Cl **00** *SC* **0** *P* **293** *L* **50** # 360

Ran, Adee — Cisco Systems, Inc.

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

"If one or two 200GAUI-n is implemented in a PHY"
possible number mismatch (two / is).

In addition, for KR and CR PHYs only one AUI can be included in a PHY.

The footnote can be phrased better to avoid the number mismatch and difference between PHYs.

There are 19 instances with 200GAUI-n, 400GAUI-n, 800GAUI-n, and 1.6TAUI-n.

SuggestedRemedy

Change to "If a PHY includes any 200GAUI-n" and similarly for all instances.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **1** *SC* **1.3** *P* **48** *L* **43** # 574

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **A** *(bucket)*

The QSFP-DD specification has been updated. Notice that 1.3 says "Standards may be subject to revision, and parties subject to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below"

SuggestedRemedy

Update QSFP-DD from Rev 7.0, September 29, 2023 to Rev 7.1, June 25, 2024, or remove the date and revision number from the reference.
Update any other references as appropriate if new revisions are published.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change the revision number and date as proposed in the suggested remedy.
Implement with editorial license.

Cl **1** *SC* **1.4** *P* **53** *L* **1** # 476

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **R** *(withdrawn)*

Need defintion for inter-sublayer link
This is defined locally in 176A.2.

SuggestedRemedy

Add definition for inter-sublayer link.

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **1** *SC* **1.4** *P* **53** *L* **1** # 475

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **R** *(withdrawn)*

Need definition for inter-sublayer link training. This is defined generally in 174.2.11.

SuggestedRemedy

Add definition for inter-sublayer link training.

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **1** *SC* **1.4.184ea** *P* **52** *L* **30** # 306

Mi, Guangcan — Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **A** *(bucket)*

missing discription of modulation format of 800GBASE-LR1

SuggestedRemedy

IEEE 802.3 physical layer specification for 800Gb/s PHY using 800GBASE-R encoding, dual polarization 16 state quadrature amplitude modulation(DP-16QAM), and coherent detection, over single-mode fiber, with reach up to at least 10km.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change the definition to the following:
IEEE 802.3 Physical Layer specification for 800Gb/s PHY using 800GBASE-R encoding, dual polarization 16-state quadrature amplitude modulation (DP-16QAM), and coherent detection, over single-mode fiber, with reach up to at least 10 km.

Cl **1** *SC* **1.5** *P* **53** *L* **22** # 474

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

Need to include ISL here

SuggestedRemedy

Add new abbreviation as follows:
ILS inter-sublayer link

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Add new abbreviation as follows:
ISL inter-sublayer link

Cl **30** *SC* **30.3.2.1.2** *P* **56** *L* **16** # 450

Sluyski, Mike — Cisco Systems Inc.

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

Does 800GBASE-ER1 encompass 800GBASE-ER1-20 or should 800GBASE-ER1-20 reference an subclause of Clause 186

SuggestedRemedy

Add 800GBASE-ER1-20 and Clause 186 type 800GBASE-ER1-20 after line 16

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **30** *SC* **30.3.2.1.3** *P* **56** *L* **35** # 451

Sluyski, Mike — Cisco Systems Inc.

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

Does 800GBASE-ER1 PCS encompass 800GBASE-ER1-20 or should 800GBASE-ER1-20 have it's own listing

SuggestedRemedy

Add 800GBASE-ER1-20 and Clause 186 type 800GBASE-ER1-20 PCS after line 44

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **30** *SC* **30.5.1.1.2** *P* **58** *L* **36** # 307

Mi, Guangcan — Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **A** *(bucket)*

wrong PCS type for 800GBASE-ER1

SuggestedRemedy

change to 800GBASE-ER1 PCS/PMA encoding over single-mode fiber ..

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
change to 800GBASE-ER1 PCS/PMA over single-mode fiber ..
Implement the suggested remedy with editorial license

Cl **30** *SC* **30.5.1.1.2** *P* **58** *L* **38** # 308

Mi, Guangcan — Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **A** *(bucket)*

wrong PCS type for 800GBASE-ER1-20

SuggestedRemedy

change to 800GBASE-ER1 PCS/PMA encoding over single-mode fiber ..

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
change to 800GBASE-ER1 PCS/PMA over single-mode fiber ..
Implement the suggested remedy with editorial license

Cl **30** *SC* **30.13.1.1** *P* **60** *L* **1** # 185

He, Xiang — Huawei

Comment Type **TR** *Comment Status* **A** *(bucket)*

TimeSync related registers for Inner FEC sublayer were added in Clause 45, but were not reflected in 30.13. Suggest to add the new registers to TimeSync entity managed object class, and corresponding subclause numbers in 30.13.1.1 - 30.13.1.12.

SuggestedRemedy

Add following text after subclause 30.6:
"30.13 Management for oTimeSync entity
30.13.1 TimeSync entity managed object class
Change the items in 30.13.1 (as amended by IEEE Std 802.3cx-2023) as follows (some unchanged items not shown):
30.13.1.1 aTimeSyncCapabilityNsTX
If a Clause 45 MDIO Interface to PMA/PMD, Inner FEC, WIS, PCS, PHY XS, DTE XS, and/or TC is present, ...
- For Inner FEC: 1.1800.5, see 45.2.1.175
30.13.1.2 aTimeSyncCapabilityNsRX
If a Clause 45 MDIO Interface to PMA/PMD, Inner FEC, WIS, PCS, PHY XS, DTE XS, and/or TC is present, ...
- For Inner FEC: 1.1800.4, see 45.2.1.175
30.13.1.3 aTimeSyncDelayNsTXmax
If a Clause 45 MDIO Interface to PMA/PMD, Inner FEC, WIS, PCS, PHY XS, DTE XS, and/or TC is present, ...
- For Inner FEC: 1.1813 and 1.1814, see 45.2.1.177a
30.13.1.4 aTimeSyncDelayNsTXmin
If a Clause 45 MDIO Interface to PMA/PMD, Inner FEC, WIS, PCS, PHY XS, DTE XS, and/or TC is present, ...
- For Inner FEC: 1.1815 and 1.1816, see 45.2.1.177a
30.13.1.5 aTimeSyncDelayNsRXmax
If a Clause 45 MDIO Interface to PMA/PMD, Inner FEC, WIS, PCS, PHY XS, DTE XS, and/or TC is present, ...
- For Inner FEC: 1.1819 and 1.1820, see 45.2.1.177b
30.13.1.6 aTimeSyncDelayNsRXmin
If a Clause 45 MDIO Interface to PMA/PMD, Inner FEC, WIS, PCS, PHY XS, DTE XS, and/or TC is present, ...
- For Inner FEC: 1.1821 and 1.1822, see 45.2.1.177b
30.13.1.7 aTimeSyncCapabilitySubNsTX
If a Clause 45 MDIO Interface to PMA/PMD, Inner FEC, WIS, PCS, PHY XS, DTE XS, and/or TC is present, ...
- For Inner FEC: 1.1800.7, see 45.2.1.175
30.13.1.8 aTimeSyncCapabilitySubNsRX
If a Clause 45 MDIO Interface to PMA/PMD, Inner FEC, WIS, PCS, PHY XS, DTE XS, and/or TC is present, ...
- For Inner FEC: 1.1800.6, see 45.2.1.175
30.13.1.9 aTimeSyncDelaySubNsTXmax
If a Clause 45 MDIO Interface to PMA/PMD, Inner FEC, WIS, PCS, PHY XS, DTE XS, and/or TC is present, ...
- For Inner FEC: 1.1817, see 45.2.1.177a
30.13.1.10 aTimeSyncDelaySubNsTXmin
If a Clause 45 MDIO Interface to PMA/PMD, Inner FEC, WIS, PCS, PHY XS, DTE XS, and/or TC is present, ...
- For Inner FEC: 1.1818, see 45.2.1.177a
30.13.1.11 aTimeSyncDelaySubNsRXmax
If a Clause 45 MDIO Interface to PMA/PMD, Inner FEC, WIS, PCS, PHY XS, DTE XS, and/or TC is present, ...
- For Inner FEC: 1.1823, see 45.2.1.177b
30.13.1.12 aTimeSyncDelaySubNsRXmin
If a Clause 45 MDIO Interface to PMA/PMD, Inner FEC, WIS, PCS, PHY XS, DTE XS, and/or TC is present, ...
- For Inner FEC: 1.1824, see 45.2.1.177b

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license

Cl **45** *SC* **45** *P* **61** *L* **1** # 453

Sluyski, Mike — Cisco Systems Inc.

Comment Type **TR** *Comment Status* **R** *(withdrawn)*

Clause 45 has no visibility to whether there is or is not an inner nor outer FEC added in the PMA/PMD or an extender sublayer. It seems "inner FEC was added after 2022" to cover aapplications where there is an XS either segmented or concatenated.

SuggestedRemedy

Remove . "inner" . from all Clause 45 FEC descriptions. When a FEC or XS is present the latency should be added as a fixed additive value. These could be added as separate terms but they shouldn't be referred to as either inner or outer FEC. These adders should also be "fixed" in nature (unlike the dynamic adjustments done for idle insert/remove.

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **45** *SC* **45.2.1** *P* **61** *L* **37** # 11

Marris, Arthur — Cadence Design Systems

Comment Type **T** *Comment Status* **A** *(bucket)*

There are 146 Inner FEC control and status registers so there is not adequate space for them at the space starting at 1.2000

SuggestedRemedy

Move start location of inner FEC control/status registers from 1.2000 to 1.2400

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license

Cl **45** *SC* **45.2.1.60d** *P* **71** *L* **35** # 452

Sluyski, Mike — Cisco Systems Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

Missing Parenthesis after (Register 1.75

SuggestedRemedy

Add closing parenthesis

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **45** *SC* **45.2.1.175** *P* **79** *L* **14** # 295

de Koos, Andras — Microchip Technology

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

In table 45-139, the value = 0 descriptions for the 4 new bits (bits 1.1800.4:7) are each missing the word 'FEC'

SuggestedRemedy

change
"0 = Inner does not provide information on."
to
"0 = Inner FEC does not provide information on."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **45** *SC* **45.2.1.213g** *P* **86** *L* **37** # 40

Bruckman, Leon — Nvidia

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

Wrong table name. Table 45-177g is for the Inner FEC, not an RS-FEC

SuggestedRemedy

Change title of Table 45-177g to: "Inner FEC codeword error bin 1 bit definitions"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **45** *SC* **45.2.1.213h** *P* **86** *L* **52** # 41

Bruckman, Leon — Nvidia

Comment Type **TR** *Comment Status* **A** *(bucket)*

These seem to be the bin counters for lanes 1 to 7. The text is not clear and the register addresses seems to be wrong. Too many addresses (17 per lane), only 6 per lane (total 42) are required.

SuggestedRemedy

Change the title of subclause 45.2.1.213g to: "Inner FEC codeword error bin registers 1 through 3 for lane 0"
Change: the subcaluse 45.2.1.213h title to: " Inner FEC bin counter registers for lanes 1 through 7 (Registers 1.2020 through 1.2061)"
Change the text of subclause 45.2.1.213h to: "Registers 1.2014 through 1.2019 are repeated for each Inner FEC lane present, with registers 1.2020 through 1.2024 being for lane 1, registers 1.2025 through 1.2030 being for lane 2, etc."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The counter registers from 1.2002 to 1.2019 are repeated for all 8 inner FEC lanes. So each lane needs 18 registers for the counters.
Add "for lane 0" to title of 45.2.1.213g, and add "The eighteen counter registers" to the body of 45.2.1213h.
Implement these changes with editorial license.

Cl **45** *SC* **Table 45-139** *P* **79** *L* **5** # 454

Sluyski, Mike — Cisco Systems Inc.

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

Table 45 Descriptions are not consistent "1" mentions FEC "0" does not include the term FEC.

SuggestedRemedy

Remove . "inner" FEC . from name column or remove FEC in description column or add "inner FEC for desciption when "0".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **90A** *SC* **90A.3** *P* **593** *L* **39** # 9

Marris, Arthur — Cadence Design Systems

Comment Type **T** *Comment Status* **A** *(bucket)*

Update Table 90A-1 in accordance with mainenance request
https://www.ieee802.org/3/maint/requests/maint_1432.pdf

SuggestedRemedy

For AM/CWM collumn change 200/400/800G values to 5.12 from 2.56 ns, adding appropriate editors note

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license

Cl **116** *SC* **116.1** *P* **113** *L* **0** # 273

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Clause 90 should be included in the PHY type and Clause Correlation Tables
Is clause 90 necessary in these tables if the previous comment is implemented? Some features/interfaces/functions (e.g. MDIO) are not included in these tables, but others (e.g. clause 78 EEE) are.

SuggestedRemedy

Add a column for Clause 90, and mark as 'optional' for all PHYs in the following Tables:
Table 116-3-PHY type and clause correlation (200GBASE copper with 2 or 4 lanes)
Table 116-3aa-PHY type and clause correlation (200GBASE copper with 1 lane)
Table 116-3a-PHY type and clause correlation (400GBASE copper with 4 lanes)
Table 116-3b-PHY type and clause correlation (400GBASE copper with 2 lanes)
Table 116-4-PHY type and clause correlation (200GBASE-R optical with 2 or 4 lanes)
Table 116-4a-PHY type and clause correlation (200GBASE-R optical with 1 lane)
Table 116-5-PHY type and clause correlation (400GBASE optical with 4, 8, or 16 lanes)
Table 116-5a-PHY type and clause correlation (400GBASE-R optical with 2 lanes)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **116** *SC* **116.1.4** *P* **117** *L* **9** # 309

Mi, Guangcan — Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **R** *(withdrawn)*

missing discription in last column of CL180 and 182

SuggestedRemedy

change the clause names of the last two columns to 200GBASE-DR1 and 200GBASE-DR1-2

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **116** *SC* **116.2** *P* **120** *L* **0** # 272

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Missing reference to Clause 90 Time synchronization in Clause 169 - Introduction to 200 Gb/s and 400 Gb/s networks

SuggestedRemedy

Insert a new sub-clause (e.g. 116.2.10) (akin to 116.2.6 Management interface (MDIO/MDC))

116.2.8 Time Synchronization
A 200 Gb/s or 400 Gb/s Physical Layer can optionally support time synchronization protocols that require knowledge of packet egress and ingress time.
When Time Synchronization is supported:
the 200 Gb/s and 400 Gb/s RS provides a Time Synchronization Service Interface (TSSI) which connects to a TimeSync Client.
the path data delays through each PHY layer are reported in MDIO status registers
Time synchronization support through Ethernet PHYs is specified in Clause 90.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **116** *SC* **116.2.5** *P* **119** *L* **48** # 220

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

The changes made to this text have removed 400GBASE-CR4 from the list of PHYs supporting auto-negotiation, and did not add 400GBASE-CR2. This is not consistent with what is in table 116-3a and 116-3b.

SuggestedRemedy

Update the list of PHYs to include 400GBASE-CR4 and 400GBASE-R2.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Add the following two PHY types to the list: 400GBASE-CR4, 400GBASE-CR2

Cl **116** *SC* **116.3.1** *P* **121** *L* **2** # 221

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

The newly added sentence about IS_SIGNAL.request isn't folowing the same structure as the sentences about the other primitives, all of which have this layer as the subject and the adjacent layer as the object.

SuggestedRemedy

Change the last sentence from:
"The IS_SIGNAL.request primitive is used to define the transfer of signal status from the next higher layer to a sublayer"
to
"The IS_SIGNAL.request primitive is used to define the transfer of signal status from a sublayer to the next lower sublayer."

Response *Response Status* **C**

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

Cl **116** *SC* **116.3.3.3** *P* **125** *L* **49** # 42

Bruckman, Leon Nvidia

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

The acronym for Inter-sublayer link training was already defined in subclause 116.2.9. No need to spell the whole function name

SuggestedRemedy

Use the acronym ILT throughout this clause

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **116** *SC* **116.3.3.4** *P* **126** *L* **42** # 222

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

It is confusing to be referring to both the next higher sublayer and the next lower sublayer when discussing this primitive - any given primitive should be between "a sublayer" and an adjacent sublayer..

SuggestedRemedy

Rewrite the text as follows (essentially deleting the first sentence and clarifying the remaining text):
The IS_SIGNAL.request primitive is generated by the transmit process to propagate the detection of severe error confitions (e.g., no valid signal being received by a sublayer) to the next lower sublayer, and, for physical layer implemenations that use the inter-sublayer link training function defined in Annex 176A, to indicate the status of the inter-sublayer link training.

Response *Response Status* **C**

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

Cl **116** *SC* **116.3.3.4.1** *P* **127** *L* **1** # 223

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **R** *(bucket)*

The value OK means there is valid data being presented to the lower layer whether or not ILT is used.

SuggestedRemedy

Revise the paragrah as follows:
A value of OK indicates that communication between the next higher sublayer and this sublayer has been established and valid data is being presented by the sublayer to the next lower sublayer.

Response *Response Status* **C**

REJECT.
The value of ILT is that it confirms unambiguously that data being received at each physical interface is indeed valid. The phrase "service interface supports the values IN_PROGRESS and READY" implies that ILT is being used. Without ILT a value of "OK" means only that there are no indications that the data is not valid, but at the same there is no confirmation that it is valid.

Cl **116** *SC* **116.3.3.4.1** *P* **127** *L* **7** # 224

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **R** *(bucket1p)*

The IN_PROGRESS and READY values are only supported if ILT is being used. It would be more clear to make support of ILT the condition rather than support of the values.

SuggestedRemedy

Change "supports the values IN_PROGRESS and READY" to "supports inter-sublayer link training".

Response *Response Status* **C**

REJECT.
The proposed changes do not improve the clarity or accuracy of the draft.

Cl **116** *SC* **116.3.3.4.1** *P* **127** *L* **15** # 225

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *(bucket1p)*

The phrase "communication with some upper sublayer is not fully established yet" is confusing. Any sublayer only directly communicates with the immediately adjacent sublayer(s). The corresponding indication primitive refers to communication with the link partner; while that is still not really clear, it is at least some improvement.

SuggestedRemedy

Change "with some upper sublayer" to "with the link partner".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The SIGNAL_OK parameter value is potentially propagated through multiple sublayers in a PHY. As an example, this READY value might emanate from an AUI component (indicating that this AUI is not done ILT) and this might propagate through a PMA, and Inner FEC, and final to the PMD. The suggested remedy is not correct.
But it might be better to refer to the ILT process.
Change "but communication with some upper sublayer is not fully established yet"
To "but ILT at an upper ISL has not completed"
Implement with editorial license.

Cl **116** *SC* **116.5** *P* **131** *L* **12** # 183

He, Xiang — Huawei

Comment Type **TR** *Comment Status* **R** *(bucket)*

Figure 116-5, 200GAUI-n and 400GAUI-n above SP6 should be 200GAUI-m and 400GAUI-m.

SuggestedRemedy

Change the "200GAUI-n" below PMA(8:m) to "200GAUI-m";
Change "400GAUI-n" below PMA(16:m) to "400GAUI-m".

Response *Response Status* **C**

REJECT.
The labels for each of the xAUI-n are the standard nomenclature. Note that the "n" is not italicized. This aligns with the figure title. Note also that this is consistent with other diagrams in Clause 116 in the base standard (e.g., Figure 116-5).

Cl **119** *SC* **119** *P* **137** *L* **1** # 579

Nicholl, Gary — Cisco Systems

Comment Type **T** *Comment Status* **R** *(withdrawn)*

I really like Table 175-1 in that it clearly specifies which of the bits in the tx_am_sf are for "local degraded" and "remote degraded". Add a similar table to 119 and 172.

SuggestedRemedy

Add a similar table to 119.2.4.4, defining which bits in tx_am_sf are for "local degraded" and "remote degraded.

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **119** *SC* **119.7.4.1** *P* **141** *L* **12** # 226

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

In clauses 171, 172, and 175, the PICS has separate elements for using the state diagram and stateless encoder; here they seem to be lumped together.

SuggestedRemedy

Align the PICS items for 66b encoder/decoder with what is in clauses 171/172.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editoiral license

Cl **120F** *SC* **120F.1** *P* **597** *L* **14** # 337

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

Comment Type **TR** *Comment Status* **A** *'bucket), OSI reference figure*

The OSI Reference Model "Physical" includes the MDI - the lower border should align with the MDI / Medium border. As currently shown, it appears to be showing the bottom border of the PHY.
Two instances in Figure 120F-1

SuggestedRemedy

Redraw the bottom of the OSI Reference model so it aligns to the MDI / Medium Border

Response *Response Status* **C**

ACCEPT.

Cl **120G** *SC* **120G.1** *P* **603** *L* **14** # 338

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

Comment Type **TR** *Comment Status* **A** *'bucket), OSI reference figure*

The OSI Reference Model "Physical" includes the MDI - the lower border should align with the MDI / Medium border. As currently shown, it appears to be showing the bottom border of the PHY.
Two instances in Figure 120G-1

SuggestedRemedy

Redraw the bottom of the OSI Reference model so it aligns to the MDI / Medium Border

Response *Response Status* **C**

ACCEPT.

Cl **169** *SC* **169.1** *P* **145** *L* **0** # 271

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Clause 90 should be included in the PHY type and Clause Correlation Tables in Clause 169 (Introduction to 800 Gb/s networks)
Is clause 90 necessary in these tables if the previous comment is implemented? Some features/interfaces/functions (e.g. MDIO) are not included in these tables, but others (e.g. clause 78 EEE) are.

SuggestedRemedy

Add a column for Clause 90, and mark as 'optional' for all PHYs in the following Tables:
Table 169-2-PHY type and clause correlation (800GBASE copper)
Table 169-3-PHY type and clause correlation (800GBASE optical PAM4)
Table 169-3a-PHY type and clause correlation (800GBASE optical coherent)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **169** *SC* **169.1.2** *P* **143** *L* **14** # 43

Bruckman, Leon — Nvidia

Comment Type **ER** *Comment Status* **A** *(editorial)*

Typo: an 4-lane

SuggestedRemedy

Change "an 4-lane" to "a 4-lane"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **169** *SC* **169.1.3** *P* **144** *L* **40** # 44

Bruckman, Leon — Nvidia

Comment Type **TR** *Comment Status* **A** *(bucket)*

800GBASE-LR1 is also dual polarization 16-state quadrature amplitude modulation (DP-16QAM), and coherent detection

SuggestedRemedy

Make the description of all coherent PHYs (800GBASE-LR1, 800GBASE-ER1, 800GBASE-ER1-20) consistent.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #310.

Cl **169** *SC* **169.1.3** *P* **144** *L* **41** # 310

Mi, Guangcan — Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **A** *(bucket)*

missing discription of modulation format of 800GBASE-LR1

SuggestedRemedy

change discription to , 800Gb/s PHY using 800GBASE-R encoding, dual polarization 16 state quadrature amplitude modulation(DP-16QAM), and coherent detection, over single-mode fiber, with reach up to at least 10km.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change the discription to: "800Gb/s PHY using 800GBASE-R encoding, dual polarization 16-state quadrature amplitude modulation (DP-16QAM), and coherent detection, over single-mode fiber, with reach up to at least 10km."

Cl **169** *SC* **169.2** *P* **148** *L* **0** # 270

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Missing reference to Clause 90 Time synchronization in Clause 169 - Introduction to 800 Gb/s networks

SuggestedRemedy

Insert a new sub-clause (e.g. 169.2.10) (akin to 169.2.7 Management interface (MDIO/MDC))

169.2.10 Time Synchronization
A 800 Gb/s Physical Layer can optionally support time synchronization protocols that require knowledge of packet egress and ingress time.
When Time Synchronization is supported:
the 800 Gb/s RS provides a Time Synchronization Service Interface (TSSI) which connects to a TimeSync Client.
the path data delays through each PHY layer are reported in MDIO status registers
Time synchronization support through Ethernet PHYs is specified in Clause 90.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **171** *SC* **171** *P* **164** *L* **0** # 303

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *PTP accuracy (ER1)*

In order to support Clause 186 AM location relay, the PHY_XS Receive needs an input that dictates where to insert its AMs.
This requires an addition to the existing interface. The Rx PCS indicates its AM position to the Rx PHY_XS
Will also need an ammendment to the PHY_XS Rx clauses so that AMs are inserted at a specific position based on this new input.
All very dicey. AM insertion for the Rx PHY_XS (Cl 171) is defined in the Tx PCS Clause (Cl172), which in turn points to Clause 119.
But perhaps not as bad as it seems. Implementations already do this, we're just forced to formalize it due to CL186.

SuggestedRemedy

Might be possible to ammend 172.2.4.6, adding a bullet point:
When AM position relay is supported, the alignment markers within each flow shall occur at the point in the original stream of 66-bit blocks indicated by <new input>

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #302

Cl **171** *SC* **171** *P* **164** *L* **0** # 302

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *PTP accuracy (ER1)*

In order to support Clause 186 AM location relay, the PHY_XS Transmit needs to indicate its AM location to the Tx PCS.
It should be possible to do this using the existing RX_NUM_BIT_CHANGE output defined in Clause 90, which indicates xMII discontinuities due to idle insertion/deletion and AM removal done in the PCS/PHY_XS/DTE_XS.

SuggestedRemedy

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed the presentation at:
https://www.ieee802.org/3/dj/public/24_09/huber_3dj_02_2409.pdf

Implement the approach captured in huber_3dj_02_2409 with editorial license.

[Editor's note: CC 171, 186]

Cl **171** *SC* **171.2.1** *P* **167** *L* **0** # 457

Sluyski, Mike — Cisco Systems Inc.

Comment Type **TR** *Comment Status* **A** *PTP accuracy (ER1)*

FEC alignment marker framing, deskew, and OH Counter for AM positional preservation over the GMP mapped ER1/ER1-20 datapath is not described in document.

SuggestedRemedy

I'm happy to work with editors to document sluyski_3dj_02_2405

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #302

Cl **171** *SC* **171.3** *P* **168** *L* **4** # 256

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *PTP accuracy (ER1)*

The adopted baseline for improving PTP accuracy for 800GBASE-ER1[-20] requires tweaks to the processes of removing and inserting alignment markers, which happens in the 800GXS.

SuggestedRemedy

A presentation regarding how to update clause 171 to account for the fact that there need to be functions in the 800GXS that are used only when it is connected to an 800GBASE-ER1[-20] PCS will be provided.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #302

Cl **171** *SC* **171.9.5.2** *P* **181** *L* **10** # 458

Sluyski, Mike — Cisco Systems Inc.

Comment Type **TR** *Comment Status* **A** *PTP accuracy (ER1)*

RF required for AM positional transmission transparency. Status O.

SuggestedRemedy

Add RFx to table.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #302

Cl **171** *SC* **Figure 171.2a** *P* **169** *L* **1** # 456

Sluyski, Mike — Cisco Systems Inc.

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

Can't tell from 802.3dj/D1p1 whether 171.2 is the equivalent PHY 800GXS block diagram.

SuggestedRemedy

If Figure 171.2 is the 800G equivalent to 171.2a they should be able to be combined. If not then there is no 800G XS drawing.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **172** *SC* **172** *P* **185** *L* **4** # 580

Nicholl, Gary — Cisco Systems

Comment Type **T** *Comment Status* **R** *(withdrawn)*

I really like Table 175-1 in that it clearly specifies which of the bits in the tx_am_sf are for "local degraded" and "remote degraded". Add a similar table to 119 and 172.

SuggestedRemedy

Add a similar table to 119.2.4.4, defining which bits in tx_am_sf are for "local degraded" and "remote degraded.

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **172** *SC* **172.1.3** *P* **185** *L* **17** # 459

Sluyski, Mike — Cisco Systems Inc.

Comment Type **TR** *Comment Status* **R** *(bucket)*

subbullet i) is not relevant or consistent with an External XS layer. Rate compensation

SuggestedRemedy

make optional for external XS layer.

Response *Response Status* **C**

REJECT.
The current text is consistent with other PCS clauses, such as 82, 119 and 175. Even in the case where an Extender Sublayer (XS) is implemented, the XS and the PHY are allowed to run asynchronous to each other, and so this rate compensation function in the PCS is required. However if in a given implementation the XS and PHY are synchronous to each other, then this funciton is not required to be implemented (becuase in this case there would be "no rate difference between the 800GMII and the sublayer below the PCS").

Cl **172** *SC* **172.1.3** *P* **185** *L* **19** # 455

Sluyski, Mike — Cisco Systems Inc.

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

Doesn't read well

SuggestedRemedy

Change "The 800GBASE-R PCS provide all services require by the 800GMII". to "The 800GBASE-R PCS provides all of the services required by the 800GMII" ..

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **174** *SC* **174.1** *P* **196** *L* **0** # 269

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Clause 90 should be included in the PHY type and Clause Correlation Tables in Clause 174 (Introduction to 1.6 Tb/s networks)
Is clause 90 necessary in these tables if the previous comment is implemented? Some features/interfaces/functions (e.g. MDIO) are not included in these tables, but others (e.g. clause 78 EEE) are.

SuggestedRemedy

Add a column for Clause 90, and mark as 'optional' for all PHYs in the following Tables:
Table 174-2-PHY type and clause correlation (1.6TBASE-R optical)
Table 174-3-PHY type and clause correlation (1.6TBASE-R electrical)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **174** *SC* **174.2** *P* **198** *L* **0** # 268

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Missing any reference to Clause 90 Time synchronization in Clause 174 - Introduction to 1.6 Tb/s networks.

SuggestedRemedy

Insert new sub-clause (e.g. 174.2.13) (akin to 174.2.9 Management interface (MDIO/MDC))

174.2.13 Time Synchronization
A 1.6 Tb/s Physical Layer can optionally support time synchronization protocols that require knowledge of packet egress and ingress time.
When Time Synchronization is supported:
the 1.6 Tb/s RS provides a Time Synchronization Service Interface (TSSI) which connects to a TimeSync Client.
the path data delays through each PHY layer are reported in MDIO status registers
Time synchronization support through Ethernet PHYs is specified in Clause 90.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **174** *SC* **174.2.11** *P* **198** *L* **30** # 45

Bruckman, Leon — Nvidia

Comment Type **TR** *Comment Status* **A** *(bucket)*

"module" is not the right term

SuggestedRemedy

Change "module" to "modulation"

Response *Response Status* **C**

ACCEPT.

Cl **174** *SC* **174.2.11** *P* **198** *L* **33** # 46

Bruckman, Leon — Nvidia

Comment Type **TR** *Comment Status* **R** *(bucket1p)*

There are two ILT formats A1 and A2. Indicate which is used by each PMD

SuggestedRemedy

Separate the list into two, one for CR8 and KR8 titled: "ILT using format A1 frames is supported by the following PHY types:"
and another for DR8 and DR8-2 titled: "ILT using format A2 frames is supported by the following PHY types:"

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **174A** *SC* **174A** *P* **611** *L* **1** # 350

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

Comment Type **T** *Comment Status* **R** *(bucket)*

Annex 174B is noted as normative - but there are no corresponding SHALL statements or PICS.

SuggestedRemedy

Add Shall statement where intended or make informative.

Response *Response Status* **C**

REJECT.
A normative annex need not have either shall statements or PICS to be normative. As an example, Annex 93A (COM) does include shall statements, but it has no PICS subclause. As another example, Annex 93C, which provides test methodologies for 25 Gb/s signaling, is normative, but includes no shall statement and no PICS.
The content of this annex is indeed normative. However, the normative relavance is set by piecemeal reference from another clause. Therefore no shall statements or PICS are required here. Those will be part of the referencing clauses and annexes.

Cl **174A** *SC* **174A** *P* **611** *L* **9** # 133

Dudek, Mike Marvell

Comment Type **T** *Comment Status* **A** *error ratio*

The name "Data reliability" is not helpful as "reliability" has connotations of long term performance and the title doesn't refer to error requirements.

SuggestedRemedy

Change "Data reliability" to "error performance" or "error ratio" throughout the draft.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #473.

Cl **174A** *SC* **174A** *P* **611** *L* **10** # 473

Brown, Matt Alphawave Semi

Comment Type **T** *Comment Status* **A** *error ratio*

The term "data reliability" is new in 802.3 and does not accurately reflect the related specifications. Annex 174A provides a budget or allocation of error ratios for and end to end path, sub-paths between, and individual inter-sublayer links. Also, the scope is limited to physical layers affected by 802.3dj (e.g., signaling 200 Gb/s or higher).

SuggestedRemedy

Change the term "data reliability" to "error ratio allocation for physical layers with 200 Gb/s per lane or higher signaling"
Change other instances of "data reliability" to throughout 802.3dj "error ratio allocation".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change the name of Annex 174A to "Error ratio allocation"

Straw poll TF-9/10 (directional)
For the name of Annex 174A I support:
A: leave as is (Data reliability considerations)
B: change to "error ratio allocation"
C: change to "communication reliability considerations"
TF-9 (choose 1): A: 17 B: 33 C: 5
TF-10 (chicago): A: 29 B: 38 C: 9

Cl **174A** *SC* **174A,6** *P* **612** *L* **51** # 134

Dudek, Mike Marvell

Comment Type **T** *Comment Status* **A** *error ratio*

This alternative method as described only works for the complete PCS to PCS link and should not be included under the title "inter-sublayer links" It also breaks up the flow of the other sections.

SuggestedRemedy

Separate this alternative procedure into a separate subclause.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The alternative method using the PCS as the pattern source and error monitor is not necessarily limited to a PCS to PCS link. The PCS might be considered as test pattern generator and pattern error monitor. The difference from the other approach is that this method monitors all lanes within the same PHY rather than a single lane.
Nevertheless, the suggestion to document this approach in a separate subclause would be helpful to clearly differentiate and define the two approaches.
Define the second approach completely in a separate subclause.
Implement with editorial license.

Cl **174A** *SC* **174A.4** *P* **612** *L* **2** # 323

Healey, Adam Broadcom Inc.

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

"This requirement is equivalent to...". There is no "requirement" stated. The preceding sentence is phrased as an "expectation".

SuggestedRemedy

Change to "This is equivalent to...". Similar considerations should be made in 174A.5 (lines 16 and 18) and 174A.2 (page 611, line 31).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **174A** SC **174A.6** P **612** L **37** # 324

Healey, Adam — Broadcom Inc.

Comment Type **T** *Comment Status* **A** *error ratio*

Item b) requires "random bit errors" to be inserted at the output of the PAM4 decoder. Further, it is suggested that this operation is done in hardware where truly "random" error injection is unlikely to be acheived. Therefore, it seems to be necessary to define specific characteristics of the injected errors (e.g., inter-arrival times, limits on correlation to the test pattern) so that error injection hardware can be designed and implemented in a way that is consistent with the intent of the measurement.

SuggestedRemedy

Define specific (and implementable) characteristics for the error injection function. Alternatively, remove this part of the test and define a calculation that can be applied to the measured number of 10-bit symbol errors per block that accounts for the impact of BER_added.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following presentation was reviewed by the CRG.
https://www.ieee802.org/3/dj/public/24_09/healey_3dj_02a_2409.pdf

Implement the proposals on slides 8 to 11 and 13 in healey_3dj_02a_2409.
Implement with editorial license.

Cl **174A** SC **174A.6** P **612** L **37** # 325

Healey, Adam — Broadcom Inc.

Comment Type **T** *Comment Status* **A** *error ratio*

Item b) suggests that additional hardware must be implemented in the PMA (or test equipment) to inject random bit errors. However, the impact of BER_added could also be determined using off-line computation based on the measured number of 10-bit symbol errors per block. Such a calculation should be provided as an alternative in cases where the error injection function is not available.

SuggestedRemedy

Specify that a histogram of the blocks with NSE 10-bit symbol errors, where NSE = 0 to 15, is to be recorded (in addition to the number of blocks that exceed 15 errors, NT). This would be needed to do statistical projections for NT as suggested in item g). This data would also be available if a PCS is included in the device under test. Define a calculation that may be used instead of hardware-based error injection based on the measured histogram and the specified value of BER_added. Details will be provided in a separate contribution.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #324.

Cl **174A** SC **174A.6** P **612** L **43** # 326

Healey, Adam — Broadcom Inc.

Comment Type **T** *Comment Status* **A** *error ratio*

Item e) states that the number of 10-bit symbol errors within a block of 544 10-bit symbols are to be counted. This does not seem to account for the fact that four codewords are interleaved onto the PMA lane under test.

SuggestedRemedy

Redefine a "block" to consist of every 4th 10-bit symbol and the size of the block to be 544/NL 10-bit symbols where NL is the number of PMA lanes in the interface under test.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #324.

Cl **174A** SC **174A.6** P **613** L **2** # 479

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *error ratio (bucket)*

BER_added is not just for other ISLs in the PHY, but also between PHYs, and in the other PHY.

SuggestedRemedy

Change to "BER_added represents the total random BER account for other physically instantiated inter-sublayer links within the same
the PHY-to-PHY link (see 174A.5) or xMII Extender (see 174A.4)."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change to "BER_added represents the total random BER accounting for other physically instantiated inter-sublayer links within the same PHY-to-PHY link (see 174A.5) or xMII Extender (see 174A.4)."

Cl **174A** *SC* **174A.11** *P* **611** *L* **4** # 318

Mi, Guangcan — Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **A** *error ratio*

Now changing the error ratio metric completely requires update to test instrument and adoption by the industry. It creats a gap between what is being defined in 802.3dj and what is actually being used in industry for a period of time, presumably not too short. On the other hand, the decision of the value to fill in the receiver sensitivity spec relies on the test result of BER curve, whether the data was shared or not. So changing the error metric ratio has huge impact to the optical spec.

SuggestedRemedy

Provide informative discription on how the new metric correlates to BER which has been used for the past generations of optical PMD. Example of text for a FECo PMD can be : a block error ratio of 1.45e-11 with BERadded of 4e-5 corresponds to a pre-FEC BER of 2.0e-4 measured at the output of the receiving PMD assuming random enough errors.

Task force discussion is suggested.. Need input from logical track to optical track.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add an editor's note in 180.2, 181.2, 182.2, 183.2, 174A.6 stating that a BER target based upon the required block error ratio for the purpose of TDECQ and other optical measurements is needed. Contributions on this subject are encouraged.

Implement with editorial license.

Cl **175** *SC* **175** *P* **208** *L* **0** # 274

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Add explicit instructions for path data delay measurement for the 1.6 Tb/s PCS in Clause 175
Though it could be argued that path data delay reporting in the presence of alignment markers is already covered in clause 90.7.1, including it here leaves no ambiguity

SuggestedRemedy

Insert a new sub-clause (perhaps after 175.5 Delay constraints) :

175.6 Path data delay for time synchronization

When the 1.6TBASE-R PCS is part of a Physical Layer that supports Time Synchronization, 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 FEC codewords.

Four separate delays are reported, each with nanosecond and (if supported) sub-nanosecond portions, in the following eight status variables:
PCS_delay_ns_TX_max, PCS_delay_subns_TX_max
PCS_delay_ns_TX_min, PCS_delay_subns_TX_min
PCS_delay_ns_RX_max, PCS_delay_subns_RX_max
PCS_delay_ns_RX_min, PCS_delay_subns_RX_min

A description of the path data delay values can be found in Clause 90.7.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed slides 3 to 24 in the following presentation:
https://www.ieee802.org/3/dj/public/24_09/nicholl_3dj_01a_2409.pdf.

Implement the changes captured in slides 3-24 of nicholl_3dj_01a_2409 with editorial license.

[Editor's note: CC 116, 169, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187]

Cl **175** *SC* **175.2.4.10** *P* **220** *L* **50** # 586

Nicholl, Gary — Cisco Systems

Comment Type **T** *Comment Status* **A** *(bucket)*

Table 175-7 is missing the legend to define the potential values of "inst".

SuggestedRemedy

Update Table 175-7 to add a legend to define the potential values of "inst" for the service interface below the PCS. See Figure 175-2 as an example.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Assume the comment and suggested remedy is referring to Figure 175-7 and not Table 175-7.
Implement the suggested remedy with editorial license.
[Editor's note: CC 119]

Cl **175** *SC* **175.7** *P* **229** *L* **4** # 275

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

The path data delay status variables should be included in the MDIO mapping in table Table 175-4.

SuggestedRemedy

Add the following rows to Table 175-4:
variable: {PCS_delay_ns_TX_max, PCS_delay_subns_TX_max, PCS_delay_ns_TX_min, PCS_delay_subns_TX_min}; variable reference : <new subclause>; MDIO Registers : {3.1801, 3.1802, 3.1803, 3.1804, 3.1809, 3.1810}; MDIO reference : 45.2.3.68
variable: {PCS_delay_ns_RX_max, PCS_delay_subns_RX_max, PCS_delay_ns_RX_min, PCS_delay_subns_RX_min}; variable reference : <new subclause>; MDIO Registers : {3.1805, 3.1806, 3.1807, 3.1808, 3.1811, 3.1812}; MDIO reference : 45.2.3.69

could be grouped into two rows, or spread over 8 rows... editorial license and all that.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **176** *SC* **176** *P* **263** *L* **21** # 276

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Add explicit instructions for path data delay measurement to the Clause 176 SM-PMA

SuggestedRemedy

Insert a new sub-clause (perhaps after 176.8 Delay constraints) :

176.x Path data delay for time synchronization

When the SM-PMA is part of a Physical Layer that supports Time Synchronization, transmit and receive path data delays are reported as if the DDMP (data delay measurement point) occurs on an odd PCS lane.

Four separate delays are reported, each with nanosecond and (if supported) sub-nanosecond portions, in the following eight status variables:
PMA_delay_ns_TX_max, PMA_delay_subns_TX_max
PMA_delay_ns_TX_min, PMA_delay_subns_TX_min
PMA_delay_ns_RX_max, PMA_delay_subns_RX_max
PMA_delay_ns_RX_min, PMA_delay_subns_RX_min

A description of the path data delay values can be found in Clause 90.7.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **176** *SC* **176.1.3** *P* **237** *L* **13** # 227

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

Since the description of the 1.6T PCS uses A, B, C, and D to identify the four FEC encoders, the definition of a symbol-pair could be misinterpreted as literally only being from codeword A and codeword B, when what is intended is that a symbol pair is any pair of symbols that come from two different FEC encoders.

SuggestedRemedy

Change the nomenclature in the symbol-pair and symbol-quartet definitions to use something other than A, B, C, D (e.g., 1, 2, 3, 4), or to more explicitly state that the symbols are from codewords produced by different FEC encoders without naming them (e.g., a symbol-pair is defined as two adjacent RS-FEC symbols where the two symbols were produced by two different FEC encoders).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The ordering of the symbols in the symbol-pair and symbol-quartet is important. A symbol-pair is always a symbol from FEC codeword A followed by a symbol from FEC codeword B as captured in the current symbol-pair definition in the draft. Similarly, a symbol-quartet is always a symbol from FEC codeword A, followed by B, C and D which is also captured in the current symbol-quartet definition in the draft. In addition, symbol-pairs are only applicable to the 200GBASE-R, 400GBASE-R and 800GBASE-R symbol-muxing PMAs, and symbol-quartets are only applicable to 1.6TBASE-R symbol-muxing PMA - the proposed change is to add this detail to the definitions.

Change the symbol-pair definition to:
"A symbol-pair is defined as two adjacent RS-FEC symbols (for example, on a PCS lane) where the first symbol in the pair is from RS-FEC codeword A and the second symbol is from RS-FEC codeword B. Symbol-pairs are used in the 200GBASE-R, 400GBASE-R and 800GBASE-R symbol-multiplexing PMAs."

Change the symbol-quartet definition to:
"A symbol-quartet is defined as four adjacent RS-FEC symbols (for example, on a PCS lane) where the first symbol in the quartet is from RS-FEC codeword A, the second symbol is from RS-FEC codeword B, the third symbol is from RS-FEC codeword C, and the fourth symbol is from RS-FEC codeword D. Symbol-quartets are used in 1.6TBASE-R symbol-multiplexing PMAs."

Additionally, copy the legend from Fig. 176-4 and add it to Fig. 176-7, and copy the legend from Fig. 176-5 and add it to Fig. 176-6.

Implement with editorial license.

