Cl **FM** *SC* **FM** *P* **1** *L* **31** # 10

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

IEEE Std 802.3bu-2016 and IEEE Std 802.3bv-201x are missing from the list of amendments

SuggestedRemedy

Add IEEE Std 802.3bu-2016 and IEEE Std 802.3bv-201x to the list of amendments
Change "IEEE Std 802.3butm-201x" to "IEEE Std 802.3bu™-2016" on page 13

Proposed Response *Response Status* **O**

Cl **030** *SC* **30.5.1.1.15** *P* **42** *L* **36** # 11

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

The text as modified by IEEE Std 802.3by-2016 ends: "(see 65.2, Clause 74, Clause 91, and Clause 108).". This includes a closing ")". Consequently the ")" in this draft should not be shown in underline font as it is not being inserted.

SuggestedRemedy

Remove the underline from ")"

Proposed Response *Response Status* **O**

Cl **031B** *SC* **31B.3.7** *P* **316** *L* **17** # 38

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **X**

The delay in pause_quanta for 50 Gb/s Ethernet should be derived by adding up the delay values for the sublayers in the PHY where they add to the highest value.
From Table 131-4, this is 50GBASE-KR (or 50GBASE-CR). This gives a value of 32 + 22 + 50 + 9 + 4 = 117 pause_quanta
The value in the equation on line 26 is the number of pause_quanta * 512 / 8 = 117 * 515 / 8 = 7488

SuggestedRemedy

On line 17, change "394" to "117"
On line 26, change "25216" to "7488"

Proposed Response *Response Status* **O**

Cl **045** *SC* **45** *P* **0** *L* **0** # 89

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **X**

BASE-R PMD control and status registers need to have Clause 136 and 137 added to the list of supported clauses.

SuggestedRemedy

Add Clause 136 and 137 to introduction paragraphs of 45.1.2.80 and 45.2.1.81

Proposed Response *Response Status* **O**

Cl **045** *SC* **45** *P* **0** *L* **0** # 90

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **X**

Clause 136 training variables need to be added to the training_failure, start-up protocol status, frame_lock and receiver_status bit definitions in Clause 45

SuggestedRemedy

Add Clause 136.8.11.7.1 to 45.2.1.81.4, 45.2.1.81.3
Add "and local_trained in 136.8.11.7.1" to 45.2.1.81.1
Add "and local_tf_lock in 136.8.11.7.1" to 45.2.1.81.2

Proposed Response *Response Status* **O**

Cl **045** *SC* **45** *P* **0** *L* **0** # 91

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **X**

Need to add equivalent to 45.2.1.122 for Clause 136/137 to enable control over which PRBS sequence to use for training frames and the PRBS seed. Current register only suppots a 11b seed, while we have a 13b seed for PRBS13.

SuggestedRemedy

Per comment

Proposed Response *Response Status* **O**

Cl **045** *SC* **45** *P* **62** *L* **23** # 13

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

Several tables in Clause 45 of this draft have entries for "RW" in the "R/W" column.
To be consistent with the rest of Clause 45 and also the footnotes to the tables, these should be "R/W"

SuggestedRemedy

Change "RW" to "R/W" throughout the Clause.
This affects Tables 45-90ad, 45-90ae, 45-90af, 45-90ag, 4590-ai, 45-90aj, 45-90ak, 45-90am.

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1** *P* **45** *L* **50** # 12

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

The name of the registers should not include "registers".
Also, there are three registers, each one ending "lane x".
Follow the example on line 29 of this page.

SuggestedRemedy

Change "BASE-R PAM4 PMD training LP control registers, lanes 0 through 3" to "BASE-R PAM4 PMD training LP control, lane 0 through lane 3".
On page 46, change the other three sets of register names to:
"BASE-R PAM4 PMD training LP status, lane 0 through lane 3"
"BASE-R PAM4 PMD training LD control, lane 0 through lane 3"
"BASE-R PAM4 PMD training LD status, lane 0 through lane 3"

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.116h.1** *P* **62** *L* **35** # 14

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

Clause 45 level five headings that define a particular bit should match the entry for that bit in the "Name" column of the table giving the assignment of bits in the register.

SuggestedRemedy

Change the title of 45.2.1.116h.1 from "PMA precoder down Tx enable lane 3 (1.600.3)" to "Lane 3 down transmitter precoder enable (1.600.3)"
Make equivalent changes for the other bits in this register and all of the bits in 45.2.1.116i through 45.2.1.116k

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.116l** *P* **64** *L* **51** # 15

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

Clause 45 is consistent in having a footnote of "aRO = Read only" when all of the bits of a register are "RO"

SuggestedRemedy

Change the footnote to "aRO = Read only" for Tables 45-90ah, 45-90al, 45-90an

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.118a** *P* **66** *L* **11** # 16

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

The title of 45.2.1.118a is not consistent with three separately named registers.
Table 45-90ak only shows the assignment of bits for the first of the three registers.

SuggestedRemedy

Change the title to: "BASE-R PAM4 PMD training LP control, lane 0 through lane 3 registers (Register 1.1120 through 1.1123)".
On line 14, change the start of the sentence to: "The BASE-R PAM4 PMD training LP control, lane 0 through lane 3 registers reflect..."
On line 19, change the sentence to: "The assignment of bits in the BASE-R PAM4 PMD training LP control, lane 0 register is shown in Table 45–90ak. The assignment of bits in the registers for lane 1 through lane 3 is equivalent to the assignment for lane 0.
Change the title of Table 45-90ak to "BASE-R PAM4 PMD training LP control, lane 0 register bit definitions"

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.118a** *P* **66** *L* **14** # 17

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

"16-bit" should not split across two lines.

SuggestedRemedy

us a non-breaking hyphen (Esc - h)

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.118a** *P* **66** *L* **22** # 18

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

The Table in 45.2.1.118a is after Table 45-90a as inserted by P802.3bv in 45.2.1.117a. This means that it should be Table 45-90b

SuggestedRemedy

Renumber Tables 45-90ak through 45-90an to be Tables 45-90b through 45-90e

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.118a** *P* **66** *L* **26** # 19

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

In Table 45-90ak, "1.1120.15:41" should be "1.1120.15"

SuggestedRemedy

Change "1.1120.15:41" to "1.1120.15"

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.118a** *P* **66** *L* **53** # 20

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

The sentence "Normally the bits in this register are read only; however, when training is disabled the registers become writeable." needs to be changed.

SuggestedRemedy

Change to "When training is not disabled, the bits in registers 1.1120 through 1.1123 are read only; however, when training is disabled the R/W bits become writeable."

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.119a** *P* **67** *L* **3** # 21

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

The title of 45.2.1.119a is not consistent with three separately named registers.
Table 45-90al only shows the assignment of bits for the first of the three registers.

SuggestedRemedy

Change the title to: "BASE-R PAM4 PMD training LP status, lane 0 through lane 3 registers (Register 1.1220 through 1.1223)".
On line 6, change the start of the sentence to: "The BASE-R PAM4 PMD training LP status, lane 0 through lane 3 registers reflect..."
On line 11, change the sentence to: "The assignment of bits in the BASE-R PAM4 PMD training LP status, lane 0 register is shown in Table 45–90al. The assignment of bits in the registers for lane 1 through lane 3 is equivalent to the assignment for lane 0.
Change the title of Table 45-90al to "BASE-R PAM4 PMD training LP status, lane 0 register bit definitions"

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.119a** *P* **67** *L* **43** # 22

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

In the row for 1.1220.2:0 in Table 45-90al, "Coefficient at limit and equalization limit" wraps onto the next line. This should be changed so that "limit" aligns with "Coefficient" rather than appearing in the bit columns

SuggestedRemedy

Move "limit" to align with "Coefficient"
Make the same change in Table 45-90an

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.120a** *P* **68** *L* **3** # 23

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

The title of 45.2.1.120a is not consistent with three separately named registers.
Table 45-90am only shows the assignment of bits for the first of the three registers.

SuggestedRemedy

Change the title to: "BASE-R PAM4 PMD training LD control, lane 0 through lane 3 registers (Register 1.1320 through 1.1323)".
On line 6, change the start of the sentence to: "The BASE-R PAM4 PMD training LD control, lane 0 through lane 3 registers reflect..."
On line 10, change the sentence to: "The assignment of bits in the BASE-R PAM4 PMD training LD control, lane 0 register is shown in Table 45–90am. The assignment of bits in the registers for lane 1 through lane 3 is equivalent to the assignment for lane 0.
Change the title of Table 45-90am to "BASE-R PAM4 PMD training LD control, lane 0 register bit definitions"

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.121a** *P* **69** *L* **3** # 24

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

The title of 45.2.1.121a is not consistent with three separately named registers.
Table 45-90an only shows the assignment of bits for the first of the three registers.

SuggestedRemedy

Change the title to: "BASE-R PAM4 PMD training LD status, lane 0 through lane 3 registers (Register 1.1420 through 1.1423)".
On line 6, change the start of the sentence to: "The BASE-R PAM4 PMD training LD status, lane 0 through lane 3 registers reflect..."
On line 11, change the sentence to: "The assignment of bits in the BASE-R PAM4 PMD training LD status, lane 0 register is shown in Table 45–90an. The assignment of bits in the registers for lane 1 through lane 3 is equivalent to the assignment for lane 0.
Change the title of Table 45-90an to "BASE-R PAM4 PMD training LD status, lane 0 register bit definitions"

Proposed Response *Response Status* **O**

Cl **069** *SC* **69.1.2** *P* **78** *L* **39** # 25

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

The inserted figure number in the P802.3cb draft has been changed from "Figure 69-2a" to "Figure 69-3"

SuggestedRemedy

Change "Figure 69-2a" to "Figure 69-3" here and on page 79, line 1

Proposed Response *Response Status* **O**

Cl **078** *SC* **78.1.4** *P* **90** *L* **17** # 26

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

For some inserted rows in Table 78-1 (e.g. 50GBASE-KRb), the entry in the "PHY or interface type" column ends with a dot at the same vertical position as the underline.

SuggestedRemedy

Remove the dots

Proposed Response *Response Status* **O**

Cl **091** *SC* **91.7.4.1** *P* **108** *L* **16** # 27

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **X**

PICS item TF11 has been modified to include 100GBASE-CR2, 100GBASE-KR2, 100GBASE-SR2, or 100GBASE-DR in the Feature column. However, the Status column contains "KP4:M" and "KP4" is "Used to form complete 100GBASE-KP4 PHY" which excludes the newly added PHY types.

SuggestedRemedy

In 91.7.3, change "*KP4":
Feature entry to "100GBASE-KP4, 100GBASE-CR2, 100GBASE-KR2, 100GBASE-SR2, or 100GBASE-DR"
Value/Comment entry to "Used to form complete 100GBASE-KP4, 100GBASE-CR2, 100GBASE-KR2, 100GBASE-SR2, or 100GBASE-DR PHY"
Also change PICS items RF4, RF12 to include the additional PHY types in the Feature column.

Proposed Response *Response Status* **O**

Cl **093A** *SC* **93A.1.4.2** *P* **318** *L* **41** # 39

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

Equation 93A-21 appears to be truncated at the top and the equation number appears twice.

SuggestedRemedy

"Shrink wrap" the equation and remove the second version of the equation number

Proposed Response *Response Status* **O**

Cl **093A** *SC* **93A.1.6** *P* **319** *L* **16** # 214

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

COM is taking far too long now because there are 5 dimensions to sweep instead of 3. It turns out that a good COM result can be found with either c(-2) or c(1) at zero: usually COM chooses this itself but it saves the industry time and cost if it's an explicit rule rule . This change reduces the sweep to 4 dimensions.

SuggestedRemedy

Add a restriction that either c(-2) or c(1) is zero.

Proposed Response *Response Status* **O**

Cl **093A** *SC* **93A.1.7** *P* **688** *L* # 177

Dawe, Piers Mellanox

Comment Type **E** *Comment Status* **X**

Eq 93A–37 can't be right: can't integrate with respect to y, to y.

SuggestedRemedy

Correct Eq 93A–37

Proposed Response *Response Status* **O**

Cl **116** *SC* **116.1.4** *P* **110** *L* **27** # 70

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

Comment i-164 against P802.3bs D3.0 proposes to change the title of Table 116-3 to be "PHY type and clause correlation (200GBASE optical)"

SuggestedRemedy

If comment i-164 against P802.3bs D3.0 changes the title of Table 116-3, reflect this change in the P802.3cd draft.

Proposed Response *Response Status* **O**

Cl **120** *SC* **120.5.7.2** *P* **113** *L* **27** # 33

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **X**

In "Precoding is enabled and disabled using variables precoder_down_tx_enable_i and precoder_down_rx_enable_i" The first variable precoder_down_tx_enable_i is correct as it controls precoding for the signal sent towards the PMD. However, precoder_down_rx_enable_i is not correct as it controls removing precoding from the signal received from the layer above this PMA. The second variable should be precoder_up_rx_enable_i as this controls removing precoding from the signal received from the PMD layer below.
Same issue with the three further instances of the variables below.

SuggestedRemedy

On lines 27, 30, 33, and 36, change "precoder_down_rx_enable_i " to "precoder_up_rx_enable_i "
On line 30, change "1.601" to "1.603 "
On line 31, change "45.2.1.116i" to "45.2.1.116k"

Proposed Response *Response Status* **O**

Cl **131** *SC* **131.1.2** *P* **117** *L* **18** # 68

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

"The MDI as specified in … use a 1-lane data path." should be "The MDI as specified in … uses a 1-lane data path."

SuggestedRemedy

Change "use" to "uses"

Proposed Response *Response Status* **O**

Cl **131** *SC* **131.5** *P* **124** *L* **4** # 69

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

"PMA below to the RS-FEC" should be "PMA below the RS-FEC"

SuggestedRemedy

Delete "to"

Proposed Response *Response Status* **O**

Cl **131** *SC* **131.5** *P* **124** *L* **22** # 147

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

All 50G PMDs are serial. So the Skew and Skew Variation at SP3 (transmitter MDI), SP4 (receiver MDI) and SP5 (PMD output) can't be different to those at SP2 (PMD input) because there is only one lane from SP2 to SP5.

SuggestedRemedy

Correct the Skew and Skew Variation limits for 50GBASE-CR, 50GBASE-KR, 50GBASE-SR, 50GBASE-FR and 50GBASE-LR.
If appropriate, list the skew values that would apply if there were an 2-lane 50G PMD. But they should not be required - almost all NICs would never see such a PMD even if it existed.

