Cl **FM** *SC* **FM** *P* **1** *L* **31** # 30

Anslow, Pete
Ciena

Comment Type **E** *Comment Status* **D** *<bucket>*

The Working Group Chair has now announced the assumed approval order for the next three amendments as:
IEEE P802.3bs - Amendment 10
IEEE P802.3cc - Amendment 11
IEEE P802.3cb - Amendment 12

SuggestedRemedy

Change the end of the list of amendments on Page 1 line 31 from:
"… IEEE Std 802.3bu-2016, and IEEE Std 802.3bv-2017." to:
"… IEEE Std 802.3bu-2016, IEEE Std 802.3bv-2017, IEEE Std 802.3-2015/Cor 1-2017, IEEE Std 802.3bs-201x, IEEE Std 802.3cc-201x, and IEEE Std 802.3cb-201x."

On page 13:
Add the summary for Corrigendum 1 to be immediately after the summary for 802.3bv
In the summary for 802.3bs, add Amendment 10-
Add the summary for 802.3cc as Amendment 11 after 802.3bs
Add the summary for 802.3cb as Amendment 12 after 802.3cc

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **000** *SC* **0** *P* **13** *L* **19** # 185

Slavick, Jeff
Broadcom Limited

Comment Type **E** *Comment Status* **D** *<bucket><late>*

Shouldn't IEEE Std 802.3-2015/Cor1-2017 be listed in the introduction of what we're amending?

SuggestedRemedy

Add IEEE Std 802.3-2015/Cor1-2017 to the list of ammendments preceding the cd ammendment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

See comment #30.

Cl **000** *SC* **000** *P* **118** *L* **33** # 38

Anslow, Pete
Ciena

Comment Type **T** *Comment Status* **A** *extender sublayer <cc>*

Comment r01-56 against P802.3bs D3.1 has added rows for the Clause 118 200GMII Extender to Tables 121-1 and 122-1.
Assuming that the related comment to add a column fir Clause 118 to Tables 116-2a and 116-3 is accepted, corresponding rows should be added co Tables 136-3, 137-3, and 138-3.

SuggestedRemedy

In Table 136-3, add a row for 118-200GMII Extender, Optional
In Table 137-3, add a row for 118-200GMII Extender, Optional
In Table 138-3, add a row for 118-200GMII Extender, Optional

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: Changed Clause/Subclause from 136/136.1 to 000]

The original intent of the 200GMII extender specification was to enable future PMD types to be connected by terminating the 200GBASE-R PCS and replacing it with a different future PCS.

The 200GMII extender specification also allows extension of the 200GMII using the Clause 119 PCS for reach longer than possible with a single 200GAUI.

Implement suggested remedy.

Cl **000** *SC* **69.1.2** *P* **80** *L* **47** # 20

Hajduczenia, Marek — Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket><cc>*

"two-lane" or "2-lane" - it is not a big difference but the draft seems to use such terms inconsistently.

SuggestedRemedy

If you feel like doin a global find&replace, please at least align how you use these terms. I would opt for <number"-lane format, which is easier to read IMO

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: Changed clause from 69 to 000.]

802.3-2015 Section 6 uses only "four-lane" and not "4-lane".

P802.3bs is inconsistent, but the use of text form is significantly more prevalent than digit form.

Make the following changes thoughout the document with the exception of unchanged, imported text in amended clauses, if any.

Change all instances of "1-lane" to "one-lane".

Change all instances of "2-lane" to "two-lane".

Change all instances of "4-lane" to "four-lane".

Cl **030** *SC* **30.5.1.1.2** *P* **41** *L* **25** # 61

Cheng, Weiying — Coriant

Comment Type **E** *Comment Status* **D** *<bucket>*

Should it be 200GBASE-R? same comment for line 27, and 29.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response comment #49

Cl **030** *SC* **30.5.1.1.2** *P* **41** *L* **25** # 49

Graber, Steffen — Pepperl+Fuchs

Comment Type **E** *Comment Status* **D** *<bucket>*

100GBASE-R on right side of table

SuggestedRemedy

Change 100GBASE-R to 200GBASE-R

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **030** *SC* **30.5.1.1.2** *P* **41** *L* **27** # 50

Graber, Steffen — Pepperl+Fuchs

Comment Type **E** *Comment Status* **D** *<bucket>*

100GBASE-R on right side of table

SuggestedRemedy

Change 100GBASE-R to 200GBASE-R

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **030** *SC* **30.5.1.1.2** *P* **41** *L* **29** # 51

Graber, Steffen — Pepperl+Fuchs

Comment Type **E** *Comment Status* **D** *<bucket>*

100GBASE-R on right side of table

SuggestedRemedy

Change 100GBASE-R to 200GBASE-R

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **030** *SC* **30.5.1.1.15** *P* **42** *L* **35** # 178
Slavick, Jeff Broadcom Limited

Comment Type **T** *Comment Status* **D** *<bucket><late>*

Clause 119 has been added to the aFECAbility list of clauses

SuggestedRemedy

Bring in the changes made by 802.3bs, which are: Add "Clause 119," after Clause 108. Delete the words "a FEC sublayer for"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **030** *SC* **30.5.1.1.29** *P* **43** *L* **0** # 175
Slavick, Jeff Broadcom Limited

Comment Type **T** *Comment Status* **D** *<bucket><late>*

aRSFECIndicationAbility has a Clause 91 reference, need to add Clause 134 as well.