Cl **176** *SC* **176.1.4** *P* **237** *L* **30** # 182

Marris, Arthur — Cadence Design Systems

Comment Type **T** *Comment Status* **A** *(bucket1p)*

Add PCSL lane delay to the list of principal PMA functions

SuggestedRemedy

Add extra line item for "Delaying odd PCS lanes in one direction and delaying even PCS lanes in the corresponding direction"
Also change "Adapt" to "Adapting" in the first line item

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Update Clause 176 as described in https://www.ieee802.org/3/dj/public/24_09/nicholl_3dj_01_2409.pdf slide #30 with editorial license.

The CRG reviewed slide 29 in the following presentation: https://www.ieee802.org/3/dj/public/24_09/nicholl_3dj_01a_2409.pdf.

Implement the proposed changes on slide 29 of nicholl_3dj_01a_2409 with editorial license.

Cl **176** *SC* **176.2** *P* **240** *L* **6** # 357

Ran, Adee — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *AUI architecture*

The SIGNAL_OK parameters of the .indication and .request primitives are set separately in the PMA.
The semantics of this parameter were proposed in https://www.ieee802.org/3/dj/public/24_05/ran_3dj_05_2405.pdf slides 7-8 and were implemented in 116.3, 169.3 and 174.3, but the cross-references in the first paragraph of 176.2 appear as external.

In the PMA, the propagation of values between the two interfaces should also be defined as noted in slide 9.

Also applies to 176.3.

SuggestedRemedy

Update the cross-references in P239 L33-34 to point to the updated service interface subclauses in this draft.
Add propagation of the SIGNAL_OK values in both directions, based on slide 9 of ran_3dj_05_2405.
Delete the editor's note.
Apply in both 176.2 and 176.3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #516.

Cl **176** *SC* **176.3** *P* **240** *L* **31** # 12

Marris, Arthur — Cadence Design Systems

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

Typo in "When the sublayer below then PMA"

SuggestedRemedy

Change "then" to "the"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **176** *SC* **176.4** *P* **240** *L* **48** # 581

Nicholl, Gary — Cisco Systems

Comment Type **T** *Comment Status* **R** *(withdrawn)*

I tihnk it would be better if the title for this section would be the generic "m:n PMAs" and the specific rate specific PMA nomeclature, such as 200GBASE-R 8:1, are called out in the text within the sub-clause. Same comment for the title of Figure 176-2.

SuggestedRemedy

Change the title of 176.4 to "m:n PMAs" and change the text for Figure 176-2 to "m:n PMAs functional block diagram"

Make similar changes to 176.5 and 176.6.

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176** *SC* **176.4.2** *P* **243** *L* **1** # 585

Nicholl, Gary — Cisco Systems

Comment Type **T** *Comment Status* **A** *PMA service interface*

It seems uncessary/redundant/confusing to have two subclauses titled "PMA service interface" , i.e. 176.2 and 176.4.2 (and 176.5.2 and 176.6.2). This is different to what was done in previous PMA clauses, such as Clause 120 and Clause 173.

Same comment related the subclause "Service interface below the PMA"

SuggestedRemedy

Either delete 176.4.2 (and 176.5.2 and 176.6.2) and move the necessary information into 176.2 (similar to what has be done in the past), or if there are too many differences in the service interfaces between the m:n, n:m and n:n PMAs, then delete 176.2 and copy the necessary information into the PMA specific subclauses 176.4.2 (and 176.5.2 and 176.6.2).

My personal preference would be to go with the first option as it captures all of the PMA service interface information in one place , and although it makes that one subclause a little more difficult to read (with many options), it is probably not that important as most people don't case too much about the details of the service interface definitions.

Similar suggestion for the "Service interface below the PMA" subclauses.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed slides 26 and 27 in the following presentation:
https://www.ieee802.org/3/dj/public/24_09/nicholl_3dj_01a_2409.pdf.

Implement the following changes with editorial license:
Move the content from 176.4.2.1, 176.5.2.1 and 176.6.2.1 into 176.2.
Move the content from 176.4.2.2, 176.5.2.2 and 176.6.2.2 into 176.3
Remove 176.4.2, 176.5.2 and 176.6.2

[Editor's note: Clause/Subclause changed from 174/174.4.2 to 176/176.4.2]

Cl **176** *SC* **176.4.2.1** *P* **242** *L* **3** # 13

Marris, Arthur — Cadence Design Systems

Comment Type **T** *Comment Status* **A** *PMA service interface*

There are several subclauses in 176 titled "PMA service interface"

SuggestedRemedy

Change "PMA service interface" to "PMA service interface for m:n" to make it clear which service interface is being defined

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment # 585.

Cl **176** *SC* **176.4.2.1** *P* **243** *L* **5** # 228

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *PMA service interface*

This first paragraph is difficult to parse. The intended meaning of 'x' here is the variable x in clause 176.2, referring to the number of input lanes, but clause 176 also uses x in the context of xBASE-R, which is completely different.

SuggestedRemedy

Change to: The PMA service interface semantics for each of the m input and output streams is defined in 176.2.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment # 585.

Cl **176** *SC* **176.4.2.2** *P* **243** *L* **14** # 229

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *PMA service interface*

This first paragraph is difficult to parse. The intended meaning of 'x' here is the variable x in clause 176.3, referring to the number of output lanes, but clause 176 also uses x in the context of xBASE-R, which is completely different.

SuggestedRemedy

Change to: The service interface below the PMA semantics for each of the n input and output streams is defined in 176.3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment # 585.

Cl **176** *SC* **176.4.3.1** *P* **243** *L* **38** # 14

Marris, Arthur — Cadence Design Systems

Comment Type **T** *Comment Status* **A** *(bucket1p)*

PAM4 decode is only required for 1.6TAUI-16

SuggestedRemedy

Change "The transmit PAM4 decode is only required if the sublayer above the PMA is an AUI. " to "The transmit PAM4 decode is only required if the sublayer above the PMA 1.6TAUI-16. "

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change from "The transmit PAM4 decode is only required if the sublayer above the PMA is an AUI."
to "The transmit PAM4 decode is only required if there is a 1.6TAUI-16 above the PMA".

Implement with editorial license.

Cl **176** *SC* **176.4.3.3.1** *P* **244** *L* **8** # 582

Nicholl, Gary — Cisco Systems

Comment Type **T** *Comment Status* **R** *(withdrawn)*

It would be more useful for the title to give an indication of which PMA this function is used on , rather than just the function. This would be easier for the reader when scanning through the bookmarks, and wanting to know which deskew subclause is relevant to a specific PMA. . Same change for 176.4.3.3.2 and 176.4.3.3.3.

SuggestedRemedy

Change the title of this subcluase to be " 8:1 PMA and 16:2 PMA deskew" or "200GBASE-R 8:1 and 400GBASE-R 16:2 PMA deskew"

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176** *SC* **176.4.3.3.1** *P* **244** *L* **14** # 230

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

"until there is an integer number of four RS-FEC codewords between the start of the alignment markers on any two PCSLs" could be misinterpreted as meaning exactly 4 (literally, "an integer number of four"), when the intent was a mulitple of four.

SuggestedRemedy

Change to ". until the number of RS-FEC codewords between the start of the alignment markers on any two PCSLs is an integer multiple of four."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change from ".. until there is an integer number of four RS-FEC codewords between the start of the alignment markers on any two PCSLs. "
to ".. until there is an integer multiple of four RS-FEC codewords between the start of the alignment markers on any two PCSLs. "

Implement with editorial license.

Cl **176** *SC* **176.4.3.3.2** *P* **244** *L* **34** # 231

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

"until there is an integer number of two RS-FEC symbols (20 bits) between the start of the alignment markers on any two PCSLs" could be misinterpreted as meaning exactly 2 (literally, "an integer number of two"), when the intent was a mulitple of two.

SuggestedRemedy

Change to ". until the number of RS-FEC symbols between the start of the alignment markers on any two PCSLs is an integer multiple of two."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change from "...until there is an integer number of two RS-FEC symbols (20 bits) between the start of the alignment markers of any two PCSLs."
to "until there is an integer multiple of two RS-FEC symbols (20 bits) between the start of the alignment markers of any two PCSLs."

Implement with editorial license.

Cl **176** *SC* **176.4.3.3.3** *P* **244** *L* **45** # 232

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

"until there is an integer number of four RS-FEC symbols (40 bits) between the start of the alignment markers on any two PCSLs" could be misinterpreted as meaning exactly 4 (literally, "an integer number of four"), when the intent was a mulitple of four.

SuggestedRemedy

Change to ". until the number of RS-FEC symbols between the start of the alignment markers on any two PCSLs is an integer multiple of four."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change from "until there is an integer number of four RS-FEC symbols (40 bits) between the start of the alignment markers of any two PCSLs."
to "until there is an integer multiple of four RS-FEC symbols (40 bits) between the start of the alignment markers of any two PCSLs."

Implement with editorial license.

Cl **176** *SC* **176.4.3.4.1** *P* **245** *L* **16** # 583

Nicholl, Gary Cisco Systems

Comment Type **T** *Comment Status* **R** *(withdrawn)*

It would be more useful for the title to give an indication of which PMA this delay function is used on , rather than just the function. This would be easier for the reader when scanning through the bookmarks, and wanting to know which delay subclause is relevant to a specific PMA. . Same change for 176.4.3.4.2.

SuggestedRemedy

Change the title of this subclause to be "Delay odd PCSLs by one symbol (200GBASE-R 8:1, 400GBASE-R 16:2 and 800GBASE-R 32-4 PMAs)"

Change the title of 176.4.3.4.2 to "Delay odd PCSLs by two codewords (200GBASE-R 8:1 and 400GBASE-R 16:2 PMAs)"

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176** *SC* **176.4.3.4.1** *P* **245** *L* **39** # 233

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **R** *(bucket)*

In figure 176-3, since this subclause is about m:n PMAs, and m is the number of PSCL, it would be more clear to use m as the variable to represent the number of PCSLs.

SuggestedRemedy

Change x=7 and x=15 in the figure to m=7 and m=15

Response *Response Status* **C**

REJECT.
Sub-clause 176.4 uses m to indicate the number of input lanes of the m:n PMAs. While in Fig 176-3, the variable x is used as the index to the PCS lane. For example, m = 8 and x = 7 for the 200GBASE-R 8:1 PMA. The variable x is also used as the index of the PCS lane in the state diagrams sub-clause (176.4.5) and in various PCS clauses (e.g. Cl119). Hence, using x as the index for the PCS lane in Fig 176-3 is a better choice, while reserving the use of m to denote number of lanes (where needed).

The draft as written is technically correct, and the suggested remedy will not improve the readability of the draft.

Cl **176** *SC* **176.4.3.4.1** *P* **246** *L* **22** # 587

Nicholl, Gary Cisco Systems

Comment Type **T** *Comment Status* **A** *(bucket)*

In figure 176-4 it is very difficult in the pdf (at least on screeen) to distinguish the shading betweenB, C and D codewords. Given that each codeword is uniquely identifed by a letter is the shading even necessary in the first place. Similar comment against other similar figures.

SuggestedRemedy

Either find a better way to distinguish the shading between B, C and D, or just delete all the shading in the diagram. Make similar changes to all of the similar diagrams.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Modify or remove the shading used for the RS-FEC symbols in the figures, to better distinguish (while viewing the pdf) between: (1) symbols belonging to FEC B, C, D in Figs 176-4, 176-7 and 176-8; and (2) symbols belonging to FEC B, A', B' in Figs 176-5, 176-6.

Cl **176** *SC* **176.4.3.4.2** *P* **247** *L* **11** # 234

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **R** *(bucket)*

In figure 176-5, since this subclause is about m:n PMAs, and m is the number of PSCL, it would be more clear to use m as the variable to represent the number of PCSLs.

SuggestedRemedy

Change x=7 and x=15 in the figure to m=7 and m=15

Response *Response Status* **C**

REJECT.
Sub-clause 176.4 uses m to indicate the number of input lanes of the m:n PMAs. While in Fig 176-5, the variable x is used as the index to the PCS lane. For example, m = 8 and x = 7 for the 200GBASE-R 8:1 PMA. The variable x is also used as the index of the PCS lane in the state diagrams sub-clause (176.4.5) and in various PCS clauses (e.g. Cl119). Hence, using x as the index for the PCS lane in Fig 176-5 is a better choice, while reserving the use of m to denote number of lanes (where needed).

The draft as written is technically correct, and the suggested remedy will not improve the readability of the draft.

Cl **176** *SC* **176.4.3.5.2** *P* **249** *L* **15** # 584

Nicholl, Gary — Cisco Systems

Comment Type **T** *Comment Status* **R** *(bucket)*

In Figure 176-8, consider changing the example lane numbers from 0 and 1 to "x" and "y" since they can be any two PCSLs for 1.6T.

SuggestedRemedy

In Figure 176-8 change the example lane numbers to be "x" and "y" and indicate in the text that x and y can be any two PCSLs.

Response *Response Status* **C**

REJECT.
Figure 176-8 is meant to illustrate an example of the symbol quartet multipexing and hence uses specific PCS lane numbers to illustrate the function. The description in 176.4.3.5.2 clearly states that any two PCS lanes can be used as inputs to the symbol quarter multiplexer. This is consistent with the other figures (Fig 176-7 and 176-6) that are also showing examples using specific PCS lane numbers, which makes it much easier to follow.

The suggested remedy will not improve the accuracy or readability of the draft.

Cl **176** *SC* **176.4.4.1** *P* **250** *L* **9** # 15

Marris, Arthur — Cadence Design Systems

Comment Type **T** *Comment Status* **A** *(bucket)*

This is describing the receive direction not the transmit direction.

SuggestedRemedy

Change "transmit" to "receive"

Response *Response Status* **C**

ACCEPT.

Cl **176** *SC* **176.4.4.2.1** *P* **250** *L* **34** # 296

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **R** *(bucket1p)*

Is a 1-bit SLIP appropriate? Why not SLIP by two bits, since the AM alignment necessarily lines up with PAM4 symbols in the received PMA lane?
Implementations are free to do something more optimal, but the base algorithm presented here could still have a two-bit SLIP.
Using 1 bit does not do any lasting harm, but does double the expected lock time.

SuggestedRemedy

Consider changing to a 2-bit SLIP.

Response *Response Status* **C**

REJECT.
When transmitting PAM4 symbols, there is no requirement that the PAM4 symbols align with RS-FEC symbols. There can be scenarios where the 2 bits of a PAM4 symbol belong to adjacent RS-FEC symbols. Therefore a PMA demux symbol lock mechanism that uses a 2-bit slip per the suggested remedy (instead of the 1 bit slip in the current draft) will not be able to guarantee finding the RS-FEC symbol boundary and achieving AM lock.

The suggested remedy will not work and the 1-bit slip present in the current draft is necesary.

Cl **176** *SC* **176.4.4.6** *P* **251** *L* **34** # 16

Marris, Arthur — Cadence Design Systems

Comment Type **T** *Comment Status* **A** *(bucket1p)*

PAM4 encode is only required for 1.6TAUI-16

SuggestedRemedy

Change "The PAM4 encode process is required if the adjacent sublayer is an AUI or PMD." to "The PAM4 encode process is required if the adjacent sublayer is 1.6TAUI-16."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change from "The PAM4 encode process is required if the adjacent sublayer is an AUI or PMD."
to "The receive PAM4 encode is only required if there is a 1.6TAUI-16 above the PMA".

Implement with editorial license.

Cl **176** *SC* **176.4.5.2.3** *P* **254** *L* **3** # 297

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Symbol Lock*

value of j for the symbol_lock_counter_demux (y). (currently TBD)
Alignment marker lock takes 2 AMs. Plus, the AM lock algorithm already tolerates a fair amount of bit errors (needs 8/12 nibbles to match on the common AM portion).
And note that within one incoming 200Gbps lane, there is zero skew among the underlying PCS lanes.
So j=2 AM intervals is sufficient, and minimizes the expected lock time.
But really, the number is of no consequence as long as it is 2 or greater. Implementations will optimize, and could even examine all the alignments in parallel.

SuggestedRemedy

Replace TBD with 2 for the value of j.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The value of 2 AM intervals is not sufficient in case of skew between PCS lanes. PCS lanes carried within an input lane of an m:n PMA can incur skew. For example, 8 PCS lanes of 200GE can incur skew when carried over a 200GAUI-2 interface. In the presence of skew, a value of 3 AM intervals (and not 2 per the suggested remedy) is the smallest number that will work. Change the TBD in the draft to 3, and add an Editor's note that a full analysis is recommended to either confirm the choice of 3 AM intervals or update to a better number.
Implement with editorial license.

Cl **176** *SC* **176.5.2.1** *P* **259** *L* **3** # 17

Marris, Arthur — Cadence Design Systems

Comment Type **T** *Comment Status* **A** *PMA service interface*

There are several subclauses in 176 titled "PMA service interface"

SuggestedRemedy

Change "PMA service interface" to "PMA service interface for n:m" to make it clear which service interface is being defined

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment # 585.

Cl **176** *SC* **176.5.2.1** *P* **259** *L* **5** # 235

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *PMA service interface*

This first paragraph is difficult to parse. The intended meaning of 'x' here is the variable x in clause 176.2, referring to the number of input lanes, but clause 176 also uses x in the context of xBASE-R, which is completely different.

SuggestedRemedy

Change to: The PMA service interface semantics for each of the n input and output streams is defined in 176.2.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment # 585.

Cl **176** *SC* **176.5.2.2** *P* **259** *L* **11** # 236

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *PMA service interface*

This first paragraph is difficult to parse. The intended meaning of 'x' here is the variable x in clause 176.3, referring to the number of output lanes, but clause 176 also uses x in the context of xBASE-R, which is completely different.

SuggestedRemedy

Change to: The service interface below the PMA semantics for each of the m input and output streams is defined in 176.3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment # 585.

Cl **176** *SC* **176.6.2.1** *P* **260** *L* **47** # 237

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *PMA service interface*

This first paragraph is difficult to parse. The intended meaning of 'x' here is the variable x in clause 176.2, referring to the number of input lanes, but clause 176 also uses x in the context of xBASE-R, which is completely different.

SuggestedRemedy

Change to: The PMA service interface semantics for each of the n input and output streams is defined in 176.2.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment # 585.

Cl **176** *SC* **176.6.2.2** *P* **261** *L* **3** # 238

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *PMA service interface*

This first paragraph is difficult to parse. The intended meaning of 'x' here is the variable x in clause 176.3, referring to the number of output lanes, but clause 176 also uses x in the context of xBASE-R, which is completely different.

SuggestedRemedy

Change to: The service interface below the PMA semantics for each of the n input and output streams is defined in 176.3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment # 585.

Cl **176** *SC* **176.10** *P* **264** *L* **43** # 277

de Koos, Andras Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

The path data delay status variables should be included in the MDIO mapping in table Table 176-7.

SuggestedRemedy

Add the following rows to Table 176-7:
variable: {PMA_delay_ns_TX_max, PMA_delay_subns_TX_max, PMA_delay_ns_TX_min, PMA_delay_subns_TX_min}; variable reference : <new subclause>; MDIO Registers : {1.1801, 1.1802, 1.1803, 1.1804, 1.1809, 1.1810}; MDIO reference : 45.2.1.175
variable: {PMA_delay_ns_RX_max, PMA_delay_subns_RX_max, PMA_delay_ns_RX_min, PMA_delay_subns_RX_min}; variable reference : <new subclause>; MDIO Registers : {1.1805, 1.1806, 1.1807, 1.1808, 1.1811, 1.1812}; MDIO reference : 45.2.1.177

could be grouped into two rows, or spread over 8 rows... editorial license and all that.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **176A** *SC* **176A** *P* **624** *L* **0** # 511

Brown, Matt Alphawave Semi

Comment Type **T** *Comment Status* **A** *General*

Annex 176A defines inter-sublayer training that is not related at all to the PMA. It is more closely related the optical and electrical PMDs and the AUI components. Perhaps it would be better numbered in conjunction with the first clause defining a PMD.
Annex 176C is directly related to the PMA defined in Clause 176, so should be 176A.
If we are going to clean up the annex and clause numbering, now is a good time.

SuggestedRemedy

Change Annex 176A to Annex 174B.
Change Annex 176C to 176B.
Change Annex 176D to 176C.
Change Annex 176E to 176D.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change Annex 176A to Annex 178B.
Change Annex 176C to 176A.
Change Annex 176D to 176C.
Change Annex 176E to 176D.
[Editor's note: CC: 176A, 176C, 176D, 176E]

Cl **176A** *SC* **176A** *P* **624** *L* **1** # 351

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

Comment Type **T** *Comment Status* **A** *(bucket)*

Annex 176A is noted as normative - but there are no corresponding SHALL statements or PICS.

SuggestedRemedy

Proposed Change

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

There are several "shall" in the Annex.

Add PICS entries for all "shall" in the Annex.

Cl **176A** *SC* **176A.1** *P* **624** *L* **15** # 480

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *General*

This annex defines two distinct but complementary but complementary protocols. One is mutual control of the transmitter between two peer interfaces on an ISL. The other is the coordination of a series of ISLs along a path, per "path start-up protocol".

SuggestedRemedy

Reword and rearrange Annex 176A to distinguish these two concepts.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
In 176A.1 change: "and the transport of path end-to-end indications."
to: "and the coordination of the ISLs along a path by transporting path end-to-end indications."
Implement with editorial license

Cl **176A** *SC* **176A.1** *P* **624** *L* **23** # 209

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **A** *LT types*

The nomenclature for the two flavors of inter-sublayer link training could be improved. The current designations of Type A1 and Type A2 are difficult to decypher and associate with the the relevant PMD or interface type.

SuggestedRemedy

Replace Type A1 (used for the electrical PMDs and electrical interfaces) with "Type E-1".

Replace Type A2 (used the relevant optical PMDs) with "Type O-1"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change A1 to E1
Change A2 to O1
Update here and in other clauses/annexes.
Implement with editorial license.

Cl **176A** *SC* **176A.3** *P* **625** *L* **1** # 481

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

This is not really ILT, or at least excludes a great deal of what ILT is. This is actually more about the path start-up than ILT. Also, the bullets do not describe operation, but rather the mechanisms that allow path start-up to occur.

SuggestedRemedy

Change "ILT operation is as follows:"
To "Path start-up are achieved as follows:"
A similar overview description of ILT, between peer interfaces on the same ILS is still missing.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
This description is needed to help the reader understand the end-to-end control that is not explained in detail elsewhere. The rest of the ILT is detailed and easy to undestand, so no need for an overview here; also, the suggested remedy does not provide sufficient detail to implement.
Change: "ILT operation is as follows:"
To: "Path start-up is achieved as follows:"

Cl **176A** SC **176A.3** P **625** L **2** # 483

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *Extender*

The following phrase is incorrect, since local_rts might be progated from one AUI componet across an AUI channel toward the locat PCS.
"the transmit direction from the local PCS toward the remote PCS". Furthermore, within a

SuggestedRemedy

Change "propagates in the transmit direction from the local PCS toward the remote PCS"
To "propagates toward the terminating (local or remote) PCS or XS".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change: "and propagates in the transmit direction from the local PCS toward the remote PCS"
to: "and propagates from the PCS at one end of the path towards the PCS at the other end of the path"

Cl **176A** SC **176A.3** P **625** L **2** # 482

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *General*

In many places in 176A there is reference to AUI and PMD, meaning an AUI interface and PMD interface. As written, "AUI" is ambiguous since each AUI has two interfaces with one AUI component at each end.

SuggestedRemedy

In such instances, replace "AUI or PMD" with "AUI component or PMD".

Response *Response Status* **C**

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

Cl **176A** SC **176A.3** P **625** L **5** # 484

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *Extender*

The following phrase is incorrect, since remote_rts might be progated from a PMD to PMD across the medium toward the remote PCS.
"propagates similarly and independently in the receive direction from the remote PCS".

SuggestedRemedy

Change "propagates similarly and independently in the receive direction from the remote PCS"
To "propagates toward the sourcing (local or remote) PCS or XS".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change: "and propagates similarly and independently in the receive direction from the remote PCS"
to: "and propagates similarly and independently from PCS to PCS in both directions"

Cl **176A** SC **176A.3** P **625** L **8** # 485

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

Not clear what "all the ISLs" means. I expect it means all of the ISL along the same path (see definition in 176A.2).

SuggestedRemedy

Change "all the ISLs" to "all the ISLs on the same path (see 176A.2)".

Response *Response Status* **C**

ACCEPT.

Cl **176A** SC **176A.3** P **625** L **10** # 486

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

It could be a path between XSs as well. Path is defined completely in 172A.2 so no need to embellish the end points of a path. Also, what is established?

SuggestedRemedy

"the path between the PCSs is established" to "communication on the path is established"

Response *Response Status* **C**

ACCEPT.

Cl **176A** *SC* **176A.3** *P* **625** *L* **13** # 487

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

What does it mean that "training is available and enabled". Not clear what "available" means. This annex applies only to sublayers that require it, so it must be implemented. Perhaps the though is that for some future sublayers that reference 176A, it is optional only.

SuggestedRemedy

Change "if training is available and enabled" to either "if training is enabled" or "if training is implemented and enabled".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change "if training is available and enabled"
to "if training is enabled"

Cl **176A** *SC* **176A.3** *P* **625** *L* **17** # 488

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

the term "earlier PMAs" has no significance in the base standard. All are defined concurrently. Should either reference specific PMA clauses or use other defining criteria. Furthermore, previously specified electrical PMDs do not include the "extend training" bit, so they are excempt as well.

SuggestedRemedy

Change to "Interaction with PMAs and PMDs that do not support ILT, as specified in this annex, employs the second method."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change: "Interaction with earlier PMAs (e.g. those defined in Clause 120 or Clause 173) and with optical PMDs that do not support training, is performed using the second method.
to: "Interaction with PMAs and PMDs that do not support ILT as specified in this annex (e.g. those defined in clause 120 or Clause 173) use the second method"

Cl **176A** *SC* **176A.3** *P* **625** *L* **30** # 489

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

This sentence doesn't make sense: "If there are multiple lanes, all lanes switch within this time."
First, no time limit is defined in the previous sentence. Secondly, the previous sentence applies to each and all lanes so not need for this elaboration.

SuggestedRemedy

Delete the sentence or rewrite it to convey the intended meaning.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change: " If there are multiple lanes, all lanes switch within this time."
to: "The condition is shared by all lanes within an ISL, and therefore the switching of all lanes occurs in a period within the limits of propagation_timer 176A.11.3.3".

Cl **176A** *SC* **176A.3** *P* **625** *L* **32** # 490

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

rx_ready and remote_rts are always available. Perhaps it means waiting for them to switch to the value 1. Also, the word "receiver" is redundant since the variables are well defined.

SuggestedRemedy

Change the sentence to: "There is no specified timeout when waiting for either rx_ready or remote_rts to change to the value 1."

Response *Response Status* **C**

ACCEPT.

Cl **176A** *SC* **176A.3.1** *P* **625** *L* **34** # 60

Bruckman, Leon Nvidia

Comment Type **TR** *Comment Status* **A** *(bucket)*

Fail state may also be reached if there are a specific number of LT frame losses

SuggestedRemedy

Change: "While waiting for rx_ready and remote_rts, losing frame lock and not recovering it after a specified recovery time (recovery_timer, see Figure 176A-7) would cause training to fail"
to: "While waiting for rx_ready and remote_rts, losing frame lock and not recovering it after a specified recovery time (recovery_timer, see Figure 176A-7) or lossing frame lock for a configured number of times (recovery_event_count, see Figure 176A-7), would cause training to fail"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy except change "lossing" to "losing".

Cl **176A** *SC* **176A.3.2** *P* **626** *L* **12** # 61

Bruckman, Leon Nvidia

Comment Type **TR** *Comment Status* **A** *Timing*

Need to gurantee that the clock switchover does not violate the jitter requirements

SuggestedRemedy

Add note: "NOTE-During clock switchover the generated jitter requirements for the PMD or AUI shall be met ."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

It is not the jitter requirements that need to be maintained rather the phase transient characteristics that need to be constrained. There is no proposal with specific criteria in this regard.

Add an editor's note that recommendations for the clock phase transient during clock switchover are desirable. Contributions in this regard are requested.

Cl **176A** *SC* **176A.3.2** *P* **626** *L* **29** # 491

Brown, Matt Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

Why use binary labels? These are not registers, just labels to map the enumerated modes to the mux.

SuggestedRemedy

Change "00", "01", and "10" to "0", "1", "2", respectively; four times in Figure 176A-1.

Response *Response Status* **C**

ACCEPT.

Cl **176A** *SC* **176A.3.3** *P* **626** *L* **53** # 492

Brown, Matt Alphawave Semi

Comment Type **T** *Comment Status* **A** *Extender*

The following phrase is incorrect ". except that local_rts and remote_rts are communicated to the PHY XS using its IS_SIGNAL.indication and IS_SIGNAL.request primitives."
This is not an exception since the same mechanism is used for ISLs in PCS path.

SuggestedRemedy

Delete "except that local_rts and remote_rts are communicated to the PHY XS using its IS_SIGNAL.indication and IS_SIGNAL.request primitives"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change "except that" with "such that".
Implement with editorial license.

Cl **176A** *SC* **176A.3.3** *P* **627** *L* **1** # 493

Brown, Matt Alphawave Semi

Comment Type **T** *Comment Status* **A** *Extender*

This paragraph seems unecessary. First, it says behavior is same as AUIs within a PHY, which is already stated in previous paragraph. Why would it hold off? Also, what is the "main path".

SuggestedRemedy

Delete this paragraph or rewrite to clearly convey intent.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The paragraph is helpful where it is.
But there is no definition of "main path".
Change "main path" to "PCS-to-PCS path".
Implement with editorial license.

Cl **176A** *SC* **176A.4.2** *P* **628** *L* **11** # 77

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *LT types*

Need names for A1 and A2 interfaces

SuggestedRemedy

A1=non-optical
A2=Optical

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to coment #209

Cl **176A** *SC* **176A.4.2** *P* **628** *L* **17** # 132

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *LT types*

Name A1 and A2

SuggestedRemedy

Sufggest to call A1 training to Electrical and A2 should be called Optical

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to coment #209

Cl **176A** *SC* **176A.4.3.1** *P* **627** *L* **27** # 494

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

"At the start of the training pattern" is ambigous. I think it means the training pattern portion of the training frame.

SuggestedRemedy

Change to "At the start of the training pattern in each training frame".

Response *Response Status* **C**

ACCEPT.

Cl **176A** *SC* **176A.4.3.1** *P* **629** *L* **23** # 501

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

The term "PRBS13" to describe the frame synchronous PRBS13 training pattern in ambiguous given there is a second pattern using PRBS13 generator. Am embellished name for this function and the corresponding bit in the control/status fields is necessary.

SuggestedRemedy

Change the pattern name to "synchronous PRBS13". Apply wherever appropriate including:
page 628, lines 28, 33
page 629, lines 25, 27, 35
page 631 line 28
page 632 line 29
page 633 line 19
page 634 line 18
page 635 line 15
page 644 line 3, 29

Response *Response Status* **C**

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

Cl **176A** *SC* **176A.4.3.1** *P* **630** *L* **5** # 212

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **R** *Pattern*

the precoder to use is not defined in the Annex.

SuggestedRemedy

Add a reference to IEEE Std. 802.3-2022 Clause 135.5.7.2 for the precoder for PAM-4 lanes

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176A** *SC* **176A.4.3.1** *P* **630** *L* **5** # 215

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **R** *(bucket1p)*

The output of the PRBS13 training patterns when the precoder is enabled depends on the initial value of the precoder.

SuggestedRemedy

Add a statement such as "The precoder state is initialized to 0 at the beginning of each training pattern, so that P(j-1)=0 in Equation (135-1) for the first PAM4 symbol of the training pattern"

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176A** *SC* **176A.4.3.1** *P* **630** *L* **15** # 76

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *Pattern*

Why default identifier is 0-3 twice

SuggestedRemedy

Make identifier 0-7

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The only defined identifier values are 0 to 3 (see first paragraph of 176A.4.3.1), so the suggested remedy cannot be applied.

The default identifier is used to identify the pseudorandom equation that is the same for i=0 and i=4, i=1 and i=5, and so on.

Change the "Default identifier_i" column name to: "Default identifier".

[Editor's note: Changed clause/subclause from 176/176.4.3.1 to 176A/176A.4.3.1]

Cl **176A** *SC* **176A.4.3.1** *P* **630** *L* **26** # 218

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **A** *Framing*

the last paragraph of the Annex sub-section indicates that two pad bits of "0" are sent immediately after the training pattern. However, the Figure 176A-2 does not show the pad bits and were explicitly removed in the baseline proposal. These two bits are not specified when the training patern is type free-running PRBS31 or free-running PRBS31. If the intent is for the non-free-running pattern to be "backward compatible" with the Clause 136.8.11 and Clause 162.8.11 patterns, then the bits needs to be preserved. Else the pad bits should not used in any of the patterns.

SuggestedRemedy

remove last paragraph in 176A..4.3.1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Update Figure 176A-2 showing the last two symbol with text clarifying that they are condition on the pattern.

The last two "0" symbols are part of the training pattern, not addition symbols.
Replace:
"Two “0” symbols are transmitted immediately after the training pattern. This zero pad ensures the training frame is DC balanced and helps to delineate the start of the frame marker for the next training frame."
With:
"The last two symbols of the training pattern are “0” symbols."

Implement with editorial license.

Cl **176A** *SC* **176A.4.3.2** *P* **630** *L* **31** # 216

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **R** *Pattern*

The output of the PRBS13 training patterns when the precoder is enabled depends on the initial value of the precoder.

SuggestedRemedy

Add text to indicate the initial state of the precoder when training starts. "The precoder state is initialized to 0 based on the initial seeds of the training pattern, so that P(j-1)=0 in Equation (135-1) for the first PAM4 symbol of the first training pattern"

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176A** SC **176A.4.3.2** P **630** L **31** # 213

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **R** *Pattern*

the precoder to use is not defined in the Annex.

SuggestedRemedy

Add a reference to IEEE Std. 802.3-2022 Clause 135.5.7.2 for the precoder for PAM-4 lanes

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176A** SC **176A.4.3.2** P **630** L **37** # 495

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *Pattern*

For eight-lane interfaces, e.g., 1.6TBASE-CR8/KR8 and 1.6TAUI-8, with only four unique polynomials, the same polynomial must be shared between two lanes, so some temporal separation is required. A requirement or recommendation to initial the patterns on the two lanes is warranted.

SuggestedRemedy

Borrowing language from 176A.4.3.3, add "For eight-lane interfaces the same polynomial is used for two lanes. The two generators shall be configured such that their relative offsets are large enough that they are uncorrelated within the length of the training frame. For example, this may be achieved by initialization with different seeds or with the same seed at different times."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

Cl **176A** SC **176A.4.3.2** P **630** L **41** # 496

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

The phrase "changes between subsequent training frames" is somewhat incorrect. It should be different between current and the subsequent frame. In general, it is always different in the next many frames.

SuggestedRemedy

Change "changes between subsequent training frames" to "is different in each training frame" or "is different in subsequent training frames".
Apply similarly in 176A.4.3.3 on page 631 line 3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change "changes between subsequent training frames"
to "is different in subsequent training frame".
Apply similarly in 176A.4.3.3 on page 631 line 3.

Cl **176A** SC **176A.4.3.2** P **630** L **52** # 497

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **R** *(withdrawn)*

The phrase of "within the length of the training frame" is incorrect. The separation must be large enough to avoid correlated noise due the impulse responses of the signal.

SuggestedRemedy

Change "their relative offsets are large enough to make adjacent lanes uncorrelated within the length of the training frame"
To: "their relative offsets are large enough that the impulse responses on one lane are not correlated with the other"

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176A** *SC* **176A.4.3.2** *P* **631** *L* **18** # 498

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

These bits are not from the PAM4 encoder, they are from the generator.

SuggestedRemedy

change "the sequence of PAM4 symbols
derived by mapping only the A bits"
to "the A bits from the pattern generator"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change "the sequence of PAM4 symbols derived by mapping only the A bits"
to "the A bits from the pattern generator"

Change: "the sequence of PAM4 symbols
derived by mapping only the A bits such that logical 0 is transmitted as 0 and logical 1 is transmitted as 3"
To: "the sequence of PAM4 symbols derived by mapping the A bits from the pattern generator such that logical 0 is transmitted as 0 and logical 1 is transmitted as 3"

[Editor's note: changed page/line from 630/52 to 631/18]

Cl **176A** *SC* **176A.4.3.3** *P* **630** *L* **46** # 217

Lusted, Kent — Intel Corporation

Comment Type **T** *Comment Status* **R** *Pattern*

The output of the PRBS13 training patterns when the precoder is enabled depends on the initial value of the precoder.

SuggestedRemedy

Add text to indicate the initial state of the precoder when training starts. "The precoder state is initialized to 0 based on the initial seeds of the training pattern, so that P(j-1)=0 in Equation (135-1) for the first PAM4 symbol of the first training pattern"

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176A** *SC* **176A.4.3.3** *P* **630** *L* **46** # 214

Lusted, Kent — Intel Corporation

Comment Type **T** *Comment Status* **R** *Pattern*

the precoder to use is not defined in the Annex.

SuggestedRemedy

Add a reference to IEEE Std. 802.3-2022 Clause 135.5.7.2 for the precoder for PAM-4 lanes

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176A** *SC* **176A.4.4** *P* **631** *L* **22** # 499

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

Reference to gray coding and precoding in 120.5.7.1 and 135.5.7.2 is ambiguous since it specifies coding for both inputs and outputs.

SuggestedRemedy

On page 631 line 21.
change "by Gray coding the {A, B} pairs as specified in 120.5.7.1"
to "by Gray coding the {A, B} pairs as specified for output lanes in 120.5.7.1"
On page 631 line 25...
change "Gray coding the {A, B} pairs as specified in 120.5.7.1 and precoding the result as specified in 135.5.7.2"
to "Gray coding the {A, B} pairs as specified for outputs in 120.5.7.1 and precoding the result
as specified for outputs in 135.5.7.2"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license.

Cl **176A** *SC* **176A.4.4** *P* **631** *L* **28** # 500

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

The following paragraph is a repeat of specifications in 176A.4.3.1 through 176A.4.3.3. "For PRBS13, at the beginning of each training pattern the test pattern generator state is set to seed_i (see 176A.4.3.1) and the precoder state is set to 0 such that P(j-1) = 0 in Equation (135-1) for the first PAM4 symbol of the training pattern. For free-running PRBS13 and PRBS31, these operations are not performed."

SuggestedRemedy

Delete paragraph.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Precoding initial state is not defined elsewhere. Delete: "the test pattern generator state is set to seed_i (see 176A.4.3.1) and".
With editorial license

Cl **176A** *SC* **176A.5** *P* **632** *L* **25** # 210

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **A** *(bucket)*

The term for the training pattern in Table 176A-2 Bit 6:5 and Table 176A-3 does not align with the term used in Figure 176A-2. Furthermore, the use of "test" in the name suggests that it only for test use.

SuggestedRemedy

Change "test pattern request" to "training pattern request" in Table 176A-2 and Table 176A-3.

Also update title of 176A.5.3 and elsewhere in the Annex as appropriate

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license.

Cl **176A** *SC* **176A.6** *P* **634** *L* **1** # 335

Rechtman, Zvi — Nvidia

Comment Type **TR** *Comment Status* **A** *Framing*

There are no reserved bits in the TF status field, whereas there are 4 reserved bits in the control field. Future ILT features may require bits in both the control and status fields, making the current arrangement suboptimal. This issue could be addressed by reallocating some bits from the TF status field to the TF control field.

SuggestedRemedy

Remove the ILT bit (bit 14 in the status field) or, alternatively, move it to bit 7 in the control field.

Reallocate the Extend Training bit (bit 6 in the status field) to bit 10 in the control field.

After these changes, there will be 2 reserved bits in the status field and either 3 or 2 reserved bits in the control field.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

There was no consensus to change the ILT bit.

Reallocate the Extend Training bit (bit 6 in the status field) to bit 10 in the control field.

Cl **176A** *SC* **176A.6** *P* **634** *L* **15** # 211

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **A** *(bucket)*

The term for the training pattern in Table 176A-4 Bit 13:12 and Table 176A-5 does not align with the term used in Figure 176A-2. Furthermore, the use of "test" in the name suggests that it only for test use.

SuggestedRemedy

Change "test pattern status" to "training pattern status" in the tables

Also update title of 176A.6.3 and elsewhere in the Annex as appropriate

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license.

Cl **176A** *SC* **176A.6.8** *P* **636** *L* **22** # 502

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

The name of this field implies a state that occurs after normal training period, thus extension. It is asserted when ILT starts and goes to zero when ILT is complete.

SuggestedRemedy

Change the name of this bit to one of the following or similar:
"continue training"
"training in progress"
Update here and elsewhere where this bit is referenced.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change the name of the Extend training bit to: "Continue training".
Implement with editorial license.

Cl **176A** *SC* **176A.7** *P* **636** *L* **42** # 503

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

This clause conflates training frame lock and polarization detection/correction. The former is not well defined and should be separate. The frame lock process should allow for locking on the defined frame marker or its inverse.

SuggestedRemedy

Create new subclause before 176A.7 Training frame lock.
Define the training frame lock process here including reference to the lock state machine.
Remove the first paragraph in 176A.7.
In 176A.11.3.1, redefine marker_valid as follows:
"Boolean variable that is set to true when the candidate frame marker matches the frame marker pattern defined in 176A.4.1 or its inverse and is set to false otherwise."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license.

Cl **176A** *SC* **176A.7** *P* **636** *L* **45** # 504

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

This specification is incomplete in a few ways:
#1 inversion or not is not conveyed to a managent status variable
#2 it is not clear if the correction persists after training is complete
#3 there should be some text in the PMD and AUI clause referring to the correction state and what to do with it

SuggestedRemedy

Update 176A.7 as follows with editorial license...
When training starts for each lane, the variable polarity_correction is set to false. [This should be included in the frame lock state diagram.]
If inverted frame markers are detected during the frame lock process, the polarity_correction variable shall be set to true.
The state of the polarity_correction variable persists until training restarts.
If polarity_correction is true, the lane input shall be corrected by mapping the received PAM4 symbols 0, 1, 2, and 3 to PAM4 symbols 3, 2, 1, and 0, respectively.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Add propossed change to 176A.7. Add new variable as propossed.
Implement with editorial license

Cl **176A** *SC* **176A.7** *P* **636** *L* **49** # 62

Bruckman, Leon — Nvidia

Comment Type **TR** *Comment Status* **R** *(withdrawn)*

Polarity detection is also not avaiable for optical interfaces

SuggestedRemedy

Change the Note in 176A.7 to: "NOTE-Polarity detection and correction is not available for optical interfaces or when training is disabled."

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176A** *SC* **176A.8** *P* **637** *L* **3** # 219

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **A** *(bucket)*

Equalization control is only available for devices uses "Type A1" link training. Eq contril is not supported for "Type A2" link training. (Note: another comment proposed to change the terms "Type A1" and "Type A2")

SuggestedRemedy

Denote in the first paragraph that equalization control is only available with "Type A1" link training

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license.

Cl **176A** *SC* **176A.8.2** *P* **638** *L* **7** # 336

Rechtman, Zvi — Nvidia

Comment Type **TR** *Comment Status* **A** *Coefficients*

According to this sentence, if a preset is unsupported, the Initial Condition status should indicate 'not-updated.' On the receiving side, this status is ambiguous as it does not clarify whether the remote side has not yet responded to the preset request or if it does not support it at all.
Similarly, if the Initial Condition status indicates 'updated,' it remains unclear whether this means the preset request was successfully handled or if the coefficient configuration is not supported

SuggestedRemedy

Define the following behavior:

If a preset request is received and supported by the AUI/PMD, set the Initial Condition status (bit 8) to '1 - updated' and the Coefficient status (bits 2:0) to '000 - not updated.'

If a preset request is received but not supported by the AUI/PMD, set the Initial Condition status (bit 8) to '1 - updated' and the Coefficient status (bits 2:0) to '011 - Coefficient not supported.'

This remedy maintains backward compatibility when presets are supported and provides unambiguous indication when they are not

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license.

