*Cl* **FM** *SC* **FM** *P* **8** *L* **41** # 45

McClellan, Brett — Marvell Semiconductor, Inc.

*Comment Type* **E** *Comment Status* **A** *(B1) (CG)*

typo

*SuggestedRemedy*

change 'Mcclellan' to 'McClellan'

*Response* *Response Status* **C**

ACCEPT.

*Cl* **FM** *SC* **FM** *P* **14** *L* **1** # 68

Maguire, Valerie — Copperopolis

*Comment Type* **E** *Comment Status* **A** *(B1) (CG)*

IEEE Std 802.3da has published

*SuggestedRemedy*

Replace "20xx" with "2026"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
802.3dk was also approved.
Change "IEEE Std 802.3daT-20xx" to "IEEE Std 802.3daT-2026"
Change "IEEE Std 802.3dkT-20xx" to "IEEE Std 802.3dkT-2026"
[Editor's note: changed Clause/Subclause to FM]

*Cl* **1** *SC* **1.2** *P* **56** *L* **33** # 54

Brown, Matthew — Qualcomm

*Comment Type* **ER** *Comment Status* **A** *definitions (CG)*

The definition of the 1.6TMII reads as follows:
1.6 Tb/s Media Independent Interface (1.6TMII). The 1.6TMII is designed to connect a 1.6 Tb/s capable MAC to a 1.6 Tb/s PHY. The 1.6TMII is a logical interface intended for use as an intra-chip interface. No mechanical connector is specified for use with the 1.6TMII. The 1.6TMII is optional."
It is defined as a "logical interface intended for use as an intra-chip interface". It is rather obvious that no "mechanical connect" would be defined. I believe this is a carry-over from earlier xMII interfaces where a physical interface was defined (e.g., XGMII, see 46.5 XGMII electrical characteristics).

*SuggestedRemedy*

Delete "No mechanical connector is specified for use with the 1.6TMII."

*Response* *Response Status* **C**

ACCEPT.

*Cl* **1** *SC* **1.3** *P* **57** *L* **9** # 31

Brown, Matthew — Qualcomm

*Comment Type* **E** *Comment Status* **A** *Normative references (B1) (E)*

The following normative reference is never referenced in the draft:
"SFF-8665, Rev 1.9.11, July 11, 2025, QSFP+ 4X Pluggable Transceiver Solutions."

*SuggestedRemedy*

Delete this reference or alternately move to bibliography if there is a desire to keep it in the draft as informative information.
Alternately, if the lack of reference was an oversight then add the reference where needed.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved with the response to Comment I-324.

*Cl* **1** *SC* **1.3** *P* **57** *L* **17** # 323

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

A reference specifications for SFP224 has not been made aviailable to the Task Force.
Remove references to SFP224, SFF-TA-1031 and remove editors note.

*SuggestedRemedy*

Remove references to SFP224 to SFF-TA-1031 and remove editors note.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **45** *SC* **45.2** *P* **76** *L* **45** # 364

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

The register address for Reserved section after 1.1478 appears to be a typo for the first address.

*SuggestedRemedy*

Change "1.4479 through 1.1499" to "1.1479 through 1.1499"

*Response* *Response Status* **W**

ACCEPT.

*Cl* **45** *SC* **45.2.1** *P* **77** *L* **32** # 1

Marris, Arthur self

*Comment Type* **T** *Comment Status* **A** *(B1) (L)*

All of the registers from 1.2412 through 1.2436 are for lane 0 only and there are equivalent registers for lanes 1 through 7 in the range 1.2437 through 1.2611.
However, only the last two counters have "lane 0" in their names. However all the registers should have "lane 0" in their names to make it clear that there are equivalent registers following on for the other lanes for all of them.

*SuggestedRemedy*

Add "lane 0" in the register name for registers 1.2412 through 1.2423

*Response* *Response Status* **C**

ACCEPT.

*Cl* **45** *SC* **45.2.1** *P* **77** *L* **52** # 2

Marris, Arthur self

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

The range of the "IFEC symbol error counter, lane 16 to 31" registers should be "1.2770 through 1.2801" rather than "1.2770 through 1.2799".

*SuggestedRemedy*

Change range to "1.2770 through 1.2801" in 45.2.1

In 45.2.1.222 on page 110 line 21 make it "IFEC symbol error counter, lane 1 through 31 (Register 1.2212 through 1.2241, and 1.2770 through 1.2801)"

In the body of 45.2.1.222 update the text to clarify that lanes 1 through 15 are in the block 1.2212 through 1.2241 and lanes 16 through 32 are in the block 1.2270 through 1.2801.

*Response* *Response Status* **W**

ACCEPT.

*Cl* **45** *SC* **45.2.1.8** *P* **82** *L* **1** # 142

Bruckman, Leon NVIDIA

*Comment Type* **TR** *Comment Status* **A** *AUI Management (CG)*

The title of this section is: "PMD transmit disable register", but in Table 45-3 of the base standard the name is: "PMA/PMD transmit disable". This makes the reference in 176C.3: "The C2C component shall meet the functional specifications in 178.8 and the management variable specifications in 178.13, unless stated otherwise." inconsistent since the name of the variables has the PMD prefix only (see comment #104 against D2.3)

*SuggestedRemedy*

Change the title of section 45.2.1.8 to: "PMA/PMD transmit disable register"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The discrepancy (i.e. missing "PMA") between the subclause title "45.2.1.8 PMD transmit disable register" and the register name in Table 45-3 "PMA/PMD transmit disable" is in the base standard IEEE Std 802.3-2022. It is not within scope or necessary to change the subclause title as suggested.

The base standard states in a sentence above Table 45-3 "The addresses and functions of all registers in MMD 8, 9, 10, and 11 are defined identically to MMD 1, except registers m.5 and m.6 as defined in Table 45-2", therefore it is appropriate to reuse PMD registers for AUI/PMA control in other MMDs.

Also it should be noted that the MMD 1 address space is duplicated for the upper (host side) AUI component as described in 45.2.1.272 so there are adequate control and status bits to cover the requirements of both the AUI and the PMD without aliasing to multiple variables.

AUI-C2M defined in 176D, AUI-C2C defined in 176C, and the KR and CR PMDs defined in 178 and 179 all use the same management variables as defined in 179.14.

The text in 176C.3 and 176D.3 should be clarified.

Clarify the text in 176C.3 and 176D.3 by making the following changes.

In 176C.3 on page 795 line 45 change from:
"The C2C component shall meet the functional specifications in 178.8 and the management variable specifications in 178.13, unless stated otherwise."
To:
"The C2C component shall meet the functional specifications in 178.8 unless stated otherwise. The C2C component shall use the management variable specifications in 179.14. The management variables in 179.14 have PMD in their variable names and point to MMD 1. The lower (network side) AUI component (see Figure 176C-3) will be located in a different MMD (8, 9, 10, or 11) and these PMD variables are reused for the AUI. For the upper (host side) AUI component the register addresses are offset by 4000 as described in 45.2.1.272."

In 176D.3 page 817 line 18, make the same change to "The C2M component shall meet the functional specifications in 179.8 and the management variable specifications in 179.14, unless stated otherwise."

Implement with editorial licence.
[Editor's note: CC 176C, 176D]

---

*Cl* **45** *SC* **45.2.1.60b** *P* **85** *L* **32** # 15

Marris, Arthur self

*Comment Type* **E** *Comment Status* **A** *(B1) (L)*

Typo in description of bit 1.73.6 in Table 45û58bù800G PMA/PMD ability register bit definitions

*SuggestedRemedy*

Change:
0 = PMA/PMD is not able to perform 800GBASE-DR8-2
To
0 = PMA/PMD is not able to perform 800GBASE-KR4

*Response* *Response Status* **C**

ACCEPT.

---

*Cl* **45** *SC* **45.2.1.60c** *P* **87** *L* **4** # 3

Marris, Arthur self

*Comment Type* **ER** *Comment Status* **A** *(B1) (L)*

This is the "800G PMA/PMD extended ability register" not the "800G PMA/PMD extended ability 2 register".

*SuggestedRemedy*

Delete "2" on lines 4, 6, and 9

*Response* *Response Status* **W**

ACCEPT.

---

*Cl* **45** *SC* **45.2.1.96** *P* **90** *L* **0** # 385

Slavick, Jeff Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

The descriptions for 45.2.1.96 point to the ILT clauses and we haven't added 178B to those lists.

*SuggestedRemedy*

Update the following clauses to be:
45.2.1.96.1 Receiver status 0 (1.151.0)
This bit maps to the state variable rx_trained as defined in 72.6.10.3.1, local_trained in 136.8.11.7.1 and local_rx_ready in 178B.8.3.1.
45.2.1.96.2 Frame lock 0 (1.151.1)
This bit maps to the state variable frame_lock as defined in 72.6.10.3.1 and local_tf_lock in 136.8.11.7.1 and 178B.8.3.1.
45.2.1.96.3 Startup protocol status 0 (1.151.2)
This bit maps to the state variable training as defined in 72.6.10.3.1, 136.8.11.7.1 and 178B.8.3.1.
45.2.1.96.4 Training failure 0 (1.151.3)
This bit maps to the state variable training_failure as defined in 72.6.10.3.1, 136.8.11.7.1 and 178B.8.3.1.

*Response* *Response Status* **W**

ACCEPT.

---

*Cl* **45** *SC* **45.2.1.139** *P* **90** *L* **26** # 16

Marris, Arthur self

*Comment Type* **ER** *Comment Status* **A** *(B1) (L)*

Missing space in "0 = Lane 9Tx output precoder disabled"

*SuggestedRemedy*

Change "9Tx" to "9 Tx"

*Response* *Response Status* **W**

ACCEPT.

*Cl* **45** *SC* **45.2.1.217.6a** *P* **109** *L* **5** # 6

Marris, Arthur self

*Comment Type* **T** *Comment Status* **A** *(B1) (L)*

Correct subclause tiltle and and make it clear this is for the 800G-ER1 FEC.

*SuggestedRemedy*

Change "45.2.1.217.6a IER1 FEC remote loopback ability (1.2201.7)"
to: "45.2.1.217.6a 800G-ER1 FEC remote loopback ability (1.2201.7)"

on line 7 change "the ER1 FEC" to "the 800G-ER1 FEC"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

It is the "800GBASE-ER1 FEC" rather than the "800G-ER1 FEC"

Change from: "45.2.1.217.6a IER1 FEC remote loopback ability (1.2201.7)"
to: "45.2.1.217.6a 800GBASE-ER1 FEC remote loopback ability (1.2201.7)"

on line 7 change "the ER1 FEC" to "the 800GBASE-ER1 FEC"

Implement with editorial licence.

*Cl* **45** *SC* **45.2.1.217.6c** *P* **109** *L* **15** # 9

Marris, Arthur self

*Comment Type* **TR** *Comment Status* **A** *Management (L) (B1)*

The bit definitions for 1.2201.4 and 1.2201.5 are incorrect. These bits are nothing to do with the 800GBASE-ER1 FEC but are for indicating IFEC status signalled by the partner AUI attached PCS.

*SuggestedRemedy*

Change "45.2.1.217.6c IFEC received local degraded (1.2201.5)" description to:

"When read as a one, bit 1.2201.5 indicates that the local degraded SER signal has been received. This bit reflects the state of rx_local_degraded for the IFEC."

Change "45.2.1.217.6d IFEC received remote degraded (1.2201.4)" description to:

"When read as a one, bit 1.2201.4 indicates that the remote degraded SER signal has been received. This bit reflects the state of rx_rm_degraded for the IFEC."

*Response* *Response Status* **W**

ACCEPT.

*Cl* **45** *SC* **45.2.1.257** *P* **115** *L* **8** # 7

Marris, Arthur self

*Comment Type* **E** *Comment Status* **A** *(B1) (L)*

Change PS to "pilot sequence" for clarity

*SuggestedRemedy*

Change "PS" to "pilot sequence"

*Response* *Response Status* **C**

ACCEPT.

*Cl* **45** *SC* **45.2.1.269** *P* **121** *L* **15** # 14

Marris, Arthur self

*Comment Type* **E** *Comment Status* **A** *(B1) (L)*

For 1.2733.13 "0 = Lane 20 alignment marker is not locked" should read "0 = Lane 29 alignment marker is not locked"

*SuggestedRemedy*

Change 20 to 29 on line 15 to fix this typo.

*Response* *Response Status* **C**

ACCEPT.

*Cl* **45** *SC* **45.2.1.271** *P* **122** *L* **46** # 4

Marris, Arthur self

*Comment Type* **T** *Comment Status* **A** *(B1) (L)*

Table 45û212t shows the assignment of bits for the lane 0 PMA test block error bin 0 to bin 3 registers in the transmit direction, and the text in the third paragraph mentions test_block_error_bin_tx_0_16p and test_block_error_bin_tx_1_0 registers, however there is no "tx" in the names and descriptions in Table 45û212t.

*SuggestedRemedy*

On line 46 change "Table 45û212tùLane 0 PMA test block error bin register definitions (for 4 of the 17 bins)"
to "Table 45û212tùLane 0 PMA transmit test block error bin register definitions (for 4 of the 17 bins)"

In the table add "transmit" to the names. For example make the first name "PMA transmit test block error bin 0 lower"

In the table add "tx" to the descriptions. For example make the first description "test_block_error_bin_tx_0_0[15:0] "

*Response* *Response Status* **C**

ACCEPT.

*Cl* **45** *SC* **45.2.1.272** *P* **123** *L* **25** # 365

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *AUI Management (CG)*

The title of this section is not entirely true as it a replica of all the registers which is more than jus the ILT training registers.

*SuggestedRemedy*

Change the title of 45.2.1.272 to be "Registers for the upper AUI component"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change the title of 45.2.1.272 to be "Registers for the upper (host side) AUI component".

Change the first sentence from:
"Inter sublayer training requires control registers for the upper and lower AUI components."
To:
"Control and status registers are required for both the upper (host side) and lower (network side) AUI components (see Figure 176C-3 and Figure 176D-3)."

Add extra sentence to the end of the subclause:
"Register descriptions referring to the "PMD" should be interpreted as also referring to the AUI."

In Table 45-3 change:
"ILT training registers for the upper AUI component"
To:
"Registers for the upper (host side) AUI component."

Implement with editorial licence.

*Cl* **73A** *SC* **73A.1a** *P* **723** *L* **24** # 130

Huber, Thomas — Nokia

*Comment Type* **ER** *Comment Status* **A** *(Bx) (L)*

The description of host class priority is overly complex and leaves the reader guessing. The intended meaning is that if a PMD supports more than one host class, it should advertise one of them, with the preference being to prioritize them in the order HL, HN, HH.

*SuggestedRemedy*

Replace "If the PMD is compliant to more than one host class, the recommended priority of which host class to indicate would be HL followed by HN. So for example, HL would be advertised if the PMD supports all three host classes"
with
"If the PMD is compliant to more than one host class, it is recommended to advertise HL class if that is supported; if HL is not supported (and thus the PMD supports only HN and HH), it is recommended to advertise HN."

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The text in 73A.1 describes a recommended priority for how to fill the host class field of the AN extended ability message page. It lists HL and HN, but not HH. The text can be made more clear.

In addition, it is possible for a host to conform to more than one host class as described in 179.9 "PMD electrical characteristics" which states:

"PMD compliance with a host class (HH, HN, or HL) is defined by meeting the requirements of 179.9.4 and 179.9.5 for that host class on all MDI lanes (see 179.9.2).
NOTE-A PMD can comply with one or more host classes."

In 73A.1, modify the text before Table 73A-1b,
From:
"Table 73A-1b defines how EH0 and EH1 indicate CR host class. When the host class of the PHY is set to a value other than '0 0', the PMD shall be compliant to that host class. If the PMD is compliant to more than one host class, the recommended priority of which host class to indicate would be HL followed by HN. So for example, HL would be advertised if the PMD supports all three host classes. See 179.9 for host class compliance requirements."
To:
"Table 73A-1b defines how EH0 and EH1 indicate the CR host class. When the host class is set to a value other than '0 0', the PMD shall be compliant to that host class. When indicating a specific host class, the recommended priority is HL, followed by HN, followed by HH. See 179.9 for host class compliance requirements."

In 179.1, change the first sentence,
From:
"PMDs defined in this clause conform to one of three host classes: HH, HN and HL."
To:

"PMDs defined in this clause conform to at least one of three host classes: HH, HN, and HL."

[Editor's note: CC 73A, 179]

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*Cl* **116** *SC* **116.1.4** *P* **163** *L* **20** # 280

D'Ambrosia, John — Futurewei Technoogies, U.S. Subsidiary of Huawei

*Comment Type* **ER** *Comment Status* **A** *APSU conditions (CA)*

Annex 178B is described in the clause as ILT/RTS. Annex 178B is about APSU, which RTS / ILT are functions of, but could cause reader confusion, as support of APSU means support of both functions. Furthermore, when looking at PMD functional specifications, it is denoted as APSU, not ILT/RTS

*SuggestedRemedy*

Change "RTS / ILT" to "APSU" in Table 116-3 and all PHY type clause correlation tables.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following contribution was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/dambrosia_3dj_02_2605.pdf

Implement the proposed changes on slides 5 and 6 of dambrosia_3dj_02_2605 with editorial license.

---

*Cl* **116** *SC* **116.1.4** *P* **164** *L* **163** # 279

D'Ambrosia, John — Futurewei Technoogies, U.S. Subsidiary of Huawei

*Comment Type* **TR** *Comment Status* **A** *APSU conditions (CA)*

For ILT / RTS entry - APSU can not be described as mandator for any 200Gb/e, 400 Gb/s, or 800 Gb/s PHY as the PHY might be implemented using a 100 Gb/s based AUI.

*SuggestedRemedy*

Change all PHY type / clause correlation tables where any PHY based on 200 Gb/s signaling needs the ILT/RTS column to be changed from "M" to "C", as it might be implemented with a 100Gb/s based AUI.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-280.

---

*Cl* **116** *SC* **116.2.9** *P* **170** *L* **53** # 366

Slavick, Jeff — Broadcom Inc

*Comment Type* **E** *Comment Status* **A** *(B1) (CG)*

The list of PHYs and AUIs are ordered in PMD first then AUI last rather than 200G then 400G. I would think makes more sense to list all 200G then all 400G.

*SuggestedRemedy*

Move 200GAUI-C2C and 200G-C2M before 400G-KR2 and perhaps insert an empty line before doing the 400G list.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
A space in a dashed list would be rather odd. It is not necessary to provide an accurate list.
Also, conventionally we list interfaces types by Medium length.
Move the 200GAUI-1 C2C/C2M to start of list and 400GAUI-2 C2C/C2M just before 400GBASE-KR2.

---

*Cl* **116** *SC* **116.3.3.3.1** *P* **176** *L* **24** # 145

Bruckman, Leon — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *Service Interface (CA)*

An interface may reach the OK state and still the receive signal may be ILT frames (not valid data). For example if the propagation_timer (see 178B.8.3.3) in this side of the ISL is shorter than the one configured in the peer side.

*SuggestedRemedy*

Change: "A value of OK indicates that valid data is being presented by the sublayer to the next higher sublayer in the rx_symbol parameters."
To: "A value of OK indicates that data received by the next lower layer is being presented by the sublayer to the next higher sublayer in the rx_symbol parameters."

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The term "valid data" is consistent with text for service interface in the base standard (IEEE 802.3-2022). The term means that the data is valid from the perspective of the sublayer generating the signal_ok parameter. The criteria differs between sublayers. An informative note clarifying this would be helpful.

Add an informative note as follows:
"NOTE--The criteria by which each sublayer determines when data is valid (i.e., SIGNAL_OK = OK) is specified within the clause that defines the sublayer."

*Cl* **118** *SC* **118** *P* **184** *L* **1** # 287

D'Ambrosia, John — Futurewei Technoogies, U.S. Subsidiary of Huawei

*Comment Type* **TR** *Comment Status* **A** *APSU conditions (CA)*

A 200GMII Extender shall support APSU if based on 200GAUI-1

*SuggestedRemedy*

Add a normative statement that a A 200GMII Extender shall support APSU if based on 200GAUI-1

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-280.

---

*Cl* **118** *SC* **118** *P* **184** *L* **1** # 288

D'Ambrosia, John — Futurewei Technoogies, U.S. Subsidiary of Huawei

*Comment Type* **TR** *Comment Status* **A** *APSU conditions (CA)*

A 400GMII Extender shall support APSU if based on 400GAUI-2

*SuggestedRemedy*

Add a normative statement that a A 400GMII Extender shall support APSU if based on 400GAUI-2

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-280.

---

*Cl* **118** *SC* **118.1** *P* **184** *L* **40** # 281

D'Ambrosia, John — Futurewei Technoogies, U.S. Subsidiary of Huawei

*Comment Type* **TR** *Comment Status* **A** *APSU conditions (CA)*

An extender is considered to be an ISL and should be denoted in Table 118-a, as a physical layer clause assocated with 200GMII Extender

*SuggestedRemedy*

Add table entry in Tabe 118-a
178B - APSU Conditional Note F
Note F - Required when implementing a 200GMII Extender based on 200GAUI-1 C2C or 200GAUI-1 C2M only.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-280.

---

*Cl* **118** *SC* **118.1** *P* **185** *L* **28** # 282

D'Ambrosia, John — Futurewei Technoogies, U.S. Subsidiary of Huawei

*Comment Type* **TR** *Comment Status* **A** *APSU conditions (CA)*

An extender is considered to be an ISL and should be denoted in Table 118-b, as a physical layer clause assocated with 400GMII Extender

*SuggestedRemedy*

Add table entry in Tabe 118-b
178B - APSU Conditional Note F
Note F - Required when implementing a 400GMII Extender based on 400GAUI-2 C2C or 400GAUI-2 C2M only.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-280.

---

*Cl* **120** *SC* **120.1.1** *P* **199** *L* **19** # 411

Opsasnick, Eugene — Broadcom Inc.

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

The first sentence states that this clause defines bit-multiplexing for 200GE and 400GE implementations. But there is no indication of when this type of lane multiplexing is needed. Add some color for the reader so this single statement makes sense, Especially since the Clause title implies it is used for all 200/400 type PMAs.

*SuggestedRemedy*

In 120.1.1change the the first paragraph
from:
"This clause specifies the Physical Medium Attachment (PMA) sublayer types that use bit-multiplexing for 200GBASE-R and 400GBASE-R Physical Layer implementations."
To:
"This clause specifies the Physical Medium Attachment (PMA) sublayer types that use bit-multiplexing for 200GBASE-R and 400GBASE-R Physical Layer implementations. Bit-multiplexing is used for 200GBASE-R PMA interfaces of 8, 4, and 2 lanes, and for 400GBASE-R PMA interfaces of 16, 8 and 4 lanes. Symbol-muxing, as defined in Clause 176, is used for 200GBASE-R PMA interfaces of 1 lane, and for 400GBASE-R PMA interfaces of 2 lanes."

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
It would be helpful provide a bit more clarity on the scope of PMA types defined in this clause. However, it would be overstepping to define PMA types defined in other clauses. Instead add the following sentence only:
"Bit-multiplexing PMAs defined in this clause include 200GBASE-R PMA with interfaces of 8, 4, and 2 lanes, and 400GBASE-R PMA with interfaces of 16, 8, and 4 lanes."

*Cl* **120** *SC* **120.1.1** *P* **199** *L* **22** # 410

Opsasnick, Eugene Broadcom Inc.

*Comment Type* **E** *Comment Status* **R** *(B1) (L)*

The last paragraph on 120.1.1 that defines how the terms SM-PMA and BM-PMA are used in this clause is unecessary since those terms are not used at all in Clause 120. But it should still be noted that this clause defines the bit-muxing PMAs since there is now a new clause which define the SM-PMAs. This is clearly stared in the previous paragraph.

*SuggestedRemedy*

In 120.1.1, remove the last paragraph:
"When necessary to differentiate the bit-multiplexing PMA (BM-PMA) types defined in this clause from the symbol-multiplexing PMA (SM-PMA) types defined in Clause 176, the term BM-PMA is used. Within this clause the term PMA refers specifically to the BM-PMA."

*Response* *Response Status* **C**

REJECT.
This paragraph is necessary to provide terminology to reference the bit-multiplexing PMA or BM-PMA. It clarifies that PMA used in this clause is the BM-PMA that is reference in other clauses. Finally, as worded, it avoids having to rename PMA throughout this clause to BM-PMA as otherwise might be necessary.

*Cl* **120** *SC* **120.1.4** *P* **200** *L* **7** # 412

Opsasnick, Eugene Broadcom Inc.

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

The numbered items 2, 3, and 4 in the list of item b) define the AUIs that run at 25G/lane, 50G/lane, and 100G/lane, respectively. These terms are used in the later list items 5 to 10. Those later list items also refer the AUI types that run at 200G/lane. There should be new item (5) added after item (4) to define these new AUI types.

*SuggestedRemedy*

In 120.1.4, add a new item between list items 4 and 5 (a new #5), and update the numbering on the rest of the list accordingly.
New list item 5:
"5) 200GAUI-1 is a 106.25 GBd single lane PAM4 physical instantiation of the 200 Gb/s connection. 400GAUI-2 is a 106.25 GBd by 2 lane PAM4 physical instanttiation of the 400 Gb/s connection."

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
The referenced list is for AUIs that are affiliated with the BM-PMA defined in Clause 120. It would therefore not be appropriate to add 200GAUI-1 and 400GAUI-2 the that list.
However, it would be helpful to point the reader to where these are defined.
Change item 7 to the following (adding references to the PMD clauses and AUI annexes):
"7) For a PHY that includes a 200GAUI-1 interface (see Annex 176C and Annex 176D) or a 200GBASE-KR1 (see Clause 178), 200GBASE-CR1 (see Clause 179), 200GBASE-DR1 (see Clause 180), or 200GBASE-DR1-2 (see Clause 182) PMD, the signaling rate range for the output of any 200GAUI-8, 200GAUI-4, or 200GAUI-2 PMA within the PHY shall be limited to ±50ppm (see 176B.4)."
Similarly change items 8 through 10.
Implement with editorial license.

*Cl* **169** *SC* **169.1.4** *P* **205** *L* **19** # 357

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **R** *(B1) (CA)*

In the copper tables ILT/RTS is listed as conditional for PHYs that don't use 178B but with a footnote stating it's mandatory for 800GAUI-4 C2M/C2C. Currently these PHYs don't use ILT/RTS, so the conditional value is based on the existence of a 800GAUI-4 being present.

*SuggestedRemedy*

In Table 169-3a Add a new footnote that says "Mandatory for 800GAUI-4 C2C and 800GAUI-4 C2M." and replace the footenote b in the 178B column with a reference to this new footnote.

*Response* *Response Status* **W**

REJECT.
The requirement for ILT/RTS is conditional upon there being an 800GAUI-4 in the PHY.
Thus these are marked with C with footnote "b" pointing us to the PMD clause.
The PMD clause repeats that ILT/RTS is conditional with the footnote 'd": "ILT and RTS functions are mandatory for the 800GAUI-4 C2C and 800GAUI-4 C2M."
Thus the information request by the comment and suggested remedy is already provided.
The approach taken was to avoid these summary tables in 169 from blowing up with special cases for the various PMD types. Instead, the special cases are taken care of in the PMD clause.

*Cl* **169** *SC* **169.2.10** *P* **207** *L* **7** # 367

Slavick, Jeff — Broadcom Inc

*Comment Type* **E** *Comment Status* **A** *(B1) (CG)*

The order of the PHY list intermixes DR and FR.

*SuggestedRemedy*

Move 800G-FR4-500 to be after 800G-FR4

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
By convention we normally list by medium length, not by medium/modulation type.
Instead, move 800GAUI-4 C2C/C2M to start of list.

*Cl* **170** *SC* **170.4.3** *P* **223** *L* **7** # 422

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

800GMII and 1.6TMII are different; a prospective customer reading a PICS is entitled to know which is being offered.

*SuggestedRemedy*

Create major options (not exclusive) for 800GMII and 1.6TMII

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.

*Cl* **171** *SC* **171.1** *P* **225** *L* **22** # 283

D'Ambrosia, John — Futurewei Technoogies, U.S. Subsidiary of Huawei

*Comment Type* **TR** *Comment Status* **A** *APSU conditions (CA)*

An extender is considered to be an ISL and should be denoted in Table 171-1, as a physical layer clause assocated with 800GMII Extender

*SuggestedRemedy*

Add table entry in Tabe 171-1
178B - APSU Conditional Notee
Note E - Required when implementing a 800GMII Extender based on 800GAUI-4 C2C or 800GAUI-4 C2M only.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-280.

*Cl* **171** *SC* **171.1** *P* **226** *L* **20** # 284

D'Ambrosia, John — Futurewei Technoogies, U.S. Subsidiary of Huawei

*Comment Type* **TR** *Comment Status* **A** *APSU conditions (CA)*

An extender is considered to be an ISL and should be denoted in Table 171-1a, as a physical layer clause assocated with 1.6TMII Extender

*SuggestedRemedy*

Add table entry in Tabe 171-1a
178B - APSU Conditional Notee
Note C - Required when implementing a 1.6TMII Extender based on 1.6TAUI-8 C2C or 1.6TAUI-8 C2M only.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-280.

*Cl* **171** *SC* **171.3.3** *P* **233** *L* **8** # 289

D'Ambrosia, John — Futurewei Technoogies, U.S. Subsidiary of Huawei

*Comment Type* **TR** *Comment Status* **R** *APSU conditions (CA)*

A 800GMII Extender shall support APSU if based on 800GAUI-4.

However, it states here
The TXLS and RXLS signals and tx_link_status variable are only required if the PHY 800GXS is part of a
Physical Layer that supports autonomous path startup (APSU) (Annex 178B).

This would apply to 800GAUI-8, which is not what Annex 178B states.

*SuggestedRemedy*

Modify this statement -
The TXLS and RXLS signals and tx_link_status variable are only required if the PHY 800GXS is part of a
Physical Layer that supports autonomous path startup (APSU) (Annex 178B).

To

The TXLS and RXLS signals and tx_link_status variable shall be implemented if the PHY 800GXS is supporting a 800GAUI-4.

*Response* *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

*Cl* **171** *SC* **171.3.3a** *P* **234** *L* **10** # 290

D'Ambrosia, John — Futurewei Technoogies, U.S. Subsidiary of Huawei

*Comment Type* **TR** *Comment Status* **R** *APSU conditions (CA)*

A 1.6TGMII Extender shall support APSU if based on 1.6TAUI-8.
However, it states here
The TXLS and RXLS signals and tx_link_status variable are only required if the PHY 1.6TXS is part of a
Physical Layer that supports autonomous path startup (Annex 178B).

*SuggestedRemedy*

Modify this statement -
The TXLS and RXLS signals and tx_link_status variable are only required if the PHY 1.6TXS is part of a
Physical Layer that supports autonomous path startup (Annex 178B).

To

The TXLS and RXLS signals and tx_link_status variable shall be implemented if the PHY 1.6TXS is supporting a 1.6TAUI-8.

*Response* *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

*Cl* **171** *SC* **171.6.1** *P* **235** *L* **48** # 399

Opsasnick, Eugene — Broadcom Inc.

*Comment Type* **E** *Comment Status* **A** *(B1) (L)*

Lines 48-51 on page 236 contain one very long run-on sentence that should be broken up into separate sentences. It might also be better to separate the equation from the definition of the variables.

*SuggestedRemedy*

Replace the text in 171.6.1 with:
"The variable tx_am_sf is set as follows:
tx_am_sf<2:0> = {FEC_degraded_SER + rx_local_degraded,0,0}

FEC_degraded_SER and rx_local_degraded are defined in 172.2.6.2.2 for DTE 800GXS and in 175.2.5.3 and 175.2.5.5 for DTE 1.6TXS. The "+" symbol denotes a logical OR."

*Response* *Response Status* **C**

ACCEPT.

*Cl* **171** *SC* **171.6.2** *P* **236** *L* **4** # 400

Opsasnick, Eugene — Broadcom Inc.

*Comment Type* **ER** *Comment Status* **A** *(B1) (L)*

Lines 4-7 on page 236 contain one very long run-on sentence that should be broken up into separate sentences. It might also be better to separate the equation from the definition of the variables.

It is also very confusing to assign this "TX" variable from the RX inputs. It should be explained that the "tx_am_sf" variable is actually propaging in the RX direction.

*SuggestedRemedy*

Replace the text in 171.6.2 with:
"The variable tx_am_sf is set as follows:
tx_am_sf<2:0> = {RXRD,RXLD, 0}

RXRD and RXLD are signals from the PCS on the PCS service interface. They are are defined in 172.1.5.1 for the PHY 800GXS and in 175.1.4.1 for the PHY 1.6TXS. Note that for the PHY XS, the tx_am_sf variable is used in the alignment markers of the data propagating in the RX direction towards the MAC.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Replace the text in 171.6.2 with:

"The variable tx_am_sf is set as follows:
tx_am_sf<2:0> = {RXRD,RXLD, 0}

RXRD and RXLD are signals from the PCS on the PCS service interface. They are are defined in 172.1.5.1 for the PHY 800GXS and in 175.1.4.1 for the PHY 1.6TXS."

*Cl* **172** *SC* **172.2.5** *P* **262** *L* **42** # 360

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *Stateless decoder (L)*

We have editted the 64b66b encoder/decoder sections of 800G to guide folks to use the new stateless decoder defined in 119. In Clause 119 FEC decoder we state when using the 119 stateless decoding function you SHALL also error mark extra blocks that could have errors due to scrambler extension.
In 172.2.5.3 FEC decodoer we have the following:
The Reed-Solomon decoder is identical to that specified in 119.2.5.3, with the following exceptions:
ù FEC_degraded_SER in flow 0 and flow 1 are mapped to FEC_degraded_SER_0 and FEC_degraded_SER_1, respectively.
ù hi_ser in flow 0 and flow 1 are mapped to hi_ser_0 and hi_ser_1, respectively.

Which if someone is doing a 800G that uses the 119 stateless 64b66b decoder then the FEC decoder shall error mark some of the extra blocks beyond the uncorrectable CW. But if they're using the 172 stateless 64b66b decoder (perhaps due to re-use) then they would not be guided to fix their design to address the scrambler error extension possiblity. So adding guidance to do the same error mark when using 172 stateless 64b66b decoder, but not mandating it, would be a service to humanity to address a hole in the standard.

*SuggestedRemedy*

Bring in 172.2.5.3 add another exception that states:
"The additional error marking when using the stateless decoder specified in 119.2.5.8 should also be done if using the stateless decoder specified in 172.2.5.9.2."

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The draft is correct as written; however, if an implementation chooses to use the 64B/66B stateless decoder defined in Clause 172, it is a good suggestion to recommend that the correct error extension marking be done when an uncorrectable codeword is detected. In addition, it is worthwhile to point out in 172.2.5.3 that the extended error marking is required if the CL 119 64B/66B PCS decoder is used since this is only required through a cross-reference to 119.2.5.3 and does not currently appear in Clause 172.

The CRG revived slides 3-8 of
https://www.ieee802.org/3/dj/public/26_05/opsasnick_3dj_01a_2605.pdf

Update 172.2.5.3 as shown on slide 8 of opsasnick_3dj_01a_2605.pdf

*Cl* **174** *SC* **174.1.4** *P* **272** *L* **18** # 370

Slavick, Jeff — Broadcom Inc

*Comment Type* **T** *Comment Status* **R** *(B1) (CG)*

Is footnote b necessary for 1.6T given all PMDs require it to be present. Yes RTS may not be possible if you have 1.6TAUI-16, but you need to read the spec to know that so what clarification is being made that would otherwise be missed?

*SuggestedRemedy*

Remove footnote b from Table 174-2 and 174-3.

*Response* *Response Status* **C**

REJECT.
It is always mandatory for the PMD and for 1.6TAUI-8 but not for 1.6TAUI-16. A clarification for the latter is provided in each PMD clause.

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*Cl* **174A** *SC* **174A.4** *P* **743** *L* **45** # 65

WANG, Xuebo — Huawei Technologies Co., Ltd

*Comment Type* **ER** *Comment Status* **A** *(B1) (CG)*

"MAC-TO-MAC" in the sub-clause title should be "MAC-to-MAC".

*SuggestedRemedy*

Change "MAC-TO-MAC" to "MAC-to-MAC".

*Response* *Response Status* **W**

ACCEPT.

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*Cl* **174A** *SC* **174A.6** *P* **744** *L* **25** # 27

Brown, Matthew — Qualcomm

*Comment Type* **E** *Comment Status* **A** *(B1) (CG)*

list of figures and tables should include Figure 174A-11

*SuggestedRemedy*

Change "(see Figure 174Aû6, Table 174Aû1, and Table 174Aû2)"
To "(see Figure 174Aû6, Figure 174A-11, Table 174Aû1, and Table 174Aû2)"

*Response* *Response Status* **C**

ACCEPT.

---

*Cl* **174A** *SC* **174A.9** *P* **745** *L* **22** # 421

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *(Bx) (CG)*

The FEC bin histogram, BER_added and masks methodology is very complicated. It needs more accessible explanation.

*SuggestedRemedy*

Add a more accessible explanation, with graphs and examples to illustrate what is going on. Show how the method can be simplified when assessing error rates around PMDs, where BER_added is relatively small.

*Response* *Response Status* **U**

REJECT.

The suggested remedy does not provide sufficient detail to implement.

---

*Cl* **174A** *SC* **174A.9** *P* **745** *L* **27** # 241

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *(Bx) (CG)*

In case of Clause 180 or 181 there is no Inner FEC

*SuggestedRemedy*

Need to clarify an Inner FEC only for PMDs defined with Inner FEC

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The PMD for Clause 180 and Clause 181 is covered by the first item in the list "a PMD at each end and a medium between". In the subsequent subclause (174A.9.1) detailed test configuration for each case is provided in Figure 174A-1 and Figure 174A-2.

However, the opening text could be revised to better introduce the scenarios listed below it.

Change:
"This subclause defines test methods for an ISL (see 178B.3) with 200 Gb/s per lane signaling between a pair of PMAs including:"
To:
"This subclause defines test methods for ISLs (see 178B.3) with 200 Gb/s per lane signaling between a pair of PMAs including three ISL configurations as follows:"

Implement with editorial license.

*Cl* **174A** *SC* **174A.9.6** *P* **749** *L* **12** # 66

WANG, Xuebo Huawei Technologies Co., Ltd

*Comment Type* **TR** *Comment Status* **A** *(B1) (CG)*

For step b), Ha(k) should reflect the error distribution over all lanes that are not tested by the PMA. When using Equation (174A-5) to calculate Ha(k), the value of n should be specified to be 544 as Ha(k) is calcuated without convolution of per-lane error histogram. The same issue also exists in 174A.9.7. A contribution related to this comment was presented in March plenary meeting and the option 1 therein was supported. See https://www.ieee802.org/3/dj/public/26_03/wang_3dj_01a_2603.pdf

*SuggestedRemedy*

Implement option 1 of the proposed change on slide 5 in https://www.ieee802.org/3/dj/public/26_03/wang_3dj_01a_2603.pdf

*Response* *Response Status* **W**

ACCEPT.

*Cl* **174A** *SC* **174A.13** *P* **755** *L* **43** # 64

WANG, Xuebo Huawei Technologies Co., Ltd

*Comment Type* **TR** *Comment Status* **A** *(B1) (CG)*

In Figure 174A-11, CRC error ratio for FEC-to-FEC path should be less than 5.7 x 10-11 instead of 1.45 x 10-11 according to 174A.7.

*SuggestedRemedy*

Change "CRC error ratio < 1.45 x 10-11" to "CRC error ratio < 5.7 x 10-11".

*Response* *Response Status* **W**

ACCEPT.

*Cl* **174A** *SC* **174A.13** *P* **755** *L* **43** # 28

Brown, Matthew Qualcomm

*Comment Type* **T** *Comment Status* **A** *(B1) (CG)*

This figure should include allocation of FLR for the PCS to PCS path.

*SuggestedRemedy*

Add arrows and label for PCS-to-PCS path, similar to Figure 174A-10, except for error expectations listing only "FLR < 6E-11".

*Response* *Response Status* **C**

ACCEPT.

*Cl* **175** *SC* **175.2.4.6.1** *P* **291** *L* **10** # 423

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *syntax (L)*

802.3 is a specification, not an example, lecture or tutorial. It is definitive and should be written in proper formal English. am_x<119:0> is not an example; it is *the* name for this thing. Other sections use better language, for example "The variable tx_am_sf is set as follows".

*SuggestedRemedy*

Change:
Let am_x<119:0> be the alignment marker for PCS lane x, x=0 to 15, where bit 0 is the first bit transmitted.
am_x<119:0> is constructed as shown in Figure 175-3 using the values in Table 175-4 for each PCS lane number x.
to:
The alignment marker for PCS lane x is am_x<119:0>, where x=0 to 15 and bit 0 is the first bit transmitted. It is constructed as shown in Figure 175-3 using the values in Table 175-4 for each PCS lane number x.
Scrub the draft for similar misuse of "let".

*Response* *Response Status* **C**

REJECT.
The sentence is grammatically correct and is a well-structured definition commonly used in technical specifications to define a variable (am_x<119:0>), its context (PCS lane x), its range (x=0 to 15), and the interpretation of its bits ("bit 0 is the first bit transmitted"). This precise phrasing is used to ensure the transmitter and receiver agree on how the alignment marker is constructed and serialized.

The CRG reviewed the slide 29-33 of https://www.ieee802.org/3/dj/public/26_05/opsasnick_3dj_01a_2605.pdf.

There are many examples of this language in the base standard, see slide 32 of opsasnick_3dj_01a_2605.pdf.

The is no consensus to make a change.

*Cl* **175** *SC* **175.6** *P* **305** *L* **17** # 57

de Koos, Andras
Microchip Technology Inc

*Comment Type* **T** *Comment Status* **A** *timesync (L)*

The path data delay instructions could be further clarified for the RxPCS to incorporate the deskew function.
Specifically, the current text just says to calculate the path data delay using the first bit of a set of 4 interleaved FEC codewords, which is necessarily on PCS lane 0. But the directives in Clause 90 specify that the path data delay to be calculated on the last-arriving lane - essentially ignoring any incoming skew.
If the last-arriving lane is not PCS lane 0, then the instructions here and the directive in clause 90 would appear to be at odds. But not really, as the directive is to ignore any incoming skew by treating all the lanes as if they arrived at the same time as the last-arriving lane. But a wording tweak could avoid any potential confusion.

*SuggestedRemedy*

I'd rather avoid making the instructions even more complicated.

Consider changing the instructions to include the deskew step for the Rx PCS

from :
When the PCS_timesync_multilane_ability variable is asserted, the transmit and receive path data delays are reported as if the DDMP (data delay measurement point) is at the start of the set of four interleaved RS-FEC codewords (see 90.7).
to :
When the PCS_timesync_multilane_ability variable is asserted, the transmit and receive path data delays are reported as if the DDMP (data delay measurement point) is at the start of the set of four interleaved RS-FEC codewords, ignoring any incoming lane skew (see 90.7).

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The comment points out an apparent contradiction in the path data delay calculation instructions in 175.6 and IEEE std 802.3cx-2023, subclause 90.7.3 "Lane skew".

90.7.3 states:
"The receive path data delay for a PHY with multiple lanes is reported as if the DDMP arrived at the MDI input on the lane with the smallest buffer delay." [In other words, use the the arrival time of the last arriving lane]

175.6 states:
"... receive path data delay [is] reported as if the DDMP is at the start of the set of four interleaved RS-FEC codewords."

Clause 175 contains a deskew function to remove skew between the incoming PCS lanes. Subclause 90.7.3 might be interpreted as saying delay through the RX PCS should be based on the last arriving PCS lane instead of the bit at the start of a set of four interleaved RS-FEC codewords as stated in 175.6.

The suggested remedy of adding "... ingoring any incoming lane skew" to the end of the 175.6 instruction, is a bit vague and needs to be more explicit.

In 175.6, change the third paragraph,
From:
"When the PCS_timesync_multilane_ability variable is asserted, the transmit and receive path data delays are reported as if the DDMP (data delay measurement point) is at the start of the set of four interleaved RS-FEC codewords (see 90.7)."
To:
"The PCS lane distribution can cause significant delay variations as described in 90.7.1. When the PCS_timesync_multilane_ability variable is asserted, the maximum delay value through the PCS is allocated to the transmit path and the minimum delay value to the receive path.

The transmit and receive path data delays are reported as the delay incurred by the first bit of a set of four interleaved RS-FEC codewords. Additionally, the receive path data delay is reported as if the PCS lanes arrive without any skew (see 90.7.3) which is equivalent to the first bit of a set of four interleaved RS-FEC codewords being present in the last arriving PCS lane."

*Cl* **176** *SC* **176.4.2.2** *P* **322** *L* **28** # 74

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **E** *Comment Status* **A** *syntax (L)*

(Comment resubmitted from WG ballot)
"with the following exception: <dashed list>"
A single exception does not require a list (there are many such exceptions in the draft without a list).

*SuggestedRemedy*

Change the first paragraph to the following text:
"The alignment marker lock process for each input PCSL operates in the same manner as the xBASE-R PCS alignment marker lock process (see 119.2.5.1, 172.2.5.1, and 175.2.5.1), except that the restart_lock variable (see Figure 119û12) takes the value of restart_lock_mux, which is defined in 176.4.4.2.1 and set by the PMA multiplex synchronization state diagram (Figure 176û10).

Delete the dashed list.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The proposed text will result in the first paragraph being a long and complex sentence. The dashed list in the current draft makes it easier for the reader to focus on the exception. While it is true that some exceptions are described in the draft without a list, in this case, using a list makes the text easier to follow.

The current text is correct as written. The comment does not provide sufficient justification to support the suggested remedy.

However, the cross-reference should be updated to follow conventions used in the draft, but that is also covered by comment #I-53.

Resolved using the response to comment #I-53.

*Cl* **176** *SC* **176.4.2.2** *P* **322** *L* **28** # 53

Brown, Matthew — Qualcomm

*Comment Type* **ER** *Comment Status* **A** *syntax (L)*

In a previous draft, most of the new logic clauses were updated to reference state diagram figures with the form "<state diagram name> (Figure xxx-xx)".
As an example, from Clause 177: "Inner FEC self-synchronization state diagram (Figure 177û13) or the Inner FEC pad detection state diagram (Figure 177û14)"
Some instances were missed in Clause 176 and Clause 184.

*SuggestedRemedy*

On page 322 line 29 change "in the state diagram shown in Figure 176û10" to "in the PMA multiplex synchronization state diagram (Figure 176-10)".
Other locations to update are (page/line):
Clause 176: 322/33, 330/39, 331/34, 331/47
Clause 184: 607/36

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.

In 176.4.2.2, pg. 322, line 29
Change from: "in the state diagram shown in Figure 176–10"
To: "in the PMA multiplex synchronization state diagram (Figure 176-10)"

In 176.4.2.2, pg. 322, line 33
Change from: "Synchronization between the PCS lanes is performed by the PMA multiplex lane synchronization process as specified in the state diagram in Figure 176-10"
To: "Synchronization between the PCS lanes is performed by the process specified in the PMA multiplex synchronization state diagram (Figure 176-10)"

In 176.4.2.3, pg. 322, line 43:
Change from:
"PMA multiplex lane synchronization process (see Figure 176–10)."
to
"PMA multiplex synchronization state diagram (Figure 176–10)."

In 176.4.3.2.2, pg 331, line 34
Change from: "The 1.6TBASE-R PMA shall implement one PMA demultiplex symbol lock process for each input lane as specified by the state diagram in Figure 176-11 ...."
To: "The 1.6TBASE-R PMA shall implement one PMA demultiplex symbol lock process for each input lane as specified by the PMA demultiplex symbol lock state diagram (Figure 176-11)..."

In 176.4.3.2.3, pg 331, line 47
Change from :"The restart_lock variable in Figure 119–12 takes the value of restart_lock_demux<y> which is set in the state diagram shown in Figure 176-11"
To: "The restart_lock variable in Figure 119–12 takes the value of restart_lock_demux<y>, which is defined in 176.4.4.2.1 and set by the PMA demultiplex symbol lock state diagram (Figure 176-11)"

In 184.5.4, pg 607, line 36
Change from: "DSP synchronization shall comply with the DSP lock state diagram shown in Figure 184–9."
To: "DSP synchronization shall comply with the DSP lock state diagram (Figure 184–9).

Implement with editorial license.

[Editor's note: CC 184
In 176.4.2.2, pg. 322, line 29
Change from: "in the state diagram shown in Figure 176-10"
To: "in the PMA multiplex synchronization state diagram (Figure 176-10)"

In 176.4.2.2, pg. 322, line 33
Change from: "Synchronization between the PCS lanes is performed by the PMA multiplex lane synchronization process as specified in the state diagram in Figure 176-10"
To: "Synchronization between the PCS lanes is performed by the process specified in the PMA multiplex synchronization state diagram (Figure 176-10)"

In 176.4.2.3, pg. 322, line 43:
Change from:
"PMA multiplex lane synchronization process (see Figure 176-10)."
to
"PMA multiplex synchronization state diagram (Figure 176-10)."