SuggestedRemedy

Delete the (see 91.5.3.3) from both 30.5.1.1.29 and 30.5.1.1.31

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **045** *SC* **45.2.1.116l** *P* **65** *L* **49** # 174
Slavick, Jeff Broadcom Limited

Comment Type **T** *Comment Status* **A** *<late>*

The bits in register 1.604 are for indicating a change in state is requested. In 135F.3.2.1 the text describing these bits using the term flag. The bits of 1.605 and 1.606 are the requested status/setting. Currently the Names for 1.604, 1.605, 1.606 only differ by the presence of "Lane X" for 1.605 and 1.606. So I think some clarity could be made.

SuggestedRemedy

Change "request status" to "request flag" for all of 45.2.1.116l. Change the Description of the bits from "Tx/Rx input precoding requested" to "Tx/Rx input precoding change requested" and "Tx/Rx input precoding not requested" to "Tx/Rx input precoding no change requested"

Response *Response Status* **C**

ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **045** *SC* **45.2.7** *P* **77** *L* **6** # 18
Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

Bottom line in Table 45-200 should be thick all around

SuggestedRemedy

Fix the line thickness

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **045** *SC* **45.5** *P* **78** *L* **1** # 19
Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

Since there are no PICS to be added, why is it in here and empty?

SuggestedRemedy

Remove 45.5 is no PICs are intended to be added

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Remove Clause 45 PICS

Cl **045** *SC* **45.5** *P* **78** *L* **1** # 31
Anslow, Pete Ciena

Comment Type **T** *Comment Status* **D** *<bucket>*

The Clause 45 PICS has no changes in it.

SuggestedRemedy

Either add some changes to the Clause 45 PICS or remove this section from the draft.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Remove Clause 45 PICS

Cl **045** *SC* **45.5.3.3** *P* **78** *L* **11** # 62

Cheng, Weiying Coriant

Comment Type **E** *Comment Status* **D** *<bucket>*

Is there any reason to have an empty table here? If there is no change, remove it. Otherwise, add changes for the PICS.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Remove Clause 45 PICS

Cl **069** *SC* **69.1.2** *P* **80** *L* **53** # 21

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

Missing "," before "repectively"

SuggestedRemedy

Add missing comma

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **069** *SC* **69.2.3** *P* **81** *L* **36** # 32

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **D** *<bucket>*

4-level should not split across two lines

SuggestedRemedy

change to a non-breaking hyphen (Esc - h)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **073** *SC* **73.2** *P* **84** *L* **20** # 22

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **R**

It would be really nice if at least initial version of the draft showed actual changes in figures when complete replacement is required. A red box around added / modified areas would really help readers asses what was modified.

SuggestedRemedy

Thank you

Response *Response Status* **C**

REJECT.

The precedence is that this is not done in other amendments.

Cl **073** *SC* **73.6.4** *P* **85** *L* **17** # 23

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

Stray "."

SuggestedRemedy

Remove "."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **073** *SC* **73.6.4** *P* **85** *L* **44** # 24

Hajduczenia, Marek Charter Communicatio

Comment Type **T** *Comment Status* **D** *<bucket>*

It does not matter what the purpose of reservation its is, it is just reserved, nothing more.

SuggestedRemedy

Change "Reserved for future technology" to "Reserved"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **078** *SC* **78.1** *P* **91** *L* **5** # 180

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **A** *<late>*

In BS we decided to keep the AUIs in the introduction paragaph even when they don't support shutdown, (D3.0 comment i-13). This is done to make it clear if you want to use EEE and have a AUI in the system it's supported.

SuggestedRemedy

Bring in the 3rd paragph of 78.1 from 802.3bs and modify it to read "EEE supports operation over twisted-pair cabling systems, twinax cable, electrical backplanes, optical fiber, the XGXS for 10 Gb/s PHYs, the 25GAUI for 25 Gb/s PHYs, the XLAUI for 40 Gb/s PHYs, the LAUI-2 or 50GAUI-n for 50 Gb/s PHYs, the CAUI-10, CAUI-4 or 100GAUI-n for 100 Gb/s PHYs, the 200GAUI-n and 200GXS for 200 Gb/s PHYs, and the 400GAUI-n and 400GXS for 400 Gb/s PHYs. Table 78-1 lists the supported PHYs and interfaces and their associated clauses."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the Working Group ballot closed.]

Align with P802.3bs and implement with editorial license.