Cl **176A** *SC* **176A.8.3** *P* **638** *L* **18** # 186

He, Xiang — Huawei

Comment Type **TR** *Comment Status* **R** *Coefficients*

The current LT coefficient update request process requires wait *until* there is a status received. In cases where LT frame loses sync, it takes long to recover. Suggest to allow a fast "roll back" to the process when LT frame is lost, so recovery is faster and overall LT process is shorter.

SuggestedRemedy

A supporting presentation will be provided with proposed changes to 176A.8.3.

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176A** *SC* **176A.10** *P* **640** *L* **3** # 505

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **R** *Coefficients*

The average response time is specified as a recommendation. Given this is a greenfield specification this should be a normative requirement.

SuggestedRemedy

Change: "It is recommended that the average response time be less than 2 ms."
To: "The average response time shall be less than 2 ms."

Response *Response Status* **C**

REJECT.

There is no consensus to make to recommended changes.

Cl **176A** *SC* **176A.10** *P* **641** *L* **12** # 506

Brown, Matt Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

What is meant by a time-out? The only once I could find was due to a time-out in the recovery state in Figure 176A-7, where a time-out there causes a transition to the FAIL state. Why not reference that instead.

SuggestedRemedy

Clarify what specifically this is referring to. Perhaps "ILT should not be restarted based on entering the FAIL state in the Training control state diagram (see Figure 176A-7)"
But that seems like an unrecoverable fault.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment is against the note in 176A.11.2.1.

Delete: "based on a timeout"
Add the following at the beginning of the note:
"There is no specified time limit for the ILT protocol."
Add the following at the end of the note: "The definition of an unrecoverable fault is beyond the scope of this Annex."

[Editor's note: Changed the page/line from 640/3 to 641/12.]

Cl **176A** *SC* **176A.11.2.1** *P* **641** *L* **20** # 507

Brown, Matt Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

The defintion of how to set remote_rts to true and false is a bit convoluted and the last sentence is redundant.

SuggestedRemedy

Change the second sentence to:
If mr_training_enable is true and "extend training" bit of the status field of received training frames
on all lanes of the interface is zero then remote_rts is true otherwise it is false. If mr_training is false then remote_rts is always true.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license.

Cl **176A** *SC* **176A.11.2.1** *P* **642** *L* **46** # 508

Brown, Matt Alphawave Semi

Comment Type **T** *Comment Status* **A** *State diagrams*

The editor's note points out that the location of the Figure 176A-6 state diagram needs to be specified. Given that there is one per interface and since the ILT function is part of the PMD or AUI component the location is implicit.

SuggestedRemedy

Delete the editor's note.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

A functional block diagram for the ILT function was adopted by comment #98. See slide 14 of the following presentation:
https://www.ieee802.org/3/dj/public/24_09/issenhuth_3dj_02_2409.pdf

The adopted diagram depicts the per-interface ILT function as part of the PMD or the AUI component.

Delete the editor's note.

Cl **176A** *SC* **176A.11.3** *P* **643** *L* **4** # 509

Brown, Matt Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

These statements indicate what to due if precoding is selecting but not if precoding is not selected.

SuggestedRemedy

Add text here or in Clause 176 indicating either:
For the PMA output and Inner FEC transmitter output the precoder is disabled unless set otherwise by management or the ILT process as defined in 176A.11.3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The right place to implement this comment is Clause 176.
Implement with editorial license in Clause 176.
[Editor's note: CC: 176, 176A]

Cl **176A** *SC* **176A.11.3.1** *P* **644** *L* **45** # 510

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

There is no allotted time limit for training. There is one for recovery after a coefficient update by entering the FAIL state in Figure 176A-7 where training_failure is asserted.

SuggestedRemedy

Change definition to:
Boolean variable that is set to true when training failed to complete. The value is set by the Training control state diagram (see Figure 176A-x).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license.

Cl **176A** *SC* **176A.11.3.5** *P* **647** *L* **7** # 63

Bruckman, Leon — Nvidia

Comment Type **TR** *Comment Status* **R** *(withdrawn)*

Training_status should follow the behavior of "training"

SuggestedRemedy

Assign the value of FAIL to training_status in the QUIET state and move the assignment of IN_PROGRESS to training_status from the QUIET state to the SEND_TRAINING state

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176A** *SC* **176A.11.3.5** *P* **647** *L* **42** # 64

Bruckman, Leon — Nvidia

Comment Type **TR** *Comment Status* **A** *State machine*

When LT is disabled the LT frames from one ISL will be passed to the other ISL for the time of propagation_timer. These LT frames are not expected by the receiver in the ISL. A presentation will be submitted to explain the issue

SuggestedRemedy

The arrow from the SEND_LOCAL state shall be connected to the PATH_READY state instead of to the PATH_UP state.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following presentation was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/24_09/bruckman_3dj_01_2409.pdf

Implement the changes on slide 6 of bruckman_3dj_01_2409.

Add an editor's note stating that more detail is required for the local pattern and contributions on this subject are requested.

Implement with editorial license.

Cl **176A** *SC* **176A.11.3.5** *P* **649** *L* **6** # 184

He, Xiang — Huawei

Comment Type **TR** *Comment Status* **R** *State machine*

Using preset 1 may not be the best option. We have so many presets and should let vendors decide which preset should be used in case of out of sync.

SuggestedRemedy

Change "ic_req <= preset 1" to "ic_req <= preset x", where x can be any of the presets.

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **176A** *SC* **176A.12** *P* **650** *L* **28** # 65

Bruckman, Leon Nvidia

Comment Type **TR** *Comment Status* **A** *(bucket)*

Missing thershold configuration in Table 176A-7

SuggestedRemedy

Add max_recovery_events to Table 176A-7

Response *Response Status* **C**

ACCEPT.

Cl **176B** *SC* **176B** *P* **654** *L* **1** # 349

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

Comment Type **T** *Comment Status* **R** *(bucket)*

Annex 176B is noted as normative - but there are no corresponding SHALL statements or PICS.

SuggestedRemedy

Add Shall statement where intended or make informative.

Response *Response Status* **C**

REJECT.
A normative annex need not have either shall statements or PICS to be normative. As an example, Annex 93A, which defines channel operating margin and other test methodologies, does include shall statements, but it has no PICS subclause. As another example, Annex 93C, which provides test methodologies for 25 Gb/s signaling, is normative, but includes no shall statement and no PICS.
The content of this annex is indeed normative. However, the normative relavance is set by piecemeal reference from another clause. Therefore no shall statements or PICS are required here. Those will be part of the referencing clauses and annexes.

Cl **176D** *SC* **176D.1** *P* **674** *L* **17** # 33

Heck, Howard Intel Corporation

Comment Type **T** *Comment Status* **A** *C2C channel*

D1.1 contains a TBD for the approximate interconnect length. The contribution in https://www.ieee802.org/3/dj/public/24_07/heck_3dj_01a_2407.pdf indicates that an interconnect length of approximately 30 cm will pass COM

SuggestedRemedy

Replace "TBD" with "30 cm"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The contribution referenced in the comment does not mention interconnect length, so it does not justify the suggested remedy.
There was no support to adopt a length value.

Make the following change:
from
"These interfaces have specified electrical characteristics, and may optionally be used when designing systems with electrical interconnect of approximately TBD cm in length"
to
"These interfaces have specified electrical characteristics, and may optionally be used when designing systems with electrical interconnects."

Nevertheless, it would be good to adopt a value instead of the TBD, if there is consensus.
For CRG discussion.

Cl **176D** *SC* **176D.1** *P* **675** *L* **14** # 339

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

Comment Type **TR** *Comment Status* **A** *'bucket), OSI reference figure*

The OSI Reference Model "Physical" includes the MDI - the lower border should align with the MDI / Medium border. As currently shown, it appears to be showing the bottom border of the PHY.
Figure 176D-1

SuggestedRemedy

Redraw the bottom of the OSI Reference model so it aligns to the MDI / Medium Border

Response *Response Status* **C**

ACCEPT.

Cl **176D** *SC* **176D.2** *P* **675** *L* **42** # 135

Dudek, Mike Marvell

Comment Type **T** *Comment Status* **A** *(bucket)*

The C2C interface is more similar to KR than CR.

SuggestedRemedy

Change the inter-sublayer service interface reference from 179.4 to 178.4

Response *Response Status* **C**

ACCEPT.

Cl **176D** *SC* **176D.2** *P* **676** *L* **10** # 136

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **A** *Link diagram (bucket)*

Figure 176D-2 is confusing. Note 2 is correctly saying that the device package is part of the channel, and implying that the "component" includes the package. The Figure however looks as though TP0d and TP5d are at the edge of the component.

SuggestedRemedy

In figure 176D-2 Move the C2C componet box edges significantly closer to the connector so that there is a much longer trace between what represents the package edge and the TP0/5d points.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Update the diagram to visualize the components, package, die, TP0d, TP5d, etc., based on Figure 178-2, with editorial license.

Cl **176D** *SC* **176D.2** *P* **676** *L* **18** # 138

Dudek, Mike Marvell

Comment Type **T** *Comment Status* **A** *(bucket)*

Figure 176D-2 title is wrong.

SuggestedRemedy

Change C2M to C2C.

Response *Response Status* **C**

ACCEPT.

Cl **176D** *SC* **176D.2.1** *P* **676** *L* **35** # 137

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **A** *error ratio*

The value of BERadded is incorrect. It should be the KP4 random error correction capability minus the allowed BER for the AUI. Assuming the adopted DER of 0.67e-5, and an assumed worst case error extension for FEC symbol errors of 0.6 (see Dudek_3dj_01_2309) the random BER allowance is only 0.8e-5. Anslow_3ck_adhoc_01_072518 slide 7 is showing the KP4 random error correction capability as 3.2e-4. however I am not sure this number is correct and the number needs to be confirmed.

SuggestedRemedy

Change 2.7e-4 to 3.12e-4. Add an editor's note that the value is to be confirmed.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed slides 7 to 9 in the following presentation:
https://www.ieee802.org/3/dj/public/24_09/brown_3dj_04_2409.pdf

Change BERadded to 2.841e-4.

Implement with editorial license.

Cl **176D** *SC* **176D.3.3** *P* **677** *L* **35** # 139

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **A** *Tx diff PtP, vf*

In order to close the link budget the difference in linear fit pulse peak ratio and difference in steady state voltage need to be zero as they were at 100G

SuggestedRemedy

Make dvf and dRpeak equal to zero.

Response *Response Status* **C**

ACCEPT.

Cl **176D** *SC* **176D.3.4.1** *P* **681** *L* **29** # 140

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **A** *(bucket)*

There are blanks in the text. Comparing with 802.3ck they should be the references to Interference tolerance and jitter tolerance.

SuggestedRemedy

replace with "176D.3.4.4 and 176D.3.4.5

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Add 176D.3.4.4 and 176D.3.4.5 as references to "Interference tolerance" and "Jitter tolerance", respectively.

Cl **176D** *SC* **176D.3.4.1** *P* **681** *L* **29** # 34

Heck, Howard — Intel Corporation

Comment Type **T** *Comment Status* **A** *(bucket)*

"The receiver shall comply with the requirements of and for any signaling rate in the range specified in Table 176D-3." The cited sentence is missing text to describe the specific requirements, which are meeting the Itol (176D.3.4.4) and Jtol (176D.3.4.5).

SuggestedRemedy

Insert references to 176D3.4.4 and 176D3.3.5.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The suggested remedy includes a typo in the second reference.
Resolve using the response to comment #140.

Cl **176D** *SC* **176D.3.4.4** *P* **683** *L* **20** # 141

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **A** *error ratio*

It would be helpful to provide a reference for the BERadded here in footnote a.

SuggestedRemedy

Add "The BERadded is specified in 176D.2.1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

BERadded should be explicitly mentioned in the test requirements.

In footnote a, change "The block error ratio (see 174A.6) is measured" to "Block error ratio (see 174A.6) is measured with BER_added specified in 176D.2.1".

In the first paragraph of 176D.3.4.4, change
"The receiver on each lane shall meet the expected block error ratio specified in 176D.2 with channels matching the Channel Operating Margin (COM) and loss parameters for Test 1 and Test 2 in Table 176D-4"
to
"A receiver shall meet the requirements in Table 176D-4 for both Test 1 and Test 2".

Implement with editorial license.

Cl **176D** *SC* **176D.4.1** *P* **686** *L* **8** # 162

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **A** *A_v, A_fe, A_ne*

With the change of Rd from 50 Ohm to 46.25 Ohm in COM the effective output amplitude into a 50 Ohm load increased resulting in a requirement for approximately 4% larger steady state output amplitude from the transmitter than for 100G per lane.

SuggestedRemedy

Change the values of Av and Afe to 400mV and Ane to 585mV. If that is not done then the Test transmitter constraint on page 682 line 37 should be increased from 800mV to 830mV

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG has reviewed slides 20-23 in
https://www.ieee802.org/3/dj/public/24_09/ran_3dj_04a_2409.pdf.

In 176D and 176E, use COM parameters Av = Afe = 0.385 V and Ane = 0.578 V.
For annex 176E, use min vf=0.4 and max vf=0.6.

Straw poll taken during resolution of comment #160 for the corresponding PMD parameters indicates support for this direction.

Cl **176D** *SC* **176D.4.1** *P* **686** *L* **9** # 538

Li, Mike — Intel

Comment Type **TR** *Comment Status* **A** *A_v, A_fe, A_ne*

Ane of 0.45 is inconsistent with the TX Vdiff max

SuggestedRemedy

Change it to 0.6 to be consistent

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #162.

Cl **176D** *SC* **176D.4.1** *P* **686** *L* **9** # 410

Ran, Adee — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *A_v, A_fe, A_ne*

The value of A_ne in Table 176D-7 is 0.45.
The maximum allowed differential peak-to-peak voltage for a transmitter in Table 176D-1 is 1200 mV.
The local device's transmitter (which creates the NEXT) can have this maximum, so its A_ne should be at least 600 mV to match. In 802.3ck, the value 0.608 V was used, but since the maximum differential applies to any signal (not just PRBS13Q) there is no need to exceed 600 mV.
Alternatively the max diff ptp voltage in the Tx could be reduced to 900 mV, but it is likely that this would reduce reach in practical implementations, so it is not desired.

This also applies to A_ne in Table 176E-6 (currently 0.45 V) and in Table 178-13 and 179-16, (currently TBD).

SuggestedRemedy

Change A_ne to 0.6 V in Table 176D-7, Table 176E-6, Table 178-13, and Table 179-16.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #162.

Cl **176D** *SC* **176D.4.1** *P* **686** *L* **44** # 547

Li, Tobey — MediaTek

Comment Type **TR** *Comment Status* **A** *Reference FFE, eta0*

Multiple COM parameters in Table 176D-7 are TBD

SuggestedRemedy

In Table 176D-7, use COM parameter values from heck_3dj_01a_2407 slide 13.
eta_0 = 1e-8
d_w = 5
N_fix = 14
N_g = 2
N_f = 4
N_max = 50

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the responses to comments #377 (eta0) and #2 (Reference Rx FFE parameters).

Cl **176D** *SC* **176D.4.1** *P* **686** *L* **44** # 35

Heck, Howard — Intel Corporation

Comment Type **T** *Comment Status* **A** *eta0*

The value for eta0 is TBD. Slide 13 of https://www.ieee802.org/3/dj/public/24_07/heck_3dj_01a_2407.pdf proposes a value of 1e-8 V^2/GHz and is supported by Straw Poll E-4 from the July 2024 Plenary:

Straw Poll #E-4
I would support the proposed COM parameter values per heck_3dj_01a_2407, slide 13
And with editor note: "The RX FFE tap values limits were chosen based upon no reliance upon the TX FFE taps. Further work is required to determine how the equalization effect is distributed between the RX FFE and the TX FFE taps to account for some reasonable implementation choices."
(choose one)
Results (all): Y: 27 , N: 7 , A: 14

SuggestedRemedy

Change TBD to 1e-8 V^2/GHz.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #377.

Cl **176D** *SC* **176D.4.1** *P* **686** *L* **44** # 142

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **A** *Reference FFE, eta0*

Much discussion occurred on COM paratemeters and a straw poll was taken at the Montreal Plenary. We should replace values in table 167D-7 based on the straw poll which showed consensus.

SuggestedRemedy

Adopt the values in heck_3dj_01a_2407, slide 13 and add the editor's note shown in Straw Poll #E-4 in that meeting.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the responses to comments #377 (eta0) and #2 (Reference Rx FFE parameters).

Cl **176D** *SC* **176D.4.1** *P* **687** *L* **5** # 36

Heck, Howard — Intel Corporation

Comment Type **T** *Comment Status* **A** *(bucket)*

Table 176D-7 entries for d_w, N_fix, N_g, N_f, N_max, w_max(j), w_min(j), N_b, b_max(j), and b_min(j) are duplicated.

SuggestedRemedy

Remove the duplicate entries on lines 5-17 of Table 76D-7.

Response *Response Status* **C**

ACCEPT.

Cl **176D** *SC* **176D.4.1** *P* **687** *L* **27** # 37

Heck, Howard — Intel Corporation

Comment Type **T** *Comment Status* **A** *Reference FFE*

Values for d_w, N_fix, N_g, N_f, N_max are TBD. Additionally, https://www.ieee802.org/3/dj/public/24_07/heck_3dj_01a_2407.pdf provides analysis and proposed changes to the values for w_max(j) and w(min). The proposed changes are supported by results from Straw Poll E-4 from the July 2024 Plenary:

Straw Poll #E-4
I would support the proposed COM parameter values per heck_3dj_01a_2407, slide 13
And with editor note: "The RX FFE tap values limits were chosen based upon no reliance upon the TX FFE taps. Further work is required to determine how the equalization effect is distributed between the RX FFE and the TX FFE taps to account for some reasonable implementation choices."
(choose one)
Results (all): Y: 27 , N: 7 , A: 14

SuggestedRemedy

Modify the appropriate rows in Tabld 176D-6 with the changes in slide 13 of the referenced contribution, including the proposed editor's note.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The subject of the comment is Table 176D-7.
Resolve using the response to comment #2.

Cl **176D** *SC* **176D.4.3** *P* **689** *L* **11** # 539

Li, Mike — Intel

Comment Type **TR** *Comment Status* **A** *ERL*

Channel ERL parameter values have many TBDs

SuggestedRemedy

Replace them with the filled values provided in the "Table 176D-8" sheet.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The table referred to in the suggested remedy is available in the following URL:
https://www.ieee802.org/3/dj/comments/D1p1/8023dj_D1p1_comment_539_attachment.pdf
The values are:
T_r = 5e-3 ns
rho_x = 0.618
N = 4000 UI
N_bx = 16 UI

Use the proposed values for ERL tables in Annex 176D.

Cl **176E** *SC* **176E.1** *P* **694** *L* **14** # 340

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

Comment Type **TR** *Comment Status* **A** *'bucket), OSI reference figure*

The OSI Reference Model "Physical" includes the MDI - the lower border should align with the MDI / Medium border. As currently shown, it appears to be showing the bottom border of the PHY.
Figure 176E-1

SuggestedRemedy

Redraw the bottom of the OSI Reference model so it aligns to the MDI / Medium Border

Response *Response Status* **C**

ACCEPT.

Cl **176E** *SC* **176E.2** *P* **695** *L* **3** # 143

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **A** *error ratio*

The value of BERadded is incorrect. It should be the KP4 random error correction capability minus the allowed BER for the AUI. Assuming the adopted DER of 2e-5, and an assumed worst case error extension for FEC symbol errors of 0.6 (see Dudek_3dj_01_2309) the random BER allowance is 2.4e-5.
Anslow_3ck_adhoc_01_072518 slide 7 is showing the KP4 random error correction capability as 3.2e-4. however I am not sure this number is correct and the number needs to be confirmed.

SuggestedRemedy

Change 2.7e-4 to 2.96e-4. Add an editor's note that the value is to be confirmed.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed slides 7 to 9 in the following presentation:
https://www.ieee802.org/3/dj/public/24_09/brown_3dj_04_2409.pdf

Change BERadded to 2.681E-4.

Implement with editorial license.

Cl **176E** *SC* **176E.2** *P* **695** *L* **40** # 115

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *k diagram, C2M Host channel*

Figure TBDs

SuggestedRemedy

See Ghiasi_01 supporting presentation from July-24
Connector Ildd=2.45 dB
Module Ildd=3.8 dB
Host Ildd=23.75 dB

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG has reviewed the presentations https://www.ieee802.org/3/dj/public/24_09/ghiasi_3dj_03a_2409.pdf, https://www.ieee802.org/3/dj/public/24_09/kareti_3dj_02_2409.pdf, https://www.ieee802.org/3/dj/public/24_09/ran_3dj_03a_2409.pdf, https://www.ieee802.org/3/dj/public/24_09/ghiasi_3dj_04a_2409.pdf, and slides 25-28 in the editorial slide set https://www.ieee802.org/3/dj/public/24_09/ran_3dj_04a_2409.pdf.

Straw poll #E-1 (directional):
I would support setting the AUI-C2M ILdd from TP0d to TP1a to:
A: 26 dB
B: 30 dB
C: 32 dB
D: 34 dB
(Choose 1) A: 6 B: 9 C: 23 D: 4

Straw poll #E-2 (directional):
I would support setting the AUI-C2M ILdd from TP0d to TP1a to:
A: 26 dB
B: 30 dB
C: 32 dB
D: 34 dB
(Chicago rules) A: 13 B: 22 C: 31 D: 14

Based on the straw polls, there is consensus to use 32 dB as the TP0d to TP1a budget.
Per ghiasi_3dj_03a_2409, the module ILdd allocation is 3.8 dB, same as the HCB.
Therefore, TP0d to TP1d is also 32 dB.

Comment #515 suggests separating the budget from the structural diagram into a separate diagram.
Comment #566 suggests including the connector in the host budget.

Implement the proposed changes on slides 4 and 6 in ran_3dj_03a_2409, but on slide 6 extend the host channel arrow to include the connector, and delete the "up to TBD dB" below the connector. Also, use 28.2 dB for the host channel ILdd.

Implement with editorial license.

Cl **176E** *SC* **176E.3** *P* **695** *L* **3** # 144

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **A** *(bucket)*

It is ambiguous as to what a C2M component is. From the diagram it appears to be the die which is inconsistent with the usage of C2C component in 176D which includes the package.

SuggestedRemedy

If the intent is to include the packages in the "component" then amend Figure 176E-2 to show the TP0/1/4/5d interfaces well inside the "component" box. Or change the name "component" to be different than what is used for C2C both in figure 176E-2 and appropriately in the test above. I suggest "die" is used. If neither of these is done then add a note. "The C2M component is different from a C2C component as the C2C component includes the package while the C2M component does not.".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the responses to comments #145 and #411.

Cl **176E** SC **176E.3** P **695** L **16** # 516

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *AUI architecture*

The AUI-C2M compoent is defined as being "functionally equivalent to a corresponding n-lane PMD specified in Clause 179" and includes the same ILT. However, for the AUI-C2M the functional architecture, like the PMD, including the channel, the component at each end, and the abstract service interface signaling are never defined.

SuggestedRemedy

Define a complete architecture schema for the AUI-C2M as follows:
PMA service interface (above the AUI)
AUI Component
AUI Channel
AUI Component
PMA service interface (below the AUI)
Implement similarly for AUI-C2C in Annex 176D.
A presentation with a more complete proposal will be provided.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following presentation was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/24_09/brown_3dj_03_2409.pdf

Implement the proposal on slides 12 to 14, 24 to 26, and 28 to 31 in brown_3dj_03_2409.

Implement with editorial license.

Cl **176E** SC **176E.3** P **695** L **22** # 114

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *AC coupling*

Replace sentence " The transmission lines are AC-coupled within the module and have a common ground reference." The 50 kHz corner frequncy is legacy from 25.78 GBd, given the 106 GBd operation this corner frequency should be increased

SuggestedRemedy

with "The transmission lines are AC-coupled within the module with low-frequency 3 dB cutoff of less than equal 200 kHz or at least 100 KHz and have acommon ground reference."

Response *Response Status* **C**

REJECT.
Comments #533 and #123 were resolved with changing of the KR and CR corner frequency to 100 kHz, which is the current value in Annex 176E (see 176E.4.4).

No change to the value is required.

Cl **176E** SC **176E.3** P **695** L **35** # 411

Ran, Adee — Cisco Systems, Inc.

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

Figure 176E-2 should depict the test points being inside the component packages and include a corresponding NOTE as done in Figure 176D-2. (This was intended but omitted due to an editorial mistake).

SuggestedRemedy

Update Figure 176E-2 with the format of Figure 176D-2 with the appropriate changes from C2C to C2M (including test point names and location of AC coupling caps).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **176E** SC **176E.3** P **695** L **35** # 517

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket), C2M link diagram*

The service interface to the left of the host component and to the right of the module component are by definition specifically the PMA service interface. The AUI is a physical instantiation of the PMA service interface.

SuggestedRemedy

Change "inter-sublayer service interface" to "PMA service interface" in two places.

Response *Response Status* **C**

ACCEPT.

Cl **176E** SC **176E.3** P **695** L **36** # 515

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *C2M link diagram*

Figure 176E-2 is becoming overly inflated with both architecture depiction of the AUI-C2M and with the complex channel insertion loss parameters. This subclause (176E.3) and figure (Figure 176E-2) should be simplified to describe the AUI-C2M is general. All of the channel insertion loss parameters should be depicted and defined in a subclause dedicated to the channel and its characteristics.

SuggestedRemedy

Move all of the channel characteristics and create a new related diagram under the channel subclause 176E.5.
Simply Figure 176E-2 to show only the architectural aspects.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #115.

Cl **176E** *SC* **176E.3** *P* **695** *L* **38** # 412

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *C2M link diagram*

Figure 176E-2 includes both components and insertion loss budget. This creates an impression that its content is normative, and leads to long dispute. In fact, nothing in this figure is normative, and the test points that appear in it are inaccessible.
The "loss budget" numbers should be listed in the "Recommended channel" subclause 176E.5 instead

SuggestedRemedy

Remove the loss indications labels from Figure 176E-2. Remove the editor's note below the figure.
Add a table in 176E.5.1 with recommended loss values between:
- Host TP0d/TP5d and connector pads
- Module TP0d/TP5d and paddle card pads
- HCB paddle card pads and TP1d/TP4d
- MCB connector pads and TP1/TP4
- Connector allocation

A presentation with proposed table format and values is planned.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #115.

Cl **176E** *SC* **176E.3** *P* **695** *L* **40** # 413

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *AC coupling*

Figure 176E-2 shows capacitor symbols on the module side, but there is nothing that says explicitly that modules have AC-coupling in both input and output. This figure is not a normative requirement for having AC coupling.

176E.4.4 (Module output characteristics) mentions AC-coupling casually in a "should" statement: "The low-frequency 3 dB cutoff of the output AC-coupling within the module should be less than 100 kHz", so even the cutoff frequency is not a hard requirement for modules, as it is with for cable assemblies. Having high cutoff frequency can cause occasional error bursts due to baseline wander, so this should be a hard requirement. There is no similar statement for the module input.

AC coupling is part of the functional specification so it should be mentioned in 176E.3.

SuggestedRemedy

Add the following sentence at the end of 176E.3:
"The signals in both directions are AC-coupled within the module as specified in 176E.4.4 and 176E.4.6."

In 176E.4.4 change the sentence
"The low-frequency 3 dB cutoff of the output AC-coupling within the module should be less than 100 kHz"
to
"The module output shall be AC-coupled. The low-frequency 3 dB cutoff frequency shall be less than 100 kHz".
Add a similar sentence about module input in 176E.4.6.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
AC-coupling is already mentioned in the 4th paragraph of 176E.3, so the suggested additional sentence is not required.

In 176E.4.4 change the sentence
"The low-frequency 3 dB cutoff of the output AC-coupling within the module should be less than 100 kHz"
to
"The module output shall be AC-coupled within the module, with low-frequency 3 dB cutoff frequency less than 100 kHz".

In 176E.4.4 insert the following paragraph at the beginning:
"The module input shall be AC-coupled within the module. It is recommended that the low-frequency 3 dB cutoff frequency is less than 100 kHz".

Cl **176E** *SC* **176E.4.1** *P* **696** *L* **13** # 568

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **A** *(bucket)*

802.3 is not a component spec. We define observable behaviour of complete equipment ("hosts") at specified interfaces. For example, an optical signal at TP2 is the product of the host and the module. And see NOTE 2 below.

SuggestedRemedy

Change " for the C2M component" to "for C2M"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #145.

Cl **176E** *SC* **176E.4.1** *P* **696** *L* **14** # 145

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **A** *(bucket)*

The characteristics defined at the compliance points are for the host and module are not for the "C2M componets" (assuming these refer to the die with/without package see separate comment). They include the connector and host channel for the host and the module channel for the module.

SuggestedRemedy

Change the sentence "The electrical characteristics for the C2M components are defined at compliance points for the host and
module." to "The electrical characteristics for the C2M host and module are defined at compliance points" or possibly "The electrical characteristics for the C2M host and module interfaces are defined at compliance points"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change from
"The electrical characteristics for the C2M components are defined at compliance points for the host and module"
to
"The electrical characteristics for the C2M host and module are defined at compliance points".

Change other instances in 176E where "components" refer to the host and module rather than their parts, similarly, with editorial license.

Cl **176E** *SC* **176E.4.1** *P* **696** *L* **15** # 414

Ran, Adee Cisco Systems, Inc.

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

"mechanically equivalent with" on L16 but "to" on L17

SuggestedRemedy

Change to "mechanically equivalent to"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **176E** *SC* **176E.4.1** *P* **696** *L* **19** # 415

Ran, Adee Cisco Systems, Inc.

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

"Figure 176E-3 depicts the location of compliance points for each lane in which host characteristics are specified."
The phrase "for each lane" is confusing in its current location.

Similarly for MCB on P697 L1.

SuggestedRemedy

Change to
"Figure 176E-3 depicts the location of compliance points in which host characteristics are specified. The test points are separate for each lane."

Change similarly on P697.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **176E** *SC* **176E.4.3** *P* **697** *L* **43** # 570

Dawe, Piers
Nvidia

Comment Type **TR** *Comment Status* **R** *Tx diff PtP, vf*

1200 mV is quite excessive for C2M in 2024.

SuggestedRemedy

Change to 900 mV, as in most C2M. Similarly, reduce vf max to 450 mV.

Response *Response Status* **C**

REJECT.
The resolution of comment #162 included a maximum vf of 0.6 V, consistent with the existing differential peak-to-peak voltage of 1.2 V.
Comment #416 addressed the definition of differential peak-to-peak voltage, but there was no consensus for using the suggested remedy.

Further work on this topic is encouraged.

Cl **176E** *SC* **176E.4.3** *P* **697** *L* **44** # 146

Dudek, Mike
Marvell

Comment Type **TR** *Comment Status* **A** *Tx diff PtP, vf*

Providing a differential peak to peak voltage of 1200mV from the host will potentially overload optical receivers and this is an un-necessarily large swing at the host output, particularly as the steady-state voltage max is only 600mV. (1200mV may be present at the chip output with pre-emphasis but should not be present at TP1a.)

SuggestedRemedy

Reduce this amplitude to 900mV also the amplitude tolerance in table 176E-4. Note if this is not done then Ane in table 176E-6 should be increased to 600mV. If it is done the near end aggresor Ane should be split into two rows Ane host to module of 600mV and Ane module to host of 450mV. Another possible change would be to reduce the max differential peak to peak voltage to 900mV for both module output and host output and leave the Ane value as 450mV. Change the amplitude tolerance value on page 709 line 15 to match (or better change page 709 line 15 to refer to the appropriate tables for the values.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #162.

Cl **176E** *SC* **176E.4.3** *P* **698** *L* **12** # 569

Dawe, Piers
Nvidia

Comment Type **TR** *Comment Status* **A** *Tx FFE specs*

In 3ck, C2M had just two modes for its "transmitter output waveform training". In this project, COM seems to think that TxFIR setting is not important, although that may be a feature of the abstract COM receiver not real receivers. It is not clear whether CR needs such careful transmitter output waveform rules, and if it does, it does not necessarily follow that C2M, with less loss, also needs them.

SuggestedRemedy

Add an editor's note here, at module output, and at the presets table, saying that transmitter output waveform requirements are to be confirmed, and contributions addressing the need (or not) for fine granularity are encouraged.
Do the same in other clauses if appropriate.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Add editor's notes below each of the COM tables (Table 178-13, Table 179-16, Table 176D-7, and Table 176E-5) stating that the COM parameters currently result in not utilizing the transmitter equalizer specified in COM and in the transmitter output waveform; that the required equalization range and resolution in the transmitter output waveform specification need confirmation; and that contributions in these areas are encouraged.

Cl **176E** *SC* **176E.4.3** *P* **698** *L* **28** # 416

Ran, Adee Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **R** *Tx diff PtP, vf*

The specification of "Differential peak-to-peak voltage (max)" points to 176E.6.1 but has a footnote saying that the measurement uses the method in 93.8.1.3 except that PRBS13Q test pattern is used.
It should be noted that 93.8.1.3 is a KR specification at TP0a (very close to the transmitter) and it does not describe a measurement method in detail.

With an insertion loss of ~30 dB to from the transmitter to TP1a, the measured peak-to-peak with PRBS13Q will not be indicative of the real swing and the peak-to-peak that can occur with mission data. The difference can be large, and the existing limit can lead to excessive swing that can overstress devices, e.g. in amplitude tolerance.

The specified max peak-to-peak voltage is intended to hold with any data pattern, not just PRBS13Q, and at any equalization setting, and any violations should be extremely rare - 1e-5 is too high and can create an error floor. It is a clear design requirement that does not require a specific measurement method (the standard is not a measurement specification).

For compliance purposes, the peak-to-peak measurement needs to be verified at least with equalization off, and to be performed with a sufficiently rich test pattern, such as PRBS31Q. Compare to "Average optical power" which is specified with PRBS31, scrambled idle, or "valid xGBASE-R signal".

This also applies to module output and to CR and KR transmitter output specifications, although the loss to the measurement point for those is smaller.

SuggestedRemedy

Delete footnote b.

Replace the editor's note in 176E.6.1 with new text defining the maximum peak-to-peak differential voltage as an absolute requirement for any equalization setting. For compliance testing it is measured with equalization off (preset 1) and may use PRBS31Q, scrambled idle, or any valid PMD pattern. The measurement excludes voltages that occurs with a probability less than 1e-9.

Apply similar changes in clauses 178 and 179 and in annex 176D

Response *Response Status* **C**

REJECT.

The CRG reviewed the presentation
https://www.ieee802.org/3/dj/public/24_09/ran_3dj_02a_2409.pdf.

It was suggested that measurement with a pattern such as SSPRQ may be more adequate than the PRBS13Q defined in D1.1. The probability of the peak should also be addressed.

However, there was no consensus to adopt the changes proposed in the presentation.

Further work on this topic is encouraged.

Cl **176E** *SC* **176E.4.4** *P* **699** *L* **9** # 118

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *signaling rate*

Supporting +/- 100 PPM is Onerous and an unlikly use case as it means a system with 50G IO, by haivng to support +/-100 ppm one can't take advnatge of +/-50 ppm. All the optical PMDs currently only support +/-50 PPM so supporting +/-100 ppm on the eletrical interfacs has limited benefit. Multi-rate electrical SerDes that support 200G/100G/50G they will support 100 PPM and will interoperate with legacy 50G SerDes, so there is no need to add 50 PPM support to the 200G SerDes.

SuggestedRemedy

Remove support for +/- 100 PPM here and for all 200G PMA/PMDs throughout the draft, see:
176D.3.4
176E.4.6
176E.4.5
179.9.5
178.9.3

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

As indicated by slide 4 in https://www.ieee802.org/3/dj/public/24_09/brown_3dj_04_2409.pdf slides, if the signaling rate range is changed to 50 ppm for all AUIs and PMDs it may result in a signaling rate interoperability issue with 50 Gb/s per lane AUIs. However, this can be resolved by use of an extender sublayer within the device that converts the lane rates.

The straw polls TF-5/6/7 indicated sufficient concensus to change the signaling rate range to 50 ppm for all 200 Gb/s per lane AUIs and PMDs.

Change the signaling rate range to +/-50 ppm on TX and RX for all PMDs defined in Clause 178 to 183 and AUIs defined Annex 176D and 176E. Include an editor's note pointing out that for interoperation with AUIs with lower than 100 Gb/s lane rate an xMII extender will be required.

Strawpoll TF-5 (directional)
I support changing the signaling rate range for all 200 Gb/s per lane PMD to 50 ppm only.
Y: 41
N: 23
A: 36

Strawpoll TF-6 (directional)
I support changing the signaling rate range for all 200 Gb/s per lane AUI to 50 ppm only.
Y: 43
N: 23
A: 34

Strawpoll TF-7 (decision)
I support changing the signaling rate range for all 200 Gb/s per lane AUIs and PMDs to 50 ppm. Note that for interoperability with 50 Gb/s per lane AUIs an xMII extender would be required.
Y: 43
N: 33
A: 32

Cl **176E** *SC* **176E.4.4** *P* **699** *L* **17** # 575

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **R** *AC common mode*

AC common-mode voltages are not as large as this in practice, even at 200G/lane

SuggestedRemedy

Reduce both AC common-mode voltage limits for CR, KR, C2C and C2M.

In particular, halve the LF ACCM limit for module output (Table 176E-2) because the module output is measured in the MCB which should have a clean power supply.
Also in Table 176E-3, host input ACCM tolerance.
We may need a sentence of explanation: the host must tolerate this much module-generated ACCM, as well as any that it generates itself.

Response *Response Status* **C**

REJECT.
For C2M module output and host input tolerance, the suggested remedy is understood as max VCM_LF=15 mV. This may be reasonable if there is consensus.
For all other interfaces, the suggested remedy does not provide sufficient detail to implement.

There is no consensus to implement the suggested remedy at this time.

Cl **176E** *SC* **176E.4.5** *P* **700** *L* **33** # 147

Dudek, Mike
Marvell

Comment Type **T** *Comment Status* **A** *DC common mode*

The Module common-mode output voltage and host input common-mode voltage should be related. As should the Host common mode output and Module common mode input.

SuggestedRemedy

Reduce the common mode voltage from 2.8V to 1.95V here or increase the DC common-mode voltage (max) in Table 176E-2 to 2.75V. Make the equivalent change for the module input in table 176E-4 or host output in table 176E-1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Module output and input are tolerance values (DC common mode is generated by the host). The module tolerance range should match the host maximum and minimum ranges with a reasonable margin.
Host output and input range can match those of KR and C2C, assuming similar devices will be used in both interfaces.

In Table 176E-1, change the "DC common-mode voltage (max)" row to a maximum of 1 Volt and a minimum of 0 Volt.
In Table 176E-2, change the "DC common-mode voltage (max)" row to "DC common-mode voltage tolerance (range)" with values 1.05 V to -0.05 V.
In Table 176E-3, change the "DC common-mode voltage" values to 1 V to 0 V.
In Table 176E-4, change the "DC common-mode voltage tolerance (range)" values to upper 1.05 V and lower -0.05 V.

Cl **176E** *SC* **176E.4.6** *P* **701** *L* **13** # 417

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *DC common mode*

The reference for "Single-ended voltage tolerance range (min)" is TBD. There is no definition related to this row anywhere; the listing in the table seems informative.

Also, the combination of the DC common-mode voltage tolerance and the Amplitude tolerance specifications can lead to a larger single-ended range (from -0.95 V to 3.9 V) and it is unclear which of the requirement prevails.

It seems that the single-ended tolerance is redundant. If necessary, the DC common-mode tolerance limits can be adjusted to create the correct single-ended conditions.

SuggestedRemedy

Delete the "Single-ended voltage tolerance range (min)" row.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
There was no consensus to delete the specification. However, the reference TBD is not required, since the meaning of single-ended voltage tolerance is straightforward.

Delete "TBD" from the reference.

Cl **176E** *SC* **176E.5** *P* **701** *L* **30** # 418

Ran, Adee
Cisco Systems, Inc.

Comment Type **T** *Comment Status* **A** *C2M Host channel*

The standard does not recommend a channel - and the full channel is not owned by a single designer, so no such recommendation can be made.

The content of this subclause would be better described as "Expected channel properties".

SuggestedRemedy

Change the heading of 176E.5 to "Expected channel properties".

Add the following paragraph after the existing paragraph:
"The following subclauses describe the expected properties of the channels between the two C2M components, from TP0a to TP1d and from TP5d to TP5d, as depicted in Figure 176E-2. These test points are typically not accessible in an implemented system."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change the heading of 176E.5 to "Expected channel properties".

Add the following paragraph after the existing paragraph:
"The following subclauses describe the expected properties of the channels from TP0d to TP1d and from TP4d to TP5d, as depicted in Figure 176E-X. These test points are typically not accessible in an implemented system."
Where 176E-X is the figure that includes the ILdd allocations.

Implement the suggested remedy with editorial license and with consideration of the resolution of comments #148, #196, and #420.

Cl **176E** *SC* **176E.5** *P* **701** *L* **33** # 419

Ran, Adee
Cisco Systems, Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

The phrase ", with its associated insertion loss (ILdd), " is not helpful, and can cause confusion because ILdd is not defined here. The channel is not specified at all.

SuggestedRemedy

Delete the quoted phrase.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **176E** *SC* **176E.5.1** *P* **701** *L* **41** # 196

Mellitz, Richard
Samtec

Comment Type **TR** *Comment Status* **A** *C2M Host channel*

Just simple IL loss equations are not sufficient over the 60 GHz or so bandwidth required for the C2M channels topologies. For example, the shape of an insertion loss curve for cables and PCB and/or a combination vary greatly. In addition, the use of electromagnetically compensated connectors is becoming more prevalent which alters the loss curve in new ways. Coming up with an IL curve as suggested in 176E-1 will likely be quite difficult to accommodate the collection of expected host designs. A single value IL value at 53.125 GHz is a good starting point but would need to be qualified with Rpeak and mode conversion limits.

SuggestedRemedy

replace the entire section with text that recommends a maximum insertion loss at 53.125 GHz and an minimum Rpeak value.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Rpeak is already a normative parameter for both host output and module output.
Resolve using the response to comment #420.

Cl **176E** *SC* **176E.5.1** *P* **701** *L* **41** # 148

Dudek, Mike
Marvell

Comment Type **T** *Comment Status* **A** *C2M Host channel*

With the huge variations in package loss expected and the expectation that implementations that have lower package losses will use that loss to increase the PCB/flyover cable losses, providing equations and insertion loss figures for this loss is not helpful.

SuggestedRemedy

Either change the equations and figures (and related text) to refer to the complete die to die loss or delete the equations and figures and just retain the insertion loss budget of Figure 176E-2. Or potentially more useful provide equations and figures for the host die to TP1a in a separate "Recommended Host channel" section.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #420.

Cl **176E** SC **176E.5.1** P **702** L **41** # 420

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *C2M Host channel*

The insertion loss limit equation is currently TBD, and it will be challenging to replace it with specific values. The loss of a C2M channel is not owned by one designer, and even if it were, channels can be bad while being well within the limit of the equation. The value of having such IL equations is questionable.

The normative requirements are input and output characteristics. Design recommendations can be made for specific components that have clear ownership. As a first-order approximation it can be in terms of loss at the Nyquist frequency. For endpoints, the assumed end-to-end IL can be provided, in addition to the COM reference model that is already in place in 176E.5.2.

SuggestedRemedy

Delete the current text, equation 176E-1 and Figure 176E-5, and replace them with a table for IL at 53.125 GHz with recommended maximum values for the host channel (TP0d/TP5d to the connector pad), the module channel (paddle card edge to TP1d/TP4d, and the die-to-die channel (TP0d/TP4d to TP1d/TP5d). Values are TBD unless adopted by another comment.
Add text to clarify that the normative specifications are the input and output characteristics.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
[Editor changed page from 702 to 701]
The resolution of comment #115 added a figure in 176E.5.1 showing the ILdd at 53.125 GHz, and text referring to the figure.

In 176E.5.1, delete equation 176E-1 and Figure 176E-5 and the text referring to them.
Add text to clarify that the normative specifications are the input and output characteristics.
Implement with editorial license.

Straw poll #E-3 shows sufficient consensus.