In 176.4.3.2.2, pg 331, line 34
Change from: "The 1.6TBASE-R PMA shall implement one PMA demultiplex symbol lock process for each input lane as specified by the state diagram in Figure 176-11 ...."
To: "The 1.6TBASE-R PMA shall implement one PMA demultiplex symbol lock process for each input lane as specified by the PMA demultiplex symbol lock state diagram (Figure 176-11)..."

In 176.4.3.2.3, pg 331, line 47
Change from :"The restart_lock variable in Figure 119-12 takes the value of restart_lock_demux<y> which is set in the state diagram shown in Figure 176-11"
To: "The restart_lock variable in Figure 119-12 takes the value of restart_lock_demux<y> (see 176.4.4.2.1) which is set by the PMA demultiplex symbol lock state diagram (Figure 176-11)"

In 184.5.4, pg 607, line 36
Change from: "DSP synchronization shall comply with the DSP lock state diagram shown in Figure 184-9."
To: "DSP synchronization shall comply with the DSP lock state diagram (Figure 184-9).

Implement with editorial license.

[Editor's note: CC 184]

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*Cl* **176** *SC* **176.4.2.2** *P* **322** *L* **33** # 75

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **E** *Comment Status* **A** *syntax (L)*

"PMA multiplex lane synchronization process" is not defined anywhere.
The state diagram in Figure 176-10 has a different title.
Similarly in 176.4.2.3.
In 176.4.4.3 the text refers to this diagram as "the PMA multiplex synchronization process"

*SuggestedRemedy*

Change from
"performed by the PMA multiplex lane synchronization process as specified in the state diagram in Figure 176û10"
to
"performed by the PMA multiplex synchronization state diagram (Figure 176û10)"
Apply a similar change to the second paragraph of 176.4.2.3.

Alternatively, change the figure title and align the text.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Small wording changes are needed in 176.4.2.2 and 176.4.2.3.

Resolved using the response to comment #I-53.

*Cl* **176** *SC* **176.4.2.3.1** *P* **322** *L* **52** # 76

Ran, Adee
Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

"The 4-codeword deskew aligns PCSLs to a four codeword boundary relative to the start of the alignment marker block across all PCSLs"

The expression "alignment marker block" is used once in 176A where it refers to what we usually call "alignment marker group" (subject of another comment). In clause 176 it is used 3 times (176.4.2.3.1, 176.4.2.3.2, and 176.4.2.3.3) and seems to refer to the (single) alignment marker on each PCSL.

This expression is used in the base standard only once, in clause 82, with the meaning of single alignment markers (which are 66-bit blocks in that case). But from clause 119 and on, alignment markers are not 66-bit blocks anymore.

*SuggestedRemedy*

Change from
"relative to the start of the alignment marker block across all PCSLs"
to
"relative to the start of the alignment marker on each PCSL".

Apply the same change in 176.4.2.3.2, and 176.4.2.3.3.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.

In 176.4.2.3.1, 176.4.2.3.2, and 176.4.2.3.3:
Change:
"... relative to the start of the alignment marker block across all PCSLs.".
To:
"... relative to the start of the alignment markers across all PCSLs."

Implement with editorial license.

*Cl* **176** *SC* **176.4.3.2.1** *P* **330** *L* **28** # 56

de Koos, Andras
Microchip Technology Inc

*Comment Type* **T** *Comment Status* **R** *Skew reporting (L)*

In the receive SM-PMA, the symbol pair de-interleave will be successful whether or not the odd PCS lane delay was performed by the opposite-end transmitter. PCS lanes are symbol-pair deinterleaved with a random symbol alignment from the PMA lane. As long as the PMA lane was formed by the round-robin symbol-pair-interleave from PCS lanes, delay between the PCS lanes will have no bearing on whether the lanes can lock to their AM. When all 8 PCS lanes lock, the de-interleave is successful. It is strange that something so fundamental to the proper functioning of the 200Gbps/lane signaling (odd lane delay) is in no way enforced or even visible at the receiver.
There may be a temptation, especially for the 8:1 and 16:2 SM-PMAs, to forego the 2CW odd lane delay in order to reduce the latency.
Furthermore, there is no obvious way for the receiver to deduce whether the transmitter has such a non-compliance. The only visible effect would be that the FEC symbol error histogram (errors/codeword) would look worse than expected in the presence of burst errors.

*SuggestedRemedy*

There is likely no appetite to change the symbol pair de-interleave process at this stage. But consider mandatory PCS lane skew reporting after the symbol pair de-interleave. With such a status, the user could deduce whether the Tx odd lane delay was properly done. (many implementations would already have a skew status, so this may not be too intrusive to existing development efforts).

*Response* *Response Status* **C**

REJECT.

The comment is correct in pointing out that it is impossible for a receiver to determine if the transmitter implemented the mandaory two codeword odd PCS lane delay. The main purpose of the 802.3 standard is to ensure interoperability between transmitters and receivers. Specifying a capability in the receiver to detect the compliance of the transmitter, as the suggested remedy is asking to consider, is not expected from the standard.

The suggested remedy does not provide sufficient detail to implement a change to the draft.

*Cl* **176** *SC* **176.4.3.2.2** *P* **331** *L* **34** # 77

Ran, Adee Cisco Systems, Inc.

*Comment Type* **E** *Comment Status* **A** *syntax (L)*

"as specified by the state diagram in Figure 176û11"
The state diagram title should be stated.

*SuggestedRemedy*

Change to
"as specified by the PMA demultiplex symbol lock state diagram (Figure 176û11)"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-53.

*Cl* **176** *SC* **176.4.3.2.3** *P* **331** *L* **46** # 78

Ran, Adee Cisco Systems, Inc.

*Comment Type* **E** *Comment Status* **A** *syntax (L)*

"takes the value of restart_lock_demux<y> which is set in the state diagram shown in Figure 176û11"
The variable is defined separately from the figure.
The state diagram title should be stated.

*SuggestedRemedy*

Change to
"takes the value of restart_lock_demux<y>, which is defined in 176.4.4.2.1 and set by the PMA demultiplex symbol lock state diagram (Figure 176û11)"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-53.

*Cl* **176** *SC* **176.4.4.2** *P* **332** *L* **35** # 79

Ran, Adee Cisco Systems, Inc.

*Comment Type* **E** *Comment Status* **A** *(B1) (L)*

(Comment resubmitted from WG ballot)
This subclause includes a dashed list with one item (external reference to Figure 119-12), and then a paragraph with multiple statements regarding different PMAs, which would be more readable as a table or a list.
It should be the other way around: single statement in a text paragraph, and multiple statements in a list.

The suggested remedy is one way of improving this text, using a table. Other ways may be considered.

*SuggestedRemedy*

Use the following content, with editorial license:
The 200GBASE-R 8:1, 400GBASE-R 16:2, 800GBASE-R 32:4, and 1.6TBASE-R 16:8 PMAs use the alignment marker lock state diagram from Clause 119 (Figure 119-12), with the definitions of variables in 176.4.4.2.1, functions in 176.4.4.2.2, and counters in 176.4.4.2.3. Table 176-<new> lists the locations of additional variable definitions and values, and the values of the index x, which denotes the PMA service interface lane number.

Add a new table 176-<new> with columns for PMA type, reference clause for variables, and the range of x.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The current text in 176.4.4.2 is technically correct as written, but could be improved for clarity. Further, the definition of the index variable, x, is included in the definitions in Clauses 119, 172, and 175 and can be removed from 176.4.4.2.

Replace the text in 176.4.4.2 with:

"The 200GBASE-R 8:1, 400GBASE-R 16:2, 800GBASE-R 32:4, and 1.6TBASE-R 16:8 PMAs use the alignment marker lock state diagram from Clause 119 (Figure 119-12).

Any constants, variables, functions, or counters used in the alignment marker lock state diagram (Figure 119-12), that are not defined in the following subclauses, shall use the values and definitions for each PMA from the following subclauses:
- For 200GBASE-R 8:1 PMA, use 119.2.6.2
- For 400GBASE-R 16:2 PMA, use 119.2.6.2
- For 800GBASE-R 32:4 PMA, use 172.2.6.2
- For 1.6TBASE-R 16:8 PMA, use 175.2.6.2
"

Implement with editorial license.

*Cl* **176** *SC* **176.4.4.2** *P* **332** *L* **38** # 402

Opsasnick, Eugene — Broadcom Inc.

*Comment Type* **ER** *Comment Status* **A** *(B1) (L)*

The paragraph starting at line 38 on page 332 contains cross-references for variable definitions and defines the value of x for four separate PMA types. It is very wordy and hard to follow. The text can be cleaned up with the addtion of a simple table.

*SuggestedRemedy*

Replace the text of the second paragraph of 176.4.4.2 with the following text and a new table (Table 176-n) as described below.

Change:
"Any constants, variables, functions, or counters used in the above Clause 119 state diagram which are not defined in the following subclauses shall use the values and definitions from 119.2.6.2 for the 200GBASE-R 8:1 PMA and 400GBASE-R 16:2 PMA, the values and definitions from 172.2.6.2 for the 800GBASE-R 32:4 PMA, and the values and definitions from 175.2.6.2 for the 1.6TBASE-R 16:8 PMA. The variable x in the definitions of 119.2.6.2 is used as an index for the PMA service interface lane number and shall use the values of x = 0 to 7 for the 200GBASE-R 8:1 PMA, x = 0 to 15 for the 400GBASE-R 16:2 PMA, x = 0 to 31 for the 800GBASE-R 32:4 PMA, and x = 0 to 15 for the 1.6TBASE-R 16:8 PMA."
To:
"Any constants, variables, functions, or counters used in the above Clause 119 state diagram which are not defined in the following subclauses shall use the values and definitions of the variables defined in the subclauses referenced in Table 176-N. The index variable x in these definitions is used to indicate the PMA service interface lane number and shall take the values as specified in Table 176-N."

Table 176-N:
column headers:
PMA type | variable references | x
---
4 rows with these entries:

| PMA type | variable references | x |
|---|---|---|
| 200GBASE-R 8:1 | 119.2.6.2 | 0 to 7 |
| 400GBASE-R 16:2 | 119.2.6.2 | 0 to 15 |
| 800GBASE-R 32:4 | 172.2.6.2 | 0 to 31 |
| 1.6TBASE-R 16:8 | 175.2.6.2 | 0 to 15 |

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-79.

*Cl* **176** *SC* **176.4.4.3** *P* **334** *L* **39** # 80

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **E** *Comment Status* **A** *(B1) (L)*

"shall each implement m alignment marker processes as depicted in Figure 119û12"
Figure 119-12 is titled "Alignment marker lock state diagram".

*SuggestedRemedy*

Change "alignment marker processes" to "alignment marker lock processes".

*Response* *Response Status* **C**

ACCEPT.

*Cl* **176** *SC* **176.6.1** *P* **340** *L* **10** # 147

Bruckman, Leon — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *(Bx) (L)*

In Figure 176-13 there is an input from each PAM4 decode block to the SIL, but there is no requreiment to monitor anything in the PAM4 decoder that can be used as a signal failure detection

*SuggestedRemedy*

Ether define what shall be monitored by the PAM4 decoder or in Figure 176-13:
- remove the arrow from the PAM4 decode blocks to the SIL block
- remove the SIL block and pass the IS_SIGNAL.request directly to the Service Interface below the PMA and IS_SIGNAL.indication directly to the Service Interface above the PMA

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The 200G/lane n:n PMA has a PAM4 encode and decode, but no CDR. The CDR is part of the AUI-component. The last sentence of 176.2 and 176.3 already indicates that the n:n PMA passes the SIGNAL_OK paramater through the PMA without any modification.
Remove the SIL blocks in Figure 176-13 and pass IS_SIGNAL from input to output without any modification (pass-through).
Implement with editorial license.

*Cl* **176** *SC* **176.7.1.2** *P* **341** *L* **18** # 371

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *ILT reference (L) (B1)*

Figure 178B-10 does not have a state named LINK_READY. It is now named PATH_READY.

*SuggestedRemedy*

Change LINK_READY to PATH_READY

*Response* *Response Status* **W**

ACCEPT.

*Cl* **176** *SC* **176.7.1.2** *P* **341** *L* **18** # 81

Ran, Adee
Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *ILT reference (L) (B1)*

"in the LINK_READY state on lane i (see Figure 178Bû10)"
There is no such state.

*SuggestedRemedy*

Change "LINK_READY" to "ISL_READY".

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-371.

*Cl* **176** *SC* **176.7.1.2** *P* **341** *L* **22** # 372

Slavick, Jeff
Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

ILT is run for both settings of mr_training_enable so stating ILT is disabled is not accurate. In 178B.7 we refer to it as training enabled and training disabled.

*SuggestedRemedy*

Change "ILT is disabled" to "training is disabled"

*Response* *Response Status* **W**

ACCEPT.

*Cl* **176** *SC* **176.7.3** *P* **341** *L* **42** # 82

Ran, Adee
Cisco Systems, Inc.

*Comment Type* **E** *Comment Status* **A** *(B1) (L)*

Typo: IS_UNIT_DATA (twice)

*SuggestedRemedy*

Change to IS_UNITDATA

*Response* *Response Status* **C**

ACCEPT.

*Cl* **176** *SC* **176.10** *P* **344** *L* **24** # 55

de Koos, Andras
Microchip Technology Inc

*Comment Type* **TR** *Comment Status* **A** *timesync (L)*

Instructions for calculating the path data delay in the SM-PMA are incomplete, as they do not take into account the symbol pair (or symbol quartet) interleave function.
Ideally, the text should specify which bit through the SM-PMA layer should be used to calculate its path data delay.
To align with the directives in Clause 90, the chosen bit should have the largest delay on transmit, and the smallest delay on receive.
See short presentation from the March plenary :
https://www.ieee802.org/3/dj/public/26_03/dekoos_3dj_01_2603.pdf

*SuggestedRemedy*

Change the following paragraph in 176.10 from:
The transmit and receive path data delays are reported as if the DDMP (data delay measurement point) occurs on an
odd PCS lane (see 90.7).
To:
For 8:1, 16:2, 32:4, 1:8, 2:16, and 4:32 SM-PMAs, the transmit and receive path data delays are reported as if the
DDMP (data delay measurement point) occurs on the first bit of the last odd-PCS-lane symbol-pair within an 8:1
symbol-pair round-robin interleave sequence, across all PMA lanes.
For 16:8 and 8:16 SM-PMAs, the transmit and receive path data delays are reported as if the DDMP (data delay
measurement point) occurs on the first bit of the last PCS-lane symbol-quartet within a 2:1 symbol-quartet
interleave sequence.
For 1:1, 2:2, 4:4, 8:8 and 16:16 SM-PMAs, the transmit and receive path data delays are reported as if the DDMP
(data delay measurement point) occurs on an arbitrary bit.
See 90.7 for more information.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The text of 176.10 which uses the "path data delay of an odd PCS lane" is not complete. Odd PCS lanes are indeed delayed the most in the transmit path, by two codewords for 200GbE and 400GbE for the m:n SM-PMAs, but this does not take into accout the delay incurred by the 8:1 symbol-pair and 2:1 symbol-quartet multiplexing of PCS lanes to PMA lanes. In addition, the n:m SM-PMAs incur the opposite delays where the even lanes are delayed in the transmit direction, and odd lanes are delayed in the receive direction. Further, the reference to the DDMP is not necessary and adds unnecessary complexity to the description.

In 176.10, change the third paragraph,
From:
"The transmit and receive path data delays are reported as if the DDMP (data delay

measurement point) occurs on an odd PCS lane (see 90.7)."
To:
"The SM-PMA sublayers have an intrinsic delay where the sum of the transmit and receive delays is a constant value. As recommended in 90A.7, the maximum delay value is allocated to the transmit path and the minimum delay value to the receive path. The transmit path data delay is reported as the delay incurred by the first bit of the PCS alignment marker of the PCS lane with the largest delay through the PMA . The receive path data delay is reported as the delay incurred by the first bit of the PCS alignment marker of the PCS lane with the smallest delay through the PMA. To determine the PCS lanes with the largest and smallest delay, delays added to PCS lanes (see 176.4.2.4 and 176.4.3.3) as well as symbol multiplexing and demultiplexing delays (see 176.4.2.5 and 176.4.3.2) shall be considered."

Make corresponding wording changes to the PICS in 176.12.3.5, in Item TS1 for path data delays with editorial license.

Make similar wording changes to the timesync subcluses in Clauses 177, 184, and 186 to remove the references to the DDMP.

In 177.9, change the third paragraph,
From:
"The transmit and receive path data delays are reported as if the DDMP (data delay measurement point) occurs on the first symbol on FEC flow 0 after the 1024-bit pad insertion (see 177.4.7), corresponding to the longest delay for transmit and the shortest delay for receive (see 90.7). "
To:
"The Inner FEC sublayer has an intrinsic delay pattern where the sum of the transmit and receive delays is a constant value. As recommended in 90A.7, the maximum delay value is allocated to the transmit path and the minimum delay value to the receive path. The transmit and receive path data delays are reported as the delay incurred by the first symbol on FEC flow 0 after the 1024-bit pad insertion (see 177.4.7)."

In 184.9, change the third paragraph,
From:
"The transmit and receive path data delay values are reported as if the DDMP (data delay measurement point) occurs on dspfo[3,1894] (see 184.4.10), corresponding to the longest delay for transmit and the shortest delay for receive (see 90.7)."
To:
"The Inner FEC sublayer has an intrinsic delay pattern where the sum of the transmit and receive delays is a constant value. As recommended in 90A.7, the maximum delay value is allocated to the transmit path and the minimum delay value to the receive path. The transmit and receive path data delay values are reported as the delay incurred by dspfo[3,1894] (see 184.4.10)."

In 186.6.1, change the second paragraph,
From:
"The transmit and receive path data delays are reported as if the data delay measurement point (DDMP) occurs on the start of the first non-fixed-stuff 257-bit GMP word of the tributary 0 multi-frame, where the start of the 800GBASE-ER1 tributary frame is also the start of a FEC frame, taking into account the maximum (transmit) and minimum (receive) data delay through the GMP mechanism. This corresponds to the longest delay through the transmit 800GBASE-ER1 FEC sublayer and shortest delay through the receive 800GBASE-ER1 FEC sublayer (see 90.7),"
To:
"The transmit and receive path data delay values are reported as the sum of the delays through the three sections that make up the 800BASE-ER1 FEC sublayer (see Figure 186-3). The lane distribution and interleaving processes performed by the Inverse RS-FEC function and ER1 FEC encoder can cause significant delay variations as described in 90.7.1. As recommended in 90A.7, the maximum delay value is allocated to the transmit path and the minimum delay value to the receive path.
The delay through the Inverse RS-FEC section is reported as the delay incurred by the first bit of a set of interleaved RS-FEC codewords, ignoring any skew. The transmit path data delay is reported as if all lanes at the FEC Service Interface arrive at the same time as the last arriving lane. The delay through the Mapping/Demapping and ER1 FEC encoding/decoding sections is reported as the delay incurred by the first bit of the first non-fixed-stuff 257-bit GMP word of the tributary 0 multi-frame, where the start of the 800GBASE-ER1 tributary frame is also the start of an ER1 FEC frame."

In 186.6.2, change the second paragraph,
From:
"The transmit and receive path data delays are reported as if the DDMP occurs on the first data symbol of the PMA frame S<0>, corresponding to the maximum delay for transmit and minimum delay for receive (see 90.7)."
To:
"The 800GBASE-ER1 PMA sublayer has an intrinsic delay pattern where the sum of the transmit and receive delays is a constant value. As recommended in 90A.7, the maximum delay value is allocated to the transmit path and the minimum delay value to the receive path. The transmit and receive path data delay values are reported as the delay incurred by the first bit of the first data symbol of the PMA frame S<0>."

Implement with editorial license.

[Editor's note: CC 176, 177, 184, 186]

[Editor's note: changed subclause/page from 334 to 344]

*Cl* **176** *SC* **176.12.3** *P* **349** *L* **52** # 149

Bruckman, Leon NVIDIA

*Comment Type* **TR** *Comment Status* **R** *(B1) (L)*

MDIO has its own table (Table 176.12.3.6)

*SuggestedRemedy*

Delete MDIO row from Table 176.12.3

*Response* *Response Status* **W**

REJECT.

MDIO is a major capability, therefore listed in Table 176.12.3. The MDIO capability is also a condition for the line items in Table 176.12.3.6. MDIO is listed as a major capability in other clauses as well.
The draft is correct as written. There isn't sufficient justification to adopt the suggested remedy.

*Cl* **176A** *SC* **176A** *P* **768** *L* **45** # 102

Ran, Adee Cisco Systems, Inc.

*Comment Type* **ER** *Comment Status* **A** *(B1) (L)*

"The first of the four codewords contains the alignment marker block"
"Alignment marker block" is not defined in 802.3dj or the base standard. Its usage here seems to refer to the "alignment marker group" which is defined in 175.2.4.6 and used extensively in clause 175 and annex 175A, consistent with previous PCS clauses and annexes.

*SuggestedRemedy*

Change "alignment marker block" to "alignment marker group".

*Response* *Response Status* **W**

ACCEPT.

*Cl* **176B** *SC* **176B.3** *P* **773** *L* **5** # 103

Ran, Adee Cisco Systems, Inc.

*Comment Type* **T** *Comment Status* **A** *(B1) (CG)*

176B.3 is titled "Special Case for 200GBASE-R, 400GBASE-R, and 800GBASE-R PMAs", and includes Figure 176Bû4, which provides examples of 800GBASE-R PHYs with back-to-back PMAs. However, there are no examples of the equally relevant 200GBASE-R and 400GBASE-R PHYs.

Realizing that adding detailed 200G and 400G labeling to the same figure would make it unreadable, and new figures would be almost identical, this could be noted in the text and/or in a NOTE inside the figure.

The suggested remedy is a NOTE.

*SuggestedRemedy*

Add a NOTE inside the figure:
NOTE---400GBASE-R and 200GBASE-R PHYs are formed in a similar way except that the number of lanes is divided by two and four, respectively.

Implement with editorial license.

*Response* *Response Status* **C**

ACCEPT.

*Cl* **176C** *SC* **176C.3** *P* **795** *L* **48** # 318

Nicholl, Gary — Cisco Systems, Inc.

*Comment Type* **T** *Comment Status* **A** *AUI Management (CG)*

As Mike Dudek pointed out in Draft 2.3 comment #104 (https://www.ieee802.org/3/dj/comments/D2p3/8023dj_D2p3_comments_final_clause.pdf), the C2C spec normatively requires meeting the functional specifications in management variable specifications in 178.13 which point to those in 179.14 where PMD_reset is required.
" The C2C component shall meet the functional specifications in 178.8 and the management variable specifications in 178.13, unless stated otherwise."

However the C2C component functions were separated from optional functions that resided in the PMA clause in earlier revisions of the specification. Mike was therefore proposig to reference the PMA status/control variables in Clause 176 rather than the PMD status/control control variables in Clause 178.

One issue with this approach is that the PMA and AUI compontent sublayers are co-located and likely using the same MMD (MDIO Manageable Device) address and therefore we can't use "PMA_reset" to independently reset the PMA sublayer and the AUI componenent subalyer as Mike proposed (see Figure 83C-7 as an example of how this was done in the past).

A better solution would to define a separate set of control and status variables for the AUI component (both C2C and C2M) sublayers and add the aprropriate MDIO registers in Clause 45.

Same issue applies in 176D.3 for the C2M AUI Component.

*SuggestedRemedy*

Add a new sub-clause in 176C called "Management Variables" (similar to 178.13) and define the specific control and status variables that are required for the AUI C2C component. Add associated new MDIO registers in Clause 45.

An alternative proposal would be to continue to reference the management variable specifications in 178.13 and the same MDIO registers in Clause 45, but with the local control and status variables names of "AUI_xxx" replacing "PMD_xxx". With this approach we could use the same MMD address for both the PMA and the AUI Component, but still have unique control and status variables (and associated MDIO registers) for both sub-layers.

Make the same change in 176D for the AUI C2M Component.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-142.

*Cl* **176C** *SC* **176C.3** *P* **796** *L* **48** # 299

Dudek, Michael — Marvell

*Comment Type* **TR** *Comment Status* **A** *AUI Management (CG)*

As discussed in dudek_3dj_01_2603 the C2C spec normatively requires meeting the functional specifications in management variable specifications in 178.13 which point to those in 179.14 where a number of registers are called PMD_xxxx (including PMD_reset). This is confusing particularly as PMA_reset is defined in table 178B-6

*SuggestedRemedy*

Adopt Option 1 on slide 6 of dudek_3dj_01_2603

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-142.

*Cl* **176C** *SC* **176C.4** *P* **797** *L* **3** # 104

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *Service interface (CA)*

"When SIGNAL_OK is either IN_PROGRESS or FAIL, the corresponding tx_symbol parameters on all lanes are unspecified"

This sentence should apply to AUI components in both directions, so it is either tx_symbol or rx_symbol.

The two directions are listed in the preceding sentence - PMA:IS_SIGNAL.indication or PMA:IS_SIGNAL.request. In the first case, the parameters are rx_symbol; in the second case, they are tx_symbol.

(A similar comment is submitted against 176D.4, the same changes should be applied in both clauses).

*SuggestedRemedy*

Implement the same changes as in the comment against 176D.4.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment #I-108.

*Cl* **176C** *SC* **176C.4** *P* **797** *L* **3** # 382

Slavick, Jeff — Broadcom Inc

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

The acronym RTS has already be referred to.

*SuggestedRemedy*

In 176C.4 and 176D.4: Change "ready-to-send (RTS)" to "RTS"

*Response* *Response Status* **C**

ACCEPT.

*Cl* **176C** *SC* **176C.6.4.4** *P* **803** *L* **32** # 106

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *Error Ratio (CG)*

For p=1, measurement of block error ratio for validation of the requirements for AUI-C2C (Table 176C-6, probability lower than Hmax for all values of k), even with corrected values of Hmax per another comment, would take more than 1e20 years (for k=16), which is not quite feasible.
For p>1 the required times are even longer.

This means the test cannot be declared to pass without some kind of extrapolation of the measurement.

Similar concerns exist for AUI-C2M (Table 176D-10), KR (Table 178-11) and CR (Table 179-13). Although for KR and CR the test times for p=1 may be feasible, p=2 would still require more than a year to verify.

A spreadsheet for the calculation will be contributed.

*SuggestedRemedy*

Add the following NOTE after Table 176C-6, based on 180.9.16:

NOTEùIf the statistical projection is modeled accurately by a linear fit extrapolation, a means to provide statistical projection of the measured histograms (see 174A.9.3) in order to reduce test time follows. Extrapolate the measured histogram to Hm(i)(16) using a line determined by a linear fit of log10(Hm(i)(k)), for k = 1 to n, where n is the largest value of k for which all bins from 0 to k have a count greater than 2.

Add similar notes after Table 176D-10, Table 178-11, and Table 179-13.

*Response* *Response Status* **U**

ACCEPT IN PRINCIPLE.

Add the NOTE as in the response to comment I-266 after Table 178-11, and Table 179-13.

There was no consesus to add similar notes to Table 176C-6 and Table 176D-10.

*Cl* **176C** *SC* **176C.6.4.4** *P* **803** *L* **32** # 105

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *Error Ratio (CG)*

The values in Table 176C-6 seem incorrect. The probabilities match the calculation of H_max in 174A.9.5 with RSSER=8e-6, not with BER_max=8e-6, which would yield RSSER=8e-5.

A spreadsheet for the calculation will be contributed.

*SuggestedRemedy*

Use the following values, which result from calculation with BER_max=8e-6 and RSSER=8e-5:

Probability Hmax(k)□
k□=1□=2□=4□=8
13.3E-013.5E-012.6E-011.6E-01
22.5E-011.3E-014.8E-021.4E-02
31.3E-013.3E-026.0E-038.8E-04
44.7E-026.1E-035.5E-043.9E-05
51.4E-029.1E-044.0E-051.4E-06
63.5E-031.1E-042.4E-064.1E-08
77.4E-041.2E-051.2E-071.9E-10
81.4E-041.1E-065.5E-092.1E-11
92.3E-058.7E-082.2E-103.9E-13
103.3E-066.4E-097.6E-126.3E-15
114.5E-074.2E-102.4E-139.2E-17
125.5E-082.5E-116.9E-151.2E-18
136.2E-091.4E-121.8E-161.4E-20
146.5E-107.1E-144.4E-181.6E-22
156.4E-113.4E-151.0E-191.5E-24
165.8E-121.5E-162.1E-211.4E-26

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-85.

*Cl* **176C** *SC* **176C.6.7** *P* **807** *L* **33** # 159

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

Reflect the proposal on slide 3 in https://www.ieee802.org/3/dj/public/26_03/mellitz_3dj_03a_2603.pdf, incorporating the consensus from Straw Poll #13 in https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf.

*SuggestedRemedy*

In Table 176Cû8:
Add note (a) to row ôDifferential-mode to common-mode return loss, RLcdö
Insert 3 table rows for with the respective Reference, Value, and Units
Common-mode to common-mode effective return loss, ERLcc (min) (b); 178A.3; 2dB
Common-mode to differential-mode effective return loss, ERLdc (min) (b); 178A.3; 17 dB
Differential -mode to common-mode effective return loss, ERLcd (min) (b); 178A.3; 17 dB
Add the following notes to the bottom of the table:
(a & b) The minimum modal return loss is met by exceeding the requirements of either (a) or (b)
(b) Modal ERL parameter values are taken from 178C.7.3

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **176C** *SC* **176C.7** *P* **807** *L* **32** # 167

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *ERL (E)*

As suggested in 179.1, table 179-16, channels with high values of COM should not be required to meet minimum ER

*SuggestedRemedy*

Add note (c) to the ERL row in table 176C.8 and the add the following note at bottom of the table:
(c) Channels with a COM greater than 4 dB are not required to meet minimum ERL.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Add a footnote (a) to the ERL row in table 176C-8 with the following footnote text:
(a) Channels with a COM greater than 4 dB are not required to meet minimum ERL.

*Cl* **176D** *SC* **176D** *P* **817** *L* **35** # 107

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **T** *Comment Status* **A** *C2M figures (E)*

Updated figures for Annex 176D have been proposed in <https://www.ieee802.org/3/dj/public/26_03/ran_3dj_03a_2603.pdf>, to reduce usage of the contentious term "connector" and improve the representation of entities.

*SuggestedRemedy*

Implement the proposed figures on slides 7, 8, 9, and 10 of ran_3dj_03a_2603, with editorial license.

*Response* *Response Status* **C**

ACCEPT.

*Cl* **176D** *SC* **176D.3** *P* **819** *L* **38** # 173

Healey, Adam — Broadcom Inc.

*Comment Type* **E** *Comment Status* **A** *A176D figures (E)*

In Figure 176D-2, the delineation between host and module is shown to be the outer edge of the box labeled "connector". However, in Figures 176D-4 and 176D-5, the host and module are shown to extend to the line in the middle of a simlar looking "connector" box. Figure 176D-2 should be changed to be consistent with the other figures.

*SuggestedRemedy*

In Figure 176D-2, move the point where the arrows delineating "host" and "module" meet to align with the line in the middle of the box labelled "connector". If there is ambiguity about what this line represents, add a note to the figure indicating that the line corresponds to the "mating point of the MDI connector" similar to what is described in 179B.2.1 and 179B.3.1.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Comment I-107 suggests modifying Figure 176D-2 in a different way (see <https://www.ieee802.org/3/dj/public/26_03/ran_3dj_03a_2603.pdf#page=7>).
Resolved using the response to comment I-107.

*Cl* **176D** *SC* **176D.4** *P* **818** *L* **14** # 108

Ran, Adee
Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *Service interface (CA)*

"When SIGNAL_OK is either IN_PROGRESS or FAIL, the corresponding tx_symbol parameters on all lanes are unspecified"

This sentence should apply to AUI components in both directions, so it is either tx_symbol or rx_symbol.

The two directions are listed in the preceding sentence - PMA:IS_SIGNAL.indication or PMA:IS_SIGNAL.request. In the first case, the parameters are rx_symbol; in the second case, they are tx_symbol.
The proposed text breaks the paragraph into the two cases to avoid using "corresponding", "respectively", etc.

*SuggestedRemedy*

Change the paragraph:
"The SIGNAL_OK parameter of the PMA:IS_SIGNAL.indication (for an AUI component above the AUI channel) or PMA:IS_SIGNAL.request (for an AUI component below the AUI channel) corresponds to the variable rts_status of the RTS function, as defined in 178B.8.2.1. When SIGNAL_OK is either IN_PROGRESS or FAIL, the corresponding tx_symbol parameters on all lanes are unspecified."
To the following two paragraphs:
"For an AUI component above the AUI channel, the SIGNAL_OK parameter of the PMA:IS_SIGNAL.indication primitive corresponds to the variable rts_status of the RTS function, as defined in 178B.8.2.1. When SIGNAL_OK is either IN_PROGRESS or FAIL, the rx_symbol parameters of the PMA:IS_DATAUNIT_i.indication primitive on all lanes are unspecified.
For an AUI component below the AUI channel, the SIGNAL_OK parameter of the PMA:IS_SIGNAL.request primitive corresponds to the variable rts_status of the RTS function, as defined in 178B.8.2.1. When SIGNAL_OK is either IN_PROGRESS or FAIL, the tx_symbol parameters of the PMA:IS_DATAUNIT_i.request primitive on all lanes are unspecified."

Apply the same change in 176C.4.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy with editorial license.

*Cl* **176D** *SC* **176D.6.2** *P* **820** *L* **25** # 178

Healey, Adam
Broadcom Inc.

*Comment Type* **T** *Comment Status* **A** *MDI connector (E)*

The definitions of HCB and MCB leverage the definitions of TP2/TP3 and cable assembly test fixtures in 179B.2 and 179B.3 respectively. These definition refer to "MDI connectors" but this term is not used in the chip-to-module reference model. For clarity, it should be noted that references to the "MDI connector" in 179B.2 and 179B.3 are equivalent the host "connector" in the Annex 176D reference model.

*SuggestedRemedy*

Add a statement to 179D.6.2 clarifying that references to the MDI connetor in 179B.2 and 179B.3 correspond to the "connector" cited in the chip-to-module reference model.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Add the following paragraph at the end of 176D.6.2:
The AUI-C2M connector mentioned in this annex is equivalent to the MDI connector in 179B.2 and 179B.3.

[Editor's note: change clause/subclause from 179D/179D.6.2 to 176D/176D.6.2]

*Cl* **176D** *SC* **176D.6.4** *P* **820** *L* **36** # 242

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *C2M methodology (E)*

Comments submitted against D2.x requested demonstration that using transmitter out test parameters with SNDR are sufficient for interoperability. These explicit jitter value either will are too strengthen or too relaxed from the point of what receiver cares!

*SuggestedRemedy*

The established method in CK VEO and VEC has direct correlation to what receiver can tolerate, the EECQ is another test developed in the OIF Linear and RTLR is a composite test that determines goodness/badness from the perspective of the receiver.
TF either need to demonstrate that the current jitter limits is sufficient for interoperability otherwise consider adding VEO/VEC or EECQ.
Other standards that typically follow IEEE in this case plan to continue with VEC/VEO and some major customers also not convinced what we have for C2M is sufficient and likely will create their own specifications

*Response* *Response Status* **U**

REJECT.
The comment does not indicate any problem with the existing specification. Rather, it requests a demonstration that it is "sufficient for interoperability". This is a call for action, and is not implementable in the draft.

The existing methodology has been in place since D1.1 (based on the response to comment #186 against D1.0). It is aligned with the KR/CR methodology due to the addition of ILT to C2M interfaces. The methods mentioned in the suggested remedy are specified for fixed-waveform signals and do not take into account the effect of variable transmitter equalization.
Measurement data of the currently specified parameters with existing test equipment has been provided in several contributions. No such data for the suggested alternative methods has been contributed.
A methodology change will have a widespread impact on the draft, since input specifications (receiver tolerance tests) are aligned with the transmitter specified paramters for calculation of COM. It would risk the project schedule.

The suggested remedy does not provide sufficient detail for the CRG to understand the proposed changes and for the editors to implement.

*Cl* **176D** *SC* **176D.6.4** *P* **821** *L* **18** # 160

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

Reflect the proposal on slide 3 in https://www.ieee802.org/3/dj/public/26_03/mellitz_3dj_03a_2603.pdf, incorporating the consensus from Straw Poll #13 in https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf.

*SuggestedRemedy*

In Table 179Dû2:

Add note (a) to rows
Common-mode to common-mode return loss, RLcc (min)
Common-mode to differential-mode return loss, RLdc (min)
Insert 3 table rows for with the respective Reference, Value, and Units
Common-mode to common-mode effective return loss, ERLcc (min) (b); 178A.3; 2dB
Common-mode to differential-mode effective return loss, ERLdc (min) (b); 178A.3; 17 dB
Differential -mode to common-mode effective return loss, ERLcd (min) (b); 178A.3; 17 dB
Add the following notes to the bottom of the table:
(a & b) The minimum modal return loss is met by exceeding the requirements of either (a) or (b)
(b) Modal ERL parameter values are taken from 176D.8.3

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **176D** *SC* **176D.6.4** *P* **821** *L* **22** # 276

Calvin, John — Keysight Technologies

*Comment Type* **TR** *Comment Status* **R** *C2M specs (E)*

Vf minimum value of .372 still fails the majority of early designs.

*SuggestedRemedy*

The interop report out:
https://www.ieee802.org/3/dj/public/26_01/calvin_3dj_01a_2601.pdf Page 23 shows 9 out of 12 modules failing Vf. We either need to review the measurement methodology in Vf (which is not new) or consider further reduction of the Vf values to 350mV.

*Response* *Response Status* **C**

REJECT.
The comment refers to host output v_f (based on the value 0.372) but the data in the presentation referred to in the suggested remedy is for module output (subject of comment #I-277).
The comment does not provide sufficient justification to support the suggested remedy.
[Editor's note: changed Clause/Subclause from 179D/179D.6.4 to 176D/176D.6.4]

*Cl* **176D** *SC* **176D.6.4** *P* **821** *L* **33** # 312

Dudek, Michael — Marvell

*Comment Type* **TR** *Comment Status* **R** *SNDR (E)*

The SNDR for the host output is measured with the worst case next agressor after the major loss of the channel. (i.e. close to the end of the channel). It is unrealistic and unnecessary to meet the values at the CR test point

*SuggestedRemedy*

Change the requirement (just for the host output) from "Table 179-9" to 27.5dB. On line 17 Delete "The minimum SNDR requirements in Table 179ûù9 apply for both module output and host output."

*Response* *Response Status* **U**

REJECT.

The CRG discussion indicated concerns about the proposed change, and lack of data to support it.

There was no consensus to make a change.

*Cl* **176D** *SC* **176D.6.4** *P* **821** *L* **34** # 274

Calvin, John — Keysight Technologies

*Comment Type* **TR** *Comment Status* **R** *SNR_ISI (E)*

SNRISI has a limit of 26dB. The pass/fail statistics gathered on early system/switch designs are having trouble passing this number. Particularly any host with a HH channel ranges from 24-25dB and fails current specifications.

*SuggestedRemedy*

A presentation will be offered to support this comment. Propose changing the 26dB target value for SNRISI to 24dB would offer margin on systems that are known to interoperate, but are failing this spec.

*Response* *Response Status* **U**

REJECT.
No related presentation was provided for review at the CRG meeting.
The comment does not provide sufficient evidence to support the proposed changes.

*Cl* **176D** *SC* **176D.6.4** *P* **821** *L* **36** # 183

Rysin, Alexander — NVIDIA

*Comment Type* **ER** *Comment Status* **A** *Jitter (E)*

The method for the random jitter measurement changed to phase-only (horizontal) jitter, yet the naming remained J_rms, similar to the previous, 12-edge method.

*SuggestedRemedy*

Replace J_rms with JH_rms here and in subclause 176D.6.8.10.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-182.

*Cl* **176D** *SC* **176D.6.4** *P* **821** *L* **37** # 354

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *C2M methodology (E)*

TP1a has no composite eye penalty

*SuggestedRemedy*

Add EECQ per definition in the OIF 112G-RTLR with max limit of 9 dB and following exceptions BT4 filter 60 GHz, reference equalizer per definition in table 176D-7

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment I-242.

*Cl* **176D** *SC* **176D.6.4** *P* **821** *L* **38** # 311

Dudek, Michael Marvell

*Comment Type* **T** *Comment Status* **R** *jitter (E)*

With the change from J4U to JH4u this jitter parameter is no longer expected to be dependent on channel loss and therefore there shouldn't be different values for the host and module and the value should match the value allocated to the die

*SuggestedRemedy*

In table 176D-2 change JH4U value to 0.118

*Response* *Response Status* **C**

REJECT.
The adopted JH4u measurement is intended to reduce the effect of channel loss on the measurement.
However, data provided with the JH4u proposal (see <https://www.ieee802.org/3/dj/public/25_11/calvin_3dj_01a_2511.pdf#page=8>) suggests that in some cases there is still a higher JH3u in measurements after 31 dB compared to the same transmitter after 12 dB.
Therefore, keeping a relaxed limit for host output JH4u after 32 dB, as in D3.0, may be justified.

Comment #I-297 is related and suggests that transmitters on other lanes should be active in JH4u measurement. JH4u is likely sensitive to additive noise too and results would likely degrade even if the phase jitter is the same. Data supporting the proposed change has not been provided.

There was no consensus to make the proposed change.

*Cl* **176D** *SC* **176D.6.5** *P* **821** *L* **22** # 298

Dudek, Michael Marvell

*Comment Type* **TR** *Comment Status* **A** *C2M specs (E)*

As discussed in healey_3dj_01_2601 the module loss allocated in the budget does not align with Rpeak and Vf specifications and the module input interference and jitter tolerance calibration

*SuggestedRemedy*

Implement the changes proposed in healey_3dj_01_2601

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the responses to comments I-174 and I-175.
[Editor's note: changed line from 25 to 22]

*Cl* **176D** *SC* **176D.6.5** *P* **822** *L* **20** # 161

Mellitz, Richard Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

Reflect the proposal on slide 3 in https://www.ieee802.org/3/dj/public/26_03/mellitz_3dj_03a_2603.pdf, incorporating the consensus from Straw Poll #13 in https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf.

*SuggestedRemedy*

In Table 179Dû3:

Add note (a) to rows
Common-mode to common-mode return loss, RLcc (min)
Common-mode to differential-mode return loss, RLdc (min)
Insert 3 table rows for with the respective Reference, Value, and Units
Common-mode to common-mode effective return loss, ERLcc (min) (b); 178A.3; 2dB
Common-mode to differential-mode effective return loss, ERLdc (min) (b); 178A.3; 17 dB
Differential -mode to common-mode effective return loss, ERLcd (min) (b); 178A.3; 17 dB
Add the following notes to the bottom of the table:
(a & b) The minimum modal return loss is met by exceeding the requirements of either (a) or (b)
(b) Modal ERL parameter values are taken from 176D.8.3

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **176D** *SC* **176D.6.5** *P* **822** *L* **23** # 277

Calvin, John — Keysight Technologies

*Comment Type* **TR** *Comment Status* **R** *C2M specs (E)*

Vf minimum value of .389V still fails the majority of early designs.

*SuggestedRemedy*

The interop report out:
https://www.ieee802.org/3/dj/public/26_01/calvin_3dj_01a_2601.pdf Page 23 shows 9 out of 12 modules failing Vf. We either need to review the measurement methodology in Vf (which is not new) or consider further reduction of the Vf values to 350mV.

*Response* *Response Status* **U**

REJECT.
The v_f specification is an important component of the COM analysis that supports the loss budget of 32 dB for C2M applications. Reducing the minimum v_f would undermine this analysis and prevent interoperability with worst-case hosts.
The information in the referenced presentation does not justify reducing the v_f limits. It shows that some of the tested modules met the requirements. Devices that failed the requirements might have not been configured correctly or might be non-compliant.
[Editor's note: changed clause/subclause/page from 179D/179D.6.3/821 to 176D/176D.6.5/822]

*Cl* **176D** *SC* **176D.6.5** *P* **822** *L* **38** # 184

Rysin, Alexander — NVIDIA

*Comment Type* **ER** *Comment Status* **A** *jitter (E)*

The method for the random jitter measurement changed to phase-only (horizontal) jitter, yet the naming remained J_rms, similar to the previous, 12-edge method.

*SuggestedRemedy*

Replace J_rms with JH_rms.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-182.

*Cl* **176D** *SC* **176D.6.5** *P* **824** *L* **25** # 175

Healey, Adam — Broadcom Inc.

*Comment Type* **TR** *Comment Status* **A** *C2M specs (E)*

Slide 7 of <https://www.ieee802.org/3/dj/public/25_11/healey_3dj_01a_2511.pdf> highlighted that there is some ambiguity in the loss that has been allocated to the module. The value computed on slide 12 for module output Rpeak was based on the more generous interpretation i.e., 5.9 dB from the TP4d to the mating point of the connector. If the loss from TP4d to the mating point of the connector is limited to 3.8 dB as shown in Figure 176D-6, then the Rpeak limit in Table 176D-3 needs to be adjusted.

*SuggestedRemedy*

If the module loss allocation is limited to 3.8 dB, then in Table 176D-3 change Rpeak (min) to 0.51 and change the lower value of the vf range to 0.392.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed slides 6-10 of <https://www.ieee802.org/3/dj/public/26_05/ran_3dj_01c_2605.pdf>.

In Table 176D-3, change Rpeak (min) to 0.51 and change the lower value of the vf range to 0.392.

*Cl* **176D** *SC* **176D.6.6** *P* **823** *L* **16** # 162

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

Reflect the proposal on slide 3 in
https://www.ieee802.org/3/dj/public/26_03/mellitz_3dj_03a_2603.pdf, incorporating the consensus from Straw Poll #13 in
https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf.

*SuggestedRemedy*

In Table 176Dû4:
Add note (a) to row ôDifferential-mode to common-mode return loss, RLcdö
Insert 3 table rows for with the respective Reference, Value, and Units
Common-mode to common-mode effective return loss, ERLCC (min) (b); 178A.3; 2dB
Common-mode to differential-mode effective return loss, ERLCD (min) (b); 178A.3; 17dB
Differential -mode to common-mode effective return loss, ERLDC (min) (b); 178A.3; 17; dB
Add the following notes to the bottom of the table:
(a & b) The minimum modal return loss is met by exceeding the requirements of either (a) or (b)
(b) Modal ERL parameter values are taken from 178D.8.3

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **176D** *SC* **176D.6.7** *P* **823** *L* **45** # 163

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

Reflect the proposal on slide 3 in https://www.ieee802.org/3/dj/public/26_03/mellitz_3dj_03a_2603.pdf, incorporating the consensus from Straw Poll #13 in https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf.

*SuggestedRemedy*

In Table 176Dû5:
Add note (a) to row ôDifferential-mode to common-mode return loss, RLcdö
Insert 3 table rows for with the respective Reference, Value, and Units
Common-mode to common-mode effective return loss, ERLcc (min) (b); 178A.3; 2dB
Common-mode to differential-mode effective return loss, ERLdc (min) (b); 178A.3; 17 dB
Differential -mode to common-mode effective return loss, ERLcd (min) (b); 178A.3; 17 dB
Add the following notes to the bottom of the table:
(a & b) The minimum modal return loss is met by exceeding the requirements of either (a) or (b)
(b) Modal ERL parameter values are taken from 178D.8.3

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **176D** *SC* **176D.7.1** *P* **824** *L* **25** # 243

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *C2M reference channel (E)*

Should make it clear that host and module chnanel include any packages

*SuggestedRemedy*

Replace Host channel with "Host channel and package"
Replace Module channel with "Module channel which may include a package"

*Response* *Response Status* **C**

REJECT.
The host channel is explicitly defined and depicted as being bookended by TP0d/TP5d, which represent output and input "at the device-to-package interface" (176D.7).
Similarly the module channel is bookended by TP1d/TP4d with a similar definition.
The details of internal host and module structure are implementation dependent and are irrelevant for their specifications.
The proposed wording change does not improve the technical clarity or accuracy of the text.

*Cl* **176D** *SC* **176D.7.1** *P* **824** *L* **37** # 292

Dudek, Michael — Marvell

*Comment Type* **E** *Comment Status* **A** *A176D figures (E)*

In figure 176D-6 the note includes "to the center of the edge connector of the module " whereas in Figure 179A-1 it says "The point of demarcation between the MCB and HCB is the
mating point of the MDI connector." and in 179B.2.1 and 179B.3.1 it says "the mating point of the MDI connector". These points should be the same.

