared to the copper cables. It seems correct to strongly recommend thar the lower PMD numbers be used when MDI connectors are not fully utilized, however it has never been a normative requirement in past projects.

Consensus will be needed to make the change. For CRG discussion.

Text in question

An MDI connector type may support one or more PMDs. The assignment of PMD signals to connector signals is specified in Table 179C–2, where as an example 0:DL0n refers to the DL0n signal of the first PMD; see 179.8.2 and 179.8.3 for signal naming definitions. When an MDI connector is not fully utilized the lower PMD numbers in Table 179C–2 should be used.

Annex 179C is about the MDI (part of the PMD), not the cable assembly.

The suggested remedy as written would forbid, for example, a host from disabling some lanes in an 8x200G port (e.g. with OSFP connector) because in this case the MDI connector is not fully utilized.

MDI lane mapping Comment #183

Cl **179C** *SC* **179C.1** *P* **916** *L* **3** # 183

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **D** *PMD Mapping (E)*

Annex 180A provides normative requirements for which fibers should be used when connectors are not fully utilized. Whereas for the equivalent situation for CR there is just a "recommendation" with the use of "should"

SuggestedRemedy

Change "When an MDI connector is not fully utilized the lower PMD numbers in Table 179C–2 should be used." to "When an MDI connector is not fully utilized the lower PMD numbers in Table 179C–2 shall be used"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
The commenter points out the misalignment for PMD mapping requirements in the optical modules compared to the copper cables. It seems correct to strongly recommend thar the lower PMD numbers be used when MDI connectors are not fully utilized, however it has never been a normative requirement in past projects.

Consensus will be needed to make the change. For CRG discussion.

Text in 180A in comparison

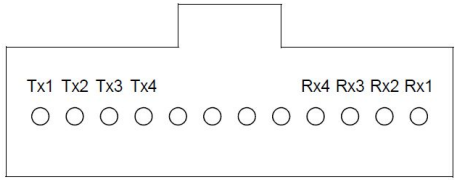


Figure 180A–2—Optical lane assignments for a single-row 12-position connector

When the optical MDI is only supporting a single 1-lane PMD (200GBASE-DR1 or 200GBASE-DR1-2), the optical lanes shall be assigned to the optical connector positions Tx1 and Rx1, as shown in Table 180A–2, regardless of whether fibers are populated in the remaining optical connector positions.

This text is about the case that a host does not **support** all possible PMDs of the MDI (e.g., a module that does not include optical components for some of the lanes of an MPO12 connector).

This is not the same case as in an electrical MDI (it would be equivalent to “not all lanes of an OSFP are associated with PMD Tx/Rx functions”).

As stated in the proposed response, there was never a normative requirement for CR PMDs as suggested. It is arguable whether such hosts exist and need to be addressed at all, especially with a normative statement.

MDI lane mapping
Comment #183

Cl **179C** *SC* **179C.1** *P* **916** *L* **3** # 183

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **D** *PMD Mapping (E)*

Annex 180A provides normative requirements for which fibers should be used when connectors are not fully utilized. Whereas for the equivalent situation for CR there is just a "recommendation" with the use of "should"

SuggestedRemedy

Change "When an MDI connector is not fully utilized the lower PMD numbers in Table 179C–2 should be used." to "When an MDI connector is not fully utilized the lower PMD numbers in Table 179C–2 shall be used"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
The commenter points out the misalignment for PMD mapping requirements in the optical modules compared to the copper cables. It seems correct to strongly recommend thar the lower PMD numbers be used when MDI connectors are not fully utilized, however it has never been a normative requirement in past projects.

Consensus will be needed to make the change. For CRG discussion.

Current text in 179C

An MDI connector type may support one or more PMDs. The assignment of PMD signals to connector signals is specified in Table 179C–2, where as an example 0:DL0n refers to the DL0n signal of the first PMD; see 179.8.2 and 179.8.3 for signal naming definitions. When an MDI connector is not fully utilized the lower PMD numbers in Table 179C–2 should be used.

