Cl **FM** *SC* **FM** *P* **11** *L* **40** # 8

Laubach, Mark — Broadcom

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

The frontmatter of P802.3cn lists 802.3cg and 802.3cq, as before P802.3cm.

SuggestedRemedy

Align list of prior ammendments as necessary for consistency before going to Draft 3.0.

Proposed Response *Response Status* **W**

[Editor's note: Clause changed from Frontmatter to FM]

Cl **FM** *SC* **FM** *P* **11** *L* **53** # 6

Grow, Robert — RMG Consulting

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

Though this should be noticed during publication preparation, perhaps you can make this non-substantive change for the next draft. The text "100 m." needs a non-breaking space.

SuggestedRemedy

Replace regular space with a non-breaking space in "100 m."

Proposed Response *Response Status* **O**

Cl **FM** *SC* **FM** *P* **17** *L* **41** # 19

Zimmerman, George — CME Consulting/ADI, APL Gp, Aquantia, BMW, Cisc

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

The note says that the editing instructions have been written to minimize the probability of changes being lost due to projects running in parallel, but, UNLIKE other 802.3 projects which write instructions, modifed text and front matter relative to projects in progress and likely ahead of the project in order, this one doesn't. It could cause a train wreck in the editors office at revision time. Examples include 802.3cg which is already in SA ballot, which modifies Tables 45-9, 45-10, and 78-1 but isn't mentioned in the editing instructions for these tables. (Front matter is more easily updated near the end, but usually is done at this stage. Note that comment on front matter in the previous draft was rejected because the project was not yet finished - contrary to our usual process, but not fatal - this one could be.)

SuggestedRemedy

Editor to review projects ahead of 802.3cm in amendment order, and align/revise editing instructions in common parts of the drafts to acknowledge parallel edits. (I think this is just 802.3cg and 802.3cq - but check with 802.3 Chief Editor)

Proposed Response *Response Status* **O**

Cl **00** *SC* **0** *P* **11** *L* **48** # 9

Maguire, Valerie — The Siemon Company

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

Information for Amendment 4: 802.3cg is missing.

SuggestedRemedy

Insert, "IEEE Std 802.3cg™-20xx Amendment 4—This amendment includes changes to IEEE Std 802.3-2018 and adds Clause 146 through Clause 148 and Annex 146A and Annex 146B. This amendment adds 10 Mb/s Physical Layer specifications and management parameters for operation over a single balanced pair of conductors."

Proposed Response *Response Status* **O**

Cl **138** *SC* **138** *P* **29** *L* **6** # 7

Laubach, Mark — Broadcom

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

Suggest adding a note of clarification for the readers to the beginning of Clause 138 immediately after the Clause title, similar to what was done in P802.3cn.

SuggestedRemedy

Add: <ital>Clause 138 was added to IEEE Std 802.3-2018 by IEEE Std 803.3cd-2018.</ital>

Proposed Response *Response Status* **W**

[Editor's note: Subclause changed from 138.8.10 to 138]

Cl **138** *SC* **138.1** *P* **29** *L* **13** # 17

Maguire, Valerie — The Siemon Company

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

More than one optical fiber medium is specified. The plural of medium is media.

SuggestedRemedy

Replace, "multimode fiber medium" with "multimode fiber media" showing correct strikethrough and underline marks. Consider making this a global change where appropriate.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.1** *P* **30** *L* **2** # 12

Maguire, Valerie — The Siemon Company

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

Use preferred terminology for mandatory criteria.

SuggestedRemedy

Replace, "a conforming implementation must behave functionally" with, "a conforming implementation shall behave functionally" showing correct strikethrough and underline marks and adjust PICS, if necessary.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.5** *P* **39** *L* **38** # 1

Dawe, Piers — Mellanox

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

The 0.1 dB allocation for both modal noise and mode partition noise is too little. See dawe_3cm_adhoc_01_101118, castro_3cm_01_1118, pepeljugoski_1_1104 and castro_3cm_01_0119: we need 0.1 to 0.2 dB for MN (castro_3cm_01_0119 said 0.23 to 0.45 dB) as well as 0.1 dB for MPN. D2.0 comments 38 and 38 against 150.7.3 recommended increasing the power budget for 400GBASE-SR4.2 by 0.2 dB; these were "satisfied" by increasing it by 0.3 dB. However, the same issue for 400GBASE-SR8 has not been fixed yet, and the total penalties should be kept below 4.6 dB, which is unreasonably high already. The adjustment should be done in the same way as before for 100GBASE-SR4 with a formula, so as not to penalise good transmitters.
With this remedy, a 400GBASE-SR8 module used in breakout mode as 200GBASE-SR4, 100GBASE-SR2 or 50GBASE-SR remains interoperable with and compliant to those specs.