*SuggestedRemedy*

Change "to the center of the edge connector of the module" to "to the mating point of the host connector"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Comment I-107 suggests modifying Figure 176D-6 in a different way, which would remove the NOTE (see <https://www.ieee802.org/3/dj/public/26_03/ran_3dj_03a_2603.pdf#page=10>).
Resolved using the response to comment I-107.

*Cl* **176D** *SC* **176D.7.2** *P* **824** *L* **41** # 269

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *C2M reference channel (E)*

COM reference model provided is module-chip and only used for interference tolerance, but current transmitter relies on jitter output which is incomplete not having a reference COM model

*SuggestedRemedy*

Create an ASIC-Module COM model and also a Module-ASIC COM model. If there is interest in TF, I can provide it COM models.

*Response* *Response Status* **U**

REJECT.
The COM reference model applies to both host-to-module and module-to-host channels.
The direction may require different inputs to the analysis (s-parameter files, port order, and possibly 802.3 COM tool configuration sheets) but these are not part of the standard.
The COM reference model is not used in jitter measurement.

The suggested remedy does not include sufficient detail to implement.

*Cl* **176D** *SC* **176D.7.2** *P* **825** *L* **26** # 246

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *C2M reference channel (E)*

Host package model in the is package B and not calling the package host class B disconnects one from the knowledge in CL 178/179

*SuggestedRemedy*

Add to the name , host class B

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
There are no package or host classes for AUI-C2M, and moreover, "host class B" in the suggested remedy is not defined anywhere else.
The device package model for the host is based on the "package class B" model defined in Table 176C-9, Table 178-14, and Table 179-19, but with a single "Transmission line 1 length" unlike the other tables.
Since there is also a different "package class A" model, the similarity to "class B" is worth mentioning in an informative NOTE at the bottom of Table 176D-6.

Change the existing note to "NOTE 1" and add the following note:
NOTE 2-the host device package model is similar to the "class B" device package model defined in Table 176C-9 but with a specific value for "Transmission line 1 length".

*Cl* **176D** *SC* **176D.7.2** *P* **825** *L* **41** # 244

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *C2M reference channel (E)*

Given HCB has a loss of ~3.8 dB adding a module will increase the loss to 34.1 dB

*SuggestedRemedy*

Not a clean option here some options that can be considered:
- Adjust host partial channel loss by up to 2.1 dB (not a good option)
- Not to use module package maybe the simplest option
- Another viable option is to use 4 mm package with partial module PCB adjsuted for total of 3.8 dB loss
see ghiasi_3dj_01_2605

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved by the response to comment I-174.

*Cl* **176D** *SC* **176D.7.2** *P* **825** *L* **49** # 245

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *C2M reference channel (E)*

Module packages if exist are core-less

*SuggestedRemedy*

In case of core-less package you just have stack via through the ABF layers, suggest replacing 1.8 mm with 0.25 mm.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The resolution of comment I-174 removed the module's device package model altogether.

Resolved using the response to comment I-174.

*Cl* **176D** *SC* **176D.8.2** *P* **828** *L* **24** # 291

Dudek, Michael — Marvell

*Comment Type* **T** *Comment Status* **R** *C2M methodology (E)*

Two synchronous samples per UI is potentially insufficient to find the peak to peak voltage if there is significant overshoot in the signal.

*SuggestedRemedy*

Change to four samples per UI at least when the sampling is synchronous.

*Response* *Response Status* **C**

REJECT.
There was no consensus to make a change.

*Cl* **176D** *SC* **176D.8.2** *P* **828** *L* **31** # 427

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *(Bx) ?*

This says "For compliance testing, it is sufficient to measure it from a square wave output with a period of at least 128 UI". There is no such square wave in this spec, and no alternative is offered. "At least" makes the measurement arbitrary. The nonlinear processes in the transmitter are not in their normal state - 128 UI is much more extreme than the SONET CID. 802.3 is not a compliance test spec; we define parameters not write test definitions. As the measurement doesn't need the scope to lock to the signal, one can just look at the envelope of a scrambled idle or scrambled RF signal; this avoids over- or under-measurement.
I wonder whether this could be done with PRBS13Q.

*SuggestedRemedy*

Change "For compliance testing, it is sufficient to measure it from a square wave output with a period of at least 128 UI, while lanes not under test transmit PRBS31Q" to "with the lane under test transmitting pattern 7 (e.g. idle, RF, or a one-lane portion of one of these), while lanes not under test transmit pattern 7 (e.g. other lanes from a common PCS) or PRBS31Q.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Straw poll #TF-7 indicated general support for the comment.
Change from
"For compliance testing, it is sufficient to measure it from a square wave output with a period of at least 128 UI, while lanes not under test transmit PRBS31Q"
to
"For compliance testing, it is sufficient to measure it with the lane under test transmitting scrambled idle, while lanes not under test transmit either scrambled idle or PRBS31Q".

Implement with editorial license.

Straw poll #TF-6 (directional)
For the differential peak-to-peak value, I would support the suggested remedy (with possible editorial changes).
Y: 10
N: 5

*Cl* **176D** *SC* **176D.8.3** *P* **829** *L* **2** # 428

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *(Bx) ?*

This says "the test fixture delay is defined as the propagation delay between the coaxial connector on the test fixture and the host-facing connection, excluding the mating interface discontinuity". The test fixture has two mating interfaces per lane, one at the coaxial connector and the other at the host-facing connection, each of which can have a discontinuity. It is not stated which one is to be excluded.

*SuggestedRemedy*

Please clarify. Three places.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change from
"excluding the mating interface discontinuity"
To
"excluding the discontinuity at the HCB-to-host mating interface".

Implement with editorial license.

*Cl* **176D** *SC* **176D.8.7** *P* **830** *L* **1** # 304

Dudek, Michael Marvell

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

missing "and"

*SuggestedRemedy*

Change "step size coefficient" to "step size and coefficient"

*Response* *Response Status* **C**

ACCEPT.

*Cl* **176D** *SC* **176D.8.13.1** *P* **833** *L* **39** # 313

Dudek, Michael — Marvell

*Comment Type* **TR** *Comment Status* **A** *Test channel calibration (E)*

The test channel for both Host test and Module itest L is just a mated test board. The loss value in Table 176D-11 is 9+/-2dB but the Mated test board loss given in 179B does not match this. (The value wasn't changed here when the MCB loss was changed).

*SuggestedRemedy*

Change "9+/-2" dB to "8+/-2" dB, or better delete the numbers and replace with "note a" rewording note a to "The test channel consists of mated MCB and HCB with no frequency-dependent attenuator."

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Notes within tables are informative. Table footnotes are normative but need something to be attached to.
It is preferable to require that the actual pair of mated test fixtures used in the test is subject to some IL requirement.

Change "9+/-2" dB to "8+/-2" dB.

*Cl* **176D** *SC* **176D.8.13.1** *P* **833** *L* **44** # 355

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *C2M methodology (E)*

Interference penalty has no composite measurable penalty and given COM may differ from actual stress generator may result in under/over stress test condition

*SuggestedRemedy*

Add EECQ per definition in the OIF 112G-RTLR with max limit of 9 dB and following exceptions BT4 filter 60 GHz, reference equalizer per definition in table 176D-7

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment I-242.

*Cl* **176D** *SC* **176D.8.13.2** *P* **832** *L* **6** # 352

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *(B1) (E)*

The description for host test is not clear enough for average reader

*SuggestedRemedy*

Create a figure starting with Figure 176D-7b but add module package, host package, and partial host channel

*Response* *Response Status* **W**

REJECT.
The suggested remedy does not provide sufficient detail to implement.

*Cl* **176D** *SC* **176D.8.13.2** *P* **832** *L* **8** # 353

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *(B1) (E)*

The description for module test is not clear enough for average reader

*SuggestedRemedy*

Create a figure starting with Figure 176D-8b but add module package and host package

*Response* *Response Status* **W**

REJECT.
The suggested remedy does not provide sufficient detail to implement.

*Cl* **176D** *SC* **176D.8.13.2** *P* **834** *L* **8** # 12

Lusted, Kent — Synopsys, Inc.

*Comment Type* **TR** *Comment Status* **A** *C2M specs (E)*

Repeating comment #58 from D2.3: For the module receiver interference tolerance test, item b) states that "COM is calculated
using the module device package and device termination models". However, the module test channel shown in Figure 176D-8b includes the host compliance board (HCB). The reference loss of the HCB equals the module loss allocation to TP1d illustrated in Figure 176D-6. Therefore, the addition of the module device package model results in the interference tolerance test being calibrated with approximately 2.1 dB more loss than a module has been allocated.

*SuggestedRemedy*

Replace 176D.8.13.2 item b) with the following. "For the module test, the test channel is measured between the Tx and Rx test references shown in Figure 176D-8b, and COM is calculated using device termination model in Table 176Dû6 for the receiver S-parameter model."

implement the changes per
https://www.ieee802.org/3/dj/public/26_01/healey_3dj_01_2601.pdf

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the responses to comments I-174 and I-175.

*Cl* **176D** *SC* **176D.8.13.2** *P* **834** *L* **9** # 174

Healey, Adam — Broadcom Inc.

*Comment Type* **TR** *Comment Status* **A** *Test channel calibration (E)*

For the module receiver interference tolerance test, item b) states that "COM is calculated using the module device package and device termination models". However, the module test channel shown in Figure 176D-8b includes the host compliance board (HCB). The reference loss of the HCB equals the module loss allocation to TP1d illustrated in Figure 176D-6. Therefore, the addition of the module device package model results in the interference tolerance test being calibrated with approximately 2.1 dB more loss than a module has been allocated.

*SuggestedRemedy*

Replace 176D.8.13.2 item b) with the following. "For the module test, the test channel is measured between the Tx and Rx test references shown in Figure 176D-8b, and COM is calculated using device termination model in Table 176Dû6 for the receiver S-parameter model."

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The suggested remedy removes the only mention of the module device package model in Annex 176D. As a result, the "Device package model, module" row in Table 176D-6 becomes irrelevant.

Implement the suggested remedy, and in addition, delete the "Device package model, module" row in Table 176D-6.
Implement with editorial license.

[Editor's note: Changed page from 836 to 834]

*Cl* **176D** *SC* **176D.8.15** *P* **836** *L* **12** # 179

Healey, Adam — Broadcom Inc.

*Comment Type* **TR** *Comment Status* **A** *Amplitude tolerance (E)*

The transmitter output amplitude tolerance test calibrates the receiver input for a target steady-state voltage value. However, a transmitter with overshoot in the preset 1 configuration would have a differential peak-to-peak output amplitude greater than 1 V. Since a compliant transmitter must also meet a differential peak-to-peak output voltage limit of 1 V (see Table 176D-2), the resulting test condition would not be encountered in practice and would over-stress the receiver. The stress test signal must also be verified to have a differential peak-to-peak voltage less than or equal to 1 V for the preset 1 configuration.

*SuggestedRemedy*

Add a requirement that the differential peak-to-peak output voltage measured at TP1 must meet the requirements of Table 176D-2 for module testing. Add similar requirements to transmitter output amplitude tolerance tests in Clauses 178, Clause 179, Annex 176C, and for host testing in Annex 176D.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.

*Cl* **177** *SC* **177.1** *P* **354** *L* **4** # 398

Opsasnick, Eugene — Broadcom Inc.

*Comment Type* **E** *Comment Status* **A** *(B1) (L)*

In Figure 177-2, the input and output UNITDATA signals at the top of figure use the index "i" to represent n input lanes and output lanes. "n" is defined on the previous page, but "i" is not defined until later in the subclause. On the bottom of the figure the UNITDATA input & output lanes are indexed as "*_0:n-1". This is more consistent with the representation of a variable number of I/O lanes as shown in other clauses (e.g. Figure 176-2 on page 321).

*SuggestedRemedy*

In Figure 177-2 on page 354:

change:
"FEC:IS_UNITDATA_i.request"
to:
"FEC:IS_UNITDATA_0:(n-1).request"

change:
"FEC:IS_UNITDATA_i.indication"
to:
"FEC:IS_UNITDATA_0:(n-1).indication"

*Response* *Response Status* **C**

ACCEPT.

*Cl* **177** *SC* **177.2** *P* **355** *L* **21** # 83

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

For SIGNAL_OK in the transmit direction (.request primitive) there is the following text:
"When SIGNAL_OK is IN_PROGRESS or FAIL, the corresponding tx_symbol parameters on all lanes are unspecified"
In the subsequent paragraph, for the receive direction (.indication primitive) there is a similar text but it also includes the READY state.

The READY state indicates that the sublayer that generates the primitive is not generating valid data - either because of incomplete training on an adjacent interface or because AM lock and deskew is still underway. Therefore, the data that the inner FEC sublayer provides to the next sublayer will also be invalid, both for indication and for request.

However, this paragraph actually describes the behavior of the client sublayer (PMA), so the wording "the corresponding tx_symbol parameters" refers to the PMA's transmitted symbol. The statement does not describe the inner FEC sublayer's output, and thus is not required in this subclause.

*SuggestedRemedy*

Since the paragraph about the PMA's signal status information describes the PMA's output, it should be deleted from this clause.

If the paragraph is retained, change the quoted sentence to
"When the value of SIGNAL_OK is READY, IN_PROGRESS, or FAIL, the corresponding tx_symbol parameters of the PMA:IS_SIGNAL.request_i primitive on all lanes are unspecified".

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Change
"When SIGNAL_OK is IN_PROGRESS or FAIL, the corresponding tx_symbol parameters on all lanes are unspecified"
to
"When the value of SIGNAL_OK is READY, IN_PROGRESS, or FAIL, the corresponding tx_symbol parameters of the PMA:IS_SIGNAL.request_i primitive on all lanes are unspecified".

*Cl* **177** *SC* **177.4.2** *P* **358** *L* **15** # 403

Opsasnick, Eugene — Broadcom Inc.

*Comment Type* **ER** *Comment Status* **A** *(B1) (L)*

At end of the second paragraph, there is an extra instance of the word "table".

*SuggestedRemedy*

Replace:
"... are shown in table Table 177-3."
with:
"... are shown in Table 177-3."

*Response* *Response Status* **W**

ACCEPT.

*Cl* **177** *SC* **177.4.7.1** *P* **362** *L* **41** # 60

WANG, Xuebo — Huawei Technologies Co., Ltd

*Comment Type* **ER** *Comment Status* **A** *(B1) (L)*

The hyphen in "48-bits" is redundant, and should be removed.

*SuggestedRemedy*

Change "48-bits" to "48 bits".

*Response* *Response Status* **W**

ACCEPT.

*Cl* **177** *SC* **177.4.8.2** *P* **364** *L* **10** # 373

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *(Bx) (L)*

ILT is run for both settings of mr_training_enable so stating ILT is disabled is not accurate. In 178B.7 we refer to it as training enabled and training disabled.

*SuggestedRemedy*

Change "ILT is disabled" to "training is disabled"

*Response* *Response Status* **C**

ACCEPT.

*Cl* **177** *SC* **177.5.1.1** *P* **364** *L* **34** # 374

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

ILT is run for both settings of mr_training_enable so stating ILT is enabled is not accurate. In 178B.7 we refer to it as training enabled and training disabled.

*SuggestedRemedy*

Change "ILT is enabled" to "training is enabled"

*Response* *Response Status* **W**

ACCEPT.

*Cl* **177** *SC* **177.5.1.1** *P* **364** *L* **36** # 375

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

ILT is run for both settings of mr_training_enable so stating ILT is disabled is not accurate. In 178B.7 we refer to it as training enabled and training disabled.

*SuggestedRemedy*

Change "ILT is disabled" to "training is disabled"

*Response* *Response Status* **W**

ACCEPT.

*Cl* **177** *SC* **177.5.1.1** *P* **364** *L* **37** # 376

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *(Bx) (L)*

All the other precoder conditions for non-training mode of operation state it is set as required by implementation rather then specifically stating management entity. And this is the receiver not the transmitter.

*SuggestedRemedy*

Change "data at the transmitter is controlled by a management entity" to "received data is set as required by the implemetation"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Which transmitter is doing the precoding can be made more clear.

In 177.5.1.1, change the text
From:
"If ILT is disabled, then the precoding of data at the transmitter is controlled by a management entity."
To:
"If ILT is disabled, then the precoding of the data at the peer interface transmitter is controlled by a management entity."

*Cl* **177** *SC* **177.5.2** *P* **365** *L* **37** # 143

Bruckman, Leon — NVIDIA

*Comment Type* **E** *Comment Status* **A** *(B1) (L)*

Figure 177-11 is related with section 177.5.2.

*SuggestedRemedy*

Move Figure 177-11 to be before section 177.5.3

*Response* *Response Status* **C**

ACCEPT.

*Cl* **177** *SC* **177.5.5** *P* **366** *L* **42** # 361

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

The definition of the bin_counters in Clause 177 and 184 are not entirely accurate. It states that they count for exactly k corrected bits, but then the highest bin also increments if you changed k or more bits.
Also, stating bin_0 is counting codewords received with no detectable errors would be useful to clarify its behavior.

*SuggestedRemedy*

Implement the changes shown in
https://www.ieee802.org/3/dj/public/26_01/opsasnick_3dj_01b_2601.pdf slides 13 and 14

*Response* *Response Status* **W**

ACCEPT.

*Cl* **177** *SC* **177.5.8** *P* **367** *L* **14** # 413

Opsasnick, Eugene — Broadcom Inc.

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

177.5.8 "Convolutional deinterleaver" does not give any information regarding the relationship of the120-bit block inputs from the 120-bit block distribution (multiplexer) to the 40-bit symbol-quartets distributed to each of the three delay lines. 177.4.3 requires that the first RS-FEC quartet within a 120-bit block is always from delay line 0. A similar statement should be added to 177.5.8.

*SuggestedRemedy*

In 177.5.8, Add this text to the end of the second paragraph:
"Symbol quartets of data from the120-bit block multiplexor are distributed sequentially to delay line 0, delay line 1, and delay line 2. The first 40-bit symbol quartet of each 120-bit block is always aligned to delay line 0."

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Add the following text at the end of the second paragrph of 177.5.8:
"RS-FEC Symbol-quartets from the120-bit block multiplexor are distributed sequentially to delay line 0, delay line 1, and delay line 2. The first 40-bit RS-FEC symbol-quartet from each 120-bit block is always aligned to delay line 0."

*Cl* **177** *SC* **177.5.8** *P* **367** *L* **38** # 317

Nicholl, Gary — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

To ensure that the the convolutional deinterleaver shall correctly perform the inverse function of the convolutional interleaver function, it is important that the convolutional deinterleaver is aligned to the 120-bit block structure in the same way as the convolution interleaver.

The alignment between the convolution interleaver and the 120-bit block structure in the transmit direction is defined by the following sentence in 177.4.3:
"The first RS-FEC symbol-quartet within a 120-bit block is always from delay line 0."

Need a similar sentence in the receive direction, to ensure that the first RS-FEC symbol-quartet within a 120-bit block is always sent to delay line 0.

*SuggestedRemedy*

Add the following sentence at the end of the second paragraph of 177.5.8:
"The first RS-FEC symbol-quartet (40 bits) within a 120-bit block received from the 120-bit block demultiplexer is sent to Delay Line 0."

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-413.

*Cl* **177** *SC* **177.6.1.1** *P* **368** *L* **4** # 172

He, Xiang — Huawei Technologies Co., Ltd

*Comment Type* **E** *Comment Status* **A** *(B1) (L)*

"FEC lane" should be "Inner FEC lane". Also line 51 on this page.

*SuggestedRemedy*

Change "FEC lane" to "Inner FEC lane". Apply this fix throughout the clause.

*Response* *Response Status* **C**

ACCEPT.

*Cl* **177** *SC* **177.7.2.1** *P* **369** *L* **50** # 84

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **T** *Comment Status* **R** *(B1) (L)*

There is only one signal_ok variable in the inner FEC sublayer, but it seems that there should be one for each of the two interfaces (similar to the PMA's signal_ok_mux and signal_ok_demux).
There are no state diagrams for the client sublayer interface function but the inner FEC should have a function for identifying the symbol boundaries similar to the PMA multiplex synchronization state diagram (Figure 176-10), which uses signal_ok_mux. The currently defined signal_ok is for the PMD service interface, and should thus be called signal_ok_demux. Alternatively, it can be called pmd_signal_ok.

*SuggestedRemedy*

Rename signal_ok to signal_ok_demux in the definition and the state diagrams that use it (Figure 177-13 and Figure 177-14).
Consider adding signal_ok_mux to represent the PMA's SIGNAL_OK and specifying how it affects the transmit process.

*Response* *Response Status* **C**

REJECT.
The signal_ok in the synchronization state diagram is clearly defined to be relevant to PMD:IS_SIGNAL.indication. The client sublayer interface function has been defined in 177.4.1.1, which referred to CL176. Adding new text explaining this process would be redundant.

*Cl* **178** *SC* **178.1** *P* **381** *L* **14** # 17

Brown, Matthew — Qualcomm

*Comment Type* **TR** *Comment Status* **A** *Ref pkg (E)*

Relating to the following text: "The package is either class A or class B. PMD transmitters and PMD receivers conform to electrical specifications of either class A or class B."
It is not possible to determine if a package is of class A or class B. It is only possible to determine if a a device meets the class A or class B requirements. Also, these are not mutually exclusive; a device could possibly meet both the class A and class B requirements. Instead reword this to indicate that two classes, class A and class B, are defined for transmitters and receivers to allow for a range of package characteristics.

*SuggestedRemedy*

Change the paragraph to the following:
"This clause defines specifications for two classes of transmitters and two classes of receivers, class A and class B, to allow for a range of package characteristics. A transmitter or receiver is classified as class A or class B if it meets all the specifications for class A or class B, respectively. The required characteristics of the electrical interconnect between two PMDs depend on the intended transmitter class on one PMD and the receiver class on the other PMD."
Further changes elsewhere may be required to align with this restatement.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG reviewed slides 21-22 of
<https://www.ieee802.org/3/dj/public/26_05/ran_3dj_01c_2605.pdf>.

Implement the proposed changes as shown on slides 21-22 of ran_3dj_01c_2605 with editorial license.
[CC 178, 176C]

*Cl* **178** *SC* **178.1** *P* **381** *L* **48** # 285

D'Ambrosia, John — Futurewei Technoogies, U.S. Subsidiary of Huawei

*Comment Type* **TR** *Comment Status* **A** *APSU conditions (CA)*

Note e states the following -
ILT and RTS functions are mandatory for the 200GBASE-KR1 PMD and 200GAUI-1 C2C.

However, this is incomplete. It is also necessary for the 200GMII Extender if based on a 200GAUI-1.

*SuggestedRemedy*

Add note "e" to 200GAUI-1 C2C entry.
Add note "f" to 200GMII Extender entry -
f. If the 200GMII Extender is based on a 200GAUI-1,it shall support APSU, as defined in 178B.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-280.

*Cl* **178** *SC* **178.1** *P* **382** *L* **31** # 286

D'Ambrosia, John — Futurewei Technoogies, U.S. Subsidiary of Huawei

*Comment Type* **TR** *Comment Status* **A** *APSU conditions (CA)*

Note e states the following -
ILT and RTS functions are mandatory for the 400GBASE-KR2 PMD and 400GAUI-2 C2C.

However, this is incomplete. It is also necessary for the 400GMII Extender if based on a 400GAUI-2.

*SuggestedRemedy*

Add note "e" to 400GAUI-2 C2C entry.
Add note "f" to 400GMII Extender entry -
f. If the 4400GMII Extender is based on a 400GAUI-2,it shall support APSU, as defined in 178B.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-280.

*Cl* **178** *SC* **178.8.10** *P* **388** *L* **37** # 146

Bruckman, Leon NVIDIA

*Comment Type* **TR** *Comment Status* **A** *ILT (B1) (E)*

The PMD reset, resets also the RTS function as shown in Figure 178B-9. See also the reset variable definition in 178B.8.2.1.

*SuggestedRemedy*

Change: "PMD reset shall reset the inter-sublayer link training (ILT) and ready-to-send (RTS) functions associated with the PMD"

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
To avoid duplicate definitions, the PMD reset function can refer to 179.8.10, like the other functions.
Change the text of 178.8.10 to:
The specification of PMD reset function is identical to that of 179.8.10.
See also related comment I-381.

*Cl* **178** *SC* **178.9.2** *P* **389** *L* **32** # 306

Dudek, Michael Marvell

*Comment Type* **T** *Comment Status* **A** *TX EQ (E)*

The reference 179.9.2.4 is only appropriate for the coefficient step size. The values at minim and maximum state should not be referencing 179.9.2.4 they should reference the Coefficient ranges in 179.9.4.2.5

*SuggestedRemedy*

Add the appropriate references to 179.9.4.2.5. as is done in Table 179-7. Make the same change in table 176C-2

*Response* *Response Status* **C**

ACCEPT.

[Editor's note: CC: 178, 176C]

*Cl* **178** *SC* **178.9.2** *P* **389** *L* **43** # 310

Dudek, Michael Marvell

*Comment Type* **T** *Comment Status* **A** *Jitter (E)*

With the change from J4U to JH4u this jitter parameter is no longer expected to be dependent on channel loss and therefore there shouldn't be different values for different package classes and should match the value allocated to the die

*SuggestedRemedy*

Remove the different package classes and have a single value of 0.118 Make the same change in 176C

*Response* *Response Status* **C**

ACCEPT.

*Cl* **178** *SC* **178.9.2.3** *P* **391** *L* **11** # 176

Healey, Adam Broadcom Inc.

*Comment Type* **TR** *Comment Status* **A** *ERL (B1) (E)*

The receiver 3 dB bandwidth and the target detector error ratio for the dERL measurement is not defined. It is presumably the values specified in Table 178-15 but this table is not included in the list of references for parameter values.

*SuggestedRemedy*

In the first sentence of 178.9.2.3, change "àwith the values in Table 178-8 and Table 178-14, with differential reference impedanceà" to "àwith the values in Table 178-8, Table 178-14, and Table 178-15, with differential reference impedanceà".

*Response* *Response Status* **W**

ACCEPT.

[Editor's note: changed page from 954 to 391]

*Cl* **178** *SC* **178.9.3.3** *P* **394** *L* **45** # 52

Brown, Matthew — Qualcomm

*Comment Type* **T** *Comment Status* **A** *Error Ratio (CG)*

Draft 2.2 comment #220 changed BER_total in Table 178-10 from 2.92E-4 to 2.921E-4. However, the BER_max value in Table 178-10, and the mask values in Table 178-11 were not correspondingly updated. A similar problem exists in Table 179-12/13, Table 180-19/20, Table 181-17/18, and Table 185-15/16.

*SuggestedRemedy*

Update Table 178-10, Table 179-12, Table 180-19, Table 181-17, and Table 185-15, changing BER_max to the different of BER_total and BER_added. Accordingly update the mask values in Table 178-11, Table 179-13, Table 180-20, Table 181-18, and Table 185-16, A contribution will be provided with the updated BER_max and mask values.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-85.

*Cl* **178** *SC* **178.9.3.3** *P* **395** *L* **30** # 85

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *Error Ratio (CG)*

The values in Table 178-11 mostly match the calculation of H_max in 174A.9.5 with BER_max=2.76e-4, but the values for k=16 with p=1 and p=2 have a slight mismatch, while for p=4 and p=8 they match.
Note that the text in 174A.9.5 does not include a special treatment for k=16.

The same values appear in Table 179-13.

A spreadsheet for the calculation will be contributed.

*SuggestedRemedy*

In Table 178-11, row k=16, change the values as follows:
p=1: Change from 6.4e-12 to 5.8e-12
p=2: Change from 1.6e-16 to 1.5e-16

Make the same changes in Table 179-13.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Slides 2 to 8 of the following contribution were reviewed by the CRG:
https://www.ieee802.org/3/dj/public/adhoc/electrical/26_0421/ran_3dj_adhoc_01_260421.pdf

The following contribution was provided by the commenter as a reference:
https://www.ieee802.org/3/dj/public/adhoc/electrical/26_0421/ran_3dj_adhoc_02_260421.xlsx

Implement the proposed changes on slides 3, 4, 6, 7 ,8 of ran_3dj_adhoc_01_260421 with editorial license.

*Cl* **178** *SC* **178.10** *P* **400** *L* **28** # 46

Lusted, Kent — Synopsys, Inc.

*Comment Type* **T** *Comment Status* **A** *Modal ERL (E)*

Apply modal ERL.
Keep all frequency domain modal masks
If modal masks for cable assembles, hosts, modules, KR channels, chip to chip channels, or MTF fail the respective modal RL mask, there is an opportunity to pass if modal ERL passes.

*SuggestedRemedy*

Apply modal ERL per mellitz_3dj_03a_2603, slides 2 and 3.

see also straw poll #13 in https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **178** *SC* **178.10** *P* **400** *L* **41** # 166

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *ERL (E)*

As suggested in 179.1, table 179-16, channels with high values of COM should not be required to meet minimum ER

*SuggestedRemedy*

Add note (c) to the ERL row in table 178.13 and the add the following note at bottom of the table:
(c) Channels with a COM greater than 4 dB are not required to meet minimum ERL.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Add a footnote (a) to the ERL row in table 178-13 with the following footnote text:
(a) Channels with a COM greater than 4 dB are not required to meet minimum ERL.

*Cl* **178** *SC* **178.10** *P* **400** *L* **41** # 155

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

Reflect the proposal on slide 3 in https://www.ieee802.org/3/dj/public/26_03/mellitz_3dj_03a_2603.pdf, incorporating the consensus from Straw Poll #13 in https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf.

*SuggestedRemedy*

In Table 178û13:
Add note (a) to row ôDifferential-mode to common-mode return loss, RLcdö
Insert 3 table rows for with the respective Reference, Value, and Units
Common-mode to common-mode effective return loss, ERLcc (min) (b); 178A.3; 2 dB
Common-mode to differential-mode effective return loss, ERLdc (min) (b); 178A.3; 17 dB
Differential -mode to common-mode effective return loss, ERLcd (min) (b); 178A.3; 17 dB
Add the following notes to the bottom of the table:
(a & b) The minimum modal return loss is met by exceeding the requirements of either (a) or (b)
(b) Modal ERL parameter values are taken from 179,10.3

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **178** *SC* **178.10** *P* **400** *L* **43** # 171

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *SCMR_CH (E)*

Prior posted computations for SCMR_CH where computed using DER_0 for P_Peak. The current daft specifies P_peak as 1e-7. This reduces SCMR_CH by 3 dB.

*SuggestedRemedy*

Lower SCMR_CH (min) as follows:

178.10
Page 400
Line 43
Change
Minimum channel signal to common-mode ratio, SCMR_CH from 20 dB to 17 dB

179.11
Page 443
Line 21
Channel signal to common-mode ratio, SCMR_CH (min) from 12 dB to 9 dB

Page 807
Line 35
Change
Minimum channel signal to common-mode ratio, SCMR_CH from 20 dB to 17 dB

*Response* *Response Status* **C**

ACCEPT.

*Cl* **178** *SC* **178.10.1** *P* **401** *L* **16** # 424

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *(Bx) ?*

This table contains "C_d^(1)", "C_d^(2)" and so on. A superscript denotes either exponentiation or some sort of footnote or reference, yet the former would not be consistent with the units and the latter are missing. Computer programs don't have variable names containing superscript, and such names are difficult for humans too.

*SuggestedRemedy*

Change to C_d1", "C_d2" and so on. Similarly R_d and so on
Scrub the draft for unnecessary superscript notation, so that it does not appear outside 178A.1, Channel Operating Margin.

*Response* *Response Status* **U**

REJECT.

The format of the die capacitance symbol is consistent with the convention specified in 178A and used in 179, 176C, and 176D.
It is also consistent with similar symbols defined in Annex 93A.

There is no consensus to make the suggested changes.

[CC: 178, 179, 176C, 176D]

*Cl* **178** *SC* **178.10.1** *P* **402** *L* **12** # 32

Brown, Matthew — Qualcomm

*Comment Type* **E** *Comment Status* **A** *(Bx) ?*

Per style manual, use of the word "can" in the sense of "is permitted" is deprecated. Instead, use the word "may".

*SuggestedRemedy*

Change "parameters can be measured" to "parameters may be measured".

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The second sentence of the NOTE is redundant as the same statement appears in 178A.1.3.

Delete "Channel scattering parameters can be measured with different reference impedance and renormalized to match the reference impedance before computation".
Change the notes at the bottom of Table 179-19, Table 176C-10, and Table 176D-6 accordingly.
Implement with editorial license.
[CC: 178, 176C]

*Cl* **178** *SC* **178.10.1** *P* **403** *L* **25** # 425

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *Jitter (E)*

This says "Random jitter, RMS", "sigma_RJ" yet it is clear by inspection that what is meant is Gaussian jitter, and the its cause (random, known cause, or unknown cause) is not the point. A new COM definition is our chance to follow OIF and break with this old name from 8B/10B times which in the age of scrambled coding is inaccurate and encourages sloppy thinking.

*SuggestedRemedy*

Change "Random jitter, RMS", "sigma_RJ" to "Gaussian jitter, RMS", "sigma_GJ" throughout. Add notes as necessary pointing out that similar quantities in older clauses (Annex 93A for example) use the old names.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment I-426.

*Cl* **178** *SC* **178.13** *P* **405** *L* **53** # 300

Dudek, Michael — Marvell

*Comment Type* **T** *Comment Status* **A** *PMD variables (E)*

The notes to the tables 179-23 and 179-24 correctly apply to CR, but these tables are normatively referenced by clause 178 where these CR PMD references do not apply but should be replaced by other references.

*SuggestedRemedy*

In 178.13 Change ôThe PMD control and status variables are identical to those defined in 179.14.ô to ôThe PMD control and status variables are identical to those defined in 179.14, with the exception that references to CR PMDÆs are replaced by references to the equivalent KR PMDÆsô.

*Response* *Response Status* **C**

ACCEPT.

*Cl* **178** *SC* **178.14.3** *P* **407** *L* **15** # 58

de Koos, Andras — Microchip Technology Inc

*Comment Type* **ER** *Comment Status* **A** *(B1) (E)*

It is unclear how the PICS items PMA100, FEC100, and PCS100 relate to the 200GBASE-KR1 PMD. Are they meant to be in this table?

*SuggestedRemedy*

Clean up the Clause 178 PICS table - The equivalent table in Clause179 (CR) looks a lot cleaner - includes references to 800GBASE-R and does NOT include references to 100GBASE-P/R.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
There are several discrepancies in the PICS tables that require significant rework. Recreate the PICS subclause based on the structure of Clause 179 PICS, with editorical license.

*Cl* **178** *SC* **178.14.3** *P* **407** *L* **18** # 59

de Koos, Andras — Microchip Technology Inc

*Comment Type* **ER** *Comment Status* **A** *(B1) (E)*

Typo : "200GBASE-P PMA"

*SuggestedRemedy*

Replace with "200GBASE-R PMA"

*Response* *Response Status* **W**

ACCEPT.

*Cl* **178** *SC* **178.14.4.2** *P* **409** *L* **42** # 401

Opsasnick, Eugene — Broadcom Inc.

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

in the table row for PC10 "Training", the Value/Comment column capitalizes the value TRUE. The rest of 802.3dj seems to always keep Boolean values "true" and "false" in lower case, even though the base standard, IEEE802.3-2022, seems to have a mix of uppercase and lowercase.

*SuggestedRemedy*

Change "TRUE" to "true" on line 42 of page 409.

*Response* *Response Status* **C**

ACCEPT.

*Cl* **178A** *SC* **178A** *P* **864** *L* **13** # 154

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

A comprehensive method is required to support modal ERL, reflecting the consensus from Straw Poll #13 in https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf.

*SuggestedRemedy*

Add a section to Annex 178A (178A.1.3) that describes the computation of modal ERL (see mellitz_3dj_02_adhoc_260415.pdf).

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **178A** *SC* **178A.1.2** *P* **842** *L* **47** # 153

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

Modal S-parameters are not explicitly specified for 200 Gb/s per lane, reflecting the consensus from Straw Poll #11 in https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf.

*SuggestedRemedy*

Modify 178A.1.2 to include modal S-parameter syntax (see mellitz_3dj_02_adhoc_260415.pdf).

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **178A** *SC* **178A.1.8.1** *P* **854** *L* **36** # 414

Swenson, Norman — Nokia Corporation,Norman Swenson Consulting,Point

*Comment Type* **ER** *Comment Status* **A** *Quantizer defintion (B1) (E)*

The quantizer is actually a 1UI (T-spaced) sampler and quantizer. This should be explicitly stated.

*SuggestedRemedy*

Change "The input to the feed-forward filter is the output of the quantizer." to "The input to the feed-forward filter is the output of the quantizer, which samples and quantizes its input at 1 UI intervals.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
The "quantizer" is first introduced in 178A.1.7 and is illustrated in Figure 178A-7. Additional descriptive text should be added where the block is first introduced.
In 178A.1.7, change the first sentence from "...at the output of the quantizer." to "...at the output of the quantizer which samples the signal and noise once per unit interval and quantizes the amplitude to discrete levels."
In 178A.1.8.1, change the second sentence from "...is the output of the quantizer." to "...is the output of the quantizer (see Figure 178A-7)."
Implement with editorial license.

*Cl* **178A** *SC* **178A.1.9.1** *P* **857** *L* **47** # 51

Shakiba, Mohammad — Huawei Technologies Canada Co., Ltd.

*Comment Type* **TR** *Comment Status* **R** *:OM signal amplitude (B1) (E)*

*** Comment submitted with the file 802d3_TFR_SAB_comments_D3p0_Shakiba260318.xls attached ***

Equation (178A-37) defines signal amplitude, (A_s) used in Equation (178A-36) for COM calculation. However, Equation (178A-37) defines the signal amplitude at the launch point. Since noise amplitude (A_ni) for COM calculation (described in section 178A.1.9.2 and its referenced sections and equations) is for noise at the input of the DFE slicer, A_s should also be defined as the signal amplitude at this point. This was the case in Annex 93A.

*SuggestedRemedy*

Modify Equation (178A-37) to include the effect of the signal chain on the signal amplitude up to the DFE slicer input (from before TxFFE to after RxFFE). This can be achieved by adding a multiplying factor equal to the main cursor of the equalized pulse response (h^(0)(0)) to Equation (178A-37).
FYI, the COM Matlab code implementation seems to have used the correct equation as it is still following the procedure defined in section 93A.1.6 to calculate A_s.

*Response* *Response Status* **W**

REJECT.
[Editor's note: The commenter indicated that the file submitted with the comment was unintentional.]
The optimization of the discrete-time equalizer defined in 178A.1.8 forces the value of the pulse response at the input to the decision feedback equalizer (or maximum likelihood sequence detector) to be 1 at n = d+1 (the "main cursor").
The value of Ani is also computed from the inter-symbol interference and noise at the input to the decision feedback equalizer (or maximum likelihood sequence detector) and therefore is subject to the same filtering and scaling.
There is no difference in the scale between As and Ani and since the value of the "main cursor" is 1, it does not need to be included in the equation. Equation (178A-37) is correct as written.

*Cl* **178A** *SC* **178A.2** *P* **863** *L* **28** # 347

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SCMR_CH definition (B1) (E)*

The lack of nomenclature around the terms of sigma_ts and VCMch used in calculating SCMR_CH can be confusing for the reader.

*SuggestedRemedy*

Add the following "nomenclature" to clarify the terms. sts is "the channel-induced differential timing noise" calculated using Equation (178A-56) and Equation (178A-57). VCMch is "the channel-generated common-mode voltage" calculated using Equation (178A-58) through Equation (178A-60).

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
In 178A.2, define sigma_ts to be the "RMS value of the signal" and VCM_CH to be the "common-mode peak-to-peak voltage at the channel output due to channel differential-mode to common-mode conversion".
Implement with editorial license.

*Cl* **178B** *SC* **178B** *P* **865** *L* **6** # 247

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *Nomenclature (CA)*

By calling the overall function "Autonomous path startup functions for electrical and optical interfaces" we are putting the cart in front of the horse! APSU and RTS are function of ILT not the other way aorund

*SuggestedRemedy*

Change the chapter name to Inter-sublayer link training with two key functions link training and RTS.
APSU and RTS are somewhat redundent terminology. One way to solve the overlap between RTS and APSU are as following: RTS is signal indicator on an ISL after compleation of link training. After receipt of RTS by the training function attached to the PCS indicating all ISLs are trained APSU conditions are met, where training stops and data transitions to PCS.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-280.

*Cl* **178B** *SC* **178B** *P* **865** *L* **7** # 494

Dawe, Piers J G NVIDIA

*Comment Type* **ER** *Comment Status* **A** *(B1) (CA)*

Put the abbreviation in the title as we do for PMD, PMA, PCS...

*SuggestedRemedy*

Autonomous path startup (APSU) functions for electrical and optical interfaces

*Response* *Response Status* **C**

ACCEPT.

*Cl* **178B** *SC* **178B** *P* **870** *L* **9** # 137

Huber, Thomas Nokia

*Comment Type* **TR** *Comment Status* **R** *Functions (CA)*

The ILT function shouldnÆt have a DATA or a LOCAL PATTERN mode. This function is providing training on all the lanes of the PMD/AUI, not RTS signaling.

*SuggestedRemedy*

Remove DATA and LOCAL PATTERN modes from 178B.7. Further details will be provided in a presentation.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment I-140.

*Cl* **178B** *SC* **178B.1** *P* **865** *L* **35** # 278

D'Ambrosia, John Futurewei Technoogies, U.S. Subsidiary of Huawei

*Comment Type* **TR** *Comment Status* **A** *APSU conditions (CA)*

This note appears to be in conflict with the implementation in the standard itself - NOTEùAUI components and PMDs that are not specified to support the ILT function or the RTS function as defined in this annex may include equivalent capabilities, however this is beyond the scope of this standard.

However, looking at Table 116-3 as an example, all of these PHY types (not based on 200 Gb/s signaling) - 200GBASE-KR2 / KR4 / CR2 / CR4 have 2 notes -
b: Mandatory for 200GAUI1-C2C
c: Conditional

This is in conflict with the note in 178B.1, as it is noted that:this is beyond the scope of this standard."
If it is beyond the scope of the standard, then it should not be noted.

*SuggestedRemedy*

Any PHYs that are based on 100 Gb/s should delete any entires in the 178B column - it is beyond the scope of the standard.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-280.

*Cl* **178B** *SC* **178B.3** *P* **866** *L* **16** # 195

Mascitto, Marco Infinera Canada Inc.,Nokia

*Comment Type* **TR** *Comment Status* **A** *(B1) (CA)*

The Physical Layer extends from RS to MDI, and includes the RS and MDI.

*SuggestedRemedy*

Extend the arrows representing the boundaries of the Physical Layer to include the MDI.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.

*Cl* **178B** *SC* **178B.4** *P* **867** *L* **5** # 194

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **E** *Comment Status* **R** *Definitions (CA) (Bx)*

The word "activated" is used extensively in this subclause. Considering the first paragraph in 178B.2, it may be more consistent to use the word "initialized" instead. If my interpretation is incorrect and "activated" is not a synonym for "initialized", please define "activated" in 178B.3.

*SuggestedRemedy*

Replace all instances of the word "activated" with the word "initialized".

*Response* *Response Status* **C**

REJECT.

There is no consensus to make the proposed changes.

*Cl* **178B** *SC* **178B.4** *P* **867** *L* **18** # 131

Huber, Thomas — Nokia

*Comment Type* **TR** *Comment Status* **A** *Definitions (CA)*

The description of APSU in this bullet list needs to be rewritten. The variables local_rts and remote_rts do not propagate anywhere; they are state variables at an interface. RTS or !RTS is signaled between peer interfaces via a PMD-specific mechanism and signaled between adjacent sublayers via the service interface. An interface uses that signaling (plus other criteria) to determine the values of the local_rts and remote_rts state variables. Also, since we are extending APSU to coherent PMDs, the ILT function is not a requirement for APSU.

*SuggestedRemedy*

Replace "APSU is the result of each ISL in the path transitioning to DATA mode using the RTS and ILT functions as follows:" and the subequent bullet list with this:

"APSU is the result of each ISL in the path transitioning to DATA mode as follows:
- The local_rts variable at an interface indicates that the interface is ready to send data. An interface signals that it is ready to send to a peer interface via a PMD-specific or AUI-specific mechansim. An interface signals that it is ready to send data to an adjacent sublayer via the inter-sublayer service interface.
- The remote_rts variable indicates that the peer interface is ready to send. An interface asserts remote_rts when the receive function detects RTS signaling; this indicates that local_rts is true in the peer interface
- When both local_rts and remote_rts are true for an interface, it switches to DATA mode (tx_mode = data, see 178B.8.3.1)
- End-to-end communication is established when all interfaces in the path are in DATA mode"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Slides 5 to 7 of the following editorial contribution was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/brown_3dj_03_2605.pdf

Replace the text on page 867 lines 19 to 29 with the proposed text on slide 7 of brown_3dj_03_2605, except replace "via the transmitted data" with "via the transmitted signal".

Implement with editorial license.

*Cl* **178B** *SC* **178B.4** *P* **867** *L* **27** # 358

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *Definitions (CA)*

Sending and receiving RTS does not always mean "all ISLs" are ready, it just means that upstream of your Tx is ready to transmit and that upstream of your peer Tx are all ready to transmit.

For example on slide 19 of https://ieee802.org/3/dj/public/adhoc/178b/25_1029/slavick_178b_03a_251029.pdf the Retimer and Host B are not "RTS = true" but Host A has shifted to data mode since it has RTS at both Tx and Rx.

*SuggestedRemedy*

Change: "it means all the ISLs in the same path (see 178B.3) are ready"
To: "it means the ISL is ready"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-131.

*Cl* **178B** *SC* **178B.5** *P* **867** *L* **34** # 196

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **E** *Comment Status* **A** *(B1) (CA)*

The words "for the entire interface" makes the sentence confusing. The sentence also reads a bit awkward.

*SuggestedRemedy*

Replace:
The ILT function is composed of one per-interface ILT function for the entire interface and one per-lane ILT function for each lane associated with the interface.

With:
The ILT function within an interface is composed of:
- one per-interface ILT function, and
- n per-lane ILT functions, one for each of n lanes associated with the interface.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **178B** *SC* **178B.5** *P* **867** *L* **36** # 197

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **TR** *Comment Status* **A** *(B1) (CA)*

An input is missing. The RTS function uses inputs from:
a) adjacent interface (via the service interface)
b) peer interface (via the ILT function)
c) its own per-interface ILT function
to transition to DATA mode.

*SuggestedRemedy*

Replace:
The RTS function uses inputs from the adjacent interface (via the service interface) and the peer interface (via the ILT function) to permit the ILT function to transition to DATA mode.

With:
The RTS function uses inputs from the adjacent interface (via the service interface), its peer interface (via the ILT function), and its per-interface ILT function to permit the ILT function to transition to DATA mode.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **178B** *SC* **178B.5** *P* **868** *L* **8** # 132

Huber, Thomas — Nokia

*Comment Type* **TR** *Comment Status* **R** *Functions (CA)*

Figure 178B-3 shows bidirectional communication between the RTS and ILT functions. This is presumably the result of the chocie to use the ILT training frames to signal RTS information on 200G IMDD PHYs - but that choice doesn't make the RTS signaling part of the ILT function. There is no need for the RTS function to communicate to the ILT function.

*SuggestedRemedy*

Change the arrow between ILT and RTS to be one-way from ILT to RTS.Further detail will be provided in a presentation

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment I-140.

*Cl* **178B** *SC* **178B.5** *P* **869** *L* **5** # 62

WANG, Xuebo — Huawei Technologies Co., Ltd

*Comment Type* **TR** *Comment Status* **A** *Functions (CA)*

In Figure 178B-4, RTS function provide the state of the rts_status variable from a reference interface to its adjacent interface via SIGNAL_OK. However, if we are talking about host devices, the reference interface has no adjacent interface. Under this case, in the receive direction, SIGNAL_OK will be sent to PCS or DTE xXS by IS_SIGNAL.indication primitive.

*SuggestedRemedy*

Add a note to Figure 178B-4: If there is no adjacent interface, in the receive direction, SIGNAL_OK will be sent to PCS or DTE xXS via the IS_SIGNAL.indication primitive of PMA service interface.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

With editorial license modify text and/or figure to convey that the SIGNAL_OK may be from an adjacent interface or from a PCS next to the RS or a DTE XS.

*Cl* **178B** *SC* **178B.5** *P* **869** *L* **14** # 133

Huber, Thomas — Nokia

*Comment Type* **TR** *Comment Status* **R** *Functions (CA)*

Figure 178B-4 shows local_rts as a signal communicated from the RTS function to the ILT function and remote_rts as a signal communicated from the ILT function to the RTS function. Since local_rts cannot be true unless the ILT function is complete on every lane, the ILT function cannot possibly depend on local_rts. Remote_rts is unrelated to training the link, so it should not be coming through the ILT function, it should be a driect input to the RTS function. The confusion seems to be that the sa,e frame structure used for ILT is used to signal RTS for 200G IMDD AUIs/PMDs - but that doesn't make the RTS signaling part of the ILT function.