Straw poll #E-3: (direction)
I support deleting Equation 176E-1 and Figure 176E-5 and the text referring to them and replacing them with text stating that the normative specifiations are input and output charateristics.
Y: 22 N: 8 A: 12

Cl **176E** SC **176E.5.2** P **703** L **38** # 421

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *(bucket)*

There are three separate rows for host PCB model, based on the three designations in clause 179. But these designations are irrelevant for this annex.

SuggestedRemedy

Change to one row with parameter name "Host PCB model". The content of that model should be TBD unless a model is adopted by other comments.

Response *Response Status* **C**

ACCEPT.

Cl **176E** SC **176E.5.2** P **703** L **41** # 422

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *C2M Host channel*

Host PCB channel is TBD.
In addition, there are two package models with different parameters; we need to choose the package model as part of the host model.

A set of possible C2M host models was presented in https://www.ieee802.org/3/dj/public/24_07/ran_3dj_01b_2407.pdf, slide 16, using PCB parameters on slide 8, which result in 1.7 dB/inch (same as those used in clause 162).

With a host channel IL of 27.3 dB, option 2, with 45-mm class B package trace and 217-mm PCB zp, represents a reasonable high-radix host design.

Note that the zp is not the actual PCB trace length but only TP0-TP1 (see slide 7).

SuggestedRemedy

Use the parameters on slide 8 with PCB zp=217, C0=C1=0, as the host PCB model for C2M in Table 176E-5.
Delete the "Class A package model" row and set "Transmission line 1 length" in the "Class B package model" row to 45 mm (one value).
Refer to this model in "Host channel parameters" in Table 176E-9 (interference tolerance) and in 176E.6.12.2.

Change TBDs in "Test channel insertion loss at 53.125 GHz" row to:
Low loss: min=9 dB, max:10 dB (a mated test fixture)
High loss: min=33.5 dB, max=34.5 dB (maximum TP0d-TP1a loss)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The reslution of comment #537 was to use a different set of parameters for the CR host PCB model.
Use the set of parameters in the resolution of comment #537 for 176E.5.2.
The PCB zp and package model are still TBD.

Cl **176E** SC **176E.5.2** P **703** L **42** # 149

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **A** *(bucket)*

There is not intended to be multiple different host designations for C2M and having this name would lead to confusion with the host designations for CR. The only requirement for a PCB model would be for calibration of noise addition for the host input stressed test.

SuggestedRemedy

Replace the 3 rows labelled Host PCB model with one row labelled "Host PCB model for Host stressed input calibration".

Response *Response Status* **C**

ACCEPT.

Cl **176E** SC **176E.5.2** P **704** L **8** # 573

Dawe, Piers — Nvidia

Comment Type **TR** *Comment Status* **A** *A_v, A_fe, A_ne*

These voltages Av Afe Ane look like old style backplane-style values, which should be reduced even for CR and KR, and should be reduced further for C2M. They are TBD in 178 and 179, so it's hard to see why they are not TBD here also.

SuggestedRemedy

Reduce Av Afe Ane. Assuming this COM table passes and fails the right scenarios, reduce eta0 in proportion.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #162.

Cl **176E** SC **176E.5.2** P **704** L **8** # 163

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **A** *A_v, A_fe, A_ne*

With the change of Rd from 50 Ohm to 46.25 Ohm in COM the effective output amplitude into a 50 Ohm load increased resulting in a requirement for approximately 4% larger steady state output amplitude from the transmitter than for 100G per lane.

SuggestedRemedy

Change the values of Av and Afe to 400mV and Ane to 585mV. If that is not done then the Transmitter steady-state Voltage Vf(min) in Table 176E-1 needs to be increased to 400mV and the steady state output voltage Vf (min) in Table 176E-2 increased to 415mV

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #162.

Cl **176E** SC **176E.6.2** P **706** L **4** # 198

Mellitz, Richard — Samtec

Comment Type **TR** *Comment Status* **A** *Test fixture delay*

Tfx is very dependent on the fixture design as an be seen from performing a TDR on the test fixture presentation from sekel_3dj_02_2407. Thus, test fixture manufacturer is best equipped to provide the Tfx value that corresponds to the MDI connector attachment.

SuggestedRemedy

Replace this line:
and with Tfx set to twice the test fixture delay minus 0.2 ns. .
With this:
and with Tfx is provided by the test fixture vendor representing twice the delay time to the MDI connector attachment. .

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #199.

Cl **176E** SC **176E.6.2** P **706** L **22** # 150

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **A** *ERL*

The Length of the reflection signal needs to encompass the expected distance (in UI) within the component.

SuggestedRemedy

Replace the TBD value for the host with 1600 UI and the TBD value for the module with 400 UI.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #423.

Cl **176E** *SC* **176E.6.2** *P* **706** *L* **22** # 423

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *ERL*

The value of N for ERL is TBD for both host and module.
For the host input and output specification in clause 179, the value of N was adopted as twice the corresponding the one in 162.9.4.8, (1600 vs. 800).
A similar approach can be taken for C2M host (which has N=800 in 120G.3.1.2) and for C2M module (which has N=400 in 120G.3.2.3).

SuggestedRemedy

Change N from TBD to 1600 for host and 800 for module.

Response *Response Status* **C**

ACCEPT.

Cl **176E** *SC* **176E.6.6** *P* **707** *L* **46** # 328

Healey, Adam
Broadcom Inc.

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

"...transmit equalization is controlled by the inter-sublayer link training (ILT) function for a Type A1 interface, specified in Annex 176A, or by equivalent methods." The term "equivalent" seems too strong since Annex 176A defines a complex handshaking protocol to which other valid methods (such as forcing values via direct register access) are arguably not equivalent.

SuggestedRemedy

Change to "...specified in Annex 176A, or by other methods." See also 179.9.5.2 (page 345, line 14).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **176E** *SC* **176E.6.6** *P* **707** *L* **48** # 151

Dudek, Mike
Marvell

Comment Type **T** *Comment Status* **A** *(bucket)*

Table 176E-6 does not have a list of presets and the reference should be to the table of presets in clause 179

SuggestedRemedy

Change the reference from table 176E-6 to table 179-8

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Table 176E-8 includes presets for C2M (which are currently the same as those of CR in Table 179-8). The exception enables having different presets in the future.

Change "instead of the ones in Table 176E-6" to "instead of the ones in Table 179-8".
Add an editor's note (to be removed prior to publication) stating that Table 176E-6 and Table 179-8 are currently identical, and that the exception and table 176E-8 may be removed if it stays this way.

Cl **176E** *SC* **176E.6.12** *P* **709** *L* **34** # 152

Dudek, Mike
Marvell

Comment Type **T** *Comment Status* **A** *error ratio*

It would be helpful to provide a reference for the BERadded here in a footnote.

SuggestedRemedy

Add a footnote "The BERadded is specified in 176E.2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

BERadded should be explicitly mentioned in the test requirements.

Add the following footnote to the "Block error ratio" row: "Block error ratio (see 174A.6) is measured with BER_added specified in 176E.2.1".

Implement with editorial license.

Cl **176E** *SC* **176E.6.12.4** *P* **712** *L* **37** # 154

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **R** *Rx tests*

The amplitude of the transmitters in the DUT should be specified during the test.

SuggestedRemedy

Add "and with amplitude equal to the maximum peak to peak amplitude specified in Table 176E-1 for host testing and Table 176E-2 for module testing."

Response *Response Status* **C**

REJECT.

The DUT has equalization control but its peak-to-peak output (with no equalization) is not necessarily controllable. It is quite possible that some DUTs (receivers) cannot reach the maximum on their transmitters.
The current text requires that equalization is turned off (preset 1 condition), which would maximize NEXT power, but the peak-to-peak output is whatever the DUT has in preset 1 - there is no specified control other than the equalizer coefficients.

Cl **176E** *SC* **176E.6.12.4** *P* **712** *L* **40** # 155

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **A** *Rx tests, multi-lane*

The Block error ratio is on a per lane basis with BERadded to each lane and there being no need to add noise to all lanes. The Note is incorrect as with the BERadded to all the tests the resultant block error ratio will be way too high.

SuggestedRemedy

Change the note to say "For multi-lane devices the requirement is that the average block error ratio from all the lanes meets the requirement.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #334.

Cl **176E** *SC* **176E.6.13.2** *P* **713** *L* **6** # 156

Dudek, Mike Marvell

Comment Type **T** *Comment Status* **A** *(bucket)*

The reference to table 176E-10 is missing

SuggestedRemedy

Change "in at" to "in table 176E-10 at"

Response *Response Status* **C**

ACCEPT.

Cl **176E** *SC* **176E.6.13.2** *P* **713** *L* **23** # 157

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **A** *Rx tests, multi-lane*

The Block error ratio is on a per lane basis with BERadded to each lane and there being no need to add noise to all lanes. Note 1 is incorrect as with the BERadded to all the tests the resultant block error ratio will be way too high.

SuggestedRemedy

Change note 1 to say "For multi-lane devices the requirement is that the average block error ratio from all the lanes meets the requirement.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #334.

Cl **176E** *SC* **176E.6.13.2** *P* **713** *L* **25** # 158

Dudek, Mike Marvell

Comment Type **T** *Comment Status* **A** *Rx tests*

There is no channel to be chosen for the Host input tolerance test so it is impossible to choose a suitable channel.

SuggestedRemedy

Reword the Note to "The ADD (Equation (176E-3)) and sRJ (Equation (176E-4)) calculated from transmitter measurements in this test may be higher than the values in Table 176E-6. For the module input test a suitable channel should be chosen in order to meet the COM requirement with these higher values. If the values are higher for the host input test then a pattern generator with lower output Rj or BuJ is required.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change NOTE 2 to "For module input test, the ADD (Equation (176E-3)) and sigma_RJ (Equation (176E-4)) calculated from transmitter measurements in this test may be higher than the values in Table 176E-6. In this case, a suitable test channel should be chosen in order to meet the COM requirement with these higher values. For host input test, if the calculated COM is lower than the requirement, a better pattern generator is needed."

Cl **177** SC **177** P **268** L **0** # 278

de Koos, Andras Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Add explicit instructions for path data delay measurement.

SuggestedRemedy

Insert a new sub-clause (perhaps after 177.8 Delay constraints) :

177.x Path data delay for time synchronization

When the Inner FEC is part of a Physical Layer that supports Time Synchronization, 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 after the 1024-bit pad insertion. This symbol corresponds to the largest delay for transmit, and the shortest delay for receive.

Four separate delays are reported, each with nanosecond and (if supported) sub-nanosecond portions, in the following eight status variables:
inner_FEC_delay_ns_TX_max, inner_FEC_delay_subns_TX_max
inner_FEC_delay_ns_TX_min, inner_FEC_delay_subns_TX_min
inner_FEC_delay_ns_RX_max, inner_FEC_delay_subns_RX_max
inner_FEC_delay_ns_RX_min, inner_FEC_delay_subns_RX_min

A description of the path data delay values can be found in Clause 90.7.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **177** SC **177.1.3** P **269** L **7** # 159

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **A** *Deskew*

In order to fully preserve the performance of the convolutional interleaver for 800G and 1.6T for FECi the input PCSL lanes need to be aligned. See https://grouper.ieee.org/groups/802/3/dj/public/24_07/dudek_3dj_01_2407.pdf

SuggestedRemedy

Implement full de-skew at the input to the convolutional interleaver for 800G and 1.6T as described as option 2 on slide 5 of that presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The following presentation was reviewed and discussed during the July 2024 plenary session:
https://www.ieee802.org/3/dj/public/24_07/dudek_3dj_01_2407.pdf

A straw poll was taken to determine the level of support for the different options captured in the above presentation.

Straw Poll #TF-2 (https://www.ieee802.org/3/dj/public/24_07/motions_3dj_2407.pdf):
To address the de-skew issue for 800GbE/1.6TbE Inner FEC (Clause 177) identified in dudek_3dj_01_2407, the de-skew function should be addressed in:
A. Within Clause 177 Inner FEC sublayer (option 2 in dudek_3dj_01_2407)
B. Within Clause 176 SM-PMA sublayer (option 3 in dudek_3dj_01_2407)
C. Need more information
(choose one)
Results (all): A: 59, B: 17, C: 21

Based on the results of straw poll #TF-2 there is strong support for the option called out in the suggested remedy (option 2 in dudek_3dj_01_2407).

Implement the suggested remedy with editorial license

Cl **177** *SC* **177.2** *P* **271** *L* **15** # 358

Ran, Adee — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *ILT signaling*

The SIGNAL_OK parameters of the .indication and .request primitives are set separately in the PMA.
The semantics of this parameter were proposed in https://www.ieee802.org/3/dj/public/24_05/ran_3dj_05_2405.pdf slides 7-8 and were implemented in 116.3, 169.3 and 174.3.
In the Inner FEC, the propagation of values between the two interfaces should also be defined as noted in slide 9.

Also applies to 177.3.

SuggestedRemedy

Add propagation of the SIGNAL_OK values in both directions, based on slide 9 of ran_3dj_05_2405, in a similar manner to the PMA (separate comment).
Delete the editor's note.
Apply in both 177.2 and 177.3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #516.

Cl **177** *SC* **177.4** *P* **271** *L* **47** # 5

Huang, Kechao — Huawei

Comment Type **T** *Comment Status* **A** *Deskew*

Based on "Straw Poll #TF-2" results (59 vs 17) in July Plenary, suggest to describe the de-skew function within Clause 177 Inner FEC sublayer to solve the deskew issue. Also, the RS-FEC symbol-quartet boundaries can be indicated after the deskew process is complete, which will be used for the following convolutional interver function (see Editor's note in subclause 177.4.1 of D1.0).

SuggestedRemedy

Suggest to add a new subclause 177.4.1 to describe the de-skew function to solve the deskew issue. The deskew function can refer to subclause 176.4.3.3. Also, add some paragraph to address that the RS-FEC symbol-quartet boundaries can be indicated after the deskew process is complete.
Develop with editorial license.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #159.

Cl **177** *SC* **177.4.1** *P* **272** *L* **23** # 280

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *(bucket)*

The order of the delay lines is specified 0,1,2 round robin. It is hinted at, but not stated explicitly, that the order of the symbols within each codeword is thus 0000,1111,2222. Is this always the case, or would 1111,2222,0000 or 2222,0000,1111 also be possible? Asked another way, is the start of the CI output sequence guaranteed to line up with the start of the 120-bit output? If they don't line up, then the bit chosen for the path data delay would not be correct.

SuggestedRemedy

Assuming the delay-line to inner-FEC CW symbol order is deterministic, add a sentence (and maybe even a figure) showing the exact order symbols from each delay line within each 120-bit output (000011112222)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Mark the order of symbols in the figure and add a sentence describing the order.
Implement the suggested remedy with editorial license.

Cl **177** *SC* **177.4.4** *P* **273** *L* **48** # 239

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

The symbol + is used to mean two different things in this equation; the first instance is intended to mean the Boolean XOR operation, while the second is normal arithmetic addition.

SuggestedRemedy

Change the first + to XOR

Response *Response Status* **C**

ACCEPT.

Cl **177** *SC* **177.4.6.2** *P* **276** *L* **51** # 469

Brown, Matt Alphawave Semi

Comment Type **T** *Comment Status* **A** *IBSF*

The contents of the IBSF are never explicitly defined. As such, this field should be deemed to be outside the scope of this standard, at least until such time an alternate proposal is adopted.

SuggestedRemedy

Replace "It may be used to carry link and signal-related information, such as receiver state, channel response, FEC statistics, etc. The details of how to use the IBSF are beyond the scope of this standard."
With "The use and contents of the IBSF not beyond the scope of this standard."
Delete the editor's note.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #359.

Cl **177** *SC* **177.4.6.2** *P* **276** *L* **51** # 470

Brown, Matt Alphawave Semi

Comment Type **T** *Comment Status* **A** *IBSF*

The source of content of the IBSF is not defined.

SuggestedRemedy

Define a management control variable tx_isbf (912 bits) and along with MDIO registers.
Specify the default value is all zeros.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #359.

Cl **177** *SC* **177.4.6.2** *P* **276** *L* **51** # 471

Brown, Matt Alphawave Semi

Comment Type **T** *Comment Status* **A** *IBSF*

The contents of the IBSF must be sufficiently rich to prevent degradation of the transmitted signal, e.g., due to baseline wander.
Note that another comment proposes to fill the ISBF with the contents of a management control register.

SuggestedRemedy

Scramble the contents of the ISBF using an n-bit scrambler, with scrambler state retained from the previous ISBF.
The scrambler length should be at least 10 bits. A 13 bit scramber is suggested.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #359.

Cl **177** SC **177.4.6.2** P **276** L **51** # 359

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *IBSF*

As it appears now the IBSF content is not defined at all, since it is "The details of how to use the IBSF are beyond the scope of the standard". If so, it is implementation-specific, and a compliant receiver is not required to decode it.
The words "link and signal-related information, such as receiver state, channel response, FEC statistics, etc." are a promise that cannot be fulfilled unless the content is defined.

To eliminate the TBDs in Table 177-2 it is suggested to follow a lot of precedent cases and define the IBSF content as reserved (transmitted as zeros, ignored on receipt). This can be changed in a future draft if we decide to define a meaning for these bits in the standard.

SuggestedRemedy

Change from
"It may be used to carry link and signal-related information, such as receiver state, channel response, FEC statistics, etc. The details of how to use the IBSF are beyond the scope of this standard"
to
"The assignment of the IBSF field is provided in Table 177-2".

Replace all instances of "TBD" in Table 177-2 with "Reserved" with a footnote "Transmitted as all zeros, ignored on receipt", with editorial license.

Delete the editor's note.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed the following presentation:
https://www.ieee802.org/3/dj/public/24_09/he_3dj_01a_2409.pdf.

Implement changes on slide 4 of he_3dj_01a_2409 with editorial license.

Cl **177** SC **177.10** P **286** L **7** # 279

de Koos, Andras
Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

The path data delay status variables should be included in the MDIO mapping in table Table 176-5.

SuggestedRemedy

Add the following rows to Table 176-5:
variable: {inner_FEC_delay_ns_TX_max, inner_FEC_delay_subns_TX_max,inner_FEC_delay_ns_TX_min, inner_FEC_delay_subns_TX_min}; variable reference : <new subclause>; MDIO Registers : {1.1813, 1.1814, 1.1815, 1.1816, 1.1817, 1.1818}; MDIO reference : 45.2.1.177a
variable: {inner_FEC_delay_ns_RX_max, inner_FEC_delay_subns_RX_max, inner_FEC_delay_ns_RX_min, inner_FEC_delay_subns_RX_min}; variable reference : <new subclause>; MDIO Registers : {1.1819, 1.1820, 1.1821, 1.1822, 1.1823, 1.1824}; MDIO reference : 45.2.1.177b

could be grouped into two rows, or spread over 8 rows... editorial license and all that.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **177A** SC **177A** P **720** L **3** # 424

Ran, Adee
Cisco Systems, Inc.

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

128 bit

SuggestedRemedy

Change to 128 bits

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **178** *SC* **178.1** *P* **293** *L* **26** # 287

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Consider adding Clause 90 as 'Optional' to the 'Physical Layer Clauses Associated with the XXX PMD tables.

SuggestedRemedy

Add the following row
90-Time Synchronization Optional
to Tables 178-1, 178-2, 178-3, 178-4

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **178** *SC* **178.1** *P* **296** *L* **27** # 70

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *(bucket) OSI reference figure*

We show AN and not ILT, given that some interfaces have both and other just ILT

SuggestedRemedy

Suggest to add ILT to the AN box

Response *Response Status* **C**

REJECT.

ILT is not a sublayer but a function that is part of some sublayers (PMDs or PMAs that have an AUI).
There can be mutiple instances of ILT in the sublayer stack.

Cl **178** *SC* **178.2** *P* **296** *L* **50** # 164

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **A** *error ratio*

For the KR Phys two chip to chip AUI's are budgetted in the complete link. Assuming the adopted DER of 0.67e-5, and an assumed worst case error extension for FEC symbol errors of 0.6 (see Dudek_3dj_01_2309) the random BER allowance for one C2C AUI is 0.8e-5.

SuggestedRemedy

Change the TBD for BERadded to1.6e-5

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #361.

Cl **178** *SC* **178.2** *P* **296** *L* **50** # 361

Ran, Adee — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *error ratio*

"BERadded equal to TBD"
For a KR PMD the additional error allocation should account for possible AUI-C2C instances in the link. The allocation for AUI-C2C is 1/4 of "the total allocation for 200Gbps/lane AUIs within a PHY" which is 2e-5. Therefore for a single AUI-C2C it is 5e-6.

For a PMD in the same package as the PCS, the PHY-to-PHY link can include one AUI-C2C instance in the link partner. Therefore the additional BER allocation should be 5e-6.

For a PMD not in the same package as the PCS, the PHY-to-PHY link can include two AUI-C2C instances. Therefore the additional BER allocation should be 1e-5.

A PMD product is clearly either packaged with a PCS or not, so it is should be ok to have different specifications for the two cases.

Similarly in 179.2 for a CR PHY.

SuggestedRemedy

Specify BERadded as 5e-6 for a PMD in the same package as the PCS, and 1e-5 for a PMD not in the same package as the PCS.

Implement similarly in 179.2.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

This comment suggests BERadded values of 5e-6 (one additional ISL in the remote PHY) or 1e-5 (two, one on each PHY).
Comment #164 suggests 1.6e-5 for two additional ISLs.
Comment #165 suggests 1.6e-5 for two additional ISLs for CR.

The CRG reviewed slides 7 to 9 in the following presentation:
https://www.ieee802.org/3/dj/public/24_09/brown_3dj_04_2409.pdf

In 178.2 and 179.2 (and elsewhere as necessary) set the BERadded values as follows:
When tested at a PMA: BERadded = 2*8e-6 = 1.6e-5
When tested at the PCS (including any AUIs): BERadded = 8e-6

Implement with editorial license.

Cl **178** *SC* **178.4** *P* **374** *L* **16** # 478

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *PMD service interface*

To support the necessary signaling for ILT PMD:IS_SIGNAL.request(SIGNAL_OK) is needed.

SuggestedRemedy

The SIGNAL_OK parameter of the PMD:IS_SIGNAL.request provides the status from ISLs above the PMD.
Similar for 179.4, 180.3, 181.3, 182.3, and 183.3.
Delete related editor's notes.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
[Editor's note: Changed page from 374 to 297]
[Editor's note: CC 178, 179, 180, 181, 182, 183]
Implement suggested remedy with editorial license.

Cl **178** *SC* **178.6** *P* **298** *L* **13** # 362

Ran, Adee — Cisco Systems, Inc.

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

"625 fs for 1.6TBASE-CR8"
Should be KR in this clause.

SuggestedRemedy

Change CR to KR.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **178** *SC* **178.6** *P* **298** *L* **20** # 363

Ran, Adee — Cisco Systems, Inc.

Comment Type **T** *Comment Status* **A** *Delay*

Delay constraints for KR and CR PHYs should account for possible additional delay due to MLSD implementation, which was not expected in previous generation PMDs.
MLSD can be implemented in various ways but is likely to be in synthesized logic with clock periods above 1 ns,

The allocation should not assume an optimized implementation. To allow implementation flexibility it is suggested to increase the maximum by approximately 20 ns, or 50% higher than previous generations.

SuggestedRemedy

Change the maximum delay for KR1 to 12288 bits / 24 pause_quanta / 61.44 ns.
Change the other rows accordingly (same in ns, scaled in bit times and pause_quanta).

Delete the editor's note.

Implement similarly in 179.6.

Update 116.4, 169.4, and 174.4 accordingly.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy.
Add informative NOTEs at the end of 178.6 and 179.6, stating that the PMD delay includes allocation for an MLSD implementation.

Cl **178** *SC* **178.8.1** *P* **299** *L* **32** # 364

Ran, Adee — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *(bucket)*

In 178.10 the channel is defined from TP0d to TP5d but these are not defined in this clause. These "test points" should appear in Figure 178-2, Figure 178-3, and Figure 178-4.

SuggestedRemedy

Update the figures per the comment. Extend the "Channel" arrow to be from TP0d to TP5d.

Add descriptive text if necessary.

Response *Response Status* **C**

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

Cl **178** *SC* **178.8.2** *P* **301** *L* **14** # 365

Ran, Adee
Cisco Systems, Inc.

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

The words "each lane" are not helpful for "signaling rate". All specifications hold for each lane - signaling rate is not special. Also it cannot be aggregated (unlike power and bit rate).

This occurs in multiple tables and rows in electrical clauses. "Each lane" should be in the text above the table or in the table heading, not on specific rows.

SuggestedRemedy

Delete "each lane" from the parameter names in all tables as appropriate.
Where necessary add indication in the text that the spefications are defined for each lane separately unless noted otherwise.
Apply in all electrical PMD clauses and annexes.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **178** *SC* **178.9** *P* **301** *L* **17** # 366

Ran, Adee
Cisco Systems, Inc.

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

Table 178-6 has some parameters in mV units and others in V units.
The style manual (16.3.1) advises against this: "The same units of measure shall be used throughout each column. ohms shall not be combined with megohms, millimeters with centimeters, or seconds with minutes".

There are multiple tables with this mixture and some units that appear in the text. mV units can be changed to V for consistently in all new clauses.

SuggestedRemedy

Change the units to V and adjust the values.
Apply in all tables and text in 178, 179, 176D, 176E.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **178** *SC* **178.9.2** *P* **301** *L* **18** # 523

Simms, William (Bill)
NVIDIA

Comment Type **TR** *Comment Status* **R** *Tx diff PtP, vf*

Table 178-6 has the Differential pk-pk voltage (max) Transmit enabled as 1200mV. This is not keeping with limitations and power efficiency of modern CMOS process nodes. It is also desirable to reduce the TX swing in order to limit noise impacts seen in FEXT and NEXT in addition to potential simplification of ESD circuts

SuggestedRemedy

Reduce TX swing to 1000mV. Additional studies are in progress to further evaluate these improvements.

Response *Response Status* **C**

REJECT.
The resolution of comment #160 included a maximum vf of 0.6 V, consistent with the existing differential peak-to-peak voltage of 1.2 V.
Comment #416 addressed the definition of differential peak-to-peak voltage, but there was no consensus for using the suggested remedy.

Further work on this topic is encouraged.

Cl **178** *SC* **178.9.2** *P* **301** *L* **50** # 367

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *Signaling rate*

Footnote a is very specific about the cases where the rule applies, which are the majority of expected practical implementations; there are few exceptions, and they are atypical (200GBASE-KR1 or 400GBASE-KR2 PMD in a PHY that includes a chip-to-chip interface defined in Annex 120B or Annex 120D).
It would be simpler to understand if the footnote addressed the exceptions instead.

The first editor's note below the table suggests better wording.

Also applies to clause 179, Annex 176D, and Annex 176E.

SuggestedRemedy

Replace the text in footnote a with the text in the editor's note.
Delete the editor's note.

Implement in 179, 176D and 176E with appropriate changes.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #118.

Cl **178** *SC* **178.9.2.2** *P* **304** *L* **14** # 541

Li, Tobey MediaTek

Comment Type **TR** *Comment Status* **A** *ERL*

Set N_bx value based on reference receiver parameters

SuggestedRemedy

Replace TBD with 16, see lit_3dj_01a_2407.
Also applies in Table 178-14.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #540.

Cl **178** *SC* **178.9.2.2** *P* **304** *L* **14** # 540

Li, Mike Intel

Comment Type **TR** *Comment Status* **A** *ERL*

Nbx TBD

SuggestedRemedy

Based on the 8 post tap, and 2x4 floating per straw-polls (#TF-3, #TF-4, https://www.ieee802.org/3/dj/public/24_07/motions_3dj_2407.pdf), change it to 16.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Use Nbx=16 in all ERL tables in Clause 178 and Annex 176D. Add/change editorial notes to state that the value of Nbx is to be confirmed and contributions in this area are encouraged.

Use Nbx=0 in Table 179B-1.

Cl **178** *SC* **178.9.2.5** *P* **304** *L* **42** # 30

Heck, Howard Intel Corporation

Comment Type **T** *Comment Status* **A** *(bucket)*

"receiver" should be "transmitter"

SuggestedRemedy

Replace "receiver" with "transmitter"

Response *Response Status* **C**

ACCEPT.

Cl **178** *SC* **178.9.3** *P* **305** *L* **25** # 526

Li, Mike Intel

Comment Type **TR** *Comment Status* **A** *ERL*

dERL (min) is TBD

SuggestedRemedy

change it to -3 dB, same as TX

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy.
Add an editor's note stating that the value of dERL may need to be increased (toward 0), and that contributions in this area are encouraged.

Cl **178** *SC* **178.9.3** *P* **305** *L* **26** # 542

Li, Tobey MediaTek

Comment Type **TR** *Comment Status* **A** *ERL*

dERL is TBD

SuggestedRemedy

Replace TBD with -3 dB to be consistent with TX ERL spec.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #526.

Cl **178** *SC* **178.9.3.3** *P* **306** *L* **6** # 370

Ran, Adee Cisco Systems, Inc.

Comment Type **T** *Comment Status* **A** *(bucket)*

This subclause refers to the procedure in Annex 93C. Annex 93C has a few references to Annex 93A for calculation of COM, but in this project we use a different calculation of COM in Annex 178A.

Relevant places in Annex 93A are:
- 93A.2 Test channel calibration (referenced by 93C.1, and Figure 93A-2 by 93C.2)
- Equation 93A-19 (referenced by 93C.2)

SuggestedRemedy

Add exceptions to the list as required to replace the references to Annex 93A with appropriate references to Annex 178A. Add content to 178A as necessary.

Also apply in 176D as appropriate.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with consideration of comments #330 and #31, with editorial license.

Cl **178** *SC* **178.9.3.3** *P* **306** *L* **6** # 334

Healey, Adam Broadcom Inc.

Comment Type **T** *Comment Status* **A** *Rx tests, multi-lane*

The following note is included in 179.9.5.4.2 and 176E.6.12. "NOTE--If noise is applied to each of the n lanes one at a time, results of the n measurements are summed to yield the block error ratio. The result may need to be corrected based on the block error ratio with no noise added on any lane." This statement should be true for any interference (or jitter) tolerance test but it only appears in Clause 179 and Annex 176E. This consideration should be repeated here, or moved to a centralized location (which is referenced from here).

SuggestedRemedy

Add this note, or equivalent content, to 178.9.3.3. Alternatively, define considerations for lane-by-lane testing in a central location (Annex 174A?) and ensure it is referenced by these test procedures. See also 176D.3.4.4.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Move the NOTEs addesssing multi-lane testing in clause 179 and annex 176D into Annex 174A, such that they apply to receiver tests in all PMDs and AUIs.

Implement with editorial license.

Cl **178** *SC* **178.9.3.3** *P* **306** *L* **23** # 330

Healey, Adam Broadcom Inc.

Comment Type **T** *Comment Status* **A** *(bucket)*

Annex 178A specifies the calculation of COM for this PMD and therefore references to Annex 93A in this test procedure should be changed to the corresponding references in Annex 178A. E.g., at line 23, the reference to "the transmitter pacakge model in 93A.1.2" should be replaced with "the transmitter package model defined in 178A.1.4.2".

SuggestedRemedy

Update references to Annex 93A to point to equivalent content in Annex 178A as appropriate.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #370.

Cl **178** *SC* **178.9.3.3** *P* **306** *L* **31** # 31

Heck, Howard Intel Corporation

Comment Type **T** *Comment Status* **A** *(bucket)*

The text specifies using the transmitter device model in 93A.1.2. The models for .dj are described in 178A.1.4

SuggestedRemedy

Change the reference to 178A.1.4.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #370.

Cl **178** *SC* **178.9.3.3** *P* **306** *L* **32** # 369

Ran, Adee Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *(bucket)*

The third dash item describes a case of a transmitter in a packaged device but with unknown package S-parameters.
In that case, one of the reference packages in this amendment should be used, not the one in 93A.1.2 (which was defined for much lower bandwidth).

Which of the two package class should be used should depend on the package class that the test transmitter adheres to.

SuggestedRemedy

Refer to Table 178-12 instead, and change the text to refer to the package class that the test transmitter adheres to.

Response *Response Status* **C**

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

Cl **178** *SC* **178.9.3.3** *P* **307** *L* **30** # 371

Ran, Adee Cisco Systems, Inc.

Comment Type **T** *Comment Status* **A** *Rx tests*

Footnote b of table 178-10 says "ILdd measured between TPt and TP5 (see Figure 93C-4) minus ILdd of the specific package used by the test transmitter." and the value of the "hight loss" is 40 dB minus the DUT's package loss.
If TPt is a measurable point then the test channel does not include the package used by test transmitter.
In order to calibrate the test channel to "40 dB minus the DUT package" the transmitter package's ILdd should be added to the measured ILdd, not subtracted from it.

The footnote is missing from the table in 176D.

SuggestedRemedy

Change "minus" to "plus".

Use the same footnote in 176D.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG has reviewed slides 15-16 in
https://www.ieee802.org/3/dj/public/24_09/ran_3dj_04a_2409.pdf.

Resolve using the response to comment #372.

Cl **178** *SC* **178.9.3.3** *P* **307** *L* **39** # 372

Ran, Adee Cisco Systems, Inc.

Comment Type **T** *Comment Status* **A** *Rx tests*

The editor's note highlights a problem in footnote b that should be addressed.
The insertion loss of the test channel should be calculated differently for each of the cases listed in list item e).

SuggestedRemedy

Add an item to the list to address the calculation of the required test channel ILdd.
Change the "Parameter" in the second row of Table 178-10 to "Test channel ILdd at 53.125" and refer to the new list item in the footnote instead of the current footnote.

Also apply in 176D as appropriate.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG has reviewed slides 15-16 in
https://www.ieee802.org/3/dj/public/24_09/ran_3dj_04a_2409.pdf.

The suggested remedy seems to refer to the dashed list in item e) of 178.9.3.3.
The test channel ILdd calculation are different for each of the cases in the dashed list:
- in the first case, the TP0d-TP0 IL should be taken from s-parameters.
- in the second case, the transmitter IL should be omitted from the calculation.
- in the third case, the device should comply with either Tx class A or Tx class B, and the IL of the corresponding package model should be used.

Comment #371 indicates that footnote b of Table 178-10 should say "plus" instead of "minus".

Implement the suggested remedy with the additional considerations above, and change "minus" to "plus" in footnote b of Table 178-10.

Add an editor's note encouraging further study of the third case.

Implement with editorial license.

Cl **178** *SC* **178.9.3.3** *P* **307** *L* **39** # 373

Ran, Adee
Cisco Systems, Inc.

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

The abbreviation ILdd is not defined anywhere and is potentially confusing; "dd" can be interpreted as die-to-die, which is not the intent here.
Similarly for ILcd, ILdc, RLcd and RLdc.

SuggestedRemedy

Add ILcd, ILdc, ILdd, RLcd, and RLdc to the abbreviations list in 1.5.

Go over occurences of these terms in all clauses and ensure they are fully expanded before being used.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **178** *SC* **178.9.3.6** *P* **308** *L* **26** # 374

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *RL masks*

RLcd limit in equation 178-4 is TBD.
The PMD limit was defined in previous KR clauses by a piecewise linear function, with 25 dB at 50 MHz and 15 dB flat from some corner frequency to the maximum specified frequency (defined in 93.8.2.2 for 25G NRZ and 50G PAM4, and in 163.9.3.4 for 100G PAM4).
A similar function can be used here to replace the TBD. If this proves inadequate it can be changed later.

SuggestedRemedy

Use RLcd(f) >=
25-20(f/106.25) for 0.05 <= f <= 53.125
15 for 53.125 <= f <= 60
Generate a figure accordingly.
Add an editor's note that the equation needs confirmation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG has reviewed the presentation
https://www.ieee802.org/3/dj/public/24_09/ran_3dj_01_2409.pdf.

Use the content enclosed in green boxes on slides 4-7, 10-12, 15-17, and 19 to replace the corresponding equations and figures.

Implement with editorial license.

Cl **178** *SC* **178.9.3.6** *P* **308** *L* **26** # 527

Li, Mike
Intel

Comment Type **TR** *Comment Status* **A** *RL masks*

RLcd min EQ is TBD

SuggestedRemedy

RLcd(f) >= 25-20(f/106.25) when 0.05<=f<=53.125; RLcd(f) >= 15 when 53.125 <f<= 106.25

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #374.

Cl **178** *SC* **178.10** *P* **309** *L* **21** # 543

Li, Tobey
MediaTek

Comment Type **TR** *Comment Status* **A** *ERL*

Minimum channel ERL is TBD

SuggestedRemedy

Replace TBD with 11dB, see response to comment #29, 8023dj_D1p0_closedcomments_id_240612.

Response *Response Status* **C**

ACCEPT.

Cl **178** *SC* **178.10** *P* **309** *L* **21** # 544

Li, Tobey
MediaTek

Comment Type **TR** *Comment Status* **A** *(bucket)*

Reference to the wrong section 178.10.2

SuggestedRemedy

Change reference of channel ERL from 178.10.2 to 178.10.3.

Response *Response Status* **C**

ACCEPT.

Cl **178** *SC* **178.10** *P* **309** *L* **27** # 119

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *AC coupling*

The 50 kHz corner frequncy is legacy from 25.78 GBd, given the 106 GBd operation this corner frequency should be increased

SuggestedRemedy

Suggest to increase low-frequency 3 dB cutoff to 200 kHz or at least 100 KHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Comment #533 changed the required frequency to 100 kHz.
Change from 50 to 100 in Table 178–11.

Cl **178** *SC* **178.10.** *P* **309** *L* **21** # 375

Ran, Adee — Cisco Systems, Inc.

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

Reference for Minimum channel ERL should be 178.10.3

SuggestedRemedy

Change per comment

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **178** *SC* **178.10.1** *P* **311** *L* **10** # 376

Ran, Adee — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *A_v, A_fe, A_ne*

The value of A_v and A_fe in Table 178-13 is TBD.

In previous PMD clauses it was assumed that a transmitter can have a minimum output voltage of A_v=0.413 V with a reference die impedance Rd=50 Ohm. This somewhat matches the specification of min V_f=0.387 V as measured on a 50 Ohm load (although since the reference was equal to the load, these should be the same; the difference is due to a historic definition of v_f).

However, in this project we changed the reference Rd to 45.25 Ohm, so to get 0.413 V on a 50 Ohm load the A_v should be increased by at least a factor of 2*50/(45.25+50)=1.05, resulting in 0.434 V.

In addition, experience shows that devices typically have higher than the minimum output voltage allowed in by previous specifications. This improves the reach by providing larger signal to the link partner. Increasing the minimum output will improve COM for high loss channels targeted by KR and CR PMDs, and from design point of view it is preferable over assuming more capable receivers.

It is therefore suggested that A_v is increased from 0.434 V (which would create the same output voltage) to 0.525 V (which would create 500 mV on a 50 Ohm load).

Note that this change would directly affect the Tx output requirements for KR because the spec parameter is dv_f, where the reference is calculated with A_v. For CR, the minimum v_f needs to be set correspondingly (ideally 0.5 V but may be lower for high-loss hosts). Since host channels have not been adopted, a change in v_f is not proposed at this time.

This should be applied in KR and CR, but not in C2C and C2M, which target lower loss channels.

SuggestedRemedy

Change A_v and A_fe in Table 178-13 and Table 179-16 from TBD to 0.525 V.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #160.

Cl **178** *SC* **178.10.1** *P* **311** *L* **10** # 528

Li, Mike — Intel

Comment Type **TR** *Comment Status* **A** *A_v, A_fe, A_ne*

Av, Afe, Ane TBDs

SuggestedRemedy

Replace them w
0.413, 0.413, 0.608 V (Av, Afe, Ane)
see lim_3dj_01a_2407.pdf, slide 4

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #160.

Cl **178** *SC* **178.10.1** *P* **311** *L* **10** # 160

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **A** *A_v, A_fe, A_ne*

With the change of Rd from 50 Ohm to 46.25 Ohm in COM the effective output amplitude into a 50 Ohm load increased resulting in a requirement for approximately 4% larger steady state output amplitude from the transmitter than for 100G per lane if Av is the same as for 100GBASE-KR1.

SuggestedRemedy

Make Av and Afe equal to 400mV and Ane to 585mV.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG has reviewed slides 20-23 in
https://www.ieee802.org/3/dj/public/24_09/ran_3dj_04a_2409.pdf.

In 178 and 179, use COM parameters Av = Afe = 0.385 V and Ane = 0.578 V.
For clause 179, use min vf=0.4 and max vf=0.6.

Straw poll #TF-8 (directional)
For Tx output voltage (as either Av or vf) I would prefer the option:
A. a range of 0.4 to 0.6
B. a range of 0.4 to 0.5
Results: A: 25 B: 13

Cl **178** *SC* **178.10.1** *P* **311** *L* **46** # 545

Li, Tobey — MediaTek

Comment Type **TR** *Comment Status* **A** *Reference FFE, eta0*

Multiple COM parameters in Table 178-13 are TBD

SuggestedRemedy

In Table 178-13, use COM parameter values from lit_3dj_01a_2407 slide 10.
eta_0 = 1e-8
d_w = 6
N_fix = 15
N_g = 2
N_f = 4
N_max = 80

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #2 (FFE parameters) and #377 (eta_0).

Cl **178** *SC* **178.10.1** *P* **311** *L* **46** # 377

Ran, Adee — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *eta0*

eta0 is TBD in Table 178-13.
A value of 1e-8 has been adopted for C2M in Table 176E-6 (in the resolution of comment #72 against D1.0).
There is no reason to have different values in other interfaces; eta0 represents physical noise that comes from the same sources in all interfaces.

Also applies to eta0 in 179.11.7, Table 179-16, and in 176D.4.1, Table 176D-7.

SuggestedRemedy

Change the TBDs for eta0 to 1e-8 in Table 178-13, Table 179-16, and Table 176D-7.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed the editorial slide 3 on
https://www.ieee802.org/3/dj/public/24_09/ran_3dj_04a_2409.pdf.

Implement the suggested remedy, and remove the duplicate row in Table 176D-7.

Cl **178** SC **178.10.1** P **311** L **46** # 2

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **A** *Reference FFE*

The COM parameter values for the 200GBASE-KR1, 400GBASE-KR2, 800GBASE-KR4 and 1.6TBASE-KR8 PMDs are TBDs

SuggestedRemedy

In table 178-12, use the COM parameter values and the editors note for KR (per lusted_3dj_06b_2407, slides 6-7) , which are:

d_w = 6
Nfix = 15
N_g = 2
N_f = 4
N_max = 80

Use MLSE per Annex 178A.1.11
the MLSD implementation allowance is TBD

Set COM = 3dB

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed the editorial slide 4 on https://www.ieee802.org/3/dj/public/24_09/ran_3dj_04_2409.pdf.

Use the following values for clause 178 for clause 179.
d_w = 6
Nfix = 15
N_g = 2
N_f = 4
N_max = 80
Use the following values for Annex 176D
d_w = 5
Nfix = 14
N_g = 2
N_f = 4
N_max = 50

Add editor's notes below the COM tables in 178, 179, 176D, and 176E: "The parameters values in this table are to be confirmed and may change based on further analysis. Contributions in this area are encouraged.

There was no objection to the above except for the value of N_max for clauses 178 and 179.
The following straw poll was taken:
Straw Poll #TF-4 (direction)

Cl **178** SC **178.10.1** P **312** L **17** # 530

Li, Mike — Intel

Comment Type **TR** *Comment Status* **A** *MLSD*

MLSD implementation penalty Q is missing

SuggestedRemedy

Add MLSD implemtentation penalty Q parameter and set it as zero in magenta or TBD.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The parameter Q was removed by the resolution of comment #327.

Add editor's note after the text specifying that the minimum value of COM is 3 dB in Clauses 178 and 179:
The minimum value of COM may need adjustment to include MLSD implementation penalty. Further study of this area is encouraged.

Cl **178** SC **178.10.1** P **312** L **17** # 529

Li, Mike — Intel

Comment Type **TR** *Comment Status* **A** *MLSD*

MLSD is not enabled

SuggestedRemedy

Add MLSD usage parameter, and set it to 1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG reviewed the editorial slide 12 on https://www.ieee802.org/3/dj/public/24_09/ran_3dj_04a_2409.pdf.