Cl **080** *SC* **80.1.3** *P* **93** *L* **20** # 54

Hanan, Leizerovich — MultiPhy

Comment Type **E** *Comment Status* **D** *<bucket>*

There is no 100GAUI-4 in Annex 83A, Annex83B, Annex83D, or Annex83E.

SuggestedRemedy

Change:
Annex 83A, Annex 83B, Annex 83D, or Annex 83E.

to:
Annex 83A, Annex 83B, Annex 83D, Annex 83E, Annex135D, or Annex 135E .

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **080** *SC* **80.1.3** *P* **93** *L* **44** # 25

Hajduczenia, Marek — Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

"100GBASE-KP4 all use a 4 lane data path." - in this case, "4 lane" is an adjective and should be hyphenated

SuggestedRemedy

Change to "4-lane"; make changes also in other pieces of text already in the draft for consistency. See also comment on "four-lane" versus "4-lane"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The instance of "4 lane" pointed out by the commenter is in imported, unchanged text (i.e., not new text). A maintenance request against 802.3-2015 is required to make the suggested change in this location.

However, there are other instances in new text which should be fixed.

In all instances of new text with "<number> lane" used as an adjective, add a hyphen as follows "<number>-lane".

See also comment #20.

Cl **080** *SC* **80.5** *P* **101** *L* **4** # 181

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **A** *<late>*

Table 80-7 is missing columns for new baud rates we've added.

SuggestedRemedy

See presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the Working Group ballot closed.]

Implement new columns proposed slavick_3cd_01_0717 slide 3 in Table 80-7 with editorial license.

Cl **080** *SC* **80.7** *P* **101** *L* **0** # 182

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **D** *<bucket><late>*

We added new 100G Clauses so list of related clauses needs to be updated.

SuggestedRemedy

Add "Clause 135-138, Clause 140" to the list of clauses that are 100G related to the first paragraph of 80.7

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the Working Group ballot closed.]

Import from 802.3-2015 and amend the first paragraph of 80.7, adding clauses 135, 136, 137, 138, and 140 to the list of clauses.

Cl **090** *SC* **90.1** *P* **104** *L* **6** # 33

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **D** *<bucket>*

The paragraph being changed is the second paragraph of 90.1 not the first.

SuggestedRemedy

Change "second" to "first".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **091** *SC* **91** *P* **105** *L* **1** # 77

Nicholl, Gary — Cisco Systems

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

In keeping with the response to comment #85 against D1.2 (made by Jeff Slavic) and subsequent ad-hoc discussions, it is proposed to add an optional FEC degrade monitor feature to the 100G RS-FEC. The proposed feature is identical to what was added for 200G/400G in 802.3bs, but without the end-to-end signalling. Please see nicholl_042617_3cd_adhoc for background.

SuggestedRemedy

nicholl_3cd_01_0717 defines the necessary changes to implement the proposed FEC degrade feature for 50G RS-FEC in Clause 134. Implement the same changes for the 100G RS-FEC in Clause 91, and add the appropriate MDIO registers/bits to Clause 45.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

With editorial license, implement the proposal in nicholl_3cd_01_0717 with the exception that it applies only to 100G PHYs specified in this project: 100GBASE-KR2, 100GBASE-CR2, 100GBASE-SR2, 100GBASE-DR.

Cl **091** *SC* **91.3** *P* **105** *L* **0** # 183

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **D** *<bucket><late>*

Need to add 135 reference

SuggestedRemedy

Modify the 2nd sentence of the 1st paragraph of 91.3 to read "Therefore, the RS-FEC sublayer may be a client of the PMA sublayer defined in Clause 83 or Clause 135 when the PMA service interface width, p, is set to 4."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **091** *SC* **91.5.3.3** *P* **107** *L* **8** # 184

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **A** *<late>*

We aren't precluding the use of Bypass Correction for the CD PHYs, and we should do so.

SuggestedRemedy

Bring the last sentence of the 3rd paragraph of 91.5.3.3 into the draft and add 100GBASE-CR2, 100GBASE-KR2, 100GBASE-SR2 and 100GBASE-DR to the list of PHYs that don't support bypass correction.
PICS RF6 also needs to be updated with the PHYs that don't support bypass correction

Response *Response Status* **C**

ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **116** *SC* **116.1.4** *P* **112** *L* **8** # 34

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **D** *<bucket>*

Comment r01-56 against P802.3bs D3.1 has added a column for "Clause 118 200GMII Extender" in Table 116-3 as "O" for all PHY types.

SuggestedRemedy

Add a column for "Clause 118 200GMII Extender" in Table 116-2a as "O" for both PHY types.
Add a column for "Clause 118 200GMII Extender" in Table 116-3 as "O" for all PHY types.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **120** *SC* **120.5.7.2** *P* **115** *L* **31** # 35

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **D** *<bucket>*

The editor's note says it will be deleted in the next draft.