*SuggestedRemedy*

Revise figure 178B-4 to not show local_rts and remote_rts as signals between the two functions, but rather to show a 'training complete' signal from ILT to RTS. Further details will be provided in a presentation.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment I-140.

*Cl* **178B** *SC* **178B.6** *P* **869** *L* **28** # 198

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **E** *Comment Status* **A** *(B1) (CA)*

While the first sentence is technically correct, it may help the reader to list the control actions in the order in which they will occur.

*SuggestedRemedy*

Replace:
The RTS function facilitates the indication of the local interface readiness to switch to DATA mode (local_rts) to other interfaces (peer and adjacent) and controls the switch over of the transmitter clock source to its DATA mode clock (when necessary).

With:
The RTS function controls the switch over of the transmitter clock source to its DATA mode clock (when necessary) and facilitates the indication of the local interface readiness to switch to DATA mode (local_rts) to other interfaces (peer and adjacent).

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **178B** *SC* **178B.6** *P* **869** *L* **31** # 134

Huber, Thomas — Nokia

*Comment Type* **TR** *Comment Status* **R** *Functions (CA)*

The operation of the RTS function should have no dependency on whether training is enabled (or even defined) for an ISL. Having such a dependency complicates extending APSU to PMDs that don't use ILT. The ISL needs to indicate to the RTS function that "training is complete" (whatever that means for the ISL in question).

*SuggestedRemedy*

Change "The operation of the RTS function is different based upon the state of mr_training_enable and whether the interface is implemented in a retimer (see 178B.9)."
to
"The operation of the RTS function is different based upon whether the interface is implemented in a retimer (see 178B.9)."
Further details will be provided in a presentation.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment I-140.

*Cl* **178B** *SC* **178B.6** *P* **869** *L* **46** # 135

Huber, Thomas Nokia

*Comment Type* **TR** *Comment Status* **R** *Functions (CA)*

RTS status signalling cannot provided by the ILT function, since some PMDs don't have that function. RTS status is signaled by a PMD- or AUI-specific mechanism (which in some cases is the same training frame that ILT uses, but that does not make this signaling part of the ILT function).

*SuggestedRemedy*

Change "The state of the local_rts variable is provided to the peer interface via the ILT function (Figure 178Bû4)."
to
"The state of the local_rts variable is provided to the peer interface via a PMD- or AUI-specific mechanism."
Further details on the implications of this will be provided in a presentation.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment I-140.

*Cl* **178B** *SC* **178B.7** *P* **870** *L* **4** # 136

Huber, Thomas Nokia

*Comment Type* **TR** *Comment Status* **R** *Functions (CA)*

RTS status signaling cannot be transferred by the ILT function, since some PMDs don't have that function. RTS status is signaled by a PMD- or AUI-specific mechanism (which in some cases is the same training frame that ILT uses, but that does not make this signaling part of the ILT function).

*SuggestedRemedy*

Change "The ILT function facilitates the establishment of communication between the peer interfaces of an ISL, including clock and data recovery and the transfer of the RTS status of the transmitter."
to
"The ILT function facilitates the establishment of communication between the peer interfaces of an ISL."
Further details on the implications of this will be provided in a presentation.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment I-140.

*Cl* **178B** *SC* **178B.7** *P* **870** *L* **9** # 199

Mascitto, Marco Infinera Canada Inc.,Nokia

*Comment Type* **E** *Comment Status* **A** *(B1) (CA)*

It may help the reader to place this sentence after the paragraph that follows, so that they are introduced to the three modes of operation before stating something specific about one of those modes.

*SuggestedRemedy*

Place the sentence which starts at line 9 after the paragraph that begins on line 13.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **178B** *SC* **178B.7** *P* **870** *L* **14** # 200

Mascitto, Marco Infinera Canada Inc.,Nokia

*Comment Type* **E** *Comment Status* **A** *(B1) (CA)*

To add clarity to TRAINING mode, it is suggested to use similar phrasing to LOCAL_PATTERN mode.

*SuggestedRemedy*

Replace:
TRAINING mode (tx_mode = training): training frames are sent between peer interfaces

With:
TRAINING mode (tx_mode = training): training frames are transmitted to the peer interface

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **178B** *SC* **178B.7.2** *P* **870** *L* **51** # 201

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **TR** *Comment Status* **R** *Functions (CA) (Bx)*

The first sentence of this subclause appears to suggest that the per-lane ILT function generates local pattern data so that an adaptation process can take place when in LOCAL_PATTERN mode. We do not want imply or suggest this. The only mode where adaptation is taking place is in TRAINING mode.

*SuggestedRemedy*

Replace:
The per-lane ILT function is responsible for the locally generated data that is transmitted while not in DATA mode and for the adaptation processes of the received signal.

With:
The per-lane ILT function is responsible for the locally generated training frames that are transmitted while in TRAINING mode and for the adaptation processes of the received signal. It is also responsible for the locally generated pattern that is transmitted while in LOCAL_PATTERN mode.

*Response* *Response Status* **U**

REJECT.

The Per-lane ILT function is also responsible for squelching in the QUIET state (Figure 178B-10). The sentence as is covers this case also, while the proposed text will need more details.

The sentence does not suggest that local pattern mode should be used to for transmitter training.

There is no consensus to make the proposed changes.

*Cl* **178B** *SC* **178B.7.2** *P* **871** *L* **1** # 202

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **E** *Comment Status* **A** *(B1) (CA)*

Comma missing.

*SuggestedRemedy*

Add comma after the word "mode":
"When in TRAINING mode, the frame format [à]"

*Response* *Response Status* **C**

ACCEPT.

*Cl* **178B** *SC* **178B.7.2** *P* **871** *L* **7** # 203

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **E** *Comment Status* **A** *(B1) (CA)*

Comma missing.

*SuggestedRemedy*

Add comma after the word "mode":
"When in LOCAL_PATTERN mode, the pattern transmitted [à]"

*Response* *Response Status* **C**

ACCEPT.

*Cl* **178B** *SC* **178B.7.3.3** *P* **873** *L* **8** # 138

Huber, Thomas — Nokia

*Comment Type* **TR** *Comment Status* **R** *Training pattern (CA)*

The "1:2" and "x3" functions in figure 178B-6 are not clear. There is some explanation in 178B.7.3.4, but if the reader doesn't know that, it's hard to understand the figure.

*SuggestedRemedy*

In fiure 178B-6, change "1:2" to "Distribution" and change "x3" to "PAM2 encoder". Add these sentences to the end of the first paragraph of 178B.7.3.3:
The distribution function performs a round-robin distribution of the test pattern to two streams, A and B, with the first bit going to stream A and the second bit going to stream B, etc. The PAM2 encoder encodes the input stream of bits as PAM2 symbols to be transmitted over the PMD (see 178B.7.3.4).

*Response* *Response Status* **U**

REJECT.

There is some agreement that the labelling in the figure as pointed out in this comment could be improved.

There is no consensus to adopt the changes as proposed in the suggested remedy.

*Cl* **178B** *SC* **178B.7.4** *P* **876** *L* **18** # 139

Huber, Thomas — Nokia

*Comment Type* **ER** *Comment Status* **A** *ILT frame (CA) (Bx)*

The "continue training" field in he E1 and O1 frame is inaccurately named. Signaling not-RTS or RTS is not a continuation of the ILT function, it is part of the RTS function. The use of the ILT frame structure to indicate nor-RTS or RTS status should not be confused with that signaling being part of the ILT function.

*SuggestedRemedy*

In both tables 178B-2 and 178B-3, rename the "Continue training" field to "RTS status", and change the definition of the 1 value to "not ready to send". Change heading 178B.7.4.2 to "RTS status".

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Per the result of straw poll TF-19 there is preference to change the field name "continue training" to "not ready to send".

Change the field name "continue training" to "not ready to send".

In Table 178B-2 and Table 178B-3, change assignments to the variable to the following:
1 = not ready to send
0 = Switch to data when training is completed

Update the descriptions, management variables, etc., to reflect this change.

Implement with editorial license.

Straw poll TF-19 (directional)
I support changing the field name from "continue training" to "not ready to send".
Yes: 21
No: 14

*Cl* **178B** *SC* **178B.7.7** *P* **880** *L* **42** # 383

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *(B1) (CA)*

Now that we specify a specific pattern to transmit when training is disabled (local_pattern), an implementation could potentially do auto polarity correction.

*SuggestedRemedy*

Change: "NOTEùPolarity detection and correction is not available when training is disabled."
To: "NOTEùWhen training is disabled support of polarity detection and correction is implementation dependent."

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **178B** *SC* **178B.8** *P* **884** *L* **17** # 140

Huber, Thomas — Nokia

*Comment Type* **TR** *Comment Status* **R** *state diagram (CA)*

The state diagrams in figures 178B-9 and 178B-10 need to be refactored to separate states related to per-lane link training from states related to per-interface ready-to-send functions. This will simplify extension of APSU to PMD types other than 200G/lane IMDD.

*SuggestedRemedy*

A presentation with a complete proposal to revise the diagrams and supporting text (variable definitions, etc.) will be provided.

*Response* *Response Status* **U**

REJECT.

The following related contributions were reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/huber_3dj_01a_2605.pdf
https://www.ieee802.org/3/dj/public/26_05/osorio_3dj_01a_2605.pdf
https://www.ieee802.org/3/dj/public/26_05/mascitto_3dj_02b_2605.pdf
https://www.ieee802.org/3/dj/public/26_05/huber_3dj_02_2605.pdf

Further work to develop a complete proposal and related consensus is needed.

There is no consensus to make the proposed changes.

*Cl* **178B** *SC* **178B.8.2.1** *P* **885** *L* **4** # 204

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **TR** *Comment Status* **A** *(B1) (CA)*

APSU is the behaviour that is observed on a path, not at an interface (see 178B.2 and 178B.4). mr_restart applies to an interface, not the entire path.

*SuggestedRemedy*

Replace the definition of mr_restart with:
Boolean variable used by management to restart the RTS and ILT functions.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **178B** *SC* **178B.8.2.1** *P* **885** *L* **6** # 205

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **TR** *Comment Status* **A** *Variables (CA)*

There are scenarios where a user may need to restart the RTS and ILT functions at an interface. The note is too restrictive and should be changed to a warning.

*SuggestedRemedy*

Replace:
NOTE ù There is no specified time limit for the APSU. Restarting APSU might result in live-lock situation, thus APSU should only be restarted if there is an indication of an unrecoverable fault. The definition of unrecoverable fault is beyond the scope of this standard.

With:
NOTE -- There is no specified time limit for APSU to complete along a path. Caution should be exercised when invoking mr_restart, as it may result in live-lock situations.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to coment I-109.

*Cl* **178B** *SC* **178B.8.2.1** *P* **885** *L* **18** # 356

Slavick, Jeff — Broadcom Inc

*Comment Type* **T** *Comment Status* **A** *Variables (CA) (B1)*

Rewording the 2nd sentence defining remote_rts behavior can help the reader understand its behavior better.

*SuggestedRemedy*

Change: "If mr_training_enable is true and the ôcontinue trainingö bit of the control field of received training frames on all lanes of the interface is zero then remote_rts is set to true, otherwise it is set to false."
To: "If mr_training_enable is true then remote_rts is set to true when the received training frames on all lanes of the interface have the ôcontinue trainingö bit set to zero (see 178B.7.4.2), otherwise it is set to false."

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **178B** *SC* **178B.8.2.1** *P* **885** *L* **26** # 186

Osorio, Luz — Nokia

*Comment Type* **TR** *Comment Status* **A** *(B1) (CA)*

rts_status is missing from the Management Variables

*SuggestedRemedy*

Add per interface rts_status to the Management Variables (2 bits)

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-387.

*Cl* **178B** *SC* **178B.8.2.1** *P* **885** *L* **34** # 185

Osorio, Luz — Nokia

*Comment Type* **TR** *Comment Status* **A** *(Bx) (CA)*

training_status is, based on this definition, the aggregated value of the lane_training_status. It is an enumerated variable with 4 possible values. However, in the Management Variables table, it is linked to a MDIO Boolean variable (1.151.2), which only indicates whether training is in progress. It further suggests this a per lane indication providing a link to 8 lanes.
Based on the variable definition, if any lane is FAIL, then the training_status value must also be set to FAIL.
The current Management Variables definition would dictate that all 8 values must be set to FAIL, which makes it impossible to know which lane actually failed.
There must be a way for management to know the status of each lane clearly so that fault isolation can proceed in case of a failure.

*SuggestedRemedy*

Add lane_training_status to the Management Variables (2 bits per lane) to indicate the status of each signal.
Change training_status to be an aggregate per interface indicator (2 bits).

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The resolution to comment I-387 resolves adding the proper mapping for training_status.

Add lane_training_status to Table 178B-7 Status variables and MDIO mapping (2 bits per lane) to indicate the status of each lanes lane_training_status.

Add new MDIO register fields to assign these to.

Implement with editorial license.

[CC 45]

*Cl* **178B** *SC* **178B.8.2.4** *P* **886** *L* **15** # 206

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **TR** *Comment Status* **R** *State diagrams (CA)*

Figure 178B-9 should be optimized for the reason described in:

https://www.ieee802.org/3/dj/public/26_03/slavick_3dj_03_2603.pdf.

However, the revised state diagram shown on slide 3 can be further optimized by removing the CLOCK_MODE state, and revising the START state exit conditions as follows:

(Isl_ready + !mr_training_enable) *
uses_recovered_clock condition to the SWITCH_CLOCK state

(Isl_ready + !mr_training_enable) *
!uses_recovered_clock to the FOWARD_RTS state

*SuggestedRemedy*

Implement the optimizations described in this comment. For clarity, a presentation with a revised diagram will be provided.

*Response* *Response Status* **U**

REJECT.

The following contribution was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/mascitto_3dj_01_2605.pdf

There is no consensus to make the proposed change.

*Cl* **178B** *SC* **178B.8.2.4** *P* **886** *L* **18** # 369

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *State diagrams (B1) (CA)*

As shown in https://ieee802.org/3/dj/public/26_03/slavick_3dj_03_2603.pdf Figure 178B-9 could be simplified. During the March plenary some feedback indicated the desire to retain the isl_ready check from SWITCH_CLOCK to FORWARD_RTS. However, local_rts is really an indicator of Yes we're transmitting on mission mode clock. isl_ready is a condition of both local and peer Rx (in training mode) are happy and that has no bearing on the transmitters state. The edits proposed related to https://ieee802.org/3/dj/public/26_03/slavick_3dj_01_2603.pdf cover the concerns that were raised.

*SuggestedRemedy*

Update Figure 178B-9 per https://ieee802.org/3/dj/public/26_03/slavick_3dj_03_2603.pdf slide 3

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-206.

*Cl* **178B** *SC* **178B.8.3** *P* **887** *L* **3** # 207

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **E** *Comment Status* **A** *(B1) (CA)*

Sentence is a bit awkward.

*SuggestedRemedy*

Replace:
An interface using the E1 format implements one instance of each of the training control, the training frame lock and the coefficient update state diagrams, and their associated variables, functions, counters and timers defined in this subclause, independently for each lane.

With:
An interface using the E1 format implements one instance per lane of each of the training control, the training frame lock and the coefficient update state diagrams, and their associated variables, functions, counters and timers defined in this subclause.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **178B** *SC* **178B.8.3** *P* **887** *L* **7** # 208

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **E** *Comment Status* **A** *(B1) (CA)*

Sentence is a bit awkward.

*SuggestedRemedy*

Replace:
An interface using the O1 format implements one instance of each of the training control and the training frame lock state diagrams, and their associated variables, functions, counters and timers defined in this subclause, independently for each lane.

With:
An interface using the O1 format implements one instance per lane of each of the training control and the training frame lock state diagrams, and their associated variables, functions, counters and timers defined in this subclause.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **178B** *SC* **178B.8.3.1** *P* **887** *L* **24** # 409

Opsasnick, Eugene — Broadcom Inc.

*Comment Type* **E** *Comment Status* **A** *Variables (CA) (B1)*

It would be much easier for the reader if the text values of all enumerated variables used in the state diagrams were written in upper case. Note that several variables already use upper case for their enumerated values such as lane_training_status and local_mc_mode and all enumerated variables in 178B.8.2.1.

*SuggestedRemedy*

In 178B.8.3.1, put the enumerate values in upper case for these variables:
coef_req, coef_sts, ic_req, ic_sel, ic_sts, tx_mode.
In both the variable definitions and when used in the state diagrams or text.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **178B** *SC* **178B.8.3.1** *P* **888** *L* **16** # 63

WANG, Xuebo — Huawei Technologies Co., Ltd

*Comment Type* **TR** *Comment Status* **A** *(B1) (CA)*

The value of local_mc_mode is initially set to PAM2 by the training control state diagram instead of training frame lock state diagram. A similar issue happens in Line 33 on Page 888. The value of local_tp_mode is initially set to synchronous PRBS13 by the training control state diagram instead of training frame lock state diagram.

*SuggestedRemedy*

Change "training frame lock state diagram" to "training control state diagram" in Line 16 on Page 888.
Make the same change in Line 33 on Page 888.

*Response* *Response Status* **W**

ACCEPT.

*Cl* **178B** *SC* **178B.8.3.3** *P* **890** *L* **16** # 29

Brown, Matthew — Qualcomm

*Comment Type* **T** *Comment Status* **A** *Timers (CA)*

The behavior of the quiet_timer is somewhat ambiguous. The state diagram in Figure xxx shows the quiet timer being started in "QUIET" state. If reset or mr_restart are true then this state is "entered" continuous until both are false. So does this mean the the quiet_timer is constantly reset until both reset and mr_restart are false? In this case, the quiet_timer would only start counter after exiting the quiet state. Or is the intent that the timer starts counting right away and if it has expired the transition out of QUIET state can immediately occur.

*SuggestedRemedy*

Add some clarity as to the intent. One option is to add an intermediate state that starts the quiet_timer when exiting the QUIET state and before entering the SEND_LOCAL or SEND_TRAINING states.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed slide 3 and 4 of the following editorial contribution:
https://www.ieee802.org/3/dj/public/26_05/brown_3dj_03_2605.pdf

"Figure xxx" in the comment is "Figure 178B–10—Training control state diagram"

Implement changes as proposed on slide 4 of the following editorial contribution:
https://www.ieee802.org/3/dj/public/26_05/brown_3dj_03_2605.pdf

*Cl* **178B** *SC* **178B.8.3.3** *P* **890** *L* **18** # 151

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **T** *Comment Status* **R** *Timers (CA)*

The quiet_timer has a maximum duration of 200 ms. But in practice the state diagram can be held in the QUIET state due to reset / mr_restart for an unspecified time, and prior to that it can be in FAIL state for an unspecified time. The effect would be identical to extending quiet_timer. This does not affect interoperability, so the maximum duration of quiet_timer has no importance.
Specifying something that has no importance can lead to confusion, unnecessary verification efforts and false failures.

*SuggestedRemedy*

Change from
"The terminal count of this timer is between 100 ms and 200 ms"
to
"The terminal count of this timer is at least 100 ms".

*Response* *Response Status* **C**

REJECT.

There is no consensus to make the proposed changes.

*Cl* **178B** *SC* **178B.8.3.5** *P* **891** *L* **1** # 109

Ran, Adee
Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *state diagram (CA)*

The link training state diagram does not address the event of loss of signal (LOS). There is no specification of how the LOS event affects other sublayers and interfaces, and how the link is recovered, whether training is restarted or not.

Annex 178B should specify behavior that results in interoperability.

*SuggestedRemedy*

The required changes are currently discussed in a consensus building group. A detailed proposal is planned.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following contributions were reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/ran_3dj_02_2605.pdf
https://www.ieee802.org/3/dj/public/26_05/osorio_3dj_01a_2605.pdf

Based on the result of straw poll TF-7 there is strong support for adopting the proposed changes in ran_3dj_02_2605.

Implement the changes proposed on slides 6 to 11 of ran_3dj_02_2605 with editorial license.

Straw poll TF-7 (choose 1) and TF-8 (chicago) (directional)
I support addressing the handling of detected faults using:
A: no changes
B: the proposal on slide 7 of ran_3dj_02_2605
C: the proposal on slide 13, 14, 15, 16 of osorio_3dj_01a_2605
TF-7 (choose 1): A: 3 B: 23 C: 11
TF-8 (chicago): A: 7 B: 29 C: 15

*Cl* **178B** *SC* **178B.8.3.5** *P* **891** *L* **38** # 110

Ran, Adee
Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *state diagram (CA)*

As highlighted in <https://www.ieee802.org/3/dj/public/26_03/slavick_3dj_01_2603.pdf>, the transition from ISL_READY to PATH_READY is unsafe. It can cause the peer to time out and fail if it has lost its frame lock due to the clock transition.
The peer indicates this condition in its outgoing training frames (received as remote_tf_lock) but it is not part of the condition for the transition.

A simple solution is to add this variable to the transition condition. It would verify that the peer has "survived" the clock transition.

Note that if the peer signals that it's receiver is not ready (remote_rx_ready=false) it will prevent the transition through the variable isl_ready, so it is already covered.

*SuggestedRemedy*

In Figure 178B-10, in the condition for the transition from ISL_READY to PATH_READY, add "* remote_tf_lock".

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-359.

*Cl* **178B** *SC* **178B.8.3.5** *P* **891** *L* **39** # 359

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *state diagram (CA)*

The RTS timer that runs after the clock swap has a minimum time of 10ms. That duration is shorter than the recovery_timer. We need to ensure that one side can't go to FAIL while the other goes to PATH_READY. See https://ieee802.org/3/dj/public/26_03/slavick_3dj_01_2603.pdf
Suggested remedy is based on feedback during March plenary though the solution proposed in the presentation is also viable.

*SuggestedRemedy*

In Figure 178B-10 add "remote_tf_lock *" to the transition requirements from ISL_READY to PATH_READY.
Add the following to the definition of local_rx_ready "When in the RECOVERY state (see Figure 178B-10) this variable should be false."

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

In Figure 178B-10 add "remote_tf_lock *" to the transition requirements from ISL_READY to PATH_READY.

Add to the definition of local_rx_ready that when in the RECOVERY state (see Figure 178B-10) this variable is false.

Implement with editorial license.

*Cl* **178B** *SC* **178B.8.3.5** *P* **891** *L* **46** # 111

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *state diagram (CA)*

As highlighted in <https://www.ieee802.org/3/dj/public/26_03/slavick_3dj_02_2603.pdf>, the transition from PATH_READY to PATH_UP might occur before mission data is available.

Three options for solving this problem have been presented. We should choose one and go with it.

Option 1 (in which the transition is deferred until mission data is available, so training frames are sent) seems less pervasive and is easy to write in the standard and to implement in practice. It is also well-defined and results in a predictable startup behavior.

Options 2 and 3 both require a "random" data stream for the interim period. Option 2 adds this requirement to the PMDs while option 3 adds it to the PMA and inner FEC, but the effect would be identical.
Note that training frames should be considered adequate as a "random" data stream, so implementing option 1 would be valid for option 2 as well. Thus, option 2 provides the most freedom for implementations.

Two alternatives can be discussed, based on options 1 and 2 in slavick_02 (both with editorial adjustments to match existing text):
A (option 1): Add the following term to the transition from PATH_READY to PATH_UP: "adjacent_signal_ok=OK".

B (option 2): Add statements in the "PMD transmit function" subclauses of clauses 179, 180, 181, 182, and 183, as follows (substituting the service interface subclause number): "When tx_mode = data and the SIGNAL_OK parameter of the PMD: IS_SIGNAL.request primitive (see 179.4) is not OK, the PMD shall transmit a locally-generated random data stream (e.g. PRBS31Q). This results in continuous signaling on the medium until valid data is supplied by the client sublayer."

The suggested remedy is option A, but if people prefer option B it is also acceptable.

*SuggestedRemedy*

In Figure 178B-10, in the condition for the transition from PATH_READY to PATH_UP, add "* (adjacent_signal_ok=OK)".

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-368.

*Cl* **178B** *SC* **178B.8.3.5** *P* **891** *L* **47** # 368

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *state diagram (CA)*

As shown in https://ieee802.org/3/dj/public/26_03/slavick_3dj_02_2603.pdf we need to specify the data that transmitted while chip level datapath logic initializes.

*SuggestedRemedy*

Insert a new state "WAIT_DATAPATH" between PATH_READY and PATH_UP. Entry from PATH_READY occurs when propagation_timer_done is true, the exit to PATH_UP occurs when "adjacent_signal_ok = OK" and within the state "tx_mode <= fill_pattern

In 178B.8.3.1 update tx_mode to add another enumeration
fill_pattern: transmits either training frames or local_pattern

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following contribution was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/slavick_3dj_01_2605.pdf

Implement the changes proposed on slide 6 of slavick_3dj_01_2605.

Implement with editorial license.

*Cl* **178B** *SC* **178B.8.3.5** *P* **891** *L* **49** # 144

Bruckman, Leon — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *state diagram (CA) (B1)*

There is no guidance how the FAIL state is exited.

*SuggestedRemedy*

Add to the end of 178B.7 - ILT function, this text:
ôRecovery from the FAIL state in the Training control state diagram (Figure 178B-10) requires management to assert mr_restart_training or reset; the timing of this action is implementation dependent and beyond the scope of this standard.ö

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **178B** *SC* **178B.10** *P* **894** *L* **51** # 209

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **E** *Comment Status* **A** *Management (CA)*

Wrong word.

*SuggestedRemedy*

Replace:
The control and status variables related with this annex and intended to be accessible via a management system are listed in Table 178Bû6 and Table 178Bû7.

With:
The control and status variables related with this annex are intended to be accessible via a management system are listed in Table 178Bû6 and Table 178Bû7.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Align the wording with similar subclauses in this draft.

*Cl* **178B** *SC* **178B.10** *P* **895** *L* **0** # 387

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *Management (CA) (B1)*

training_status and rts_status are not mapped to MDIO registers.

*SuggestedRemedy*

Assign the bits in Table 45-133c as follows:
1.1476.14:13 | rts_status | 0 - FAIL, 1 - IN_PROGRESS, 2- READY, 3 - OK
1.1476.11:10 | training_status | 0 - FAIL, 1-IN_PROGRESS , 2 - READY, 3-OK
In Table 178B-7 add rows for rts_status and training_status referencing those bit assignments.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license.
[Editor's note: CC 178B, 45]

*Cl* **178B** *SC* **178B.10** *P* **895** *L* **22** # 384

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *Management (CA) (B1)*

Table 178B-6 says its control variables but many status variables are listed in it.

*SuggestedRemedy*

Move the following from Table 178B-6 to Table 178B-7:
training_status
coef_sts
ic_sts
local_tf_lock
remote_tf_lock
local_rx_ready
remote_rx_ready
remote_rts

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **178B** *SC* **178B.10** *P* **895** *L* **22** # 386

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *Management (CA) (B1)*

Bit 151.2 is mapped to the variable "training" for the other two startup protocols.

*SuggestedRemedy*

Change training_status to training.

*Response* *Response Status* **W**

ACCEPT.

*Cl* **178B** *SC* **178B.10** *P* **895** *L* **34** # 187

Osorio, Luz — Nokia

*Comment Type* **ER** *Comment Status* **A** *(B1) (CA)*

The cross-reference note indicator "c" is not formated as a superscript for coef_sts

*SuggestedRemedy*

Fix formatting of note cross-reference

*Response* *Response Status* **W**

ACCEPT.

*Cl* **178B** *SC* **178B.10** *P* **895** *L* **37** # 188

Osorio, Luz — Nokia

*Comment Type* **ER** *Comment Status* **A** *(B1) (CA)*

The cross-reference note indicator "b" is not formated as a superscript for local_tf_lock

*SuggestedRemedy*

Fix formatting of note cross-reference

*Response* *Response Status* **W**

ACCEPT.

*Cl* **178B** *SC* **178B.10** *P* **895** *L* **37** # 362

Slavick, Jeff — Broadcom Inc

*Comment Type* **ER** *Comment Status* **A** *(B1) (CA)*

MDIO mapping table for local_tf_lock has a non-superscript for b. It's written as 151.1b

*SuggestedRemedy*

Make the b a reference to the footnote b

*Response* *Response Status* **W**

ACCEPT.

*Cl* **178B** *SC* **178B.10** *P* **895** *L* **38** # 189

Osorio, Luz — Nokia

*Comment Type* **TR** *Comment Status* **A** *(B1) (CA)*

Incorrect MDIO register/bit number for remote_tf_lock. It should 1.1420.9

*SuggestedRemedy*

Fix register reference

*Response* *Response Status* **W**

ACCEPT.

*Cl* **178B** *SC* **178B.10** *P* **895** *L* **40** # 191

Osorio, Luz — Nokia

*Comment Type* **ER** *Comment Status* **A** *(B1) (CA)*

The cross-reference note indicator "c" is not formated as a superscript for local_rx_ready

*SuggestedRemedy*

Fix formatting of note cross-reference

*Response* *Response Status* **W**

ACCEPT.

*Cl* **178B** *SC* **178B.10** *P* **895** *L* **40** # 190

Osorio, Luz — Nokia

*Comment Type* **TR** *Comment Status* **R** *Management (CA) (B1)*

Incorrect MDIO register/bit number for local_rx_ready. The referenced MDIO bit is a training complete indicator. The title and the description of the bit are conflicting

*SuggestedRemedy*

Fix the register definition or point to the correct MDIO bit

*Response* *Response Status* **W**

REJECT.
The Receiver ready bit in the transmitted status field is the local_rx_ready

---

*Cl* **178B** *SC* **178B.10** *P* **895** *L* **41** # 192

Osorio, Luz — Nokia

*Comment Type* **TR** *Comment Status* **A** *(B1) (CA)*

Incorrect MDIO register/bit reference for remote_rx_ready. It should 45.2.1.163

*SuggestedRemedy*

Fix register reference

*Response* *Response Status* **W**

ACCEPT.

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*Cl* **178B** *SC* **178B.10** *P* **895** *L* **41** # 193

Osorio, Luz — Nokia

*Comment Type* **TR** *Comment Status* **A** *Management (CA) (B1)*

Incorrect MDIO register/bit number for remote_rx_ready. The referenced MDIO bit is a training complete indicator. The title and the description of the bit are conflicting

*SuggestedRemedy*

Fix the register definition or point to the correct MDIO bit

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Chnage reference from 45.2.1.167 to 45.2.1.163.

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*Cl* **178B** *SC* **178B.10** *P* **895** *L* **50** # 67

WANG, Xuebo — Huawei Technologies Co., Ltd

*Comment Type* **TR** *Comment Status* **A** *(B1) (CA)*

The variables local_mc_mode and local_tp_mode are set according to control field bits of training frames from the link partner (LP), and are encoded in the status field of training frames of the local device (LD). Thus, these two variables should correspond to 45.2.1.167, the PMD training LD status registers, instead of 45.2.1.165, the PMD training LD control registers. A contribution related to this comment was presented in March plenary meeting. See https://www.ieee802.org/3/dj/public/26_03/mi_3dj_01a_2603.pdf

*SuggestedRemedy*

Implement the proposed change on slide 5 in https://www.ieee802.org/3/dj/public/26_03/mi_3dj_01a_2603.pdf

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

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*Cl* **178B** *SC* **178B.10** *P* **895** *L* **54** # 30

Brown, Matthew — Qualcomm

*Comment Type* **T** *Comment Status* **A** *Management (CA)*

The Table 178B-6 footnote is incorrect. The register/bit numbers in this table are specifically for the PMD. For the PMA immediately above the PMD (connected to an AUI above) would correctly be the same address but with register number offset by 4000. For other AUIs, a different device number would be used with the AUI above a PMA offset by 4000.

*SuggestedRemedy*

MDIO register/bit numbers and references are for a PMD. For the closest AUI component above the PMD the same addresses, except with the register number offset by 4000, are used. For AUIs, above and below any other PMA, the same addressing is used except the device number is the same as used for the PMA.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Update the draft to reflect the intended MDIO addressing per suggested remedy.

Use the resolution to comment I-142 as further guidance.

[Editor's note: CC 178B, 45]

*Cl* **178B** *SC* **178B.11.3** *P* **898** *L* **29** # 148

Bruckman, Leon NVIDIA

*Comment Type* **TR** *Comment Status* **A** *(B1) (CA)*

The polarity test appears twice

*SuggestedRemedy*

Delete the second apperance of the polarity test in Table 178B.11.3

*Response* *Response Status* **W**

ACCEPT.

*Cl* **179** *SC* **179.4** *P* **423** *L* **47** # 156

Mellitz, Richard Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

Reflect the proposal on slide 3 in https://www.ieee802.org/3/dj/public/26_03/mellitz_3dj_03a_2603.pdf, incorporating the consensus from Straw Poll #13 in https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf.

*SuggestedRemedy*

In Table 179ûû7:

Add note (a) to rows
Common-mode to common-mode return loss, RLcc (min)
Common-mode to differential-mode return loss, RLdc (min)
Insert 3 table rows for with the respective Reference, Value, and Units
Common-mode to common-mode effective return loss, ERLcc (min) (b); 178A.3; 2dB
Common-mode to differential-mode effective return loss, ERLdc (min) (b); 178A.3; 17 dB
Differential -mode to common-mode effective return loss, ERLcd (min) (b); 178A.3; 17 dB
Add the following notes to the bottom of the table:
(a & b) The minimum modal return loss is met by exceeding the requirements of either (a) or (b)
(b) Modal ERL parameter values are taken from 179.9.4.8

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG has reviewed slides 24-35 of <https://www.ieee802.org/3/dj/public/26_05/ran_3dj_01b_2605.pdf>.

Implement the proposed changes in slides 5-8 of <https://www.ieee802.org/3/dj/public/26_05/mellitz_3dj_01_2605.pdf>, which also address the related comments I-46, I-155, I-157, I-158, I-239, I-159, I-160, I-161, I-162, I-163, I-165, and I-164.

In addition, implement the proposed changes on slides 24-35 of ran_3dj_01b_2605, which address the related comments I-153, I-154.

implement with editorial license.

*Cl* **179** *SC* **179.5** *P* **434** *L* **44** # 157

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

Reflect the proposal on slide 3 in https://www.ieee802.org/3/dj/public/26_03/mellitz_3dj_03a_2603.pdf, incorporating the consensus from Straw Poll #13 in https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf.

*SuggestedRemedy*

In Table 179û11:
Add note (a) to rows ôDifferential-mode to common-mode return loss, RLcdö
Insert 3 table rows for with the respective Reference, Value, and Units
Common-mode to common-mode effective return loss, ERLcc (min) (b); 178A.3; 2dB
Common-mode to differential-mode effective return loss, ERLdc (min) (b); 178A.3; 17 dB
Differential -mode to common-mode effective return loss, ERLcd (min) (b); 178A.3; 17 dB
Add the following notes to the bottom of the table:
(a & b) The minimum modal return loss is met by exceeding the requirements of either (a) or (b)
(b) Modal ERL parameter values are taken from 179.9.5.6

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **179** *SC* **179.8.2** *P* **420** *L* **44** # 377

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *(B1) (E)*

ILT has two data generation modes TRAINING and LOCAL_PATTERN. The training pattern gen is not necessarily the source of the LOCAL_PATTERN stream of symbols.

*SuggestedRemedy*

In 179.8.2, 180.5.2, 181.5.2, 182.5.2, 183.5.2
Change: "When operating in TRAINING mode, the PAM4 symbol stream on each lane is taken from the output of the training pattern generator in the ILT function (see 178B.7.3.3)."
To: "When operating in TRAINING mode, the PAM4 symbol stream on each lane is provided by the ILT function (see 178B.7)."

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license in all indicated locations and elsewhere if necessary.
[CC 179, 180, 181, 182, 183]

*Cl* **179** *SC* **179.8.4** *P* **421** *L* **24** # 379

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *Signal detect (CA)*

179.8.9 is not called ILT startup protocol.

*SuggestedRemedy*

change "ILT startup protocol" to "APSU"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The first sentence of 179.8.4 does not match the specification of remote_rts mentioned in the second sentence.

Change the text of 179.8.4 from:
The PMD global signal detect function is used by the PMD to indicate the successful completion of the ILT startup protocol (see 179.8.9). The variable Global_PMD_signal_detect is set to the value of remote_rts in the ILT function (see 178B.8.2.1).
To:
The PMD global signal detect function sets the variable Global_PMD_signal_detect to the value of remote_rts in the ILT function (see 178B.8.2.1). When mr_training_enable is true, this variable indicates the status of the RTS function in the peer interface, as communicated through the training protocol (see 179.8.9). When mr_training_enable is false this variable is always true.

Implement with editorial license.

*Cl* **179** *SC* **179.8.4** *P* **421** *L* **26** # 378

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *(B1) (E)*

remote_rts is a RTS function variable not an ILT function variable.

*SuggestedRemedy*

change ILT to RTS

*Response* *Response Status* **W**

ACCEPT.

[Editor's note: Changed line from 27 to 26]

*Cl* **179** *SC* **179.8.9** *P* **422** *L* **27** # 380

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *(B1) (E)*

What pattern is sent when tx_mode = local_pattern should apply regardless of the state of mr_training_enable

*SuggestedRemedy*

In 179.8.9, 180.5.12, 181.5.12, 182.5.12, 183.5.12
Remove "when mr_training_enable is false and"

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
The phrase is indeed not required.
The effect of local_pattern in conjunction with mr_training_enable should be based on definitions in Annex 176B rather than in the PMD clauses.

In the indicated locations, change from
"When mr_training_enable is false and tx_mode = local_pattern"
to
"When tx_mode = local_pattern"
Implement with editorial license.
[CC 179, 180, 181, 182, 183]

*Cl* **179** *SC* **179.8.10** *P* **422** *L* **36** # 381

Slavick, Jeff — Broadcom Inc

*Comment Type* **TR** *Comment Status* **A** *ILT (B1) (CA)*

If we're going to call out ILT needs to be reset, so should RTS.

*SuggestedRemedy*

change "ILT function" to "ILT and RTS functions"

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
The proposed change in the suggested remedy improves the accuracy of the draft. Note that similar text is not provided in the PMD reset subclauses in clauses 180 through 183, though it is equally relevant there.

Implement the suggested remedy in 179.8.10.
Also, in 180.5.6, 181.5.6, 182.5.6, 183.5.6, and other places as appropriate add the following text:
"PMD reset shall reset the ILT and RTS functions associated with the PMD (see <ref>)"
with the appropriate reference.
Implement with editorial license.
[CC 178, 179, 180, 181, 182, 183]

*Cl* **179** *SC* **179.9.4** *P* **424** *L* **21** # 182

Rysin, Alexander — NVIDIA

*Comment Type* **ER** *Comment Status* **A** *Jitter (E)*

The method for the random jitter measurement changed to phase-only (horizontal) jitter, yet the naming remained J_rms, similar to the previous, 12-edge method.

*SuggestedRemedy*

Replace J_rms with JH_rms here and in the explanatory subclauses 179.9.4.7 and 179.9.4.7.1.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy in listed subclauses and other places that refer to J_RMS, with editorial license.

*Cl* **179** *SC* **179.9.4** *P* **424** *L* **24** # 309

Dudek, Michael — Marvell

*Comment Type* **T** *Comment Status* **A** *Jitter (E)*

With the change from J4U to JH4u this jitter parameter is no longer expected to be dependent on channel loss and therefore there shouldn't be different values for different host classes and should match the value allocated to the die.

*SuggestedRemedy*

Remove the different host classes and have a single value of 0.118

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Note that 0.118 is the JH4u limit for module output in Table 176D-3 which assumes the lowest insertion loss to the measurement point (approx. 9 dB).
CR host channels assume (approx.) 12, 17, and 22 dB.

Implement the suggested remedy with editorial license.

*Cl* **179** *SC* **179.9.4.2.1** *P* **425** *L* **17** # 270

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *(withdrawn) (CG)*

Defining just the corner frequency of CRU is not sufficent for accurate measurment

*SuggestedRemedy*

change to: (CRU) with a corner frequency of 4 MHz and a slope of 20 dB/decade with maximum CRU jitter transfer peak of =0.3 dB.

*Response* *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

*Cl* **179** *SC* **179.9.4.2.1** *P* **425** *L* **33** # 264

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *Reference CRU peaking (CG)*

Defining just the corner frequency of CRU is not sufficent for accurate measurment

*SuggestedRemedy*

change to: (CRU) with a corner frequency of 4 MHz and a slope of 20 dB/decade with maximum CRU jitter transfer peak of =0.3 dB.

*Response* *Response Status* **U**

REJECT.

The CRU description with the wording "a slope of 20dB/decade" matches several other clauses in the draft, as well as existing PMD clauses. The specifications in 802.3dj are consistent with these existing clauses and do not require deviation from established wording.

The term "jitter transfer peak" in the suggested remedy is not defined in 802.3dj, and "jitter transfer" is used only informatively in the base standard. Since the specifications (e.g. 179.9.4.2.1) refer to the CRU as a high-pass filter, the editors assume the intent is peaking in the observed jitter transfer function (though this term is not used in 802.3 at all).

The comment seems to address possible jitter amplification by the CRU. However, the specification of "slope of 20 dB/decade" implies a first-order filter, for which there is no peaking, as a model. The existing specification does not explicitly allow any jitter amplification. Implementations might deviate from this model, but no evidence has been provided for significant jitter amplification in CRUs of test equipment used for jitter measurements.

The suggested remedy would allow jitter amplification (0.3 dB) at some frequencies in test equipment, without justification. No data was provided suggesting that the suggested remedy would improve interoperability or change measurement results significantly.

There is no consensus to make the proposed changes.

*Cl* **179** *SC* **179.9.4.2.1** *P* **430** *L* **33** # 271

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *(withdrawn) (CG)*

Defining just the corner frequency of CRU is not sufficent for accurate measurment

*SuggestedRemedy*

change to: (CRU) with a corner frequency of 4 MHz and a slope of 20 dB/decade with maximum CRU jitter transfer peak of =0.3 dB.

*Response* *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

*Cl* **179** *SC* **179.9.4.3** *P* **428** *L* **27** # 303

Dudek, Michael — Marvell

*Comment Type* **E** *Comment Status* **A** *RLM (E)*

The parameter is called "Level separation mismatch ratio" in table 179-7. but the heading and definition in 179.9.4.3 are called "Transmitter linearity" which is the section title of the reference called in 120D.3.1.2 where RLM is defined. Electrical tables in clause 178, 179, 176C and 176D all have the parameter "Level separation mismatch ratio." The parameters in 178, 179, 176C reference 179.9.4.3, but 176D references 176D.8.6 which is titled "Level Separation mismatch ratio" and does not use "transmitter linearity" in the section. Consistency would be good.

*SuggestedRemedy*

Change the title of 179.9.4.3 from "Transmitter linearity" to "Level separation mismatch ratio" and also in text on page 428 line 29

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The specified parameter is indeed the level separation mismatch ratio.
Implement the suggested remedy to make subclause titles and table entries consistent across the draft, with editorial license.

*Cl* **179** *SC* **179.9.4.6** *P* **429** *L* **42** # 181

Rysin, Alexander NVIDIA

*Comment Type* **TR** *Comment Status* **R** *SNDR (E)*

SNDR limits for most of the presets cannot be met even with a test equipment PPG with practical host channels. Data obtained with an instrument-grade pattern generator and practical channels representing the different host classes was presented in rysin_3dj_01a_2509.

*SuggestedRemedy*

Revise the SNDR limits based on data collected with practical channels.

*Response* *Response Status* **U**

REJECT.
The comment refers to the contribution <https://www.ieee802.org/3/dj/public/25_09/rysin_3dj_01a_2509.pdf>, where SNDR measurements are on slides 5-8.
The presentation provided measured data for a specific implementation. It is unclear whether the measured devices (host boards and pattern generators) represent PMDs that could interoperate with minimum capability receivers, and whether the data indicates inability to meet the SNDR in all implementations.

The resolution of comment I-275 can improve the measured SNDR results.

The suggested remedy does not include sufficent detail to implement.

*Cl* **179** *SC* **179.9.4.6** *P* **429** *L* **45** # 275

Calvin, John Keysight Technologies

*Comment Type* **TR** *Comment Status* **A** *SNDR (E)*

Signal-to-noise-and-distortion ratio has recently settled on a revised set of values depending on presets (Table 179-9). The SNDR method still exhibits a strong dependency on overall channel loss, and reduces in value as a function of higher loss. Systems with a HH channel range in SNDR values of around 29dB, which is well short of the required 33.5 needed for Preset 1. The systems interop well, with reasonable BLER values, but fail SNDR.

*SuggestedRemedy*

Examine methods to make Psignal and Sigma e found in equation 179-8 more channel loss resilient. POJ methods may be applied here. The interop report out: https://www.ieee802.org/3/dj/public/26_01/calvin_3dj_01a_2601.pdf Page 22 shows SNDR values in 7 our of 12 test cases fail the SNDR limits. Alternately the table values found in Table 179-9 could be backed off 1.5dB across the board for all presets.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

In 179.9.4.2.1, change N_p from 400 to 700.

The CRG reviewed the contribution <https://www.ieee802.org/3/dj/public/26_05/calvin_3dj_01a_2605.pdf>.
CRG discussion following the the presentation included:
- The POJ methods" mentioned in the suggested remedy are not covered by the presentation and there isn't sufficient detail for the CRG to understand the proposed change.
- Relaxing the SNDR limits would impact the link budget unless COM parameters are also changed, which would affect cable assembly compliance.
- Examples of failing the specifications do not necessarily indicate that it is impossible to meet them.

*Cl* **179** *SC* **179.9.4.7** *P* **430** *L* **11** # 297

Dudek, Michael — Marvell

*Comment Type* **TR** *Comment Status* **A** *Jitter (E)*

This comment is a re-submission of comment #105 on D2.3. With the change to using JH4u, amplitude noise is no longer creating jitter therefore disabling the other lanes should not be done as any true phase noise introduced by the other lanes should be included.

*SuggestedRemedy*

Delete "JH4u and"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Based on straw poll #TF-5 there is support for the suggested remedy.

Implement the suggested remedy with editorial license.

Straw poll #TF-5 (directional)
I would support the suggested remedy to comment I-297.
Y: (change to enable adjacent transmitters)
N: (keep adjacent transmitters off)
Y: 20 N: 10

*Cl* **179** *SC* **179.9.4.7** *P* **430** *L* **17** # 263

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *Reference CRU peaking (CG)*

Defining just the corner frequency of CRU is not sufficent for accurate measurment

*SuggestedRemedy*

change to: (CRU) with a corner frequency of 4 MHz and a slope of 20 dB/decade with maximum CRU jitter transfer peak of =0.3 dB.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment #I-264.

*Cl* **179** *SC* **179.9.4.7** *P* **448** *L* **8** # 426

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *Jitter (E)*

This says "Random jitter, RMS", "sigma_RJ" yet it is clear by inspection that what is meant is Gaussian jitter, and the its cause (random, known cause, or unknown cause) is not the point. A new COM definition is our chance to follow OIF and break with this old name from 8B/10B times which in the age of scrambled coding is inaccurate and encourages sloppy thinking.

*SuggestedRemedy*

Change "Random jitter, RMS", "sigma_RJ" to "Gaussian jitter, RMS", "sigma_GJ" throughout. Add notes as necessary pointing out that similar quantities in older clauses (Annex 93A for example) use the old names.

*Response* *Response Status* **U**

REJECT.
The term "random jitter" and associated symbols has been used in several previous places in 802.3.
The suggested change is a matter of preference.

There was no consensus to make the suggested changes.

[Editor's note: changed Page/Line from 403/25 to 448/8]
[CC: 178, 179, 176C, 176D, 178A]

*Cl* **179** *SC* **179.9.4.7.1** *P* **430** *L* **22** # 272

Calvin, John — Keysight Technologies

*Comment Type* **TR** *Comment Status* **A** *Jitter (E)*

For the Jrms decomposition method, the highly prescriptive text of "using the method described in this subclause" should be softened to permit "equivalent implementations" as would be required in an under sampled measurement system (Equivalent Time /DCA platform)

*SuggestedRemedy*

Replace the text at line 22 from "using the method described in this subclause" to "using the method described in this subclause or equivalent"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Equivalent methods of measurements are implicitly allowed.
However, there are other places in the draft where explicit statements about equivalent methods are mentioned:
In the specification of TDECQ in 180.9.6.1: "Other equivalent measurement implementations may be used with suitable calibration."
In the SRS setup descriptions in 181.9.16 and 183.9.16: "alternative test setups that generate equivalent stress conditions may be used"

Change "using the method described in this subclause" to "using the method described in this subclause or equivalent methods" in 179.9.4.7.1 and 179.9.4.7.2.