In 178.10.1 and 179.11.7, specify that the maximum likelihood sequence detection defined in 178A.1.11 is to be used for the calculation of COM.
In 176D.4.1 and 176E.5.2., specify that the maximum likelihood sequence detection defined in 178A.1.11 is not included in the calculation of COM.
Implement with editorial license.

Cl **178** *SC* **178.10.1** *P* **356** *L* **33** # 4

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **A** *MLSD*

A receiver discrete-time equalizer with MLSD is needed to close the link budget for KR

SuggestedRemedy

Change the COM computation to use the receiver discrete-time equalizer with MLSD in Annex 178A.1.11

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #529.

Cl **178** *SC* **178.10.3** *P* **313** *L* **40** # 531

Li, Mike — Intel

Comment Type **TR** *Comment Status* **A** *ERL*

Nbx is TBD

SuggestedRemedy

change it to 16. See comment #1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #540.

Cl **178** *SC* **178.10.3** *P* **313** *L* **42** # 532

Li, Mike — Intel

Comment Type **TR** *Comment Status* **A** *Test fixture delay*

Tfx is TBD

SuggestedRemedy

change it to zero

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
While the comment does not provide explicit justification, Tfx = 0 is appropriate for KR channel ERL, and there is precedent in Clause 163.

Implement the suggested remedy.

Cl **178** *SC* **178.10.4** *P* **314** *L* **6** # 378

Ran, Adee — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *RL masks*

RLcd limit in equation 178-6 is TBD.
The channel limit was defined in the previous KR clause by a piecewise linear function, with 22 dB at 50 MHz, 15 dB at f_b/2 and a slope of 6/f_b to the maximum specified frequency (defined in 163.10.4 for 100G PAM4).
A similar function can be used here to replace the TBD. If this proves inadequate it can be changed later.

SuggestedRemedy

Use RLcd(f) >=
22-10(f/53.125) for 0.05 <= f <= 53.125
15-3(f/53.125) for 53.125 <= f <= 60
Generate a figure accordingly.
Add an editor's note that the equation needs confirmation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #374.

Cl **178** *SC* **178.10.5** *P* **314** *L* **50** # 379

Ran, Adee — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *Channel ILcd-ILdd*

The ILcd-ILdd limit in equation 178-7 is TBD.
This specification is important to limit mode conversion in the channel.
The limit was defined in the previous KR clause by a piecewise linear function, with 10 dB from 50 MHz to approximately f_b/4, and a slope of 0.3108 dB per GHz 15 dB at to the maximum specified frequency, creating 6 dB at the Nyquist frequency (defined in 163.10.5 for 100G PAM4).
A similar function can be used here to replace the TBD. If this proves inadequate it can be changed later.

SuggestedRemedy

Use ILcd(f)-ILdd(f) >=
10 for 0.05 <= f <= 26.5625
10-8((f-26.5625)/53.125) for 53.125 <= f <= 60
Generate a figure accordingly.
Add an editor's note that the equation needs confirmation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #374.

Cl **178** *SC* **178.10.6** *P* **315** *L* **32** # 380

Ran, Adee — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *Channel ILcd-ILdd*

The specification of ILdc-ILdd in clause 163 is the same as that of ILcd-ILdd.
There is no reason for these to be different in this clause.

SuggestedRemedy

Use the same equation suggested in another comment.
Preferably, merge the two subclauses with editorial license.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #374.

Cl **178** *SC* **178.10.7** *P* **315** *L* **54** # 533

Li, Mike — Intel

Comment Type **TR** *Comment Status* **A** *AC coupling*

AC-couping 3 dB cutoff freq needs to be double, as data rate is doubled, to enable smaller capacitor.

SuggestedRemedy

Change 50 KHz to 100 KHz

Response *Response Status* **C**

ACCEPT.

Cl **178** *SC* **178.10.7** *P* **315** *L* **54** # 120

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *AC coupling*

The 50 kHz corner frequncy is legacy from 25.78 GBd, given the 106 GBd operation this corner frequency should be increased

SuggestedRemedy

Suggest to increase low-frequency 3 dB cutoff to 200 kHz or at least 100 KHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #533.

Cl **178** *SC* **178.13** *P* **316** *L* **41** # 381

Ran, Adee — Cisco Systems, Inc.

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

Reference to the definition in another clause should be phrased clearly to reduce potential confusion.

SuggestedRemedy

Change "The PMD control and status variables are defined in 179.14" to "The PMD control and status variables are identical to those defined in 179.14".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **178** *SC* **178.14.4.5** *P* **322** *L* **29** # 121

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *AC coupling*

The 50 kHz corner frequncy is legacy from 25.78 GBd, given the 106 GBd operation this corner frequency should be increased

SuggestedRemedy

Suggest to increase low-frequency 3 dB cutoff to 200 kHz or at least 100 KHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #533.

Cl **178A** *SC* **178A** *P* **721** *L* **1** # 352

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

Comment Type **T** *Comment Status* **R** *(bucket)*

Annex 178A is noted as normative - but there are no corresponding SHALL statements or PICS.

SuggestedRemedy

Proposed Change

Response *Response Status* **C**

REJECT.
The annex is labeled "normative" since it contains content required for implementation of the standard (see the 2021 IEEE-SA Standards Style Manual 12.6.2). Multiple clauses and annexes (e.g., 178.10.1, 176D.4.1) require the calculation of COM to verify normative requirments. There is no requirement for a normative annex to use the "shall" keyword or include a PICS proforma.
Finally, the suggested remedy does not contain sufficient detail to understand the impact of the proposed change or implement it in the draft.

Cl **178A** *SC* **178A.1.3** *P* **723** *L* **15** # 548

Li, Tobey MediaTek

Comment Type **TR** *Comment Status* **A** *Freq Range*

Minimum stop frequency of channel s-parameters is TBD

SuggestedRemedy

Change it to 67GHz, considering test equipment capability and channel roll-off frequency.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change "TBD GHz" to "67 GHz".

Cl **178A** *SC* **178A.1.3** *P* **723** *L* **15** # 425

Ran, Adee Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *Freq Range*

"stop frequency of at least TBD GHz"
60 GHz was adopted for PMD clauses.

SuggestedRemedy

Change TBD to 60.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #548. Note that 60 GHz was adopted as the 3 dB frequency for a measurement filter and not the maximum measurement frequency.

Cl **178A** *SC* **178A.1.6** *P* **728** *L* **14** # 187

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **R** *(bucket)*

In healey_3dj_01_2401.pdf, M samples per UI was used as well as in Annex 93A. Use M instead of 32 to align.

SuggestedRemedy

Change instances of 32 to M

Response *Response Status* **C**

REJECT.
Draft 1.0 comment #360 observed that parameters such as "M" are independent of PMD/AUI type, signaling rate, etc. and have historically been assigned the same values. The response to Draft 1.0 comment #360 was to remove these parameters from the COM parameter/value tables and instead provide general guidance in Annex 178A. The note referenced by this comment is part of the guidance written in the response to that comment. It recommends that the time step be no larger than Tb/32, which is consistent with the prior practice where M has always been set to 32, and allows for smaller time steps to be used (which is expected to yield simlar results). Changing "32" to "M" would remove any specific guidance since "M" is no longer a COM parameter value for PMDs/AUIs that refer to Annex 178A.

Cl **178A** *SC* **178A.1.7.** *P* **730** *L* **36** # 567

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **R** *eta0*

In COM, the receiver noise spectral density is a parameter: it does not depend on the channel or how the receiver is tuned. As Hossein has shown us, this is unrealistic. It matters because it gives lower loss channels credit they don't deserve, allowing some bad lower loss channels to pass that shouldn't when the right high-loss channels are passed and failed. As far as I know, just changing the eta0 or COM margin value would not fix this. On the other hand, there seems to be an issue with COM calculation time if the CTLE is swept, hence this simple proposal.

SuggestedRemedy

Make the noise term a mild function of channel loss (higher for low loss). If COM calculation time remains a problem, provide a lookup for CTLE setting based on channel loss.

Response *Response Status* **C**

REJECT.
The comment suggests that a relationship between channel loss and receiver input noise be defined but does not propose any specific relationship between these parameters. It also suggests that a look-up table of receiver continuous-time equalizer parameters could be defined as a function of channel loss but no specific table is proposed.
Therefore, the suggested remedy does not contain sufficient detail to understand the impact of the proposed change or to implement it in the draft.

Further exploration of this topic is encouraged.

Cl **178A** *SC* **178A.1.7.2** *P* **731** *L* **4** # 188

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **A** *(bucket1p)*

In 178A.1.8 ts is defined as the timing sample point that minimizes the mean square error. Annex 93A ts has similar meaning. ts^(k) should be interpreted as any sampling time for the kth crosstalk element. This is confusing without a note clarifying since they are both use the terminology ts.\

SuggestedRemedy

Insert a line initiating that ts^(k) is not the same ts which is to be used for the victim response but any aligned to any of M samples per UI.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The "(k)" superscript corresponds to the signal path index defined in 178A.1.2. This superscript notation is used consistently throughout Annex 178A (e.g., it is also used to label the voltage transfer functions and time-domain responses for each signal path). Any confusion may be due to the use of "ts" as shorthand for "ts(0)" where k=0 corresponds to the victim signal path (again, see 178A.1.2).
The suggested remedy also suggests that the value of ts(k) should correspond to a sampled value in the (oversampled) discrete-time signal. This seems unnecessarily restrictive since interpolation could be used to derive values between samples in the discrete-time signal. If the time step of the discrete-time signal is small enough, further interpolation should not be needed to achieve an accurate result. However, if an implementation of this calculation can achieve the same result with a larger time step and interpolation, then it should be allowed.

In the first sentence of 178A.1.7.2, change "sampled crosstalk signal corresponding to signal path k" to "sampled crosstalk signal corresponding to signal path k (k > 0)". Change all instances of "ts" (without superscript) to "ts(0)" (i.e., add a "(0)" superscript).
Implement with editorial license.

Cl **178A** SC **178A.1.8.1** P **737** L **25** # 207

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **A** *(bucket)*

It was not obvious that the Table 178A-10 summary of discrete-time equalizer parameters would apply to the Annex178A1.11 equalizer with maximum likelihood sequence detection.

SuggestedRemedy

Add a note near Table 178A-10 or in Annex178A.1.11 indicating that the parameters are used for both.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

During the review of this comment, it was noted that the parameter "b1" is not defined in the draft and the parameter "blim(1)" ("lim" in subscript) should have been used instead.

In 178A.1.11, replace the second paragraph with the following.
"The receiver discrete-time equalizer coefficients are determined using the procedure defined in 178A.1.8.1 using the parameters defined in Table 178A-10 but with the value of Nb set to 1. COM is then computed as defined in 178A.1.10 and the resulting value is labeled COMDFE. The value of COMDFE and the feedback filter coefficient blim(1), along with the corresponding noise and residual inter-symbol interference computed at the output of the feed-forward filter, are used to calculate a modification to COMDFE that represents the advantage the MLSD-based receiver has over the DFE-based receiver. This modification is defined by Equation (178A-36)."
Replace references to "b1" in 178A.1.11 and its subclauses with "blim(1)".
Implement with editorial license.

Cl **178A** SC **178A.1.11** P **737** L **4** # 327

Healey, Adam — Broadcom Inc.

Comment Type **T** *Comment Status* **A** *MLSD*

For the calculation of COM using the MLSD-based reference receiver, COM_DFE and the noise at the output of the feed-forward filter should be adjusted to account for impairments not explicitly included in the calculation of COM but considered to be consumed by the margin represented by the minimum COM limit.

SuggestedRemedy

Implement the "scale receiver noise" option from <https://www.ieee802.org/3/dj/public/24_07/healey_3dj_01a_2407.pdf>. Specific changes to 178A.1.11 will be provided in a separate contribution.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG reviewed the editorial slide 11 on https://www.ieee802.org/3/dj/public/24_09/ran_3dj_04a_2409.pdf.
Implement the changes on slides 11-15 of https://www.ieee802.org/3/dj/public/24_09/healey_3dj_01_2409.pdf.

Cl **178A** SC **178A.1.11** P **737** L **6** # 206

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **A** *(bucket)*

The calculated COM value for the MLSD-based receiver DER value depends on the value "Q", per equation 178A-36. However, Q is not parameter in a table in the annex.

SuggestedRemedy

Add a new table in Annex178.1.11 with the additional receiver parameter "Q"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add a table in Annex 178A to summarize parameters specific to the MLSD reference receiver, as needed, with editorial license.
Add the parameters in other clauses as necessary.

Cl **179** SC **179.1** P **323** L **13** # 32

Heck, Howard — Intel Corporation

Comment Type **T** *Comment Status* **A** *(bucket)*

The text says there are 5 associated annexes, but the paragraph only describes 4 of them.

SuggestedRemedy

Change "There are five associated." to "There are four associated."

Response *Response Status* **C**

ACCEPT.

Cl **179** SC **179.1** P **324** L **3** # 288

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Consider adding Clause 90 as 'Optional' to the 'Physical Layer Clauses Associated with the XXX PMD tables.

SuggestedRemedy

Add the following row
90-Time Synchronization Optional
to Tables 179-1, 179-2, 179-3, 179-4

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **179** *SC* **179.1** *P* **327** *L* **27** # 71

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *'bucket), OSI reference figure*

We show AN and not ILT, given that some interfaces have both and other just ILT

SuggestedRemedy

Suggest to add ILT to the AN box

Response *Response Status* **C**

REJECT.
Resolve using the response to comment #70.

Cl **179** *SC* **179.2** *P* **327** *L* **50** # 165

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **A** *error ratio*

For the CR Phys two chip to chip AUI's are budgetted in the complete link. Assuming the adopted DER of 0.67e-5, and an assumed worst case error extension for FEC symbol errors of 0.6 (see Dudek_3dj_01_2309) the random BER allowance for one C2C AUI is 0.8e-5.

SuggestedRemedy

Change the TBD for BERadded to1.6e-5

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #361.

Cl **179** *SC* **179.8.3** *P* **332** *L* **52** # 382

Ran, Adee — Cisco Systems, Inc.

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

Stray table.

SuggestedRemedy

Delete it

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179** *SC* **179.9.4** *P* **334** *L* **47** # 576

Dawe, Piers — Nvidia

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

Table 178-6 and 179-7 are ordered differently. 178-6 groups the pk-pk voltages for disabled and enabled (although putting disabled first isn't intuitive) while 179-7 separates them.

SuggestedRemedy

Use a consistent order

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179** *SC* **179.9.4** *P* **334** *L* **53** # 563

Dawe, Piers — Nvidia

Comment Type **TR** *Comment Status* **R** *Tx diff PtP, vf*

Supply voltages and voltage swing trend downwards over the years. This 1200 mV max has not changed since 10GBASE-KR, a long time ago. In 3ck and D1.0, C2M had 750 mV, and other C2M had 900 mV. A high max is harmful when a receiver can ask someone else's transmitter to turn up to the max, causing the second party to suffer unnecessary NEXT in its receiver.

SuggestedRemedy

Reduce 1200 mV to e.g. 1000 mV, here, in the receiver Table 179-10 and in the text in 179.9.5.2. Reduce the steady-state voltage vf max from 0.6 V to 0.5 V. Make appropriate adjustments to Av Afe Ane and eta0 in COM tables.
Similarly for KR and C2C. See another comment for C2M.

Response *Response Status* **C**

REJECT.
The resolution of comment #160 included a maximum vf of 0.6 V, consistent with the existing differential peak-to-peak voltage of 1.2 V; a minimum vf of 0.4 V; and the corresponding Av, Ane, and Afe.

Comment #416 addressed the definition of differential peak-to-peak voltage, but there was no consensus for using the suggested remedy.

Further work on this topic is encouraged.

Cl **179** *SC* **179.9.4** *P* **334** *L* **54** # 525

Simms, William (Bill) NVIDIA

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

Differential pk-pk voltage is called Vdi where elsewhere is is Vppd. Transmit enabled is omitted

SuggestedRemedy

change to Vppd and add 'Transmit enabled' if needed

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179** *SC* **179.9.4** *P* **334** *L* **54** # 524

Simms, William (Bill) NVIDIA

Comment Type **TR** *Comment Status* **R** *Tx diff PtP, vf*

Table 179-7 has the Differential pk-pk voltage (max) Transmit enabled as 1200mV. This is not keeping with limitations and power efficiency of modern CMOS process nodes. It is also desirable to reduce the TX swing in order to limit noise impacts seen in FEXT and NEXT in addition to potential simplification of ESD circuts

SuggestedRemedy

Reduce TX swing to 1000mV. Additional studies are in progress to further evaluate these improvements.

Response *Response Status* **C**

REJECT.
The resolution of comment #160 included a maximum vf of 0.6 V, consistent with the existing differential peak-to-peak voltage of 1.2 V.
Comment #416 addressed the definition of differential peak-to-peak voltage, but there was no consensus for using the suggested remedy.

Further work on this topic is encouraged.

Cl **179** *SC* **179.9.4.1.3** *P* **339** *L* **10** # 333

Healey, Adam Broadcom Inc.

Comment Type **T** *Comment Status* **A** *Tx FFE specs*

A tolerance range of +/-1.25% seems tight for an initial condition. Implementations will typically use subsequent increment/decrement commands to move from these initial conditions to the desired state making an extremely high accuracy representation of the initial condition unnecessary. Note that even implementations with a mean step size finer than 2.5% can lose a good portion this tolerance range to misalignment between realizable coefficient values and the 2.5% "grid" on which the nominal initial condition values are based. This puts an increased burden on the measurement accuracy required to determine whether an implementation is compliant, and such accuracy may not be easily acheived at these signaling rates.

SuggestedRemedy

Increase the tolerance range to +/-2.5%. Simlarly in Table 176E-8.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The comment is specific to the initial conditions and does not suggest changing the step size.
The suggested remedy would also affect clause 178 and annex 176D, which refer to table 179-8 and Table 176E-8, respectively.

Implement the suggested remedy.

Cl **179** *SC* **179.9.4.1.4** *P* **339** *L* **18** # 384

Ran, Adee Cisco Systems, Inc.

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

Footnote a has "PRESET1" twice, but the value of ic_req is "preset 1" in the table and in its definition. Also in Table 176E-8.

SuggestedRemedy

Change all instances of "PRESET1" to "preset 1".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179** *SC* **179.9.4.4** *P* **340** *L* **32** # 122

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *AC coupling*

The 50 kHz corner frequncy is legacy from 25.78 GBd, given the 106 GBd operation this corner frequency should be increased

SuggestedRemedy

Suggest to increase low-frequency 3 dB cutoff to 200 kHz or at least 100 KHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Delete "(e.g., the 50 kHz limit specified in 179.11 for the cable assembly)."

Cl **179** *SC* **179.9.4.7** *P* **341** *L* **39** # 329

Healey, Adam — Broadcom Inc.

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

It seems odd to describe requirements for 200 Gb/s per lane AUIs in the this subclause. Annexes 176D and 176E include subclauses for "Output jitter" which just refer to 179.4.7. The content specific to those Annexs should be included in their respective "output jitter" subclauses.

SuggestedRemedy

Move the description of J4u03 from 179.4.7 to 176D.3.3.6 and 176E.6.9.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179** *SC* **179.9.4.8** *P* **342** *L* **5** # 199

Mellitz, Richard — Samtec

Comment Type **TR** *Comment Status* **A** *Test fixture delay*

Tfx is very dependent on the fixture design as an be seen from performing a TDR on the test fixture presentation from sekel_3dj_02_2407. Thus, test fixture manufacturer is best equipped to provide the Tfx value that corresponds to the MDI connector attachment.

SuggestedRemedy

Replace this line
the test fixture host-facing connection minus 0.2 ns.
With
the test fixture host-facing connection is provided by the test fixture vendor.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change
"with the value of Tfx equal to twice the delay between the test fixture test connector and the test fixture host-facing connection minus 0.2 ns"
to
"with the value of Tfx equal to twice the delay between the test fixture test connector and the test fixture host-facing connection, excluding the mating interface discontinuity. Tfx is provided by the test fixture provider".

Apply similar changes in Annex 176E for host and module ERL.
Implement with editorial license.

Cl **179** *SC* **179.9.4.9** *P* **342** *L* **30** # 387

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *RL masks*

The RLcc limit in equation 179-9 is TBD.
In clause 162 the RLcc mask is piecewise-linear, with limits ranging from 2 to 4.5 dB, based on reasoning provided in https://www.ieee802.org/3/ck/public/22_04/dawe_3ck_01_0422.pdf, including measurements of mated test fixtures.

Recently provided measurements of mated test fixture (https://www.ieee802.org/3/dj/public/24_07/sekel_3dj_02_2407.zip) show RLcc with somewhat different characteristics, that are similar between MCB and HCB. The suggested mask is different but follows the same rationale.

The same limits are suggested for host (CR and C2M), cable assembly, and module (in Annex 176E).

SuggestedRemedy

Use the RLcc limits:
-2, 0.05 <= f <= 4
3/36*(f-4)+2, 4 <= f <= 40
2/20*(f-40)+5, 40 <= f <= 60

In equation 179-9, and update Figure 179-4 accordingly.
In 179.11.6, delete Equation 179-25 and Figure 179-11 (which are used only for cable assembly) and point to Equation 179-9 and Figure 179-4 instead.
Add an editor's note that the RLcc limits need confirmation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #374.

Cl **179** *SC* **179.9.4.10** *P* **343** *L* **32** # 388

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *RL masks*

The RLdc limit in equation 179-10 (transmitter output) is TBD.
In clause 162 the RLdc mask is piecewise-linear, with 22 dB at 50 MHz, 12 dB at f_b/2, and 10.5 dB at the maximum of 40 GHz. It is the same as the cable assembly RLcd, which is based on reasoning provided in https://www.ieee802.org/3/ck/public/20_10/diminico_3ck_01_1020.pdf - including measured cable assemblies.
(see also comment resolution slide 4 in https://www.ieee802.org/3/ck/public/21_01/brown_3ck_03_0121.pdf).

It is expected that mode conversion in hosts and modules will be well-controlled at the full bandwidth. Thus, the RLdc frequency mask is proposed to be based on the mated test fixtures with some guard band.

Recently provided measurements of mated test fixtures (https://www.ieee802.org/3/dj/public/24_07/sekel_3dj_02_2407.zip) have HCB-side RLdc somewhat worse than the MCB-side RLdc. The proposed change has minimum distance of ~1.7 dB for the HCB; the distance is larger for the MCB.

The same limits are suggested for host (CR and C2M) and module (in Annex 176E).
Note that for cable assembly there is no specified RLdc limit - only RLcd is specified.

SuggestedRemedy

Use the RLdc limits:
25-24(f/53.125), 0.05 <= f <= 26.5625
16-6*(f/53.125), 26.5625 <= f <= 60

In equation 179-10, and update Figure 179-5 accordingly.
Add an editor's note that the RLdc limits need confirmation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #374.

Cl **179** *SC* **179.9.5.3.3** *P* **346** *L* **40** # 390

Ran, Adee Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *Rx tests*

Np for SNDR is TBD.
SNDR is typically measured with Np=400 but that allows ISI that the receiver is expected to equalize. This ISI is limited separately with SNR_ISI.
In receiver tests, SNR_ISI does not affect the calibration of the signal, and the transmitter is expected to be clean. In past projects, a shorter Np was used instead; for example in clause 162 (802.3ck), Np is 200 for SNDR in Tx specification, but 29 in Rx test calibration.

It is proposed to scale Np proportionally with the signaling rate (expecting that the physical sizes of the test transmitter are the same).

SuggestedRemedy

Set Np to 58 replacing the TBD.

Response *Response Status* **C**

ACCEPT.

Cl **179** *SC* **179.9.5.3.3** *P* **347** *L* **3** # 332

Healey, Adam Broadcom Inc.

Comment Type **T** *Comment Status* **A** *Rx tests*

S(rp) is not defined in 93A.1.2.5 as stated. Instead, the COM calculation should be based on the content of Annex 178A. The representation of the receiver host, package, and device should be based on the specific host designation to which the receiver under test will claim compliance.

SuggestedRemedy

Delete Equation (179-11). In 179.9.5.3.3 item a), state that the receiver host, package, and device models use the parameters defined in Table 179-15 corresponding to the designation of the receiver host under test.

Response *Response Status* **C**

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

Cl **179** *SC* **179.9.5.5** *P* **350** *L* **11** # 200

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **A** *Test fixture delay*

Tfx is very dependent on the fixture design as an be seen from performing a TDR on the test fixture presentation from sekel_3dj_02_2407. Thus, test fixture manufacturer is best equipped to provide the Tfx value that corresponds to the MDI connector attachment.

SuggestedRemedy

Replace this line
the test fixture host-facing connection minus 0.2 ns.
With
the test fixture host-facing connection is provided by the test fixture vendor.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Apply the change as written in the response to comment #199.

Cl **179** *SC* **179.9.5.6** *P* **350** *L* **21** # 393

Ran, Adee Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *RL masks*

The RLcd limit in equation 179-21 is TBD.
In clause 162 the RLcd mask is piecewise-linear, with 22 dB at 50 MHz, 12 dB at f_b/2, and 10.5 dB at the maximum of 40 GHz. It is the same as the cable assembly RLdc, which is based on reasoning provided in
https://www.ieee802.org/3/ck/public/20_10/diminico_3ck_01_1020.pdf - including measured cable assemblies.
(see also comment resolution slide 3 in
https://www.ieee802.org/3/ck/public/21_01/brown_3ck_03_0121.pdf).

It should be expected that mode conversion in hosts and modules will be well-controlled at the full bandwidth. Thus, the RLcd frequency mask is proposed to be based on the mated test fixtures with some guard band.

Recently provided measurements of mated test fixtures (https://www.ieee802.org/3/dj/public/24_07/sekel_3dj_02_2407.zip) have HCB-side RLcd somewhat worse than the MCB-side RLcd. The proposed change has minimum distance of ~1.7 dB for the HCB; the distance is larger for the MCB.

The same limits are suggested for host (CR and C2M), cable assembly, and module (in Annex 176E). For cable assembly the limits are currently with a separate equation and figure. This is inherited from clause 162, where it was suspected that cable assemblies will have difference limits, but since the specifications are eventually identical, it is suggested to use one specification for all.

SuggestedRemedy

Use the RLcd limits:
25-24(f/53.125), 0.05 <= f <= 26.5625
16-6*(f/53.125), 26.5625 <= f <= 60
In Equation 179-21, and update Figure 179-7 accordingly.
Add an editor's note that the RLcd limits need confirmation.

In 179.11.4 (cable assembly RLcd), Delete Equation 179-23 and Figure 179-19 and point to Equation 179-21 and Figure 179-7 instead.
In 176E.6.3 (C2M Return loss specifications) Delete Equation 176E-2 and Figure 176E-6 and point to Equation 179-21 and Figure 179-7 instead.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #374.

Cl **179** *SC* **179.11** *P* **351** *L* **47** # 123

Ghiasi, Ali Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *AC coupling*

The 50 kHz corner frequncy is legacy from 25.78 GBd, given the 106 GBd operation this corner frequency should be increased

SuggestedRemedy

Suggest to increase low-frequency 3 dB cutoff to 200 kHz or at least 100 KHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change the low-frequency 3 dB cutoff from 50 kHz to 100 kHz here and elsewhere in Clause 179 as required.

Cl **179** *SC* **179.11** *P* **352** *L* **9** # 460

Kocsis, Sam Amphenol

Comment Type **T** *Comment Status* **A** *CA ILdd*

The values for ILdd,max for CA-n should match Table 179A-3 (which was updated in D1P1)

SuggestedRemedy

CA-A = 19
CA-B = 24
CA-C = 29
CA-D = 34

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The resolution of comment #586 against D1.0 set the MCB via allocation to 0.8. This was reflected in Table 179A-3 but the values in Table 179-13 were not updated accordingly.

Implement the suggested remedy.

Cl **179** *SC* **179.11** *P* **352** *L* **13** # 461

Kocsis, Sam Amphenol

Comment Type **T** *Comment Status* **A** *CA ILdd*

Value for ILdd,min is TBD

SuggestedRemedy

Replace TBD with 16

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using comment #521.

Cl **179** SC **179.11** P **352** L **32** # 189

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **A** *CA ILdd*

I believe that one of the purposes of the normative clause 179.11.2 is assure performance. The specifications are reflected in the first entries in table 179-13. Ildd(max) and Ildd(min) should be informative and specified as suggest informative ranges. It possible to pass COM with a ILdd greater than ILdd(max). Compare two lengths cable length but the same ILdd at the Nyquist frequency. The shorter cable will have more signal i.e. larger pulse peak. So, it's completely plausible to exceed ILdd(max) and operate just fine. There is a corresponding argument for the cable assemblies with less loss than ILdd. Shorter cables may indeed cause more reflection that would need more design attention. It's a product choice. If there is too much reflection, COM will fail.

SuggestedRemedy

In table 179-12
Replace the first entry with data from (diminico_3dj_01_0924)
Suggested Insertion loss range at 53.125 GHz ILdd :
CA- A (18 dB to 19 dB);
CA- B (19 dB to 24 dB);
CA- C (24 dB to 29 dB);
CA- D (29 dB to 34 dB);
Note: normative Cable classification uses COM.
remove the 2nd entry i.e. Insertion loss at 53.125 GHz, ILdd (min)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

This comment seems to be the same as comment #190 but with a different suggested remedy, which is the same as that of comment #460.

Resolve using the response to comment #460.

Cl **179** SC **179.11.1** P **352** L **26** # 462

Kocsis, Sam Amphenol

Comment Type **T** *Comment Status* **A** *(bucket)*

This section no longer says anything about Characteristic Impedance

SuggestedRemedy

Remove "Characteristic impedance" from the section title.

Response *Response Status* **C**

ACCEPT.

Cl **179** SC **179.11.2** P **352** L **31** # 190

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **R** *CA ILdd*

I believe that one of the purposes of the normative clause 179.11.2 is assure performance. The specifications are reflected in the first entries in table 179-13. Ildd(max) and Ildd(min) should be informative and specified as suggest informative ranges. It possible to pass COM with a ILdd greater than ILdd(max). Compare two lengths cable length but the same ILdd at the Nyquist frequency. The shorter cable will have more signal i.e. larger pulse peak. So, it's completely plausible to exceed ILdd(max) and operate just fine. There is a corresponding argument for the cable assemblies with less loss than ILdd. Shorter cables may indeed cause more reflection that would need more design attention. It's a product choice. If there is too much reflection, COM will fail.

SuggestedRemedy

Replace the entire 179.11.2 section with
179.11.2 Cable assembly insertion loss (informative)
The suggested measured insertion loss ranges are annotated in Table 179-13

Alternatively, go back to one range, 18 to 29 dB, with the note further qualification of different loss hosts and cable assemblies are possible but outside the scope of this standard. There are 1728 permutations of 2 package types 2 lengths, 3 hosts, and 4 cables. We can limit the permutations bit the process will be time consuming and still result in a lot of COM figuration cases.

Response *Response Status* **C**

REJECT.
It can be argued that the normative specification for cable assemblies is COM, and IL (which is accounted for by COM) can be made a recommendation.
However, cable assembly IL has been part of normative specifications, in addition to COM, for several generations.

Note that informative and normative subclauses are not used within the same clause.

Cl **179** *SC* **179.11.3** *P* **353** *L* **32** # 201

Mellitz, Richard — Samtec

Comment Type **TR** *Comment Status* **A** *Test fixture delay*

Tfx is very dependent on the fixture design as an be seen from performing a TDR on the test fixture presentation from sekel_3dj_02_2407. Thus, test fixture manufacturer is best equipped to provide the Tfx value that corresponds to the MDI connector attachment.

SuggestedRemedy

Replace this line
test connector and the test fixture cable-facing connection minus 0.2 ns.
With
test connector and the test fixture cable-facing connection is provided by the test fixture vendor.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Apply the change as written in the response to comment #199.

Cl **179** *SC* **179.11.7** *P* **356** *L* **10** # 161

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **A** *A_v, A_fe, A_ne*

With the change of Rd from 50 Ohm to 46.25 Ohm in COM the effective output amplitude into a 50 Ohm load increased resulting in a requirement for approximately 4% larger steady state output amplitude from the transmitter than for 100G per lane if Av is the same as for 100GBASE-CR1.

SuggestedRemedy

Make Av and Afe equal to 400mV and Ane to 585mV.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
[Editor: Page changed from 356 to 358]
Resolve using the response to comment #160.

Cl **179** *SC* **179.11.7** *P* **356** *L* **31** # 3

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **A** *MLSD*

A receiver discrete-time equalizer with MLSD is needed to close the link budget for CR

SuggestedRemedy

Change the COM computation to use the receiver discrete-time equalizer with MLSD in Annex 178A.1.11

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #529.

Cl **179** *SC* **179.11.7** *P* **357** *L* **28** # 191

Mellitz, Richard — Samtec

Comment Type **TR** *Comment Status* **A** *CA designations*

host desinators TBD need to be defined

SuggestedRemedy

Respectively use designation in diminico_3dj_01_0924, HL, HN, and HH

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG reviewed the following presentation.
<https://www.ieee802.org/3/dj/public/24_09/diminico_3dj_01_2409.pdf>
Use the term "host class", similar to the "package class" used in clause 178. Replace references to host designation with host class HL, host class HN , and host class HH.
Implement across the draft with editorial license.

Cl **179** *SC* **179.11.7** *P* **357** *L* **28** # 192

Mellitz, Richard — Samtec

Comment Type **TR** *Comment Status* **A** *(bucket), CA COM*

It not clear what COM case are to be run.

SuggestedRemedy

Add a table/matrix after table 179-15 which annotates which of the 1728 permutations of 2 package types, 2 lengths, 3 hosts, and 4 cables need to be evaluated and provide a designator for each.
For the time being, start with columns:
Package type, Package Zp. Host type, cable type, Zp for SCHS_p^(k), C0 for SCHS_p^(k), c1 for SCHS_p^(k), and a case designator.
Row entries can start out at TBD.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #397.

Cl **179** *SC* **179.11.7** *P* **358** *L* **10** # 534

Li, Mike Intel

Comment Type **TR** *Comment Status* **A** *A_v, A_fe, A_ne*

Av, Afe, Ane TBDs

SuggestedRemedy

Replace them w
0.413, 0.413, 0.608 V (Av, Afe, Ane)
see lim_3dj_01a_2407.pdf, slide 4

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
[Editor's note: Changed subclause from 179.11.11 to 179.11.7]
Resolve using the response to comment #160.

Cl **179** *SC* **179.11.7** *P* **358** *L* **46** # 1

Lusted, Kent Intel Corporation

Comment Type **TR** *Comment Status* **A** *Reference FFE*

The COM parameter values for the 200GBASE-CR1, 400GBASE-CR2, 800GBASE-CR4 and 1.6TBASE-CR8 PMDs are TBDs

SuggestedRemedy

In table 179-16, use the COM parameter values and the editors note for CR (per lusted_3dj_06b_2407, slides 6-7) , which are:

d_w = 6
Nfix = 15
N_g = 2
N_f = 4
N_max = 80

Use MLSE per Annex 178A.1.11
the MLSD implementation allowance is TBD

Set COM = 3dB

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #2, #529, and #530.

Cl **179** *SC* **179.11.7.1** *P* **359** *L* **34** # 331

Healey, Adam Broadcom Inc.

Comment Type **T** *Comment Status* **A** *(bucket), Host channel model*

The host channel model is defined Annex 178A (see 178A.1.4.3) and the calculations described in 179.11.7.1 are redundant. The information about the host transmission lines (e.g., transmission line parameters, zp values for transmitters, receivers, and aggressors) should now be part of the COM parameter value tables and any explanatory material, if needed, moved to 179.11.7.

SuggestedRemedy

Delete subclause 179.11.7.1. Define host transmission line parameters and lengths in the table of COM parameter values. If the information about the loss of the host transmission line model is considered valuable, it can be moved to 179.11.7. In 179.9.5.3.3, re-phrase item a) to indicate that the s-parameters measured from the Tx test reference to the Rx test reference (see Figure 110-3b) are used for the computation of COM and that the transmitter device, package, and host models are omitted from the calculation. For item c) delete the first sentence, delete Equation (179-11), and re-phrase the text to state that Tr is set to the transition time measured at the Tx test reference (measured using the method in 120E.3.1.5, etc.).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy with editorial license.

Cl **179** *SC* **179.11.7.1** *P* **359** *L* **46** # 395

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *Host channel model*

As the editor's note indicates, host channel models for the three host designations have not been adopted. Many parameters in 179.11.7.1 and 179.11.7.2 are still TBD.

As a result, all calculations of COM for cable assemblies are currently undefined. In addition, several host output parameters that are currently TBD cannot be proposed, and input signal calibration is undefined.

Possible host channel models were presented in https://www.ieee802.org/3/dj/public/24_07/ran_3dj_01b_2407.pdf, slides 21-25 (with updated PCB model creating 1.1 dB/inch of PCB).
Out of the 4 sets of parameters, it is proposed to use the one that creates the minimum pulse peak at TP2. This is option 1 (maximum PCB length and C0=0) for host-high and host-nominal, and option 4 (maximum package length and nonzero C0) for host-low.
If these models prove inadequate they can be changed later.

SuggestedRemedy

Change the text in 179.11.7.1 and 179.11.7.2 to use the host channel parameters in ran_3dj_01b_2407, slides 21-25, with option 1 for host-high and host-nominal, and option 4 for host-low, with editorial license.

Update the "Host PCB model" rows in Table 179-15 to point to the updated model

Add an editor's note that the host channel model needs confirmation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #537.

Cl **179** *SC* **179.11.7.1** *P* **360** *L* **8** # 537

Li, Mike
Intel

Comment Type **TR** *Comment Status* **A** *Host channel model*

Table 179-17-PCB model parameter values TBDs

SuggestedRemedy

Replace them with the filled table provided in the "PCB_models_parameters" sheet. A presentation "lim_3dj_01_2409" will be requested to explain how those values are derived.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The table referred to in the suggested remedy is available at the following URL:
https://www.ieee802.org/3/dj/comments/D1p1/8023dj_D1p1_comment_537_attachment.pdf.
The CRG has reviewed the presentation
https://www.ieee802.org/3/dj/public/24_09/lim_3dj_01a_2409.pdf.

The presentation does not provide values for the PCB lengths (zp) and for the host package model.
Straw poll #E-6 was taken on the value of C1.

Adopt the proposed values on slide 2.

Straw Poll #E-6 (directional)
I would support C1 value of:
A: as proposed (1e-5 nF)
B: 0 nF
A: 22 B: 14

Cl **179** *SC* **179.11.7.1.1** *P* **360** *L* **23** # 396

Ran, Adee
Cisco Systems, Inc.

Comment Type **T** *Comment Status* **A** *(bucket), Host channel model*

The method of host channel calculation is defined in 178A.1.4.3 and its combination with . The package and device model for usage in COM are defined in 178A.1.4 and 178A.1.5. These definitions should be referenced for both through and crosstalk path calculations.

SuggestedRemedy

Replace the text and equations in 179.11.7.1.1 and 179.11.7.1.2 with references to 178A.1.4.3 and the appropriate parameter values.

Also change references to these subclauses, e.g., 176E.6.12.2, with editorial license.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy in alignment with the response to comment #331, with editorial license.

Cl **179** *SC* **179.11.7.1.1** *P* **360** *L* **24** # 193

Mellitz, Richard — Samtec

Comment Type **TR** *Comment Status* **A** *ıcket1p), Host channel model*

Then host may not contain a PCB.

SuggestedRemedy

replace the designation "host PCB" with "host interconnect" or "host PCB assembly" everywhere

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The host model is described as including a PCB, but hosts can be built in multiple ways.

Add a statement in 179.11.7.1 that for the purpose of calculating COM, a host model is used, which includes a combination of a pacakge and a PCB (with references to the models), but this model is not a host specification and implementations can use different constructions.
Add a similar statement in reference to the COM model of Annex 176E.
Implement with editorial license.

Cl **179** *SC* **179.11.7.1.1** *P* **360** *L* **24** # 397

Ran, Adee — Cisco Systems, Inc.

Comment Type **T** *Comment Status* **A** *(bucket), Host channel model*

The text in 179.11.7.1.1 and 179.11.7.1.2 about calculations of the channel signal and crosstalk paths is inherited from clause 162. It does not account for the new possibility that the hosts on both sides of the cable are of different designations.

Regardless of the host model parameters, The through and FEXT paths should be set by the combination of the transmitter's host designation, the cable assembly, and the receiver's host designation; while the NEXT path is set only by the receiver's host designation.

This inherently creates multiple test conditions for a cable assembly, because the NEXT effect can different in each direction. All combinations need to be addressed.

SuggestedRemedy

Rewrite 179.11.7.1.1 to address the combination of host designations on both ends of the channel. Clarify that a cable assembly needs to comply with all valid combinations of hosts on its two ends.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy (possibly using a table as suggested in comment #192).
Align with the response to comment #331.
Implement with editorial license.

Cl **179** *SC* **179.11.11** *P* **359** *L* **18** # 535

Li, Mike — Intel

Comment Type **TR** *Comment Status* **A** *MLSD*

MLSD is not enabled

SuggestedRemedy

Add MLSD usage parameter, and set it to 1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #529.

Cl **179** *SC* **179.11.11** *P* **359** *L* **18** # 536

Li, Mike — Intel

Comment Type **TR** *Comment Status* **A** *MLSD*

MLSD implementation penalty Q is missing

SuggestedRemedy

Add MLSD implemtentation penalty Q parameter and set it as zero in magenta or TBD

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #530.

Cl **179** *SC* **179.14** *P* **363** *L* **35** # 10

Marris, Arthur — Cadence Design Systems

Comment Type **T** *Comment Status* **A** *(bucket)*

Per lane signal detect status variables are missing from Table 179-20

SuggestedRemedy

Add PMD_signal_detect_0 to PMD_signal_detect_7 in bits 1.10.9:1

Response *Response Status* **C**

ACCEPT.

Cl **179** *SC* **179.15.4.5** *P* **368** *L* **18** # 124

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *(withdrawn)*

The 50 kHz corner frequncy is legacy from 25.78 GBd, given the 106 GBd operation this corner frequency should be increased

SuggestedRemedy

Suggest to increase low-frequency 3 dB cutoff to 200 kHz or at least 100 KHz

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **179** *SC* **179.15.4.5** *P* **369** *L* **18** # 125

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *AC coupling*

The 50 kHz corner frequncy is legacy from 25.78 GBd, given the 106 GBd operation this corner frequency should be increased

SuggestedRemedy

Suggest to increase low-frequency 3 dB cutoff to 200 kHz or at least 100 KHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #123.

Cl **179A** *SC* **179A..7** *P* **744** *L* **30** # 208

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **A** *MLSD*

A receiver discrete-time equalizer with MLSD is needed to close the link budget for CR and is not called out in the Annex

SuggestedRemedy

Add that the COM computation is to use the receiver discrete-time equalizer with MLSD in Annex 178A.1.11

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #529.

Cl **179A** *SC* **179A.4** *P* **739** *L* **1** # 194

Mellitz, Richard — Samtec

Comment Type **TR** *Comment Status* **A** *Host channel IL*

Insertion loss plots are not indicative of COM or performance because of cable vs PCB choices, electromagnetically compensated connectors, top-package connections, or other design choices. In addition, the host MDI connector may not have a connector footprint. Insertion loss limit mask plots are not easily determined because of the variety of design choices. In addition, the use of the words "maximum" and "minimum" are imperative words that are often circumvent the informative nature of the specification. A suggested range is more appropriate for an informative specification.