Proposed Response *Response Status* **O**

Cl **131** *SC* **131.5** *P* **124** *L* **23** # 220

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

Table 131-5 following Table 116-7 which follows Table 80-6 (but there is no requirement that they should be the same) has 80 ns for optical skew, and 100 ns for electrical (PCB), PMD and PMA skew. This is the same in ns as 802.3ba, but a total of 38,250 bits for 200G instead of 18,562.5, or twice as many bits to buffer. While this may not be as expensive as just a few bits in an optical module, some of this is an avoidable cost. The first thing to note is that all 50G PMDs are serial. Also, the Skew limits need updating according to the principles used there (see http://ieee802.org/3/ba/public/may08/anslow_01_0508.pdf). The unit interval here is 38 (or 19) ps not 97 ps, and the number of lanes is 4 not 10.

SuggestedRemedy

Change SP1 from 29 ns, ~771 UI to 16 ns, ~425 UI.
Change SP2 from 43 ns, ~1143 UI to 16 ns, ~425 UI.
Change SP3 from 54 ns, ~1435 UI to 16 ns, ~425 UI.
Change SP4 from 134 ns, ~3560 UI to 16 ns, ~425 UI.
Change SP5 from 145 ns, ~3852 UI to 16 ns, ~425 UI.
Change SP6 from 160 ns, ~4250 UI to 32 ns, ~850 UI.
Change "At FEC receive" from 180 ns, ~4782 UI to 52 ns, ~1,381 UI.
Make the equivalent changes in the following clauses.
If appropriate, list the skew values that would apply if there were a 2-lane 50G PMD. But they should not be required - almost all NICs would never see such a PMD even if it existed.

Proposed Response *Response Status* **O**

Cl **131** *SC* **131.5** *P* **124** *L* **24** # 28

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **X**

The principle used to calculate the UI equivalents in previous Skew tables (such as Table 80-6) was to find the exact UI value and then round to the nearest integer. If this is done for SP1 in Table 131-5, the result is 770.31 UI, which rounds to 770 UI (not 771 UI as shown in the table).

SuggestedRemedy

In Table 131-5 , change the Maximum Skew for 50GBASE-R FEC lane (UI) to:
770 for SP1
1142 for SP2
1434 for SP3
3559 for SP4
4781 for "At FEC receive"

Proposed Response *Response Status* **O**

Cl **131** *SC* **131.5** *P* **125** *L* **9** # 29

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **X**

The principle used to calculate the UI equivalents in previous Skew Variation tables (such as Table 80-7) was to find the exact UI value and then round to the nearest integer. If this is done for SP0 in Table 131-6, the result is 5.16 UI, which rounds to 5 UI (not 6 UI as shown in the table).

SuggestedRemedy

In Table 131-6 , change the Maximum Skew Variation (UI) to:
5 for SP0
5 for SP1
90 for SP4
106 for "At FEC receive"
10 for "At PCS receive"
Also, add the missing curly equals in front of the 10 for "At PCS receive"

Proposed Response *Response Status* **O**

Cl **131** *SC* **131.5** *P* **125** *L* **10** # 221

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

All 50G PMDs are serial so most of this skew variation can't exist. Where it does exist and matter is where a 2:1 PMA might exist, e.g. above the PMD on the Tx side or above a possible future 2-lane 50G PMD on the Rx side but below another PMA, e.g. in a module. The 1/2-lane module PMA is a completely different design to a host SerDes, and naturally, Tx and Rx sides are different designs. These relatively small FIFOs (just a few UI) are very expensive per UI in e.g. power, and consume some power even if never used.
The Skew Variation limits need updating according to the principles in http://ieee802.org/3/ba/public/may08/anslow_01_0508.pdf as explained in http://ieee802.org/3/cd/public/Jan17/wertheim_3cd_01_0117.pdf The unit interval here is 38 (or 19) ps not 97 ps.

SuggestedRemedy

Change SP1 from 0.2 ns, ~6 UI to 0.11 ns, ~3 UI.
Change SP2 from 0.4 ns, ~11 UI, to 0.11 ns, ~3 UI.
Change SP3 from 0.6 ns, ~16 UI to 0.11 ns, ~3 UI.
Change SP4 from 3.4 ns, ~90 UI to 0.11 ns, ~3 UI.
Change SP5 from 3.6 ns, ~96 UI to 0.11 ns, ~3 UI.
Change SP6 from 3.8 ns, ~101 UI, N/A to 0.22 ns, ~6 UI.
Change "At FEC receive" from 4 ns, ~107 UI to 0.42 ns, 11 UI.
Make the equivalent changes in the following clauses.
It doesn't matter much if the SP4,5,6 and "At PCS receive" limits are changed or not.
If appropriate, list the Skew Variations that would apply if there were a 2-lane 50G PMD.
But those numbers should not be required - almost all NICs would never see such a PMD even if it existed.

Proposed Response *Response Status* **O**

Cl **134** *SC* **134.2** *P* **143** *L* **41** # 61

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **X**

The parameters are defined by 131.3 which refers to 116.3.3.1 through 116.3.3.3. This means that "rx_bit" should be "rx_symbol"

SuggestedRemedy

Change "rx_bit" to "rx_symbol"

Proposed Response *Response Status* **O**

Cl **134** *SC* **134.5.3.3** *P* **149** *L* **49** # 85

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **X**

200/400G has added an optional feature to it's RS-FEC, degrade monitor. It's optional so maybe we should add it for 50G as well.

SuggestedRemedy

Add just the monitor by copying the last two paragraphs of 119.2.5.3 to the end of 134.5.3.3, changing PCS lanes to FEC lanes, add the appropriate MDIO registers for a degrade function outside of a PCS and the MDIO mappings to Table 134-1 and 134-2. No signalling of the status to be added, just the monitor. So it'd be an optional feature with status only available at one end of the link.

Proposed Response *Response Status* **O**

Cl **134** *SC* **134.7.2.2** *P* **157** *L* **11** # 56

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

"IEEE Std 802.3-201x" should be "IEEE Std 802.3cd-201x"

SuggestedRemedy

Change "IEEE Std 802.3-201x" to "IEEE Std 802.3cd-201x"

Proposed Response *Response Status* **O**

Cl **135** *SC* **135.5.7.2** *P* **172** *L* **30** # 30

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **X**

In "The variables precoder_up_tx_enable_i and precoder_up_rx_enable_i are always set to 0..." The first variable precoder_up_tx_enable_i is correct as it controls precoding for the signal sent towards the MAC. However, precoder_up_rx_enable_i is not correct as it controls removing precoding from the signal received from the layer below this PMA. The second variable should be precoder_down_rx_enable_i as this controls removing precoding from the signal received from the layer above.
Similar issues with the variables associated with the interface below the PMA.

SuggestedRemedy

On line 30, change "precoder_up_rx_enable_i " to "precoder_down_rx_enable_i "
On line 32, change "precoder_down_rx_enable_i " to "precoder_up_rx_enable_i "
On line 36, change "precoder_down_rx_enable_i " to "precoder_up_rx_enable_i "

Proposed Response *Response Status* **O**

Cl **135** *SC* **135.5.7.2** *P* **172** *L* **33** # 31

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **X**

This says "The variables precoder_down_tx_enable_i and precoder_down_rx_enable_i are always set to 0 in a PMA that does not have a physical instantiation of its service interface towards the PMD and is not adjacent to a PMD." The draft then goes on to list some PHY types where the PMA adjacent to the PMD may enable precoding. However the draft does not say what happens when the PMA is adjacent to the PMD for 50GBASE-SR, 50GBASE-FR, 50GBASE-LR, 100GBASE-SR2, and 100GBASE-DR

SuggestedRemedy

Add a new sentence at the end of 135.5.7.2: "In a PMA that is adjacent to any other PMD, precoder_down_tx_enable_i and precoder_up_rx_enable_i are always set to 0."

Proposed Response *Response Status* **O**

Cl **135** *SC* **135.5.7.2** *P* **172** *L* **36** # 32

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

The list of PMDs on lines 35 and 36 includes 200GBASE-CR4 and 200GBASE-KR4, but this clause covers "PMA sublayer, type 50GBASE-R and 100GBASE-P" so including requirements for 200G PHY types here is inappropriate.

SuggestedRemedy

Delete "200GBASE-CR4, or 200GBASE-KR4 PMD" and add "or " before "100GBASE-KR2"

Proposed Response *Response Status* **O**

Cl **135** *SC* **135.5.10.2** *P* **174** *L* **11** # 196

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

Generating SSPRQ dynamically is quite complicated, and generating several copies of it with offsets is more complicated. It's probably OK to use other patterns on the aggressors (see another comment against 121.8.5.1). Generating several offsets of SSPRQ then overwriting all but one of them with PRBS13Q is clumsy; generating a single SSPRQ among several lanes of PRBS31Q or scrambled idle is not supported by this draft.

SuggestedRemedy

If SSPRQ victim with other patterns for aggressors is acceptable, change the SSPRQ generator to a single-lane generator (no need for the multi-lane facility that PRBS13Q has). Change the registers in Clause 45 accordingly.

Proposed Response *Response Status* **O**

Cl **135** *SC* **135.5.10.2.3** *P* **174** *L* **34** # 195

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

SSPRQ is use on the Tx side only, as is clear from MDIO registers. Also it is not intended to be multiplexed up (i.e. one would not generate SSPRQ in a PMA with 50 Gb/s lanes to test a 100 Gb/s/lane PMD Tx, but one could generate it in the 100 Gb/s/lane PMA).

SuggestedRemedy

Change "A PMA may optionally include" to "A Tx direction PMA with the same number of output lanes as the PMD may optionally include"

Proposed Response *Response Status* **O**

Cl **135** *SC* **135.5.10.2.4** *P* **174** *L* **38** # 197

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

When the RIN measurement has been changed to a more convenient pattern such as PRBS13Q or possibly removed (see other comments)...

SuggestedRemedy

The square wave (quaternary) test pattern will be unnecessary, and it and the associated MDIO registers can be removed or reallocated to lane-specific SSPRQ.

Proposed Response *Response Status* **O**

Cl **135E** *SC* **135E.1** *P* **344** *L* **30** # 76

Ghiasi, Ali — Ghiasi Quantum LLC

Comment Type **ER** *Comment Status* **X**

One discuss SFP28 and QSFP28, I don't see the third conector

SuggestedRemedy

either change three connector to two or add the third connector

Proposed Response *Response Status* **O**

Cl **135F** *SC* **135F.3.2.1** *P* **353** *L* **28** # 215

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

Why does this have a precoder request when it is based on 120D in 802.3bs and I could not find anything about precoding in 802.3bs?

SuggestedRemedy

Reconcile

Proposed Response *Response Status* **O**

Cl **135G** *SC* **135G.3.2** *P* **359** *L* **14** # 2

Arumugham, Vinu — Amazon

Comment Type **T** *Comment Status* **X**

Wander (jitter frequency components under 10MHz) can be transferred across interfaces and can accumulate. If this is not accounted, it increases risk of failures.

SuggestedRemedy

For the module output test signal generation, the module should be excited with a signal modulated with maximum sinusoidal jitter amplitude specified by the applicable PMD specification. The SJ frequency should be the lowest specified frequency. If the module transfers wander, this test condition ensures that the transferred wander is observed at the module output. Since this sub-clause refers to 120E.3.2, the change will have to be implemented there.

Proposed Response *Response Status* **O**

Cl **135G** *SC* **135G.5.3** *P* **361** *L* **6** # 102

Dudek, Mike — Cavium

Comment Type **T** *Comment Status* **X**

The number of AC-coupled lanes is wrong.

SuggestedRemedy

Change to 2 indepentent lanes for 50GAUI-1 and 4 for 100GAUI-2.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.10** *P* **219** *L* **6** # 72

Zambell, Andrew — Amphenol

Comment Type **T** *Comment Status* **X**

The spec states "The channel insertion loss, return loss, COM, and the transmitter and receiver differential controlled impedance printed circuit
board parameters are provided informatively in 136A.1 through 136A.4."

Transmitter and receiver differential printed circuit board trace loss is 136A.4.
Channel insertion loss is 136A.5
Channel return loss is 136A.6
Channel Operating Margin (COM) is 136A.7.

SuggestedRemedy

Change "136A.1 through 136A.4" to "136A.4 through 136A.7"

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.12** *P* **224** *L* **28** # 83

Palkert, Thomas — Molex

Comment Type **T** *Comment Status* **X**

Referenced MDIs do not include recently available high density form factors

SuggestedRemedy

Add QSFP-DD as a referenced MDI. Change '(multi-lane MDI)' to '(four-lane MDI)' in line 38. Add new subsection 136.12.1 with text from presentation. Add new section 136.11.7.2.5 with text from presentation. (Use same crosstalk paths)

Proposed Response *Response Status* **O**

Cl **136** *SC* **136** *P* **184** *L* # 226

Greg McSorley — Amphenol Corp.

Comment Type **T** *Comment Status* **X**

There needs to be alternate interconnect solutions that allows for the higher density, SI performance and needed thermal performance that is required in this application

SuggestedRemedy

Propose the OSFP connector being developed in the OSFP-MSA. This connector system meets the needs of the requirements being specified in the latest revision. Will follow up with data and formal proposal.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.1** *P* **185** *L* **50** # 218

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

The crosstalk for 50GBASE-CR can be worse than for 200GBASE-CR4 (different zp). For identical cable and IC performance, this can make the BER worse. But I believe there is some slack in the 2.4e-4 BER number for 50G.

SuggestedRemedy

Increase the 2.4e-4 BER for 50GBASE-CR, 50GBASE-KR and 50GBASE-SR. Probably also 50GBASE-FR and 50GBASE-LR.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.1** *P* **185** *L* **50** # 219

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

These paragraphs taken together with p 186 line 12 create a requirement for a receiver to give the right BER (FLR) with any compliant transmitter and channel, which usurps the receiver interference tolerance spec and is too vague. We moved off this years ago in favour of clear and specific stressed sensitivity or RITT spec. soutput of a compliant PHY that has passed through a compliant cable assembly.

SuggestedRemedy

Change "are required to detect bits" to "are expected to detect bits" and "BER is required to be lower" to "BER is expected to be lower", for each text like this (there are several

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.1** *P* **209** *L* **4** # 80

Ghiasi, Ali — Ghiasi Quantum LLC

Comment Type **TR** *Comment Status* **X**

Clause 136 specification references clause 92 mated board where MDFEXT=4.8 mV and MDNEXT=1.8 mV are very high, the standard has not demonstrated a connector with such high amount of crosstalk can support max channel insertion loss.