SuggestedRemedy

This is a simpler implementation of D2.0 comment 6:
Add an exception in 138.8.5 as follows:
For the calculation of TDECQ (but not SECQ) for 400GBASE-SR8, Equation (138-1) is used in place of Equation (121-11).
R=sqrt(sigmaG^2 + sigmaS^2 - M^2) (138-1)
where M = 0.0065Pave

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.5.1** *P* **39** *L* **45** # 4

Dawe, Piers — Mellanox

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

As explained in D2.0 comment 9, equalizing a signal after an 11.2 GHz BT4 filter with a 5-tap FFE needs at least one precursor unless the signal is carefully pre-distorted. If it is, and a fourth post-cursor is needed, the same transmitter seen after a fast channel, e.g. a short fibre, can be difficult to receive (outside the TDECQ spec limit and/or receive power too low) because the 5-tap FFE can't correct the fourth post-cursor and the (now -ve) first precursor at the same time.
The fast channel can have less mode partition noise but more modal noise, but the problem remains.

Possible remedies include:
(a) Ensure there is at least one precursor (tap 2 or 3 is the largest), or
(b) Add ~0.4 dB to TDECQ if tap 1 is the largest, or
(c) Defining MMF TDECQ with fast and slow channels, in the same spirit as SMF with high and low dispersion, noting that if tap 2 or 3 is the largest it can be assumed that TDECQ(fast) < TDECQ(slow), so no need to determine it.
An implementer who doesn't like option c, if adopted, can comply by following options a or b. If he doesn't like b he can follow a. In practice, it seems that TDECQ uses at least one precursor for reasonable MMF transmitters, so there is no extra cost to a competent / responsible transmitter implementer, but the receiver needs protection from inferior transmitters that could appear in the future.
With this remedy, a 400GBASE-SR8 module used in breakout mode as 200GBASE-SR4, 100GBASE-SR2 or 50GBASE-SR remains interoperable with and compliant to those specs.

SuggestedRemedy

To ensure that the 400GBASE-SR8 transmitter is good enough for the intended range of channel bandwidths, either:
(a) Change the fourth sentence in 138.8.5.1 from "Tap 1, tap 2, or tap 3, has the largest magnitude tap coefficient, which is constrained to be at least 0.8." to
"For 50GBASE-SR, 100GBASE-SR2, and 200GBASE-SR4, tap 1, tap 2, or tap 3, has the largest magnitude tap coefficient, which is constrained to be at least 0.8. For 400GBASE-SR8, tap 2, or tap 3 has the largest magnitude tap coefficient, which is constrained to be at least 0.8."; or
(b) In 138.8.5, add another exception: "For 400GBASE-SR8, if tap 1 has the largest magnitude tap coefficient, TDECQ is 1.1 x the value given by Eq. (121-12). The TDECQ value with tap 2 having the largest magnitude tap coefficient may be used instead."; or
(c) Change the third exception in 138.8.5 to:
TDECQ is defined for two measurement conditions for 400GBASE-SR8, and for one measurement condition for 50GBASE-SR, 100GBASE-SR2, and 200GBASE-SR4. In the high bandwidth case, which applies to 400GBASE-SR8, the combination of the O/E converter and the oscilloscope used to measure the optical waveform is as in 121.8.5.1. In the low bandwidth case, it has a 3 dB bandwidth of 11.2 GHz with a fourth-order Bessel-Thomson response to at least 1.5 x 22.4 GHz and at frequencies above 1.5 x 22.4 GHz the response should not exceed -24 dB. Compensation may be made for any deviation from an ideal fourth-order Bessel-Thomson response. For 400GBASE-SR8, TDECQ is the higher of the results from the two bandwidth cases. If tap 2 or tap 3 has the largest magnitude tap

coefficient in the low bandwidth case, it may be assumed that the result from the low bandwidth case is higher than the result from the high bandwidth case.

Proposed Response *Response Status* **O**

Cl **150** *SC* **150.1** *P* **47** *L* **12** # 2

Dawe, Piers Mellanox

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

The 4.2 nomenclature tells us the number of fibres divided by 2 (they aren't really pairs in this PMD type, by the way) and the number of wavelengths per fibre. It doesn't tell us that it's bidirectional; had we chosen the co-directional option I think we would still have called it 400GBASE-SR4.2. No need to introduce a controversial assertion that would interfere with a future project.

SuggestedRemedy

Delete "propagating in opposite directions". If wished, add a separate sentence "The two wavelengths propagate in opposite directions on each fiber."

Proposed Response *Response Status* **O**

Cl **150** *SC* **150.1** *P* **47** *L* **41** # 10

Maguire, Valerie The Siemon Company

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

Use preferred terminology for mandatory criteria.

SuggestedRemedy

Replace, "a conforming implementation must behave functionally" with, "a conforming implementation shall behave functionally" and adjust PICS, if necessary.

Proposed Response *Response Status* **O**

Cl **150** *SC* **150.3.2** *P* **49** *L* **44** # 11

Maguire, Valerie The Siemon Company

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

Use preferred terminology for mandatory criteria.

SuggestedRemedy

Replace, "between the PCS lanes must be kept" with, "between the PCS lanes shall be kept" and adjust PICS, if necessary.

Proposed Response *Response Status* **O**

Cl **150** *SC* **150.3.2** *P* **49** *L* **45** # 13

Maguire, Valerie The Siemon Company

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

Use preferred terminology for mandatory criteria.