SuggestedRemedy

Replace section 179A.4 with
The suggested differential insertion loss range for the host channels, consisting of controlled impedance PCB assembly, device package, and up to the host connect for the MDI connector attachment and the same with the MDI connector through the HCB I.e. (TP0d to TP2 or TP3 to TP5d) are shown in table 179a-1

Change table 179A-1 to:

Table 179A-1-Suggested differential insertion range at 53.125 GHz
Change the 2nd line from
[Max(dB) Min(dB)], [Max(dB)]
to
[Ildd range (dB)] ,[Ildd range (dB)]

Use values from in diminico_3dj_01_0924 for row entries

Host Low (HL)	[1 dB to 6.5 dB]	[6.25 dB to12.75 dB]
Host Nominal (HN)	[6.5 dB to 11.5 dB]	[12.75 dB to17.75 dB]
Host Nominal (HN)	[11.5 dB to16.5dB]	[17.75 dB to 22.75 dB]

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using response to comment #521.

Cl **179A** *SC* **179A.4** *P* **739** *L* **2** # 566

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **A** *Host channel IL*

Defining a "host channel" as "controlled impedance PCB, device package, and host connector footprints" is not realistic. There may be cables in the host, and the connector loss is significant and will not be the same for all connectors, cabled and not, on either side of the board... The connector is part of the host and its loss should be included. This will simplify things: there will be only two parts making up the TP0d to TP2 channel: the host and the HCB traces.

SuggestedRemedy

Define the host channel from TP0d to the outside of the connector, adding the nominal connector loss (2.9 dB because hundredths of a dB are to be avoided) to the values in Table 179A-1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #518.

Cl **179A** *SC* **179A.4** *P* **739** *L* **9** # 518

DiMinico, Christopher PHY-SI/SenTekse/MC Communications

Comment Type **TR** *Comment Status* **A** *MTF IL*

Assumed mated connector insertion loss TBD

SuggestedRemedy

Assumed mated connector insertion loss 2.45 dB. See supporting presentation diminico_3dj_01_0924.pdf.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG has reviewed the presentation https://www.ieee802.org/3/dj/public/24_09/diminico_3dj_01_2409.pdf.
Comment #566 suggests that the connector ILdd is made part of the host channel.

Implement the changes shown on slides 4 and 5 in the presentation, with editorial license.

Cl **179A** *SC* **179A.4** *P* **740** *L* **4** # 522

DiMinico, Christopher PHY-SI/SenTekse/MC Communications

Comment Type **TR** *Comment Status* **A** *Host channel IL*

TP0d to TP2 or TP3 to TP5 Min (dB) TBDs in Table 179A-1

SuggestedRemedy

TP0d to TP2 or TP3 to TP5 Min (dB) - HL - 3.5 dB dB, HN-3.5 dB,HH-3.5 dB. See supporting presentation diminico_3dj_01_0924.pdf.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using comment #521.

Cl **179A** *SC* **179A.4** *P* **740** *L* **4** # 519

DiMinico, Christopher PHY-SI/SenTekse/MC Communications

Comment Type **TR** *Comment Status* **A** *Host channel IL*

TP0d to TP2 or TP3 to TP5 Max (dB) TBDs in Table 179A-1 and Figure 179A-3 TBDs

SuggestedRemedy

TP0d to TP2 or TP3 to TP5 Max (dB) - HL -12.75 dB,HN-17.75 dB,HH-22.75 dB. See supporting presentation diminico_3dj_01_0924.pdf.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG has reviewed the presentation https://www.ieee802.org/3/dj/public/24_09/diminico_3dj_01_2409.pdf.

Implement the changes proposed on slide 6 of the presentation.
Change column "TP5" to "TP5d".

Cl **179A** *SC* **179A.5** *P* **741** *L* **27** # 195

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **A** *Host channel IL*

Insertion loss plots are not indicative of COM or performance because of cable vs PCB choices, electromagnetically compensated connectors, top-package connections, or other design choices. In addition, the host MDI connector may not have a connector footprint. Insertion loss limit mask plots are not easily determined because of the variety of design choices. In addition, the use of the words "maximum" and "minimum" are imperative words that are often circumvent the informative nature of the specification. A suggested range is more appropriate for an informative specification.

SuggestedRemedy

Replace line 27 and 28 with
This subclause provides information on the channel (TP0d-TP5d) insertion losses for the suggested loss ranges for cabling topologies.

Remove from line 45 page 741 to line 20 on page 742

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG has reviewed the presentation https://www.ieee802.org/3/dj/public/24_09/diminico_3dj_01_2409.pdf.

Replace equations 179A-10 and 179A-11 shown on slide 9 with sum of values at the Nyquist frequency, using values in the tables including any changes due to other comments. Implement with editorial license.

Cl **179A** *SC* **179A.5** *P* **742** *L* **5** # 426

Ran, Adee Cisco Systems, Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

Equation 179A-10 includes the terms "ILdd_{Host1, Max+TF}" and "ILdd_{Host2, Max+TF}", which are not defined.

Apparently these correspond to "ILdd_{Host1}" and "ILdd_{Host2}" in the equation variable list.

SuggestedRemedy

Rename the variables, preferably in the equation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179A** *SC* **179A.5** *P* **742** *L* **7** # 427

Ran, Adee Cisco Systems, Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

Equation 179A-10 includes the terms "ILdd_{Host1, Min}" and "ILdd_{Host2, Min}", which are not defined.

SuggestedRemedy

Add the definitions for these variables and refer to a table as appropriate.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179A** *SC* **179A.5** *P* **742** *L* **15** # 428

Ran, Adee Cisco Systems, Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

ILdd_Host1 definition is "from TP0d to TP2d", and ILdd_Host2 definition is "from TP3d to TP5d".

In addition, the reference to Table 179A-2 is confusing, as there is no column for these parameters in that table. Both minimum and maximum loss (with the variable names) should appear clearly for each host designation. Preferably it should be separate from the configuration matrix in Table 179A-2.

SuggestedRemedy

Change TP2d to TP2, and TP3d to TP3.

Add a new table with recommended min and max ILdd for each host designation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179A** *SC* **179A.5** *P* **742** *L* **15** # 429

Ran, Adee Cisco Systems, Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

"for link configurations Table 179A-3" is unnecessary and seems incorrect - the host ILdd (max and min) is defined (recommended) regardless of the link it is in.

SuggestedRemedy

Delete the phrase "for link configurations Table 179A-3".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179A** *SC* **179A.5** *P* **742** *L* **17** # 430

Ran, Adee
Cisco Systems, Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

"mated test fixture" here and elsewhere in 179A (15 instances"
"mated test fixtures" in 179B.1 and elsewhere in 179B (25 instances excluding editor's notes and PICS)

We should be consistent...

SuggestedRemedy

Preferably change "mated test fixture" to "mated test fixtures" globally.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179A** *SC* **179A.5** *P* **742** *L* **34** # 431

Ran, Adee
Cisco Systems, Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

In Table 179A-3 column "ILdd_{Ca,max}" should have "CA" instead of "Ca". The column should contain values in dB, not the cable assembly designation. The loss limits for each cable assembly designation are normative and are mapped in Table 179-13, so the designations should not be repeated here.

Table 179A-3 and Table 179A-4 are similar and would be better merged into one table showing both minimum and maximum values.

SuggestedRemedy

Merge the tables into one with min and max for CA and for Ch. Cable assembly designations can appear in footnotes.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179A** *SC* **179A.5** *P* **743** *L* **1** # 521

DiMinico, Christopher
PHY-SI/SenTekse/MC Communications

Comment Type **TR** *Comment Status* **A** *Min IL*

Table 179A-4-Minimum Insertion loss budget values at 53.125 GHz TBD

SuggestedRemedy

Ilddch,min 24 dB, Ilddca,min 16 dB. Reformat information into Table similar to Table 162A-1-Insertion loss budget values at 26.56 GHz.See supporting presentation diminico_3dj_01_0924.pdf.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The CRG reviewed the presentation https://www.ieee802.org/3/dj/public/24_09/diminico_3dj_01_2409.pdf.

Modify table 179A-1 as shown on slide 8 of the presentation, but with minimum host loss of 2 dB + mated connector 2.45 dB. The maximum numbers need to be adjusted accordingly.

Add a new table as shown on slide 7 of the presentation, with CA min of 16 dB, and channel min adjusted accordingly.

Implement with editorial license.

The straw polls indicated support for this resolution:

Straw poll #E-4 (directional):
For a minimum host loss recommendation (as shown on slide 8) I prefer:
A. 3.5 dB
B. 2 dB
C. No minimum recommendation
(choose one)
A: 6 B:14 C: 12

Straw poll #E-5 (directional):
For a minimum host loss recommendation (as shown on slide 8) I prefer:
A. 3.5 dB
B. 2 dB
C. No minimum recommendation
(chicago rules)
A: 9 B: 23 C: 15

Cl **179A** *SC* **179A.5** *P* **743** *L* **22** # 432

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *MTF IL*

The MCB loss appears without the via (which according to the note is allowed additional 0.8 dB).
In comparison, the host channel allocation (line 31) appears with the host via included.

This is confusing and the difference seems unnecessary. Host and MCB designers should have the same freedom to allocate the budget.

SuggestedRemedy

Change the 3 instances of the number 2.7 dB to 3.5 dB and move the lines and arrows to include the MCB via, similar to the host via drawings.

Consider removing the second sentence in the note about MCB via allowance.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Add an arrow that includes both MCB PCB and via allocation (total 3.5 dB) to Figure 179A-3 MTF.
Delete text in Note-The MCB via allowance is 0.8 dB.
Implement with editorial license.

Cl **179A** *SC* **179A.5** *P* **743** *L* **25** # 433

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *(bucket)*

The horizontal locations of TP0d and TP5d appear almost aligned with those of TP1 and TP4, but these are very different test points. This could be improved.
The boxes labeled "Transmit function" and "Receive function" are not helpful here and do not appear in the similar Figure 179A-4.

SuggestedRemedy

Delete the boxes labeled "Transmit function" and "Receive function".
Move TP0d further to the left and TP5d further to the right.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Move TP0d further to the left and TP5d further to the right

Cl **179A** *SC* **179A.5** *P* **743** *L* **33** # 434

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *(bucket)*

"NOTE-The 11.5 dB ILdd includes allowance for BGA and connector footprint vias"

The host connector via is clearly shown as part of the 11.5 dB arrow.
The BGA footprint via is obviously included in the combination of "Device package + Host PCB".

The allocation includes the package too, so the NOTE as written is partial and misleading.

SuggestedRemedy

Delete the NOTE.

Response *Response Status* **C**

ACCEPT.

Cl **179A** *SC* **179A.5** *P* **743** *L* **33** # 520

DiMinico, Christopher
PHY-SI/SenTekse/MC Communications

Comment Type **TR** *Comment Status* **A** *MTF IL*

Mated Test Fixture IL TBD. Mated Test Fixture NOTE TBD.

SuggestedRemedy

Mated Test Fixture IL 9.75 dB. Delete Mated Test Fixture NOTE TBD. 179B.1 Test fixtures TBD 9.75 dB. See supporting presentation diminico_3dj_01_0924.pdf.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed the presentation https://www.ieee802.org/3/dj/public/24_09/diminico_3dj_01_2409.pdf.

As shown on slide 4, the sum of the mated test fixtures ILdd is 9.75 dB=2.7 dB (MCB) + 0.8 dB (MCB via) + 2.45 dB (connector) + 3.8 dB (HCB).

Implement the proposed changes on slide 6 of the presentation. Remove the TBD in the NOTE.

Cl **179A** *SC* **179A.5** *P* **743** *L* **41** # 435

Ran, Adee Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *(bucket), MTF IL*

"Mated cable assembly and test point test fixture" is confusing. This thing is well known as "Mated test fixtures".

SuggestedRemedy

Change the label to "Mated test fixtures".

Response *Response Status* **C**

ACCEPT.

Cl **179A** *SC* **179A.5** *P* **744** *L* **2** # 436

Ran, Adee Cisco Systems, Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

Stray circle at the top of Figure 179-4

SuggestedRemedy

Delete it

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179A** *SC* **179A.5** *P* **744** *L* **12** # 437

Ran, Adee Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *CA ILdd (bucket)*

The label showing the calculation of 40 dB is unnecessary. 40 dB and 11.5 dB appear in the figure and are easy to understand. The number 17 dB seems to come out of nowhere - is not found elsewhere and is only a result of this calculation (cable assembly loss without its test fixtures?)

SuggestedRemedy

Delete the label "Channel (TP0d-TP5d) ILdd = 40 dB @ 53.125 GHz = (2*11.5)+17"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Delete =(2*11.5)+17 and NOTE-Channel (TP0d-TP5d) ILdd derived from cable assembly host, and mated test fixture.

Cl **179A** *SC* **179A.6** *P* **744** *L* **25** # 38

Heck, Howard Intel Corporation

Comment Type **T** *Comment Status* **A** *(bucket)*

The text states that the CR channels are recommended to meet the ERL specified in 178.9.2. Subclause 178.9.2. contains specifications for transmitters, and so is not the correct reference. Channel ERL requirements are specified in 178.10.3.

SuggestedRemedy

Change "178.9.2" to "178.10.3".

Response *Response Status* **C**

ACCEPT.

Cl **179A** *SC* **179A.7** *P* **744** *L* **30** # 197

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **R** *(bucket)*

COM is normative.

SuggestedRemedy

Change line 28 to
179A.7 (Normative) Channel (TP0d-TP5d) Operating Margin (COM)
And
Line 31 to
procedure in 178A.1 and the parameters in Table 178-13, and shall be to be greater than or equal to

Response *Response Status* **C**

REJECT.

Annex 179A is informative.
COM is normative for cable assemblies between TP1-TP4.
The channel (TP0d-TP5d) subject of 179A.7 is not owned by a single vendor and cannot be normative.

Cl **179B** SC **179B.1** P **745** L **18** # 126

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *MTF IL*

Target loss for MTF is TBD

SuggestedRemedy

Per sekel_3dj_01_2407 data on page 7 the target loss should be 9 dB=2.7 dB (MCB) + 2.45 dB (connector) + 3.8 dB (HCB) then the math also works out

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The suggested remedy does not include the 0.8 dB allocated to the MCB via as shown in Figure 179A-3.

Resolve using the response to comment #520.

Cl **179B** SC **179B.2.1** P **745** L **41** # 439

Ran, Adee — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *Freq Range*

An upper limit of 60 GHz has been adopted for RLcc in 178.9.2.3.

S-parameter measurement of 60 GHz is feasible with existing equipment. Specifying the test fixtures up to this bandwidth is adequate and sufficient for 106.25 GBd signaling.

Similarly for Equations 179B-2 through 179B-4.

SuggestedRemedy

Change "TBD GHz" to "60 GHz" in equations 179B-1, 179B-2, and 179B-4.
Change the upper limit in 179B-3 to 60 GHz.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
[Editor's note: Changed page from 746 to 745]

The resolution of comment #548 adopted a maximum frequency of 67 GHz for channel s-parameter measurements.
Therefore, test fixture specifications need to be at least to this frequency.

Change "TBD GHz" to "67 GHz" in equations 179B-1, 179B-2, and 179B-4.
Change the upper limit in 179B-3 to 67 GHz.

Cl **179B** SC **179B.2.1** P **745** L **41** # 438

Ran, Adee — Cisco Systems, Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

f is defined as the frequency in GHz, meaning f itself is a pure number. So the limits should not include "GHz".

Similarly for Equations 179B-2, 179B-4, and 179B-5 (179B-3 is correctly limited by pure numbers).

SuggestedRemedy

Delete "GHz" from the frequency range limits in all listed equations.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179B** SC **179B.3.1** P **746** L **44** # 440

Ran, Adee — Cisco Systems, Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

The insertion loss defined here is a reference; it should be labeled accordingly, as in 179B.2.1.

SuggestedRemedy

Change "ILdd_catf" to "ILdd_catfref" in the equation and variable list.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179B** SC **179B.3.1** P **747** L **47** # 441

Ran, Adee — Cisco Systems, Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

"93A.4" is an external reference

SuggestedRemedy

Format accordingly

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **179B** *SC* **179B.4.1** *P* **747** *L* **47** # 443

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *FOM_ILD*

Transmitter transition time is a parameter for calculation of FOM_ILD. It should scale linearly with the unit interval from the value 8.5 ps used in Annex 162B.

Other choices can be made which will affect the resulting FOM_ILD, but the limit is TBD too, so the parameters should be chosen first.

SuggestedRemedy

Change TBD to 4.25 for T_r.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The response to comment #447 adopted 6 ps for T_ft and T_nt for ICN calculation.

Change T_t value from TBD to 6.

Cl **179B** *SC* **179B.4.1** *P* **747** *L* **47** # 442

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *FOM_ILD*

The signaling rate and reference receiver bandwidth have been adopted.

The upper limit for calculation can be specified (at this time) as the measurement bandwidth for which 60 GHz was adopted (for RLcc measurements); frequencies above f_r (58.4 GHz) are weighted down by the calculation anyway.

SuggestedRemedy

Replace TBDs to 106.25 for f_b, 0.55 for f_r, and 60 for f_max.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The resolution of comment #548 adopted a maximum frequency of 67 GHz for channel s-parameter measurements.
Implement the suggested remedy except that f_max is 67 GHz.

Cl **179B** *SC* **179B.4.2** *P* **749** *L* **20** # 444

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *ERL*

Reflections in the mated test fixtures should not be eliminated from the measurement.

Thus, in Table 179B-1, N_bx and T_fx should both be set to 0, consistent with Table 162B-1 (802.3ck) and the NOTE in this table.

The note is not TBD.

SuggestedRemedy

Replace both TBDs with value 0.

Delete "(TBD)" from the NOTE.

Response *Response Status* **C**

ACCEPT.

Cl **179B** *SC* **179B.4.3** *P* **749** *L* **43** # 445

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *ILdc limit*

The ILdc limit equation 179B-6 is TBD. Although measurement results have not been shared, it is reasonable to assume that at least the limits of 802.3ck can be met, with extension to a measurement bandwidth of 60 GHz. This assumption is better than a TBD equation.

Similarly for RLdc, equation 179B-8.

If the suggested limits turn out to affect other specifications then they can be modified in future comments.

SuggestedRemedy

Change equation 179B-6 to the following limits (based on Equation 162B-6):

30-(21/28)f | for 0.01 <= f < 20
15 | for 20 <= f <= 60

Change equation 179B-8 to the following limits (based on Equation 162B-8):

30-(30/25.78)f | for 0.01 <= f < 12.89
17.85-0.0225f | for 12.89 <= f < 35
10 | for 35 <= f <= 60

Create figures depicting the equations.

Add an editor's note after each equation stating that the limit in the equation requires confirmation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #374.

Cl **179B** *SC* **179B.4.6** *P* **752** *L* **14** # 446

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *ICN*

The upper limit for calculation can be specified (at this time) as the measurement bandwidth for which 60 GHz was adopted (for RLcc measurements); frequencies above f_r (58.4 GHz) are weighted down by the calculation anyway.

Limits are given in GHz everywhere else, so we can be consistent.

SuggestedRemedy

Change "50 MHz to TBD MHz" to "0.05 GHz to 60 GHz".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The resolution of comment #548 adopted a maximum frequency of 67 GHz for s-parameter measurements.
Implement the suggested remedy but with 67 instead of 60.

Cl **179B** *SC* **179B.4.6** *P* **752** *L* **26** # 447

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *ICN*

Reference receiver bandwidth has been adopted; 0.55*106.25=58.4375.

The value of A_nt can be taken from 802.3ck as the allowed maximum output is the same.

The value of t_ft and T_nt can be taken from 802.3ck with scaling for the UI length.

SuggestedRemedy

In Table 179B-2, replace TBDs to 58.4375 for f_r, 600 for A_nt, 4.25 for T_nt.

In Table 179B-4, use the same values and in addition replace TBDs to 600 for A_ft and 4.25 for T_ft.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy, except for change T_ft and T_nt to 6 ps.

Cl **179C** *SC* **179C.1** *P* **756** *L* **36** # 448

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *(bucket)*

"the mechanical interface between the PMD and the cable assembly may be a mated pair of connectors..."

Subsequent paragraphs have "is" instead of "may be". This is adequate in this paragraph too because it is a closed list (unlike subsequent subclauses).

SuggestedRemedy

Change "may be" to "is".

Response *Response Status* **C**

ACCEPT.

Cl **179D** *SC* **179D.1.1** *P* **771** *L* **30** # 129

Ghiasi, Ali
Ghiasi Quantum/Marvell

Comment Type **T** *Comment Status* **A** *(bucket)*

Typo "112"

SuggestedRemedy

Replace 112 with SFP-DD224

Response *Response Status* **C**

ACCEPT.

Cl **179D** *SC* **179D.1.1** *P* **771** *L* **30** # 449

Ran, Adee
Cisco Systems, Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

"112" should probably be "SFP-DD224"

SuggestedRemedy

Correct as appropriate

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **180** *SC* **180.1** *P* **371** *L* **4** # 289

de Koos, Andras
Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Consider adding Clause 90 as 'Optional' to the 'Physical Layer Clauses Associated with the XXX PMD tables.

SuggestedRemedy

Add the following row
90-Time Synchronization Optional
to Tables 180-1, 180-2, 180-3, 180-4

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **180** *SC* **180.1** *P* **373** *L* **27** # 72

Ghiasi, Ali
Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *(withdrawn)*

Need shod ILT in the figure

SuggestedRemedy

Add a box below the PMDB to show ILT

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **180** *SC* **180.2** *P* **373** *L* **48** # 166

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **A** *error ratio*

For the optical Phys two C2C AUI's and two C2M are budgetted in the complete link. Assuming the adopted DER for one C2C plus one C2M AUI pf 2.67e-5, and an assumed worst case error extension for FEC symbol errors of 0.6 (see Dudek_3dj_01_2309) the random BER allowance for one C2C plus one C2M link is 4.27E-5.

SuggestedRemedy

Change the "BERadded to 8.6e-5 here and in the equivalent places in clauses 181, 182, and 183.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed slides 7 to 9 in the following presentation:
https://www.ieee802.org/3/dj/public/24_09/brown_3dj_04_2409.pdf

In 180.2, 181.2, 182.2, 183.2 (and elsewhere as necessary) set the BERadded values as follows:
When tested at a PMA: BERadded = 6.4E-5
When tested at the PCS (including any AUIs): BERadded = 3.2E-5

Implement with editorial license.

Cl **180** *SC* **180.5.1** *P* **376** *L* **6** # 98

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *ILT*

Figure is missing PMD transmit function and PMD receive function

SuggestedRemedy

Add PMD transmit function between PMA and optical transmitter and PMD receive fucntion between optical receiver and receive PMA.
Also add following lable between PMD transmit function and optical transmit "Sli"
Also add following lable between optical receive and PMD receive function "DLi"
PMD Signal_OK shold be connected to the PMD receive function.
Alternatively you could combine PMD TX function with optical TX and optical RX with PMD RX function.
In Figure 180-2 L0-L3 (left) at PMA input can be replaced with SL1-SL3 and L0-L3 (Right) with DL0-DL3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the proposals on slides 12-14 of issenhuth_02_2409 with editorial license.

Cl **180** *SC* **180.5.1** *P* **376** *L* **29** # 398

Ran, Adee — Cisco Systems, Inc.

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

802.3 editorial guidelines recommends "implementer" (not "implementor"), and indeed most instances in this document (12) follow.
Also in 182.5.1 and in an editor's note in 176A.11.2.4.

SuggestedRemedy

Change to "implementer".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **180** *SC* **180.5.1** *P* **376** *L* **30** # 399

Ran, Adee — Cisco Systems, Inc.

Comment Type **T** *Comment Status* **A** *Test points*

"these test points will not typically be accessible in an implemented system"
"will" is improper here.

This sentence is inherited from older optical PMD clauses which implicitly assumed the PMD interface consists of analog signals (the diagrams showed the retimer as part of the PMA - see e.g. Figure 121-2).

Since this PMD's functional specification includes the retiming function (and its service interface consists of PAM4 symbols, not an analog signal), This sentence is not warranted anymore. These test points are typically quite accessible through the adjacent PMA that can inject test patterns and check the received symbols, and are useful for system testing as well as component testing. They are just not exposed to external testing.

SuggestedRemedy

Change to "these test points are typically not directly accessible in an implemented system"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Test points TP0 and TP4 have no significance for the PMDs defined in 180, 181, 182, or 183.
Also, note that comment #98 proposes updates to Figure 180-2 that might be relevant to this comment.
Delete TP0 and TP4 labels in Figure 180-2, Figure 181-2, Figure 182-2, Figure 183-2.
In 180, 181, 182, 183 remove the text (or similar) "TP1<0:3> and TP4<0:3> are optional reference points that may be useful to implementors for testing components (these test points will not typically be accessible in an implemented system)."
[Editor's note: CC 180, 181, 182, 183]

Cl **180** *SC* **180.5.4** *P* **376** *L* **51** # 477

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *Signal detect (bucket)*

Define signal detect in context of OLT.

SuggestedRemedy

Redefine global_pmd_signal_detect to be function of ILT rather than optical power similar to the definition in 179.8.4.
Similarly for 181.5.4, 182.5.4, and 183.5.4.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Given the updated definition of SIGNAL_OK in 180.3 no changes to the global_signal_detect function is required.
Delete the editor's note here and in 181.5.4, 182.5.4, and 183.5.4.
[Editor's note: CC: 180, 181, 182, 183]

Cl **180** *SC* **180.5.5** *P* **377** *L* **16** # 400

Ran, Adee — Cisco Systems, Inc.

Comment Type **T** *Comment Status* **R** *Signal detect*

The lane-by-lane signal detect function is written as a remnant of the old optical-power based specification, which assumed the PMD has no detection function (DSP/CDR).
The sentences about "various implementations" and "adequate margin" were used to allow things beyond average power detection.

With the current generation DSPs that include DSPs, these sentences are not helpful anymore; it is obvious that various implementations are permitted (like in other functions) and the signal detection is dependent on other criteria beyond optical power.

Only the sentence about time requirements needs to stay.

Applies in all optical clauses.

SuggestedRemedy

Replace the last two paragraphs with the following text:
There are no timing requirements for updating the PMD_signal_detect_i variable.

Update other PMD clauses accordingly.

Response *Response Status* **C**

REJECT.

The first paragraphs makes it clear to implementers explicit measurement of power is not needed as long the criteria is met. The second paragraph is not incorrect as merely points out that margins are required if explicit power monitoring is done, which may be helpful to implementers.

Cl **180** *SC* **180.6** *P* **378** *L* **39** # 99

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *(bucket1p)*

Section 180.6 would fit better earlier

SuggestedRemedy

Consider moving 180.6 to 180.5.2 and increase index for current 180.5.2 by +1

Response *Response Status* **C**

REJECT.

After CRG discussion there was no consensus to make a change at this time.

Cl **180** *SC* **180.7** *P* **378** *L* **50** # 266

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *Chromatic dispersion*

G.652.B fiber was not included in the statistical analysis of chromatic dispersion conducted by ITU-T Q5. Since the 3dj optical channel CD specs now reference this methodology, all references to G.652.B fibers should be removed.

SuggestedRemedy

Remove the references to "G.652.B" in 180.7 and in 180.8.1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

It was noted during discussion that this fiber type has not been manufactured for approximately 20 years so is not relevant to these PMDs.

Implement suggested remedy with editorial license.

Cl **180** *SC* **180.7.1** *P* **379** *L* **26** # 401

Ran, Adee
Cisco Systems, Inc.

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

The words "each lane" are not helpful for "signaling rate". All specifications hold for each lane - signaling rate is not special. Also it cannot be aggregated (unlike power and bit rate).

This occurs in multiple tables and rows in optical clauses. "Each lane" should be in the text above the table or in the table heading, not on specific rows.

SuggestedRemedy

Delete "each lane" from the parameter names in all tables as appropriate.
Where necessary add indication in the text that the spefications are defined for each lane separately unless noted otherwise.
Apply in all optical PMD clauses.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **180** *SC* **180.7.1** *P* **379** *L* **27** # 402

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **R** *Jitter*

Recent OIF presentation by Marco Mazzini and Yi Tang showed that jitter has very little effect on exising transmitter specifications, and is thus not caught by the existing tests. Degradation of FEC bins was also demonstrated.
With current optical specifications, transmitters are allowed to have jitter that receivers cannot track, including jitter profiles that create correlated errors and impact post-FEC performance. This creates a hole in the spec.

Jitter can be measured on an optical signal at TP2 just like on an electrical signal at TP2. Adding jitter specifications would guard against high levels of jiter that other specs don't catch.

Also in other optical clauses.

SuggestedRemedy

Add a jitter specificaion with parameters J4u03 and JRMS with the same definitions as in electrical clauses (e.g. 179.9.4.7) and max values of 118 mUI and 23 mUI respectively. Measuremnt is allowed with PRBS13Q or SSPRQ allowing choice of R03 and F30 transitions that minimizes the measurement error.

Apply in other optical PMD clauses.

Response *Response Status* **C**

REJECT.

During CRG discussion there was no consensus to make a change at this time. Further contributions on this topic are encouraged.

The following presentation was reviewed at a previous ad hoc meeting:
https://www.ieee802.org/3/dj/public/adhoc/electrical/24_0822/ran_3dj_elec_01_240822.pdf

Cl **180** *SC* **180.7.1** *P* **379** *L* **34** # 311

Mi, Guangcan
Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **A** *Rx optical parameter*

the transmitted AOP min was changed from -2.8dBm to -3.3dBm, the receiver AOP min was not updated accordingly

SuggestedRemedy

change the AOP min of receiver from -5.8dBm to -6.3dBm, such that it is equivalent to (AOPmin of transmitter - link IL)

Response *Response Status* **C**

ACCEPT.

Cl **180** *SC* **180.7.1** *P* **379** *L* **35** # 312

Mi, Guangcan Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **R** *Tx optical parameter*

OMAouter of each aggressor lane is higher than OMAout max of the transmitter spec.

SuggestedRemedy

Response *Response Status* **C**

REJECT.

The suggested remedy does not provide sufficient detail to implement.

Cl **180** *SC* **180.7.2** *P* **381** *L* **16** # 261

Yu, Rang-chen InnoLight

Comment Type **T** *Comment Status* **A** *Rx optical parameter*

Due to the Average launch power, each lane (min) of transmitter was changed from -2.8dBm to -3.3dBm in D1.1, then the Average receive power, each lane (min) in table 180-8 should be changed accordingly.

SuggestedRemedy

Change the Average receive power, each lane (min) of receiver from -5.8dBm to -6.3dBm.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #311

Cl **180** *SC* **180.7.2** *P* **381** *L* **21** # 403

Ran, Adee Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *Rx optical parameter*

Receiver sensitivity is not defined with specific performance requirement.
Compare to SRS which has a specified block error ratio (footnote c).

The requirement should preferably be in the subclauses that defines RS (and SRS) instead of a table footnote.

Applies similarly in 181.7.2, 182.7.2, and 183.7.2.

SuggestedRemedy

Add footnote to the row for receiver sensitivity specifying the block error ratio.

Consider adding the requirements for RS and SRS in 180.9.12 and 180.9.13.

Apply in other optical PMD clauses.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In Table 180-5, for stressed receiver sensitivity the target block error ratio is specified in footnote use.

Add the same footnote c for "receiver sensitivity" as used for "stressed receiver sensitivity".

Implement similar in Table 181-5, Table 182-5, and Table 183-5.

Implement with editorial license.

Cl **180** *SC* **180.7.2** *P* **381** *L* **26** # 404

Ran, Adee Cisco Systems, Inc.

Comment Type **T** *Comment Status* **A** *Rx optical parameter*

The bottom three rows of Table 180-8 are not receiver characteristics - they are conditions for a test for stressed receiver sensitivity, the row above.

Test definitions should appear in the subclause that defines SRS, 180.9.13 . A table footnote can refer to the subclause if necessary.

Also, the paragraph below the table is related to receiver sensitivity, which is the subject of 180.9.12.

Applies similarly in 181.7.2, 182.7.2, and 183.7.2.

SuggestedRemedy

Move the last three rows of Table 180-8 to a separate table in 180.9.13.
Move the following paragraph and Figure 180-4 to 180.9.12.

Apply in other optical PMD clauses.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

It is preferred to keep the rows for the stressed receiver condition in this table for consistently with similar clauses in the base standard.

Regardless, the bottom rows are indeed conditions for SRS and should have been shown as indents, e.g., see Table 122-11.
In the first column, indent stressed receiver condition names.

Cl **180** *SC* **180.7.2** *P* **382** *L* **3** # 405

Ran, Adee Cisco Systems, Inc.

Comment Type **ER** *Comment Status* **A** *(editorial)*

Figure 180-4 does not show the pass and fail regions for receiver sensitivity vs. TECQ.

SuggestedRemedy

Add labels to clarify.
Also in other optical PMD clauses.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **180** *SC* **180.7.3** *P* **382** *L* **42** # 66

Ghiasi, Ali Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *Power budget*

Table 180-9 allocation for penalties covers 200G-DR which has optical return loss tolerance of 15.5 dB only. The assumed 0.1 dB MPI penalty is accurate for 400G-DR2, 800G-DR4, 1.6T-DR8 with return loss tolerance of 21.4 dB

SuggestedRemedy

Add note to 200G-DR1 with allocation for penalties increased to 0.4 dB per table 140-12

Response *Response Status* **C**

REJECT.

Table 140-12 does not show 0.4 dB MPI penalty. If 0.4 dB MPI penalty is needed then a complete revision of the DR1 spec is needed. Therefore the proposed remedy is incomplete.

Cl **180** *SC* **180.8** *P* **384** *L* **14** # 22

Johnson, John Broadcom

Comment Type **TR** *Comment Status* **A** *Chromatic dispersion*

The chromatic dispersion specifications in Table 180-10 for DRn PMDs should be calculated using the same statistical methodology as used for the 800GBASE-FR4, lane L2, CD specifications.

SuggestedRemedy

Use the same CD methodology as 800GBASE-FR4, lane L2, to calculate the optical channel CD limits, with the dispersion values scaled for 500m for DRn. A 3rd order polynomial fitting is used to interpolate the G.652 data at 1304.5 nm and 1317.5 nm.
Positive dispersion(max): 0.65 ps/nm
Negative dispersion(min): -0.85 ps/nm
Add the following text to footnote (b):
"The dispersion specifications are based on the statistical link design methodology documented in ITU-T REC G.652, Appendix I, and the optical channel characteristics methodology described in Annex-TBD."
Further implementation details to be provided in johnson_3dj_01_2409.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement slide 10 of johnson_01_2409.

Cl **180** *SC* **180.8.3.1** *P* **386** *L* **48** # 341

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

Comment Type **T** *Comment Status* **A** *MDI*

Any DR MDI is also capable of supporting any lower lane count DR interfaces than what it is specified for as applicable, as well as combinations. Clause 180.8.3.1.1 starts off specifying 400GBASE-DR2 with twelve total positions. It could support multiple ports of 200GBASE-DR1, or could support a combination of a single 400GBASE-DR2 with two ports of 200GBASE-DR1.

SuggestedRemedy

Add subclause before 180.8.3.1.1 - Optical lane assignments for 200GBASE-DR1.
Copy and modifiy text from 180.8.3.1.1 to reflect 200GBASE-DR1 with editorial license
Add - only a single instance of 200GBASE-DR1 is specified.
To: 180.8.3.1.1 - only a single instance of 400GBASE-D2 is specified.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Create a new informative annex based on slide 15 of issenhuth_02_2409 providing a separate mapping for each connector type with editorial license.

Cl **180** *SC* **180.8.3.1.1** *P* **386** *L* **3** # 100

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *ILT*

Add sentence describing where TX/RX data are coming

SuggestedRemedy

Tx1 and Tx2 data are sourced respectively from SL1 and Sl2. Rx1 and Rx2 data propagate respectively to DL1 and DL2. Also add reference to Figure 180-2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #98

Cl **180** *SC* **180.8.3.1.2** *P* **386** *L* **25** # 101

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *ILT*

Add sentence describing where TX/RX data are coming

SuggestedRemedy

Tx1, Tx2, Tx3, and T4 data are sourced respectively from SL1, SL2, SL3, and Sl4. Rx1, Rx2, Rx3, and Rx4 data propagate respectively to DL1, DL2, DL3, and DL4. Also add reference to Figure 180-2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #98

Cl **180** *SC* **180.8.3.1.3** *P* **386** *L* **44** # 102

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *ILT*

Add sentence describing where TX/RX data are coming

SuggestedRemedy

Tx1 to T8 data are sourced respectively from SL1 to Sl8. Rx1 to Rx8 data propagate respectively to DL1 to DL8. Also add reference to Figure 180-2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #98

Cl **180** *SC* **180.9.1** *P* **389** *L* **4** # 406

Ran, Adee — Cisco Systems, Inc.

Comment Type **T** *Comment Status* **A** *(bucket)*

The title of Table 180-14 is incorrect. These are not the test pattern definitions; these are the test patterns used for measuring each parameter. The "related subclause" column contains references to the parameters, not to the test patterns.

Also in other optical subclauses.

SuggestedRemedy

Change the title of Table 180-14 to "Parameter to test pattern mapping".
Apply in other optical PMD clauses.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

Cl **180** *SC* **180.9.5** *P* **390** *L* **24** # 69

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *(bucket)*

Reference equalizer in 120.8.5.4 is not applicable as it is only 5 tap FFE

SuggestedRemedy

Remove the reference and update the exception sentence:
- The reference equalizer is a T-spaced, 15 taps feed-forward equalizer (FFE) with sum of the equalizer tap coefficients equal to 1, where T is the symbol period,
Reference equalizer tap coefficient constraints as shown in Table 180-15.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

Cl **180** *SC* **180.9.5** *P* **390** *L* **24** # 24

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *Chromatic dispersion*

The TX compliance channel chromatic dispersion specifications for DRn PMDs should be calculated using the same statistical methodology used for 800GBASE-FR4, lane L2, CD specifications, scaled to 500m.

SuggestedRemedy

Clause 180.9.5 currently points to TX compliance channel requirements in clause 121.8.5.1. Create a new sub-clause 180.9.5.1 based on 121.8.5.1, including a new TX compliance channel Table 180-TBD, and replace the reference to 121.8.5.1 with 180.9.5.1.
In new Table 180-TBD, add linear dispersion equations of the form: A(WL - WL0) + B:
Minimum: 0.0463(? - 1311) - 0.55
Maximum: 0.0443(? - 1311) + 0.37
Add new text to footnote (a):
"The dispersion specifications are based on the statistical link design methodology documented in ITU-T REC G.652, Appendix I, and the optical channel characteristics methodology described in Annex-TBD."
Further implementation details to be provided in johnson_3dj_01_2409.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement slide 11 of johnson_01_2409.

Cl **180** *SC* **180.9.5** *P* **390** *L* **29** # 67

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *TDECQ - test setup*

Add sentence to provide further instruction on the TDECQ test setup

SuggestedRemedy

If the PMD under test has optional AUI (C2M) the TDECQ is measured with stress sensitivity signal applied to AUI attached to the PMD under test.

Response *Response Status* **C**

REJECT.

The comment correctly points out that the transmitter measurement needs to include the effects of the complete PHY, not just the PMD or the module.
However, the suggested remedy does not provide sufficient detail to implement.

After CRG discussion there was no consensus to make a change at this time.

Cl **180** *SC* **180.9.5** *P* **391** *L* **12** # 68

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *Tap weights*

Updated FFE tap limit per relaxation and TBD as suggested in the https://www.ieee802.org/3/dj/public/24_07/ghiasi_3dj_02a_2407.pdf

SuggestedRemedy

C(-3)=(-0.15, 0.15)
C(-2)=(-0.2, 0.3)
C(-1)=(-0.6, 0.2) - replace TBD
C(1)=(-0.6, 0.2) - replace TBD
C(2)=(-0.2, 0.3)
C(3, 4, 5, 6)=(-0.15, 0.15)
C(7, 8, 9, 10, 11)=(-0.1, 0.1)
C(0)=(0.8, 2.2)
Given the capability of DSP having tight limit on TDECQ mostly will result in module failure where it doesn't matter

Response *Response Status* **C**

REJECT.

After CRG discussion there was no consensus to make a change at this time.

Cl **180** *SC* **180.9.5** *P* **391** *L* **15** # 202

Welch, Brian Cisco

Comment Type **TR** *Comment Status* **A** *Tap weights*

Table 180-15 is lacking min coefficient limits for the first pre-cursor and post-cursor, currently indicated as TBD.

SuggestedRemedy

Propose replacing each TBD with -0.5, as documented on page 4 of welch_3dj_01_0924.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

A straw poll O-1 was taken:

For (c1) I support tap weight minimum value of
A: -0.5
B: -0.6
C: abstain

A: 9 B: 13 C: 19

In Table 180-15 for c(-1) minimum change "TBD" to "-0.5" and for c(1) minimum change "TBD" to "-0.6".

Implement with editorial license.

Cl **180** *SC* **180.9.11** *P* **392** *L* **32** # 407

Ran, Adee Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *RIN*

The new RIN definition says "the noise is measured before the reference equalizer". This means the optical power is not flat in a region of 2 UI as depicted in Figure 180-11 (the figure shows a well-equalized signal).

If RIN is measured on an unequalized signal, the measurement region should be as short as possible, no more than 0.5 UI, and preferably on a region with minimal slope. The test equipment should be allowed to select the region of measurement that minimizes the measurement error.

Also in other optical clauses.

SuggestedRemedy

Change the definitions of N0 and N3 to be measured on a region of no more than 0.5 UI in a specific place in the pattern that is selected to minimize the measurement error.

Remove the labeling of N0 and N3 from Figure 180-11, because they are misleading, this figure shows equalized signals.

Apply in other optical PMD clauses.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG idenitified that the current figure is not helpful and a specific new figure addressing RIN may help. A contribution is encouraged.

In D1.2 change Figure 180-11 to the Figure 180-11 and figure title from D1.0.

In 180.9.11 add a new 2nd paragraph "N0 and N3 are to be measured on a region in a place in the pattern that is selected to minimize the measurement error".

Implement in clauses 180, 181, 182 and 183 with editorial license.

Cl **180** *SC* **180.9.11** *P* **392** *L* **37** # 408

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *RIN*

Equation 180-1 sums N0 and N3 and then squares them and divides by 4 - this seems inadequate. RIN should be a power ratio, so two measured noise levels should be power-averaged, not linearly averaged and then squared.

Also in other optical clauses.

SuggestedRemedy

Change the denominator from (N0+N3)^2/4 to (N3^2+N0^2)/2.

Apply in other optical PMD clauses.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

During CRG discussion it was noted that equation 180-1 is incorrect. In the equation remove "/4".

In the first "where" of equation 180-1 change "measured with xx dB "optical reflection" to "measured with xx dB optical return loss".

Add an editorial note stating "The change in the equation between D1.1 and D1.2 may require revision of this RIN OMA value. The revised equation is consistent with commericial test methodologies and the RIN OMA defintion in clause 52.9.6.3. Contributions in this area are encouraged."

Apply in clauses 180, 181, 182 and 183 with editorial license.

Cl **180** *SC* **180.9.11** *P* **392** *L* **45** # 409

Ran, Adee
Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **A** *RIN*

"N3 = Optical noise power of the 3 level" is a poor definition. The optical power is the signal. "Noise" is not defined anywhere except for the graphics in Figure 180-11.

Also in other optical clauses.

SuggestedRemedy

Define N0 and N3 as the RMS deviation from the mean of the optical power in the 0 and 3 levels respectively.

Apply in other optical PMD clauses.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

For N3 change "is the optical noise power"
to
"is the RMS deviation from the mean of the optical power at the P3 level".

For N0 change "is the optical noise power"
to
"is the RMS deviation from the mean of the optical power at the P0 level".

Make changes in clauses 180, 181, 182, and 183.
Implement with editorial license.

Cl **180** *SC* **180.9.13** *P* **393** *L* **8** # 562

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **R** *Jitter*

The LF jitter slope for 113.4375 GBd and the LF jitter slope for 106.25 GBd are both based on 4 MHz, 0.05 UI pk-pk but the UI differ, so there is a buffering requirement that is finite at 4 MHz but unbounded at low jitter frequencies (which themselves are unbounded). One of the slopes must be adjusted to match the other must match in absolute time units (not UI) at low frequencies so that there is not an unbounded buffering requirement. The proposed remedy is very simple. (Another remedy would be to modify the shape of the non-FECi jitter tolerance slope at the lowest frequencies).