SuggestedRemedy

Need proof/demonstration that worst case crosstalk as defined in CL92 supports max channel loss.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.6.1** *P* **189** *L* **19** # 148

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

The Skew and Skew Variation at SP3 (transmitter MDI), SP4 (receiver MDI) and SP5 (PMD output) can't be different to those at SP2 (PMD input) because there is only one lane from SP2 to SP5.

SuggestedRemedy

Correct the Skew and Skew Variation limits for 50GBASE-CR and 50GBASE-KR.
If appropriate, list the skew values that would apply if there were an electrical 2-lane 50G PMD. But they should not be required - almost all NICs would never see such a PMD even if it existed.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.7** *P* **191** *L* **41** # 34

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

The "PMA/PMD register name" for registers 1.1220 through 1.1223 are incorrect as are the "MDIO status variable" names.

SuggestedRemedy

In the "PMA/PMD register name" column for bits from registers 1.1220 through 1.1223, change "PMD" to "BASE-R PAM4 PMD" and add a comma before "lane" (20 instances)
In the "MDIO status variable" column for bits from registers 1.1220 through 1.1223, remove the numbers from the end as the variables in Clause 45 do not have these numbers. (20 instances)

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.8.1** *P* **192** *L* **40** # 142

Hidaka, Yasuo — Fujitsu Labs. of Ameri

Comment Type **T** *Comment Status* **X**

It is written as the test fixture specified in 136B.1.1 on line 40 and line 43, but 136B.1.1 specifies Mated test fixtures. It seems that a relevant reference may be 136B.1 which specifies Test fixtures and includes a reference to the test fixture spcified in 110B.1.1 and 92.11.1.

SuggestedRemedy

Change the reference to 136B.1.1 on line 40 with a reference to 136B.1.

Change the reference to 136B.1.1 on line 43 with a reference to 136B.1.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.8.1** *P* **192** *L* **53** # 143

Hidaka, Yasuo — Fujitsu Labs. of Ameri

Comment Type **T** *Comment Status* **X**

It is written as the cable assembly test fixture of 136B.1.1, but 136B.1.1 specifies Mated test fixtures. It seems that a relevant reference may be 136B.1 which specifies Test fixtures and includes a reference to the cable assembly test fixture spcified in 110B.1.2 and 92.11.2.

SuggestedRemedy

Change the reference to 136B.1.1 on line 53 with a referencer to 136B.1.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.8.7** *P* **195** *L* **1** # 149

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **X**

PMD lane-by-lane transmit disable function is optional in 92, 93 and 94. Also 138. Why should it be required in this clause?

SuggestedRemedy

Make it optional here and in 137. Delete "If MDIO is not implemented..." or change it to the usual sentence "If the optional PMD_transmit_disable_i function is not implemented in MDIO, an alternative method may be provided to independently disable each transmit lane."

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.8.11.1** *P* **196** *L* **10** # 150

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

If Transmission order is left-to-right then top-to-bottom, the cells are labelled or transmitted in reverse order.

SuggestedRemedy

If the diagram is correct, add words saying the cells are transmitted in reverse order, and preferably say why. If not, modify the diagram.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.8.11.1.3** *P* **197** *L* **33** # 81

Ghiasi, Ali — Ghiasi Quantum LLC

Comment Type **TR** *Comment Status* **X**

The text mentions four PRBS generartor but does not say what type of the PRBS genrator

SuggestedRemedy

Add PRBS 13 generator

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.8.11.3.5** *P* **201** *L* **24** # 86

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **X**

"Even parity ensures the resulting pattern is DC balanced". Which pattern? It's the DME encoded control channel (made up of the status and control fields) which it's ensuring is DC balanced.

SuggestedRemedy

Change "resulting pattern is" to "transmitted control and status fields (136.8.11.1.2) are"

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.8.11.3.5** *P* **201** *L* **24** # 151

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

Making a field DC balanced won't ensure what goes on the line after PAM4 and Gray coding is DC balanced.

SuggestedRemedy

Delete "Even parity ensures that the resulting pattern is DC balanced."?

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.8.11.5** *P* **202** *L* **12** # 152

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **X**

Unspecified pseudo-code is not proper, although much easier to guess what it means than a state diagram.

SuggestedRemedy

Say what language this is, with reference. Pascal and Matlab are understandable high-level languages used in the base doc.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.8.11.6** *P* **203** *L* **28** # 87

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **X**

The definition for a request is solely based on the control field changing. We added a parity bit in D1.2, and don't preculde designs from ignoring frames with invalid parity (you're allowed to ignore it if you want). So I think the timing now needs to account for the parity bit being validly set as well.

SuggestedRemedy

Change "A new request is defined to be a received training frame whose control field differs from the control field of the precedingtraining frame."
to "A new request is defined to be a received training frame whose control field differs from the control field of the preceding training frame and the received parity bit is properly set."
Since the acknowledgement already states "status field encoding" I think that covers parity transmission.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.8.11.7.1** *P* **205** *L* **12** # 88

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **X**

remote_rx_rdy is a direct mirror of the status bit received in the training frames. In clause 72 this variable is only updated to TRUE when 3 consecutive training frames with the status bit are received.

SuggestedRemedy

Change remote_rx_rdy and remote_tf_lock to be set to TRUE once 3 consecutive training frames are received with the appropriate field set.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.8.11.7.2** *P* **206** *L* **21** # 84

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **X**

The algorightm for setting the ic_sts is in 136.8.11.4, the current reference is to the definition of ic_sts field in the Status message. That definition does point you to 136.8.11.4 as well.

SuggestedRemedy

Change the reference to be 136.8.11.4 so you have 1 less level of indirection.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.1** *P* **211** *L* **5** # 153

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

I think the point is that the MDI (meaning either host i/o, or a mated connector) is NOT AC coupled because the cable is.

SuggestedRemedy

Delete "AC-coupled", the next sentence explains it correctly.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.1** *P* **211** *L* **5** # 74

Ghiasi, Ali — Ghiasi Quantum LLC

Comment Type **TR** *Comment Status* **X**

Clause 136 does not use low swing, it is confusing to use low swing with 1200 mV driver. If any thing it should be called high swing!

SuggestedRemedy

remove low swing

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.1** *P* **211** *L* **6** # 75

Ghiasi, Ali — Ghiasi Quantum LLC

Comment Type **TR** *Comment Status* **X**

The text is ambigous and uncessary long "AC-coupling within the plug connector, as defined in 136.12, allows for interoperability between components operating from different supply voltages"

SuggestedRemedy

AC-coupling incorporated into the receive plug connector, as defined in 136.12. No extra explanation needed.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.1** *P* **211** *L* **48** # 154

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **X**

120D.3.1.2.1

SuggestedRemedy

120D.3.1.2

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.1** *P* **211** *L* **48** # 155

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

Choosing a value for RLM. Elsewhere in P802.3bs and P802.3cd we have 0.95. 0.97 has been proposed but this would require a very linear measurement procedure as well as a very linear transmitter under test. This clause is measuring at TP2, so the measurement may not work as well as 120D's measurement at TP0a.

SuggestedRemedy

Change TBD to 0.95 magenta for now, check the measurement procedure in practice.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.3** *P* **211** *L* **34** # 198

Dawe, Piers — Mellanox

Comment Type **ER** *Comment Status* **X**

Clause 94 should be deprecated and we should not refer to it in new clauses. The same definitions and figure as in 94.3.12.3 are in 93.8.1.3 and 83E.3.1.2.

SuggestedRemedy

Change the references to 94.3.12.3 (five here, one in PICS 136.14.4.3, one in PICS 137.12.4.3) to 93.8.1.3 or 83E.3.1.2.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.3** *P* **211** *L* **47** # 222

Ran, Adee — Intel

Comment Type **T** *Comment Status* **X**

Several values in clause 136 are either TBD or marked in magenta.

A proposal for values was presented in http://www.ieee802.org/3/cd/public/adhoc/archive/ran_02082017_3cd_adhoc.pdf.

SuggestedRemedy

Replace TBDs and magenta items with numerical values in black.

An updated proposal will be presented.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.3** *P* **212** *L* **18** # 146

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

J4 (all but 1e-4 of the edges, or 1e-4*0.75 of the number of UI, divided between early and late, so 3.75e-5 per UI or 1.875e-5 per bit) is overkill for the spec BER of 2.4e-4, and J3 (1.875e-4 per bit) is a good match to the spec BER - just as J4 is a good match to the BER of 1e-5 (PCS FEC Symbol error ratio 1e-4) for 120D. Getting this right makes the spec better (more accurate, less performance left on the table) and reduces test time.

SuggestedRemedy

Change J4 to J3. In Eq 136-6 change Q4=3.8906 to Q3=3.2905, Q(Q3) = 5 x10^-4

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.3.1.1** *P* **213** *L* **39** # 144

Hidaka, Yasuo — Fujitsu Labs. of Ameri

Comment Type **T** *Comment Status* **X**

In equation (136-1), the term "+ j - M * i" should be a part of the index of r(m).

SuggestedRemedy

Change "r(m) + j - M * i" to "r(m + j - M * i)".

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.3.1.4** *P* **214** *L* **53** # 156

Dawe, Piers — Mellanox

Comment Type **ER** *Comment Status* **X**

Should not re-specify things that are already specified in a table.

SuggestedRemedy

Change "shall be between 0.005 and 0.05" to "shall be within the limits given for c(-1), c(0), and c(1) in Table 136-11, and so on; similarly in 136.9.3.1.5.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.1** *P* **215** *L* **44** # 134

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X**

In 136 there is text (in 136.1) which describes the need for sufficiently random bit error statistics to meet the FLR spec.
However, there is no reference in 136.9.4.1 that connects the Rx BER to the FLR specified in 136.1.

Consequently, the measured BER could meet the value in 136.9.4.1, but could fail the FLR specified in 138.1. The spec appears to have a hole in it.

SuggestedRemedy

In 136.1, add a sub section 136.1.1 "Bit error ratio" which contains all the BER and FLR requirements.

In 136.9.4.1 change
"When a PMD receiver is connected to a compliant transmitter whose peak-to-peak differential output voltage, as defined by 92.8.3.1 and measured at the preset 1 equalizer setting, is 1 200 mV, using a compliant cable assembly with the minimum insertion loss specified in 136.11.2, the PMD receiver shall operate at a BER better than 10-4."

To

"When a PMD receiver is connected to a compliant transmitter whose peak-to-peak differential output voltage, as defined by 92.8.3.1 and measured at the preset 1 equalizer setting, is 1 200 mV, using a compliant cable assembly with the minimum insertion loss specified in 136.11.2, the PMD receiver shall operate at the BERas specified in 136.1.1"
Fix the appropriate PIC

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.2** *P* **216** *L* **1** # 1

Arumugham, Vinu Amazon

Comment Type **T** *Comment Status* **X**

Separate interference tolerance (noise stress) and jitter tolerance (jitter stress) tests result in understressing the receiver.

SuggestedRemedy

Combine 136.9.4.2.2, 136.9.4.2.3 and apply both stress conditions simultaneously. This is the way it has been done in 83E, 120E and other specifications. Sinusoidal Jitter, Random Jitter and Bounded Uncorrelated Jitter must be applied simultaneously for a proper stress test.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.2** *P* **216** *L* **13** # 4

Arumugham, Vinu Amazon

Comment Type **E** *Comment Status* **X**

Table 136-13 describes a Test 1 and Test2. Table 136-15 also describes Test 1 and Test 2. Reading 136.9.4.2.3 (c) is a bit confusing at first.

SuggestedRemedy

Use a different name in one of the tables? Test A/B?

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.2** *P* **216** *L* **18** # 135

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X**

In Table 136-13, currently the FEC symbol error ratio upper limit is 1e-3. There's no text to link the FEC symbol error rate to the BER specified in 136.1. The FEC symbol errors should also be sufficently random , so that FEC frames aren't overwhelmed with bursty error statistics which then break the FLR requirement. For example, for sparse, stochastic errors, the FEC symbol error rate would be less than or equal to the BER.

SuggestedRemedy

In 136.1, add a sub section 136.1.1 "Bit error ratio" which contains all the BER and FLR requirements.
In Table 136-13, the allowed FEC symbol error ratio should refer to 136.1.1.
Fix the appropriate PIC

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.2** *P* **216** *L* **26** # 3

Arumugham, Vinu Amazon

Comment Type **T** *Comment Status* **X**

Table 136-13 has a DER value of 1E-4. 136.1 specifies BER of 2.4E-4. 136.9.4.2.3 calculates Q for 5E-5.

SuggestedRemedy

A note should be added to clarify the relationship or fix the apparent inconsistency.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.2** *P* **216** *L* **26** # 136

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X**

In Table 136-13, currently the DER_0 upper limit is 1e-4. This is lower than the allowed PAM4 symbol error ratio would be for stochastic errors with the BER specified in 136.1. Also there's no text to link the DER_0 to the BER specified in 136.1. The DER_0 should also have sufficently random errors , so that FEC frames aren't overwhelmed with bursty error statistics which then break the FLR requirement.

SuggestedRemedy

In 136.1, add a sub section 136.1.1 "Bit error ratio" which contains all the BER and FLR requirements.
In Table 136-13, the allowed DER_0 should refer to 136.1.1.
Fix the appropriate PIC

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.2.3** *P* **217** *L* **4** # 157

Dawe, Piers Mellanox

Comment Type **E** *Comment Status* **X**

If this list by letters is in the right order, equations 136-7, 136-5 and 136-6 aren't.

SuggestedRemedy

Make 136-7 come before 136-5 and 136-6, renumbering.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.2.3** *P* **217** *L* **7** # 82

Krishnasamy, Kumaran Broadcom Ltd

Comment Type **ER** *Comment Status* **X**

Where it says "Tr is measured using the method in 86A.5.3.3,...", it would be appropriate to refer to section "120E.3.1.5 Transition time" rather than section 86A.5.3.3.

SuggestedRemedy

Modify above sentence to "Tr is measured using the method in 120E.3.1.5,...".

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.2.3** *P* **217** *L* **8** # 97

Dudek, Mike Cavium

Comment Type **T** *Comment Status* **X**

It is not appropriate to measure risetime using the method in 86A.5.3.3 which is for an NRZ signal. There is a good method which doesn't need exceptions in 120E

SuggestedRemedy

Replace "Tr is measured using the method in 86A.5.3.3, with the exception that the observation filter bandwidth is 33 GHz instead of 12 GHz." with "Tr is measured using the method in 120E.3.1.5"

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.2.3** *P* **217** *L* **17** # 176

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

This says "set such that the SNDR matches the calculated SNRTX value". Transmitter measurements, presumably including SNDR, are made with a fourth-order Bessel-Thomson low-pass response with 33 GHz 3 dB bandwidth. It would be impractical to do them without a low-pass response. TXSNR seems to go into 93A–36 without any filtering. So it looks like the SNDR should be smaller than the TXSNR, not the same.