*Cl* **179** *SC* **179.9.4.7.2** *P* **430** *L* **52** # 273

Calvin, John — Keysight Technologies

*Comment Type* **TR** *Comment Status* **A** *Jitter (E)*

For the JH4U decomposition method, the highly prescriptive text of "using the method described in this subclause" should be softened to permit "equivalent implementations" as would be required in an under sampled measurement system (Equivalent Time /DCA platform)

*SuggestedRemedy*

Replace the text at line 52 from "using the method described in this subclause" to "using the method described in this subclause or equivalent"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-272.

*Cl* **179** *SC* **179.9.4.7.2** *P* **431** *L* **10** # 86

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *(B1) (E)*

"The set may be filtered by eliminating transitions heavily affected by ISI"

The set A_i is the transition times corresponding to a specific transition (location in the test pattern) i.
All these transitions are equally affected by ISI, so this sentence seems to be misplaced.
The intent is probably to filter specific sets (values of i) that are heavily affected by ISI.

*SuggestedRemedy*

Delete the quoted sentence.
Add a sentence instead to the paragraph preceding the dashed list, which describes the set A:
"For example, locations where the transition slope is low due to ISI should be eliminated".

*Response* *Response Status* **W**

ACCEPT.

*Cl* **179** *SC* **179.9.4.7.2** *P* **431** *L* **21** # 87

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **T** *Comment Status* **A** *(B1) (E)*

Equation 179-10 includes the term RJdd_i, which is not defined and not used elsewhere.
This seems to be a typo, and the term should be RJrms_i, which appears in the paragraph and the dashed list preceding the equation.

*SuggestedRemedy*

Change RJdd_i to RJrms_i

*Response* *Response Status* **C**

ACCEPT.

*Cl* **179** *SC* **179.9.4.7.2** *P* **431** *L* **26** # 88

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *(Bx) ?*

"calculate the best-fit coefficients for the polynomial in 1 / s_i"

DJdd, the "deterministic jitter component" of the dual-Dirac model, is always a positive value, regardless of the sign of the slope. The noise amplification factor is the inverse absolute value of the slope.

*SuggestedRemedy*

Change to the absolute value, i.e., 1 / |s_i|, both in the text and in equation 179-12.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The statement in the comment is inaccurate. The intent was that the noise amplification factor is positive regardless of the slope of the signal.

Change to the absolute value of the inverse slope, i.e., 1 / |s_i|, both in the text and in equation 179-12.

*Cl* **179** *SC* **179.9.4.7.2** *P* **431** *L* **38** # 305

Dudek, Michael — Marvell

*Comment Type* **TR** *Comment Status* **R** *Jitter (E)*

For calculating JH4u from Djdd and RJrms Q4 is used with a value of 3.891 approximating Q(Q4) of 5x10^-5 (equation 179-13). However for the calculation of ADD and sigmaRj from JH4u and Jrms in the interference tolerance test in 179.9.5.3.3 Q4d is used with a value of 3.719. approximating Q(Q4d)-1x10^-4 . That means that Add is not equal to Djdd. and sigmaRJ is not equal to RJRMS. This seems strange. (Note the same Q4d is also used in 178.9.3.4.2)

*SuggestedRemedy*

Reconcile this difference. Change "Q4" to "Q4d" with value 3.719 in 4 places in 179.9.4.7.2 and change the Q value to 1x10^-4.

*Response* *Response Status* **U**

REJECT.
Equations (179-17) and (179-18) are solutions of standard deviation from a measured quantile, and use Q4d.
The term Q4d is consistent with Q3d defined in 162.9.5.3.3, which was changed from Q3 by the resolution of comment #209 against 802.3ck D2.0 (see <www.ieee802.org/3/ck/comments/draft2p0/8023ck_D2p0_final_closedcomments.pdf#page=45> and related contributions <https://www.ieee802.org/3/ck/public/adhoc/apr14_21/hidaka_3ck_adhoc_01_041421.pdf> and <https://www.ieee802.org/3/ck/public/21_05/li_3ck_02c_0521.pdf>).

The calculation in Equation (179-13) uses Q4 to convert the parameters of the Dual Dirac model to the 5e-5 quantile on each side, to calculate the "all but 1e-4" range. This is a different calculation and it can be tested to yield a sufficiently accurate result. Using Q4d would yield the 1e-4 quantile, which would result in "all but 2e-4" range instead.

There was no consensus to make the suggested change.

*Cl* **179** *SC* **179.11** *P* **443** *L* **9** # 168

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *ILdd fit (E)*

Channel ILD is covered by COM and ERL. ILdd variations are common in potential passing channels. The ILdd here is overly restrictive.

*SuggestedRemedy*

In Table 179-16 and section 179.11.2 change Ildd to Ildd fit

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy, adding a reference to the fitted insertion loss calculation in 93A.3, with editorial license.

*Cl* **179** *SC* **179.11** *P* **443** *L* **16** # 158

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

Reflect the proposal on slide 3 in https://www.ieee802.org/3/dj/public/26_03/mellitz_3dj_03a_2603.pdf, incorporating the consensus from Straw Poll #13 in https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf.

*SuggestedRemedy*

In Table 179–16:
Add note (b) to rows
Differential-mode to common-mode return loss, RLcd
Common-mode to common-mode return loss, RLcc
Insert 3 table rows for with the respective Reference, Value, and Units
Common-mode to common-mode effective return loss, ERLcc (min) (c); 178A.3; 2 dB
Common-mode to differential-mode effective return loss, ERLdc (min) (c); 178A.3; 17 dB
Differential -mode to common-mode effective return loss, ERLcd (min) (c); 178A.3; 17 dB
Add the following notes to the bottom of the table:
(b & c) The minimum modal return loss is met by exceeding the requirements of either (a) or (b)
(c) Modal ERL parameter values are taken from 179.11.3

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **179** *SC* **179.11.4** *P* **444** *L* **22** # 239

Heck, Howard — TE Connectivity

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

Straw poll #12 from the March plenary showed consensus for adding modal ERL as a method for limiting mode conversion in cable assemblies.

*SuggestedRemedy*

Implement the proposal in https://ieee802.org/3/dj/public/26_03/mellitz_3dj_02_2603.pdf for copper cables using the pass/fail requirement contained on slide 3 of https://ieee802.org/3/dj/public/26_03/mellitz_3dj_03a_2603.pdf.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **179** *SC* **179.11.6** *P* **449** *L* **29** # 325

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

The details of the specific MDI name are not relevant in the definition of crosstalk paths used in calculation of COM, and may be confusing to the reader if some PMDs do not have explicit MDI.

*SuggestedRemedy*

Remove the explicit MDI names (e.g. "SFP224", in favor of more generic MDI references by maximal lane count. Contribution planned to demonstrate consensus on nomenclature.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.
[Editor's note: changed line from 29 to 33]

*Cl* **179** *SC* **179.11.6.2.2** *P* **449** *L* **23** # 89

Ran, Adee — Cisco Systems, Inc.

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

(Comment resubmitted from WG ballot)
A single exception does not require a list (there are many such exceptions in the draft without a list).

*SuggestedRemedy*

Merge the list into the preceding paragraph, with editorial license.

*Response* *Response Status* **C**

ACCEPT.

*Cl* **179** *SC* **179.12** *P* **450** *L* **1** # 327

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP-DD224 does not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove SFP-DD224 from the possible 200GBASE-CR1 MDI connectors

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179** *SC* **179.12** *P* **450** *L* **1** # 326

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP224 does not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove SFP224 from the possible 200GBASE-CR1 MDI connectors

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179** *SC* **179.12** *P* **450** *L* **4** # 328

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP-DD224 does not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove SFP-DD224 from the possible 400GBASE-CR2 MDI connectors

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179** *SC* **179.12** *P* **450** *L* **8** # 90

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *MDI connector (E)*

As presented in <https://www.ieee802.org/3/dj/public/26_03/ran_3dj_02a_2603.pdf>, implementations that support multiple combinations of PHY types on the same connector (e.g. 1.6TBASE-CR8 and 8x200GBASE-CR1) need to be configured appropriately for interoperability.
A proposed NOTE in 179.12 to inform users about this need was included on slide 8 of ran_3dj_02a_2603.

*SuggestedRemedy*

Add an informative note at the end of 179.12 as follows:
NOTEùImplementations that support multiple combinations of PHY types on the same MDI connector, as described in Annex 179C, must be configured appropriately for interoperability with the connected link partners. Selecting the appropriate configuration requires knowledge of the link partners.

*Response* *Response Status* **C**

ACCEPT.

*Cl* **179** *SC* **179.14** *P* **450** *L* **21** # 363

Slavick, Jeff — Broadcom Inc

*Comment Type* **T** *Comment Status* **A** *AUI management (CG)*

Retimers now have two PMA devices, and upper and lower. The 179.14 tables that C2M and C2C point to doesn't account for this (like is done in Table 178B-6).

*SuggestedRemedy*

Add the following footenote to Table 179-23 and 179-24 attached to the MDIO register/bit number heading
"MDIO register/bit numbers and references are for the lower AUI component or PMD. The MDIO register/bit numbers and references for the upper AUI component are at +4000 offset."

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-142.

*Cl* **179** *SC* **179.15.4.2** *P* **454** *L* **42** # 329

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP224 does not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove SFP224 from the table, and renumber the MDI items appropriately.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179** *SC* **179.15.4.2** *P* **454** *L* **45** # 330

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP-DD224 does not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove SFP-DD224 from the table, and renumber the MDI items appropriately.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179A** *SC* **179A.1** *P* **900** *L* **15** # 349

Kocsis, Sam — Amphenol Corporation

*Comment Type* **ER** *Comment Status* **R** *(B1) (E)*

missing "the"

*SuggestedRemedy*

Change sentence from "This annex provides information on transmitter, receiver, and channel parameters associated with test points
TP0d and TP5d", to "This annex provides information on the transmitter, receiver, and channel parameters associated with test points
TP0d and TP5d"

*Response* *Response Status* **W**

REJECT.
The sentence is correct as written (this annex addresses some parameters, not necessarily all parameters). It is consistent with 162A.1, 136A.1, and 92A.1

*Cl* **179A** *SC* **179A.1** *P* **900** *L* **23** # 350

Kocsis, Sam — Amphenol Corporation

*Comment Type* **ER** *Comment Status* **A** *(B1) (E)*

missing "the"

*SuggestedRemedy*

Change sentence from "TP0d is
depicted in link block diagram of Figure 179ū2." to "TP0d is
depicted in the link block diagram of Figure 179ū2."

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
change from
"TP0d is depicted in link block diagram of Figure 179-2"
to
"TP0d is depicted in Figure 179-2"
Apply a similar change in 179A.3 for TP5d.

*Cl* **179A** *SC* **179A.1** *P* **900** *L* **40** # 351

Kocsis, Sam — Amphenol Corporation

*Comment Type* **ER** *Comment Status* **A** *(B1) (E)*

missing " ".

*SuggestedRemedy*

Change "3.45dB" to "3.45 dB".

*Response* *Response Status* **W**

ACCEPT.

*Cl* **179B** *SC* **179B.3.1** *P* **907** *L* **34** # 240

Heck, Howard — TE Connectivity

*Comment Type* **TR** *Comment Status* **R** *MDI connector (E)*

There may be multiple configurations of MDI connectors (SMT right angle 1x1, Stacked SMT right angle 2x1, Cabled host, Vertical SMT, etc) which can introduce different high speed perfromance variabilities. It is requested that this clause reference a specific configuration to minimize variations between MCB suppliers.

*SuggestedRemedy*

Add text: A single port 1x1 SMT right angle MDI connector is normative for the MCB specifications. Other connector configurations are informative.

*Response* *Response Status* **U**

REJECT.
Per the style manual, "Interspersed normative and informative text is not allowed".

There was no consensus to make the proposed change.

*Cl* **179B** *SC* **179B.4.1** *P* **909** *L* **11** # 238

Heck, Howard — TE Connectivity

*Comment Type* **TR** *Comment Status* **R** *ILdd fit (E)*

Prior contributions (e.g. https://ieee802.org/3/dj/public/26_03/lusted_3dj_02a_2603.pdf) have proposed tightening the range of the min/max specs by using fitted insertion loss and accounting for differences between the fitted insertion loss of an actual test fixture and the reference insertion loss.

*SuggestedRemedy*

Change page 909, line 18 to
ILdd(f) is the fitted insertion loss in dB at frequency f

Change page 907, line 32 to
The effects of differences between the fitted insertion loss of an actual test fixture and the reference insertion loss are to be accounted for in the measurements.

A supporting presentation is planned.

*Response* *Response Status* **U**

REJECT.
The CRG reviewed the contribution <https://www.ieee802.org/3/dj/public/26_05/heck_3dj_01b_2605.pdf>.
There is no consensus to make a change to the draft.

The discussion following the presenation included the following:
- Concerns about tightening the insertion loss limits (measured or fitted).
- Support for the direction of de-embedding measured test fixture s-parameters and re-embedding S-parameters based on the reference loss curves.
- The presentation does not include S-parameters based on the reference loss curves, but there is a path to calculate these.
- Slides 7 and 8 of heck_3dj_01b_2605 include a possible change to the draft, but the CRG recommends more work on this area towards a complete proposal.

See also the response to comment I-169.

*Cl* **179B** *SC* **179B.4.1** *P* **910** *L* **24** # 348

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *FOM_ILD (E)*

In an effort to reduce the variability across mated test fixtures, the FOM_ILD should be computed with a rise time of 5ps, consistent with other metrics in Annec 179B.

*SuggestedRemedy*

Update Tt from 6ps to 5ps.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG discussion clarified that this change is tightening the test fixture requirements. There was no objection to the suggested remedy.

Implement the suggested remedy.

*Cl* **179B** *SC* **179B.4.1** *P* **911** *L* **10** # 13

Lusted, Kent — Synopsys, Inc.

*Comment Type* **T** *Comment Status* **R** *ILdd fit (E)*

Repeat of comment #306 against D2.2: Ildd_MTFmin is, at fNyquist, 4dB lower than Ildd_MTFmax. This large allowed variation in
MTF IL introduces too much uncertainty as to whether a given DUT (host or cable assembly) passes or fails due to variation in the test fixture.

*SuggestedRemedy*

Apply a fitted ILdd mask and add details on de-embed/re-embed process in the draft. A consensus presentation with a detailed solution is expected to be provided.

See also https://www.ieee802.org/3/dj/public/26_01/ran_3dj_02_2601.pdf, https://www.ieee802.org/3/dj/public/26_03/lusted_3dj_02a_2603.pdf and straw poll #10 in https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf

*Response* *Response Status* **C**

REJECT.
Resolved using the response to comment I-238.

*Cl* **179B** *SC* **179B.4.3** *P* **912** *L* **5** # 170

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *MTF Requirements (E)*

Intrapair skew has not been directly considered for the MTF. Although intrapair skew is included in the computed differential modeûtoûdifferential mode insertion loss, the effect of skew has not been explicitly specified. Common modeûtoûdifferential mode insertion loss does contain elements of skew. An either or specification for SCMR_CH should be added to control MTF intrapair skew.

*SuggestedRemedy*

Replace line 3 with:
The common-mode to differential-mode insertion loss of the mated test fixtures measured in both directions shall meet Equation (179Bû6) as illustrated in Figure 179Bû3. or the channel signal to common-mode ratio (SCMR_CH) shall exceed 12 dB using the procedure described in 179.11.7.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG viewed slides 12-15 of
<https://www.ieee802.org/3/dj/public/26_05/ran_3dj_01a_2605.pdf>.

The CRG discussion indicate that the intent is to tighten the existing specs.

Replace line 3 with:
"The mated test fixture shall comply the following requirements:
- The common-mode to differential-mode insertion loss of the mated test fixtures measured in both directions meets Equation (179B-6) as illustrated in Figure 179B-3.
- The channel signal to common-mode ratio (SCMR_CH) is greater than 12 dB using the procedure described in 179.11.7."

*Cl* **179B** *SC* **179B.4.4** *P* **913** *L* **3** # 165

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

Reflect proposal on slide 3 in
https://www.ieee802.org/3/dj/public/26_03/mellitz_3dj_03a_2603.pdf reflecting the consensus from Straw Poll #13 in
https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf and augmented with the discussion that MTF specs should be more stringent than for other channels.

*SuggestedRemedy*

Replace line 3 with:
The common-mode to common-mode return loss of the mated test fixtures measured at each test fixture test interface shall meet Equation (179Bû7) as illustrated in Figure 179Bû4 or shall meet the following modal ERL requirements.
Common-mode to common-mode effective return loss, ERLcc (min); 178A.3; 2.25 dB
Common-mode to differential-mode effective return loss, ERLdc (min); 178A.3; 20 dB
Differential -mode to common-mode effective return loss, ERLcd (min); 178A.3; 20 dB

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **179B** *SC* **179B.4.5** *P* **914** *L* **3** # 164

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **A** *Modal ERL (E)*

Reflect proposal on slide 3 in
https://www.ieee802.org/3/dj/public/26_03/mellitz_3dj_03a_2603.pdf reflecting the consensus from Straw Poll #13 in
https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf and augmented with the discussion that MTF specs should be more stringent than for other channels.

*SuggestedRemedy*

Replace line 3 with:
The common-mode to differential-mode return loss of the mated test fixtures measured at each test fixture test interface shall meet Equation (179Bû8) as illustrated in Figure 179Bû5.or shall meet the following modal ERL requirements.
Common-mode to common-mode effective return loss, ERLcc (min); 178A.3; 2.25 dB
Common-mode to differential-mode effective return loss, ERLdc (min); 178A.3; 20 dB
Differential -mode to common-mode effective return loss, ERLcd (min); 178A.3; 20 dB

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-156.

*Cl* **179B** *SC* **179B.4.5** *P* **914** *L* **9** # 177

Healey, Adam — Broadcom Inc.

*Comment Type* **TR** *Comment Status* **A** *(B1) (E)*

RLdc(f) is specified to be 15 dB for frequencies greater than or equal to 53.12 GHz and less than 67 GHz. The lower limit should be 53.125 GHz.

*SuggestedRemedy*

Change "53.12" to "53.125".

*Response* *Response Status* **W**

ACCEPT.

---

*Cl* **179B** *SC* **179B.4.5** *P* **914** *L* **9** # 10

Chen, Chi-Hua — Chunghwa Telecom Laboratories

*Comment Type* **T** *Comment Status* **A** *(B1) (E)*

*** Comment submitted with the file Corrected Equation (179B-8).pdf attached ***

Equation (179B-8) appears to contain a minor numerical inaccuracy. Specifically, the value currently stated as 53.12 should be corrected to 53.125.

*SuggestedRemedy*

Corrected Equation (179B-8) is written in the attached file.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The following file was submitted along with this comment:
https://www.ieee802.org/3/dj/comments/D3p0/8023dj_D3p0_comment_i-10_attachment.pdf

Resolved using the response to comment I-177.

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*Cl* **179B** *SC* **179B.4.6** *P* **915** *L* **22** # 331

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

The MDI reference to SFP224 does have sufficient references and the details for a separate mated test fixtures integrated crosstalk noise requirement is no longer necessary.

*SuggestedRemedy*

Remove the sentence "The SFP224 mated test fixtures integrated near-end crosstalk noise voltage for the disturber near-end
crosstalk loss is determined according to the method in 110B.1.3.6, given the disturber near-end crosstalk
loss NEXT_loss(f). The mated test fixtures integrated near-end crosstalk noise voltage shall meet the
specification in Table 179Bû3." Remove Table 179B-3. Change all references in this section to "multi-lane mated test fixtures" to "mated test fixtures". Add a sentence that to the text in this section to point out that "an MDI utilizing only a single-lane does not have any MDFEXT requirement"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

---

*Cl* **179B** *SC* **179B.4.19** *P* **909** *L* **18** # 169

Mellitz, Richard — Samtec, Inc.

*Comment Type* **TR** *Comment Status* **R** *ILdd fit (E)*

Channel ILD is covered by FOM_ILD and ERL. . ILdd variations are common in these channels on good fixture channels. The ILdd here is overly restrictive.

*SuggestedRemedy*

Change line 18 to
ILdd(f) is the fitted insertion loss in dB at frequency f

*Response* *Response Status* **U**

REJECT.
The suggested remedy would result in relaxing the test fixture specifications. Comment I-13 refers to previous presentations and straw polls that indicate a desire to tighten the specifications instead.
There was no consensus to make the proposed change.

*Cl* **179B** *SC* **179B.5.4** *P* **917** *L* **38** # 332

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP-DD224 does not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove reference to SFP224, and point to the appropriate table for MDNEXT requirements.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179B** *SC* **179B.5.4** *P* **917** *L* **41** # 333

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *(B1) (E)*

Table 179B-5 does not exist.

*SuggestedRemedy*

Remove Item TF8 from the table.

*Response* *Response Status* **W**

ACCEPT.

*Cl* **179C** *SC* **179C.1** *P* **918** *L* **15** # 334

Kocsis, Sam — Amphenol Corporation

*Comment Type* **ER** *Comment Status* **A** *(B1) (E)*

The reference to "multi-lane" connectors is not necessary.

*SuggestedRemedy*

Remove the sentence "The SFP-DD224, QSFP224, QSFP-DD1600, and OSFP1600 are also referred to as multilane
connectors.".

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
The distinction made by this sentence is not used anywhere, so it is not necessary.
Note that comment I-345 suggests removal of SFP224, which would make all connectors multi-lane.
Implement the suggested remedy with editorial license.

*Cl* **179C** *SC* **179C.1** *P* **918** *L* **23** # 112

Ran, Adee — Cisco Systems, Inc.

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

In Table 179C-1, the heading for the first column, "MDI types", should be "MDI connector type", to match the text in the first paragraph that points to this table.

*SuggestedRemedy*

Change the heading to "MDI connector type".

*Response* *Response Status* **C**

ACCEPT.

*Cl* **179C** *SC* **179C.1** *P* **918** *L* **24** # 335

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP224 does not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove the row for MDI type SFP22, in Table 179C-1.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179C** *SC* **179C.1** *P* **918** *L* **25** # 336

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP-DD224 does not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove the row for MDI type SFP-DD224 in Table 179C-1.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179C** *SC* **179C.1** *P* **918** *L* **35** # 337

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP224 and SFP-DD224 do not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove "179C.2.1 (SFP224)" and "179C.2.2 (SFP-DD224)" from the supported 200GBASE-CR1 list.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179C** *SC* **179C.1** *P* **918** *L* **39** # 338

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP-DD224 does not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove "179C.2.2 (SFP-DD224)" from the supported 400GBASE-CR2 list.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179C** *SC* **179C.1** *P* **919** *L* **1** # 113

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **E** *Comment Status* **A** *MDI connector (E)*

"An MDI connector type may support one or more PMDs"
For MDI connector types this is not an option - either they support one, or more than one (and if SFP is removed, all MDI connector types support more than one).
The actual connector (not type) may be used by one or more PMDs.

*SuggestedRemedy*

Change the quoted sentence to "An MDI connector may be used by one or more PMDs".

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license, and keep the text consistent with the responses to comment I-115, I-116, I-117, as appropriate.

*Cl* **179C** *SC* **179C.1** *P* **919** *L* **3** # 114

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *MDI connector (E)*

The signal assignment for partially-implemented MDI connectors should be normative, as was explained in <https://www.ieee802.org/3/dj/public/26_03/ran_3dj_02a_2603.pdf>. Improved language of this requirement was proposed on slide 7 of ran_3dj_02a_2603. Since the table heading is "contact mapping", the word "contact" should be used.

*SuggestedRemedy*

Change the last sentence in the paragraph preceding Table 179C-2:
From: When an MDI connector is not fully utilized the lower PMD numbers in Table 179Cû2 should be used.
To: When not all connector contacts in an MDI connector are physically connected to PMD signals, the connector contacts corresponding to lower PMD numbers in Table 179Cû2 shall be used.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The suggested remedy supports the consensus clarification from the discussion at the March Plenary.

Implement the suggested remedy as proposed.

*Cl* **179C** *SC* **179C.1** *P* **919** *L* **4** # 301

Dudek, Michael — Marvell

*Comment Type* **TR** *Comment Status* **A** *MDI connector (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". This was discussed in the March Plenary in ran_3dj_02a_2603

*SuggestedRemedy*

Implement the change to 179C.1 on slide 7 of ran_3dj_02a_2603

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-114.

*Cl* **179C** *SC* **179C.1** *P* **920** *L* **6** # 339

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP224 and SFP-DD224 do not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove Table 179C-3.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179C** *SC* **179C.2.1** *P* **924** *L* **36** # 340

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP224 does not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove Section 179C.2.1 completely.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179C** *SC* **179C.2.2** *P* **925** *L* **34** # 341

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP-DD224 does not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove Section 179C.2.2 completely.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179C** *SC* **179C.2.3** *P* **926** *L* **34** # 324

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *Normative references (Bx) ?*

This section is the primary place to use the normative reference SFF-8665.

*SuggestedRemedy*

Add sentence "The combination of connector, cage, and module that can be used to create a QSFP224 solution is defined in SFF-8665, Rev x.x.x, yyyy-mm-dd."

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The implementation of a "QSFP224" solution requires a specific set combination of components.
Those components are defined in SFF-TA-1027. The reference to SFF-8665 is redundant and the backwards compatibility of older QSFP+ hardware is not applicable. The reference to SFF-8665 does not appear anywhere else in the document and can be removed in subclause 1.4.

Delete the reference to SFF-8665 in subclause 1.4.
Impelment with editorial license.

*Cl* **179C** *SC* **179C.2.3** *P* **926** *L* **36** # 34

Turner, Michelle — Editorial Coordination

*Comment Type* **TR** *Comment Status* **A** *Normative references (B1) (E)*

The reference to SFF-TA-1027 appears inside a permissive construction (use of ômayö). Because ômayö indicates an optional choice rather than a requirement, this wording does not cite SFF-TA-1027 normatively, even though the document is listed in the Normative References clause.

*SuggestedRemedy*

If SFF-TA-1027 is required for proper implementation, please consider rewriting the sentence using normative language.

If SFF-TA-1027 is not required for implementation, please move it to the Bibliography as an informative reference.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.

The comment points out an ambiguity in the current draft. There are two parts. First, a host/module "may" use a QSFP224 form factor. Second, if it does then it "shall" comply with SFF-TA-1027. Further, this issue also applies to 179C.2.4 and 179C.2.5 in the same manner.

Propose to change the following text from:
"the mechanical interface between the PMD and the cable assembly may be a mated pair of connectors as defined in SFF-TA-1027, Rev 1.0.7, 2025-05-30, QSFP2 Connector, Cage, & Module Specification"
to:
"the mechanical interface between the PMD and the cable assembly may be a mated pair of QSFP224 connectors. If QSFP224 is used, the implementation shall comply with the QSFP224 Component Mechanical Specification in SFF-TA-1027, Rev 2.0, September 9, 2025."

Implement similar corrections, with editorial license, in 179C.2.4 and 179C.2.5 as necessary.

Also, update the reference in 1.4 to "SFF-TA-1027, Rev 2.0, September 9, 2025". Implement with editorial license.

*Cl* **179C** *SC* **179C.2.5** *P* **928** *L* **21** # 35

Brown, Matthew — Qualcomm

*Comment Type* **E** *Comment Status* **A** *Normative references (B1) (E)*

Revision "5.1" does not match revision "5.22" in subclause 1.4. Also, "Specification" should not be capitalized since it is not part of the reference title.

*SuggestedRemedy*

Change "5.1" to "5.22".
Change "Specification" to "specification".

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.
Note that the response to comment I-34 may result in further related changes to this subclause.

*Cl* **179C** *SC* **179C.3.3** *P* **931** *L* **8** # 342

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP224 and SFP-DD224 do not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove Item MDI1 and MDI2 from the PICS table.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179C** *SC* **179C.3.4** *P* **931** *L* **30** # 343

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP224 and SFP-DD224 do not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove CM1 and CM2 from the PICS table.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179D** *SC* **179D.1** *P* **932** *L* **19** # 344

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP224 and SFP-DD224 do not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove SFP224 and SFP-DD224 rows from Table 179D-1.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **179D** *SC* **179D.1.1** *P* **932** *L* **46** # 345

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP224 and SFP-DD224 do not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove rows and columns referencing SFP224 and SFP-DD224 in Table 179D-2. Add a note or text that indicates that partially populated MDI connectors may be used to support 200GBASE-CR1. Contribution planned to demonstrate consensus on nomenclature.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following contribution was reviewed by members of the IEEE 802.3dj task force at the 15 April 2026 ad hoc meeting:
https://www.ieee802.org/3/dj/public/adhoc/electrical/26_0415/kocsis_3dj_adhoc_01a_260415.pdf

Implement the proposed changes on slide 6 to 19 of kocsis_3dj_adhoc_01a_260415.

Implement with editorial license.

*Cl* **179D** *SC* **179D.1.1** *P* **933** *L* **24** # 346

Kocsis, Sam — Amphenol Corporation

*Comment Type* **TR** *Comment Status* **A** *SFP224 (CE)*

As detailed in contribution <https://www.ieee802.org/3/dj/public/26_03/kocsis_3dj_01a_2603.pdf>, SFP-DD224 do not have sufficient reference, and should be removed from the document.

*SuggestedRemedy*

Remove rows and columns referencing SFP-DD224 in Table 179D-2. Add a note or text that indicates that partially populated MDI connectors may be used to support 400GBASE-CR2. Contribution planned to demonstrate consensus on nomenclature.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-345.

*Cl* **180** *SC* **180** *P* **468** *L* **34** # 47

Mazzini, Marco — Cisco Systems

*Comment Type* **T** *Comment Status* **A** *TDECQ_CER (OI)*

TDECQcer is not stable enough measurement a contribution is forthcoming.

*SuggestedRemedy*

Remove TDECQcer from Table 180-7, row 34

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-71.

*Cl* **180** *SC* **180.1** *P* **457** *L* **49** # 416

Dawe, Piers J G — NVIDIA

*Comment Type* **ER** *Comment Status* **A** *editorial (B1) (CG)*

This says "are required according to the guidelines in 176B.5.1"; 176B.5.1 says "require". So it's not guidelines.

*SuggestedRemedy*

Delete "the guidelines in": up to 4 times per PMD clause.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
In Table 180-1 footnote b, delete "the guidelines in".
Repeat for other similar tables in clause 178 through 183, 185, and 187.
[Editor's note: CC: 178 through 183, 185, 187]

*Cl* **180** *SC* **180.1** *P* **458** *L* **6** # 417

Dawe, Piers J G NVIDIA

*Comment Type* **ER** *Comment Status* **R** *editorial (Bx) (OI)*

Table 180-1 and 2, Physical Layer clauses associated with... are clones of each other. Each really has 3 columns. The status (optional, required or conditional) is the same in each. But the presentation obscures the very high level of commonality.

*SuggestedRemedy*

Present these as a single table with four columns: Clause number, 200GBASE-DR1 (with the abbreviated titles from Table 180-1), 400GBASE-DR2 (with the abbreviated titles from Table 180-2), Status.
Combine footnotes c and e.

*Response* *Response Status* **U**

REJECT.

Combining the two tables together does not improve the clarity of the draft but rather results in a table that is more difficult to read since it would need to include a two PCS rows (one for each Ethernet rate), two xMII rows (one for each Ethernet rate), etc., where only one of those rows would be relevant to any one PHY type. An example with with two Ethernet rates can be found in Table 122-1 in the base standard.

*Cl* **180** *SC* **180.1** *P* **460** *L* **6** # 418

Dawe, Piers J G NVIDIA

*Comment Type* **ER** *Comment Status* **R** *editorial (Bx) (OI)*

Table 180-3 and 4, Physical Layer clauses associated with... are not quite clones of each other. Each really has 3 columns. The status (optional, required or conditional) is the same in each. But the presentation obscures the very high level of commonality and makes it hard to spot the differences (PCS and PMA).

*SuggestedRemedy*

Present these as a single table with four columns: Clause number, 200GBASE-DR1 (with the abbreviated titles from Table 180-1), 400GBASE-DR2 (with the abbreviated titles from Table 180-2), Status. There will be one more row than in Table 180-3.
Combine footnote d.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment #I-417.

*Cl* **180** *SC* **180.2** *P* **461** *L* **37** # 419

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *error ratio allocation (CG)*

Based on the FLR specification and FEC CER of 174A.6 and the sentence at line 41, the sentence at line 37 is applicable to pluggable modules where the decisions are made in the module, errors can be counted at its PMA, and some error budget is reserved for the following AUIs in the receive path. But it is not correct for RTLR, LPO, NPO and CPO where there is no C2M AUI.

*SuggestedRemedy*

Change the first sentence to:
With a compliant input signal, a PMD receiver is expected to meet the block error ratio (BLER) of 1.45 x 10^-11 (see 174A.6), measured at the PMA adjacent to the PMD using the method described in 174A.9, with the appropriate BER_added. For a receiver in a module with an AUI C2M, BER_added is 6.4 x 10^-5. For a receiver where the PMA adjacent to the PMD is the final PMA in the receiver (e.g. in a host ASIC), BER_added is 3.2 x 10^-5. For a receiver where the PMA adjacent to the PMD is followed by an AUI C2C then the final PMA in the receiver, BER_added is 5 x 10^-5.
Similarly in other optical clauses.

*Response* *Response Status* **U**

REJECT.

The comment points out that some implementations may not align with sublayer partitioning as specified by IEEE 802.3.
How such a device determines its compliance is left to the implementer.
Note the last paragraph of 180.2 describes the behavior the PHY is expected to meet for cases when the PMD can not be evaluated standalone. Also, 174A.9 explains how BER_added is determined and 174A.13 summarizes the allocation of error ratios to each physical interface.

There is no consensus to make the proposed changes.

*Cl* **180** *SC* **180.2** *P* **461** *L* **41** # 420

Dawe, Piers J G NVIDIA

*Comment Type* **ER** *Comment Status* **R** *editorial (Bx) (OI)*

The paragraphs in this subclause are ordered top - bottom - middle.

*SuggestedRemedy*

Swap the second and third paragraphs so that the logic behind these requirements is more apparent. Several clauses.

*Response* *Response Status* **U**

REJECT.

There is not consensus to make the proposed changes.

*Cl* **180** *SC* **180.3** *P* **461** *L* **49** # 429

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *service interface (CA)*

"The service interface" language was imposed from the world of software onto 802.3 a very long time ago. For years, it was boilerplate that we did not need to take seriously. Now, with ILT, APSU, RTLR, LPO, CPO, the distinction becomes interesting and we should get this right so as to prepare solid foundations for future projects.
As is abundantly clear from the base standard and the definitions 1.4.469, Physical Medium Attachment (PMA) sublayer, and 1.4.470 Physical Medium Dependent (PMD) sublayer, a PMA provides functions for transmission, reception, clock recovery and skew alignment while the PMD interfaces to the transmission medium concerned (coax, twinax, MMF, SMF). The PMD is untimed, it's a media convertor. In a traditional retimed optical module, there are formally, a PMA which provides CDR, pattern generation and maybe pattern checking, above a PMD that converts untimed electrical signals between the internal electrical format of the module or an IC within it, and the optical format - and vice versa. Even for a spec where there is a DFE in a reference receiver for a PMD, the spec has no concept of bits or errors at the DFE output; the digital, countable symbol steam is inside the PMA or at the interface above it, and the interface below the PMA (AUI has an analog specification.

*SuggestedRemedy*

Here, change "The PMD translates the encoded data to and from signals suitable for the specified medium" to "The PMD translates the signals from and to the adjacent PMA to and from signals suitable for the specified medium".
Replace the next paragraph, which describes a digital interface, with a definition for an interface carrying signals (rather than bits or a symbol stream) on the datapath. The auxiliary primitives PMD:IS_SIGNAL.request and PMD:IS_SIGNAL.indication can remain "digital"; they aren't associated with timing-critical pattern generators and such.
Make appropriate changes to 178A (APSU). Items such as the retimer reference model in Figure 178B-13 will be formally in a PMA, always. This will allow a consistent definition framework for copper, IMDD and coherent optical PHYs.

*Response* *Response Status* **U**

REJECT.
As defined explicitly in the draft (see 180.3), the output of the PMD is the detected PAM4 symbols (i.e., after the DSP); the PMA or Inner FEC above processes those detected symbols. The draft does not explicitly define how the the PMD is implemented. Based on that definition, for a linear optical interface, the PMD would encompass the linear optical front end and associated electronics on the module, the electrical channel between the host device and the module, and the DSP on the host device.
The definition of PMA in 1.4.469 notes some functions are only for some PHY types: "(depending on the PHY) collision detection, clock recovery and skew alignment".
The comment is proposing to change this definition to a different reference point. As currently specified the interface between the PMD and sublayer above provides a clean and consistent interface. Changing the PMD interface as proposed would required the PMD service interface to be fully redefined as an analog interface.

*Cl* **180** *SC* **180.3** *P* **462** *L* **10** # 431

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *service interface (Bx) (CG)*

This says "provides the status from ISLs above the PMD". This is the only use of "ISL" in the clause, and there is no cross-reference. The thing above a PMD is always a PMA, so this unfamiliar term seems unnecessary. "the status" is too vague. Naming a status primitive as "request " is unnatural and confusing (although we have a reason to do it), so it should be explained more thoroughly.

*SuggestedRemedy*

Change "is used for the PMA above the PMD to indicate the validity of PMD:IS_UNITDATA_i.request".
Give a cross-reference.
Four clauses.

*Response* *Response Status* **U**

ACCEPT IN PRINCIPLE.
The text as written could be improved. Similar changes are warranted in 177.2 and 184.3. A similar sentence would be beneficial in the service interface definitions in clauses 178 and 179.
In 180.3, 181.3, 182.3, 183.3...
Change: "The SIGNAL_OK parameter of the PMD:IS_SIGNAL.request provides the status from ISLs above the PMD"
To: "The PMD receives signal status information from the client sublayer using the PMD:IS_SIGNAL.request primitive"
Make similar changes in 177.2 and 184.3 but with changing "PMD" to "FEC".
Add similar sentences in 178, 179.
In 177.2, replace the 5th paragraph (starting with "The Inner FEC receives signal status information") with following sentence:
"The Inner FEC sublayer receives signal status information from the client sublayer using the FEC:IS_SIGNAL.request primitive."
Add the same sentence as a new paragraph at the end of 184.3.
Implement with editorial license.
[Editor's note: CC: 178 through 183]

*Cl* **180** *SC* **180.3** *P* **462** *L* **10** # 430

Dawe, Piers J G NVIDIA

*Comment Type* **ER** *Comment Status* **A** *editorial (B1) (OI)*

parameter of the PMD:IS_SIGNAL.request provides

*SuggestedRemedy*

parameter of the PMD:IS_SIGNAL.request *primitive* provides
Four clauses

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Indeed in the same page, the service interface primitives are referenced both with or without the word primitive. E.g.
The SIGNAL_OK parameter of the PMD:IS_SIGNAL.indication *primitive* corresponds to the variable
rts_status of the ready-to-send (RTS) function (see 180.5.12), as defined in 178B.8.2.1.
vs
When SIGNAL_OK is either IN_PROGRESS or FAIL, the rx_symbol parameters of PMD:IS_UNITDATA_i.indication on all lanes are unspecified.
Remedy:
Add primitive to where appropriate with editorial license to make the draft consistent.

*Cl* **180** *SC* **180.5.1** *P* **463** *L* **48** # 432

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *editorial (Bx) (CA)*

This says "The inter-sublayer link training (ILT) and RTS functions indicated in Figure 180û2 are defined in Annex 178B." but 178B is called APSU now.

*SuggestedRemedy*

Insert APSU:
The inter-sublayer link training (ILT) and RTS functions (APSU) indicated in Figure 180û2 are defined in Annex 178B.
Four clauses.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The resolution to comment I-280 changes the title of Annex 178B to "ILT and RTS functions and support for Autonomous Path Startup for electrical and optical interfaces". This better clarifies that ILT and RTS functions are defined in this annex.

*Cl* **180** *SC* **180.5.1** *P* **464** *L* **7** # 433

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *signal_detect (Bx) (OI)*

This shows the signal detect after the usual AND gate at the bottom of the diagram, but an unconnected SIGNAL_OK at the top of the diagram. But these are connected; the ILT/RTS functions will be asleep until signal detect reports that there is light coming in and it is worth waking up. A consideration of squelch shows that getting this right can be important.

*SuggestedRemedy*

Show signal detect as an input to "ILT/RTS functions"

*Response* *Response Status* **U**

REJECT.

802.3dj now uses a different mechanism local_rx_ready that defines the perceived quality of the signal from the perspective of ILT.

Signal detect as defined may or may not be helpful at the discretion of the implementor.

*Cl* **180** *SC* **180.5.1** *P* **464** *L* **9** # 434

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *TP2 figure (OI)*

Sometimes this diagram is taken too literally leading to a belief that the 2 to 5 m patch cord and TP2 are part of a service link. They are not; optical cabling may include a variety of connectors (not the type used on test equipment), patch panels, and maybe optical switches, the length of any first patch cord is not regulated, and there may be no accessible TP2.

*SuggestedRemedy*

Either: remove TP2 from the medium, and show the patch cord and TP2 (connected to test equipment) as an alternate;
or: at line 2 normative text), add: While TP2 and the patch cord for transmitter measurements and tests are shown in Figure 180-2, they are not part of the medium. The transmit MDI is connected to the medium for use, or to the patch cord and TP2 transmitter measurements and tests.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the second option: at line 2 normative text), add:

"While TP2 and the patch cord for transmitter measurements and tests are shown in Figure 180-2, they are not part of the medium. The transmit MDI is connected to the medium for use, or to the patch cord and TP2 for transmitter measurements and tests."

Implement with editorial license and over all optical clauses.

*Cl* **180** *SC* **180.5.2** *P* **464** *L* **37** # 435

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *PMD transmit function (CO)*

The PMD transmitter can be in one of three modes, not two.

*SuggestedRemedy*

Change: The PMD transmit function has two operating modes: DATA and TRAINING. The operating mode is controlled ...
to: The PMD transmit function can be in one of three modes; OFF, DATA and TRAINING. The use of DATA and TRAINING is controlled ...

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The transmitter function operating mode determines how data is generated for the transmitter output as controlled by the RTS and ILT state diagrams in 178B. In DATA mode, the output comes from the service interface above. In TRAINING mode, the output comes from the ILT function as defined in Annex 178B. The state of the transmitter output, either enabled or disabled (OFF), is controlled by the PMD_global_transmit_disable and PMD_transmit_disable_i management variables as defined in 180.5.7 and 180.5.8 (and similar clauses in 181, 182, and 183) and by the training control state diagram variable tx_disable as defined in 178B.8.3.1.

However, the specification of the lane-by-lane transmit disable function in 180.5.8 does not define the effect of tx_disable as is defined in 179.8.7.

Replace 180.5.8 to the following:
"180.5.8 PMD lane-by-lane transmit disable function
The PMD lane-by-lane transmit disable function allows the optical transmitters in each lane to be selectively disabled. This function is used by the ILT function. It may optionally be provided through control variables PMD_transmit_disable_i.
If either PMD_transmit_disable_i or the variable tx_disable in lane i of the ILT function (see 179B.8.2.1.) is set to one (where i represents the lane number in the range 0:n-1), this function shall turn off the associated optical transmitter so that the transmitter meets the requirements of the average launch power of the OFF transmitter in Table 180-7.
If a PMD_fault is detected, then the PMD may set each PMD_transmit_disable_i variable to one, turning off the optical transmitter in each lane."

Make the similar changes to be 181.5.8, 182.5.8 and 183.5.8.

Implement with editorial license.

*Cl* **180** *SC* **180.5.4** *P* **465** *L* **29** # 436

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *signal_detect (Bx) (OI)*

In existing optical PMDs, the relation between signal detect function and SIGNAL_OK is simple. In this draft it is not stated in these sections where one would expect it. There should be some text explaining how the global and/or lane-by-lane signal detect function relates to SIGNAL_OK.

*SuggestedRemedy*

Add text explaining how the global and/or lane-by-lane signal detect function relates to SIGNAL_OK.

*Response* *Response Status* **U**

REJECT.

For PMDs that uses RTS and ILT function, SIGNAL_OK is dependent on the rts_status and not related to the signal detect functions. The local_rx_ready variable is used to define the perceived quality of the signal in ILT function.
Signal detect as defined may or may not be helpful at the discretion of the implementor.

*Cl* **180** *SC* **180.5.5** *P* **466** *L* **1** # 437

Dawe, Piers J G
NVIDIA

*Comment Type* **TR** *Comment Status* **R** *signal_detect (OI)*

This text, which has been modified from text for 1000BASE-LX and 1000BASE-SX, says: "Implementations need to provide adequate margin between the input optical power level at which the PMD_signal_detect_i variable is set to 1 and the inherent noise level of the PMD". This could be read as a pseudo-requirement that (for decreasing signal strength), the SD should trip before the signal is too noisy to use, or after - the direction of the margin is not indicated. Actually, too noisy to use is not the requirement. The inherent noise level of the PMD is not on the same scale as the input optical power level, and for SD based on average optical power, it is barely relevant.
The paragraph would be more use in a copper clause.
"need" should be avoided.

*SuggestedRemedy*

Say what we actually mean: NOTE--Implementors should ensure that the PMD_signal_detect_i variable is not incorrectly set to 1 by the action of the inherent noise level of the PMD, including the effects of crosstalk, power supply noise, etc.
Or better, delete the paragraph. It is only an attempt at guidance to designers, and confusing.
Six clauses.

*Response* *Response Status* **U**

REJECT.

Strawpoll O-2 (directional) Chicago rules
I support
1: Leave text as is
2: Change text per suggested remedy per I-437
3: Delete the paragraph

1: 6
2: 5
3: 7

Strawpoll O-3 (directional) Pick one
I support
1: Leave text as is
2: Change text per suggested remedy per I-437
3: Delete the paragraph

1: 10
2: 1
3: 5

No consensus to make a change.

*Cl* **180** *SC* **180.5.12** *P* **466** *L* **38** # 18

Brown, Matthew
Qualcomm

*Comment Type* **E** *Comment Status* **A** *editorial (B1) (CA)*

"functions" appears twice in title

*SuggestedRemedy*

change heading to "180.5.12 Autonomous path startup (APSU) functions"
change heading 181.5.12, 182,5.12, and 183.5.12 similarly

*Response* *Response Status* **C**

ACCEPT.

*Cl* **180** *SC* **180.7.1** *P* **468** *L* **27** # 438

Dawe, Piers J G
NVIDIA

*Comment Type* **TR** *Comment Status* **A** *editorial (B1) (OI)*

This is an underlined less than symbol

*SuggestedRemedy*

Use a less than or equal symbol. Scrub the draft.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license.

*Cl* **180** *SC* **180.7.1** *P* **468** *L* **28** # 439

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TDECQ-limit (OI)*

There is a strong relation between ECQ, and histogram spacing + width. Histogram spacing is very important to protect receivers from narrow eyes caused by transmitter jitter.

*SuggestedRemedy*

If the histogram spacing + width remains as is, increase the TDECQ and TECQ limits to 3.8 dB. The useful signal strength, OMA-TDECQ, is unchanged.
Several clauses.

*Response* *Response Status* **U**

REJECT.

The comment proposes to increase the limit of TDECQ and TECQ. However, no data or simulation analysis has been provided indicating that 3.4dB is failing properly working transmitter.

Changing the TDECQ limit would require a corresponding change in the stressed receiver sensitivity limit.

Insufficient evidence was provided to justify to proposed changes.

There is no consensus to make the proposed changes.

*Cl* **180** *SC* **180.7.1** *P* **468** *L* **35** # 223

Maniloff, Eric Ciena Corporation

*Comment Type* **TR** *Comment Status* **R** *TDECQ-Ceq (OI)*

Over peaking of transmitters is not effectively prevented. The overshoot limit is not effective as higher bandwidth transmitters could be over peaked and still meet an overshoot specification. Use of Ceq from the Reference Rx gives insight into whether the Tx is overpeaked. With the introduction of the DFE into he Reference Rx, the calculation of Ceq needs to be modified to account for the DFE tap.

*SuggestedRemedy*

Reintroduce Ceq into Table 180-7 with a Minimum value of 0dB. Similar changes should be made in clauses 181, 182, 183. Supporting contribution to be provided.

*Response* *Response Status* **U**

REJECT.

There is no consensus to make the proposed changes.

*Cl* **180** *SC* **180.7.1** *P* **468** *L* **36** # 441

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *Overshoot (OI)*

The transmitter overshoot and undershoot limit is far too high (D2.2 comments 223 and 252). A signal with overshoot like this has been badly set up. It is outside the range of signal shapes a receiver is expected to see, as well as wasting transmitter headroom and receiver ADC resolution.

*SuggestedRemedy*

For the current 1e-2 hit ratio, the limit should be reduced to from 22% to 13%, and transmitter power excursion should be reduced from 2.3 dBm to 1.8 dBm. See another comment for the hit ratio.

*Response* *Response Status* **U**

ACCEPT IN PRINCIPLE.