SuggestedRemedy

Delete the note

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **120** *SC* **120.5.7.2** *P* **115** *L* **31** # 179

Slavick, Jeff — Broadcom Limited

Comment Type **E** *Comment Status* **D** *<bucket><late>*

Editors note has served it's purpose

SuggestedRemedy

Delete editors note

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **131** *SC* **131.3.3** *P* **123** *L* **21** # 86

Trowbridge, Steve — Nokia

Comment Type **E** *Comment Status* **D** *<bucket>*

The text "PMA:IS_SIGNAL.indication" has the line going through it in this one instance in Figure 131-2, where the similar text at all other inter-sublayer interfaces breaks the arrow above and below the text.

SuggestedRemedy

Break the arrow around the text as elsewhere in the same figure

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **131** *SC* **131.4** *P* **256** *L* **9** # 85

Stover, David — Analog Devices

Comment Type **E** *Comment Status* **D** *<bucket><cc>*

Gap between digits in many locations throughout document. Looks like a thousands-place separator was replaced with a space. For example, Table 131–4 column "Maximum (bit time)" includes entries such as "2 048", "16 384", etc.

SuggestedRemedy

Search and repair all instances where thousands-place separator was replaced with a space; delete the space.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment #2.

Cl **131** *SC* **131.5** *P* **125** *L* **24** # 87

Trowbridge, Steve Nokia

Comment Type **E** *Comment Status* **D** *<bucket>*

In the right hand stack, the top of the box for the 50GAUI-n (labeled wth SP1 and SP6 on the side) doesn't line up with the PMA(2:n) box above

SuggestedRemedy

Tidy up the figure

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **131** *SC* **131.5** *P* **126** *L* **22** # 186

Slavick, Jeff Broadcom Limited

Comment Type **E** *Comment Status* **D** *<bucket><late>*

Tables 131-5 and 131-6 use - for not applicable, while both Clause 80 and 116 have used N/A.

SuggestedRemedy

Change the -'s to N/A in Tables 131-5 and 131-6

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **132** *SC* **132.1** *P* **129** *L* **23** # 1

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

"64-bit wide" or "64-bit-wide"? Given that these three words form a new adjective, the latter should be used

SuggestedRemedy

Per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The use of "64-bit-wide" is correct and would be consistent with 802.3-2015 80.2.1 and 802.3cd 131.2.1. Note however there are many instances without the hyphen in 802.3-2015 and P802.3bs.

For new text in draft (not imported for amendment), change all instances of "64-bit wide" to "64-bit-wide". Include 131.1.2 and 132.1.

Cl **132** *SC* **132.1.7** *P* **131** *L* **32** # 88

Trowbridge, Steve Nokia

Comment Type **E** *Comment Status* **A**

Given that 81.3 defines CGMII and XLGMII (which are identical), given that the sublayers below (e.g., PCS) resemble 40GBASE-R more than 100GBASE-R, better to refer to XLGMII from this clause than CGMII

SuggestedRemedy

Change CGMII to XLGMII, lines 32, 37, 41 and onward through the rest of clause 132

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

To match the content of Clause 81, change "CGMII" to "XLGMII/CGMII".

Cl **133** *SC* **133.2.1** *P* **137** *L* **2** # 2

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket><cc>*

"20 479 66-bit blocks on each PCS lane, rather than after every 16 383 66-bit blocks" - in text, it would be much clearer for a reader to have "," as thousand separator rather than " "

SuggestedRemedy

Consider changing to "20,479 66-bit blocks on each PCS lane, rather than after every 16,383 66-bit blocks" or alternatively, use no separator at all - it is still simple to read without any specific separation
Consider scrubbing the rest of the draft.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

According the "2014 IEEE-SA Standards Style Manual", a space for thousand separators are required for numbers in tables. It gives no guidance for numbers outside of tables.
https://development.standards.ieee.org/myproject/Public/mytools/draft/styleman.pdf

The "IEEE Editorial Style Manual" provides the following general (not specific to tables) guidance:
"7) Use thin spaces instead of commas between numbers in tens or hundreds of thousands (e.g., 62 000, 100 000, but 4000). "
https://www.ieee.org/documents/style_manual.pdf

P802.3cj (802.3 revision) includes a thousands-separator space in most cases for numbers 10 000 and greater.

Throughout the draft, for all numbers outside of tables less than 10000 remove the thousands-separator space.

Cl **133** *SC* **133.2.2** *P* **137** *L* **26** # 3

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

In figure 133-3, individual 66b blocks are not properly left-aligned, as would be expected. Since the accompanying text does not speak of any misalignment, I assume block should be left aligned.

SuggestedRemedy

Make sure all 66b blocks and markers are left aligned across lanes - they are NOT right now

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **134** *SC* **134** *P* **144** *L* **1** # 78

Nicholl, Gary Cisco Systems

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

In keeping with the response to comment #85 against D1.2 (made by Jeff Slavic) and subsequent ad-hoc discussions, it is proposed to add an optional FEC degrade monitor feature to the 50G RS-FEC. The proposed feature is identical to what was added for 200G/400G in 802.3bs, but without the end-to-end signalling. Please see nicholl_042617_3cd_adhoc for background.