SuggestedRemedy

Change to "set such that the SNDR is 1? 2? dB smaller than the calculated SNRTX value"

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.2.3** *P* **217** *L* **20** # 224

Ran, Adee Intel

Comment Type **E** *Comment Status* **X**

The list of exceptions to the calibration process is currently empty except for a "TBD".

If there are no exceptions there is no need for this list.

SuggestedRemedy

Delete "with the following exceptions" and the list.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.2.3** *P* **217** *L* **20** # 103

Dudek, Mike — Cavium

Comment Type **TR** *Comment Status* **X**

There is a TBD here. Presently the method to measure SNDR in 120D.3.1.6 uses Np=200 which will equalize reflections in the test system which no reasonable receiver equalizer can be expected to equalize. This calibration can therefore seriously over-stress the Receiver.

SuggestedRemedy

Either amend to say "with the exception that Np=15" or change "SNDR matches the calculated SNRTX value. SNDR is measured at the Tx test reference using the procedure in 120D.3.1.6, with the following exceptions:
1) TBD " to "SNDR matches the value calculated by the equation.
SNDR=10*log(sqrt((10^-(SNRtx))^2 - sqrt(10^-(SNRisi)^2)) where SNDR is measured using the method of 120D.3.1.6 and SNRisi is measured using the method of 120D.3.1.7 with the exception that Nb is found in table 136-15

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.2.3** *P* **217** *L* **24** # 104

Dudek, Mike — Cavium

Comment Type **TR** *Comment Status* **X**

The equation for Add is wrong. Using this equation ADD can never be smaller than J4/2 this is obviously wrong as Add could be zero.

SuggestedRemedy

Fix the equation.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.2.3** *P* **217** *L* **31** # 137

King, Jonathan — Finisar

Comment Type **TR** *Comment Status* **X**

The Q4 value is inconsistent with the BER specified in 136.1, and is not the right value for Gray coded PAM4 signals.

SuggestedRemedy

The Q4 value should be 3.414 for Gray coded PAM4 signaling with a target BER of 2.4e-4; change the NOTE to say 'Q4 = 3.414 is consistent with the BER and target symbol error ratio for Gray coded PAM4', with editorial licence .

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.4.3.1** *P* **218** *L* **34** # 158

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **X**

Sinusoidal

SuggestedRemedy

sinusoidal

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11** *P* **209** *L* **18** # 77

Ghiasi, Ali — Ghiasi Quantum LLC

Comment Type **TR** *Comment Status* **X**

Type "asso0ciated"

SuggestedRemedy

associated

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11** *P* **219** *L* **12** # 106

Tracy, Nathan — TE Connectivity

Comment Type **T** *Comment Status* **X**

Proposing to add a new additional MDI to help enable new equipment designs.
Change from:
"……
Since 50GBASE-CR has two specified MDI connectors, single-lane (SFP28, specified in 110.11.1) and multi-lane (QSFP28, specified in 92.12), there are three possible combinations of the connectors at each end. The possible 50GBASE-CR cable assembly types are described in Annex 136C. 100GBASE-CR2 uses two lanes of the multi-lane QSFP28 (specified in 92.12). 200GBASE-CR4 uses four lanes of the multi-lane QSFP28 (specified in 92.12).
……"

SuggestedRemedy

Change to:
"…..
Since 50GBASE-CR has three specified MDI connectors, single-lane (SFP28, specified in 110.11.1 or microQSFP, specified in 136.12.1) and multi-lane (QSFP28, specified in 92.12 or microQSFP, specified in 136.12.1), there are three possible combinations of the connectors at each end. The possible 50GBASE-CR cable assembly types are described in Annex 136C. 100GBASE-CR2 uses two lanes of the multi-lane QSFP28 (specified in 92,12) or microQSFP (specified in 136.12.1). 200GBASE-CR4 uses four lanes of the multi-lane QSFP28 (specified in 92.12) or microQSFP (specified in 136.12.1). Note that microQSFP is a MDI that has multi-lanes but can also be used as a single-lane MDI due to its density.
….."

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.2** *P* **220** *L* **53** # 159

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

I don't remember that the technical feasibility of this spec has been established; the COM experts don't know what to do with the simpler KR spec.

SuggestedRemedy

In Task Force review, make changes to make this more Ethernet and less bleeding edge. Reduce the maximum cable loss and the 3 m headline. That's OK, you don't need a 3 m cable to cable a 7' rack if you plan it.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7** *P* **221** *L* **10** # 160

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

The device package model capacitances are more optimistic than C2C 200GAUI-4 Table 120D-8, which in turn are more optimistic than for CA-25G-N (Table 110-11). This makes it easier to make cables but harder to make hosts. I don't remember a demonstration of feasibility to justify these numbers.

SuggestedRemedy

Change to the 120D numbers, also in 137. Reduce the maximum cable loss and the 3 m headline.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7** *P* **221** *L* **41** # 162

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **X**

This says that the pole and zero frequencies are the same - so the filter is a no-op. But 93A.1.4.3 shows that fz and fz2 are not zero frequencies.

SuggestedRemedy

Either rename "Continuous time filter, zero frequencies" to "Continuous time filter, zero frequencies at unity DC gain". Or better, eliminate them; 93A.1.4.3 can use fp1 and fp2 instead. Should be coordinated with P802.3bs and may need a maintenance action for 92, 93, 110, 111.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7** *P* **222** *L* **14** # 161

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

The one-sided noise spectral density is 5.2e-8 for 100GBASE-CR4 and 25GBASE-CR including no-FEC, 2.6e-8 for C2C 200GAUI and 1.64e-8 here. Is this more than 3x improvement justified?

SuggestedRemedy

If appropriate, change to the 120D number, also in 137. Reduce the maximum cable loss and the 3 m headline.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7.1.2** *P* **223** *L* **1** # 163

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

near-end and alien far-end crosstalk

SuggestedRemedy

far-end and alien far-end crosstalk

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7.1.2** *P* **223** *L* **6** # 164

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

For 200GBASE-CR4, zp should be the same as for the victim.

SuggestedRemedy

151 mm for 200GBASE-CR4

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7.2.1** *P* **223** *L* **44** # 107

Tracy, Nathan — TE Connectivity

Comment Type **T** *Comment Status* **X**

Adding a new additional MDI to enable new equipment designs.
Change from:
136.11.7.2.1 SFP28 to SFP28
The SFP28 to SFP28 channel structure includes the signal path, one near-end crosstalk path and no alien far end
crosstalk. The signal and near-end crosstalk paths are used in calculation of COM.
The signal path is calculated using Equation (136-8).
The near-end crosstalk path is calculated using Equation (136-9).

SuggestedRemedy

Change To:
136.11.7.2.1 SFP28 to SFP28 or single-lane microQSFP to single-lane microQSFP
The SFP28 to SFP28 or single-lane microQSFP to single-lane microQSFP channel structure includes the signal path, one near-end crosstalk path and no alien far end crosstalk. The signal and near-end crosstalk paths are used in calculation of COM.
The signal path is calculated using Equation (136-8).
The near-end crosstalk path is calculated using Equation (136-9).

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7.2.2** *P* **224** *L* **1** # 108

Tracy, Nathan — TE Connectivity

Comment Type **T** *Comment Status* **X**

Adding a new additional MDI to enable new equipment designs.
Change From:
136.11.7.2.2 QSFP28 to SFP28
The QSFP28 to SFP28 channel structure includes the signal path, three alien far-end and one near-end crosstalk path. These five paths are used in calculation of COM. Crosstalk from transmitters on other SFP28 connectors is assumed to be insignificant.
The signal path is calculated using Equation (136-8).
The near-end crosstalk path is calculated using Equation (136-9), with k equal to 1.
The three alien far-end crosstalk paths are calculated using Equation (136-10), with k values from 1 to 3.

SuggestedRemedy

Change To:
136.11.7.2.2 QSFP28 (or microQSFP) to SFP28 (or microQSFP)
The QSFP28 (or microQSFP) to SFP28 (or microQSFP) channel structure includes the signal path, three alien far-end and one near-end crosstalk path. These five paths are used in calculation of COM. Crosstalk from transmitters on other SFP28 (or microQSFP) connectors is assumed to be insignificant.
The signal path is calculated using Equation (136-8).
The near-end crosstalk path is calculated using Equation (136-9), with k equal to 1.
The three alien far-end crosstalk paths are calculated using Equation (136-10), with k values from 1 to 3.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7.2.3** *P* **224** *L* **13** # 109

Tracy, Nathan TE Connectivity

Comment Type **T** *Comment Status* **X**

Adding a new additional MDI to enable new equipment designs.
Change From:
136.11.7.2.3 SFP28 to QSFP28
The SFP28 to QSFP28 channel structure includes the signal path, three alien far-end and four near-end crosstalk paths. These eight paths are used in calculation of COM.
The signal path is calculated using Equation (136-8).
The near-end crosstalk paths are calculated using Equation (136-9), with k values from 1 to 4.
The three alien far-end crosstalk paths are calculated using Equation (136-10), with k values from 1 to 3.

SuggestedRemedy

Change To:
136.11.7.2.3 SFP28 (or microQSFP) to QSFP28 (or microQSFP)
The SFP28 (or microQSFP) to QSFP28 (or microQSFP) channel structure includes the signal path, three alien far-end and four near-end crosstalk paths. These eight paths are used in calculation of COM.
The signal path is calculated using Equation (136-8).
The near-end crosstalk paths are calculated using Equation (136-9), with k values from 1 to 4.
The three alien far-end crosstalk paths are calculated using Equation (136-10), with k values from 1 to 3.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7.2.4** *P* **224** *L* **24** # 110

Tracy, Nathan TE Connectivity

Comment Type **T** *Comment Status* **X**

Adding a new additional MDI to enable new equipment designs.
Change From:
136.11.7.2.4 QSFP28 to QSFP28
The QSFP28 to QSFP28 channel structure includes the same paths defined for the SFP28 to QSFP28
channel, and COM is calculated in the same way, as defined in 136.11.7.2.3.

SuggestedRemedy

Change To:
136.11.7.2.4 QSFP28 (or microQSFP) to QSFP28 (or microQSFP)
The QSFP28 (or microQSFP) to QSFP28 (or microQSFP) channel structure includes the same paths defined for the SFP28 (or microQSFP) to QSFP28 (or microQSFP) channel, and COM is calculated in the same way, as defined in 136.11.7.2.3.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7.2.4** *P* **224** *L* **26** # 165

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

For 200GBASE-CR4, the FEXT isn't alien.

SuggestedRemedy

Modify text.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.12** *P* **224** *L* **30** # 111

Tracy, Nathan
TE Connectivity

Comment Type **T** *Comment Status* **X**

Adding a new additional MDI to enable new equipment designs.
Change From:
136.12 MDI specifications
This subclause defines the 50GBASE-CR, the 100GBASE-CR2, and the 200GBASE-CR4 Media Dependent Interface (MDIs). The MDI couples the PMD (specified in 136.8 and 136.9) to the cable assembly (specified in 136.11).

For 50GBASE-CR, the mechanical interface between the PMD and the cable assembly may be either a mated pair of connectors meeting the requirements of 110.11.1 (single-lane MDI) or a mated pair of connectors meeting the requirements of 92.12.1.1 (multi-lane MDI). The plug connector is used on the cable assembly and the receptacle is used on the PMD. For the multi-lane MDI, each of the paired transmit and receive lanes (SL0, DL0), (SL1, DL1), (SL2, DL2) or (SL3, DL3) may be used for the transmit and receive connections (SL and DL).

For 100GBASE-CR2 or 200GBASE-CR4, the mechanical interface between the PMD and the cable assembly is a mated pair of connectors meeting the requirements of 92.12.1.1 (multi-lane MDI). The plug connector is used on the cable assembly and the receptacle is used on the PMD. For 100GBASE-CR2 multilane MDI, the paired transmit and receive lanes for one PHY shall be (SL0, DL0) and (SL1, DL1), and if a second PHY uses the same MDI connector it uses (SL2, DL2) and (SL3, DL3).

For 50GBASE-CR, 100GBASE-CR2 and 200GBASE-CR4 plug connectors, the receive lanes are AC-coupled; the AC-coupling shall be within the plug connectors. It should be noted that there may be various methods for AC-coupling in actual implementations. The low-frequency 3 dB cutoff of the AC-coupling shall be less than 50 kHz. It is recommended that the value of the coupling capacitors be 100 nF. The capacitor limits the inrush charge and baseline wander

SuggestedRemedy

Change To:
136.12 MDI specifications
This subclause defines the 50GBASE-CR, the 100GBASE-CR2, and the 200GBASE-CR4 Media Dependent Interface (MDIs). The MDI couples the PMD (specified in 136.8 and 136.9) to the cable assembly (specified in 136.11).

For 50GBASE-CR, the mechanical interface between the PMD and the cable assembly may be either of three options: a mated pair of connectors meeting the requirements of 110.11.1 (single-lane MDI) or a mated pair of connectors meeting the requirements of 92.12.1.1 (multi-lane MDI) or a mated pair of connectors meeting the requirements of 136.12.1 (single-lane or multi-lane MDI). The plug connector is used on the cable assembly and the receptacle is used on the PMD. For the multi-lane MDI, each of the paired transmit and receive lanes (SL0, DL0), (SL1, DL1), (SL2, DL2) or (SL3, DL3) may be used for the transmit and receive connections (SL and DL). In cases where the connector meeting the requirements of 136.12.1 (multi-lane MDI) is used for a single-lane 50GBASE-CR cable, the paired transmit and receive lanes for one PHY shall be (SL0, DL0).

For 100GBASE-CR2 or 200GBASE-CR4, the mechanical interface between the PMD and the cable
assembly is a mated pair of connectors meeting the requirements of 92.12.1.1 (multi-lane MDI) or 136.12.1 (multi-lane). The plug connector is used on the cable assembly and the receptacle is used on the PMD. For 100GBASE-CR2 multilane MDI, the paired transmit and receive lanes for one PHY shall be (SL0, DL0) and (SL1, DL1), and if a second PHY uses the same MDI connector it uses (SL2, DL2) and (SL3, DL3).