SuggestedRemedy

For the FECi PMDs (182.9.13 and 183.9.13), instead of referring to 121.8.10.4 (Table 121-12, Applied sinusoidal jitter, which is based on 2e5/f, 0.05 UI), use 2.13e5/f, 0.053 UI. Or, here and in the other non-FECi PMD and PMA clauses, use 1.875e5/f, 0.047 UI. Either way, the jitter corner remains at 4 MHz.

Response *Response Status* **C**

REJECT.

This is a repeat of D1.0 comment #520 which was reject, "The justification provided by the comment is not sufficient to make the proposed changes. A detailed presentation providing better justification is encouraged."
No new information or detailed presentation providing better justification has been provided. Insufficient justification provided why the proposed remedy is an improvement to the specification.

Cl **181** *SC* **181.1** *P* **398** *L* **19** # 290

de Koos, Andras Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Consider adding Clause 90 as 'Optional' to the 'Physical Layer Clauses Associated with the XXX PMD tables.

SuggestedRemedy

Add the following row
90-Time Synchronization Optional
to Table 181-1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **181** *SC* **181.1** *P* **399** *L* **16** # 81

Ghiasi, Ali Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *(withdrawn)*

ILT is not shown in the digram

SuggestedRemedy

Suggest to add ILT below PMD

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **181** *SC* **181.1** *P* **399** *L* **27** # 73

Ghiasi, Ali Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *(withdrawn)*

Need shod ILT in the figure

SuggestedRemedy

Add a box below the PMDB to show ILT

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **181** *SC* **181.5.1** *P* **401** *L* **22** # 103

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *ILT*

Figure is missing PMD transmit function and PMD receive function

SuggestedRemedy

Add PMD transmit function between PMA and optical transmitter and PMD receive fucntion between optical receiver and receive PMA.
Also add following lable between PMD transmit function and optical transmit "Sli"
Also add following lable between optical receive and PMD receive function "DLi"
PMD Signal_OK shold be connected to the PMD receive function.
Alternatively you could combine PMD TX function with optical TX and optical RX with PMD RX function.
In Figure 181-2 L0-L3 (left) at PMA input can be replaced with SL1-SL3 and L0-L3 (Right) with DL0-DL3.
Use lable L0-L3 or Symbol (Lamda0-Lamda3) at input and ouptut of the Mux/De-mux. If you change L0 to Lamda0 then also need to change lable in tbale 181-3

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #98

Cl **181** *SC* **181.6** *P* **403** *L* **40** # 104

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *(bucket)*

Section 181.6 would fit better earlier

SuggestedRemedy

Consider moving 181.6 to 181.5.2 and increase index for current 181.5.2 by +1

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **181** *SC* **181.6** *P* **403** *L* **40** # 105

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *ILT*

Add sentence describing where L0-L3 data are coming

SuggestedRemedy

L0 to L3 into the Mux data are sourced respectively from SL1 and Sl2. L0 to L3 de-mux output data propagate respectively to DL1 to DL3. Also add reference to Figure 181-2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #98

Cl **181** *SC* **181.8** *P* **410** *L* **12** # 28

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *Chromatic dispersion*

The chromatic dispersion specifications in Table 181-8 for 800GBASE-FR4-500 should be calculated using the same statistical methodology used for 800GBASE-FR4 CD specifications, scaled for 500m.

SuggestedRemedy

Use the same CD methodology as 800GBASE-FR4 to calculate the optical channel CD limits, with the dispersion values scaled for 500m for FR4-500.
Positive dispersion(max): 1.50 ps/nm
Negative dispersion(min): -2.82 ps/nm
Add the following text to footnote (b):
"The dispersion specifications are based on the statistical link design methodology documented in ITU-T REC G.652, Appendix I, and the optical channel characteristics methodology described in Annex-TBD."
Further implementation details to be provided in johnson_3dj_01_2409.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement slide 13 of johnson_01_2409.

Cl **181** *SC* **181.8.2.1** *P* **411** *L* **3** # 39

Parsons, Earl — CommScope

Comment Type **T** *Comment Status* **A** *Channel insertion loss*

The total channel insertion loss for 800GBASE-FR4-500 is 3.5 dB. Of that, 0.25 dB needs to be allocated for cable attenuation (500 m at 0.5 dB/km) and 3 dB is allocated for connection and splice loss. This leaves 0.25 dB unallocated. The simplest way to allocate this is to increase the allowed connection and splice loss to 3.25 dB.

SuggestedRemedy

Change "The maximum link distance for 800GBASE-FR4-500 is based on an allocation of 3 dB total connection and
splice loss." to "The maximum link distance for 800GBASE-FR4-500 is based on an allocation of 3.25 dB total connection and
splice loss."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy with editorial license

Cl **181** *SC* **181.9.5** *P* **413** *L* **36** # 203

Welch, Brian — Cisco

Comment Type **TR** *Comment Status* **A** *Tap weights*

Table 181-15 is lacking min coefficient limits for the first pre-cursor and post-cursor, currently indicated as TBD.

SuggestedRemedy

Propose replacing each TBD with -0.5, as documented on page 4 of welch_3dj_01_0924.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #202.

Cl **181** *SC* **181.9.5** *P* **414** *L* **4** # 80

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *TDECQ*

Reference equalizer in 120.8.5.4 is not applicable as it is only 5 tap FFE

SuggestedRemedy

Remove the reference and update the exception sentence:
- The reference equalizer is a T-spaced, 15 taps feed-forward equalizer (FFE) with sum of the equalizer tap coefficients equal to 1, where T is the symbol period,
Reference equalizer tap coefficient constraints as shown in Table 181-15.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy with editorial license to ensure all references are updated in clauses 180, 181, 182, and 183.

Cl **181** *SC* **181.9.5** *P* **414** *L* **6** # 78

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *TDECQ - test setup*

Add sentence to provide further instruction on the TDECQ test setup

SuggestedRemedy

If the PMD under test has optional AUI (C2M) the TDECQ is measured with stress sensitivity signal applied to AUI attached to the PMDB under test.

Response *Response Status* **C**

REJECT.

Resolve using the response to comment #67 .

Cl **181** *SC* **181.9.5** *P* **414** *L* **31** # 84

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *TDECQ*

Reference equalizer in 120.8.5.4 is not applicable as it is only 5 tap FFE

SuggestedRemedy

Remove the reference and update the exception sentence:
- The reference equalizer is a T-spaced, 15 taps feed-forward equalizer (FFE) with sum of the equalizer tap coefficients equal to 1, where T is the symbol period,
Reference equalizer tap coefficient constraints as shown in Table 182-15.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #80.

Cl **181** *SC* **181.9.5** *P* **414** *L* **34** # 79

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *Tap weights*

Updated FFE tap limit per relaxation and TBD as suggested in the https://www.ieee802.org/3/dj/public/24_07/ghiasi_3dj_02a_2407.pdf

SuggestedRemedy

C(-3)=(-0.15, 0.15)
C(-2)=(-0.2, 0.3)
C(-1)=(-0.6, 0.2) - replace TBD
C(1)=(-0.6, 0.2) - replace TBD
C(2)=(-0.2, 0.3)
C(3, 4, 5, 6)=(-0.15, 0.15)
C(7, 8, 9, 10, 11)=(-0.1, 0.1)
C(0)=(0.8, 2.2)
Given the capability of DSP having tight limit on TDECQ mostly will result in module failure where it doesn't matter

Response *Response Status* **C**

REJECT.

After CRG discussion there was no consensus to make a change at this time.

Cl **181** *SC* **181.9.5.1** *P* **415** *L* **10** # 29

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *Chromatic dispersion*

The TX compliance channel chromatic dispersion specifications for 400GBASE-FR4-500 in Table 181-14 should be calculated using the same statistical methodology used for 800GBASE-FR4 CD specifications, scaled to 500m.

SuggestedRemedy

Use the same CD methodology as 800GBASE-FR4 to calculate the TX compliance channel CD limits, with the values scaled for 500m for FR4-500, in Table 181-14. The linear equations are per-channel and are of the form, A(WL - WL0) + B, as documented in johnson_3dj_01_2409.
Add a new text to footnote (a):
"The dispersion specifications are based on the statistical link design methodology documented in ITU-T REC G.652, Appendix I, and the optical channel characteristics methodology described in Annex-TBD."
Further implementation details to be provided in johnson_3dj_01_2409.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement slide 14 of johnson_01_2409.

Cl **181** *SC* **181.9.11** *P* **416** *L* **32** # 263

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *(bucket)*

The RINxxOMA measurement definition in 181.9.11 unnecessarily duplicates the definition in 180.9.11.

SuggestedRemedy

Shorten 181.9.11 with reference to 180.9.11 as follows:

RINxxOMA, with "xx" referring to the value for optical return loss tolerance in Table 181-5, shall be within the limit given in Table 181-5 when measured using the test pattern and sampling range specified for OMAouter measurement in 181.9.4, but with applied xx dB optical reflection and the reference receiver specified for TDECQ measurement in 181.9.5. RINxxOMA is measured using the methods specified in 180.9.11.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

Cl **182** *SC* **182.1** *P* **420** *L* **20** # 291

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Consider adding Clause 90 as 'Optional' to the 'Physical Layer Clauses Associated with the XXX PMD tables.

SuggestedRemedy

Add the following row
90-Time Synchronization Optional
to Tables 182-1, 182-2, 182-3, 182-4

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **182** *SC* **182.1** *P* **420** *L* **31** # 344

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

Comment Type **T** *Comment Status* **R** *(bucket)*

Note C for Table 182-1 reads
One or two 200GAUI-n may be instantiated within a 200GBASE-DR1-2 PHY as described in 176B.4.1.
However, the lane rate below the inner FEC is at a different BAUD rate than what a 200G AUI lane is specified for (106.25 vs 113.4375), therefore an AUI can only exist in a PHY above the inner FEC sublayer

SuggestedRemedy

Modify Note C
One or two 200GAUI-n may be instantiated within a 200GBASE-DR1-2 PHY above the Inner FEC sublayer as described in 176B.4.1.

Response *Response Status* **C**

REJECT.
The note does not imply in any way that the AUI signaling rates are the same as the PMD signaling rates. The note points to 176B.4.1 which clearly describes where the AUIs may reside. The suggested changes are not an improvement to the draft.

Cl **182** *SC* **182.1** *P* **421** *L* **15** # 345

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

Comment Type **T** *Comment Status* **R** *(bucket)*

Note C for Table 182-2 reads
One or two 400GAUI-n may be instantiated within a 400GBASE-DR2-2 PHY as described in 176B.5.1.
However, the lane rate below the inner FEC is at a different BAUD rate than what a 200G AUI lane is specified for (106.25 vs 113.4375), therefore an AUI can only exist in a PHY above the inner FEC sublayer

SuggestedRemedy

Modify Note C
One or two 400GAUI-n may be instantiated within a 400GBASE-DR2-2 PHY above the Inner FEC sublayer as described in 176B.5.1.

Response *Response Status* **C**

REJECT.
Resolve using the response to comment #344.

Cl **182** *SC* **182.1** *P* **422** *L* **16** # 346

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

Comment Type **T** *Comment Status* **R** *(bucket)*

Note C for Table 182-3 reads
One or two 800GAUI-n may be instantiated within a 800GBASE-DR4-2 PHY as described in 176B.6.1.
However, the lane rate below the inner FEC is at a different BAUD rate than what a 200G AUI lane is specified for (106.25 vs 113.4375), therefore an AUI can only exist in a PHY above the inner FEC sublayer

SuggestedRemedy

Modify Note C
One or two 800GAUI-n may be instantiated within a 800GBASE-DR4-2 PHY above the Inner FEC sublayer as described in 176B.6.1.

Response *Response Status* **C**

REJECT.
Resolve using the response to comment #344.

Cl **182** *SC* **182.1** *P* **423** *L* **44** # 347

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

Comment Type **T** *Comment Status* **R** *(bucket)*

Note b for Table 182-4 reads
If one or two 1.6TAUI-n is implemented in a PHY, additional 1.6TBASE-R SM-PMA sublayers
are required according to the guidelines in 176B.7.1.
However, the lane rate below the inner FEC is at a different BAUD rate than what a 200G AUI lane is specified for (106.25 vs 113.4375), therefore an AUI can only exist in a PHY above the inner FEC sublayer

SuggestedRemedy

Modify Note C
One or two 1.6TAUI-n may be instantiated within a 1.6TBASE-DR8-2 PHY above the Inner FEC sublayer as described in 176B.7.1.

Response *Response Status* **C**

REJECT.
Resolve using the response to comment #344.

Cl **182** *SC* **182.1** *P* **424** *L* **16** # 85

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *(withdrawn)*

ILT is not shown in the digram

SuggestedRemedy

Suggest to add ILT below PMD

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **182** *SC* **182.1** *P* **424** *L* **27** # 74

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *(withdrawn)*

Need shod ILT in the figure

SuggestedRemedy

Add a box below the PMDB to show ILT

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **182** *SC* **182.2** *P* **424** *L* **39** # 316

Mi, Guangcan — Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **A** *error ratio*

What does the 4e-5 of BERadded corresponds to is unclear.

SuggestedRemedy

In 174A.6, the BERadded was said to represent random BER of other part of the link. In the case of optical PMDs, the most relevant is assumed to be AUI. Is this 4e-5 representing two two-part AUI link at the transmit and receive end of the link? Needs to first confirm the origin of this value, then add appropriate text to this section.
Further, should this value be different for FECo and FECi types of PMD?
this comment also applies to CL 180.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #324.

Cl **182** *SC* **182.5.1** *P* **427** *L* **10** # 106

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *ILT*

Figure is missing PMD transmit function and PMD receive function

SuggestedRemedy

Add PMD transmit function between PMA and optical transmitter and PMD receive fucntion between optical receiver and receive PMA.
Also add following lable between PMD transmit function and optical transmit "Sli"
Also add following lable between optical receive and PMD receive function "DLi"
PMD Signal_OK shold be connected to the PMD receive function.
Alternatively you could combine PMD TX function with optical TX and optical RX with PMD RX function.
In Figure 182-2 L0-L3 (left) at PMA input can be replaced with SL1-SL3 and L0-L3 (Right) with DL0-DL3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #98

Cl **182** *SC* **182.6** *P* **429** *L* **31** # 107

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *(bucket1p)*

Section 182.6 would fit better earlier

SuggestedRemedy

Consider moving 182.6 to 182.5.2 and increase index for current 182.5.2 by +1

Response *Response Status* **C**

REJECT.

After CRG discussion there was no consensus to make a change at this time.

[Editor's note: CC: 180, 181, 182, 183]

Cl **182** *SC* **182.7** *P* **429** *L* **42** # 267

Johnson, John Broadcom

Comment Type **TR** *Comment Status* **A** *Chromatic dispersion*

G.652.B fiber was not included in the statistical analysis of chromatic dispersion conducted by ITU-T Q5. Since the 3dj optical channel CD specs now reference this methodology, all references to G.652.B fibers should be removed.

SuggestedRemedy

Remove the references to "G.652.B" in 182.7 and in 182.8.1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #266

Cl **182** *SC* **182.7.1** *P* **430** *L* **4** # 320

Mi, Guangcan Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **R** *Tx optical parameter*

The new data provided in yu_3dj_01b_2407 showed more than 1.5dB gain in receiver sensitivity of FECi compared to FECo. The current spec of DRn-2 is not sufficiently leveraging such benefit. Unecessary raising the receiver sensitivity hence the Transmitter output power is waste of total optical module power as discussed in mi_3dj_01b_2311

SuggestedRemedy

change the receiver sensitivity of DRn-2 to -4.7 and -5.6+TECQ,
change the average receive power,min to -6.8

Response *Response Status* **C**

REJECT.

The comment does not provide sufficient justification to support the suggested remedy at this time.

Since data reliability is defined post FEC, reexamination of receiver sensitivity and stressed received sensitivity for all 200Gb IMDD PHYs is anticipated.

No consensus to make a change at this time.

Cl **182** *SC* **182.7.1** *P* **430** *L* **21** # 321

Mi, Guangcan Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **R** *Tx optical parameter*

The new data provided in yu_3dj_01b_2407 showed more than 1.5dB gain in receiver sensitivity of FECi compared to FECo. The current spec of DRn-2 is not sufficiently leveraging such benefit. Unecessary raising the receiver sensitivity hence the Transmitter output power is waste of total optical module power 3dj_01b_2311

SuggestedRemedy

change the OMAout min to -0.3 and -1.2 + max(TECQ, TDECQ)
change the Average launch power min, to -3.3

Response *Response Status* **C**

REJECT.

The comment does not provide sufficient justification to support the suggested remedy at this time.

Since data reliability is defined post FEC, reexamination of receiver sensitivity and stressed received sensitivity for all 200Gb IMDD PHYs is anticipated.

No consensus to make a change at this time.

Cl **182** *SC* **182.7.1** *P* **430** *L* **33** # 314

Mi, Guangcan Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **A** *error ratio*

With the link reliability requirement changed from BER to Block Error Ratio and/or FEC codeword error ratio, the methodlogy of defining receiver sensitivity and stressed receiver sensitivity becomes unclear. Need annex or new discriptive text.

SuggestedRemedy

This comment applies to all 200G/L optical IMDD PMDs. Supporting contribution will be submitted.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #318.

Cl **182** *SC* **182.7.1** *P* **430** *L* **44** # 86

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *Tx optical parameter*

TDECQ, TECQ are TBDs

SuggestedRemedy

TDECQ=3.4, TECQ=3.4
ABS(TDECQ-TECQ)=2.5

Response *Response Status* **C**

REJECT.

No supporting data has been provided to justify the proposed values. There was no consensus to make a change at this time.

Cl **182** *SC* **182.7.2** *P* **430** *L* **43** # 167

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **R** *TDECQ*

The value of TDECQ is TBD. Other specifications are related to this.

SuggestedRemedy

ChangeTDECQ(max) TBD to 3.4dB to match DR spec. Also Change TECQ(max) to 3.4dB, TDECQ-TECQ to 2.5dB, Stessed eye closure in table 182-8 to 3.4dB and stressed receiver sensitivity to -1.5dBm. In table 182-9 change the allocation for penalties to 3.8dB and the Power budget (for max TDECQ) to 7.8dB. Note that the proposed value of 3.4dB is matching the value where the curves stop in figures 182-3 and 182-4. If a different value is chosen these figures would need to be modified.

Response *Response Status* **C**

REJECT.

After CRG discussion there was no consensus to make a change at this time.

See response to comment #86.

Cl **182** *SC* **182.7.2** *P* **430** *L* **50** # 168

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **A** *Tx optical parameter*

The transmitter power excursion max is TBD

SuggestedRemedy

Change the TBD to 2dBm which matches the 100GBASE-FR which has the same max average power.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy with editorial license.

Cl **182** *SC* **182.7.2** *P* **432** *L* **16** # 262

Yu, Rang-chen — InnoLight

Comment Type **T** *Comment Status* **A** *Rx optical parameter*

Due to the Average launch power, each lane (min) of transmitter was changed from -2.1dBm to -2.6dBm in D1.1, then the Average receive power, each lane (min) in table 182-8 should be changed accordingly.

SuggestedRemedy

Change the Average receive power, each lane (min) of receiver from -6.1dBm to -6.6dBm.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy with editorial license

Cl **182** *SC* **182.7.2** *P* **432** *L* **29** # 169

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **R** *Rx optical parameter*

The OMA outer of each aggressor lane should match the Max OMA of the aggressor lanes. There is no requirement to have the OMA of all the Tx lanes within a given limit and therefore the value of Max OMA of the aggressor lanes should match the MaxOMA of the Tx.

SuggestedRemedy

Change the OMA outer of each aggresor lane from TBD to 4.2dB

Response *Response Status* **C**

REJECT.

The proposed value is incorrect for DR-2/4/8 and would only apply to multiple DR1s in a single module.

Cl **182** *SC* **182.8** *P* **435** *L* **14** # 23

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *Chromatic dispersion*

The chromatic dispersion specifications in Table 182-10 for DRn-2 PMDs should be calculated using the same statistical methodology used for 800GBASE-FR4, lane L2, CD specifications.

SuggestedRemedy

Use the same CD methodology as 800GBASE-FR4, lane L2, to calculate the optical channel CD limits. A 3rd order polynomial fitting is used to interpolate the G.652 data at 1304.5 nm and 1317.5 nm.
Positive dispersion(max): 2.62 ps/nm
Negative dispersion(min): -3.41 ps/nm
Add the following text to footnote (b):
"The dispersion specifications are based on the statistical link design methodology documented in ITU-T REC G.652, Appendix I, and the optical channel characteristics methodology described in Annex-TBD."
Further implementation details to be provided in johnson_3dj_01_2409.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement slide 10 of johnson_01_2409

Cl **182** *SC* **182.8.3.1.1** *P* **437** *L* **4** # 108

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **T** *Comment Status* **A** *ILT*

Add sentence describing where TX/RX data are coming

SuggestedRemedy

Tx1 and Tx2 data are sourced respectively from SL1 and Sl2. Rx1 and Rx2 data propagate respectively to DL1 and DL2. Also add reference to Figure 182-2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #98.

Cl **182** *SC* **182.8.3.1.1** *P* **437** *L* **49** # 342

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

Comment Type **T** *Comment Status* **A** *MDI*

Any DRx-2 MDI is also capable of supporting any lower lane count DRx-2 interfaces than what it is specified for as applicable, as well as combinations. Clause 182.8.3.1.1 starts off specifying 400GBASE-DR2-2 with twelve total positions. It could support multiple ports of 200GBASE-DR1-2, or could support a combination of a single 400GBASE-DR2-2 with two ports of 200GBASE-DR1-2.

SuggestedRemedy

Add subclause before 182.8.3.1.1 - Optical lane assignments for 200GBASE-DR1-2.
Copy and modifiy text from 182.8.3.1.1 to reflect 200GBASE-DR1-2 with editorial license
Add - only a single instance of 200GBASE-DR1-2 is specified.
To: 182.8.3.1.1 - only a single instance of 400GBASE-D2-2 is specified.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #341.

Cl **182** *SC* **182.8.3.1.2** *P* **437** *L* **25** # 109

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *ILT*

Add sentence describing where TX/RX data are coming

SuggestedRemedy

Tx1, Tx2, Tx3, and T4 data are sourced respectively from SL1, SL2, SL3, and Sl4. Rx1, Rx2, Rx3, and Rx4 data propagate respectively to DL1, DL2, DL3, and DL4. Also add reference to Figure 182-2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #98.

Cl **182** *SC* **182.8.3.1.3** *P* **437** *L* **44** # 110

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *ILT*

Add sentence describing where TX/RX data are coming

SuggestedRemedy

Tx1 to T8 data are sourced respectively from SL1 to Sl8. Rx1 to Rx8 data propagate respectively to DL1 to DL8. Also add reference to Figure 182-2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #98.

Cl **182** *SC* **182.9.5** *P* **441** *L* **31** # 26

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *(bucket)*

Clause 182.9.5 still points to TX compliance channel specification in 121.8.5.1, not local sub-clause 182.9.5.1.

SuggestedRemedy

Change reference to 121.8.5.1 to 182.9.5.1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy with editorial license.

Cl **182** *SC* **182.9.5** *P* **441** *L* **35** # 82

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *TDECQ - test setup*

Add sentence to provide further instruction on the TDECQ test setup

SuggestedRemedy

If the PMD under test has optional AUI (C2M) the TDECQ is measured with stress sensitivity signal applied to AUI attached to the PMDB under test.

Response *Response Status* **C**

REJECT.

Resolve using the response to comment #67.

Cl **182** *SC* **182.9.5** *P* **441** *L* **39** # 313

Mi, Guangcan — Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **A** *TDECQ*

As discussed in Mi_3dj_01b_2407, setting different taregt PAM4 SER for PMD types using the same inner FEC can be confusing for future readers, and has no technical ground.

SuggestedRemedy

Suggest to align the target PAM4 SER of DRn-2 and 800GBASE-FR4 PMDs to that of 800GBASE-LR1, i.e. change to 9.6e-3.
A supporing contribution will be submitted.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Straw poll O-2.

I support changing the target PAM4 SER for 200GBASE-DR1-2, 400GBASE-DR2-2, 800GBASE-DR4-2, 1.6TBASE-DR8-2 and 800GBASE-FR4 from 4.0e-3 to 9.6e-3.

A: Yes
B: No
C: Abstain

A - 14 B - 9 C - 12

In 182.9.5 change the target PAM4 symbol error ratio from 4.0e-3 to 9.6e-3.

With editorial license.

Cl **182** *SC* **182.9.5** *P* **442** *L* **5** # 83

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *Tap weights*

Updated FFE tap limit per relaxation and TBD as suggested in the https://www.ieee802.org/3/dj/public/24_07/ghiasi_3dj_02a_2407.pdf

SuggestedRemedy

C(-3)=(-0.15, 0.15)
C(-2)=(-0.2, 0.3)
C(-1)=(-0.6, 0.2) - replace TBD
C(1)=(-0.6, 0.2) - replace TBD
C(2)=(-0.2, 0.3)
C(3, 4, 5, 6)=(-0.15, 0.15)
C(7, 8, 9, 10, 11)=(-0.1, 0.1)
C(0)=(0.8, 2.2)
Given the capability of DSP having tight limit on TDECQ mostly will result in module failure where it doesn't matter

Response *Response Status* **C**

REJECT.

After CRG discussion there was no consensus to make a change at this time.

Cl **182** *SC* **182.9.5** *P* **442** *L* **6** # 204

Welch, Brian — Cisco

Comment Type **TR** *Comment Status* **A** *Tap weights*

Table 182-15 is lacking values for coefficient limts (count and weight)

SuggestedRemedy

Propose updating the TBDs with the values to match those of tables 108-15 and 181-15, and as indicated on page 4 of welch_3dj_01_0924.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Update table 182-15 from slide 4 of welch_01_2409 with the exception of c(1) minimum with value of -0.6.

With editorial license.

Cl **182** *SC* **182.9.5.1** *P* **442** *L* **33** # 25

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *Tx compliance*

The TX compliance channel chromatic dispersion specifications for DRn-2 PMDs should be calculated using the same statistical methodology used for 800GBASE-FR4, lane L2, CD specifications.

SuggestedRemedy

In Table 182-16, add linear dispersion equations of the form: A(WL - WL0) + B:
Minimum: 0.1850(? - 1311) - 2.22
Maximum: 0.1770(? - 1311) + 1.47
Add new text to footnote (a):
"The dispersion specifications are based on the statistical link design methodology documented in ITU-T REC G.652, Appendix I, and the optical channel characteristics methodology described in Annex-TBD."
Further implementation details to be provided in johnson_3dj_01_2409.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement slide 11 of johnson_01_2409.

Cl **182** *SC* **182.9.5.1** *P* **442** *L* **33** # 27

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *Tx compliance*

The ORL value of 21.4dB given in Table 182-16 is incorrect for 200GBASE-DR1. An exception to use the ORL values in Table 182-7 is included in 182.9.5, but is easily missed when looking at Table 182-16.

SuggestedRemedy

Modify Table 181-16 to explicitly reference the correct ORL for each PMD type.
Option 1: Split the table to put 200GBASE-DR1 ORL on a separate line, with a value of 17.1dB.
Option 2: Populate the ORL line for all PMD types with "see Table 182-7".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement slide 11 of johnson_01_2409.

Cl **182** *SC* **182.9.11** *P* **444** *L* **1** # 264

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *(bucket)*

The RINxxOMA measurement definition in 182.9.11 unnecessarily duplicates the definition in 180.9.11.

SuggestedRemedy

Shorten 182.9.11 with reference to 180.9.11 as follows:

RINxxOMA, with "xx" referring to the value for optical return loss tolerance in Table 182-7, shall be within the limit given in Table 182-7 when measured using the test pattern and sampling range specified for OMAouter measurement in 182.9.4, but with applied xx dB optical reflection and the reference receiver specified for TDECQ measurement in 182.9.5. RINxxOMA is measured using the methods specified in 180.9.11.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

Cl **182** *SC* **182.9.12** *P* **444** *L* **24** # 317

Mi, Guangcan — Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **A** *Test pattern*

The data reliability requirement has been changed from BER to Block Error Ratio and/or FEC codeword error ratio, the two metric using different test patterns. The methodlogy of defining receiver sensitivity and stressed receiver sensitivity becomes unclear throughout the text.

Test pattern of (stressed) receiver sensitivity uses 3 and 5. For 3, PRBS31Q, the receiver spec table, data reliability and receiver sensitivity are linked. But how to implement the new error ratio metric into evaluation of optical PMD remains question.

For 5 scrambled idle test pattern, no data reliability in terms of FEC codeword error ratio was mentioned in 182.2, or in the receiver spec table or in the receiver sensitivity test discription.

SuggestedRemedy

either
remove 5 from the test pattern of (stressed) receiver sensitivity
or
add discription on data realiability requirement to 182.2 and discription on how to define receiver sensitivity in this sub clause.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

174A.6 defines the block error ratio to be measured at the PMA and thus includes processing by the Inner FEC and PMD between. It also specifies that measured block errors at the PCS (e.g., using scrambled idle) is also valid. Therefore pattern 5 is an appropriate pattern to use.

In Table 182-13,
change the description of pattern 5 to:
"Scrambled idle test pattern encoded by the Inner FEC used by 200GBASE-R, 400GBASE-R, 800GBASE-R, or 1.6TBASE-R" with editorial license to ensure consistency throughout the draft.

Cl **183** *SC* **183.1** *P* **450** *L* **18** # 292

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Consider adding Clause 90 as 'Optional' to the 'Physical Layer Clauses Associated with the XXX PMD tables.

SuggestedRemedy

Add the following row
90-Time Synchronization Optional
to Table 183-1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **183** *SC* **183.1** *P* **450** *L* **31** # 348

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

Comment Type **T** *Comment Status* **A** *(bucket)*

Note C for Table 183-1 reads
One or two 800GAUI-n may be instantiated within a 800GBASE-FR4-500 PHY as described in 176B.6.1.
However, the lane rate below the inner FEC is at a different BAUD rate than what a 200G AUI lane is specified for (106.25 vs 113.4375), therefore an AUI can only exist in a PHY above the inner FEC sublayer
Additionally, Note C does not address the 800GBASE-LR4 PHY.

SuggestedRemedy

Modify Note C
One or two 800GAUI-n may be instantiated within a 800GBASE-FR4-500 PHY or 800GBASE-LR4 PHY above the Inner FEC sublayer as described in 176B.6.1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The note does not imply in any way that the AUI signaling rates are the same as the PMD signaling rates. The note points to 176B.6.1 which clearly describes where the AUIs may reside. The suggested change in this regard is not an improvement to the draft.
However, the PHY types in the footnote should be corrected...
Change "800GBASE-FR4-500 PHY" to "800GBASE-FR4 PHY or 800GBASE-LR4 PHY"

Cl **183** *SC* **183.1** *P* **451** *L* **16** # 87

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *(withdrawn)*

ILT is not shown in the digram

SuggestedRemedy

Suggest to add ILT below PMD

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **183** *SC* **183.1** *P* **451** *L* **27** # 75

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *(withdrawn)*

Need shod ILT in the figure

SuggestedRemedy

Add a box below the PMDB to show ILT

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **183** *SC* **183.5.1** *P* **453** *L* **15** # 111

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *ILT*

Figure is missing PMD transmit function and PMD receive function

SuggestedRemedy

Add PMD transmit function between PMA and optical transmitter and PMD receive fucntion between optical receiver and receive PMA.
Also add following lable between PMD transmit function and optical transmit "Sli"
Also add following lable between optical receive and PMD receive function "DLi"
PMD Signal_OK shold be connected to the PMD receive function.
Alternatively you could combine PMD TX function with optical TX and optical RX with PMD RX function.
In Figure 183-2 L0-L3 (left) at PMA input can be replaced with SL1-SL3 and L0-L3 (Right) with DL0-DL3.
Use lable L0-L3 or Symbol (Lamda0-Lamda3) at input and ouptut of the Mux/De-mux. If you change L0 to Lamda0 then also need to change lable in tbale 183-3

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #98 .

Cl **183** *SC* **183.6** *P* **455** *L* **40** # 112

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *(bucket)*

Section 183.6 would fit better earlier

SuggestedRemedy

Consider moving 183.6 to 183.5.2 and increase index for current 183.5.2 by +1

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **183** *SC* **183.6** *P* **455** *L* **40** # 113

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *ILT*

Add sentence describing where L0-L3 data are coming

SuggestedRemedy

L0 to L3 into the Mux data are sourced respectively from SL1 and Sl2. L0 to L3 de-mux output data propagate respectively to DL1 to DL3. Also add reference to Figure 183-2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #98

Cl **183** *SC* **183.7.1** *P* **457** *L* **28** # 90

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *TDECQ*

max TDECQ for FR4 is TBD

SuggestedRemedy

Replace with 3.9 dB

Response *Response Status* **C**

REJECT.

Resolve using the response to comment #170.

Cl **183** *SC* **183.7.1** *P* **457** *L* **34** # 170

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **R** *TDECQ*

The value of TDECQ for FR4 is TBD. Other specifications are related to this.

SuggestedRemedy

ChangeTDECQ(max) TBD to 3.4dB. Also Change TECQ(max) to 3.4dB, and the inequality in the conditions on page 457 line 29 from TBD to 3.4dB. TDECQ-TECQ to 2.5dB, Stessed eye closure in table 183-7 to 3.4dB and stressed receiver sensitivity to -1.2dBm. In table 183-8 change the allocation for penalties to 3.8dB and the Power budget (for max TDECQ) to 7.8dB. Delete the editor's notes on page 458 line 35 and page 460 line 26

Response *Response Status* **C**

REJECT.

After CRG discussion there was no consensus to make a change at this time.

See response to comments #86 and 167.

Cl **183** *SC* **183.7.1** *P* **457** *L* **40** # 88

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *TDECQ*

TDECQ, TECQ are TBDs for FR4

SuggestedRemedy

FR4 having the same positive CD as LR4 that will drive the TDECQ and TECQ, see https://www.ieee802.org/3/dj/public/24_07/johnson_3dj_01a_2407.pdf
Given FR4 positive CD is about the same as LR4 positive CD penalty then TDECQ for FR4 can be the same as LR4
TDECQ=3.9, TECQ=3.2
ABS(TDECQ-TECQ)=2.5

Response *Response Status* **C**

REJECT.

Resolve using the response to comment #170 .

Cl **183** *SC* **183.7.1** *P* **457** *L* **41** # 172

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **A** *TX optical parameter*

The transmitter power excursion max is TBD for FR4

SuggestedRemedy

Change the TBD to 2.8dBm which matches the 100GBASE-LR which has a similar max average power. (4.9dBM versus 4.8dBm for FR4)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change the TBD to 2.9dBm.

Cl **183** *SC* **183.7.1** *P* **457** *L* **45** # 171

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **A** *TX optical parameter*

There is a TBD for the maximum power of the off transmitter each lane for FR4. This should match the minimum value of the signal detect level in table 183-2 which is -16dBm.

SuggestedRemedy

Change TBD to -16dBm.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #89

Cl **183** *SC* **183.7.1** *P* **457** *L* **45** # 89

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *TX optical parameter*

Average transmit off is TBD

SuggestedRemedy

Replace TBD with -16 dBm

Response *Response Status* **C**

ACCEPT.

Cl **183** *SC* **183.7.2** *P* **459** *L* **34** # 173

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **A** *Rx optical parameter*

The OMA outer of each aggressor lane should match the Max OMA of the aggressor lanes achievable in a system. There is no requirement to have the OMA of all the Tx lanes within a given limit at the Tx, but the channel insertion loss is expected to be very similar at the different wavelengths and the stressed input OMA is based on the max channel loss. The value of Max OMA of the aggressor lanes should therefore match the MaxOMA of the Tx minus the max channel insertion loss. i.e. 4.8dBm minus 4dB

SuggestedRemedy

Change the OMA outer of each aggresor lane from TBD to 0.8dB

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy with editorial license for FR4.

Cl **183** *SC* **183.7.2** *P* **459** *L* **39** # 472

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

BER should be block error ratio as in Table 180-8, Table 181-6, and Table 182-8.

SuggestedRemedy

Change "BER" to "block error ratio".

Response *Response Status* **C**

ACCEPT.

Cl **183** *SC* **183.7.3** *P* **460** *L* **39** # 92

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *TDECQ*

FR4 power budget is TBD

SuggestedRemedy

channel loss=4.0 dB with addition of allocation penalties of 4.3 dB result in power budget of 8.3 dB

Response *Response Status* **C**

REJECT.

After CRG discussion there was no consensus to make a change at this time.

Cl **183** *SC* **183.7.3** *P* **460** *L* **46** # 91

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *TDECQ*

FR4 allocation for penalties is TBD

SuggestedRemedy

3.9 dB TDECQ + 0.4 dB for MPI/DGD=4.3 dB

Response *Response Status* **C**

REJECT.

After CRG discussion there was no consensus to make a change at this time.

Cl **183** *SC* **183.7.3** *P* **460** *L* **47** # 319

Mi, Guangcan — Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **A** *Power budget*

there is no additional insertion loss allowed for FR4 and LR4, no need to keep it.

SuggestedRemedy

Delete the row of additional insertion loss in Tbale 183-10 and the associated footnote h

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy with editorial license.

Note, referenced table is 183-8 not 183-10.

Cl **183** *SC* **183.8** *P* **463** *L* **12** # 18

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *Chromatic dispersion*

Chromatic dispersion specs for 800GBASE-FR4 in Table 183-9 are TBD

SuggestedRemedy

Add 800GBASE-FR4 dispersion specs as documented in July strawpoll #O-1.
Positive dispersion(max) = 6.02 ps/nm
Negative dispersion(min) = -11.26 ps/nm
Add the following text to footnote (b):
"The dispersion specifications are based on the statistical link design methodology documented in ITU-T REC G.652, Appendix I, and the optical channel characteristics methodology described in Annex-TBD."
Further implementation details to be provided in johnson_3dj_01_2409.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement slide 6 of johnson_01_2409.

Cl **183** *SC* **183.8** *P* **463** *L* **13** # 93

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *Chromatic dispersion*

Positive and negative dispersions are TBD for FR4 and LR4

SuggestedRemedy

Per https://www.ieee802.org/3/dj/public/24_07/johnson_3dj_01a_2407.pdf propose to use CD(max)=5.86 ps/nm and C(min)=-11.32 ps/nm for FR4
https://www.ieee802.org/3/dj/public/24_07/rodes_3dj_01a_2407.pdf propose to use CD(max)=2.8 ps/nm and C(min)=-24.6 ps/nm for FR4

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comments #18 and #19

Cl **183** *SC* **183.8** *P* **463** *L* **14** # 19

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *Chromatic dispersion*

Chromatic dispersion specs for 800GBASE-LR4 in Table 183-9 are TBD

SuggestedRemedy

Add 800GBASE-LR4 dispersion specs as documented in July strawpoll #O-1.
Positive dispersion(max) = 2.8 ps/nm
Negative dispersion(min) = -24.6 ps/nm
Add the following text to footnote (b):
"The dispersion specifications are based on the statistical link design methodology documented in ITU-T REC G.652, Appendix I, and the optical channel characteristics methodology described in Annex-TBD."
Further implementation details to be provided in johnson_3dj_01_2409.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement slide 6 of johnson_01_2409

Cl **183** *SC* **183.8** *P* **463** *L* **17** # 94

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *Optical channel*

Optical return losses are TBD for FR4 and LR4

SuggestedRemedy

Given the same cable plant as FR4-500 propose to use 17.1 dB for FR4 and 15.6 dB for LR4 optical return losses

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In table 183-9 for optical return loss (min) for FR4 change "TBD" to "25" and for LR4 change "TBD" to "22". This is consistent with values in Table 122-17.

Cl **183** *SC* **183.9.5** *P* **467** *L* **24** # 95

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *TDECQ - test setup*

Add sentence to provide further instruction on the TDECQ test setup

SuggestedRemedy

If the PMD under test has optional AUI (C2M) the TDECQ is measured with stress sensitivity signal applied to AUI attached to the PMDB under test.

Response *Response Status* **C**

REJECT.

Resolve using the response to comment #67 .

Cl **183** *SC* **183.9.5** *P* **467** *L* **30** # 315

Mi, Guangcan — Huawei Technologies Co., Ltd

Comment Type **TR** *Comment Status* **A** *TDECQ*

As discussed in Mi_3dj_01b_2407, setting different taregt PAM4 SER for PMD types using the same inner FEC can be confusing for future readers, and has no technical ground.

SuggestedRemedy

Delete line 30. and change line 31 to Target PAM4 symbol error ratio of 9.6e-3 for 800GBASE FR4 and 800GBASE-LR4.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy with editorial license.

Cl **183** *SC* **183.9.5** *P* **467** *L* **31** # 97

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **A** *TDECQ*

Reference equalizer in 120.8.5.4 is not applicable as it is only 5 tap FFE

SuggestedRemedy

Remove the reference and update the exception sentence:
- The reference equalizer is a T-spaced, 15 taps feed-forward equalizer (FFE) with sum of the equalizer tap coefficients equal to 1, where T is the symbol period,
Reference equalizer tap coefficient constraints as shown in new Table 183-15.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #80 .

Cl **183** *SC* **183.9.5** *P* **467** *L* **42** # 96

Ghiasi, Ali — Ghiasi Quantum/Marvell

Comment Type **TR** *Comment Status* **R** *Tap weights*

Updated FFE tap limit per relaxation and TBD as suggested in the https://www.ieee802.org/3/dj/public/24_07/ghiasi_3dj_02a_2407.pdf

SuggestedRemedy

Add table similar to 182-15 here
C(-3)=(-0.15, 0.15)
C(-2)=(-0.2, 0.3)
C(-1)=(-0.6, 0.2) - replace TBD
C(1)=(-0.6, 0.2) - replace TBD
C(2)=(-0.2, 0.3)
C(3, 4, 5, 6)=(-0.15, 0.15)
C(7, 8, 9, 10, 11)=(-0.1, 0.1)
C(0)=(0.8, 2.2)
Given the capability of DSP having tight limit on TDECQ mostly will result in module failure where it doesn't matter

Response *Response Status* **C**

REJECT.

After CRG discussion there was no consensus to make a change at this time.

Cl **183** *SC* **183.9.5** *P* **467** *L* **45** # 205

Welch, Brian — Cisco

Comment Type **TR** *Comment Status* **A** *Tap weights*

Sub-clause 183.9.5 is lacking specifications for reference equalizer coeffecient restrictions for 800GBASE-FR4.

SuggestedRemedy

Update 183.9.5 with the table from page 4 of welch_3dj_01_0924.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In 183.9.5 add table from slide 4 of welch_01_2409 with the exception of c(1) minimum with value of -0.6.

With editorial license.

Cl **183** *SC* **183.9.5.1** *P* **468** *L* **10** # 20

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *Chromatic dispersion*

Chromatic dispersion specs for 800GBASE-FR4 in Table 183-14 are TBD

SuggestedRemedy

Add 800GBASE-FR4 dispersion equations as documented in johnson_3dj_01_2409. The linear equations are per-channel and are of the form, A(WL - WL0) + B.
Add the following text to footnote (a):
"The dispersion specifications are based on the statistical link design methodology documented in ITU-T REC G.652, Appendix I, and the optical channel characteristics methodology described in Annex-TBD."
Further implementation details to be provided in johnson_3dj_01_2409.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement slide 8 of johnson_01_2409

Cl **183** *SC* **183.9.5.1** *P* **468** *L* **11** # 21

Johnson, John — Broadcom

Comment Type **TR** *Comment Status* **A** *Chromatic dispersion*

Chromatic dispersion specs for 800GBASE-LR4 in Table 183-14 are TBD

SuggestedRemedy

Add 800GBASE-LR4 dispersion equations using the Sellmeier form with coefficients as documented in ITU-T-REC G.652, Appendix I, Table I.4 for M=4 and Q=99.9%, as proposed in rodes_3dj_01a_2407, slide 9.
Maximum: 0.2175*WL*[1-(1307/WL)^4]
Minimum: 0.2250*WL*[1-(1321.1/WL)^4]
Further implementation details to be provided in johnson_3dj_01_2409.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement slide 8 of johnson_01_2409

Cl **183** *SC* **183.9.11** *P* **469** *L* **32** # 265

Johnson, John Broadcom

Comment Type **TR** *Comment Status* **A** *(bucket)*

The RINxxOMA measurement definition in 183.9.11 unnecessarily duplicates the definition in 180.9.11.