SuggestedRemedy

Implement the changes shown in nicholl_3cd_01_0717, and add the approprite MDIO registers/bits to Clause 45.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

With editorial license, implement the changes shown in nicholl_3cd_01_0717.

Cl **134** *SC* **134.1.1** *P* **144** *L* **28** # 5

Hajduczenia, Marek Charter Communicatio

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

The scope states clearly that: "The optional FEC bypass correction feature is not supported" but then age 151, line 36 speaks of "bypass correction indication" that may be enabled - are these the same featurer os not?

SuggestedRemedy

if they are not the same, please consider adding reference to where an example of "bypass correction feature" is defined, for a reader to know what NOT to expect
If they are the same, then text on page 151 should be removed, since the feature is supposed to NOT be supported

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

There are two different features, FEC bypass correction and FEC bypass error indication. The text on page 144, line 28 is referring to the FEC bypass correction, whereas the text on page 151, line 36 is referring to FEC bypass error indication.

Change:
"The optional FEC bypass correction feature is not supported"
To:
"The optional FEC bypass correction feature (see 91.5.3.3) is not supported"

Cl **134** *SC* **134.4** *P* **146** *L* **4** # 4

Hajduczenia, Marek Charter Communicatio

Comment Type **T** *Comment Status* **A** *<cc>*

"bit times" or "BT" - 134.4 uses "bit times" while 133.3 uses "BT" to imply the same meaning, I assume

SuggestedRemedy

Pick one and use consistently Given that the acronym is not used in clauses exctensively, I'd suggest using "bit times"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

802.3-2015 Section 6 (except Clauses 82 and 83) consistently uses "bit times" rather than BT.

For all new text (not imported for amendment) in the draft, change all instances of "BT" to "bit times".

In Table 131.4, delete "(BT)" in footnote "a".

Cl **134** *SC* **134.5.3.2** *P* **151** *L* **12** # 89

Trowbridge, Steve — Nokia

Comment Type **E** *Comment Status* **D** *<bucket>*

"all FEC lanes" is appropriate when the number of FEC lanes could be in the range 4-16 as for other interfaces, but reads funny when the number of lanes is exactly two

SuggestedRemedy

Change "After all FEC lanes are aligned ." to "After both FEC lanes are aligned ."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **134** *SC* **134.5.3.3** *P* **151** *L* **49** # 120

Ran, Adee — Intel

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

As shown in a contribution to 802.3bs (see http://www.ieee802.org/3/bs/public/16_09/ran_3bs_01a_0916.pdf), predicting the link performance by the binary event of the average symbol error ratio exceeding some threshold is error prone and would result in problems setting the threshold correctly.

In mass deployment of 802.3cd links, as expected in future data centers, this may result in multiple false alerts or perceived degradations in links that have ample margin for practically error-free operation. The only way to avoid these false alarms is to have a very high margin in all links, but that would increase the cost.

An alternative solution, outlined in http://www.ieee802.org/3/bs/public/16_09/ran_3bs_02a_0916.pdf, is to count codewords with a specific number of symbol errors in separate counters. This information is available from the RS-FEC decoder and would be much more useful for predicting uncorrectable errors and identifying links that have insufficient margin (and the desired margin can be defined after the data is collected).

The proposal above was not accepted, mainly claiming that it is tightly coupled with the PCS FEC which might only be used in an XS while the actual PMD-PMD link would use another FEC. But in 802.3cd there are no XS's and no other FEC is expected, so this method is perfectly adequate.

If information on degradation or prediction of uncorrectable errors is desirable, it should use the relevant information. At the minimum, that information should be available through standard registers. These registers may be queried by management and reported to the partner through higher layer protocols, outside of the scope of 802.3 (or we can add LLDP message in clause 79 later).

SuggestedRemedy

Based on slide 17 of http://www.ieee802.org/3/bs/public/16_09/ran_3bs_02a_0916.pdf:

Define a variable array (16 integers, 12 bits each) for counting received codewords with 1 to 15 symbol errors and uncorrectable codewords. Map these variables to MDIO registers, non-rollover, clear on read.

Add similar variables mapped to the same registers also in clause 91 for the 100G RS-FEC and in clause 119 for the 200G PCS FEC. These should be optional.

Response *Response Status* **C**

REJECT.

There is no consensus to implement the suggested remedy at this time. However, there was interest from the Task Force in more discussion on this new capability. The commenter is encouraged to continue to build consensus.

Cl **134** *SC* **134.5.3.7** *P* **152** *L* # 90

Trowbridge, Steve Nokia

Comment Type **ER** *Comment Status* **D** *<bucket>*

Missing ">"

SuggestedRemedy

Change "amp_rx_3<63:58> = am_rxpayloads<1, 125:120" to "amp_rx_3<63:58> = am_rxpayloads<1, 125:120>"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **134** *SC* **134.5.3.7** *P* **152** *L* **16** # 7

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **A**

Different styles of marking up variables - in some locations, variables are surrounded with "", in others, they are not

SuggestedRemedy

Consider adding "" around names of variables - this adds to readability of the text, especially when names of variables can be easily confused with the rest of the sentence. Alternatively, putting names of variables in italics might help as well. There are multiple examples (see page 151 lin 24 for example of inconsistencies)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In general, a special font is not used for state machine variables.