For 50GBASE-CR, 100GBASE-CR2 and 200GBASE-CR4 plug connectors, the receive lanes are
AC-coupled; the AC-coupling shall be within the plug connectors. It should be noted that there may be
various methods for AC-coupling in actual implementations. The low-frequency 3 dB cutoff of the
AC-coupling shall be less than 50 kHz. It is recommended that the value of the coupling capacitors be
100 nF. The capacitor limits the inrush charge and baseline wander.
136.12.1 Style-1 50GBASE-CR, 100GBASE-CR2, 200GBASE-CR4 MDI connector
The Style-1 MDI connector can support all three cable types described by this clause. The connector for each end of the cable assembly shall be the microQSFP connector plug with the mechanical mating interface defined in the microQSFP MSA Specification and illustrated in Figure 136-11. The MDI connector shall be the microQSFP receptacle with the mechanical mating interface defined by the microQSFP MSA Specification and illustrated in Figure 136-12. These connectors have contact assignments that are listed in Table 136-16, and electrical performance consistent with the signal quality and electrical requirements of 136.9 and 136.10. This MDI can be applied in 1-lane, 2-lane and 4-lane applications due to its port density.

The Style-1 MDI connector of the 50GBASE-CR, the 100GBASE-CR2, and the 200GBASE-CR4 PMD comprises 38 signal connections. The Style-1 50GBASE-CR, 100GBASE-CR2, and 200GBASE-CR4 MDI connector contact assignments shall be as defined in Table 136-16. Note that the source lanes (SL), signals SLi<p>, and SLi<n> are the positive and negative sides of the transmitters differential signal pairs and the destination lanes (DL) signals, DLi<p>, and DLi<n> are the positive and negative sides of the receivers differential signal pairs for lane i (i = 0, 1, 2, 3).

See supplemental file sent with comment file for 2 Figures and one Table that accompany this new material.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.12** *P* **224** *L* **37** # 166

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

50GBASE-CR has only 1 lane so it can't have a multi-lane MDI.

SuggestedRemedy

multi-link MDI? multi-PMD MDI?

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.14.4.1** *P* **228** *L* **52** # 35

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

In items PF8, PF9, and PF10, "45.2.1.2.3", "45.2.1.7.4", and "45.2.1.7.5" should be cross-references

SuggestedRemedy

Make them cross-references

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.14.4.4** *P* **230** *L* **38** # 36

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

+/- 100 ppm should not be on the next line

SuggestedRemedy

Remove the line break

Proposed Response *Response Status* **O**

Cl **136A** *SC* **136A.4** *P* **363** *L* **41** # 78

Ghiasi, Ali — Ghiasi Quantum LLC

Comment Type **TR** *Comment Status* **X**

The maximum insertion loss from TP0 to TP2 or from TP3 to TP5 is defined in clause to be 10.07 dB but in clause 135G is 10.2 dB

SuggestedRemedy

Increase the loss from 10.07 to 10.2 dB in the text and on figure 136A-1 and andjust the end to end loss from 28.9 dB to 29.2 dB

Proposed Response *Response Status* **O**

Cl **136B** *SC* **136B.1.1.1** *P* **367** *L* **43** # 199

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

To calibrate the measurements with the MCB, we need the reference loss of the mated compliance boards.

SuggestedRemedy

Add the mated compliance board reference loss, by reference to (136A–2).

Proposed Response *Response Status* **O**

Cl **136B** *SC* **136B.1.1.6** *P* **368** *L* **17** # 95

Dudek, Mike — Cavium

Comment Type **E** *Comment Status* **X**

It would be helpful to include the form factors (SFP29 and QSFP) in the table titles.

SuggestedRemedy

Change the title of Table 136B-1 to "SFP28 mated test fixture integrated near-end crosstalk noise parameters" and the title of table 136B-2 to "QSFP mated test fixture integrated crosstalk noise parameters"

Proposed Response *Response Status* **O**

Cl **136B** *SC* **136B.1.1.6** *P* **368** *L* **29** # 79

Ghiasi, Ali — Ghiasi Quantum LLC

Comment Type **TR** *Comment Status* **X**

The amount of crosstalk as defined in CL 92 with PSXT 5.13 mV is so high that even chip-module specification with 10 dB does not work, see
http://www.ieee802.org/3/bs/public/adhoc/elect/20Feb_17/ghiasi_01_022017_elect.pdf

SuggestedRemedy

Need proof/demonstration that worst case crosstalk as defined in CL92 supports max channel loss

Proposed Response *Response Status* **O**

Cl **136B** *SC* **136B.1.1.6** *P* **368** *L* **31** # 216

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

Mated compliance board crosstalk specs need tightening for PAM4.

SuggestedRemedy

Tighten at least to be equivalent to the OIF limits: ICN<3.9 mV RMS, MDNEXT <1.35 mV RMS, MDFEXT <3.6 mV RMS.

Proposed Response *Response Status* **O**

Cl **136C** *SC* **136C.1** *P* **371** *L* **16** # 112

Tracy, Nathan — TE Connectivity

Comment Type **T** *Comment Status* **X**

Adding a new additional MDI to enable new equipment designs.
Change From:
"…..
Hosts have two specified MDI connectors, single-lane (SFP28, specified in 110.11.1) and multi-lane (QSFP28, specified in 92.12). ……."

SuggestedRemedy

Change To:
"…..
Hosts have three specified MDI connectors, single-lane (SFP28, specified in 110.11.1), multi-lane (QSFP28, specified in 92.12) and multi-lane (microQSFP, specified in 136.12.1). ……."

Proposed Response *Response Status* **O**

Cl **136C** *SC* **136C.1** *P* **371** *L* **22** # 96

Dudek, Mike — Cavium

Comment Type **T** *Comment Status* **X**

There are significant differences between the parameters specified in 136.11 and those specified for 100GBASE-CR4. (COM is significantly different, insertion loss is different etc.) It is not helpful to reference clause 92 and just say the frequency is a little different.

SuggestedRemedy

Delete "These specifications are based on the 100GBASE-CR4 cable assembly specifications (see 92.10) with referenced parameters specified at 13.28 GHz to account for the increase in signaling rate."

Proposed Response *Response Status* **O**

Cl **136C** *SC* **136C.1** *P* **371** *L* **30** # 98

Dudek, Mike — Cavium

Comment Type **T** *Comment Status* **X**

Lengths are not included in table 136C-1 and therefore shouldn't be included in this sentence.

SuggestedRemedy

Change "The possible combinations of host form factors, cable assembly form factors and lengths are summarized in Table 136C–1." to "The possible combinations of host form factors and cable assembly form factors are summarized in Table 136C–1."

Proposed Response *Response Status* **O**

Cl **136C** *SC* **136C.2.3** *P* **372** *L* **14** # 114

Tracy, Nathan TE Connectivity

Comment Type **T** *Comment Status* **X**

Adding a new additional MDI to enable new equipment designs.
Need to add a new paragraph to describe the new MDI.

SuggestedRemedy

Insert new Paragraph:
136C.2.3 microQSFP host form factor
A microQSFP MDI has four available lanes and can be used in either single-lane applications or multi-lane applications.

A host may use the microQSFP receptacle specified in 136.12.1 as the MDI for one or two 100GBASE-CR2 PHYs or one 200GBASE-CR4 PHY. This is referred to as a microQSFP host form factor.

A microQSFP form factor host can also form up to four 50 Gb/s links to either another microQSFP form factor host, using a microQSFP to microQSFP form factor cable assembly (see 136C.3.x), or to a QSFP28 form factor host using a microQSFP to QSFP28 form factor cable assembly (see 136C.3.x) or to four separate microQSFP form factor hosts using a microQSFP to 4×microQSFP form factor cable assembly (see 136C.3.x) or to four separate SFP28 form factor hosts using a microQSFP to 4xSFP28 form factor cable assembly (see 136C.3.x).

Proposed Response *Response Status* **O**

Cl **136C** *SC* **136C.3** *P* **374** *L* **30** # 115

Tracy, Nathan TE Connectivity

Comment Type **T** *Comment Status* **X**

Adding a new additional MDI to enable new equipment designs.
Need to insert a new paragraph to describe microQSFP to SFP28 Cables

SuggestedRemedy

Add new Paragraph:
136C.3.x SFP28 to microQSFP cable assembly form factor
The SFP28 to microQSFP cable assembly has one SFP28 plug, specified in 110.11.1, and one microQSFP plug, specified in 136.12.1. It may be used to connect one SFP28 form factor host to one microQSFP form factor host (see 136C.2.1 and 136C.2.3) with a single 50 Gb/s link. The cable assembly is illustrated in Figure 136C-x. The electrical characteristics of a cable assembly for this form factor are specified in 136.11, using the definitions in 136.11.7.2.1.

Need SFP to microQSFP cable image (TE will supply)

Proposed Response *Response Status* **O**

Cl **136C** *SC* **136C.3** *P* **374** *L* **31** # 116

Tracy, Nathan TE Connectivity

Comment Type **T** *Comment Status* **X**

Adding a new additional MDI to enable new equipment designs.
Need to add a paragraph to describe QSFP28 to microQSFP cables

SuggestedRemedy

Add new Paragraph
136C.3.x QSFP28 to microQSFP cable assembly form factor
The QSFP28 to microQSFP cable assembly has one QSFP28 plug, specified in 92.12.1.1, and one microQSFP plug, specified in 136.12.1. It may be used to connect one QSFP28 form factor host to one microQSFP form factor host (see 136C.2.2 and 136C.2.3) with up to four 50 Gb/s links. The cable assembly is illustrated in Figure 136C-x. The electrical characteristics of a cable assembly for this form factor are specified in 136.11, using the definitions in 136.11.7.2.4.

See supplemental file for image to go with this paragraph

Proposed Response *Response Status* **O**

Cl **136C** *SC* **136C.3** *P* **374** *L* **32** # 117

Tracy, Nathan TE Connectivity

Comment Type **T** *Comment Status* **X**

Adding a new additional MDI to enable new equipment designs.
Need to add a paragraph to describe microQSFP to 4xSFP28 cables.

SuggestedRemedy

Add new paragraph:
136C.3.x microQSFP to 4×SFP28 cable assembly form factor
The microQSFP to 4×SFP28 cable assembly has a microQSFP plug as specified in 136.12.1 on one end, and four SFP28 plugs as specified in 110.11.1 on the other end. It may be used to connect a microQSFP form factor host (see 136C.2.3) to up to four SFP28 form factor hosts (see 136C.2.1) with one 50 Gb/s link to each SFP28 host. The cable assembly is illustrated in Figure 136C-x. The electrical characteristics of a cable assembly for this form factor are specified in 136.11, using the definitions in 136.11.7.2.2 and 136.11.7.2.3.

See image in supplemental file provided with comment file

Proposed Response *Response Status* **O**

Cl **136C** *SC* **136C.3** *P* **374** *L* **33** # 118

Tracy, Nathan TE Connectivity

Comment Type **T** *Comment Status* **X**

Adding a new additional MDI to enable new equipment designs.
Need to add a paragraph to describe microQSFP to 4x microQSFP cables.

SuggestedRemedy

Add new Paragraph:
136C.3.x microQSFP to 4×microQSFP cable assembly form factor The microQSFP to 4×microQSFP cable assembly has a microQSFP plug as specified in 136.12.1 on one end, and four microQSFP plugs as specified in 136.12.1 on the other end. It may be used to connect a microQSFP form factor host (see 136C.2.3) to up to four microQSFP form factor hosts (see 136C.2.3) with one 50 Gb/s link to each microQSFP host. The cable assembly is illustrated in Figure 136C-x. The electrical characteristics of a cable assembly for this form factor are specified in 136.11, using the definitions in 136.11.7.2.2 and 136.11.7.2.3.

See image in supplemental file

Proposed Response *Response Status* **O**

Cl **136C** *SC* **136C.1** *P* **371** *L* **43** # 113

Tracy, Nathan TE Connectivity

Comment Type **T** *Comment Status* **X**

Adding a new additional MDI to enable new equipment designs.
Need to add additional items to Table 136C-1 so it includes all cable types resulting from the new MDI.

SuggestedRemedy

Additional material to be added (see also supplemental file sent with comment file for table format and content):
Cable Assembly Form FactorHost First EndHosts Second End
SFP28 to microQSFP (single-lane) SFP28microQSFP
microQSFP (single-lane) to microQSFP (single-lane)microQSFPmicroQSFP
QSFP28 to microQSFPQSFP28microQSFP
microQSFP to microQSFPmicroQSFPmicroQSFP
microQSFP to 4xmicroQSFPmicroQSFP4x microQSFP
microQSFP to 4xSFP28microQSFP 4x SFP28

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.10** *P* **239** *L* **47** # 71

Zambell, Andrew Amphenol

Comment Type **E** *Comment Status* **X**

When comparing tables 136-15 (COM for cables) and 137-5 (COM for backplanes) the values in both are exactly the same. Instead of refering to table 137-5 in line 47, can we delete table 137-5 and instead refer to table 136-15 on page 221-222? There are no tables after 137-5 in Clause 137 so no other tables need to change.

This was done in Clause 92 of IEEE 802.3bj on p192,
"COM is computed using the procedure in 93A.1 with the Test 1 and Test 2 values in Table 93 8 and the signal paths defined in 92.10.7.1 and 92.10.7.2."

SuggestedRemedy

Change "The Channel Operating Margin (COM) is computed using the procedure in 93A.1 with the values in Table 137 5..."
to
"The Channel Operating Margin (COM) is computed using the procedure in 93A.1 with the values in Table 136 15..."

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.1** *P* **239** *L* **48** # 145

Hidaka, Yasuo — Fujitsu Labs. of Ameri

Comment Type **TR** *Comment Status* **X**

Package parameters of Rd (termination resistance) and Zc (package transmission line impedance) have interaction between channel and Tx, and between channel and Rx. Namely, the worst-case values of Rd and Zc depends on channel. The current COM does not take account of this interaction. As a result, the current spec is optimistic by 0.6dB of COM. In addition, 0.6dB of COM must be squeezed to allocate for the variation of Rd and Zc.
There is a heuristics to shorten simulation time for option A.

Option A:
Test channel with all combinations of max and min values of Rd and Zc in Tx and Rx.
Calibrate test channel for Rx ITT with typical values of Rd and Zc.

Option B.
Test channel with typical values of Rd and Zc in Tx and Rx.
Use different COM criteria between channel and Rx ITT.
Calibrate test channel for Rx ITT with typical values of Rd and Zc.

The following are possible scenarios to squeeze margin for variation:

Scenario 1:
To keep the Tx and channel requirements same, and tighten Rx by 0.6dB:
Option A: change COM criteria to 2.4dB for channel, 2.4dB for Rx ITT.
Option B: change COM criteria to 3.0dB for channel, 2.4dB for Rx ITT.