Text in 180A in comparison

When the optical MDI is only supporting a single 1-lane PMD (200GBASE-DR1 or 200GBASE-DR1-2), the optical lanes shall be assigned to the optical connector positions Tx1 and Rx1, as shown in Table 180A–2, regardless of whether fibers are populated in the remaining optical connector positions.

Proposed change in 179C to align with 180A language:

When the electrical MDI does not support the full number of 1-lane PMDs (200GBASE-CR1) shown in Table 179C–2, the lanes [should/shall] be assigned to the lower connector positions.

Editor's recommendation: AIP; Choose between

A. Change the text in 179C as proposed on the right, keeping "should".
B. Change the text in 179C as proposed on the right, changing to "shall".
C. Delete the sentence.

Amplitude tolerance

Comments 108, 110

Amplitude tolerance Comments #108, 110

Cl **176C** *SC* **176C.6.4.5.3** *P* **803** *L* **22** # 108

Kutscher, Noam — Marvell

Comment Type **T** *Comment Status* **D** *RX ATOL (E)*

The minimum loss for Test L is not specified whereas the ATOL on page 799 line 9 refers to this test.

SuggestedRemedy

change the N/A to 15dB. Reasoning for the new range: Simple Loss Calculationa. ~1.5' escaping = ~1.8dB b. 2 X Via = ~2dB c. PCB- 3inch = ~3.6dB d. SMA = ~0.5dB e. Coupler = 3dB f. Cable to ISI PCB ~30cm = ~2dB Total estimated loss ~12.9dB → change to 15dB.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The test configuration for Test L was defined in Table 176C-7 footnote c as a noise coupler without additional ISI channel with no loss specified, based on D2.1 comments 173 and 440 . This comment proposes to change the physical definition of the Test L channel without justification to make such a change.

For CRG discussion.

Cl **178** *SC* **178.9.3.4.3** *P* **395** *L* **38** # 110

Kutscher, Noam — Marvell

Comment Type **T** *Comment Status* **D** *Rx tests (E)*

The minimum loss for Test L is not specified whereas the ATOL on page 391 line 52 refers to this test.

SuggestedRemedy

Change the N/A to 20dB - Reasoning for the new range: Simple Loss CalculationTwice of the below calculation: a. ~1.5' escaping = ~1.8dB b. 2 X Via = ~2dB c. PCB- 3inch = ~3.6dB d. SMA = ~0.5dB +connector = ~3dB Total estimated loss ~18.8dB → change to 20dB.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The configuration for Test L was defined in Table 178-12 footnote c as a noise coupler without additional ISI channel with no loss specified, based on D2.1 comments 173 and 440. This comment proposes to change the physical definition of the Test Channel without justification to make such a change..

For CRG discussion.

Table 178–12—Receiver interference tolerance parameters

Parameter	Test L (low loss)	Test H (high loss)			Units
	Min	Min	Max	Target	
Block error ratio[a]	$< 1.45 \times 10^{-11}$				—
Insertion loss, *ILdd*, at 53.125 GHz[b] Receiver package class A Receiver package class B	N/A[c]	33.5 30	34.5 31	—	dB
COM including effects of broadband noise[d]	3	—	—	3	dB

[a] The block error ratio (see 178.2) is measured instead of the FEC symbol error ratio in step 10) of the receiver interference tolerance method defined in 93C.2.

[b] ILdd measured between TPt and TP5 (see Figure 93C–4) plus *ILdd* of the specific package used by the test transmitter. See 178.9.3.4.2.

[c] For test L, the connection between TP0v and TP5v (see Figure 93C–2) is a noise coupler without an additional ISI channel, and the insertion loss is not specified.

RLdc

Comments 177, 142

RLdc
Comment #177, 142

Cl 179	SC 179.9.4.9	P432	L8	# 177

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **D** *RLdc (E)*

Equation 179-13 didn't get changed correctly per the resolution to C2.1 comment #169. (It was changed to the requirement for the mated test fixture not the TP2 point. Figure 179-5 does not match the equation and appears to be correct.

SuggestedRemedy

Make equation 179-13 match equation 179-20 (but the parameter is correctly RLdc not RLcd)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
The comment correctly points out an incorrect implementation of the resolution of comment #169 against D2.1, which refers to slide 3 of the contribution <https://www.ieee802.org/3/dj/public/25_09/ghiasi_3dj_03a_2509.pdf>.
The equation was incorrectly changed to the proposed equation for the mated test fixtures (identical to equation 179B–8), instead of the proposed equation for TP2/TP4.