For consistency, in 133.1.2.

Change:
The definition of "current_am", "am_counter" "ber_cnt" and "xus_timer" in the state diagrams defined in 82.2.19 are modified to account for the different alignment marker spacing and the different data rate. (See 133.2.4.)
To:
The definition of the variables current_am, am_counter, ber_cnt, and xus_timer in the state diagrams defined in 82.2.19 are modified to account for the different alignment marker spacing and the different data rate. (See 133.2.4.)

Cl **134** *SC* **134.5.3.7** *P* **152** *L* **18** # 6

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

missing space in "(see134.5.3.4)"

SuggestedRemedy

Per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **134** *SC* **134.6** *P* **156** *L* **48** # 80

Nicholl, Gary Cisco Systems

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

Need to insert a definiton for the fec_optional_states variable.

SuggestedRemedy

Insert a new variable definition before amps_Lock<x> as follows:

134.6.4 fec_optional_states

This variable is always set to true to indicate that the optional states in the FEC synchronization state diagram in Figure 91-8 are implemented. This variable is mapped to the bit defined in 45.2.1.102 (1.201.7).

Response *Response Status* **C**

ACCEPT.

Cl **134** *SC* **134.6.2** *P* **156** *L* **1** # 79

Nicholl, Gary Cisco Systems

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

fec_optional_states variable is missing in Table 134-2.

SuggestedRemedy

Insert new row in Table 91-3 after "RS-FEC high SER" row to define the mapping for the fec_optional_states status variable.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

With editorial licence, insert a new row in Table 134-2 after “RS-FEC high SER” to define the MDIO register mapping for the fec_optional_states variable. The variable is mapped to MDIO register bit 1.201.7.

Cl **134** *SC* **134.6.2** *P* **156** *L* **20** # 91

Trowbridge, Steve — Nokia

Comment Type **TR** *Comment Status* **D** *<withdrawn>*

Since there are only two FEC lanes, presumably only registers 1.210 and 1.211 are used

SuggestedRemedy

Change "1.210 to 1.213" to "1.210, 1.211"

Proposed Response *Response Status* **Z**

PROPOSED REJECT.

This comment was WITHDRAWN by the commenter.

Cl **134** *SC* **134.6.7** *P* **157** *L* **15** # 81

Nicholl, Gary — Cisco Systems

Comment Type **T** *Comment Status* **D** *<bucket>*

The first sentence is not strictly correct as there is no optional "fec bypass correction" feature defined in Clause 134.

SuggestedRemedy

Change
"An uncorrected FEC codeword is a codeword that contains errors (when the bypass correction feature is supported and enabled) or contains errors that were not corrected (when the bypass correction feature is not supported or not enabled)."
to
"An uncorrected FEC codeword is a codeword that contains errors that were not corrected."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **134** *SC* **134.7.4.1** *P* **160** *L* **40** # 171

Wertheim, Oded — Mellanox Technologies

Comment Type **T** *Comment Status* **D** *<bucket>*

The Alignment marker insertion feature indicates: First 256 message bits to be transmitted from every 1024th codeword.
The AM length is 257 bits.

SuggestedRemedy

Replace 256 with 257.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **135** *SC* **135.1.4** *P* **165** *L* **53** # 8

Hajduczenia, Marek — Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

More instanced of adjective forming inconsistencies: "2 lane" - other locations "2-lane" and "two-lane"

SuggestedRemedy

Align to "<digit/number>-lane" format in the whole draft

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment #20.

Cl **135** *SC* **135.3** *P* **167** *L* **52** # 92

Trowbridge, Steve — Nokia

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

The description of 50G lanes is broken in several ways: the PCSL and FECL rates are different, and only FECLs can be carried over a single-lane 50G interface

SuggestedRemedy

Change "If a PMA client is another PMA, a 50GBASE-R PMA with p=2 physical input lanes receives NRZ symbols on each of its input lanes at 2 times the PCSL/FECL rate." to "If a PMA client is another PMA, a 50GBASE-R PMA with p=2 physical input lanes receives NRZ symbols on each of its input lanes at the FECL rate or at 2 times the PCSL rate."
Change "A 50GBASE-R PMA with p=1 physical input lane receives PAM4 symbols on each of its input lanes at 2 times the PCSL/FECL rate, with each symbol formed from two bits." to "A 50GBASE-R PMA with p=1 physical input lane receives PAM4 symbols on that input lane at the FECL rate, with each symbol formed from two bits."
Delete the final sentence of the paragraph "The bit stream represented by the input symbols carries z/p bit-multiplexed PCSLs/FECLs on each physical input lane, where z=2 (below the FEC) or z=4 (above the FEC) for 50GBASE-R." since it is impossible to have a single-lane 50G AUI above the FEC

Response *Response Status* **C**

ACCEPT.