The resolution to comment I-248 changed the hit ratio for overshoot/undershoot measurement to 1E-4 and adopted a new value for overshoot/undershoot (max).

Further evidence and data is required to make a change to power excursion (max) value. There was no consensus to change either the measurement hit ratio or the value for power excursion (max).

*Cl* **180** *SC* **180.7.1** *P* **468** *L* **36** # 440

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TFSEH (OI)*

The transmitter functional symbol error histogram method tests transmitter-receiver pairs, not just transmitters. Depending on the receiver used, a transmitter could be falsely failed or falsely passed. The FEC bin 8 criterion is not connected to the FLR objective of this project, nor to a target such as OIF's 1e-15 effective BER. Extrapolation from bin 8 to bins 14-16 which are the ones that matter, is lacking. Although the idea of counting errors can be useful for deploying links in volume where the implementation of transmitter and receiver (technology, supplier, revision) really are paired, 802.3 is an interoperability standard.

*SuggestedRemedy*

Remove this row from this table. Remove row from Table 180-14. Move 180.9.9 to an annex.
Four clauses.

*Response* *Response Status* **U**

REJECT.

This comment is proposing to remove the "Transmitter functional symbol error histogram" parameter as a mandatory requirement for all PMDs defined in Clauses 180 through 183. Instead, make it informative specification.

A previous poll to determine support for removing this feature was taken by the CRG at the November 2025 Plenary meeting during Working Group ballot. The poll showed high support for retaining the TFSEH feature at the time.
See the response to comment I-138 in the following document:
https://www.ieee802.org/3/dj/comments/D2p2/8023dj_D2p2_comments_final_id.pdf

Based on straw poll TF-4, there is no consensus to make the proposed change.

Straw poll TF-3 (directional):
I support adopting the suggested remedy to comment I-440.
Y: 33
N: 16

Concern was expressed over the language and meaning of this straw poll so the poll was repeated with better clarifying language in TF-4.

Straw poll TF-4 (directional):
I support adopting the suggested remedy (as provided by commenter) to comment I-440.
Y: 20 (change to informative specification)
N: 41 (retain as mandatory specification)

*Cl* **180** *SC* **180.7.1** *P* **468** *L* **38** # 248

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *Overshoot (OI)*

In D2.0 1T DFE was added to the TDECQ equalizer where DFE is suprior to improve TDECQ for bandlimited transmitters over using large overshoot/undershoot which can have 1-2 dB of SNR penalty given TDECQ doesn't incorporate peak-to-average penlaty. Overshoot/undershoot of 22% at 1E-2 hit ratio can also result in clipping and frame loss.

*SuggestedRemedy*

Hit ratio of 1E-2 has no merits given SSPRQ and Ethernet scrambled data. Peak-peak amplitude for example are measurd at hit ratio of 1E-7 in DJ. Change hit ratio from 1E-2 to 1E-4 and reduce overshoot/undershoot from 22% to 18% given that TDECQ has DFE no longer such high overshoots are necessary.
see ghiasi_3dj_02_2605

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following related contributions were reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/ghiasi_3dj_01_2605.pdf
https://www.ieee802.org/3/dj/public/26_05/rodes_3dj_01b_2605.pdf

For the PMDs defined in 180, 181, 182, and 183, change the transmitter overshoot and undershoot (max) value to 27% measured with hit ratio of 1E-4.

Implement with editorial license.

*Cl* **180** *SC* **180.7.1** *P* **468** *L* **42** # 442

Dawe, Piers J G
NVIDIA

*Comment Type* **TR** *Comment Status* **R** *ER and MPI (OI)*

The extinction ratio limit is there to protect the receiver from MPI. MPI can get worse at low extinction ratio, when it happens (rarely - fading) but for PAM4 this is a fairly weak function. On the other hand ECQ improves with low extinction ratio (linearity), differently for different technologies but it always happens (not fading). Also, RF power and supply voltage can be reduced at lower extinction ratio.

*SuggestedRemedy*

Reduce the extinction ratio limit from 3.5 dB to 3 dB.
The definition of TDECQ, which is already channel-dependent, can be modified to include MPI, similar to Eq. 95-3; if so, increase the TDECQ limit by 0.1 dB for the reference case in tables 180-9 and 180-12. The definition of TECQ and SECQ, where the optical channel is negligible, are not changed. The receiver sensitivity is lowered by 0.1 dB.
Or, TDECQ can remain without MPI: receiver sensitivity and stressed receiver sensitivity are lowered by 0.1 dB.
Apply this to all IMDD clauses. I can imagine that it would this would be particularly helpful for 800GBASE-LR4 where a low extinction ratio will enable a good chromatic dispersion penalty.

*Response* *Response Status* **U**

REJECT.
The comment proposes to reduce the limit of extinction ratio to 3dB. However, no data or simulation analysis has been provided indicating that 3.5dB can not be supported by current modulator technology, nor any data showing 3dB is sufficient for worst case of the link , particularly in high loss and penalty cases such as LR4. Thererfore, the limit of ER should remain the same until further evidence be presented to the task force.

The power budget is built with dedicated penalty allocation for MPI and DGD for the past two PAM4 signaling rates. Changing to include penalty in TDECQ as the proposed remedy could cause unecessary confusion to the industry.
TDECQ measurement setup (Figure 180-9) could not emulate the MPI effect, i.e. the channel that the optical signal passes follows the requriement specified in Table 180-15 with minimum insertion loss, and not necessarily the mulltiple reflection from the multiple connenctions or splices as in the case of real application.

Regarding the alternate approach, the current power budget and (receiver sensitiviy-OMA_min) already takes into account of MPI penalty. -0.1-(-3.4) = 3.3dB, which includes 3dB(max. IL) and 0.1dB MPI and 0.2dB DGD penalty.

There was interest expressed in this topic. Further contributions on this topic are encouraged.

*Cl* **180** *SC* **180.7.1** *P* **468** *L* **43** # 319

Kimber, Mark
Semtech

*Comment Type* **T** *Comment Status* **R** *Transition time (OI)*

If transmitter bandwidth is too low then the BER floor will increase. Having a transmitter bandwidth < 35 GHz is detrimental to the BER floor. This would equate to a transition time of 7.2 ps with a 53 GHz SIRC measurement filter

*SuggestedRemedy*

Change 8 ps transition time to 7.2 ps.

*Response* *Response Status* **C**

REJECT.

Based on the result of straw polls O-5 and O-6 there is no consensus to change the transition time (max) value for PMDs defined in Clause 180 and 181.

The following related contribution was reviewed by the 802.3dj task force at an earlier ad hoc meeting:
https://www.ieee802.org/3/dj/public/adhoc/electrical/26_0415/kimber_3dj_adhoc_01a_260415.pdf

Straw poll O-5 (chicago) O-6 (choose 1) (directional)
For the PMDs defined in clauses 180 and 181, I support setting the transition time (max) to:
A: 8 ps (no change)
B: 7.2 ps (per comment #I-319 and #I-320)
C: 12 ps (per comment #I-443)
O-5 (chicago): A: 26 B: 17 C: 6
O-6 (choose 1): A: 18 B: 12 C: 3

*Cl* **180** *SC* **180.7.1** *P* **468** *L* **43** # 443

Dawe, Piers J G
NVIDIA

*Comment Type* **TR** *Comment Status* **R** *Transition time (OI)*

The transmitter transition time limit was scaled from 100G where a retiming (pluggable) receiver with FFE-based or other linear equalization was considered. Today at 200G, receivers are DSP, with design learnings from copper where the signals are *much* slower. Generating high bandwidth signals is far from free, and with today's receivers that tolerate slow signals well, 8 ps max is not necessary.

*SuggestedRemedy*

Change 8 ps to 12 ps, or remove the item completely and rely on well-chosen ECQ, tap weight and overshoot limits to protect us from bad signals on the far right of the ECQ map.

*Response* *Response Status* **U**

REJECT.

Resolved using the response to comment #I-319.

*Cl* **180** *SC* **180.7.1** *P* **468** *L* **47** # 444

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *editorial (B1) (OI)*

It's not RINxxOMA, it's RINxOMA, as defined in 1.4.515. Same name for a thing, every time (style manual, 10.1 Homogeneity).

*SuggestedRemedy*

Change RINxxOMA to RINxOMA, 25 times (plus contents). Change "xx dB" to "x dB", 5 times. Change " "xx" " to x (in italics, no quotation marks, as in the base standard), four times.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The parameter name "RINxOMA" is used in 9 clauses in the base standard including: 52, 58, 68, 75, 140, 141, 151, 158, and 160; while only clauses 122 and 139 use "RINxxOMA". The defiinition in 1.4.515 is RINxOMA where x in "RINxOMA" and in "x db" is non-italic. Use of italic and non-italic, for x in "x dB" is otherwise inconsistent in the base standard. Throughout the draft, change all instances of RINxxOMA to RINxOMA and change "xx dB" to "x dB" with "x" not italic in both cases.
[Editor's note: CC: 180, 181, 182, 183]

*Cl* **180** *SC* **180.7.1** *P* **468** *L* **47** # 445

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *RINxxOMA (Bx) (OI)*

Transmitter noise is included in TDECQ and TECQ. We introduced a RIN limit too, -132 dB/Hz at 50G/lane, because we don't attempt to find the shape of the RIN spectrum, which determines how the RIN is amplified by the equalizer, so we just keep fairly small. At 100G/lane, the limit is -136 (more noise bandwidth). At 200G/lane, we reduced the limit by another 3 dB, keeping things in proportion. Then we added the DFE (in the reference receiver and in real DSP), so there is much less noise enhancement. TDECQ and TECQ pick up electrical noises such as from power supplies as well as true RIN - these are not at high enough frequencies to undergo noise enhancement.

*SuggestedRemedy*

Change the RIN limit to -137 dB/Hz.
Four clauses.

*Response* *Response Status* **U**

REJECT.

Noise enhancement dependent on DSP implementation, it is not necessarily that DFE is implemented in a commercial DSP. Modern CW laser or EML could support -139dB/Hz which helps in providing clean transmitter signal. Data or evidence is needed to reduce the RIN limit.

There is no consensus to make the proposed change.

*Cl* **180** *SC* **180.7.2** *P* **470** *L* **7** # 72

HE, MICHAEL TeraHop

*Comment Type* **T** *Comment Status* **R** *Tx OMA (OI)*

Base on volume production DR transceiver data, Rx sensitivity OMAouter, Tx OMAouter, and other according Tx/Rx specs can be refined/optimized for cost, power efficiency.

*SuggestedRemedy*

Reduce Rx sensitivity OMAouter, Tx OMAouter, and other according Tx/Rx specs by 0.6dB. (Refer to contribution he_3dj_01_2603, page 10-11)
Details for transmitter---
--180.7.1 Table 180û7, page 468 line 21
Change Average launch power, each lane (min) from -3.1 to -3.7 (dBm)
--180.7.1 Table 180û7, page 468 line 26
Change Tx OMAouter (min) (for TECQ < 0.9 dB) from -0.1 to -0.7 (dBm)
--180.7.1 Table 180û7, page 468 line 27
Change Tx OMAouter (min) (for TECQ >= 0.9 dB) from -1 + max(TECQ, TDECQ) to -1.6 + max(TECQ, TDECQ) (dBm)
--180.7.1 Figure 180û3, page 469 line 27
Shift Tx OMAouter (min) lines down for 0.6 dB

Details for receiver---
--180.7.2 Table 180û8, page 469 line 51
Change Average receive power (min) from -6.1 to -6.7 (dBm)
--180.7.2 Table 180û8, page 470 line 7
Change Receiver sensitivity OMAouter (min) (for TECQ < 0.9 dB) from -3.4 to -4.0 (dBm)
--180.7.2 Table 180û8, page 470 line 8
Change Receiver sensitivity OMAouter (min) (for TECQ >= 0.9 dB) from -4.3 + max(TECQ, TDECQ) to -4.9 + max(TECQ, TDECQ) (dBm)
--180.7.2 Table 180û8, page 470 line 9
Change Stressed receiver sensitivity OMAouter (max) from -0.9 to -1.5 (dBm)
--180.7.2 Figure 180û4, page 470 line 43
Shift Receiver sensitivity OMAouter (max) line down for 0.6 dB

--180.7.3 Figure 180û5, page 471 line 47
Shift Tx OMAouter (min) and Rx sensitivity OMAouter (max) lines down for 0.6 dB

*Response* *Response Status* **C**

REJECT.

The following presentation was reviewed
https://www.ieee802.org/3/dj/public/26_05/welch_3dj_01a_2605.pdf

Straw poll #1 taken at the 21 April 2026 task force ad hoc meeting indication no consensus to make this proposed change. The straw poll is recorded in the following contribution:
https://www.ieee802.org/3/dj/public/adhoc/electrical/26_0421/3dj_elec_adhoc_Straw_Polls_260421.pdf

Straw Poll #1

I support a reduction in Tx OMA_outer and Rx Sensitivity (OMA_outer) specs per he_m_3dj_adhoc_01a_260421
Y: 11, N: 26, A: 18

No consensus to make a change.

---

*Cl* **180** *SC* **180.7.2** *P* **470** *L* **7** # 446

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *ER and MPI (OI)*

Tweaking the receiver sensitivities for MPI accounting (see another comment).

*SuggestedRemedy*

Change the receiver sensitivity from -3.4, -4.3 + TECQ to -3.5, -4.4 + TECQ. Change the stressed receiver sensitivity from -0.9 to -1.
Similarly in other IMDD clauses.

*Response* *Response Status* **U**

REJECT.

Resolved using the response to comment I-442.

---

*Cl* **180** *SC* **180.7.2** *P* **470** *L* **9** # 447

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TDECQ-limit (OI)*

Tweaking the stressed receiver sensitivity for a change to max TDECQ and TECQ (see another comment).

*SuggestedRemedy*

Change the stressed sensitivity from -0.9 to -0.5 and change SECQ from 3.4 to 3.8 dB.
Similarly in other IMDD clauses.

*Response* *Response Status* **U**

REJECT.

Resolved using the response to comment #I-439.

---

*Cl* **180** *SC* **180.7.3** *P* **471** *L* **7** # 448

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *Power budget (OI)*

Tweaking the budget for changes to max TDECQ and TECQ and MPI (see other comments).

*SuggestedRemedy*

Change the power budget from 6.7 to 7.2 dB.
Change the allocation for penalties from 3.7 to 4.2 dB
In table footnotes b and c, change 0.1 dB to 0.2 dB.
Similarly in other IMDD clauses.

*Response* *Response Status* **U**

REJECT.

This comment is partially resolved with the response to comments I-439 and I-442.

The comment does not provide sufficient evidence to support the proposed changes.

There is no consensus to make the proposed changes.

*Cl* **180** *SC* **180.8** *P* **458** *L* **24** # 449

Dawe, Piers J G NVIDIA

*Comment Type* **ER** *Comment Status* **A** *editorial (B1) (OI)*

There is an informative reference to ITU-T G.652 (08/2024) here. ITU-T G.652 (08/2024) does not appear in Annex A, bibliography. 1.3, normative references, has only:
ITU-T Recommendation G.652, 2016--Characteristics of a single-mode optical fibre and cable.

*SuggestedRemedy*

Preferably, delete "2016".
Scrub the draft for missing and out-of-date references.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Annex A is in the base standard 802.3-2022. changing the reference in the base standard may affect multiple existing specifications. The need of updating bibliography in Annex A will need to be addressed in 802.3 maintenance process.
For 802.3dj, keep the reference as is in the footnote:
b The dispersion specifications are based on the statistical link design methodology documented in Appendix I of Recommendation ITU-T G.652 (08/2024), over the wavelength range 1304.5 nm to 1317.5 nm.
Note that this referenced Appendix of ITU-T G.652 is the statistical link design method for chromatic dispersion and PMD, which was brought in the discussion in 802.3dj and evolved into an appendix of ITU-T standard. It wouldn't have been captured in the base standard of 802.3.
Retaining the date is necessary to differentiate between the previous and new version.
No other out of date references have been identified by the CRG.
However, a normative reference to ITU-T G.652 (08/2024) is required.
Add a reference to ITU-T G.652 (08/2024) in subclause 1.3.
Implement with editorial license.
[Editor's note: changed page/line from 472/48 to 458/24]

*Cl* **180** *SC* **180.9.1** *P* **475** *L* **8** # 450

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *test pattern (Bx) (OI)*

The square wave was used for an old-fashioned way of measuring RIN, which is no longer in the draft. It is not needed for anything now, as Table 180-14 shows. Given the work on OMA definition and its susceptibility to reflections, it is not clear that allowing transmitter transition time (which relies on OMA; see 180.9.13) to be defined two ways is feasible any more.

*SuggestedRemedy*

Remove the square wave from tables 180-13 and 14.
In 180.9.13, change "a test pattern specified for transmitter transition time in Table 180-14" to "the test pattern given in Table 180-14", and delete "with the exception that the square wave test pattern may be used".
Similarly in other IMDD clauses.
In 45.2.1.254 Inner FEC Square Wave testing control register (Register 1.2404), add text to say that square wave generation is optional.
In figures 176-2 and 13, delete "Required, "
In 176.7.4.6 Square wave (quaternary) test pattern, it is clear that this is optional. Add "(optional)" to the subclause titles of 176.7.4.6 and 177.6.1.6, as in 176.7.2 and 176.7.3.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

In Table 180-13, remove the row for Square Wave.

In Table 180-14, in rows for transmitter transition time and wavelength, delete the "square wave".

Make similar changes to Table 181-11, Table 181-12, Table 182-13, Table 182-14, Table 183-13, and Table 183-14.

Make any other related changes throughout clauses 180 to 183.

Implement with editorial license.

*Cl* **180** *SC* **180.9.1** *P* **475** *L* **16** # 451

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *test pattern (CO)*

Clarification to make multilane testing practical

*SuggestedRemedy*

Add text to make it clear that pattern 7 includes the use of a single lane of a multilane signal (e.g. one lane of 400GBASE-DR2 generated by a 400GBASE-R PCS) as well as a 200GBASE-DR1 signal from a 200GBASE-R PCS).

*Response* *Response Status* **C**

REJECT.

The pattern definition is consistent with previous optical PMD clauses including 121, 122, 124, 140 and 151, with the exception that the "valid xBASE-R" signal has been mapped to a pattern number ("pattern 7") for brevity and consistency.

The use of a single lane should be self-evident to the implementer.

*Cl* **180** *SC* **180.9.1** *P* **475** *L* **34** # 388

Swenson, Norman Nokia Corporation,Norman Swenson Consulting,Point

*Comment Type* **TR** *Comment Status* **R** *test pattern (OI)*

Table 180-14 says to use pattern 6 (SSPRQ) to measure TDECQ, but the text in Sec. 180.9.6.1, lines 36-37, says to use test pattern 3 or 5 (PRBS31Q or Scrambled idle).

*SuggestedRemedy*

Resolve inconsistency between text and Table 180-14.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment #I-390.

*Cl* **180** *SC* **180.9.1** *P* **475** *L* **36** # 38

Issenhuth, Tom Huawei Technologies Co., Ltd,Issenhuth Consulting,

*Comment Type* **E** *Comment Status* **A** *editorial (OI)*

In Table 180-9 TECQ is listed before TDECQ_CER but for the associated cross references TDECQ_CER comes before TECQ so the cross references for the Table are not listed in order

*SuggestedRemedy*

In Table 180-9 swap the order for the parameters TECQ and TDECQ_CER so all the parameters and their associated cross references in the Table are listed from smallest to largest

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment #I-71.

*Cl* **180** *SC* **180.9.2** *P* **476** *L* **5** # 452

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *Reference Rx (OI)*

The choice of fourth-order Bessel-Thomson response is a historical accident. Fifth order rolls off a bit steeper at high frequencies, which is more realistic, and has no other significant difference. The better roll-off leads to better measurements. This is also true for measurements where reflections at an instrument's electrical connectors are a concern. This is our chance to make the change, as the industry transitions to a new speed and new test equipment.

*SuggestedRemedy*

Change fourth-order to fifth-order throughout the draft.

*Response* *Response Status* **U**

REJECT.

The BT filter response is used to bound the implementation of a reference reciever, which typically are implemented in test equipement. Fourth order BT response has been used in previous signaling rates, changing it to a fifth order BT response may require re-validation of existing implementations.

No evidence has been provided in the comment showing that the current spec as is will cause false result of transmitter characteristic measurements.

*Cl* **180** *SC* **180.9.2** *P* **476** *L* **5** # 453

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *editorial (B1) (OI)*

This sentence extends over 4 lines and it is hard to parse. It can be divided cleanly. Also we should be clear whether it's the Bessel-Thomson response that should not exceed, or what.

*SuggestedRemedy*

IEEE Std 802.3db has a partial fix but use the wording in IEEE Std 802.3dk: change: at least 1.3 x 106.25 GHz, and at frequencies above 1.3 Î 106.25 GHz, the response should ... to: at least 1.3 x 106.25 GHz. At frequencies above 1.3 Î 106.25 GHz, *its* response should ...
Four clauses.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The text as written has a few issues. Per Figure 180-7, the reference receiver also includes a CRU, the response is due to the combination of OE and scope, and the grammar in the sentence lacking.
Change the text in 180.9.2 to the following:
The reference receiver is composed of an O/E converter, a clock recovery unit (CRU), and a pattern-triggered oscilloscope as shown in Figure 180-7.
The combined frequency response of the O/E converter and oscilloscope has a 3 dB bandwidth of approximately 53.125 GHz with a fourth-order Bessel-Thomson response for frequencies up to at least 1.3 x 106.25 GHz and a response no higher than -20 dB for frequencies greater than 1.3 x 106.25 GHz.
The CRU has a corner frequency of 4 MHz and a slope of 20 dB/decade. The CRU may be implemented in hardware or software depending on oscilloscope technology.

*Cl* **180** *SC* **180.9.2** *P* **476** *L* **6** # 252

Ghiasi, Ali Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *Reference CRU peaking (CG)*

With TDECQ expected to capture jitter more accuratly now that explicit jitter measurmeent are removed the CRU maximum peaking must be defined, also the slope should be -20 dB not 20 dB.

*SuggestedRemedy*

Origonal text: The clock recovery unit (CRU) has a corner frequency of 4 MHz and a slope of 20 dB/decade.
proposed text: The clock recovery unit (CRU) has a 3 dB corner frequency of 4 MHz and a slope of -20 dB/decade. The CRU maximum jitter transfer peak is =0.3 dB from 40 kHz to 20 MHz.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment #I-264.

*Cl* **180** *SC* **180.9.3** *P* **476** *L* **29** # 454

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *editorial (B1) (OI)*

There are multiple patterns allocated for this parameter in Table 180-14. The patterns are not defined there; they are defined by reference in Table 180-13.

*SuggestedRemedy*

Change "using the test pattern defined in Table 180-14" to "using a test pattern as in Table 180-14" or to "using one of the test patterns given in Table 180-14". Similarly in 180.9.4 and other optical clauses.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement "using one of the test patterns given in Table 180-14".
Implement with editorial license to update other instances in optical PMD clauses, 180, 181, 182, 183

*Cl* **180** *SC* **180.9.5** *P* **476** *L* **42** # 218

Maniloff, Eric — Ciena Corporation

*Comment Type* **TR** *Comment Status* **A** *OMA_outer (OI)*

OMA_Outer with pattern 6 (SSPRQ) has multiple runs of = 7 threes and = 6 zeroes. In order to obtain consistent measurements, all runs of 7's and 3's should be measured.

*SuggestedRemedy*

Change text to: ôWhen measured with pattern 6, OMA_outer is measured as the difference between the average optical launch power level P3, measured over the central 2 UI of the first 7 UI of
all runs of 7 threes or more, and the average optical launch power level P0, measured over the central 2 UI of the first 6 UI of all runs of 6 zeroes or more.ö. Make similar change in clause 181.9.5, 182.9.5, and 183.9.5

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.

The following material was reviewed by the CRG
Slide 3 of https://www.ieee802.org/3/dj/public/26_05/alloin_3dj_01_2605.pdf
Slide 3 of https://www.ieee802.org/3/dj/public/26_05/rodes_3dj_03a_2605.pdf
Slide 6 of https://www.ieee802.org/3/dj/public/26_05/chayeb_3dj_01a_2605.pdf

The proposed remedy was first brought in a contribution in March plenary https://www.ieee802.org/3/dj/public/26_03/alloin_3dj_01a_2603.pdf. A straw poll was conducted (https://www.ieee802.org/3/dj/public/26_03/motions_3dj_2603.pdf):
Straw Poll # 6
I support the addition of the proposed clarification to the OMA_outer definition when measured using a SSPRQ as outlined in alloin_3dj_01a_2603 slide 13.
Result: Y: 61 N: 11

The straw poll result indicated consensus on the proposed remedy.

Implement the suggested remedy with editorial license.

*Cl* **180** *SC* **180.9.6.1** *P* **477** *L* **34** # 455

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *test pattern (OI)*

It is surprising that ECQ is defined with SSPRQ on all transmit lanes; this means what would appear in service as crosstalk appears in the test as ISI, some of which could be equalized. I see that 121.8.5.1 says the same.

*SuggestedRemedy*

Add an informative NOTE saying that a more conservative test would use de-correlated PRBS31Q or test pattern 7. (And see another comment against the definition of pattern 7 in Table 180-13.)

*Response* *Response Status* **U**

REJECT.

The text specifies that the patterns are sufficiently skewed to avoid correlation. "There shall be at least 31 UI delay between the test pattern on one lane and the pattern on any other lane, so that the symbols on each lane are not correlated within the PMD."

There is no consensus to make the proposed changes.

*Cl* **180** *SC* **180.9.6.1** *P* **477** *L* **36** # 389

Swenson, Norman — Nokia Corporation,Norman Swenson Consulting,Point

*Comment Type* **TR** *Comment Status* **R** *test pattern (OI)*

Table 180-14 says to use pattern 6 (SSPRQ) to measure TDECQ, but the text in Sec. 180.9.6.1, pg. 477, lines 36-37, says to use test pattern 3 or 5 (PRBS31Q or Scrambled idle).

*SuggestedRemedy*

Resolve inconsistency between text and Table 180-14.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment #I-390.

*Cl* **180** *SC* **180.9.6.1** *P* **477** *L* **37** # 456

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *editorial (Bx) (OI)*

test pattern 3 or pattern 3 - we should be consistent. Table 180-13, column 1, says "Pattern".

*SuggestedRemedy*

Delete "test" before pattern in several places.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy with editorial license.

*Cl* **180** *SC* **180.9.6.1** *P* **477** *L* **44** # 258

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *TDECQ-jitter (OI)*

802.3dj has spend last 1 year to best capture jitter in TDECQ and FRx, unless xAUI-n (C2M) interface operate with jitter tolerance condition in 176D.8.14 TDECQ measurement maybe be too optimistic see also unsatisfied comment 147 D2.2

*SuggestedRemedy*

Add sentence: For those cases where there is an xAUI-n chip-to-chip (C2C) or chip-to-module (C2M) interface (see Table 180û1 through Table 180û4), the clock source for the test pattern is derived from the clock recovered from the xAUI-n input signal. The xAUI-n input signal is that described for the Jitter tolerance test in 176D.8.14. The pattern of the xAUI-n input signal may be PRBS31Q, scrambled idle, or a valid xBASE-R signal.
See ghiasi_3dj_02_2605

*Response* *Response Status* **U**

REJECT.

The following contribution was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/ghiasi_3dj_02_2605.pdf

Based on straw poll TF-17 there is no consensus to adopt the proposed changes.

Straw poll TF-17 (directional)
I support adoption of the proposed change (blue text) in the top paragraph on slide 9 of ghiasi_3dj_02_2605.
Yes: 10
No: 23

*Cl* **180** *SC* **180.9.6.1** *P* **477** *L* **46** # 390

Swenson, Norman — Nokia Corporation,Norman Swenson Consulting,Point

*Comment Type* **TR** *Comment Status* **R** *test pattern (OI)*

This says that the pattern of the xAUI-n input signal can be a valid xBASE-R signal (in addition to PRBS31Q and scrambled idle), but that contradicts lines 36-37 on the same page, and it contradicts Table 180-14 on pg 475 line 34.

*SuggestedRemedy*

Resolve inconsistencies on allowed input patterns and update affected text and Table.

*Response* *Response Status* **U**

REJECT.

The three different instances of test pattern references pointed out in the comment are meant for three different interfaces. They do not need to or should not be consistent or synchronized to avoid correlation between the different signal sources.

Consider a Tx lane under test in a PMD , this PMD could interface with xAUI-n C2M interfaces, this PMD also includes Tx aggressor lanes and Rx lanes both of which can bring crosstalk noise to the Tx lane under test.
--Line 36 and 37 of page 477 talks about the receive lanes, using test pattern 3 or 5. This addition of counter propagating aggressor lanes were first introduced into 802.3dj draft during D1.3 comment. These signals are to add crosstalk, they would benefit to be as close as to the real application. No need to use SSPRQ. <receiver may not be able to track SSPRQ, because the clock may not be able to lock to it, SSPRQ is intended for transmitter. >
--Line 45 and 46 talks about the xAUI-n interfaces that is attached to the PMD under test. The test pattern is used for the xAUI-n input signal, which can be PRBS31Q, scarmbled idle or a valid xBASE-R signal.
--Table 180-14 specifies the test pattern for the TDECQ testing, which is meant for the Tx lane under test.

Allowing multiple choices of feasible test patterns provides flexibility of user and implementer.

The suggested remedy does not provide sufficient detail to implement.

*Cl* **180** *SC* **180.9.6.1** *P* **477** *L* **46** # 457

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *test pattern (Bx) (CO)*

SSPRQ contains a section for challenging CDRs. There is no point challenging the CRU in the scope; that only degrades the measurement. SSPRQ is not used for testing receivers. So it must be there to challenge the PMAs between the PCS and the Tx PMD. Yet this says "The pattern of the xAUI-n input signal may be PRBS31Q, scrambled idle, or a valid xBASE-R signal" - which I believe is for practical considerations in ICs, some years ago.

*SuggestedRemedy*

Change "The pattern of the xAUI-n input signal may be PRBS31Q, scrambled idle, or a valid xBASE-R signal."
to "The pattern of the xAUI-n input signal should be SSPRQ on the lane under test, and test patterns 3, 5 or 6 on the other lanes. However, test patterns 3, 5 or 6 may be used on the lane under test.

*Response* *Response Status* **U**

REJECT.

The SSPRQ test pattern was adopted in IEEE 802.3bs specifically for testing of TDECQ (for optical transmitters) and SECQ (for optical receiver test calibration). See comment #50 here:
http://www.ieee802.org/3/bs/comments/P802d3bs_D1p3_comments_final_ID.pdf

The high stress and low-frequency content was intended to challenge the "low-frequency" control loops that might be implemented within an optical transmitter. It was not intended for receiver testing. There is no assurance that AUI or PMD receiver will be able to effectively track SSPRQ without penalty compared to other test patterns. Note that the analyses referenced in comment #50 shows that the phase stress is considerably higher than for the patterns specified for RX testing.

There is no consensus to make to proposed changes.

*Cl* **180** *SC* **180.9.6.2** *P* **478** *L* **32** # 458

Dawe, Piers J G NVIDIA

*Comment Type* **ER** *Comment Status* **A** *editorial (B1) (OI)*

Table layout

*SuggestedRemedy*

Make the table full width. Make the first two columns wide enough for the equations. The feature to "size columns to contents" with table full width might do this.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.

*Cl* **180** *SC* **180.9.6.2** *P* **478** *L* **37** # 459

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *editorial (OI)*

This says "does not significantly stress the tester receiver". tester receiver is the wrong term; it's called reference receiver as in the figure above. It's an oscilloscope; a small or no signal will not stress it, a very large one might. The intention was to advise the reader that with too much loss, the uncertainty in the noise of the scope (not the noise itself, which is accounted for) would degrade the measurement. But this is trying to teach the test engineer how to do his job.

*SuggestedRemedy*

Delete the column, and with it note b.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change
"The value "Minimum" implies that the test channel insertion loss should be sufficiently low that it does not significantly stress the tester receiver."

to

"The value "Minimum" implies that the test channel insertion loss does not excessively degrade the signal to noise ratio of the measurement."

With editorial license.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **3** # 391

Swenson, Norman Nokia Corporation,Norman Swenson Consulting,Point

*Comment Type* **ER** *Comment Status* **A** *Reference equalizer (OI)*

The reference equalizer is not a 15-tap, T-space, feed-forward equalizer followed by a 1-tap decision feedback equalizer. It is a DFE with 14 feedforward taps and one feedback tap. These are not the same thing; if it were the former, the coefficients for each equalizer would be independently optimized. Instead, the correct approach is to jointly optimize the feedforward taps and the feedback tap(s).

*SuggestedRemedy*

Change to "The reference equalizer is composed of a feed-forward filter
and a feedback filter. The input to the
feedback filter is an estimate of the transmitted PAM-4 symbol which is assumed to be correct." This is similar to the text used in Clause 178A.1.8.1.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-20.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **4** # 224

Maniloff, Eric — Ciena Corporation

*Comment Type* **ER** *Comment Status* **A** *Reference equalizer (OI)*

The text says that the FFE is "followed by a 1-tap decision feedback equalizer (DFE)". The reference equalizer in Fig 180-10 does not have a DFE, instead it feeds back a 1UI delayed synchronized test pattern, which removes the aspect of error propagation.

*SuggestedRemedy*

Change the text to remove "followed by a 1-tap decision feedback equalizer (DFE)" to "followed by a 1 UI delayed synchronized test pattern, implementing functionality similar to a 1-tap decision feedback equalizer (DFE)". The synchronized test pattern is an ideal PAM4 signal of outer amplitude +/-OMATDECQ/2 and its transitions aligns with the zero crossing of the captured waveform at the output of the feed forward equalizer. Make similar changes in Clauses 181, 182, 183.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-20.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **7** # 460

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *Reference equalizer (B1) (OI)*

This says "This reference equalizer ... does not imply any particular receiver equalizer implementation." Clearly that is not the case; it says "The reference equalizer is a 15-tap, T-spaced, feed-forward equalizer (FFE), followed by a 1-tap decision feedback equalizer (DFE)..." That's particular.

*SuggestedRemedy*

Change "does not imply any particular receiver equalizer implementation" to "does not imply that a compliant product should contain any particular receiver equalizer implementation".

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change "does not imply any particular receiver equalizer implementation"
To: "does not imply any particular receiver equalizer architecture in a compliant implementation"
Implement with editorial license.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **10** # 19

Brown, Matthew — Qualcomm

*Comment Type* **E** *Comment Status* **A** *editorial (B1) (OI)*

In Figure 180-10, the arrow-line goes through the summer beside the detector.

*SuggestedRemedy*

Split the line on each side of the summer.

*Response* *Response Status* **C**

ACCEPT.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **11** # 461

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *Reference equalizer (OI)*

The output from the TDECQ reference equalizer is a large number of samples of a waveform. This "Detector" implies some sort of decision circuit that outputs a stream of bits or PAM4 symbols, which is wrong. The output is from the analysis, and it is a set of numbers: ECQ, Ceq, thresholds, tap weights, phase.

*SuggestedRemedy*

Instead of "Detector", show "To Analysis". In Figure 180-9, indicate that the output is from the analysis.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-20.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **12** # 20

Brown, Matthew — Qualcomm

*Comment Type* **ER** *Comment Status* **A** *Reference equalizer (OI)*

In Figure 180-10, the detector and "AWGN" source are not part of the reference equalizer.

*SuggestedRemedy*

Clearly show which portion of this figure is the reference equalizer. For instance, draw a box around all except the detector and AWGN + summer and label it as "reference equalizer".

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Slide 4 of the following contribution was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/swenson_3dj_01b_2605.pdf

Implement the changes on slide 4 of swenson_3dj_01b_2605.

Implement with editorial license.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **17** # 180

Healey, Adam — Broadcom Inc.

*Comment Type* **T** *Comment Status* **A** *Reference equalizer (OI)*

In Figure 180-10, the term "synchronized test pattern" is introduced but is not defined. The signal to which the test pattern is synchronized needs to be defined. I believe that, in this case, the test pattern symbols should be aligned to the sequence of symbols at the detector output. Since TDECQ is computed from an eye diagram, it seems that the "synchronized test pattern" needs to be a continuous time signal (or over-sampled discrete-time approximation) which suggests some continuous-time pulse shape also needs to be defined. I believe the intent is for the for the "synchronized test pattern" to be a sequence of square pulses whose amplitudes are scaled from the test pattern symbol sequence. Finally, the phase relationship between the "synchronized test pattern" and the output of the feed-forward equalizer should be defined. The "1 UI delay block" is ambiguous since the pulse shape used to convert the sequence of symbols to a continuous-time signal could be defined to have a variety of different delays e.g., the pulse can be centered at t = 0 or its rising edge could be a t = 0). In this case, I believe that phase need only be constrained to the exent that the intended (and same) feedback value is present within the histogram windows at the sampling time +/- 0.05 UI.

*SuggestedRemedy*

Add text to 180.9.6.3 defining the "synchronized test pattern". The definition is suggested to include that it is a sequence of square pulses, that the pulse amplitudes are scaled from the test pattern symbol sequence aligned to the symbol sequence at the detector output, and that the amplitude scale is referenced to OMAouter/2 (per note b in Table 180-15, or some other appropriate value). Define the feedback delay so that the intended feedback value is subtracted from the feed-forward equalizer in both the left and right histogram windows.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-20.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **17** # 462

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *Reference equalizer (OI)*

There is very little information about the DFE. Its pulse shape or bandwidth, which is a variable to choose in the scope, is not stated.

*SuggestedRemedy*

Determine what the bandwidth of the DFE signal should be and write it down.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The resolution to comment I-20 depicts the equalizer as a discrete-time equalizer. Thus is it not relevant to define a bandwith.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **17** # 463

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *Reference equalizer (OI)*

This shows 1 UI delay, but it is not clear from what or where. In a classical DFE, the delay from decision time to feedback should be about 1/2 UI, not 1 UI.

*SuggestedRemedy*

Show the clock from the CRU feeding the DFE with appropriate delay.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-20.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **20** # 21

Brown, Matthew — Qualcomm

*Comment Type* **TR** *Comment Status* **A** *noise term (OI)*

Per discussions at previous CRG sessions, the noise source shown at the input to the reference equalizer is not AWGN.

*SuggestedRemedy*

Relabel appropriately, e.g., "noise" or "noise source" tying in with defining text later in this subclause.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Slides 4, 6 (specifically the proposed note), and 8 of the following contribution were reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/swenson_3dj_01b_2605.pdf

In 180.9.6.4, insert the note proposed on slide 6 of swenson_3dj_01b_2605.

Implement the proposed change on slide 8 of swenson_3dj_01b_2605.

Implement with editorial license.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **20** # 464

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *noise term (OI)*

The noise at the input to the FFE is not AWGN. It was AWGN at the input to the "reference receiver"; here it has the spectral shape of the ideal Gaussian response.

*SuggestedRemedy*

Change "AWGN" to "Noise" or better, show AWGN at the input to the reference receiver in Figure 180-9. (If we do the latter, spell out AWGN as on page 485 which we have not got to yet.)

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Partially resolved using the response to comment #I-21.

Also, add text defining AWGN.

Implement with editorial license.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **20** # 307

Dudek, Michael — Marvell

*Comment Type* **TR** *Comment Status* **A** *noise term (OI)*

AWGN is wrong in figure 180-10. The noise is not white at this point. It is the noise N(f) filtered by the reference Rx and is described in 180.9.6.4

*SuggestedRemedy*

Replace "AWGN" with "added noise (N(f)" in Figure 180-10 and on page 485 line 2 (in TDECQcer) replace "additive white Gaussian noise (AWGN) with RMS noise s added to the waveform". with"additive Gaussian noise (N(f)) with RMS noise s added to the waveform. N(f) is defined in 180.9.6.4 " Also on page 486 line 35 replace "AWGN" with "added noise (N(f)"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-21.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **22** # 22

Brown, Matthew — Qualcomm

*Comment Type* **E** *Comment Status* **A** *Reference equalizer(B1) (OI)*

The variable "a" is not well defined here. It would be helpful to the reader to clearly associate this with the permitter number of precursor taps as specified in Table 180-16.

*SuggestedRemedy*

Change the note the the following or similar:
"NOTEùThe variable a is an integer in the range û3 to 0 associated with the permitted number of precursor taps as specified in Table 180-16."

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **36** # 465

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *Reference equalizer (OI)*

A floating main tap is not attractive, whether in a reference equalizer (software) or a real product equalizer - it is more trouble than small floating taps well after the main tap.

*SuggestedRemedy*

Fix the main tap position e.g. at position 4, and add up to 3 more FFE taps as necessary to preserve the FFE's effectiveness. Remove the variable a in Figure 180-10.

*Response* *Response Status* **U**

REJECT.

Based on straw poll TF-9 and TF-10 there is no consensus to make any of the changes proposed in the suggested remedy.

Straw poll TF-9 (choose 1) and TF-10 (chicago) (directional)
I support changing the FFE length and number of equalizer pre-cursor taps for the reference equalizer taps as follows:
A: no change
B: set number of pre-cursor taps to fixed number 3 and leave FFE length at 15
C: set number of pre-cursor taps to fixed number 3 and change FFE length to 18

TF-9 (choose 1) A: 39 B: 1 C: 6
TF-10 (chicago) A: 39 B: 5 C: 16

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **37** # 466

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *tap weight-main (OI)*

The main tap minimum 0.8 allows an excessively over-emphasised signal (this is not affected by the addition of the DFE). Relative to the signalling rate, 200G silicon is slower than 100G or 50G silicon and 200G receivers are designed to cope well with such signals. Designing them to cope with badly set-up signals as well would be wasteful. We allow somewhat less than 1 for tolerancing, but 20% off is too much. A properly revised overshoot spec can catch some of these signals, but we should write down what we mean here in any case.

*SuggestedRemedy*

Change 0.8 to 0.9.

*Response* *Response Status* **U**

REJECT.
The limit was set based on data brought to the task force in slide 5 of https://www.ieee802.org/3/dj/public/25_09/rodes_3dj_01a_2509.pdf .
The comment does not provide sufficient evidence that the proposed changes will improve interoperability.
There is no consensus to make the proposed change.

*Cl* **180** *SC* **180.9.6.3** *P* **479** *L* **37** # 467

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *tap weight (OI)*

The tap weights were created by drawing limit lines that passed a population of transmitters, some time ago. The main tap maximum and the other FFE tap limits need review, taking the DFE into account and considering what is cost-effective for receivers. In particular, the we will see less of the characteristic alternating FFE tap weights because the DFE can do that job better, so taps 4+ should be tightened up.

*SuggestedRemedy*

Review the tap weight limits and make changes as appropriate.

*Response* *Response Status* **U**

REJECT.
The suggested remedy does not provide sufficient detail to implement.

*Cl* **180** *SC* **180.9.6.3** *P* **480** *L* **17** # 468

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *tap weight-equation (OI)*

Causal vs. anticausal pulse shapes
This pre-post equalizer coefficient difference limit |w(1)/w(0) - b(1) - w(-1)/w(0)| seeks to keep the attack and decay of the signal pulse similar. Yet the evidence from https://ieee802.org/3/dj/public/25_05/chayeb_3dj_01_2505.pdf#page=8 and 9, plotted in https://ieee802.org/3/dk/public/2511/3dk_dawe_2511_1.pdf , shows that for a real receiver, the situation is very far from symmetrical; relatively fast attack (c(-1) close to zero) and slow decay (c(+1) strongly -ve) is tolerated well, but the opposite is not.

*SuggestedRemedy*

Remove the absolute bars | |

*Response* *Response Status* **U**

REJECT.

If the absolute bars are removed then the associated limit likely needs to be adjusted. Further work to justify the change and the associated limit is required.

There is no consensus to make the proposed change.

*Cl* **180** *SC* **180.9.6.3** *P* **480** *L* **17** # 70

El-Chayeb, Ahmad — Keysight Technologies Inc

*Comment Type* **TR** *Comment Status* **R** *tap weight-equation (OI)*

Including the DFE tap b1 in the limit: |w(1)/w(0)-b(1)-w(-1)/(w0)| <= .25 makes the implementation makes the limit non-linear limit, introduces complexity and increases the measurement time.

*SuggestedRemedy*

Suggested remedy: Remove b(1) from the equation

*Response* *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

*Cl* **180** *SC* **180.9.6.3** *P* **480** *L* **22** # 221

Maniloff, Eric — Ciena Corporation

*Comment Type* **TR** *Comment Status* **A** *tap weight-DFE (OI)*

The DFE coefficient limit value of 0.3 uses prior normalization, and with the reference change would be 0.43. This value is too high. [ref: kimber_3dj_01a_2603.pdf ]. The recommended value of 0.25 using the previous normalization results in a value with the updated normalization of 0.33.

*SuggestedRemedy*

Update the value for DFE coefficient limit in Table 180-16 to 0.33. Make similar changes in Clauses 181, 182, 183.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The adopted response to comment I-220 changed the normalization reference from OMA_OUTER/2 to OMA_TDEQ/2.

Based on straw poll TF-13 there is preference to adopt a value of 0.33.

In Table 180-16 change the "feedback tap coefficient limit (max)" to 0.33.

Straw poll TF-11 (choose 1) TF-12 (chicago) (directional)
I support changing the feedback tap coefficient maximum limit given the normalization reference of OMA_TDECQ/2 as follows:
A: 0.3
B: 0.33
C: 0.43
TF-11 (choose 1) : A: 5 B: 16 C: 15
TF-12 (chicago) : A: 11 B: 22 C: 18

Straw poll TF-13 (choose 1) (directional)
I support changing the feedback tap coefficient maximum limit given the normalization reference of OMA_TDECQ/2 as follows:
A: 0.33
B: 0.43
TF-13 (choose 1) : A: 23 B: 13

*Cl* **180** *SC* **180.9.6.3** *P* **480** *L* **22** # 469

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *tap weight-DFE (OI)*

The DFE tap limit seems too weak. Copper clauses use a limit of 0.85, but with a different definition.

*SuggestedRemedy*

Set the limit to at least 0.35 on the old scale, or the equivalent of 0.55 on the new scale or as defined in copper clauses and COM. This leaves another 0.3 for losses between TP2 and TP5.

*Response* *Response Status* **U**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-221.

*Cl* **180** *SC* **180.9.6.3** *P* **481** *L* **36** # 219

Maniloff, Eric — Ciena Corporation

*Comment Type* **TR** *Comment Status* **A** *TDECQ-OMA (OI)*

OMA_TDECQ needs to be defined in the text

*SuggestedRemedy*

At line 36, page 481, add the following text :"OMATDECQ is measured on the equalized captured waveform as per method described in SC180.9.5 on the detector input (i.e. sum of FFE and DFE equalizer filters, referring fig 180-10)". Make similar changes in Clauses 181, 182, 183.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy.

Also, insert following text in P481 line 45
"OMA_TDECQ is measured on the equalized captured waveform using the method defined in 180.9.5."

Implement all with editorial license.

Note that no changes needed in clauses 181, 182 and 183, since those are referencing 180.9.6.

*Cl* **180** *SC* **180.9.6.3** *P* **482** *L* **24** # 220

Maniloff, Eric — Ciena Corporation

*Comment Type* **TR** *Comment Status* **A** *TDECQ-DFE (OI)*

DFE Normalization 1: Labeling location

*SuggestedRemedy*

In Table 180-16, line 24, p482 : the DFE coefficient b(1) should be referenced to OMA_TDECQ /2. Note: to be consistent with figure 180-10, and the normalized b(1) tap value, the synchronized PAM4 test pattern should have an outer amplitude of +/- OMATDECQ/2 . Make similar changes in Clauses 181, 182, 183.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Slide 5 of the following contribution was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/swenson_3dj_01b_2605.pdf

Slide 3 of the following contribution was also reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/alloin_3dj_02_2605.pdf

The resolution to comment #I-219 defines OMA_TDECQ.

The resolution to comment #I-180 resolves the amplitude of the synchronized PAM4 test pattern.

No changes needed for clause 181, 182, 183, since they reference 180.9.6.

Change footnote b of Table 180-16 to:
"The feedback tap coefficient b(1) is referenced to OMA_TDECQ/2."

Change the parameters labels in Table 180-10 as proposed on slide 5 of swenson_3dj_01b_2605.

Change the parameter name "DFE coefficient limit" to "feedback tap coefficient limit".

Implement with editorial license.

*Cl* **180** *SC* **180.9.6.4** *P* **480** *L* **32** # 392

Swenson, Norman — Nokia Corporation,Norman Swenson Consulting,Point

*Comment Type* **ER** *Comment Status* **A** *TDECQ (Bx) (OI)*

"The test pattern specified for TDECQ (see Table 180û13)à" The test pattern for TDECQ is not specified in Table 180-13. It is specified in Table 180-14 in combination with Table 180-13.