SuggestedRemedy

Replace, "Skew Variation must also be limited" with, "Skew Variation shall be limited" and adjust PICS, if necessary.

Proposed Response *Response Status* **O**

Cl **150** *SC* **150.5.1** *P* **51** *L* **10** # 18

Pimpinella, Rick Panduit Corp.

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

The current figure does not adequately illustrate bi-directional transmission. The figure does not depict two wavelengths nor the transmit/receive pair assignments for bi-directional transmission on 4 discrete fiber pairs. This would be important to for breakout connectivity scenarios.

SuggestedRemedy

Replace figure 150-2 with the proposed figure presented in pimpinella_3cm_0119, and append the text “For clarity, test points are shown for one direction of transmission only, which is from left to right in this figure,” with the following:
For purpose of illustration, one possible bi-directional lane assignment is shown. It is understood that lanes assignments are arbitrary.

Proposed Response *Response Status* **W**

[Editor's note: Line changed from "Figure 150-2, lines 10-30" to "10"]

Cl **150** *SC* **150.5.4** *P* **52** *L* **44** # 14

Maguire, Valerie The Siemon Company

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

Use preferred terminology for mandatory criteria.

SuggestedRemedy

Replace, "implementations must provide adequate margin" with, "implementations shall provide adequate margin" and adjust PICS, if necessary.

Proposed Response *Response Status* **O**

Cl **150** *SC* **150.7.1** *P* **55** *L* **37** # 15

Maguire, Valerie — The Siemon Company

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

Use preferred terminology for mandatory criteria.

SuggestedRemedy

Replace, "the OMA (min) must exceed" with, "the OMA (min) shall exceed" and adjust PICS, if necessary.

Proposed Response *Response Status* **O**

Cl **150** *SC* **150.8.5.1** *P* **59** *L* **28** # 5

Dawe, Piers — Mellanox

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

As explained in D2.0 comment 14, equalizing a signal after a 8.96 GHz BT4 filter with a 5-tap FFE needs at least one precursor unless the signal is carefully pre-distorted. If it is, and a fourth post-cursor is needed, the same transmitter seen after a fast channel, e.g. a short fibre, can be difficult to receive (outside the TDECQ spec limit and/or receive power too low) because the 5-tap FFE can't correct the fourth post-cursor and the (now -ve) first precursor at the same time.
The fast channel can have less mode partition noise but more modal noise, but the problem remains.

Possible remedies include:
(a) Ensure there is at least one precursor (tap 2 or 3 is the largest), or
(b) Add ~0.4 dB to TDECQ if tap 1 is the largest, or
(c) Defining MMF TDECQ with fast and slow channels, in the same spirit as SMF with high and low dispersion, noting that if tap 2 or 3 is the largest it can be assumed that TDECQ(fast) < TDECQ(slow), so no need to determine it.
An implementer who doesn't like option c, if adopted, can comply by following options a or b. If he doesn't like b he can follow a. In practice, it seems that TDECQ uses at least one precursor for reasonable MMF transmitters, so there is no extra cost to a competent / responsible transmitter implementer, but the receiver needs protection from inferior transmitters that could appear in the future.

SuggestedRemedy

To ensure that the transmitter is good enough for the intended range of channel bandwidths, either:
(a) Change "Tap 1, tap 2, or tap 3, has" to "Tap 2 or tap 3 has"; or
(b) In 150.8.5, add another exception: "If tap 1 has the largest magnitude tap coefficient, TDECQ is 1.1 x the value given by Eq. (121-12). The TDECQ value with tap 2 having the largest magnitude tap coefficient may be used instead."; or
(c) Change the paragraph at line 15 to:
TDECQ is defined for two measurement conditions. In the high bandwidth case, the combination of the O/E converter and the oscilloscope used to measure the optical waveform is as in 121.8.5.1. In the low bandwidth case, it has a 3 dB bandwidth of 8.96 GHz with a fourth-order Bessel-Thomson response to at least 1.5 x 17.92 GHz and at frequencies above 1.5 x 17.92 GHz the response should not exceed -24 dB. Compensation may be made for any deviation from an ideal fourth-order Bessel-Thomson response. TDECQ is the higher of the results from the two bandwidth cases. If tap 2 or tap 3 has the largest magnitude tap coefficient in the low bandwidth case, it may be assumed that the result from the low bandwidth case is higher than the result from the high bandwidth case.

Proposed Response *Response Status* **O**

Cl **150** *SC* **150.10** *P* **63** *L* **38** # 3

Dawe, Piers Mellanox

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

Someone who is interested in the cabling rather than the transceiver technology may not be familiar with "TxRx pairs", which aren't used in any other clause.

SuggestedRemedy

After the first mention of TxRx pairs in this subclause, insert "(see 150.6)".

Proposed Response *Response Status* **O**

Cl **150** *SC* **150.10.2.1** *P* **65** *L* **25** # 16

Maguire, Valerie The Siemon Company

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

EMB at 953 nm is missing.

SuggestedRemedy

Insert, " and 2470 MHz·km at 953 nm" after, "3100 MHz·km at 910 nm"

Proposed Response *Response Status* **O**