Scenario 2:
To keep the Tx requirements same, and tighten channel and Rx equally by 0.3dB for each:
Option A: chagne COM criteria to 2.7dB for channel, 2.7dB for Rx ITT.
Option B: change COM criteria to 3.3dB for channel, 2.7dB for Rx ITT.

Scenario 3:
To tighten Tx, channel, Rx equally by 0.2dB for each:
Option A: change COM criteria to 2.6dB for channel, 2.8dB for Rx, and tighten Tx spec by somehow equivalent to 0.2dB COM.
Option B: change COM criteria to 3.2dB for channel, 2.8dB for Rx, and tighten Tx spec by somehow equivalent to 0.2dB COM.

SuggestedRemedy

I recommend either option A + scenario 2 or option B + scenario 2.

Option A + Scenario 2:
Test channel with all combinations of max and min values of Rd and Zc in Tx and Rx.
Calibrate test channel for Rx ITT with typical values of Rd and Zc.
Change COM criteria to 2.7dB for channel, and 2.7dB for Rx ITT.

Option B + Scenario 2:
Test channel with typical values of Rd and Zc in Tx and Rx.
Calibrate test channel for Rx ITT with typical values of Rd and Zc.
Change COM criteria to 3.3dB for channel, and 2.7dB for Rx ITT.

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.1** *P* **240** *L* **10** # 93

Mellitz, Richard — Samtec

Comment Type **TR** *Comment Status* **X**

A single value for Zc, Rd, and Cd for two different lengths values does not represent a package should strive to use parameters tied to transmitter and receiver limits.

SuggestedRemedy

To better match the return loss limit proposed:
Change Zc to 85 ohms which is more line in line with 120D.

For the 30 mm package change
C_d to 0.25 e-4 nf
Rd to 55 ohms
Av,Afe to 0.42 V
Ane to 0.64 V

For the 12 mm package change
C_d to 0.18 e-4 nf
Rd to 45 ohms
Av,Afe to 0.38 V
Ane to 0.58 V

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.8.7** *P* **237** *L* **37** # 99

Dudek, Mike — Cavium

Comment Type **T** *Comment Status* **X**

The sub-section is labelled lane by lane transmit disable for the text says global transmit diable and conflicts with 137.8.6

SuggestedRemedy

Change "global" to "lane-by-lane"

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.9** *P* **238** *L* **1** # 6

Arumugham, Vinu Amazon

Comment Type **T** *Comment Status* **X**

No channel characteristic/reference impedance requirements.

SuggestedRemedy

Add a sub-clause stating: The nominal differential characteristic impedance of the channel is 100 Ω. The differential reference impedance shall be 100 Ω. The common mode reference impedance shall be 25 Ω.

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.9.2** *P* **238** *L* **22** # 100

Dudek, Mike Cavium

Comment Type **T** *Comment Status* **X**

The value of Nb for the calculation of SNRisi is also an exception to Table 120D-1.

SuggestedRemedy

Add to exception 4) "and the value of Nb is taken from table 137-5"

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.9.2** *P* **238** *L* **24** # 94

Dudek, Mike Cavium

Comment Type **T** *Comment Status* **X**

The editor's note is correctly identifying a problem.

SuggestedRemedy

Add exception 5). The value of SNDR (min) is 32.5dB Chamge TC10 PICS to match.

and delete the editor's note.

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.9.3** *P* **232** *L* **35** # 167

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

We don't yet know how to write a spec for 30 dB channels that isn't bleeding edge for ICs and/or channels. This isn't Ethernet "broad market" today, it's a specialist niche.

SuggestedRemedy

Keep working on it in Task Force review or reduce the 30 dB objective. Reduce the high loss RITT loss. It might be OK to leave the channel recommended insertion loss limit if the COM spec protects the Tx and Rx.

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.9.3** *P* **238** *L* **33** # 101

Dudek, Mike Cavium

Comment Type **T** *Comment Status* **X**

There are not RS-FEC symbol error ratio values in Tables 120D-6 and 120D-7. They are called PCS FEC Symbol error ratio there.

SuggestedRemedy

Change the bullet to say. "PCS FEC Symbol error ratio is replaced by RS-FEC Symbol error ratio and the values in Table 120D–6 and Table 120D–7 are all 10-3."

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.9.3** *P* **238** *L* **38** # 5

Arumugham, Vinu Amazon

Comment Type **T** *Comment Status* **X**

Separate interference tolerance (noise stress) and jitter tolerance (jitter stress) tests result in understressing the receiver.

SuggestedRemedy

Combine 120D.3.2.1, 120D.3.2.2 and apply both stress conditions simultaneously. This is the way it has been done in 83E, 120E and other specifications. Sinusoidal Jitter, Random Jitter and Bounded Uncorrelated Jitter must be applied simultaneously for a proper stress test. Add pointer in this clause to the new combined 120D sub-clause.

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.9.3.1** *P* **238** *L* **48** # 92

Mellitz, Richard — Samtec

Comment Type **TR** *Comment Status* **X**

The differential return loss is left over from Clause 93. The COM package parameters have changed to meet the 30 dB IL objective per kareti_3cd_01_0916. A return loss should be chosen based on those recommendation for a short and long package.

SuggestedRemedy

Change equation 137-1 to
RL_d(f) >=
{ 15.05 - f, 0.05 <= f <= 6 }
{ 9.5 - 0.075f, 6 < f <= 19 }
A Presentation will be made available if needed.
This essentially shifts the clause 93 RL_d limit down by 3 dB to accommodate PAM4 signaling

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.10** *P* **239** *L* **48** # 105

Dudek, Mike — Cavium

Comment Type **TR** *Comment Status* **X**

Work has been presented in http://grouper.ieee.org/groups/802/3/cd/public/adhoc/archive/hidaka_020117_3cd_adhoc.pdf that shows that the existing values for Rd and Zc do not provide the worst case performance for expected transmitters that would pass the Transmitter specifications. For the channels analyzed the hole in the specifcation is up to approx 0.6dB in COM

SuggestedRemedy

Either change the required channel COM to 3.6dB while leaving the receiver interference tolerance COM calibration at 3.0dB (and consider changing the values of Rd and Zc to the nominal values of 100 Ohm and 50 Ohm)
Or. Add tests using multiple different sets of Rd and Zc to cover +/-10% variation from the nominal values. If this change is made then change the channel return loss to be informative by replacing "shall meet" to "are recommended to meet" on page 239 line 53

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.10** *P* **240** *L* **1** # 73

Zambell, Andrew — Amphenol

Comment Type **T** *Comment Status* **X**

The units in the units column for some of the parameters of tables 136-15 and 137-5 are not exactly the same.

The two pre-curors and one post-cursor have one "dash" (-) in table 136-15 and three "dashes" in table 137-5.

The second zero (fz2) and second pole (fp2) in table 136-15 have a "dash" but in table 137-5 has units of GHz.

b_max has one "dash" in table 136-15 and two "dashes" in table 137-5.

The DFE parameter (Nb) has a "dash" in table 136-15 but units of UI in table 137-5. (IEEE 802.3bj uses UI for this parameter but IEEE 802.3by uses the "dash").

If my other comment about deleting table 137-5 is approved, I will withdraw this comment.

SuggestedRemedy

Make the units in table 136-15 and table 137-5 the same.

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.10** *P* **240** *L* **10** # 225

Ran, Adee — Intel

Comment Type **T** *Comment Status* **X**

Device package model parameters are not aligned with the return loss specifications, which are based on Table 120D–1 (which points to 93.8.1.4, where the package model is much more relaxed).

A similar comment was submitted to 802.3bs and a presentation for updated RL specification will be submitted.

SuggestedRemedy

Either revert to the package model in annex 93A or change the return loss specification.

Presentation will be sent.

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.10** *P* **240** *L* **46** # 223

Ran, Adee Intel

Comment Type **T** *Comment Status* **X**

Several values in clause 137 are either TBD or marked in magenta.

A proposal for values was presented in http://www.ieee802.org/3/cd/public/adhoc/archive/ran_02082017_3cd_adhoc.pdf.

SuggestedRemedy

Replace TBDs and magenta items with numerical values in black.

An updated proposal will be presented.

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.12.4.1** *P* **245** *L* **48** # 37

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

In items PF8, PF9, and PF10, "45.2.1.2.3", "45.2.1.7.4", and "45.2.1.7.5" should be cross-references

SuggestedRemedy

Make them cross-references

Proposed Response *Response Status* **O**

Cl **138** *SC* **138** *P* **249** *L* **1** # 168

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

This -SRn draft is a good baseline but we have seen surprisingly little activity to develop it - no indication that these numbers actually work with technical and economic feasibility.

SuggestedRemedy

While in Task Force review, show some evidence: eyes, receiver waterfall plots, TDECQ measurements and so on. Adjust the draft as appropriate.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.1** *P* **249** *L* **8** # 65

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

The single mode clauses have a sentence such as: "The optical signals generated by these two PMD types are modulated using a 4-level pulse amplitude modulation (PAM4) format. " as the second sentence of the introduction to make it clear that this is PAM4.

SuggestedRemedy

Add a new second sentence "The optical signals generated by these three PMD types are modulated using a 4-level pulse amplitude modulation (PAM4) format. "

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.1** *P* **249** *L* **28** # 170

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

I believe the LAUI-2 won't work below the FEC.

SuggestedRemedy

Move both LAUI rows to just above the FEC. Also for the CAUIs in Table 138-2.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.1** *P* **249** *L* **40** # 169

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

Table 95-1 has an important footnote that should apply here.

SuggestedRemedy

Add footnote to RS-FEC: The option to bypass the Clause 91 RS-FEC correction function is not supported. Also for Table 138-2, and maybe 139-1. If such an option exists for the 200G PCS, add similar footnote to Table 138-3.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.1.1** *P* **252** *L* **1** # 40

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

"Clause 120" and "Clause 119" on line 4 should be cross-references
Also applies to "116.4" page 253, line18

SuggestedRemedy

Make them cross-references

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.2** *P* **252** *L* **52** # 60

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **X**

The parameters are defined by 131.3 which refers to 116.3.3.1 through 116.3.3.3. This means that "rx_bit" should be "rx_symbol"

SuggestedRemedy

Change "rx_bit" to "rx_symbol"

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.2** *P* **252** *L* **52** # 171

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **X**

Font size

SuggestedRemedy

Remove the override for:
a poor quality link to provide sufficient light for a SIGNAL_DETECT = OK indication and still not meet the BER defined in 138.1.1.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.5** *P* **254** *L* **41** # 41

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

This says "The 100GBASE-SR4 PMD performs …". While this is true, it is not the topic of this clause.

SuggestedRemedy

Change "The 100GBASE-SR4 PMD performs ..." to "The 50GBASE-SR, 100GBASE-SR2, and 200GBASE-SR4 PMDs perform …"

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.5.1** *P* **254** *L* **44** # 178

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **X**

diagram4

SuggestedRemedy

Remove the 4? Or should there be a footnote?

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.5.1** *P* **254** *L* **44** # 42

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

"PMD block diagram4" has a spurious "4" at the end

SuggestedRemedy

Change to "PMD block diagram"

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.5.1** *P* **254** *L* **46** # 179

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

The PMD block diagram is shown in Figure 138–2.

SuggestedRemedy

The PMD block diagram for 100GBASE-SR4 is shown in Figure 138–2.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.5.1** *P* **254** *L* **46** # 43

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **X**

The first paragraph of 138.5.1 is: "The PMD block diagram is shown in Figure 138–2. 200GBASE-SR4 consists of four lanes per direction, 100GBASE-SR2 consists of two lanes, and 50GBASE-SR consists of just one lane per direction." but Figure 138-2 is specific to 200GBASE-SR4.

SuggestedRemedy

Change the paragraph to: "The PMD block diagram for 200GBASE-SR4 is shown in Figure 138–2. The block diagrams for 100GBASE-SR2 and 50GBASE-SR are equivalent to Figure 138-2 but for two lanes and one lane per direction, respectively."

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.5.2** *P* **256** *L* **4** # 180

Dawe, Piers Mellanox

Comment Type **E** *Comment Status* **X**

PMD:IS_UNITDATA_3.request

SuggestedRemedy

PMD:IS_UNITDATA_n-1.request Several changes. Define n if not already done.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.5.2** *P* **256** *L* **7** # 44

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

In: "The higher optical power level in each signal shall correspond to tx_symbol = three and the lowest shall correspond to tx_symbol = zero." we have "higher" and "lowest". The P802.3bs draft is consistent in using "highest" and "lowest" here.

SuggestedRemedy

Change "higher" to "highest" on page 256 lines 7 and 15, page 270 line 52, page 271 line 8.
Also in Clause 139, page 278 line 33
Also in Clause 140, page 301 line 33

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.5.4** *P* **256** *L* **26** # 46

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

"On all four lanes" is only appropriate for 200GBASE-SR4

SuggestedRemedy

Change to "on all lanes"

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.7.1** *P* **259** *L* **13** # 47

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

"(OMA)" should be "(OMAouter)" on both max and min rows

SuggestedRemedy

Change "(OMA)" to "(OMAouter)", where "outer" is subscripted, on both max and min rows

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.7.1** *P* **259** *L* **17** # 172

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

4 dB TDECQ represents a terrible eye before equalisation. It's a much higher limit than the SMF clauses.

SuggestedRemedy

Make the number magenta. This needs more study and any number needs validation, but I would hope 4 dB could be reduced. Also in Table 138-9, and consequent reductions in Table 138-10.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.7.1** *P* **259** *L* **19** # 173

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

Compare 100GBASE-SR4 which has an extinction ratio limit of 2 dB while this has 3 dB, although the max average power is higher but the max OMA isn't. A (any) PAM4 PMD needs all the help it can get. The max photocurrent in 0, 1, average and OMA is determined by max average and OMA specs, not extinction ratio, so I don't think it helps the receiver.

SuggestedRemedy

Change 3 to 2.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.7.1** *P* **259** *L* **25** # 217

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **X**

TDEC

SuggestedRemedy

TDECQ

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.7.1** *P* **262** *L* **28** # 203

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

The reference 121.8.5 says all lanes should use the same test pattern, SSPRQ. Generating SSPRQ dynamically is quite complicated, generating 8+8 copies of it with offsets is more complicated, generating 16 copies from memory needs 16 instances or an arrangement of splitters and cables... This seems to be an issue whether using two product PMAs or test equipment. As we may have multi-lane PRBS13Q or PRBS31Q or scrambled idle for other purposes, would it be OK to use them instead?