*SuggestedRemedy*

Change Table 180-13 to Tables 180-13 and 180-14.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change
"The test pattern specified for TDECQ (see Table 180-13) is transmitted repetitively"
to
"The test pattern specified for TDECQ (see Table 180-14) is transmitted repetitively"

*Cl* **180** *SC* **180.9.6.4** *P* **480** *L* **46** # 393

Swenson, Norman — Nokia Corporation,Norman Swenson Consulting,Point

*Comment Type* **TR** *Comment Status* **A** *reference equalizer (OI)*

"The reference equalizer specified in 180.9.6.3 is applied to the waveform. An eye diagram is formed from the equalized captured waveform." The problem with this is that the output of the equalizer shown in Figure 180-10 is the decided PAM-4 symbols. These values stay constant over a 1 UI period. So the eye diagram at the output would simply be 4 ideal PAM-4 levels.

*SuggestedRemedy*

This can be solved by describing the reference equalizer as a continuous-time equalizer with an appropriate delay d between the output of the decision element and the input to the summer before the decision element. The eye diagram would then be measured at the input to the decision element, not at the output indicated in Figure 180-10. A presentation will provide detailed changes to the text.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the responses to comment I-20 and I-394.

*Cl* **180** *SC* **180.9.6.4** *P* **480** *L* **50** # 470

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *TDECQ-histogram (OI)*

This text about the crossing points is irrelevant. It became obsolete when we decided to let the sampling phase of the histogram-pair be optimised, several years ago.

*SuggestedRemedy*

Delete "and the 0 UI and 1 UI crossing points are determined by the average of the eye diagram crossing times, as measured at P_ave , as illustrated in Figure 180-11"
In Figure 180-11, replace the incorrect "0.45 0.55" by an indication that the time-centres of the histogram windows are 0.1 UI apart. Remove the 0 and 1 bars.
Change "nominally centered at 0.45 UI and 0.55 UI" to "with histogram windows centered 0.1 UI apart."

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-394.

*Cl* **180** *SC* **180.9.6.4** *P* **481** *L* **7** # 394

Swenson, Norman — Nokia Corporation,Norman Swenson Consulting,Point

*Comment Type* **TR** *Comment Status* **A** *TDECQ-DFE (OI)*

The eye diagram shown is not representative of a continuous-time DFE. (A continuous-time eye diagram requires a continuous-time DFE.)

*SuggestedRemedy*

Show an eye diagram with the abrupt change in value representative of a continuous-time DFE. A presentation will provide an example.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Slides 4, 6, and slide 7 of the following contribution were reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/swenson_3dj_01b_2605.pdf

Implement the changes shown in slide 6 excluding the note (which was addressed by another comment).

Implement the changes proposed on slide 7.

Implement with editorial license.

*Cl* **180** *SC* **180.9.6.4** *P* **481** *L* **24** # 308

Dudek, Michael — Marvell

*Comment Type* **T** *Comment Status* **A** *TDECQ-histogram (OI)*

The time position of the histograms is not tied to the zero crossings as they are moved relative to

*SuggestedRemedy*

Change "nominally" to "approximately". In Figure 180-11. Delete the 0.45 and 0.55 and show 0.1 between these centers. Delete the 0 and 1 lines.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Based on straw poll TF-8 there no consensus to make further changes beyond those adopted by the resolution to comment I-394.

Resolved using the response to comment I-394.

Straw poll TF-8 (directional)
I support defining window centering as:
A: nominally centered .05 UI before and after sampling phase $\phi 0$ (per swenson_01b slide 7, as adopted by comment I-394)
B: Something different.
A: 35 B: 8

*Cl* **180** *SC* **180.9.6.4** *P* **481** *L* **26** # 471

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *TDECQ-histogram(B1) (OI)*

A histogram is a table of value, count pairs. A histogram *window* is a box on the scope screen.

*SuggestedRemedy*

Change "The precise time position of the pair of histograms is adjusted to minimize TDECQ while keeping the histograms spaced 0.1 UI apart."
to: "The precise time position of the pair of histogram windows is adjusted to minimize TDECQ while keeping the histogram windows spaced 0.1 UI apart."

*Response* *Response Status* **C**

ACCEPT.

*Cl* **180** *SC* **180.9.6.4** *P* **481** *L* **27** # 472

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TDECQ-histogram (OI)*

The apparent TDECQ or TECQ is a very strong function of histogram window spacing. Reducing the spacing does not make the signal any better, but it lowers our guard against signals with a jitter problem. This should be treated very carefully.

*SuggestedRemedy*

As in another comment, increase the headline TDECQ, TECQ limit from 3.4 to 3.8 dB. Reduce the histogram window spacing from 0.1 UI between centres to 0.09 UI (if sampling at 50 s/UI is feasible) or 3/32 = 0.09375 UI (if sampling at 32/UI is preferred).

*Response* *Response Status* **U**

REJECT.

First, since there is another comment #I-439 specifically on TDECQ limit, response to this comment would focus on the histogram window spacing.
In theory, the two histogram window spacing can be arbitrary. Reducing the histogram spacing could reduce the reported TDECQ value. But the effect of changing the spacing by less than 0.01 UI is questionable. Note that, previous contribution https://www.ieee802.org/3/dj/public/25_11/rodes_3dj_01a_2511.pdf provides data of TDECQ comparing impact of histogram spacing and SER target. It showed for a transmitter of 2.5dB TDECQ, changing spacing from 0.1UI to 0.08UI would reduce TDECQ to 2.44dB. The result of using 0.09UI or 0.09375UI will be closer to 2.5dB, and the difference could be within measurement variation.

However, there is value in reconsidering the factors that could affect TDECQ value, such as histogram window spacing and SER target. Contributions are encouraged to support further consensus building on this topic.

*Cl* **180** *SC* **180.9.6.4** *P* **481** *L* **29** # 473

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TDECQ-histogram (OI)*

The histogram window width should be chosen carefully. A wide width allows points in the windows to be collected more quickly, but the samples towards the time-centre of the eye are benign samples that just dilute the measurement, making it less discriminating. The evidence in rodes_3dj_01_2601.pdf slide 4 (which is for TDECQcer) shows that a narrower window improves repeatability. Common practice is to collect very close to 32, 64 or 128 samples/UI, for which 0.04 is not optimal.

*SuggestedRemedy*

Make the histogram window a little narrower according to what sampling ratio is appropriate: 1/32 = 0.03125 UI for 32 s/UI or 0.02 UI for 50 s/UI.

*Response* *Response Status* **U**

REJECT.

There is some agreement that changes in the direction of the suggested remedy may be warranted. However, further analysis and a complete proposal are required.

There is no consensus to make the proposed change.

*Cl* **180** *SC* **180.9.6.4** *P* **481** *L* **33** # 23

Brown, Matthew Qualcomm

*Comment Type* **TR** *Comment Status* **A** *TDECQ-OMA (OI)*

The variable OMA_TDECQ appears in many places in this subclause but is never defined though it might be inferred from Figure 180-11.

*SuggestedRemedy*

Define OMA_TDECQ.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-219.

*Cl* **180** *SC* **180.9.6.4** *P* **481** *L* **33** # 474

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *TDECQ (OI)*

This says that the sub-eye threshold levels Pth1, Pth2, and Pth3, are given by equations 180-1 to 3. Two pages further on, it transpires that this is not the case. There, they are called "nominal values" which isn't very informative, and the symbols Pth1... are re-used (which one would do in a computer program but it's bad in a document).

*SuggestedRemedy*

Change "The sub-eye threshold levels Pth1, Pth2, and Pth3" to "The centers of the three sub-eye threshold ranges, P0th1, P0th2, and P0th3, are ...
Adjust the symbol names in equations 180-1 to 3.
Add: "The actual sub-eye thresholds, Pth1, Pth2, and Pth3, are found by the optimization process as described below, or equivalent."
Leave Pth1, Pth2, and Pth3 as they are in equations 180-5 to 8.
On page 483, change "Pth1, Pth2, and Pth3 are varied from their nominal values by up to 1% of OMA_TDECQ in order to optimize TDECQ."
to "Pth1, Pth2, and Pth3 are adjusted to optimize TDECQ within ranges +/-1% of OMA_TDECQ around P0th1, P0th2, and P0th3 +/-1%.
See another comment for a better +/-%

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Slide 50 and 51 of the following contribution were reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/issenhuth_3dj_01a_2605.pdf

Implement the changes proposed on slide 50 and 51 of issenhuth_3dj_01a_2605 with editorial license.

*Cl* **180** *SC* **180.9.6.4** *P* **481** *L* **50** # 396

Swenson, Norman — Nokia Corporation,Norman Swenson Consulting,Point

*Comment Type* **TR** *Comment Status* **A** *TDECQ-optimization (OI)*

An eye diagram and the histograms are not realistic representation of how a discrete-time DFE would perform in the presence of jitter.

*SuggestedRemedy*

Change the calculation of TDECQ to oversample the received waveform, perform a MMSE optimization at each sample phase, find the optimal sample phase, freeze the taps at the optimal coefficients, then compute the BER at a .05UI early sample phase and at a .05UI late sample phase using a methodology similar to that in the current TDECQ. A presentation will give details.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-92.

*Cl* **180** *SC* **180.9.6.4** *P* **482** *L* **1** # 475

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *editorial (B1) (OI)*

These are not functions: unlike the Gaussian probability density function mentioned later, there is no smooth formula. They are distributions, from measurement.

*SuggestedRemedy*

Change "cumulative probability function" to " cumulative probability distribution", several times.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implemented suggested changes in all 6 instances in 802.3dj, all on page 482.

*Cl* **180** *SC* **180.9.6.4** *P* **482** *L* **13** # 415

Swenson, Norman — Nokia Corporation,Norman Swenson Consulting,Point

*Comment Type* **TR** *Comment Status* **R** *TDECQ (OI)*

The CDF(y) method of calculating SER assumes that the eye is open to begin with before noise is added. But with a TDECQ of 3.4 dB, there may be some points that cross the nearest threshold without added noise.

*SuggestedRemedy*

Since the transmitted symbol sequence is known and synchronized with the received waveform, the probability of symbol error can be computed for a particular y given x using a Q function, even when y is in the wrong decision region. Use this method to compute the SER. A presentation will be given with details.

*Response* *Response Status* **U**

REJECT.

The comment indicated that he was unable to provide the presentation mentioned in the suggested remedy.

The suggested remedy does not provide sufficient detail to implement.

*Cl* **180** *SC* **180.9.6.4** *P* **482** *L* **20** # 397

Swenson, Norman — Nokia Corporation,Norman Swenson Consulting,Point

*Comment Type* **TR** *Comment Status* **R** *TDECQ (OI)*

The method of estimating SER using a CDF for y and a Gaussian approximation is unnecessarily complex and double or triple counts errors. It also excludes the Gaussian tail probabilities as described in swenson_3dj_01a_2603.pdf

*SuggestedRemedy*

Revise calculation of SER by using Q functions (tabulated integrals of the Gaussian distribution). A presentation will give details.

*Response* *Response Status* **U**

REJECT.

The comment indicated that he was unable to provide the presentation mentioned in the suggested remedy.

The suggested remedy does not provide sufficient detail to implement.

*Cl* **180** *SC* **180.9.6.4** *P* **482** *L* **26** # 24

Brown, Matthew — Qualcomm

*Comment Type* **T** *Comment Status* **A** *noise term (OI)*

The noise represented by G_th*(y+i) is ambiguous in terms of where it is applied. Figure 180-10 includes a noise source, currently labelled as AWGN, that is likely the intended location for this noise source.

*SuggestedRemedy*

Define the noise source especially the location where it is applied and tying it in with Figure 180-10.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-21.

*Cl* **180** *SC* **180.9.6.4** *P* **483** *L* **5** # 91

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *TDECQ-DFE (OI)*

(Comment resubmitted from WG ballot)
"the normalized frequency response Heq(f) of the reference equalizer"
The reference equalizer now includes a DFE, a nonlinear element, so it does not have a frequency response.

The noise amplification is only due to the FFE.

*SuggestedRemedy*

Change "the normalized frequency response Heq(f) of the reference equalizer" to "the normalized frequency response Heq(f) of the FFE in the reference equalizer".
Implement with editorial license.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.

The CRG reviewed slide 9 of the following contribution:
https://www.ieee802.org/3/dj/public/26_05/swenson_3dj_01b_2605.pdf

Implement the changes proposed on slide 9 of swenson_3dj_01b_2605.

Implement with editorial license.

*Cl* **180** *SC* **180.9.6.4** *P* **483** *L* **23** # 476

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TDECQ (OI)*

The appropriate probability for ECQ, for the right correlation, should be considered. It won't be the same as the target pre-FEC SER because of geometrical factors. The target pre-FEC SER should not be 4.56e-4 anyway; we know that is not adequate for the FLR objective.

*SuggestedRemedy*

Choose a more appropriate probability. Adjust Qt consistent with this.

*Response* *Response Status* **U**

REJECT.

The suggested remedy does not provide sufficient detail to implement.

*Cl* **180** *SC* **180.9.6.4** *P* **483** *L* **27** # 477

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TDECQ (OI)*

The threshold adjust range of 1% is far too restrictive and a cause of the disappointing scatter that we see in TDECQ measurements. IEEE Std 802.3db (100GBASE-SR1 family) adopted 2% and I have not heard any complaints. Real receivers are pretty tolerant of this.

*SuggestedRemedy*

Change +/-1% to +/-2.5%

*Response* *Response Status* **U**

REJECT.

The comment referenced to 802.3db as a supporting evidence. 802.3db defines vcsel-based transmitters for MMF optical links. Both the transmitter and the fiber link characteristic are different from that of 802.3dj, i.e., SMF optics. Evidence or data of transmitters suitable for SMF 200Gb/s signaling is needed to justify the proposed change.

Based on straw poll TF-18, there is no consensus to make the proposed change.

Straw poll TF-18.
For TDECQ calculation, I support changing the threshold adjust range to +/-2.5%.
Yes: 11
No: 19

*Cl* **180** *SC* **180.9.6.4** *P* **483** *L* **30** # 395

Swenson, Norman — Nokia Corporation,Norman Swenson Consulting,Point

*Comment Type* **TR** *Comment Status* **A** *TDECQ-optimization (OI)*

No method is given to optimize the coefficients in a reasonable amount of time. A global optimization is not practical.

*SuggestedRemedy*

Change the optimization method to MMSE.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-92.

*Cl* **180** *SC* **180.9.6.4** *P* **483** *L* **31** # 478

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *TDECQ (OI)*

The sampling phase is optimised too.

*SuggestedRemedy*

Change "the equalizer tap coefficients or the sub-eye threshold levels," to "the equalizer tap coefficients, the sub-eye threshold levels or the time position of the pair of histograms"

*Response* *Response Status* **U**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-92.

*Cl* **180** *SC* **180.9.6.4** *P* **483** *L* **39** # 222

Maniloff, Eric — Ciena Corporation

*Comment Type* **TR** *Comment Status* **R** *TDECQ-Ceq (OI)*

Ceq is currently referenced to the low frequency signal content after FFE normalization. It needs to be aligned with the same TDECQ reference of OMA_outer and take into account the DFE tap to be meaningful interpreted as a transmitter bandwith limting metric.

*SuggestedRemedy*

Appending to TDECQ definition in line 39 thru. 48, p483, the following new metric definitions ôCEQ_DFE [dB]= 10log10(Ceq) + ?10log10(OMA?_outer)û 10log10(?OMA?_TDECQ ) represents the equalizable ISI penalty associated with the reference DFE receiver, which can be subtracted from TDECQ CEQ_FFE [dB] = CEQ_DFE -10*log10(1+b) where b is the normalized DFE coefficient defined in Table 180-16 represents the bandwidth limiting metric of the transmitterö . Make similar changes in Clauses 181, 182, 183.

*Response* *Response Status* **U**

REJECT.

There is no consensus to make the proposed changes.

*Cl* **180** *SC* **180.9.6.4** *P* **483** *L* **45** # 69

El-Chayeb, Ahmad — Keysight Technologies Inc

*Comment Type* **TR** *Comment Status* **R** *TDECQ-OMA (OI)*

OOMA measurement location for TDECQ was changed in draft 2.4 to the reference equalizer input waveform. Input waveform tends to be unstable before the equalizer. OOMA measurement location should be verified using data from real transmitters, not just simulations.

*SuggestedRemedy*

Suggested remedy: Change OMAouter definition in equation 180-12 from "OMAouter is measured as defined in 180.9.5" to "OMAouter is measured as defined in 180.9.5 except using waveforms captured at the output of the reference equalizer".

*Response* *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

*Cl* **180** *SC* **180.9.6.4** *P* **483** *L* **50** # 92

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **T** *Comment Status* **A** *TDECQ-optimization (OI)*

The final paragraph of the TDECQ measurement method specification in 180.9.6.4 states that "Alternative optimization methods such as minimum mean squared error (MMSE) may be used <à> [but] These alternative methods should not be used for receiver sensitivity and stressed receiver sensitivity calibration".

The text does not state what the alternative is for, but a common interpretation is that the normative optimization method requires something equivalent to a ôbrute force searchö that covers all valid coefficient values across all sampling phases to identify the phase + equalization that yields the minimum SECQ for SRS test.

However, it has not been demonstrated or even stated that such a search involving 15 FFE taps and a DFE tap, across multiple sampling phases, and repeated for multiple values of sigma_G, can be performed within a reasonable calculation time.

If the time required for a brute-force search (for any reported implementation) is not considered suitable for receiver test calibration, users will be forced to use some faster "optimization" method. Since no such method is specified, this would result in implementation-dependent values.

To avoid that, a realizable optimization method should be specified normatively.

*SuggestedRemedy*

A contribution is planned.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following related contribution was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/swenson_3dj_02b_2605.pdf

Based on straw polls TF-14, TF-15, and TF16 there was preference to make change instructed below.

Implement the proposal on slides 5, 6, and 9 in swenson_3dj_02b_2605 except change the last paragraph on slide 9 stating that alternative optimization methods may be used to determine equalizer tap weights if they report equal or lower mean values of TDECQ.

Implement with editorial license.

Straw poll TF-14 (choose 1) (directional)
To optimize the equalizer tap weights for the TDECQ measurement methodology I support:
A: No change. Keep exhaustive search approach and alternative methods.
B: A defined MMSE-based tap-optimization approach (as suggested in swenson_02b).
A: 14 B:17

Straw poll TF-15 was taken given the preference shown in Straw Poll TF-14 results.

Straw poll TF-15 (choose 1) (directional)
For a defined MMSE-based optimization approach I support the following:
A: Alternative optimization methods may be used to determine equalizer tap weights if they report similar mean values of TDECQ.
B: Alternative optimization methods may be used to determine equalizer tap weights if they report equal or lower mean values of TDECQ.
A: 4 B: 34

Straw poll TF-16 (decision)
I support adopting an MMSE-based optimization approach based on swenson_02b with text stating that alternative optimization methods may be used to determine equalizer tap weights if they report equal or lower mean values of TDECQ.
Yes: 22
No: 14

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*Cl* **180** *SC* **180.9.7** *P* **484** *L* **1** # 294

Dudek, Michael — Marvell

*Comment Type* **TR** *Comment Status* **A** *TDECQ_CER (OI)*

Although the concept behind TDECQcer is promising results presented to date are not sufficiently repeatable (in a reasonable test time) to provide value to the specification

*SuggestedRemedy*

Delete TDECQcer from the draft (i.e. clauses 180, 181, 182, and 183).

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-71.

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*Cl* **180** *SC* **180.9.7** *P* **484** *L* **1** # 71

El-Chayeb, Ahmad — Keysight Technologies Inc

*Comment Type* **TR** *Comment Status* **A** *TDECQ_CER (OI)*

TDECQ_CER captures additional penalties that TDECQ does not. While TDECQ_CER can be useful to improve correlation to link performance, the measurement needs more time to mature particularly to improve measurement variability which could be as high as 0.5dB in its current form. Given we are at SA ballot, TDECQ_CER should be removed from the spec.

*SuggestedRemedy*

Remove TDECQ-CER from clauses 181, 182 and 183 (180.9.7, 181.9.7, 182.9.7 and 183.9.7).

Remove TDECQ-CER from tables 180-7, 180-14, 181-5, 181-12, 182-7 and 183-6.

Remove editors notes on pages 484, 541 and 573.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

According to the result of straw poll TF-1 there is consensus to adopt the changes in the suggested remedy.

Although the TDECQ_CER parameter is theoretically a helpful metric for assessing the quality of an optical transmitter, the methodology has not been sufficiently developed for inclusion within the timeline of this project.

Remove TDECQ_CER and related definitions and editors notes from clauses 180, 181, 182, and 183, except move the definition of Q_t (Equation 180-27) to the TDECQ subclause.

Implement with editorial license.

Straw poll TF-1 (directional)
I support removing the TDECQ_CER specifications and related definition from clauses 180, 181, 182, and 183.
Y: 45
N: 8

*Cl* **180** *SC* **180.9.7.1** *P* **485** *L* **47** # 479

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *TDECQ_CER (OI)*

Mass is defined in kilograms, scientifically. This TDECQ_CER method is about statistics, it has nothing to do with mass. The if ... then ... if equation 180-19 is a lookup, not a function worthy of the name.

*SuggestedRemedy*

Change "the probability mass function (PMF) for the number of symbol errors is" to "the probability of the number of symbol errors, P_n(e, sigma) is"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment #I-71.

*Cl* **180** *SC* **180.9.7.1** *P* **486** *L* **33** # 120

Huber, Thomas Nokia

*Comment Type* **ER** *Comment Status* **A** *TDECQ_CER (OI)*

"probability of receiving an FEC symbol incorrectly" is ambiguous. I think the intended meaning of "incorrectly" is a FEC symbol that has uncorrected errors.

*SuggestedRemedy*

Change "an FEC symbol incorrectly" to "an FEC symbol with uncorrected errors"

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment #I-71.

*Cl* **180** *SC* **180.9.9** *P* **487** *L* **13** # 43

Issenhuth, Tom Huawei Technologies Co., Ltd,Issenhuth Consulting,

*Comment Type* **T** *Comment Status* **A** *TFSEH (OI)*

The Transmitter functional symbol error histogram (TFSEH) subclauses should be revised. A supporting presentation with the proposed changes for 180.9.9, 181.9.9, 182.9.9 and 183.9.9 will be provided.

*SuggestedRemedy*

Update the noted subclauses per the supporting presentation

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following contribution was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/cole_3dj_01b_2605.pdf

Also slides 14 to 31 of the following editorial contribution were reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/issenhuth_3dj_01_2605.pdf

Implement the proposed changes on slides 16, 18, 20, 22, 24, 26, 28, and 30 in issenhuth_3dj_01_2605.

Implement with editorial license.

*Cl* **180** *SC* **180.9.9** *P* **487** *L* **13** # 480

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TFSEH (OI)*

This functional symbol error histogram method tests transmitter-receiver pairs. As the receiver is not calibrated, and subject to much more possible variation than a CRU/scope, it tests transmitter-receiver pairs, not transmitters.

*SuggestedRemedy*

Remove spec row from Table 180-7. Remove row from Table 180-14. Move 180.9.9 to an annex.
Four clauses.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment #I-440.

*Cl* **180** *SC* **180.9.9** *P* **487** *L* **13** # 481

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TFSEH (OI)*

A real compliant receiver will have better jitter tolerance and other properties than a spec-worst receiver, so "passing" transmitter-receiver pairs can contain unsatisfactory transmitters because of the lack of receiver calibration.

*SuggestedRemedy*

Calibrate the receiver or delete the subclause.

*Response* *Response Status* **U**

REJECT.

Resolved using the response to comment #I-25.

*Cl* **180** *SC* **180.9.9** *P* **487** *L* **31** # 225

Maniloff, Eric — Ciena Corporation

*Comment Type* **TR** *Comment Status* **A** *TFSEH (OI)*

For symbol errors = 9 Table 180-18 specifies flat counts, consistent with a pre FEC BER ~2.3E-4. This implies that a transmitter could have a large error floor and still pass the test. It would be preferable to specify the actual probabilities consistent with a value of ~1e-26 or include no values with an informative note indicating these bins should have no measured occurances.

The measurement time to determine the probabilities for k=9 in unreasonably long for the 2.4e-5 BER defined in this clause.

*SuggestedRemedy*

Update the values in Table 180-18 for symbol errors = 9 to remove the flat mask. Remove these values and include a note that these bins should record zero counts. Make similar changes in Clauses 181, 182, 183.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment #I-43.

*Cl* **180** *SC* **180.9.9** *P* **487** *L* **40** # 262

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *TDECQ-Jitter (OI)*

802.3dj has spend last 1 year to best capture jitter in TDECQ and FRx, unless xAUI-n (C2M) interface operate with jitter tolerance condition in 176D.8.14 TDECQ measurement maybe be too optimistic see also unsatisfied comments aginst D2.1 and D2.2

*SuggestedRemedy*

Add sentence: For those cases where there is an xAUI-n chip-to-chip (C2C) or chip-to-module (C2M) interface (see Table 180û1 through Table 180û4), the clock source for the test pattern is derived from the clock recovered from the xAUI-n input signal. The xAUI-n input signal is that described for the Jitter tolerance test in 176D.8.14. The pattern of the xAUI-n input signal may be PRBS31Q, scrambled idle, or a valid xBASE-R signal.
See ghiasi_3dj_02_2605

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment I-258.

*Cl* **180** *SC* **180.9.9** *P* **488** *L* **8** # 483

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TFSEH (OI)*

If this mask were useful, there should be a figure showing it. But actually, any transmitter-receiver pair will have the least margin at bin 8 so none of the others matter.

*SuggestedRemedy*

If there will be a thought-through mask, illustrate it.

*Response* *Response Status* **U**

REJECT.

The commenter indicated that the intent of the suggested remedy was to add a figure illustrating the mask.

Based on straw poll O-4 there is no consensus to make the proposed change.

There is no consensus to make the proposed changes.

Straw poll O-4 (directional)
I support adding a figure illustrating the transmitter symbol error mask.
Y: 12
N: 22

*Cl* **180** *SC* **180.9.9** *P* **488** *L* **8** # 484

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TFSEH (OI)*

A transmitter-receiver pair that is marginal to this mask (i.e. close to the limit at bin 8) would probably have a FLR in the 1e-20 to 1e-25 region, which is far removed from the project objective (FLR 6.2e-11 = effective BER 1e-13) or the OIF's target (effective BER 1e-15) or reasonable market expectations. The difference between bin 8 and bins 14-16 is very large. Just drawing a line sideways from bin 9 is not adequate.

*SuggestedRemedy*

Decide what the performance objective of this test should be. The obvious candidate is the OIF's target (effective BER 1e-15). Use FEC bin extrapolation as we do for receiver testing.
Or delete the subclause.

*Response* *Response Status* **U**

REJECT.

The suggested remedy does not provide sufficient detail to implement.

There is no consensus to make the proposed changes.

*Cl* **180** *SC* **180.9.9** *P* **488** *L* **18** # 482

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TFSEH (OI)*

A receiver is not required to meet 1.75e-12 in bin 8 under any circumstances. A receiver that exceeds this will make any transmitter-receiver pair "fail" this test.

*SuggestedRemedy*

Provide a thought-through mask or delete the subclause.

*Response* *Response Status* **U**

REJECT.

The suggested remedy does not provide sufficient detail on an alternate mask to implement.

There is no consensus to change the mask or delete the subclause.

*Cl* **180** *SC* **180.9.9.1** *P* **488** *L* **35** # 25

Brown, Matthew Qualcomm

*Comment Type* **TR** *Comment Status* **R** *TFSEH (OI)*

The optical receiver portion of the functional receiver is defined as complying with the characteristics in Table 180-8. In other words, it meets and may likely exceed these requirements. For instance, the receiver jitter tracking bandwidth may exceed the minimum implied by the the jitter tolerance mask for the receiver sensitivity test. The effects of excessive jitter at a transmitter might therefore not be evident in this functional test. This functional test would be an ideal means to catch the effects of low-frequency jitter which may cause significant correlation (clustering) of errors. The other transmitter tests would not catch this effect.

*SuggestedRemedy*

Define the optical receiver such that the jitter tracking bandwidth is constrained to be close to barely passing the jitter tolerance requirements. For instance, define the tracking bandwidth to be no higher than 4 MHz.

*Response* *Response Status* **U**

REJECT.

The TFT method indeed capture and offset the potential better performance of the FRx than the worst case receiver.

If an optical receiver has much better tolerance to jitter, during the SRS test (which includes a jitter stressed source) that optical receiver will show larger margin to the Rx Sens spec than another optical receiver with marginal jitter tolerance. Therefore, when adjusting VOA_level per TFT, the high jitter tolerance receiver will be adjusted to lower input OMA. The amount of extra attenuation of the high jitter tolerance optical receiver would be equivalent to their offset in Rx Sensitivity.

Additionally, such a requirement would require a validation process of the functional receiver and a way to implement the suggested remedy. However these changes can be very costly even not implementable.

Several participants acknowledged there may be an issue to be considered. However, there was no consensus in this regard nor on a potential remedy.

There is no consensus to make the proposed change.

*Cl* **180** *SC* **180.9.9.1** *P* **488** *L* **36** # 121

Huber, Thomas — Nokia

*Comment Type* **ER** *Comment Status* **A** *TFSEH (OI)*

Using "FRx" to mean "functional receiver" is very confusing, since FR is also used to indicate the 2 km CWDM PMD family, and "FRx" or "FRn" are commonly used to indicate a set of FR PHYs.

*SuggestedRemedy*

It appears that "FRx" is used only in the title of the clause and in the first and last sentences of the first pararaph. Delete "(FRx)" in the title and first sentence, and replace "FRx" with "functional receiver" in the last sentence.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-43

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*Cl* **180** *SC* **180.9.9.1** *P* **488** *L* **40** # 486

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TFSEH (OI)*

AGCs have levels but attenuators have attenuations

*SuggestedRemedy*

Change "VOA_level " to "OA" for optical attenuation

*Response* *Response Status* **U**

REJECT.

There is no consensus to make the proposed change.

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*Cl* **180** *SC* **180.9.9.1** *P* **488** *L* **40** # 487

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TFSEH (OI)*

This is 802.3. We specify observable signals at compliance points. In the context of an optical spec, "DUT will be interpreted as device = optical module, while what is intended to be tested is the transmitter under test as it says on line 44, and what is actually tested is a transmitter-receiver pair.

*SuggestedRemedy*

Change "DUT" to "PUT", and when the receiver calibration is sorted out, change to "TUT".

*Response* *Response Status* **U**

REJECT.

There is no consensus to make the proposed change.

---

*Cl* **180** *SC* **180.9.9.1** *P* **488** *L* **50** # 488

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **A** *TFSEH (OI)*

Variable names with @ in the middle is horrible. Programming languages won't tolerate it.

*SuggestedRemedy*

Don't do it.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-43

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*Cl* **180** *SC* **180.9.9.1** *P* **489** *L* **16** # 485

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *TFSEH (OI)*

Estimating actual MPI and DGD penalty is impractical; we don't do it for TDECQ with much the same channel. MPI depends on transmitter and receiver as well as channel. But we expect that for a decent test channel in the lab, with good well-maintained connectors and typical not worst-case fibre, these will be very small.

*SuggestedRemedy*

Delete Test_fiber_MPI+DGD_penalty
or delete the subclause.

*Response* *Response Status* **U**

REJECT.

There is no consensus to make the proposed change.

---

*Cl* **180** *SC* **180.9.10** *P* **489** *L* **40** # 265

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *Overshoot (OI)*

140.7.7 Hit Ratio of 1E-2 doesn't make sense

*SuggestedRemedy*

Add exception hit ratio is 1E-4

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-248.

*Cl* **180** *SC* **180.9.10** *P* **489** *L* **42** # 489

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *Overshoot (OI)*

The overshoot probability criterion (hit ratio) in 140.7.7, 1e-2, is far too weak and lets a surprising number of UI exceed the limit (D2.2 comment 223). 167.8.8 for 100GBASE-SR1 says "Overshoot and undershoot are calculated relative to OMA_outer using the methods in 140.7.7 except that a hit
ratio of 3 x 10^-3 is used." This was what we could do at the time but it isn't really enough.

*SuggestedRemedy*

Use a hit ratio of 1e-4, here and in 180.9.11, transmitter power excursion.

*Response* *Response Status* **U**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-441.

*Cl* **180** *SC* **180.9.12** *P* **490** *L* **4** # 490

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *extinction ratio (OI)*

The definition of extinction ratio can be simplified, and it should be made 100% consistent with the definition of OMA, which is changing.

*SuggestedRemedy*

Change "The extinction ratio of a PAM4 optical signal is defined as the ratio of the average optical launch power level P3, measured over ... waveforms captured at the output of the reference receiver defined in 180.9.2.
to "The extinction ratio of a PAM4 optical signal is defined as the ratio of the average optical launch power levels P3 and P0, as defined for OMA_outer (see 180.9.5). In Table 180-14, change the row "Outer optical modulation amplitude (OMA_outer)"
to "Outer optical modulation amplitude (OMA_outer) and extinction ratio" and delete the separate row for extinction ratio.
Subclause 180.9.12 could be combined with180.9.5 also.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change
"The extinction ratio of a PAM4 optical signal is defined as the ratio of the average optical launch power level P3, measured over ... waveforms captured at the output of the reference receiver defined in 180.9.2."
to
"The extinction ratio of a PAM4 optical signal is defined as the ratio of the average optical launch power levels P3 and P0, as defined for OMA_outer (see 180.9.5).

With editorial license.

*Cl* **180** *SC* **180.9.13** *P* **490** *L* **44** # 491

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *RINxxOMA (OI)*

"linear units" is ambiguous: it could be field or equivalent, or power or equivalent. One is the square of the other, both are "linear".

*SuggestedRemedy*

Change "linear units" to "milliwatts", twice

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-492.

*Cl* **180** *SC* **180.9.14** *P* **490** *L* **47** # 492

Dawe, Piers J G NVIDIA

*Comment Type* **TR** *Comment Status* **A** *RINxxOMA (OI)*

"on a region in a place in the pattern that is selected to minimize the measurement error": too cryptic, and without a second opinion, one does not know which region/place has the minimum error. Actually, what one can do is minimize the apparent N0 or N3, not the (unknown) error. It is not clear how many UI wide a "place" is. Compare 179.9.4.6 for SNDR "Measure the RMS deviation from the mean voltage at a fixed low-slope point in runs of at least 6 consecutive identical PAM4 symbols, where the focus is on the rule not the purpose". "A region in a place": tautology. One can't measure N3 and N0 at the same place.

*SuggestedRemedy*

Change "N0 and N3 are measured in linear units on a region in a place in the pattern that is selected to minimize the measurement error."
to "N0 and N3 are each measured in milliwatts in a histogram window placed so that the slope of the waveform across the histogram window is negligible. These might be 1 UI wide or narrower, and they are expected to give lower readings for N0 or N3 than other positions or wider histogram windows."

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy with editorial license.

*Cl* **180** *SC* **180.9.15** *P* **491** *L* **1** # 44

Issenhuth, Tom — Huawei Technologies Co., Ltd,Issenhuth Consulting,

*Comment Type* **T** *Comment Status* **A** *Rx sensitivity (OI)*

The receiver sensitivity subclauses should be revised. A supporting presentation with the proposed changes for 180.9.15, 181.9.15, 182.9.15 and 183.9.15 will be provided.

*SuggestedRemedy*

Update the noted subclauses per the supporting presentation

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Slides 1 through 8 of the following contribution was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/cole_3dj_01b_2605.pdf

Slides 33 through 49 of the following editorial contribution were also reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/issenhuth_3dj_01_2605.pdf

Implement the changes proposed in slides 34, 35, 36, 37, 42, 44, 46, and 48 of issenhuth_3dj_01_2605.

Implement with editorial license.

*Cl* **180** *SC* **180.9.15** *P* **491** *L* **3** # 493

Dawe, Piers J G — NVIDIA

*Comment Type* **TR** *Comment Status* **R** *Rx sensitivity (OI)*

Receiver sensitivity is a property of the lanes together ("interface BER" concept), not each lane separately. We ensure that each transmit lane is good enough, and each channel lane. We test a receiver by applying the same optical power on each lane, but the receiver can share its error allocation across its lanes how it chooses, just as it can allocate errors to LSB and MSB within a lane as it chooses. This is what happens naturally if the errors are checked at the PCS. 174A.9.5 says "If this test passes for each lane, then the PHY or xMII Extender will meet the expected codeword error ratio. If this test fails, then the performance may be further verified using the method in 174A.9.6 or 174A.9.7."

*SuggestedRemedy*

Delete "of each lane" here and in 180.9.16. In Table 180-8, the table entries are optical powers which are by lane, not error ratios which are not, so maybe "each lane" can stay there, although it is misleading.

*Response* *Response Status* **U**

REJECT.

CRG discussion on this comment highlighted some ambiguity regarding the definition of receiver sensitivity and the associated measurement method, specifically with respect to per-lane and all-lane measurements.

Further consensus building and contribution is encouraged to address this matter.

There was no consensus on adopting changes.

*Cl* **180** *SC* **180.9.15** *P* **491** *L* **18** # 296

Dudek, Michael — Marvell

*Comment Type* **T** *Comment Status* **A** *Rx sensitivity - SHE (OI)*

The note could be misinterpreted as suggesting extrapolation is also needed for higher probabilites resulting in failures with random errors where the measurements meet the requirement without extrapolation

*SuggestedRemedy*

Insert "for Hm(i)(k) less than 10^-6"before "Extrapolate the measured histogramà..." Also in 180.9.16. Make the equivalent changes in clauses 181, 182 and 183 .

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-226.

*Cl* **180** *SC* **180.9.15** *P* **491** *L* **18** # 226

Maniloff, Eric — Ciena Corporation

*Comment Type* **TR** *Comment Status* **A** *Rx sensitivity - SHE (OI)*

Current text for block error extrapolation performs a linear fit from 1 to n. Because this is unlikely to be linear, it would be more accurate to only extrapolate over the 4 highest bins with sufficient counts.

*SuggestedRemedy*

Replace: "If the statistical projection is modeled accurately by a linear fit extrapolation, a means to
provide statistical projection of the measured histograms (see174A.9.3) in order to reduce test time
follows. Extrapolate the measured histogram to Hm(i)(16) using a line determined by a linear fit of
log10(Hm(i)(k)), for k = 1 to n, where n is the largest value of k, where all bins from 0 to n have a count
greater than 2."

With

"If the statistical projection is modeled accurately by a linear fit extrapolation, a means to provide statistical projection of the measured histograms (see174A.9.3) in order to reduce test time follows. Extrapolate the measured histogram to Hm(i)(16) using a line determined by a linear fit of log10(Hm(i)(k)), for k = n-3 to n, where n is the largest value of k, where all bins from n-3 to n have a count greater than 2." Make similar changes in Clauses 181, 182, 183.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

This comment suggests to add more details to the extrapolation method of the block error histogram measurement for receiver sensitivity and SRS. Another method was proposed in comment #I-296.

The following contribution was reviewed by the CRG.
https://www.ieee802.org/3/dj/public/26_05/maniloff_3dj_01b_2605.pdf

The following contributions provide measured data supporting the proposal in maniloff_3dj_01b_2605:
https://www.ieee802.org/3/dj/public/26_05/rodes_3dj_02a_2605.pdf
https://www.ieee802.org/3/dj/public/26_05/wang_3dj_01_2605.pdf

Replace the current note in 180.9.15, 180.9.16, 181.9.15, 181.9.16, 182.9.15, 182.9.16, 183.9.15, and 183.9.16 to the following:
"Note – In order to predict whether a receiver meets the BLER requirement in a short test time, extrapolation of the measured histogram (see 174.A.9.3) to Hm(16) can be performed. One way of doing this is using a linear fit of log10(Hm(k)) for k = (n-2) to n, where these values of k are the three highest bins having a count of 10 or more. If the slope of the histogram over the measured bins is increasing, it might be an indication of not meeting the BLER requirement. To verify that the slope is not increasing, the values of (log10(Hm(k))-log10(Hm(4))/(k-4) should be less than (log10(Hm(4))-log10(Hm(2))/2 for each k greater than 4."

Implement with editorial license.

*Cl* **180** *SC* **180.9.15** *P* **491** *L* **20** # 93

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *Rx sensitivity - SHE (OI)*

The definition of n in the NOTE is:
"where n is the largest value of k, where all bins from 0 to n have a count greater than 2"

This is awkward ("where" twice) and, strictly speaking, incorrect: if all bins from 0 to n have a count greater than 2 then n is likely not the largest value of k.

n should be the largest number of k that satisfies a condition that is independent of n.

Also applies to the similar comments in 180.9.16, 181.9.15, 181.9.16, 182.9.15, 182.9.16, 183.9.15, and 183.9.16.

*SuggestedRemedy*

Change the quoted phrase to
"where n is the largest value of k for which all bins from 0 to k have a count greater than 2".

Make the same change in 180.9.16, 181.9.15, 181.9.16, 182.9.15, 182.9.16, 183.9.15, and 183.9.16.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.

*Cl* **180** *SC* **180.9.15** *P* **491** *L* **22** # 295

Dudek, Michael — Marvell

*Comment Type* **E** *Comment Status* **A** *Rx sensitivity (OI)*

This comment is a re-submission of comment #101 against D2.3 where it was ruled out of scope but encouraged to be resubmitted. It would be better to describe the precoding before the details of the BLER test in this Receiver Sensitivity and stressed receiver sensitivity sub sections.

*SuggestedRemedy*

Move "Precoding (see 176.7.1.2) is enabled if the receiver requests precoding using the ILT function." to page 491 line 10. Also in 180.9.16. Make the equivalent changes in clauses 181, 182 and 183 .

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-44.

*Cl* **180** *SC* **180.9.15** *P* **492** *L* **32** # 94

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *Rx sensitivity - SHE (CG)*

The values in Table 180-20 mostly match the calculation of H_max in 174A.9.5 with BER_max=2.28e-4, but the values for k=16 with p=1, p=2, and p=4 have a slight mismatch, while for p=8 there is a match.
Note that the text in 174A.9.5 does not include a special treatment for k=16.

A spreadsheet for the calculation will be contributed.

*SuggestedRemedy*

In Table 180-20, row k=16, change the values as follows:
p=1: Change from 3.8e-13 to 3.5e-13
p=2: Change from 8.3e-18 to 8.0e-18
p=4: Change from 1.1e-22 to 1.0e-22

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-85.

*Cl* **180** *SC* **180.9.16** *P* **492** *L* **42** # 302

Dudek, Michael — Marvell

*Comment Type* **TR** *Comment Status* **A** *Stressed Rx sensitivity (OI)*

The frequency of the sinusoidal amplitude interferer in the stressed Rx test is not specified. If it's period is significantly longer than a FEC code-word it will cause significant degradation in BLER for the same BER and TECQ due to it significantly increasing the probability of correlated errors

*SuggestedRemedy*

Add an addional exception at line 42. "- The frequency of the sinusoidal interferer is greater than 200MHz. Add the same exception to 181.9.16 , 182.9.16 and 183.9.16

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Slides 9 and 10 in the following contribution were reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/issenhuth_3dj_01_2605.pdf

Based on straw poll TF-2 there is clear consensus to make the proposed change.

Implement the suggested remedy with editorial license.

Straw poll TF-2 (directional):
I support resolving comment I-302 with the suggested remedy.
Y: 47
N: 10

*Cl* **180A** *SC* **180A.2** *P* **935** *L* **29** # 115

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **T** *Comment Status* **A** *MDI connector (OI)*

Annex 180A refers to the three listed connectors (single-fiber, 12-fiber, and 16-fiber) as "MDI type".
MDI is defined as "The mechanical and electrical or optical interface between the transmission medium and <...> the PHY". Thus, a connector that serves multiple PHYs has multiple MDIs; the connector is not an "MDI type".

In Annex 179C, the term used is "MDI connector".

*SuggestedRemedy*

Edit the text in Annex 180A to align the language with 179C, using "MDI connector" for the connector, such that an MDI connector can support one or more PMDs. The single-fiber, 12-fiber, and 16-fiber are connector types.
Implement with editorial license.

*Response* *Response Status* **C**

ACCEPT.

*Cl* **180A** *SC* **180A.4.1** *P* **936** *L* **3** # 116

Ran, Adee
Cisco Systems, Inc.

*Comment Type* **ER** *Comment Status* **A** *MDI connector (OI)*

The text describing the requirement for partially-implemented MDI connectors can be improved, as was proposed in <https://www.ieee802.org/3/dj/public/26_03/ran_3dj_04a_2603.pdf>, slides 4-5.

*SuggestedRemedy*

Implement the proposed text changes on slides 4-5 of ran_3dj_04a_2603, with editorial license.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.

Implement suggested remedy with the exception that the wording "is implemented with the optical connector" is changed to "is implemented with this optical connector".

With editorial license.

*Cl* **180A** *SC* **180A.4.1** *P* **937** *L* **33** # 117

Ran, Adee
Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *MDI connector (OI)*

As presented in <https://www.ieee802.org/3/dj/public/26_03/ran_3dj_04a_2603.pdf>, implementations that support multiple combinations of PHY types on the same MDI connector (e.g. 1.6TBASE-DR8 and 8x200GBASE-DR1) need to be configured appropriately for interoperability.
A proposed NOTE in 180A.4.1 and 180A.4.2 to inform users about this need was included on slide 3 of ran_3dj_04a_2603.

*SuggestedRemedy*

Add informative notes at the end of 180A.4.1 and 180A.4.2, as follows:
NOTEùImplementations that support multiple combinations of PHY types on the same MDI must be configured appropriately for interoperability with the connected link partners. Selecting the appropriate configuration requires knowledge of the fiber plant and the link partners.

Another comment suggests changing "MDI" to "MDI connector" in Annex 180A. If that comment is accepted, it should be applied in this note too.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.

Implement suggested remedy with editorial license. Align "MDI" with the response to comment I-115

*Cl* **181** *SC* **181** *P* **509** *L* **28** # 48

Mazzini, Marco
Cisco Systems

*Comment Type* **T** *Comment Status* **A** *TDECQ_CER (OI)*

TDECQcer is not stable enough measurement a contribution is forthcoming.

*SuggestedRemedy*

Remove TDECQcer from Table 181-5, row 28

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-71.

*Cl* **181** *SC* **181.5.5** *P* **506** *L* **39** # 26

Brown, Matthew
Qualcomm

*Comment Type* **ER** *Comment Status* **A** *editorial(B1) (OI)*

In Table 181-2, the text "For any lane" is redundant since the specification in this clause is for each lane. This text should have been deleted when 181.5.5 and 181.5.4 were updated in an early draft. Should align this table with Table 181-5 and Table 182-5. Same for Table 183-2.

*SuggestedRemedy*

In Table 181-2 and Table 183-2, delete "For any lane; " twice.

*Response* *Response Status* **W**

ACCEPT.

*Cl* **181** *SC* **181.7.1** *P* **509** *L* **17** # 150

Ran, Adee
Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **R** *OMAouter value (OI)*

200G/L transmitter are found to be optimized with a lower extinction ratio; for this thereÆs the need to raise power close to the maximum limits to meet minimum OMAouter specifications.

For manufacturing purposes it would be good to have some extra room to allow for maximum OMAouter specified.

While 1.6TBASE-DR8/DR8-2 specifies OMAouter (max) = 4.2dBm and Average power (max) = 4.0 dBm, this is not true for FR4/FR4-500 which are specified with a lower OMAouter (max) = 4.8 dBm then Average power (max) = 4.9 dBm.

Proposed to normalize the tuning range across PMDs and set maximum Outer optical modulation amplitude (OMAouter) = 5.1 dBm for both FR4-500 and FR4.

*SuggestedRemedy*

In Table 181û5, change Outer optical modulation amplitude (OMAouter), each lane (max) from 4.8 to 5.1 dBm.
In Table 183û6, for 800GBASE-FR4, change Outer optical modulation amplitude (OMAouter), each lane (max) from 4.8 to 5.1dBm.

*Response* *Response Status* **W**

REJECT.

Strawpoll O-1 (directional)

I support adopting the suggested remedy to comment I-150.
Yes: 4
No: 13

Based on the result of strawpoll O-1 there was no consensus to make a change.

There was interest expressed in this topic. Further contributions on this topic are encouraged.

*Cl* **181** *SC* **181.7.1** *P* **509** *L* **31** # 249

Ghiasi, Ali
Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *Overshoot (OI)*

In D2.0 1T DFE was added to the TDECQ equalizer where DFE is suprior to improve TDECQ for bandlimited transmitters over using large overshoot/undershoot which can have 1-2 dB of SNR penalty given TDECQ doesn't incorporate peak-to-average penlaty. Overshoot/undershoot of 22% at 1E-2 hit ratio can also result in clipping and frame loss.