Change Equation 179-13 to the following:
RLdc(f) ≥{ 23-22(f/106.25), 0.05 ≤ f < 53.125 ; 12, 53.125 ≤ f 67 }

Equation 179-13 (transmitter RLdc) as of D2.2

179.9.4.9 Common-mode to differential-mode return loss

The transmitter common-mode to differential-mode return loss shall meet Equation (179–13) as illustrated in Figure 179–5.

$$RLdc(f) \geq \begin{cases} 26 - 22\dfrac{f}{106.25} & 0.05 \leq f < 53.125 \\ 15 & 53.125 \leq f < 67 \end{cases} \quad (179\text{–}13)$$

Is identical to Equation 179B-8 (Test fixture RLdc)

$$RLdc(f) \geq \begin{cases} 26 - 22\dfrac{f}{106.25} & 0.05 \leq f < 53.125 \\ 15 & 53.12 \leq f < 67 \end{cases} \quad (179B\text{–}8)$$

This is an error. To match Figure 179-5 (which is correct), the equation should be the same as Equation 179-20 (which is for RLcd).

Proposed change to Equation 179-13:

$$RLdc(f) \geq \begin{cases} 23 - 22\dfrac{f}{106.25} & 0.05 \leq f < 53.125 \\ 12 & 53.125 \leq f < 67 \end{cases} \quad (179\text{–}13)$$

AUI equivalent to PMD

Comment #16

AUI equivalent to PMD Comment #16

Cl **176C** SC **176C.3** P**792** L**50** # 16

Brown, Matt — Alphawave Semi

Comment Type **TR** *Comment Status* **D** *(E)*

The note implies that in addition to the functional specification in 178.8 other specifications, transmitter equalizer (176C.6.3.1) and management variables (178.13) are also mandatory. However, this note is informative. Also, this note was added orginally to highlight that indeed ILT was part of the C2C (and C2M) functionality, with the long list, that is now becoming less prominent and why not just list everything? Also, the reference to the explicit locally defined (within this clause) transmitter equalizer specifications is unnecessary and distracting.

SuggestedRemedy

Should be L47

Change the paragraph on page 792 line 50 to the following: "An n-lane C2C component is functionally equivalent to a corresponding n-lane PMD specified in Clause 178. The C2C component shall meet the functional specifications in 178.8 and the management variable specifications in 178.13, unless stated otherwise."
Change the note on line 49 to "NOTE 1—As part of the functional equivalence to a PMD, C2C components include the inter-sublayer link training (ILT) function for a Type E1 interface, specified in Annex 178B."
Alternately, create local subclauses pointing back to Clause 178.
Similarly update 176D.3.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.
[Editor's note: CC: 176D]

Editor's recommendation: Implement the suggested remedy in Annex 176C and Annex 176D, with editorial license.

An *n*-lane C2C component shall be functionally equivalent to a corresponding *n*-lane PMD specified in Clause 178, and meet the requirements in 178.8, unless stated otherwise.

NOTE 1—As part of the functional equivalence to a PMD, C2C components include the inter-sublayer link training (ILT) function for a Type E1 interface, specified in Annex 178B, transmit equalization as specified in 176C.6.3.1, and the management variables listed in 178.13.

The Tx equalization and management variables were mentioned because they are closely related to the ILT function.

However, the changes in suggested remedy as shown below seem to be an improvement to the draft.

"An n-lane C2C component is functionally equivalent to a corresponding n-lane PMD specified in Clause 178. The C2C component shall meet the functional specifications in 178.8 and the management variable specifications in 178.13, unless stated otherwise."

"NOTE 1—As part of the functional equivalence to a PMD, C2C components include the inter-sublayer link training (ILT) function for a Type E1 interface, specified in Annex 178B~~, transmit equalization as specified in 176C.6.3.1, and the management variables listed in 178.13~~."

<Topic>

Comment(s) <#>

<sub-topic>
Comment #<#>