SuggestedRemedy

Allow alternative patterns such as PRBS13Q or PRBS31Q or scrambled idle on the aggressor lanes as done elsewhere e.g. 120E. May affect 135.5.10.2, 135.5.10.2.3, 135.6 Table 135-3 and 139.7.5.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.7.2** *P* **259** *L* **47** # 174

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

The unstressed sensitivity is a hypothetical reference point for the spec writers. It is no use to the reader, we did not include it in 10GBASE-LRM, 40GBASE–SR4 or 100GBASE–SR4. In a link that's more about equalisation than loss, it's not to the point.

SuggestedRemedy

Delete the row and footnote b. Delete 138.8.7.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.7.2** *P* **260** *L* **17** # 175

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

Note f is not correct: it depends on the form factor. Compare 136.11.7.2.

SuggestedRemedy

Revise to say applies to 100GBASE-SR2, 200GBASE-SR4 and 50GBASE-SR in multi-PMD format.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8** *P* **261** *L* **1** # 7

Arumugham, Vinu Amazon

Comment Type **T** *Comment Status* **X**

Wander (jitter frequency components under 10MHz) can be transferred across interfaces and can accumulate. If this is not accounted, it increases risk of failures.

SuggestedRemedy

For the module optical output test signal generation, the module should be excited with a signal modulated with maximum sinusoidal jitter amplitude specified by the applicable PMA specification. The SJ frequency should be the lowest specified frequency. If the module transfers wander, this test condition ensures that the transferred wander is observed at the module output.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.1** *P* **261** *L* **14** # 202

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

Tables 138-11, 139-9, 140-9, 121-9, 122-14 124-9, Test patterns, repeat each other.

SuggestedRemedy

It would be better to show the table just once, e.g. in Clause 121 because that's the first one. But because the patterns are not PMD-specific anyway, it would be better in e.g. 116.1.5.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.1** *P* **261** *L* **18** # 48

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

The references in Table 138-11 to Clause 120 for test patterns need to be updated.

SuggestedRemedy

Change "120.5.11.2.4" to "120.5.11.2.2"
Change "120.5.11.2.3" to "120.5.11.2.1"
Change "120.5.11.2.5" to "120.5.11.2.3"

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.1.1** *P* **262** *L* **1** # 50

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **X**

This says "Where not otherwise specified, the maximum amplitude (OMA or VMA) for a particular situation is used, and for counter-propagating lanes, the minimum transition time is used."
"OMA" should be "OMAouter"
There are no specifications in Clause 138 where "VMA" is appropriate.
There is no minimum transition time requirement.

SuggestedRemedy

Change to: "Where not otherwise specified, the maximum amplitude (OMAouter) for a particular situation is used."

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.1.1** *P* **262** *L* **5** # 131

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X**

The 31 UI delay between PRBS31Q patterns is in magenta and marked TBC.
31 UI delay is used in other projects where lanes being driven with PRBS31 patterns.
When discussed in the 802.3cd ad hoc meeting, the concensus was that 31 UI was more than enough delay to make PRBS31Q patterns effectively uncorrelated, and that the value didn't need to be TBC.

SuggestedRemedy

Remove TBC and change text to black

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.1.1** *P* **262** *L* **5** # 204

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

There is no need for 31 UI offset between lanes. Only 1 UI offset is enough to give excellent decorrelation, better than 100-200 UI, and there is a spur at about 450 UI. 120.5.11.2.3 asks for 31 UI but that's at a PMA and some of that is consumed by lane-to-lane skew before and through the PMD. The paths through the PMD are not likely to differ by more than 10 mm or about 2 UI. Adding a justification so that implementers can't easily evade the spirit of the spec.

SuggestedRemedy

Change "There shall be at least 31 UI delay between the test pattern on one lane and the pattern on any other lane." to "There shall be at least 4 UI delay between the test pattern on one lane and the pattern on any other lane, so that the lanes are not correlated within the PMD."
Also revise 140.7.5 "delay requirement of at least 31 UI ... is redundant."

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.2** *P* **262** *L* **11** # 181

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

We included TIA/EIA-455-127-A in e.g. 802.3ba because IEC 61280-1-3:1998 lacked some features of the newer TIA spec. But now 1.3 refers to IEC 61280-1-3:2010.

SuggestedRemedy

Unless TIA/EIA-455-127-A still has something we value for MMF/short wavelength, use that IEC 61280-1-3:2010 lacks, delete "TIA/EIA-455-127-A or".

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.5** *P* **262** *L* **28** # 51

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **X**

Line 28 says "and equalized with the reference equalizer specified in 121.8.5" but line 38 is an exception that says the reference equalizer is specified in "138.8.5.1"

SuggestedRemedy

On line 28, change "specified in 121.8.5" to "specified in 138.8.5.1"

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.5** *P* **262** *L* **33** # 52

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **X**

This says "The polarization controller and test fiber shown in Figure 121–4" but Figure 121-4 has a "polarization rotator"

SuggestedRemedy

Change "polarization controller" to "polarization rotator"

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.5** *P* **262** *L* **39** # 183

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

TDEC in 95.8.5.2 has terms M1, M2 to account for mode partition noise and modal noise that could be added by the optical channel

SuggestedRemedy

Use those terms here.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.5** *P* **262** *L* **39** # 205

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

It may be possible to make a bad transmitter (e.g. with a noisy or distorted signal), use emphasis to get it to pass the TDECQ test, yet leave a realistic, compliant receiver with an unreasonable challenge. With the higher TDECQ limit in this clause it may be more of an issue here.

SuggestedRemedy

Define TDECQrms = 10*log10(C_dc*A_RMS/(s*3*Qt*R)) where A_RMS is the standard deviation of the measured signal after the 19.34 GHz filter response and s is the standard deviation of a fast clean signal with OMA=0.5 and without emphasis, observed through the 19.34 GHz filter response (from memory I believe s is about 0.82). Require that TDECQrms shall not exceed the limit for TDECQ. If we think it's justified, we could allow a slightly higher limit for TDECQrms.
Similarly for 139 and 140.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.5.1** *P* **262** *L* **44** # 53

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **X**

The equalizer definitions in the P802.3bs draft and in 139.7.5.4 have had a note added for clarification that would be useful to be added here.

SuggestedRemedy

Add "NOTE—This reference equalizer is part of the TDECQ test and does not imply any particular receiver equalizer implementation."

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.8** *P* **263** *L* **7** # 184

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

The SRS calibration won't work if done with SSPRQ because that badly over-estimates the effect of small imprefections in frequency response, so the receiver under test could be very under-stressed.

SuggestedRemedy

Fix the SSPRQ pattern and/or use a neutral pattern such as PRBS13Q for SRS calibration.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.8** *P* **263** *L* **18** # 132

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X**

The reference receiver bandwidth of 19.34 GHz is in magenta and marked TBC.

19.34 GHz is the same value used for the reference receiver for 25G NRZ clauses, it offers a significant practical advantage in that existing test gear has this reference receiver bandwdith, even though there is a small (3%) difference between 19.34 GHz and a traditional 0.75 x symbol rate reference bandwidth.
Since both TDECQ and SECQ assume the same reference receiver bandwdith of 19.34 GHz, and both include reference equalizers in the measurement, the link budget is self consistent.

SuggestedRemedy

Remove TBC, make text black

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.8** *P* **263** *L* **18** # 185

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

19.34 GHz TBC magenta

SuggestedRemedy

19.34 GHz black

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.8** *P* **263** *L* **18** # 186

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

This says "The BER is required to be met for each lane under test on its own" which is overkill for 100GBASE-SR2 and 200GBASE-SR4; the FEC can cope if the errors are not evenly distributed between the lanes, just as it does when the lanes are not evenly distributed between the two bits (LSB, MSB) in PAM4.

SuggestedRemedy

Delete "The BER is required to be met for each lane under test on its own.". Just before 138.8.8.1, add:
For 100GBASE-SR2, and 200GBASE-SR4 the relevant BER is the interface BER at the PMD service interface. The interface BER is the average of the two or four BER of the receive lanes when stressed: see 95.8.1.1 for background. If present, the RS-FEC sublayer or the FEC function in the PCS can measure the lane symbol error ratio at its input. The lane BER can be assumed to be one tenth of the lane symbol error ratio. If each lane is stressed in turn, the PMD interface BER is the average of the BERs of all the lanes when stressed: see 95.8.1.1.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.8.1** *P* **263** *L* **34** # 187

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

138.8.8.1 is the same as 121.8.9.4 but missing the figure. However, a jitter tolerance mask with an unbounded number of points leads to far too much measurement and cost.

SuggestedRemedy

Replace the table with a copy of Table 120E-7, or refer to it.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.8.1** *P* **263** *L* **36** # 127

King, Jonathan Finisar

Comment Type **ER** *Comment Status* **X**

In Table 138-13, the values for applied sinusoidal jitter are in magenta.

These values are the same as the other 50G PAM4 PMDs. When discussed in the 802.3cd ad hoc meeting, the concensus was that these values were correct and didn't need to be in magenta.

SuggestedRemedy

convert the table 138-13 magenta items to black text

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.10** *P* **265** *L* **6** # 54

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

"138.10.3" should be a cross-reference

SuggestedRemedy

Make it a cross-reference

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.10.2.2.2** *P* **266** *L* **48** # 188

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

Reflectance less than -20 dB is normal for MMF. should it differ for PAM4?

SuggestedRemedy

If not, -20 dB TBC magenta > -20 dB black.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.10.2.2.2** *P* **266** *L* **48** # 128

King, Jonathan Finisar

Comment Type **ER** *Comment Status* **X**

The max discrete reflectance is in magenta and marked TBC.

Since MMF has multiple propagation modes, and the sources VCSELs have multiple frequencies, any double reflections will add incoherently and any MPI would still be neglgible.
When discussed in the 802.3cd ad hoc meeting, the concensus was that the value was correct and didn't need to be magenta TBC.

SuggestedRemedy

Remove TBC, change magenta text to black

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.10.3.1** *P* **267** *L* **30** # 189

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

Don't make work for the reader or the implementer. The optical lane assignments for 200GBASE-SR4 should be exactly the same as for 100GBASE-SR4.

SuggestedRemedy

Replace this paragraph and figure with "The optical lane assignments for 200GBASE-SR4 are as for 100GBASE-SR4 (see 95.11.3.1).

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.10.3.3** *P* **268** *L* **3** # 190

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

This text and figure seems to be a slightly updated version of 95.11.3.2. They should be the same.

SuggestedRemedy

Make the changes to 95.11.3.2 and replace text and figure of 138.10.3.3 with "The MDI requirements for 100GBASE-SR2 and 200GBASE-SR4 are as for 95.11.3.2."

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.11.2.2** *P* **269** *L* **36** # 55

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

"IEEE Std 802.3-201x" should be "IEEE Std 802.3cd-201x"

SuggestedRemedy

Change "IEEE Std 802.3-201x" to "IEEE Std 802.3cd-201x" on line 36 and line 44

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.11.4.1** *P* **270** *L* **52** # 45

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

"Higher optical power is a one" is not correct.

SuggestedRemedy

Follow the format in P802.3bs and in Clauses 139 and 140.
Change to "Highest optical power corresponds to tx_symbol = three" here and in item F8

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.11.4.1** *P* **270** *L* **52** # 133

King, Jonathan — Finisar

Comment Type **TR** *Comment Status* **X**

The PICS F5 and F8 for optical modulation level mapping are not appropriate for PAM4

SuggestedRemedy

Change "Higher optical power is a one" to "Highest optical power is a three"
in F5 and F8

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.11.4.6** *P* **273** *L* **13** # 57

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

Item OC4 is specific to SR2
Item OC5 is specific to SR4
Item OC6 is specific to SR
Items OC8 and OC11 are specific to SR2 and SR4

SuggestedRemedy

In 138.11.3, change "SR" to "*SR", change "SR2" to "*SR2", and change "SR4" to "*SR4"
In the OC4 Status cell change "M" to "SR2:M"
In the OC5 Status cell change "M" to "SR4:M"
In the OC6 Status cell change "M" to "SR:M"
In the OC8 Status cell change "M" to "(SR2 or SR4):M"
In the OC11 Status cell change "INS:M" to "INS*(SR2 or SR4):M"
Add "N/A [ ]" to the Support cell for OC4, OC5, OC6, and OC8

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.1** *P* **274** *L* **45** # 58

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **X**

"139.2" should be "131.2"

SuggestedRemedy

Change the cross-reference from "139.2" to "131.2"

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.1.1** *P* **275** *L* **35** # 191

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

This is the BER paragraph for a 200G PMD. Compare 136.1.

SuggestedRemedy

Use the BER paragraph for a 50G PMD. See another comment proposing increase the 2.4e-4 BER.

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.2** *P* **276** *L* **22** # 59

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **X**

The parameters are defined by 131.3 which refers to 116.3.3.1 through 116.3.3.3. This means that "rx_bit" should be "rx_symbol"

SuggestedRemedy

Change "rx_bit" to "rx_symbol"
Make the same change in 140.2 (page 299, line 22)

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.3.1** *P* **276** *L* **32** # 192

Dawe, Piers Mellanox

Comment Type **E** *Comment Status* **X**

PMD2

SuggestedRemedy

PMD

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.3.1** *P* **276** *L* **32** # 62

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

"PMD2" should be "PMDs"

SuggestedRemedy

Change "PMD2" to "PMDs"

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.5.1** *P* **277** *L* **45** # 63

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

Missing "." after "Figure 139-2"

SuggestedRemedy

Add "."

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.5.4** *P* **279** *L* **6** # 129

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X**

Based on the measured data, 17 dB is the minimum extinction available to turn down Tx average power on a per lane basis. A Tx OFF spec = -20dBm cannot be achieved reliably on a lane by lane basis

Tx 'off' specs of -16 dBm for 50GBASE-FR allows Tx 'off' spec to be met reliably for multi-lane implementations of 50GBASE-FR.

In addition, to give enough margin between the min received average power and the Tx OFF spec, the min average launch power and min average received power should be raised.

SuggestedRemedy

In Table 139-6, change the Average launch power of OFF transmitter from -20 dBm to -16 dBm.
In Table 139-4, change -20 dBm to -16 dBm.
In Table 139-7 change the Average received power (min) spec from -9 dBm to -7.6 dBm.
In Table 139-6 change the Average launch power (min) spec from -5 dBm to -3.6 dBm.

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.6.1** *P* **280** *L* **47** # 138

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X**

The ER specified precludes the use of directly modulated lasers. Reducing the min ER to 3.5 dB would be more DML friendly, at the cost of a small change in MPI penalty (0.12 dB), but potentially allows lower power and lower cost DML based single lane implementations .