SuggestedRemedy

Shorten 183.9.11 with reference to 180.9.11 as follows:

RINxxOMA, with "xx" referring to the value for optical return loss tolerance in Table 183-6, shall be within the limit given in Table 183-6 when measured using the test pattern and sampling range specified for OMAouter measurement in 183.9.4, but with applied "xx" dB optical reflection and the reference receiver specified for TDECQ measurement in 183.9.5. RINxxOMA is measured using the methods specified in 180.9.11.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

Cl **184** *SC* **184** *P* **473** *L* **0** # 281

de Koos, Andras Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Add explicit instructions for path data delay measurement to the Clause184 Inner FEC
I don't understand the CL184 Inner FEC enough to know which bit will have max/min delays through the whole layer. It should be possible to calculate, however.

SuggestedRemedy

Insert a new sub-clause (perhaps after 184.7 Delay constraints) :

184.8 Path data delay for time synchronization

When the Inner FEC is part of a Physical Layer that supports Time Synchronization, transmit and receive path data delays are reported as if the DDMP (data delay measurement point) occurs on <TBD>, corresponding to the longest delay on transmit, and the shortest delay on receive.

Four separate delays are reported, each with nanosecond and (if supported) sub-nanosecond portions, in the following eight status variables:
inner_FEC_delay_ns_TX_max, inner_FEC_delay_subns_TX_max
inner_FEC_delay_ns_TX_min, inner_FEC_delay_subns_TX_min
inner_FEC_delay_ns_RX_max, inner_FEC_delay_subns_RX_max
inner_FEC_delay_ns_RX_min, inner_FEC_delay_subns_RX_min

A description of the path data delay values can be found in Clause 90.7.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **184** *SC* **184** *P* **475** *L* **40** # 512

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **R** *(withdrawn)*

While preparing Draft 1.0 the editorial team determined that it would be best to incorporate the PMA functionality into the Inner FEC to avoid defining an unecessary abstract interface between the DSP function and the FEC. However, the DSP function is quite complex and is similar to that defined for the PMA in Clause 186. It might therefore be better for clarity to separate the current Inner FEC into an Inner FEC sublayer (above the DP-16QAM mapper/demapper) from a PMA function below.

SuggestedRemedy

Separate the current Inner FEC into 800GBASE-LR1 Inner FEC above and 800GBASE-LR1 PMA below, with the seperation point just above the DP-16QAM mapper/demapper.

Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **184** *SC* **184** *P* **475** *L* **40** # 513

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *(bucket)*

It is rather confusing that the signal names between the PMD receiver and the Inner FEC are the same as as for the transmitter even though the content is quite different, e.g., RX_XI contains a bit of TX_XI, TX_XQ, TX_YI, and TX_YQ. A different signal name might help to drive that point home.

SuggestedRemedy

Change the signal names RX_XI/XQ/YI/YQ to RX_AI/AQ/BI/BQ.
Update Clause 185 (PMD) to match.
Do the same in Clause 186/187 for 800GBASE-ER1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license
[Editor's note: CC 185, 186, 187]

Cl **184** *SC* **184.1.3** *P* **473** *L* **54** # 240

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

The next two bullets after this one talk about per-flow functions. That terminology was introduced because after the lane permutation, the PCS lanes aren't really the PCS lanes any more. It would be useful to add some text in this bullet about the lane permutation to clarify that it creates 32 flows.

SuggestedRemedy

Add "to create 32 Inner FEC flows" at the end of the bullet

Response *Response Status* **C**

ACCEPT.

Cl **184** *SC* **184.2** *P* **475** *L* **33** # 47

Bruckman, Leon — Nvidia

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

The arrow to the DP-16QAM mapper block is too short

SuggestedRemedy

Make the inut arrow to the DP-16QAM mapper block touch the block

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **184** *SC* **184.2** *P* **476** *L* **2** # 241

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

With the introduction of the flow terminology, most of the functions are per-flow rather than per PCS lane

SuggestedRemedy

Change "PCS lane" to "Inner FEC flow"

Response *Response Status* **C**

ACCEPT.

Cl **184** *SC* **184.2** *P* **476** *L* **6** # 242

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

It will be useful here to explicitly state that the permutation process creates 32 inner FEC flows.

SuggestedRemedy

Change the end of the sentence to ". by a permutation function to create 32 Inner FEC flows."

Response *Response Status* **C**

ACCEPT.

Cl **184** *SC* **184.2** *P* **476** *L* **13** # 48

Bruckman, Leon Nvidia

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

Missing "the"

SuggestedRemedy

Change: When SIGNAL_OK parameter
to: When the SIGNAL_OK parameter

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **184** *SC* **184.4.1** *P* **477** *L* **7** # 243

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *pseudocode*

The PCS lane alignment and deskew process used in this clause is the same as in clause 176.4.4.3, which is defined without any pseudocode (and 176.4.4.3 refers to several other clauses that also specify this process without pseudocode). The purpose of the pseudocode here is to establish the pcsli[m] vectors that are used in the reorder subclause to create pcsla[q], which itself is needed to desrcibe the permutation function. It would be better to just define the input to the permutation function in that subclause rather than introduce new description of the alignment lock and deskew process.

SuggestedRemedy

Delete all the pseudocode in this subclause. A more detailed presentation related to all the pseudocode snippets in 184.4 will be provided.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed the presentation at:
https://www.ieee802.org/3/dj/public/24_09/huber_3dj_01b_2409.pdf

Implement changes captured in slides 10, 13, 14, 18, 21, 24 and 27 in huber_3dj_01b_2409 with editorial license.

Cl **184** *SC* **184.4.2** *P* **477** *L* **26** # 244

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *pseudocode*

PCS lane reordering is described in numerous other clauses without pseudocode. The purpose of the pseudocode here is to establish the pcsla[q] vectors that are used in the description of the permutation function. It would be better to just define the input to the permutation function in that subclause rather than introduce new description of the lane reordering process.

SuggestedRemedy

Delete the pseudocode in this subclause. A more detailed presentation related to all the pseudocode snippets in 184.4 will be provided.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #243.

Cl **184** SC **184.4.3** P **477** L **36** # 245

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *pseudocode*

It would be better to define pcsla[q] here.

SuggestedRemedy

Change the text to read: The permuation function shall map the RS-FEC symbols on 32 input PCS lanes, pcsla[q], to 32 output inner FEC flows, permo[q].

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #243

Cl **184** SC **184.4.3** P **477** L **44** # 246

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *pseudocode*

The algorithm for lane permutation is unnecessarily complex. The operation is performed on 10-bit symbols, so there is no need for the bit-level iterator.

SuggestedRemedy

Remove the 'j' iterator from the algorithm. A presentation related to simplifying all the pseudocode snippets in 186.4 will be provided.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #243.

Cl **184** SC **184.4.4** P **479** L **4** # 49

Bruckman, Leon Nvidia

Comment Type **TR** *Comment Status* **A** *(bucket)*

There are 2 switches that shall be updated

SuggestedRemedy

In bullet e) change: "The switch position"
to: "The switches position"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In bullet e) change: "The switch position"
to: "The position of the switches"

[Editor's note: changed page from 477 to 479]

Cl **184** SC **184.4.4** P **479** L **30** # 247

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *pseudocode*

The algorithm for the convolutional interleaver is unnecessarily complex. The function is implemented for each flow, so a flow iterator is not needed. The function is performed on 40-bit symbols, so a bit iterator is not needed.

SuggestedRemedy

Remove the 'j' and 'p' itestors from the algorithm. A presentation related to simplifying all the pseudocode snippets in 186.4 will be provided.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #243.

Cl **184** SC **184.4.4** P **479** L **40** # 248

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

It is correct that a negative index for permo is not defined, but this isn't clearly stating what the value of convio is when the algorithm produces a negative index into permo. If the intent is that the corresponding convio value should then also be considered as unspecified (i.e., it is some random 40-bit pattern), that should be explicitly stated.

SuggestedRemedy

Change the sentence to say "When the algorithm produces a negative index to permo, the value of convio is unspecified."

Response *Response Status* **C**

ACCEPT.

Cl **184** SC **184.4.5** P **480** L **27** # 249

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *pseudocode*

The algorithm for the BCH encoder is unnecessarily complex. The operation is performed on each flow, so a flow iterator is not needed.

SuggestedRemedy

Remove the 'q' iterator from the algorithm. A more detailed presentation related to all the pseudocode snippets in 184.4 will be provided

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #243.

Cl **184** *SC* **184.4.6** *P* **480** *L* **50** # 250

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *pseudocode*

The algorithm for the circular shift is unnecessarily complex. The operation is performed on each flow, so a flow iterator is not needed.

SuggestedRemedy

Remove the 'p' iterator from the algorithm. A more detailed presentation related to all the pseudocode snippets in 184.4 will be provided

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #243.

Cl **184** *SC* **184.4.8** *P* **481** *L* **38** # 6

Huang, Kechao — Huawei

Comment Type **T** *Comment Status* **A** *(bucket)*

In the DSP frame, the 63 symbols after one pilot symbol are typically called as payload symbols, which include the Information or parity symbols. See subclause 186.3.3.1.2 page 545, line 7 for reference.

SuggestedRemedy

Suggest to change "one 4-bit PS, 63 4-bit message blocks" as "one 4-bit PS, 63 4-bit payload blocks"

Response *Response Status* **C**

ACCEPT.

Cl **184** *SC* **184.4.9** *P* **483** *L* **15** # 7

Huang, Kechao — Huawei

Comment Type **T** *Comment Status* **A** *(bucket)*

In Table 184-2, the Index 27 pilot output 2 "10" after signal mapping does not match the Level "-3" in Table 184-4, the Index 27 pilot Y_I

SuggestedRemedy

Suggest to change the Index 27 pilot output 2 "10" in Table 184-2 as "00"

Response *Response Status* **C**

ACCEPT.

Cl **184** *SC* **184.4.9** *P* **484** *L* **5** # 560

Kota, Kishore — Marvell Semiconductor

Comment Type **TR** *Comment Status* **A** *pilot sequence*

Table 184-2
Some of the pilot sequence values in this table are inconsistent with Table 184-4 and need to be corrected

SuggestedRemedy

Replace with corrections to be provided in supporting presentation

Response *Response Status* **C**

ACCEPT.

The CRG reviewed the following presentation:
https://www.ieee802.org/3/dj/public/24_09/kota_3dj_01a_2409.pdf.

Implement change on slide 7 of kota_3dj_01a_2409 with editorial license.

This is duplicate of comment #7 which was closed as part of bucket#1.

Cl **184** *SC* **184.4.11.2** *P* **486** *L* **29** # 514

Brown, Matt — Alphawave Semi

Comment Type **T** *Comment Status* **A** *PMD Interface*

The Inner FEC outputs should be well defined without variance. The choice of mapping to different optical ports is a freedom to be given to the PMD, not the PMA. This way we can define a one to one signal from the TX output to the post-DSP receiver.

SuggestedRemedy

Move the symbol mapping subclause 184.4.11.2 to the the PMD clause, perhaps 185.5.3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Move the coherent symbol mapping subclauses from the subclauses 184.4.11.2 and 186.3.3.1.7 to the PMD clauses 185 and 187, respectively, with editorial license. The editor's note can be removed.

[Editor's note: CC 184, 185, 186, 187]

Cl **184** *SC* **184.4.11.2** *P* **487** *L* **3** # 251

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *PMD Interface*

WRT the editor's note - it wouldn't seem to make sense to move only table 184-5 to the PMD clause; either this entire subclause should move, in which case the PMD service interface is not four analog signals, but the four digital streams that the PMD will now convert to analog signals, or the table should stay.

SuggestedRemedy

It seems cleaner to define the tx interface between the inner FEC and PMD as four digital streams, and leave the details of the mapping to the analog signals to the PMD clause. That would be consistent with how 100GBASE-ZR was done in clauses 153 and 154. However, that doesn't work in the receive direction, since the inner FEC is soft-decoded - so there would be some asymmetry in the definition of the PMD service interface (digital in the tx direction, analog in the rx). The asymmetry in the PMD service interface seems like the lesser evil, so suggest moving 184.4.11.2 to the PMD clause.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using response to comment #514
[Editor's note: CC 184, 185, 186, 187]

Cl **184** *SC* **184.5.8** *P* **489** *L* **33** # 50

Bruckman, Leon Nvidia

Comment Type **TR** *Comment Status* **A** *(bucket1p)*

There are 2 switches that shall be updated

SuggestedRemedy

In bullet e) change: "The switch position"
to: "The switches position"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In bullet e) change: "The switch position . "
to: "The position of switches ."

The list numbering is currently f), g), h), i), j). Fix the list numbering to start at a) and go to e).

Implement with editorial license.

Cl **184** *SC* **184.5.8** *P* **490** *L* **11** # 252

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *pseudocode*

The algorithm for the convolutional de-interleaver is unnecessarily complex. The function is implemented for each flow, so a flow iterator is not needed. The function is performed on 40-bit symbols, so a bit iterator is not needed.

SuggestedRemedy

Remove the 'j' and 'p' iterators from the algorithm. A more detailed presentation related to all the pseudocode snippets in 184.4 will be provided

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #243.

Cl **184** *SC* **184.7** *P* **494** *L* **25** # 559

Kota, Kishore Marvell Semiconductor

Comment Type **TR** *Comment Status* **A** *Delay*

Maximum delay of inner FEC are currently TBD

SuggestedRemedy

Replace TBD with value to be provided in supporting presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The CRG reviewed the following presentation:
https://www.ieee802.org/3/dj/public/24_09/kota_3dj_01a_2409.pdf.

Implement change on slide 6 of kota_3dj_01a_2409 with editorial license.

Cl **184** *SC* **184.8** *P* **495** *L* **4** # 282

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

The path data delay status variables should be included in the MDIO mapping in table Table 184-7.

SuggestedRemedy

Add the following rows to Table 184-7:
variable: {inner_FEC_delay_ns_TX_max, inner_FEC_delay_subns_TX_max,inner_FEC_delay_ns_TX_min, inner_FEC_delay_subns_TX_min}; variable reference : <new subclause>; MDIO Registers : {1.1813, 1.1814, 1.1815, 1.1816, 1.1817, 1.1818}; MDIO reference : 45.2.1.177a
variable: {inner_FEC_delay_ns_RX_max, inner_FEC_delay_subns_RX_max, inner_FEC_delay_ns_RX_min, inner_FEC_delay_subns_RX_min}; variable reference : <new subclause>; MDIO Registers : {1.1819, 1.1820, 1.1821, 1.1822, 1.1823, 1.1824}; MDIO reference : 45.2.1.177b

could be grouped into two rows, or spread over 8 rows... editorial license and all that.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **184A** *SC* **184A** *P* **773** *L* **14** # 549

Kota, Kishore — Marvell Semiconductor

Comment Type **TR** *Comment Status* **A** *(bucket)*

Missing testvectors for 800GBASE-LR1

SuggestedRemedy

Add the testvectors which were provided in kota_3dj_04_2407.zip with supporting presentation in kota_3dj_01a_2407.pdf. If necessary, additional text to assist editors will be provided in supporting presentation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement suggested remedy with editorial license

Cl **185** *SC* **185.1** *P* **499** *L* **19** # 293

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Consider adding Clause 90 as 'Optional' to the 'Physical Layer Clauses Associated with the XXX PMD tables.

SuggestedRemedy

Add the following row
90-Time Synchronization Optional
to Table 185-1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **185** *SC* **185.1** *P* **499** *L* **44** # 343

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

Comment Type **T** *Comment Status* **A** *(bucket)*

Note C for Table 185-1 states the following -
One or two 800GAUI-n may be instantiated within a 800GBASE-DR4 PHY as described in 176B.6.1.
However, it does not appear from the inner FEC functional block diagram in Fig 184-2, it does not appear that an AUI can be instantiated below the inner FEC sublayer.
Additionally, it is pointing to the wrong PHY

SuggestedRemedy

Modify Note C
One or two 800GAUI-n may be instantiated within a 800GBASE-LR1 PHY above the Inner FEC sublayer as described in 176B.6.1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The note points to 176B.6.1 which clearly describes where the AUIs may reside. The suggested change in this regard is not an improvement to the draft.
However, the PHY types in the footnote should be corrected...
Change "800GBASE-DR4-500" to "800GBASE-LR1"

Cl **185** *SC* **185.2** *P* **500** *L* **36** # 550

Kota, Kishore — Marvell Semiconductor

Comment Type **TR** *Comment Status* **A** *error ratio*

Data reliability requirements for the 800GBASE-LR1 PMD are TBD

SuggestedRemedy

Replace "A PMD is expected to meet <TBD>" with value and text to be provided in supporting presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Slide 3 of the the following presentation was reviewed by the CRG:
https://www.ieee802.org/3/dj/public/24_09/kota_3dj_02a_2409.pdf

The first line in 185.2 covers the whole PHY (with AUIs) and 174A.5 shows the equivalent CER to meet the FLR requirement. Specifying pre-FEC BER does not serve any purpose since it is implementation dependent.

However, a slightly different requirement is required to measure the performance without AUIs (PMD + Inner FEC only).

For this purpose, implement the requirement in a similar manner as resolve in comment #166 using the PCS only.

Cl **185** *SC* **185.6.1** *P* **508** *L* **6** # 353

Maniloff, Eric — Ciena

Comment Type **T** *Comment Status* **A** *Tx optical parameter*

Table 185-4 Parameter Updates:

Updates required with vaules for:

- Average Power
- X/Y Skew
- TQM
- Laser Frequency Specifications

SuggestedRemedy

Supporting presentation with values will be contributed

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the green highlighted parameters for:
Average transmit power (min) in slide 9 of maniloff_01a_2409
Optical Frequency +/- value (retaining the frequency of 228.675) in slide 9 of maniloff_01a_2409
Laser relative frequency tracking accuracy in slide 9 of maniloff_01a_2409
ETCC(max) in slide 9 of maniloff_01a_240

For "Skew between X and Y polarizations (max)" add the value of 5 ps

With editorial license.

Cl **185** *SC* **185.6.1** *P* **508** *L* **11** # 554

Kota, Kishore — Marvell Semiconductor

Comment Type **TR** *Comment Status* **A** *Tx optical parameter*

Table 185-4
"Average channel output power (max)" is TBD

SuggestedRemedy

Replace TBD with value to be provided in supporting presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change TBD in "Average channel output power (max)" to -6 dBm.

Change "Average channel output power" to "Average launch power" in (max) and (min).

Cl **185** *SC* **185.6.1** *P* **508** *L* **12** # 552

Kota, Kishore — Marvell Semiconductor

Comment Type **TR** *Comment Status* **A** *Tx optical parameter*

Table 185-4
"Average channel output power (min)" is TBD

SuggestedRemedy

Replace "Average channel output power (min)" parameter with value and text to be provided in supporting presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #353.

Cl **185** *SC* **185.6.1** *P* **508** *L* **22** # 553

Kota, Kishore — Marvell Semiconductor

Comment Type **TR** *Comment Status* **R** *Tx optical parameter*

Table 185-4
"I-Q amplitude imbalance (mean)" parameter value of 1dB is too stringent and needs to be relaxed

SuggestedRemedy

Combine "I-Q amplitude imbalance (mean)" and "Power difference between X and Y polarizations (max)" into a single parameter "Difference in average launch power between lanes (max)" with a relaxed value to provided in supporting presentation.

Response *Response Status* **C**

REJECT.

No consensus to make a change.

Cl **185** *SC* **185.6.1** *P* **508** *L* **38** # 555

Kota, Kishore — Marvell Semiconductor

Comment Type **TR** *Comment Status* **A** *Tx optical parameter*

Table 185-4
"Laser relative frequency tracking accuracy" is TBD

SuggestedRemedy

Replace TBD with value to be provided in supporting presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #353.

Cl **185** *SC* **185.6.2** *P* **509** *L* **6** # 354

Maniloff, Eric — Ciena

Comment Type **T** *Comment Status* **A** *Rx optical parameter*

Table 185-5 Parameter Updates required:

Power Levels
Frequency Range
SOP rate of change

SuggestedRemedy

Supporting presentation with values will be contributed

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the green highlighted parameters for
Average receive power (min) in slide 10 of maniloff_01a_2409
Optical Frequency +/- value (retaining the frequency of 228.675) in slide 10 of maniloff_01a_2409
frequency offset in slide 10 of maniloff_01a_2409

No consensus to change SOP rate of change.

With editorial license.

Cl **185** *SC* **185.6.2** *P* **509** *L* **15** # 551

Kota, Kishore — Marvell Semiconductor

Comment Type **TR** *Comment Status* **A** *Rx optical parameter*

Table 185-5
"Average receive power (min)" is TBD

SuggestedRemedy

Replace "Average receive power (min)" parameter with a value and text to be provided in supporting presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment # 354.

Cl **185** *SC* **185.6.2** *P* **509** *L* **18** # 556

Kota, Kishore Marvell Semiconductor

Comment Type **TR** *Comment Status* **A** *Rx optical parameter*

Table 185-5
"Frequency offset between received carrier and local oscillator (max)" is TBD

SuggestedRemedy

Replace TBD with value to be provided in supporting presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the reponse to comment #354.

Cl **185** *SC* **185.6.2** *P* **509** *L* **21** # 557

Kota, Kishore Marvell Semiconductor

Comment Type **TR** *Comment Status* **R** *Rx optical parameter*

Table 185-5
"Polarization dependent loss (max)" is TBD

SuggestedRemedy

Replace TBD with value to be provided in supporting presentation

Response *Response Status* **C**

REJECT.

No consensus to make a change.

Cl **185** *SC* **185.6.2** *P* **509** *L* **22** # 558

Kota, Kishore Marvell Semiconductor

Comment Type **TR** *Comment Status* **R** *Rx optical parameter*

Table 185-5
"State of polarization (max)" is TBD

SuggestedRemedy

Replace TBD with value to be provided in supporting presentation

Response *Response Status* **C**

REJECT.

Resolve using the response to comment # 354. No consensus to make a change.

Cl **185** *SC* **185.9** *P* **514** *L* **14** # 259

Issenhuth, Tom Huawei

Comment Type **T** *Comment Status* **A** *TQM*

This subclause "Transmitter quality metric (TQM) test setup and calculation" is incomplete and there is an editors note requesting contributions to help complete.

SuggestedRemedy

Update the subclause as proposed in the supporting presentation to be provided.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement slides 2-9 of issenhuth_01_2409 incorporating the reference documents with editorial license.

Cl **186** *SC* **186** *P* **522** *L* **0** # 283

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Add explicit instructions for path data delay measurement reporting through the CL186 PCS.
Cannot be nearly as concise as other layers!
The fact that the Ethernet payload "floats" asynchronously within the GMP frame (through the use of stuff words) complicates matters.

SuggestedRemedy

Insert a new sub-clause (perhaps after 186.5 Delay constraints) :

186.6.1 PCS Path data delay for time synchronization

When the Clause 186 PCS is part of a Physical Layer that supports Time Synchronization, transmit and receive path data delays are reported as if the DDMP (data delay measurement point) occurs on:
- the start of the first non-fixed-stuff 257-bit GMP word of the tributary 0 multiframe (word 1 is always fixed stuff, so this is word 2)
- where the start of the PCS frame is also the start of an FEC frame (the start of the PCS frame and the start of the FEC frame are guaranteed to coincide every 128 FEC frames = 29 PCS frames).
- taking into account the maximum (transmit) and minimum (receive) data delay through the stuff-words mechanism.
This corresponds to the absolute longest delay on transmit, and the absolute shortest delay on receive.

Four separate delays are reported, each with nanosecond and (if supported) sub-nanosecond portions, in the following eight status variables:
PCS_delay_ns_TX_max, PCS_delay_subns_TX_max
PCS_delay_ns_TX_min, PCS_delay_subns_TX_min
PCS_delay_ns_RX_max, PCS_delay_subns_RX_max
PCS_delay_ns_RX_min, PCS_delay_subns_RX_min

A description of the path data delay values can be found in Clause 90.7.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **186** *SC* **186** *P* **522** *L* **0** # 285

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Add explicit instructions for path data delay measurement reporting through the CL186 PMA.
I don't understand the CL186 PMA deeply enough to know which bit will have the longest/shortest delay through the layer for tx/rx, respectively. But at first glance it should be straightforward - bit chosen for measurement will the the one immediately after the inserted bits.

SuggestedRemedy

Insert a new sub-clause (perhaps after 186.5 Delay constraints) :

186.6.2 PMA Path data delay for time synchronization

When the Clause 186 PMA is part of a Physical Layer that supports Time Synchronization, transmit and receive path data delays are reported as if the DDMP occurs on <TBD bit>, corresponding to the maximum delay for transmit, and minimum delay for receive.

Four separate delays are reported, each with nanosecond and (if supported) sub-nanosecond portions, in the following eight status variables:
PMA_delay_ns_TX_max, PMA_delay_subns_TX_max
PMA_delay_ns_TX_min, PMA_delay_subns_TX_min
PMA_delay_ns_RX_max, PMA_delay_subns_RX_max
PMA_delay_ns_RX_min, PMA_delay_subns_RX_min

A description of the path data delay values can be found in Clause 90.7.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **186** *SC* **186.2.2** *P* **526** *L* **43** # 51

Bruckman, Leon — Nvidia

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

The last part of the last paragraph of this sub-section seems redundant.

SuggestedRemedy

Delete the text: "The 64B/66B block stream is then transcoded into a 256B/257B stream, mapped to a 800GBASE-ER1 PCS frame using GMP, and FEC bits are added to this 800GBASE-ER1 PCS frame before transmission."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **186** *SC* **186.2.3** *P* **526** *L* **50** # 52

Bruckman, Leon Nvidia

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

This whole sub-clause can be merged with the last paragraph in the previous sub-cluase.

SuggestedRemedy

Delete sub-clause 186.2.3 and change the first sentence of the last paragraph of sub clause 186.2.2 to: "The 800GBASE-ER1 PCS maps the 800GMII signal into 66-bit blocks, and demaps the 800GMII signal from 66-bit blocks, using a 64B/66B coding scheme (see 172.2.3)."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **186** *SC* **186.2.4.1** *P* **527** *L* **4** # 304

de Koos, Andras Microchip Technology

Comment Type **T** *Comment Status* **R** *(bucket)*

It is true that the Tx PCS needs to remove idles with respect to the MII stream in order to generate the proper outgoing rate. However, WHERE to remove them may complicate timestamping, since the MII is no longer transparent from end-to-end if the MII-Extenders do not insert/extract at the same place. If there is a new input indicating discontinuities due to AM removal in the PHY_XS Transmit, then the same interface can be used to indicate discontinuities due to idle insertion done by the PHY_XS Transmit. Idles removed by the TxPCS can thus be at the same positions as the idles inserted by the PHY_XS, meaning that the MII is transparent from end-to-end.
Implementation-wise, this may not be a concern, since the PHY_XS Transmit would not have inserted idles only for the CL186 PCS Transmit to remove them. Simpler for the Tx PHY_XS to not have inserted idles at all.

SuggestedRemedy

Consider integrating the idle removal function with the AM location relay function. They are both discontinuities on the MII and can be indicated on the same input interface. Specific idles can thus be removed, rather than arbitrary idles.

Response *Response Status* **C**

REJECT.
In terms of how to write the standard, removing idles to accomodate AMs has been part of the encoding/rate adaptation process since clause 82. It would be awkward to change this in clause 186 and not elsewhere. In terms of implementation, there are many options for where the Idles could be removed, and the choice can indeed make a difference wrt timestamping, but clause 186 isn't the place to discuss that.

Cl **186** *SC* **186.2.4.5.1** *P* **530** *L* **22** # 54

Bruckman, Leon Nvidia

Comment Type **T** *Comment Status* **A** *(bucket)*

It will be beneficial for the reader not to have to search for the ITU-T standard in order to learn the AM value

SuggestedRemedy

Change the second sentence in the paragraph to: "The content of the AM field is 16 bytes of 0x09 followed by 16 bytes of 0xD7 as specified in clause 9.1 of Recommendation ITU-T G.709.6."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The AM field in G.709.6 is the 32 bytes as noted in the suggested remedy, plus an additional 28 reserved bytes that are transmitted as 0x00. The specification in G.709.6 (and in the corresponding OIF document) is that MSB is transmitter first; since the normal convention in 802.3 is to transmit all fields LSB first, the text either needs to be clear that the values are MSB first or needs to reverse the values.
Change the second sentence to "The content of the AM field is 16 bytes of 0x09, followed by 16 bytes of 0xD7, followed by 28 bytes of 0x00. All bytes are transmitted MSB first."

Cl **186** *SC* **186.2.4.6** *P* **531** *L* **8** # 301

de Koos, Andras Microchip Technology

Comment Type **T** *Comment Status* **A** *PTP accuracy (ER1)*

If the JC7-9 bytes will be used for AM relay, then Figure 186-6 should show the position of those bytes.

SuggestedRemedy

Add the JC7-9 bytes to Figure 186-6.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #302

Cl **186** *SC* **186.2.4.6.7** *P* **532** *L* **40** # 253

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **R** *(bucket1p)*

The specified values for the PT field were taken from OIF 800ZR. Since 800GBASE-ER1[-20] adds additional overhead to improve PTP accuracy, it should have its own payload type values.

SuggestedRemedy

Change 0x40 and 0x41 to TBD. Send a liaison to ITU-T Q11/15 requesting assignment of payload types for the 800GBASE-ER1[-20] application. (and yes, I will write a draft of said liaison :-))

Response *Response Status* **C**

REJECT.

It is better to leave the payload type value at 0x40/0x41 as the current value represents a technically complete solution. A liaison is being sent to the ITU, and the value can be changed in the draft when we receive the new value from the ITU. The ITU liaison can be viewed at: https://www.ieee802.org/3/dj/public/24_09/huber_3dj_03_2409_Redacted.pdf.

Cl **186** *SC* **186.2.4.6.7** *P* **532** *L* **41** # 53

Bruckman, Leon Nvidia

Comment Type **TR** *Comment Status* **A** *(bucket)*

The PT values are OIF values

SuggestedRemedy

It would be worthwhile to add a note indicating the fact that the PT values are assigned to OIF.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #253

Cl **186** *SC* **186.2.4.6.10** *P* **533** *L* **22** # 254

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *PTP accuracy (ER1)*

As the editor's note says, the text for the AM location control overhead needs to be added.

SuggestedRemedy

Add text describing the overhead per the baseline adopted in https://www.ieee802.org/3/dj/public/24_05/sluyski_3dj_01a_2405.pdf. Since it is possible that the 800GBASE-ER1[-20] PCS is used without an 800GXS (in which case there are no AMs to be removed), the text needs to define how the OH is populated in both scenarios

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #302

Cl **186** *SC* **186.2.4.6.10** *P* **533** *L* **24** # 356

Maniloff, Eric Ciena

Comment Type **T** *Comment Status* **A** *PTP accuracy (ER1)*

AM location control is listed as optional. Having a separate optional transport method is awkward and seems unnecessary. It would be preferable to define a single PTP-friendly mapping mode.

SuggestedRemedy

Modify the optional AM location control to mandatory

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #302

Cl **186** *SC* **186.2.4.9** *P* **534** *L* **35** # 55

Bruckman, Leon Nvidia

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

Typo

SuggestedRemedy

Change: "varies" to: "vary"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **186** *SC* **186.2.5.6.5** *P* **533** *L* **22** # 255

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *PTP accuracy (ER1)*

As the editor's note says, the text for the AM location control overhead needs to be added.

SuggestedRemedy

Add text describing the overhead per the baseline adopted in https://www.ieee802.org/3/dj/public/24_05/sluyski_3dj_01a_2405.pdf. Since it is possible that the 800GBASE-ER1[-20] PCS is used without an 800GXS (in which case there are no AMs to be removed), the text needs to define how the OH is processed in both scenarios

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #302

Cl **186** *SC* **186.2.5.10** *P* **541** *L* **4** # 305

de Koos, Andras Microchip Technology

Comment Type **T** *Comment Status* **R** *(bucket)*

It is true that the Rx PCS needs to add idles in order to generate the proper outgoing MII rate. However, WHERE to add them may complicate timestamping, since the MII is not necessarily the same from end-to-end if MII-Extenders do not insert/extract at the same MII positions. If there is a new output indicating the AM position from the Rx PCS then the same interface can be used to indicate discontinuities due to idle insertion done by the RxPCS. Idles added by the Rx PCS can thus be at the same positions as the idles removed by the Rx PHY_XS, meaning that the MII is transparent from end-to-end. Implementation-wise, this may not be a concern, since the Rx PCS would not have inserted idles only for the Rx PHY_XS to remove them. Simpler for the Rx PCS to not have inserted idles at all.

SuggestedRemedy

Consider integrating the idle addition function with the AM location relay function. They are both discontinuities on the MII and can thus be indicated on the same output interface (can re-use RX_NUM_BIT_CHANGE).

Response *Response Status* **C**

REJECT.
In terms of how to write the standard, adding idles to accomodate removed AMs has been part of the encoding/rate adaptation process since clause 82. It would be awkward to change this in clause 186 and not elsewhere. In terms of implementation, there are many options for where the Idles could be removed, and the choice can indeed make a difference wrt timestamping, but clause 186 isn't the place to discuss that.

Cl **186** *SC* **186.3** *P* **541** *L* **14** # 298

de Koos, Andras Microchip Technology

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

Strange that the PCS and PMA are specified in the same Clause. Has this ever been done elsewhere in 802.3?
Though I suppose the PCS and PMA will always be instantiated together.

SuggestedRemedy

Consider separating Clause 186 into two for the PCS and PMA

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **186** *SC* **186.3.1** *P* **542** *L* **29** # 8

Huang, Kechao Huawei

Comment Type **T** *Comment Status* **A** *(bucket)*

In Figure 186-11, in the transmit direction, the "PS field insertion" should be after "FAW/TS fields insert" following the discription in the first paragraph in subclause 186.3.1.3. Also, the reserved filed insertion should be included.
Make similar modification in the receive direction.

SuggestedRemedy

Suggest to redraw the figure 186-11 such that,
1) in the transmit direction, after Gray mapping and polarizatoin distribution, there are "FAW/TS/reserved fields insertion" and then "PS field insertion";
2) in the receive direction, modify "FAW alignment remove FAW, PS, and TS fields" as "FAW alignment remove FAW, PS, TS, and reserved fields"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
To maintain alignment with the way other SDOs describe the mapping, the proposed changes should be implemented. It may be necessary to change text as well as Figure 186-11.
Implement with editorial license.

Cl **186** *SC* **186.3.1.3** *P* **541** *L* **48** # 56

Bruckman, Leon Nvidia

Comment Type **TR** *Comment Status* **A** *(bucket1p)*

The 800GBASE-ER1 and ER1-20 PMDs are not DWDM

SuggestedRemedy

Delete: "the dense wavelength division multiplexing (DWDM)"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Delete: "dense wavelength division multiplexing (DWDM)"

Change from:

Signal processing of the incoming samples including: equalization of the incoming samples for the effects of chromatic dispersion and other fixed impairments caused by the dense wavelength division multiplexing (DWDM) link and by the receive portion of the 800GBASE-ER1 PMD; equalization of the incoming samples for dynamic impairments including both state of polarization and polarization mode dispersion; carrier phase and frequency recovery; and symbol timing recovery and retiming of the samples to the signaling rate.

to:

Signal processing of the incoming samples including: equalization of the incoming samples for the effects of chromatic dispersion and other fixed impairments caused by the link and by the receive portion of the 800GBASE-ER1 PMD; equalization of the incoming samples for dynamic impairments including both state of polarization and polarization mode dispersion; carrier phase and frequency recovery; and symbol timing recovery and retiming of the samples to the signaling rate.

Cl **186** *SC* **186.3.2.1.2** *P* **543** *L* **24** # 57

Bruckman, Leon Nvidia

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

Typo

SuggestedRemedy

Change: "4800GBASE-ER1" to: "800GBASE-ER1"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **186** *SC* **186.3.2.2.1** *P* **543** *L* **50** # 58

Bruckman, Leon Nvidia

Comment Type **TR** *Comment Status* **A** *(bucket)*

Missing parenthesis

SuggestedRemedy

Add opening parenthesis to the four equations

Response *Response Status* **C**

ACCEPT.

Cl **186** *SC* **186.3.3.1.2** *P* **546** *L* **3** # 59

Bruckman, Leon Nvidia

Comment Type **TR** *Comment Status* **A** *(bucket)*

P0 is a pilot symbol

SuggestedRemedy

Change: "is the symbol P0" to: "is the pilot symbol P0"

Response *Response Status* **C**

ACCEPT.

Cl **186** *SC* **186.3.3.1.7** *P* **550** *L* **31** # 257

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **A** *PMD Interface*

The same decision that is made wrt whether to move subclause 184.4.11.2 to the PMD should be taken with this subclause

SuggestedRemedy

Move this information to clause 187, specify the tx side of the PMD service interface as 4 digital streams.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #514
[Editor's note: CC 184, 185, 186, 187]

Cl **186** *SC* **186.4** *P* **553** *L* **0** # 300

de Koos, Andras Microchip Technology

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

Many cut & paste of '400GBASE-ZR' in 186.4

SuggestedRemedy

remove all references to 400GBASE-ZR.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **186** *SC* **186.4.6.7** *P* **532** *L* **41** # 355

Maniloff, Eric Ciena

Comment Type **T** *Comment Status* **A** *(bucket)*

Currently the PT defined is for 800ZR. Since there is an optional PTP timing mode defined using JC7-JC9 to carry AM locations, a second PT should be defined.

SuggestedRemedy

Update text to refer to a separate PT value for the AM location control defined in 186.2.4.6.10

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #253

Cl **186** *SC* **186.6** *P* **561** *L* **20** # 299

de Koos, Andras Microchip Technology

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

Presumably, the Clause 186 PMA needs control and status variables, too (not just the CL 186 PCS)

SuggestedRemedy

Replace 'PCS' with 'PCS and PMA'
And either add PMA to the title for tables 186-8 and 186-9, or add separate MDIO mapping tables for the PMA.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement with editorial license and discretion.

Cl **186** *SC* **186.6** *P* **562** *L* **3** # 284

de Koos, Andras Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

The PCS path data delay status variables should be included in the MDIO mapping in table Table 186-9.

SuggestedRemedy

Add the following rows to Table 186-9:
variable: {PCS_delay_ns_TX_max, PCS_delay_subns_TX_max, PCS_delay_ns_TX_min, PCS_delay_subns_TX_min}; variable reference : <new subclause>; MDIO Registers : {3.1801, 3.1802, 3.1803, 3.1804, 3.1809, 3.1810}; MDIO reference : 45.2.3.68
variable: {PCS_delay_ns_RX_max, PCS_delay_subns_RX_max, PCS_delay_ns_RX_min, PCS_delay_subns_RX_min}; variable reference : <new subclause>; MDIO Registers : {3.1805, 3.1806, 3.1807, 3.1808, 3.1811, 3.1812}; MDIO reference : 45.2.3.69

(could be grouped into two rows, or spread over 8 rows... editorial license and all that).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **186** *SC* **186.6** *P* **562** *L* **5** # 286

de Koos, Andras Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

The PMA path data delay status variables should be included in the MDIO mapping in table Table 186-9.

SuggestedRemedy

Add the following rows to Table 186-9:
variable: {PMA_delay_ns_TX_max, PMA_delay_subns_TX_max, PMA_delay_ns_TX_min, PMA_delay_subns_TX_min}; variable reference : <new subclause>; MDIO Registers : {1.1801, 1.1802, 1.1803, 1.1804, 1.1809, 1.1810}; MDIO reference : 45.2.1.175
variable: {PMA_delay_ns_RX_max, PMA_delay_subns_RX_max, PMA_delay_ns_RX_min, PMA_delay_subns_RX_min}; variable reference : <new subclause>; MDIO Registers : {1.1805, 1.1806, 1.1807, 1.1808, 1.1811, 1.1812}; MDIO reference : 45.2.1.177

(could be grouped into two rows, or spread over 8 rows... editorial license and all that).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **186A** *SC* **186A** *P* **774** *L* **13** # 258

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **A** *(bucket)*

The PCS transmit function is in 186.2.4. The PMA transmit function is in 186.3.3.1.

SuggestedRemedy

Update the first and last TBDs with the clause numbers. Delete the words "including TBD" from the sentence, as there is no need to reiterate what functions the PMA includes in this annex.

Response *Response Status* **C**

ACCEPT.

Cl **187** *SC* **187.1** *P* **565** *L* **20** # 294

de Koos, Andras — Microchip Technology

Comment Type **T** *Comment Status* **A** *Time Sync*

Consider adding Clause 90 as 'Optional' to the 'Physical Layer Clauses Associated with the XXX PMD tables.

SuggestedRemedy

Add the following row
90-Time Synchronization Optional
to Table 187-1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #274.

Cl **187** *SC* **187.6.1** *P* **574** *L* **20** # 463

Huebner, Bernd — Cisco

Comment Type **T** *Comment Status* **A** *Tx optical parameter*

TBD - Instantaneous I-Q offset per polarization - Bring in line with 800ZR OIF specification

SuggestedRemedy

-20 dB -20 dB

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Set Instantaneous I-Q offset per polarization to -20 dB for 800GBASE-ER1-20 and 800GBASE-ER1.

Also in Table 187-4 change "Average channel output power" to "Average launch power" in (max) and (min).

Implement with editorial license.

Cl **187** *SC* **187.6.1** *P* **574** *L* **21** # 464

Huebner, Bernd — Cisco

Comment Type **T** *Comment Status* **A** *Tx optical parameter*

TBD - Mean I-Q offset per polarization - Bring in line with 800ZR OIF specification

SuggestedRemedy

-26 dB -26 dB

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Set Mean I-Q offset per polarization to -26 dB for 800GBASE-ER1-20 and 800GBASE-ER1.
Implement with editorial license.

Cl **187** *SC* **187.6.2** *P* **575** *L* **14** # 465

Huebner, Bernd — Cisco

Comment Type **T** *Comment Status* **A** *Rx optical parameter*

TBD - Damage threshold - Bring in line with 800ZR OIF specification

SuggestedRemedy

10 dBm 10dBm

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Set Damage threshold to 10 dBm for 800GBASE-ER1-20 and 800GBASE-ER1.
Implement with editorial license.

Cl **187** *SC* **187.6.3** *P* **575** *L* **44** # 466

Huebner, Bernd — Cisco

Comment Type **T** *Comment Status* **A** *Power budget*

TBD - Maximum discrete reflectance - Bring in line with 800ZR OIF specification

SuggestedRemedy

-27 dB

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Set Maximum discrete reflectance to -27 dB for 800GBASE-ER1-20 and 800GBASE-ER1.

Implement with editorial license.

Cl **187** *SC* **187.7** *P* **576** *L* **40** # 467

Huebner, Bernd Cisco

Comment Type **T** *Comment Status* **A** *Optical channel*

TBD -Differential Group Delay - Bring in line with LR specification scaled to longer fiber length

SuggestedRemedy

7 ps 10 ps

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Set Differential Group Delay to 7 ps for 800GBASE-ER1-20 and to 10 ps for 800GBASE-ER1.

Implement with editorial license.

Cl **187** *SC* **187.7** *P* **576** *L* **42** # 468

Huebner, Bernd Cisco

Comment Type **T** *Comment Status* **A** *Optical channel*

TBD - Optical return loss - Bring in line with 800ZR OIF specification

SuggestedRemedy

24 dB 24 dB

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Set Optical return loss to 24 dB for 800GBASE-ER1-20 and 800GBASE-ER1.

Implement with editorial license.

Cl **187** *SC* **187.9** *P* **580** *L* **8** # 260

Issenhuth, Tom Huawei

Comment Type **T** *Comment Status* **A** *TQM*

This subclause "Transmitter quality metric (TQM) test setup and calculation" is incomplete and there is an editors note requesting contributions to help complete.

SuggestedRemedy

Update the subclause as proposed in the supporting presentation to be provided.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #259.