Cl **135** *SC* **135.3** *P* **168** *L* **7** # 93

Trowbridge, Steve — Nokia

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

PAM4 symbols carry two bits, so while a 100G PMA with p=1 or p=2 input lanes receives BITS on each of its input lanes at 4 or 2 times the FECL rate, the input lanes receive PAM4 symbols at 2 or 1 times the FECL rate

SuggestedRemedy

Change "4 or 2 times" to "2 or 1 times"

Response *Response Status* **C**

ACCEPT.

Cl **135** *SC* **135.5.7** *P* **175** *L* **2** # 187

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **A** *<late>*

In the PCS Clauses we have a flow of data, as we go from sub-clause to sub-clase, we use variables of inputs -> ouputs, where the output of the previous sub-clause is the input to the next. We don't have this in the PAM4 encoding section (Precode section uses G(j) and P(j) but the Gray encode section does not). In Clause 94, Figure 94-2 and 94-3 defines the order of gray and precoding for that PMA in each direction.

SuggestedRemedy

Add the following text to 135.5.7: For lanes encoded as PAM4 additional encoding of the data stream is done. In the transmit direction pairs of bits are first Gray encoded, and then Precoded when precoding is enabled. In the receive direction the received symbol is precoded, when precoding is enabled, and then Gray mapped into pairs of bits.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the Working Group ballot closed.]

It is clear in 135.5.7.2 that the Gray-coded symbols are inputs in the transmit lane and outputs for the receive lane. However, it would be good to tie 135.5.7.2 together with a variable name.

To address Comment #191 a description for the receive process is required in 135.5.7.1.

The reference to 120.5.7 is outdated as P802.3cd changed the Gray Coding subclause from 120.5.7 to 120.5.7.1.

Change 135.5.7.1 to the following:

For output lanes encoded as PAM4, the PMA transmit process shall map consecutive pairs of bits to Gray-coded symbols G(j) with one of four levels as specified in 120.5.7.1.

For input lanes encoded as PAM4, the PMA receive process shall map Gray-coded symbols G(j) with one of four levels to pairs of bits as specified in 120.5.7.1.

Also, change the subclause title to align with P802.3bs D3.2 comment r02-27.

Cl **135** *SC* **135.5.7.1** *P* **175** *L* **6** # 191

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **A** *<late>*

There's only a transmit path Gray mapping, no receive path. And the pairs of bits -> gray symbol is only done for output lanes, not input lanes.

SuggestedRemedy

Add the following to 135.5.7.1 "For input lanes encoded as PAM4, the PMA receive process shall map Gray-coded symbols to pairs of bits as specified in 120.5.7"

Change the current text "For lanes encoded as PAM4" to be "For output lanes encoded as PAM4"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the Working Group ballot closed.]

See response to comment #187.

Cl **135** *SC* **135.5.7.2** *P* **175** *L* **10** # 173

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **D**

This says
For lanes encoded as PAM4, the PMA shall provide 1/(1+D) mod 4 precoding capability on each transmit lane and may optionally provide 1/(1+D) mod 4 decoding capability on each receive lane.
and later,
In a PMA that is adjacent to a 50GBASE-CR, 50GBASE-KR, 100GBASE-CR2, or 100GBASE-KR2... In a PMA that is adjacent to any other PMD, precoder_tx_out_enable_i and precoder_rx_in_enable_i are always set to 0.

while 120.5.7.2 says
A PMA adjacent to a 200GBASE-CR4 or 200GBASE-KR4 PMD, shall provide 1/(1+D) mod 4 precoding capability on all transmit lanes and may optionally provide 1/(1+D) mod 4 decoding capability on all receive lanes on the PMD service interface. Precoding is implemented as specified in 135.5.7.2.
...
The variables precoder_tx_out_enable_i and precoder_rx_in_enable_i are always set to 0 in a PMA that is not adjacent to a 200GBASE-CR4 or 200GBASE-KR4 PMD.

It should be made clear that precoding is not used on optics or C2M, so there is no need to provide the functionality and then disable it.

SuggestedRemedy

Change the first paragraph of 135.5.7.2 to
For lanes encoded as PAM4, a PMA adjacent to a 50GBASE-CR, 50GBASE-KR, 100GBASE-CR2, or 100GBASE-KR2 PMD or a PMA that is used for 50GAUI-1 C2C or 100GAUI-2 C2C shall provide the 1/(1+D) mod 4 precoding capability on each transmit lane, and may optionally provide 1/(1+D) mod 4 decoding capability on each receive lane. A PMA that is used for 50GAUI-1 C2M or 100GAUI-2 C2M or adjacent to an optical PMD does not use precoding across the C2M interface, or towards or from the optical PMD.

Add a Tx output precoder ability MDIO bit.