SuggestedRemedy

In Table 139-6 change the ER min to 3.5 dB.

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.6.1** *P* **280** *L* **47** # 200

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

Requiring an extinction ratio of 4.5 dB restricts the range of transmitter technologies, pushing up the cost of this PMD, and 200GBASE-DR4 if it is aligned. Yet it does not benefit the link or the receiver significantly (they are protected by the TDECQ spec, and MPI penalty is a weak function of extinction ratio for PAM4 - very few 100th of dB difference). For an example of a modern direct-mod PMD spec and what a receiver can receive, 100GBASE-SR4 has a 2 dB limit. A transmitter optimized for PAM4 is likely to have a lower extinction ratio than one for NRZ, to reduce distortion.

SuggestedRemedy

Reduce the extinction ratio limit from 4.5 dB to 3 dB.

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.6.1** *P* **280** *L* **48** # 201

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

The purpose of the RIN spec has changed from something to ensure a good transmitter to something to ensure a good TDECQ measurement - yet 50GBASE-SR doesn't have a RIN spec anyway. The limit should be adjusted for the intended purpose, or if the purpose has gone away, be deleted.

SuggestedRemedy

When the way TDECQ handles measured noise and noise enhancement is clear, relax the RIN limits in 139 and 140 according to what is necessary for successful TDECQ measurement

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.6.1** *P* **280** *L* **48** # 141

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X**

The specified RIN is much tighter than required for link closure, and is very onerous to measure in practice. A RIN_OMA of -138dB/Hz still allows links to close and maintains BER floors more than two orders of magnitude below the required BER.

SuggestedRemedy

In Table 140-6 change the max RIN_OMA to -138dB/Hz.

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.6.3** *P* **282** *L* **23** # 193

Dawe, Piers Mellanox

Comment Type **E** *Comment Status* **X**

Make the table footnotes look better.

SuggestedRemedy

Make the table full width; widen the Parameter column.

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.6.3** *P* **282** *L* **24** # 64

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **X**

Table 139-8 footnote b says "fiber attenuation of 0.43 dB/km at 1295 nm" but the shortest wavelength for this PMD is 1304.5 nm.
Fibre loss at 1304.5 nm is 0.423 for G.552 fibre, so this can still be rounded up to 0.43 dB/km

SuggestedRemedy

Change "at 1295 nm" to "at 1304.5 nm"

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.7** *P* **282** *L* **30** # 8

Arumugham, Vinu Amazon

Comment Type **T** *Comment Status* **X**

Wander (jitter frequency components under 10MHz) can be transferred across interfaces and can accumulate. If this is not accounted, it increases risk of failures.

SuggestedRemedy

For the module optical output test signal generation, the module should be excited with a signal modulated with maximum sinusoidal jitter amplitude specified by the applicable PMA specification. The SJ frequency should be the lowest specified frequency. If the module transfers wander, this test condition ensures that the transferred wander is observed at the module output.

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.7.1** *P* **282** *L* **47** # 49

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

The references in Table 139-9 and Table 140-9 to Clause 120 for test patterns need to be updated.

SuggestedRemedy

In both Table 139-9 and Table 140-9:
Change "120.5.11.2.6" to "120.5.11.2.4"
Change "120.5.11.2.4" to "120.5.11.2.2"
Change "120.5.11.2.3" to "120.5.11.2.1"
Change "120.5.11.2.5" to "120.5.11.2.3"

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.7.2** *P* **283** *L* **25** # 182

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

We included TIA/EIA-455-127-A in e.g. 802.3ba because IEC 61280-1-3:1998 lacked some features of the newer TIA spec. But now 1.3 refers to IEC 61280-1-3:2010.

SuggestedRemedy

Unless TIA/EIA-455-127-A still has something we value for SMF, use that IEC 61280-1-3:2010 lacks, delete "TIA/EIA-455-127-A or", here and in 140.7.2.

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.7.7** *P* **286** *L* **11** # 206

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

In this draft (following 52.9.6), square wave is proposed for measuring the signal strength in a RIN measurement procedure. Clause 52 is 10GBASE-S/L/E, an NRZ clause. We should not use square wave here because it isn't PAM4; e.g. any transmitter linearity control circuits may fail because two of the expected PAM4 levels are missing. There is no need to use a special unnatural pattern for this. Using a mixed-frequency pattern is much more convenient and gives a slightly more relevant RIN, closer to SNR, anyway.

SuggestedRemedy

If a RIN spec is needed, define it based on PRBS13Q. Modify tables 139-9 and 10. Also for 100GBASE-DR, 140.7.7. Remove square wave (quaternary) test pattern from the draft.

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.7.7** *P* **286** *L* **15** # 207

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

With a 19.34 GHz front end and an equalizer capable of noise shaping in the reference receiver, and product receivers that must be equalizing too, the -3 dB limit of 26.6 GHz seems wrong. It is likely that real receivers will roll off steeply between the Nyquist frequency and the signalling frequency.

SuggestedRemedy

Change "approximately equal to the signaling rate (i.e., 26.6 GHz)" to "approximately 19.34 GHz".

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.7.7** *P* **286** *L* **17** # 208

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

Please add the warning in 52.9.6.

SuggestedRemedy

Add "This procedure describes a component test that may not be appropriate for a system level test depending on the implementation.". Also in 140.7.7.

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.7.9.2** *P* **287** *L* **42** # 209

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

Calibrating the signal for stressed receiver testing with this draft's SSPRQ then testing the receiver with PRBS31Q or scrambled idle won't work because the apparent penalty will be very different with the two patterns, creating a hole in the spec. This affects 140.7.9 also.

SuggestedRemedy

Change the first seed in Table 120-2 to one for which a minimally compliant transmitter with 0.4 dB baseline wander penalty (before and after FEC) with a random payload measures as minimally compliant (i.e. also 0.4 dB penalty) with SSPRQ.
It may be necessary to adjust another seed to get appropriate transition density characteristics.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.1** *P* **297** *L* **30** # 66

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

Space missing in "CAUI-4C2M"

SuggestedRemedy

Add the space

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.5.4** *P* **302** *L* **6** # 130

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X**

Based on the measured data, 17 dB is the minimum extinction available to turn down Tx average power on a per lane basis. A Tx OFF spec = -20dBm cannot be achieved reliably on a lane by lane basis

A Tx 'off' spec of -15 dBm for 100GBASE-DR allows Tx 'off' spec to be met reliably for multi-lane implementations of 100GBASE-DR.

SuggestedRemedy

In Table 140-4, change -20 dBm to -15 dBm
In Table 140-6, change the Average launch power of OFF transmitter from -20 dBm to -15 dBm.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.6.1** *P* **303** *L* **25** # 119

traverso, matt cisco

Comment Type **T** *Comment Status* **X**

Table 140-6 contains magenta text. Furthermore, Table 140-6 has parameters which are not consistent with Clause 124, 400GBASE-DR4.

SuggestedRemedy

I intend to submit a presentation based on ad hoc presentation "traverso_022217_3cd_adhoc-v3" with specific changes to update the parameters to be consistent with with Clause 124, 400GBASE-DR4 and to address the magenta text.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.6.1** *P* **303** *L* **31** # 210

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **X**

This PMD transmits up to 500 m at a wavelength between 1304.5 and 1317.5 nm on fibre with a dispersion minimum between 1300 and 1324 nm. The dispersion must be between -0.93 and +0.8 ps/nm. The unit interval is 18.8 ps and the side mode might be 1.5 nm away from the main mode. So if a side mode is not suppressed, it won't cause a problem to the CDR, just look like up to 0.7 ps or 0.037 UI of jitter: small and already included in the TDECQ measurement. There is no need for this very tight wavelength spec AND an SMSR spec for this PMD.

SuggestedRemedy

Delete the SMSR spec or use a more conventional wavelength spec.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.6.1** *P* **303** *L* **43** # 211

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **X**

Requiring an extinction ratio of 5 dB restricts the range of transmitter technologies, pushing up the cost of this PMD, and 400GBASE-DR4 if it is aligned. Yet it does not benefit the link or the receiver significantly (they are protected by the TDECQ spec, and MPI penalty is a weak function of extinction ratio for PAM4 - very few 100th of dB difference). Depending on technology, a transmitter optimized for PAM4 may need a lower extinction ratio than one for NRZ, to reduce distortion.

SuggestedRemedy

Reduce the extinction ratio limit from 5 dB to e.g. 3 dB.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.6.1** *P* **303** *L* **43** # 139

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X**

The ER specified precludes the use of directly modulated lasers. Reducing the min ER to 3.5 dB would cost of a very small change in MPI penalty (0.03 dB), but potentially allows future lower power and lower cost DML based single lane implementations .

SuggestedRemedy

In Table 140-6 change the ER min to 3.5 dB.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.6.1** *P* **303** *L* **45** # 140

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X**

The specified RIN is much tighter than required for link closure, and is onerous to measure in practice. A RIN_OMA of -132dB/Hz still allows links to close and maintains BER floors more than two orders of magnitude below the required BER.

SuggestedRemedy

In Table 140-6 change the max RIN_OMA to -132dB/Hz.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.6.2** *P* **304** *L* **9** # 120

traverso, matt cisco

Comment Type **T** *Comment Status* **X**

Table 140-7 has parameters which are not consistent with Clause 124, 400GBASE-DR4.

SuggestedRemedy

I intend to submit a presentation based on ad hoc presentation "traverso_022217_3cd_adhoc-v3" with specific changes to update the parameters to be consistent with with Clause 124, 400GBASE-DR4.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.6.3** *P* **304** *L* **44** # 121

traverso, matt cisco

Comment Type **T** *Comment Status* **X**

Table 140-8 has parameters which are not consistent with Clause 124, 400GBASE-DR4.

SuggestedRemedy

I intend to submit a presentation based on ad hoc presentation "traverso_022217_3cd_adhoc-v3" with specific changes to update the parameters to be consistent with with Clause 124, 400GBASE-DR4.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.7** *P* **305** *L* **6** # 9

Arumugham, Vinu Amazon

Comment Type **T** *Comment Status* **X**

Wander (jitter frequency components under 10MHz) can be transferred across interfaces and can accumulate. If this is not accounted, it increases risk of failures.

SuggestedRemedy

For the module optical output test signal generation, the module should be excited with a signal modulated with maximum sinusoidal jitter amplitude specified by the applicable PMA specification. The SJ frequency should be the lowest specified frequency. If the module transfers wander, this test condition ensures that the transferred wander is observed at the module output.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.7.1** *P* **305** *L* **35** # 122

traverso, matt cisco

Comment Type **T** *Comment Status* **X**

Table 140-10 contains magenta text. Furthermore, Table 140-6 has parameters which are not consistent with Clause 124, 400GBASE-DR4.

SuggestedRemedy

I intend to submit a presentation based on ad hoc presentation "traverso_022217_3cd_adhoc-v3" with specific changes to update the parameters to be consistent with with Clause 124, 400GBASE-DR4, and to address the magenta text.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.7.4** *P* **306** *L* **15** # 194

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

OMAouter should be defined the same as before - don't make work for the reader or the implementer.

SuggestedRemedy

Replace all but the first sentence with "OMAouter is defined in 139.7.4." Similarly for 140.7.6 Extinction ratio > 139.7.6.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.7.5** *P* **306** *L* **46** # 123

traverso, matt — cisco

Comment Type **T** *Comment Status* **X**

The reflectance methodology presented in the ad hoc presentation "traverso_022217_3cd_adhoc-v3" creates a new exception requirement for the TDECQ methods.

SuggestedRemedy

I intend to submit a presentation based on ad hoc presentation "traverso_022217_3cd_adhoc-v3" which will propose to add a new bullet along the lines of "- The optical return loss shall correspond to Table 140-6". I recommend that the editor be given license to wordsmith the bullet appropriately.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.7.7** *P* **307** *L* **6** # 212

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **X**

With a 38.68 GHz front end and an equalizer capable of noise shaping in the reference receiver, and product receivers that must be equalizing too, the -3 dB limit of 53.2 GHz seems wrong, as well as expensive. It is likely that real receivers will roll off steeply between the Nyquist frequency and the signalling frequency.

SuggestedRemedy

Change "approximately equal to the signaling rate (i.e., 53.2 GHz)" to "approximately 38.68 GHz".

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.7.9** *P* **307** *L* **25** # 213

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **X**

If the jitter corner frequency for 26.5625 GBd (NRZ and PAM4) is 4 MHz, shouldn't it be 8 MHz for 53 GBd PAM4? Or at least, the low frequency (sloping) part of the mask should scale with signalling rate, i.e. align if expressed in time vs. frequency. Compare 87.8.11.4 and 88.8.10: 4 MHz for 10.3125 GBd, 10 MHz for 25.78125 GBd.

SuggestedRemedy

Add another exception with a table like Table 138-13 but with the frequencies doubled.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.9** *P* **309** *L* **14** # 124

traverso, matt — cisco

Comment Type **T** *Comment Status* **X**

Table 140-11 contains magenta text for the return loss.

SuggestedRemedy

I intend to submit a presentation based on ad hoc presentation "traverso_022217_3cd_adhoc-v3" with specific changes to update the parameter to be 27 dB.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.10.2.2** *P* **310** *L* **9** # 126

traverso, matt — cisco

Comment Type **T** *Comment Status* **X**

The text in the paragraph is not consistent with the newly proposed tradeoff table in the ad hoc presentation "traverso_022217_3cd_adhoc-v3".

SuggestedRemedy

Change paragraph text to: "The channel insertion loss shall be less than or equal to the value shown in Table 140–13 corresponding to the number of discrete reflectances between <= -35 dB and > -45 dB as well as the number of discrete reflectances between <= -45 dB and > -55 dB within the channel. Discrete reflectances below -55 dB may be ignored when determining supported channel insertion loss."

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.10.2.2** *P* **310** *L* **15** # 125

traverso, matt cisco

Comment Type **T** *Comment Status* **X**

Table 140-13 contains magenta text. Additionally, the reflectance methodology presented in the ad hoc presentation "traverso_022217_3cd_adhoc-v3" proposes a new table format.

SuggestedRemedy

I intend to submit a presentation based on ad hoc presentation "traverso_022217_3cd_adhoc-v3" with specific changes to insert a replacement table.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.11.4.6** *P* **314** *L* **42** # 67

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**

OC1 Value/Comment is "Meets requirements specified in Table 124–11" but the requirements are in Table 140-11

SuggestedRemedy

Change "Table 124-11" to "Table 140-11"

Proposed Response *Response Status* **O**