*SuggestedRemedy*

Hit ratio of 1E-2 has no merits given SSPRQ and Ethernet scrambled data. Peak-peak amplitude for example are measurd at hit ratio of 1E-7 in DJ. Change hit ratio from 1E-2 to 1E-4 and reduce overshoot/undershoot from 22% to 18% given that TDECQ has DFE no longer such high overshoots are necessary.
see ghiasi_3dj_02_2605

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-248

*Cl* **181** *SC* **181.7.1** *P* **509** *L* **35** # 320

Kimber, Mark
Semtech

*Comment Type* **T** *Comment Status* **R** *Transition time (OI)*

If transmitter bandwidth is too low then the BER floor will increase. Having a transmitter bandwidth < 35 GHz is detrimental to the BER floor. This would equate to a transition time of 7.2 ps with a 53 GHz SIRC measurement filter

*SuggestedRemedy*

Change 8 ps transition time to 7.2 ps.

*Response* *Response Status* **C**

REJECT.
Resolved using the response to comment #I-319

*Cl* **181** *SC* **181.7.2** *P* **511** *L* **26** # 73

HE, MICHAEL — TeraHop

*Comment Type* **T** *Comment Status* **R** *Tx OMA (OI)*

Base on volume production FR-500 transceiver data, Rx sensitivity OMAouter, Tx OMAouter, and other according Tx/Rx specs can be refined/optimized for cost, power efficiency.

*SuggestedRemedy*

Reduce Rx sensitivity OMAouter, Tx OMAouter, and other according Tx/Rx specs by 0.8dB. (Refer to contribution he_3dj_01_2603, page 12-13)
Details for transmitter---
--181.7.1 Table 181û5, page 509 line 16
Change Average launch power, each lane (min) from -2.1 to -2.9 (dBm)
--181.7.1 Table 181û5, page 509 line 20
Change Tx OMAouter (min) (for TECQ < 0.9 dB) from 0.9 to 0.1 (dBm)
--181.7.1 Table 181û5, page 509 line 21
Change Tx OMAouter (min) (for TECQ >= 0.9 dB) from 0 + max(TECQ, TDECQ) to -0.8 + max(TECQ, TDECQ) (dBm)
--181.7.1 Figure 181û3, page 510 line 22
Shift Tx OMAouter (min) lines down for 0.8 dB

Details for receiver---
--181.7.2 Table 181û6, page 511 line 18
Change Average receive power (min) from -5.6 to -6.4 (dBm)
--181.7.2 Table 181û6, page 511 line 26
Change Receiver sensitivity OMAouter (min) (for TECQ < 0.9 dB) from -3.2 to -4.0 (dBm)
--181.7.2 Table 181û6, page 511 line 27
Change Receiver sensitivity OMAouter (min) (for TECQ >= 0.9 dB) from -4.1 + max(TECQ, TDECQ) to -4.9 + max(TECQ, TDECQ) (dBm)
--181.7.2 Table 181û6, page 511 line 28
Change Stressed receiver sensitivity OMAouter (max) from -0.7 to -1.5 (dBm)
--181.7.2 Figure 181û4, page 512 line 21
Shift Receiver sensitivity OMAouter (max) line down for 0.8 dB

--181.7.3 Figure 181û5, page 513 line 25
Shift Tx OMAouter (min) and Rx sensitivity OMAouter (max) lines down for 0.8 dB

*Response* *Response Status* **C**

REJECT.

Resolved using the response to comment I-72

*Cl* **181** *SC* **181.9.2** *P* **517** *L* **3** # 253

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *Reference CRU peaking (CG)*

With TDECQ expected to capture jitter more accuratly now that explicit jitter measurmeent are removed the CRU maximum peaking must be defined

*SuggestedRemedy*

Origonal text: The clock recovery unit (CRU) has a corner frequency of 4 MHz and a slope of 20 dB/decade.
proposed text: The clock recovery unit (CRU) has a 3 dB corner frequency of 4 MHz and a slope of -20 dB/decade. The CRU maximum jitter transfer peak is =0.3 dB from 40 kHz to 20 MHz.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment #I-264.

*Cl* **181** *SC* **181.9.6** *P* **517** *L* **46** # 95

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **T** *Comment Status* **A** *editorial (Bx) (OI)*

TDECQ is defined based on 180.9.6, with three exceptions.

The first exception (signaling rate and pattern) is not required (for FR4-500 these are the same as in DR).
The second exception (source clock of the SSPRQ) is not required (the same requirement exists in 180.9.6.1).
The third exception is to use optical channel specified in 181.9.6.1 (instead of the one in 180.9.6.2). This should be expanded to include an optical filter in the test setup (similar to Figure 122-4), unlike 180.9.6.1.

*SuggestedRemedy*

Remove the first and second exceptions.
Expand the third exception, or add another exception, to use an optical filter in the test setup.
Consider adding a figure of the setup with the optical filter.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The first and second exceptions are almost identical to specifications in 180.9.6 but point to the test pattern table in Clause 181 rather than Clause 180.

However, a demultiplexing filter should be either shown in a diagram or listed in the text.

Add an exception that the test configuration includes a demultiplexing filter in front of the reference receiver.

Implement the same change in Clause 183.

*Cl* **181** *SC* **181.9.6** *P* **517** *L* **53** # 259

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *TDECQ-Jitter (OI)*

802.3dj has spend last 1 year to best capture jitter in TDECQ and FRx, unless xAUI-n (C2M) interface operate with jitter tolerance condition in 176D.8.14 TDECQ measurement maybe be too optimistic see also unsatisfied comments aginst D2.1 and D2.2

*SuggestedRemedy*

Add sentence: For those cases where there is an xAUI-n chip-to-chip (C2C) or chip-to-module (C2M) interface (see Table 180û1 through Table 180û4), the clock source for the test pattern is derived from the clock recovered from the xAUI-n input signal. The xAUI-n input signal is that described for the Jitter tolerance test in 176D.8.14. The pattern of the xAUI-n input signal may be PRBS31Q, scrambled idle, or a valid xBASE-R signal.
See ghiasi_3dj_02_2605

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment I-258

*Cl* **181** *SC* **181.9.9** *P* **519** *L* **8** # 122

Huber, Thomas — Nokia

*Comment Type* **ER** *Comment Status* **A** *TFSEH (OI)*

Using "FRx" to mean "functional receiver" is very confusing, since FR is also used to indicate the 2 km CWDM PMD family, and "FRx" or "FRn" are commonly used to indicate a set of FR PHYs.

*SuggestedRemedy*

It appears that FRx is used only in this bullet point. Delete "(FRx)" in the first sentence and replace FRx in the last sentence with "functional receiver"

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-43

*Cl* **181** *SC* **181.9.9** *P* **519** *L* **11** # 293

Dudek, Michael — Marvell

*Comment Type* **TR** *Comment Status* **A** *TFSEH (OI)*

The test calls out a fiber that is compliant to Table 181-13, but that table shows a minimum and maximum chromatic dispersion, so a patch cord is compliant to that table. This test is intended to include the effects of chromatic dispersion. The proposed solution uses the same channel as the TDECQ test.

*SuggestedRemedy*

Implement the changes proposed in issenhuth_3dj_01a_2603.pdf

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-43

*Cl* **181** *SC* **181.9.10** *P* **519** *L* **35** # 266

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *Overshoot (OI)*

140.7.7 Hit Ratio of 1E-2 doesn't make sense

*SuggestedRemedy*

Add exception hit ratio is 1E-4

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-248

*Cl* **182** *SC* **182** *P* **540** *L* **36** # 49

Mazzini, Marco — Cisco Systems

*Comment Type* **T** *Comment Status* **A** *TDECQ_CER (OI)*

TDECQcer is not stable enough measurement a contribution is forthcoming.

*SuggestedRemedy*

Remove TDECQcer from Table 182-7, row 36

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-71.

*Cl* **182** *SC* **182.7.1** *P* **516** *L* **24** # 250

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *Overshoot (OI)*

In D2.0 1T DFE was added to the TDECQ equalizer where DFE is suprior to improve TDECQ for bandlimited transmitters over using large overshoot/undershoot which can have 1-2 dB of SNR penalty given TDECQ doesn't incorporate peak-to-average penlaty. Overshoot/undershoot of 22% at 1E-2 hit ratio can also result in clipping and frame loss.

*SuggestedRemedy*

Hit ratio of 1E-2 has no merits given SSPRQ and Ethernet scrambled data. Peak-peak amplitude for example are measurd at hit ratio of 1E-7 in DJ. Change hit ratio from 1E-2 to 1E-4 and reduce overshoot/undershoot from 22% to 18% given that TDECQ has DFE no longer such high overshoots are necessary.
see ghiasi_3dj_02_2605

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-248

*Cl* **182** *SC* **182.7.1** *P* **541** *L* **8** # 321

Kimber, Mark — Semtech

*Comment Type* **T** *Comment Status* **R** *Transition time (OI)*

If transmitter bandwidth is too low then the BER floor will increase. Having a transmitter bandwidth < 35 GHz is detrimental to the BER floor. This would equate to a transition time of 7.2 ps with a 53 GHz SIRC measurement filter

*SuggestedRemedy*

Change 8 ps transition time to 7.2 ps.

*Response* *Response Status* **C**

REJECT.

Based on the result of straw poll O-7 there is no consensus to change the transition time (max) value for the PMDs defined in clauses 182 and the 800GBASE-FR4 PMD defined in Clause 183.

The following related contribution was reviewed by the 802.3dj task force at an earlier ad hoc meeting:
https://www.ieee802.org/3/dj/public/adhoc/electrical/26_0415/kimber_3dj_adhoc_01a_260415.pdf

Straw poll O-7 (choose 1) (directional)
For the PMDs defined in clauses 182 and 800GBASE-FR4 defined in Clause 183, I support setting the transition time (max) to:
A: 8 ps (no change)
B: 7.2 ps (per comment #I-321 and #I-322)
A: 21 B: 13

*Cl* **182** *SC* **182.9.1** *P* **548** *L* **5** # 40

Issenhuth, Tom — Huawei Technologies Co., Ltd,Issenhuth Consulting,

*Comment Type* **E** *Comment Status* **A** *editorial (B1) (OI)*

In Table 182-14 the parameter and associated cross reference to TDECQ_CER is missing

*SuggestedRemedy*

In Table 182-14 add the parameter TDECQ_CER after TDECQ with a pattern of 6 and cross reference to 182.9.7

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-71.

*Cl* **182** *SC* **182.9.1** *P* **548** *L* **5** # 39

Issenhuth, Tom — Huawei Technologies Co., Ltd,Issenhuth Consulting,

*Comment Type* **E** *Comment Status* **A** *editorial (B1) (OI)*

In Table 182-14, the parameter Transmitter eye closure for PAM4 (TECQ) has an incorrect cross reference to 182.9.7. It should be cross referenced to 182.9.8

*SuggestedRemedy*

Change the TECQ cross reference to 182.9.8

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license.

*Cl* **182** *SC* **182.9.2** *P* **548** *L* **18** # 254

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *Reference CRU peaking (CG)*

With TDECQ expected to capture jitter more accuratly now that explicit jitter measurmeent are removed the CRU maximum peaking must be defined

*SuggestedRemedy*

The CRU maximum jitter transfer peak is =0.3 dB from 42.7 kHz to 20 MHz.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment #I-264.

*Cl* **182** *SC* **182.9.2** *P* **548** *L* **18** # 255

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *Reference CRU (CG)*

Missing CRU definition

*SuggestedRemedy*

The clock recovery unit (CRU) has a 3 dB corner frequency of 4 MHz and a slope of -20 dB/decade.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-96.

*Cl* **182** *SC* **182.9.2** *P* **548** *L* **27** # 96

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **E** *Comment Status* **A** *Rx receiver (CG)*

(Comment resubmitted from WG ballot)
The reference receiver is defined by reference to 180.9.2 with a single exception which is almost the whole definition.

*SuggestedRemedy*

Define the reference receiver using text as in the first paragraph of 180.9.2. Refer to 180.9.2 for the CRU and the block diagram.
Implement with editorial license.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Define the reference receiver using all text in 180.9.2 modified appropriately for this clause including the difference noted in the current exception and with 4.27 MHz corner frequency for the CRU. Refer to the figure in 180.9.2.

Implement with editorial license.

Implement the same 183.9.2.

*Cl* **182** *SC* **182.9.6** *P* **549** *L* **23** # 97

Ran, Adee
Cisco Systems, Inc.

*Comment Type* **T** *Comment Status* **R** *(Bx) (OI)*

TDECQ is defined based on 180.9.6, with a list of exceptions.

The penultimate exception (source clock of the SSPRQ) is not required (the same requirement exists in 180.9.6.1).

*SuggestedRemedy*

Remove the exception for clock source of SSPRQ.

*Response* *Response Status* **C**

REJECT.
The penultimate exception is almost identical to specifications in 180.9.6 but points to the test pattern table in Clause 182 rather than Clause 180.

*Cl* **182** *SC* **182.9.6** *P* **549** *L* **38** # 260

Ghiasi, Ali
Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *TDECQ-Jitter (OI)*

802.3dj has spend last 1 year to best capture jitter in TDECQ and FRx, unless xAUI-n (C2M) interface operate with jitter tolerance condition in 176D.8.14 TDECQ measurement maybe be too optimistic see also unsatisfied comments aginst D2.1 and D2.2

*SuggestedRemedy*

Add sentence: For those cases where there is an xAUI-n chip-to-chip (C2C) or chip-to-module (C2M) interface (see Table 180û1 through Table 180û4), the clock source for the test pattern is derived from the clock recovered from the xAUI-n input signal. The xAUI-n input signal is that described for the Jitter tolerance test in 176D.8.14. The pattern of the xAUI-n input signal may be PRBS31Q, scrambled idle, or a valid xBASE-R signal.
See ghiasi_3dj_02_2605

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment I-258

*Cl* **182** *SC* **182.9.6.1** *P* **550** *L* **12** # 98

Ran, Adee
Cisco Systems, Inc.

*Comment Type* **E** *Comment Status* **A** *editorial (B1) (OI)*

In Table 182û15 the first column "PMD type" is unnecessary, because all PMD types have the same parameters and values.
Compare with the similar Table 180û15, which does not include this column.

*SuggestedRemedy*

Remove the first column.

*Response* *Response Status* **C**

ACCEPT.

*Cl* **182** *SC* **182.9.9** *P* **551** *L* **32** # 123

Huber, Thomas
Nokia

*Comment Type* **ER** *Comment Status* **A** *TFSEH (OI)*

Using "FRx" to mean "functional receiver" is very confusing, since FR is also used to indicate the 2 km CWDM PMD family, and "FRx" or "FRn" are commonly used to indicate a set of FR PHYs.

*SuggestedRemedy*

It appears that FRx is used only in this bullet point. Delete "(FRx)" in the first sentence and replace FRx in the last sentence with "functional receiver"

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-43

*Cl* **182** *SC* **182.9.10** *P* **552** *L* **5** # 267

Ghiasi, Ali
Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *Overshoot (OI)*

140.7.7 Hit Ratio of 1E-2 doesn't make sense

*SuggestedRemedy*

Add exception hit ratio is 1E-4

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-248

*Cl* **183** *SC* **183** *P* **572** *L* **37** # 50

Mazzini, Marco — Cisco Systems

*Comment Type* **T** *Comment Status* **A** *TDECQ_CER (OI)*

TDECQcer is not stable enough measurement a contribution is forthcoming.

*SuggestedRemedy*

Remove TDECQcer from Table 183-6, row 37

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-71.

*Cl* **183** *SC* **183.7.1** *P* **540** *L* **41** # 251

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *Overshoot (OI)*

In D2.0 1T DFE was added to the TDECQ equalizer where DFE is suprior to improve TDECQ for bandlimited transmitters over using large overshoot/undershoot which can have 1-2 dB of SNR penalty given TDECQ doesn't incorporate peak-to-average penlaty. Overshoot/undershoot of 22% at 1E-2 hit ratio can also result in clipping and frame loss.

*SuggestedRemedy*

Hit ratio of 1E-2 has no merits given SSPRQ and Ethernet scrambled data. Peak-peak amplitude for example are measurd at hit ratio of 1E-7 in DJ. Change hit ratio from 1E-2 to 1E-4 and reduce overshoot/undershoot from 22% to 18% given that TDECQ has DFE no longer such high overshoots are necessary.
see ghiasi_3dj_02_2605

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-248

*Cl* **183** *SC* **183.7.1** *P* **572** *L* **45** # 322

Kimber, Mark — Semtech

*Comment Type* **T** *Comment Status* **R** *Transition time (OI)*

If transmitter bandwidth is too low then the BER floor will increase. Having a transmitter bandwidth < 35 GHz is detrimental to the BER floor. This would equate to a transition time of 7.2 ps with a 53 GHz SIRC measurement filter. This is for the 800G-FR4 spec only.

*SuggestedRemedy*

Change 8 ps transition time to 7.2 ps.

*Response* *Response Status* **C**

REJECT.
Resolved using the response to comment #I-321

*Cl* **183** *SC* **183.8.2** *P* **578** *L* **52** # 141

Johnson, John — Broadcom Corporation

*Comment Type* **TR** *Comment Status* **A** *fiber attenuation (OI)*

2 dB allocation for fiber cable attenuation for 800GBASE-FR4 is incorrect given 2 km maximum fiber length and 0.5 dB/km attenuation. For reference, clauses 122, 155 and 182 have the correct value of 1 dB.

*SuggestedRemedy*

Change:
"The maximum link distance for 800GBASE-FR4 is based on an allocation of 2 dB total fiber cable attenuation,"
To:
"The maximum link distance for 800GBASE-FR4 is based on an allocation of 1 dB total fiber cable attenuation,"
Also change:
"a total connection and splice loss allocation of 2 dB supports four connections"
To:
"a total connection and splice loss allocation of 3 dB supports six connections"

*Response* *Response Status* **W**

ACCEPT.

*Cl* **183** *SC* **183.9.1** *P* **581** *L* **15** # 41

Issenhuth, Tom — Huawei Technologies Co., Ltd,Issenhuth Consulting,

*Comment Type* **E** *Comment Status* **A** *editorial (B1) (OI)*

In Table 183-14 the parameter and associated cross reference to TDECQ_CER is missing

*SuggestedRemedy*

In Table 183-14 add the parameter for TDECQ_CER after TDECQ with a pattern of 6 and cross reference to 183.9.7

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-71.

*Cl* **183** *SC* **183.9.1** *P* **581** *L* **17** # 42

Issenhuth, Tom — Huawei Technologies Co., Ltd,Issenhuth Consulting,

*Comment Type* **E** *Comment Status* **A** *editorial (B1) (OI)*

In Table 183-14, the parameter Transmitter functional symbol error histogram is missing the related subclause cross reference

*SuggestedRemedy*

In Table 183-14 for transmitter functional symbol error histogram add a cross reference to 183.9.9

*Response* *Response Status* **C**

ACCEPT.

*Cl* **183** *SC* **183.9.2** *P* **581** *L* **36** # 99

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **E** *Comment Status* **A** *Reference Rx (CG)*

(Comment resubmitted from WG ballot)
The reference receiver is defined by reference to 180.9.2 with a single exception which is almost the whole definition.

*SuggestedRemedy*

Define the reference receiver using text as in the first paragraph of 180.9.2. Refer to 180.9.2 for the CRU and the block diagram.
Implement with editorial license.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-96

*Cl* **183** *SC* **183.9.2** *P* **581** *L* **38** # 256

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *Reference CRU peaking (CG)*

With TDECQ expected to capture jitter more accuratly now that explicit jitter measurmeent are removed the CRU maximum peaking must be defined

*SuggestedRemedy*

The CRU maximum jitter transfer peak is =0.3 dB from 42.7 kHz to 20 MHz.

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment #I-264.

*Cl* **183** *SC* **183.9.2** *P* **581** *L* **38** # 257

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *Reference Rx (CG)*

Missing CRU definition

*SuggestedRemedy*

The clock recovery unit (CRU) has a 3 dB corner frequency of 4 MHz and a slope of -20 dB/decade.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-96

*Cl* **183** *SC* **183.9.6** *P* **582** *L* **44** # 100

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **T** *Comment Status* **R** *editorial (OI)*

TDECQ is defined based on 180.9.6, with a list of exceptions.

The penultimate exception (source clock of the SSPRQ) is not required (the same requirement exists in 180.9.6.1).
The last exception is to use optical channel specified in 183.9.6.1 (instead of the one in 180.9.6.2). This should be expanded to include an optical filter in the test setup (similar to Figure 122-4), unlike 180.9.6.1.

*SuggestedRemedy*

Remove the exception for clock source of SSPRQ.
Expand the last exception, or add another exception, to use an optical filter in the test setup.
Consider adding a figure of the setup with the optical filter.

*Response* *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

*Cl* **183** *SC* **183.9.6** *P* **582** *L* **46** # 261

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **R** *TDECQ-Jitter (OI)*

802.3dj has spend last 1 year to best capture jitter in TDECQ and FRx, unless xAUI-n (C2M) interface operate with jitter tolerance condition in 176D.8.14 TDECQ measurement maybe be too optimistic see also unsatisfied comments aginst D2.1 and D2.2

*SuggestedRemedy*

Add sentence: For those cases where there is an xAUI-n chip-to-chip (C2C) or chip-to-module (C2M) interface (see Table 180û1 through Table 180û4), the clock source for the test pattern is derived from the clock recovered from the xAUI-n input signal. The xAUI-n input signal is that described for the Jitter tolerance test in 176D.8.14. The pattern of the xAUI-n input signal may be PRBS31Q, scrambled idle, or a valid xBASE-R signal.
See ghiasi_3dj_02_2605

*Response* *Response Status* **U**

REJECT.
Resolved using the response to comment I-258

*Cl* **183** *SC* **183.9.9** *P* **584** *L* **33** # 124

Huber, Thomas — Nokia

*Comment Type* **ER** *Comment Status* **A** *TFSEH (OI)*

Using "FRx" to mean "functional receiver" is very confusing, since FR is also used to indicate the 2 km CWDM PMD family, and "FRx" or "FRn" are commonly used to indicate a set of FR PHYs.

*SuggestedRemedy*

It appears that FRx is used only in this bullet point. Delete "(FRx)" in the first sentence and replace FRx in the last sentence with "functional receiver"

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-43

*Cl* **183** *SC* **183.9.10** *P* **585** *L* **10** # 268

Ghiasi, Ali — Ghiasi Quantum LLC,Marvell Semiconductor, Inc.

*Comment Type* **TR** *Comment Status* **A** *Overshoot (OI)*

140.7.7 Hit Ratio of 1E-2 doesn't make sense

*SuggestedRemedy*

Add exception hit ratio is 1E-4

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment #I-248

*Cl* **183** *SC* **183.9.13** *P* **585** *L* **42** # 33

Brown, Matthew — Qualcomm

*Comment Type* **E** *Comment Status* **R** *editorial (Bx) (OI)*

Per style manual, use of the word "can" in the sense of "is permitted" is deprecated. Instead, use the word "may".

*SuggestedRemedy*

Change "the square wave test pattern can be used" to "the square wave test pattern may be used".

*Response* *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

*Cl* **184** *SC* **184** *P* **595** *L* **1** # 314

Nicholl, Gary — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *APSU for coherent (CA)*

An 800GBASE-LR1 PHY must be able to participate in Annex 178B APSU, to minimize the amount of human intervention
needed to initialize a path and preserve the plug-and-play nature of Ethernet.

*SuggestedRemedy*

A contribution will be provided containing a complete proposal for how an 800GBASE-LR1 PHY may participate in Annex 178B APSU, including the detailed text changes that are necessary to the draft.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following contribution was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/brown_3dj_04a_2605.pdf

Implement slides 5 to 12 of brown_3dj_04a_2605.

Also, update 169.2.10 "Autonomous path startup (APSU)" appropriately.

Implement with editorial license.

*Cl* **184** *SC* **184.3** *P* **598** *L* **48** # 101

Ran, Adee — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

"When SIGNAL_OK is FAIL, the tx_symbol parameters of the FEC:IS_UNITDATA_i.indication primitives are undefined"
FEC:IS_UNITDATA_i.indication parameter is rx_symbol, not tx_symbol.

*SuggestedRemedy*

Change tx_symbol to rx_symbol.

*Response* *Response Status* **W**

ACCEPT.

*Cl* **184** *SC* **184.4** *P* **599** *L* **5** # 125

Huber, Thomas — Nokia

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

The text indicates that the alignment lock and deskew are the same as specified in 172.2.5.1, except that deskew is only required to a 2-symbol boundary. However, 172.2.5.1 specifies the state machine in figure 172-6 is required. That state machine counts FEC codeword errors and restarts lock if 3 consecutive uncorrected codewords are received. The LR1 inner FEC does not decode the FEC, so it doesn't need this state machine.

*SuggestedRemedy*

Change the sentence to read:
The alignment lock and deskew function shall be identical to the processes specified in 172.2.5.1 except that only a deskew to 20-bit (two RS-FEC symbols) boundaries across all PCS lanes is required, and the codeword monitor function in Figure 172-6 is not required.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

*Cl* **184** *SC* **184.10** *P* **615** *L* **45** # 5

Marris, Arthur — self

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

In "Table 184û5ùInner FEC status variables and MDIO mapping" are defined to use PMA registers test_block_error_bin_0_<0:15> and test_block_error_bin_0_16p. These registers are required by the AUI so a new set of inner fec registers need to be defined for the PRBS31 checker.

*SuggestedRemedy*

Create 51 new "Inner FEC test error bin" registers at 1.2644 through 1.2694, with similar functionality to the existing PMA registers test_block_error_bin_0_k and test_block_error_bin_0_16p.

In 184.6.2 and Table 184-5:

Rename "test_block_error_bin_0_k" to "Inner_FEC_test_block_error_bin_k"
Rename "test_block_error_bin_0_16p" to "Inner_FEC_test_block_error_bin_16p"

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

[Editor's note: CC 45]

*Cl* **185** *SC* **185.5.1** *P* **626** *L* **5** # 227

Maniloff, Eric — Ciena Corporation

*Comment Type* **T** *Comment Status* **A** *Block diagram (OC)*

The label for TP1 and TP2 on Fig 185-3 are not correct, TP1 and TP4 do not beliong in this figure

*SuggestedRemedy*

Remove TP1 and TP4

*Response* *Response Status* **C**

ACCEPT.

*Cl* **185** *SC* **185.5.1** *P* **626** *L* **5** # 228

Maniloff, Eric — Ciena Corporation

*Comment Type* **E** *Comment Status* **A** *Block diagram (OC)*

Labels and locations in Fig 185-3 are inconsistent with other clauses.

*SuggestedRemedy*

Modify Fig 185-3 to align with Fig 185-2. Move "Inner FEC." Inside box. Change Optical transmitter label to PMD transmit function. Add PMD_signal_detect

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

In Figure 185-3
Change "Optical transmitter" to "PMD Transmit Function" and "Optical receiver" to "PMD Receive Function".
Add PMD_signal_detect from the PMD Receive Function
To align with the other optical PMD clauses change "Inner FEC transmit function" to "Inner FEC Transmit Function"and "Inner FEC receive function" to "Inner FEC Receive Function"and move labels into their respective boxes.

With editorial license.

*Cl* **185** *SC* **185.10** *P* **640** *L* **15** # 229

Maniloff, Eric — Ciena Corporation

*Comment Type* **ER** *Comment Status* **A** *(B1) (OC)*

Control Variable Reset is labeled improperly

*SuggestedRemedy*

Change "Reset" to "PMD_reset"

*Response* *Response Status* **W**

ACCEPT.

*Cl* **185** *SC* **185.10** *P* **640** *L* **30** # 230

Maniloff, Eric — Ciena Corporation

*Comment Type* **ER** *Comment Status* **A** *PMD variables (OC) (B1)*

Status variables "fault" "Transmit fault" and "receive fault" are labeled improperly

*SuggestedRemedy*

Change to "PMD_fault", "PMD_transmit_fault", and "PMD_receive_ fault"

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
In Table 185-18 change
"Fault" to "PMD fault"
"Transmit fault" to "PMD transmit fault"
"Receive fault" to "PMD receive fault"
For Global PMD signal detect change the variable reference to "185.5.4"
Add a new row with variable name "PMD signal detect", variable reference "187.5.5", MDIO number "1.10.1" and MDIO reference "45.2.1.9.6"
In Tables 180-21, 181-14, 182-19 and 183-17 change "PMD_global_transmit_disable" to "Global_PMD_transmit_disable"
In Tables 180-22, 181-15, 182-20 and 183-18 change "PMD_global_signal_detect" to "Global_PMD_signal_detect"
With editorial license

*Cl* **185** *SC* **185.11.4.3** *P* **644** *L* **8** # 118

Issenhuth, Tom — Huawei Technologies Co., Ltd,Issenhuth Consulting,

*Comment Type* **E** *Comment Status* **A** *(B1) (OC)*

In optical measurements PICS table the term "Tx clock phase noise: total periodic jitter (max)" should not include "(max)"

*SuggestedRemedy*

Remove "(max)" from the feature description

*Response* *Response Status* **C**

ACCEPT.

*Cl* **185A** *SC* **185A.2.3** *P* **947** *L* **38** # 36

Brown, Matthew — Qualcomm

*Comment Type* **E** *Comment Status* **A** *(B1) (OC)*

Regarding this text... "Processing steps can be consolidated and changed in order but may not perform any additional signal processing with the purpose of compensating for transmitter signal distortions except for those explicitly mentioned below."
Per style manual, use of the word "can" in the sense of "is permitted" is deprecated. Instead, use the word "may".

*SuggestedRemedy*

Change "Processing steps can be consolidated" to "Processing steps may be consolidated".

*Response* *Response Status* **C**

ACCEPT.

---

*Cl* **185A** *SC* **185A.2.3** *P* **948** *L* **8** # 235

Maniloff, Eric — Ciena Corporation

*Comment Type* **TR** *Comment Status* **A** *ETCC (OC)*

The low pass filter has minimal impact on ETCC, and can be removed

*SuggestedRemedy*

Remove the Bessel-Thomson filter from the reference DSP. This will also remove 185.A.2.3.2

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
In Figure 185A-4 remove the box for "Low-pass filter" and delete subclause 185A.2.3.2.

---

*Cl* **185A** *SC* **185A.2.3.5** *P* **948** *L* **52** # 236

Maniloff, Eric — Ciena Corporation

*Comment Type* **TR** *Comment Status* **A** *ETCC (OC)*

The T spaced filter is inconsistent with typical implementations. T/2 -spaced equalization does not mitigate transmitter impairments more effectively in this context; its primary benefit is to support the clock recovery algorithm when residual symbol timing error is present. Moving to T/2-spaced taps makes the processing less dependent on the specific clock recovery implementation and therefore more robust and algorithm-agnostic.

*SuggestedRemedy*

Change the reference equalizer tap spacing from T-spaced to T/2-spaced.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-237.

---

*Cl* **185A** *SC* **185A.2.3.5** *P* **948** *L* **52** # 237

Maniloff, Eric — Ciena Corporation

*Comment Type* **T** *Comment Status* **A** *ETCC (OC)*

The current ETCC methodology already requires a preprocessing stage to recover the transmitted pattern for subsequent BER measurement. Given that the transmitted sequence is already available within the processing flow,using known data symbols for equalizationis a natural and consistent extension of the existing methodology. Data-aided equalization is also more representative of practical system operation, and it generally provides faster convergence and more reliable equalizer adaptation than blind methods. This is an optional implementation but it would be preferable to specify this.

*SuggestedRemedy*

Add text to the reference equalizer in 185A.2.3.7 to indicate that the adaptation may be based on known data symbols.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Comment I-236 request that the equalizer sampling is T/2 spaced rather than T spaced.

The suggested remedy incorrectly states to add text to 185A.2.3.7.
In 185A.2.3.5 change:
"A reference equalizer based on a 2×2 multiple-in multiple-out (MIMO) filter with an adaptive T-spaced feed-forward equalizer, where T is the symbol period, is used for polarization demultiplexing and channel equalization. Polarization demultiplexing may be performed as a separate processing step."
To
"A reference equalizer based on a 2×2 multiple-in multiple-out (MIMO) filter with an adaptive T/2-spaced feed-forward equalizer, where T is the symbol period, is used for polarization demultiplexing and channel equalization. Adaptation of the reference equalizer may be based on data symbols recovered during pre-processing. Polarization demultiplexing may be performed as a separate processing step."

Implement with editorial license.
[Editor's note: changed line from 8 to 52.]

*Cl* **185A** *SC* **185A.2.4.1** *P* **949** *L* **23** # 37

Brown, Matthew Qualcomm

*Comment Type* **T** *Comment Status* **A** *(B1) (OC)*

There are two issues with the following text: "ENOB can be measured using sine waves as described in IEEE Standard 1241-2023, Section 9.4 provided that the amplitude and frequency of the sine wave used for the measurement are specified."
Per style manual, use of the word "can" in the sense of "is permitted" is deprecated. Instead, use the word "may".
However, if the ENOB is not measured using the method in 1241-2023 then how should one measure it. Can it be measured in any way that one wants?

*SuggestedRemedy*

Change "ENOB can be measured using" to "ENOB is measured using"

*Response* *Response Status* **C**

ACCEPT.

*Cl* **186** *SC* **186** *P* **645** *L* **1** # 315

Nicholl, Gary Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *APSU for coherent (CA)*

An 800GBASE-ER1/ER1-20 PHY must be able to participate in Annex 178B APSU, to minimize the amount of human intervention
needed to initialize a path and preserve the plug-and-play nature of Ethernet.

*SuggestedRemedy*

A contribution will be provided containing a complete proposal for how an 800GBASE-ER1/ER1-20 PHY may participate in Annex 178B APSU, including the detailed text changes that are necessary to the draft.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following contribution was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/26_05/nicholl_3dj_01_2605.pdf

Implement slides 10 to 13 to nicholl_3dj_01_2605.

Also, update 169.2.10 "Autonomous path startup (APSU)" appropriately.

Implement with editorial license.

*Cl* **186** *SC* **186.2.3.5** *P* **653** *L* **23** # 126

Huber, Thomas Nokia

*Comment Type* **TR** *Comment Status* **A** *APSU for coherent (CA)*

The MNT bits in the ITU-T G.709.1 description of CSTAT need to be specified, as they are needed to support ER1 PHY participation in APSU

*SuggestedRemedy*

Update figure 186-6 to show the MNT bits as bits 1-3 (bit 0 will stay as reserved)

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-315.

*Cl* **186** *SC* **186.2.3.5.11** *P* **656** *L* **6** # 127

Huber, Thomas Nokia

*Comment Type* **TR** *Comment Status* **A** *APSU for coherent (CA)*

The MNT bits in the ITU-T G.709.1 description of CSTAT need to be specified, as they are needed to support ER1 PHY participation in APSU

*SuggestedRemedy*

Add a bullet to the list describing the MNT field and how the value is determined. A presentation regarding support for APSU on ER1 PHYs will be provided.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-315.

*Cl* **186** *SC* **186.2.3.12** *P* **659** *L* **33** # 210

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **TR** *Comment Status* **A** *test pattern (L)*

Clarification needed. Are 257-bit blocks from the PRBS31 generator distributed into the eight tributary frames in a round-robin fashion? Or is the output of the PRBS31 generator copied to each of the eight tributary frames?

*SuggestedRemedy*

Please clarify.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The intent is that the test pattern is replicated in each of the eight tributary frames as the text implies: "When test pattern generation is enabled by the FEC control variable tx_test_mode (set to 1), the test pattern is generated by the 800GBASE-ER1 FEC sublayer into each of the eight 800GBASE-ER1 tributary frames before the GMP mapping process (see Figure 186-3), filling the entire payload area as shown in Figure 186-11." However, the wording could be improved to make this more clear.

Change the quoted sentence to read: "When test pattern generation is enabled by the FEC control variable tx_test_mode (set to 1), the output of the test pattern generator is replicated into the payload area of each of the eight 800GBASE-ER1 tributary frames before the GMP mapping process (see Figure 186-3), filling the entire payload area as shown in Figure 186-11."

*Cl* **186** *SC* **186.2.4** *P* **660** *L* **1** # 211

Mascitto, Marco — Infinera Canada Inc.,Nokia

*Comment Type* **TR** *Comment Status* **A** *test pattern (L)*

Just as the Transmit function has a Test-pattern generator (subclause 186.2.3.12), there should be a Test-pattern checker subclause to 186.2.4. Figure 186-3 shows both a Test-pattern injection point in the transmit path and a Test-pattern extraction point in the receive path. The Test-pattern checker would be similar in functionality to that in subclause 184.6.2. Support of the subclause could be optional.

*SuggestedRemedy*

A presentation that proposes text for this new subclause will be provided.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed the presentation at
https://www.ieee802.org/3/dj/public/26_05/mascitto_3dj_03_2605.pdf.

Make updates to Clause 186 as specified in mascitto_3dj_03_2605 on slides 4-8.

Implement with editorial license.

*Cl* **186** *SC* **186.2.4.7.6** *P* **663** *L* **10** # 128

Huber, Thomas — Nokia

*Comment Type* **TR** *Comment Status* **A** *APSU for coherent (CA)*

The MNT bits in the ITU-T G.709.1 description of CSTAT need to be specified, as they are needed to support ER1 PHY participation in APSU

*SuggestedRemedy*

Add a bullet to the list describing the MNT field and how the value is processed and used.
A presentation regarding support for APSU on ER1 PHYs will be provided.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-315.

*Cl* **186** *SC* **186.3.4.3** *P* **673** *L* **50** # 405

Opsasnick, Eugene — Broadcom Inc.

*Comment Type* **TR** *Comment Status* **A** *skew (L)*

It is stated that "à the transmit X and Y polarization symbol streams are identified and deskewed." However, there is no stated limit to the maximum skew and skew variation that must be tolerated anywhere in clause 186.

*SuggestedRemedy*

Add the maximum skew and skew variation that must be tolerated. Is it the same as what is specified in the table in 187.11.4.3 plus some extra for the logic between the PMD and PMA?

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
The line between PMD and PMA is somewhat fluid, particularly in the receive direction, where the PMA has to sort out what is actually being received on each of the analog signals that the PMD provides it. The specification of how much skew the Tx can insert is in 187.6.1 (Table 187-5). That should be a reasonable number to use in the PMA. Add the following text to the end of the first paragraph of 186.3.4.3: "Refer to 187.6 for skew specifications."

*Cl* **186** *SC* **186.4.3** *P* **685** *L* **25** # 61

WANG, Xuebo — Huawei Technologies Co., Ltd

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

In 5_BAD state of state diagram 186-19, the assignment "mfas_lock<x> <= false" is redundant with the same assignment in LOSS_OF_ALIGNMENT state, and should be removed. Setting fec_mfas_restart_lock <= true will restart all 8 instances of state diagram 186-19 (x=0,...,7), and they will go to LOSS_OF_ALIGNMENT with mfas_lock<x> <= false there. Having the redundant assignment in 5_BAD seems to imply that just the single instance is being reset, but if that was the case then fec_mfas_restart_lock should also be indexed with <x>. Similar issues in state diagram 186-17 and 186-18 had been resolved per comment #386 against D2.2.

*SuggestedRemedy*

In 5_BAD state of state diagram 186-19, remove the assignment of mfas_lock<x> to false, and leave only the assignment of fec_mfas_restart_lock to true.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-407.

*Cl* **186** *SC* **186.4.3** *P* **685** *L* **25** # 129

Huber, Thomas — Nokia

*Comment Type* **T** *Comment Status* **A** *(B1) (L)*

In Figure 186-19, in the 5_BAD state, there is no need to set mfas_lock<x> to false. Setting fec_mfas_restart_lock to true will cause a transition to the loss of alignment state, which sets mfas_lock<x> to false.

*SuggestedRemedy*

remove "mfas_lock<x> <= false" from the 5_BAD state

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolved using the response to comment I-407.

*Cl* **186** *SC* **186.4.3** *P* **685** *L* **26** # 407

Opsasnick, Eugene — Broadcom Inc.

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

In state diagram Figure 186-19, the assignment "mfas_lock<x> <= false" in the state 5_BAD is redundant with the same assignment in the LOSS_OF_ALIGNMENT state.

See comment #386 against D2.2 (https://www.ieee802.org/3/dj/comments/D2p2/8023dj_D2p2_comments_final_id.pdf) which removed similar assignments from the state diagrams 186-17 and 186-19. This figure is simliar to those and was just missed in the D2.2 comment, and it should be cleaned up now. Note that one fiigure was removed in D2.3 -- Figures 186-19 and 186-20 in Draft 2.2 became Figures 186-18 and 186-19 in Draft 2.3, respectively.

*SuggestedRemedy*

Remove "mfas_lock<x> <= false" from the 5_BAD state in Figure 186-19.

*Response* *Response Status* **W**

ACCEPT.

*Cl* **186** *SC* **186.4.3** *P* **686** *L* **1** # 408

Opsasnick, Eugene — Broadcom Inc.

*Comment Type* **TR** *Comment Status* **R** *state diagram (L) (B1)*

State diagram Figure 186-20 is used for the RX alignment marker location field syncing. As stated in another comment, the statement to "start multiframe_counter" is missing. The state diagram also requires either 8 non-zero values or 5 zero values in a row to match in order to use the new value, but this should not be necessary since the AML value used is after FEC correction. This state diagram is actually two state diagrams that interact and the interaction is not very clear. This process could be simplified to use the aml_value as-is unless the expected RAML location it is part of an uncorrectable codeword. The state diagram can then be simplified and made easier to understand.

*SuggestedRemedy*

Simplify and make more clear the state diagram figure 186-20 for alignment marker location tracking. A consensus presentation with changes for this state daigram is planned.

*Response* *Response Status* **W**

REJECT.
The commenter indicated that a related consensus presentation will not be available for the CRG meeting.
The suggested remedy does not provide sufficient detail to implement.

*Cl* **186** *SC* **186.4.3** *P* **686** *L* **26** # 406

Opsasnick, Eugene Broadcom Inc.

*Comment Type* **TR** *Comment Status* **A** *state diagram (L)*

The condition to exit the WAIT_FOR_MULTIFRAME state in the Figure 186-20 state diagram is "multiframe_counter_done". The multiframe_counter is defined in 186.4.2.4 as counting a number of bytes between successive AML overhead blocks. However, there is no "start multiframe_counter" statement in any of the state diagram figures and it is impossible to tell when to start the counter.

*SuggestedRemedy*

Update Figure 186-20 (or another appropiate state diagram figure in clause 186) to start the multiframe_counter before entering the WAIT_FOR_MULTIFRAME state.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

Define a multiframe_counter_done variable in 186.4.2.2 that indicates when the multiframe_counter has reached the terminal value.

Add a function that is called in either the state diagram in figure 186-19 or the state diagram in figure 186-20 to start the multiframe counter as would be appropiate for correct operation.

Implement with editorial license.

*Cl* **186** *SC* **186.7.2** *P* **689** *L* **39** # 404

Opsasnick, Eugene Broadcom Inc.

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

The Status variable "FEC_hi_ser" is missing from Table 186-8.

*SuggestedRemedy*

Add variable FEC_hi_ser to Table 186-8. Also add it to a bit definitions in Clause 45 if needed.

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.

Resolved using the response to comment I-11

*Cl* **186** *SC* **186.7.2** *P* **690** *L* **10** # 11

Marris, Arthur self

*Comment Type* **TR** *Comment Status* **A** *(B1) (L)*

Missing status variables in Table 186û8ù800GBASE-ER1 FEC sublayer status variables and MDIO mapping

*SuggestedRemedy*

In Table 186-8

Add IFEC_high_SER status variable mapping to 1.2201.2

Add remote PHY fault indication status variable as described in 186.2.3.5.2 and map to new status bit 1.2411.2

*Response* *Response Status* **W**

ACCEPT.

[Editor's note: CC: 186, 45]

*Cl* **186** *SC* **186.7.2** *P* **690** *L* **12** # 8

Marris, Arthur self

*Comment Type* **T** *Comment Status* **A** *(B1) (L)*

In Table 186û8 IFEC_degraded_SER points to bit 1.2201.2.

This is incorrect as 1.2201.2 is for high SER

*SuggestedRemedy*

Create new bit in Clause 45 at register location 1.2201.12 to indicate IFEC degraded SER.

Change 1.2201.2 to 1.2201.12 on line 12 in Table 168-8 for IFEC_degraded_SER and make appropriate additions in "45.2.1.217 IFEC status register (Register 1.2201)" for this new bit

*Response* *Response Status* **C**

ACCEPT.

[Editor's note: CC: 186, 45]

*Cl* **186A** *SC* **186A** *P* **954** *L* **1** # 316

Nicholl, Gary — Cisco Systems, Inc.

*Comment Type* **TR** *Comment Status* **A** *test vectors (L)*

As noted in Draft 2.2 Comment #44 (https://www.ieee802.org/3/dj/comments/D2p3/8023dj_D2p3_comments_final_clause.pdf), test vectores are required to be provided for the 800GBASE-ER1 FEC and PMA.

*SuggestedRemedy*

Two contributions will be provided:
1) A contributution containing the test vectors. This will be based on the test vectors files provided against Draft 2.2 Comment #44 (https://www.ieee802.org/3/dj/comments/D2p3/8023dj_D2p3_comments_final_clause.pdf) and posted as https://www.ieee802.org/3/dj/public/26_01/sluyski_3dj_02_2601.7z.
2) A contribution containing the proposed text for Annex 186A.

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed the presentation at:
https://www.ieee802.org/3/dj/public/26_05/nicholl_3dj_02a_2605.pdf
with associated data at
https://www.ieee802.org/3/dj/public/26_05/nicholl_3dj_03_2605.7z

Make changes to Annex 186A as outlined in nicholl_3dj_02a_2605 on slides 5-7.
Implement with editorial license.

*Cl* **187** *SC* **187.5.1** *P* **701** *L* **8** # 232

Maniloff, Eric — Ciena Corporation

*Comment Type* **E** *Comment Status* **A** *Block diagram (OC)*

Labels and locations in Fig 187-3 are inconsistent with other clauses.

*SuggestedRemedy*

Change Optical transmitter label to PMD transmit function and Optical receiver to "PMD receive function". Add PMD_signal_detect

*Response* *Response Status* **C**

ACCEPT IN PRINCIPLE.
In Figure 187-3
Change "Optical transmitter" to "PMD Transmit Function" and "Optical receiver" to "PMD Receive Function".
Add PMD_signal_detect from the PMD Receive Function
To align with the other optical PMD clauses change "ER1 PMA transmit function" to "ER1 PMA Transmit Function" and "ER1 PMA receive function" to "ER1 PMA Receive Function" and move labels into their respective boxes.

With editorial license.

*Cl* **187** *SC* **187.5.1** *P* **701** *L* **8** # 231

Maniloff, Eric — Ciena Corporation

*Comment Type* **T** *Comment Status* **A** *Block diagram (OC)*

The label for TP1 and TP2 on Fig 187-3 are not correct, TP1 and TP4 do not beliong in this figure

*SuggestedRemedy*

Remove TP1 and TP4

*Response* *Response Status* **C**

ACCEPT.

*Cl* **187** *SC* **187.10** *P* **714** *L* **9** # 233

Maniloff, Eric — Ciena Corporation

*Comment Type* **ER** *Comment Status* **A** *(B1) (OC)*

Control Variable Reset is labeled improperly

*SuggestedRemedy*

Change "Reset" to "PMD_reset"

*Response* *Response Status* **W**

ACCEPT.

*Cl* **187** *SC* **187.10** *P* **714** *L* **20** # 234

Maniloff, Eric — Ciena Corporation

*Comment Type* **ER** *Comment Status* **A** *Block diagram (OC)*

Labels and locations in Fig 187-3 are inconsistent with other clauses.

*SuggestedRemedy*

Change Optical transmitter label to PMD transmit function and Optical receiver to "PMD receive function". Add PMD_signal_detect

*Response* *Response Status* **W**

ACCEPT IN PRINCIPLE.

The commenter indicated that the comment and suggested remedy field were erroneously entered and that they were intended to be the same as for comment I-230 except directly at Clause 187 instead of Clause 185. The clause, subclause, page, and line numbers are as intended. The response to this comment addresses the commenter indicated intent.

In Table 187-16 change
"Fault" to "PMD fault"
"Transmit fault" to "PMD transmit fault"
"Receive fault" to "PMD receive fault"
For "Global PMD signal detect" change the variable reference to "187.5.4"
Add a new row with variable name "PMD signal detect", variable reference "187.5.5", MDIO number "1.10.1" and MDIO reference "45.2.1.9.6"

With editorial license

*Cl* **187** *SC* **187.11.4.3** *P* **718** *L* **9** # 119

Issenhuth, Tom — Huawei Technologies Co., Ltd,Issenhuth Consulting,

*Comment Type* **E** *Comment Status* **A** *(B1) (OC)*

In optical measurements PICS table the term "Tx clock phase noise: total periodic jitter (max)" should not include "(max)"

*SuggestedRemedy*

Remove "(max)" from the feature description

*Response* *Response Status* **C**

ACCEPT.