Change the first paragraph of 120.5.7.2 to:
A PMA adjacent to a 200GBASE-CR4 or 200GBASE-KR4 PMD shall provide 1/(1+D) mod 4 precoding capability on all transmit lanes, and may optionally provide 1/(1+D) mod 4 decoding capability on all receive lanes on the PMD service interface. Precoding is implemented as specified in 135.5.7.2. A PMA that is used for 200GAUI-4 C2C or 400GAUI-8 C2C, 200GAUI-4 C2M or 400GAUI-8 C2M, or adjacent to an optical PMD, does not use precoding across the C2C or C2M interface, or towards or from the optical PMD.

Add a Tx output precoder ability MDIO bit (I don't know if it would be the same bit as for 135).

Consistency: "each lane" or "all lanes"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment #172.

Cl **135** *SC* **135.5.7.2** *P* **175** *L* **10** # 172

Wertheim, Oded Mellanox Technologies

Comment Type **TR** *Comment Status* **D**

The PAM4 encoding clause states that for lanes encoded as PAM4, the PMA shall provide 1/(1+D) mod 4 precoding capability. While this is true for PMAs used for C2C interfaces or for PMA adjacent to KR or CR PMDs, it's not the case for C2M.
The requirement implies that an optical transceiver has to add the cost for a precoder even when it's not in use in the C2M interfaces

SuggestedRemedy

For lanes encoded as PAM4, a PMA adjacent to a 50GBASE-CR, 50GBASE-KR, 100GBASE-CR2, or 100GBASE-KR2 PMD or a PMA that is used for 50GAUI-1 C2C or 100GAUI-2 C2C shall provide 1/(1+D) mod 4 precoding capability on each transmit lane and may optionally provide 1/(1+D) mod 4 decoding capability on each receive lane. A PMA that is used for 50GAUI-1 C2M or 100GAUI-2 C2M or adjacent to an optical PMD does not use precoding towards or from the optical PMD.

Add a Tx output precoder capability MDIO bit either to PMA precoder control Tx output register or to a new register.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The commenter correctly points out that precoding is not a requirement for PMA outputs that are driving a 50GAUI-1 or 100GAUI-2 C2M or an optical PMD.

For lanes encoded as PAM4, the PMA shall provide 1/(1+D) mod 4 precoding capability on each transmit lane and may optionally provide 1/(1+D) mod 4 decoding capability on each receive lane.

The last paragraph in 135.5.7 states the following, making it clear that precoding is not required for PMD except KR and CR PMDs listed.
"In a PMA that is adjacent to a 50GBASE-CR, 50GBASE-KR, 100GBASE-CR2, or 100GBASE-KR2, precoder_tx_out_enable_i and precoder_rx_in_enable_i shall be set as determined by the PMD control function on lane I (see 136.8.11.7.5). The method by which the PMD control function affects these variables is implementation dependent. In a PMA that is adjacent to any other PMD, precoder_tx_out_enable_i and precoder_rx_in_enable_i are always set to 0."

This paragraph is ambiguous about the 50GAUI-1 and 100GAUI-2 C2M/C2C.

Change the last paragraph of 135.5.7 to the following:

"In a PMA that is adjacent to a 50GBASE-CR PMD, 50GBASE-KR PMD, 100GBASE-CR2 PMD, or 100GBASE-KR2 PMD, precoder_tx_out_enable_i and precoder_rx_in_enable_i shall be set as determined by the PMD control function on lane I (see 136.8.11.7.5). The method by which the PMD control function affects these variables is implementation

dependent.

In a PMA that is adjacent to any other PMD, precoder_tx_out_enable_i and precoder_rx_in_enable_i are always set to 0.

In a PMA that is adjacent to a 50GAUI-1 C2C or a 100GAUI-2 C2C, precoder_tx_out_enable_i, precoder_rx_in_enable_i, precoder_tx_in_enable_i, and precoder_rx_out_enable_i are set as required by the implementation. The implementation may use the method described in 135F.3.2.1.

In a PMA that is adjacent to a 50GAUI-1 C2M or a 100GAUI-2 C2M, precoder_tx_out_enable_i, precoder_rx_in_enable_i, precoder_tx_in_enable_i, and precoder_rx_out_enable_i are always set to 0."

Cl **135** *SC* **135.7.2.1** *P* **181** *L* **21** # 36

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **D** *<bucket>*

Comment i-52 against P802.3bx D3.0 changed all instances of “enquiries” to "inquiries" in IEEE Std 802.3-2015.

SuggestedRemedy

Change “enquiries” to "inquiries" on Page 181, line 21 and Page 364, line 25

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **135B** *SC* **135B.1** *P* **330** *L* **50** # 116

Ran, Adee Intel

Comment Type **E** *Comment Status* **D**

The third paragraph of this annex contains too much information. It talks about definition of link, loss budget, NRZ modulation, AC coupling, recommendation about -3 dB point, seems to have no logical order and is dificult to follow.

The rest of the annex is short and concise paragraphs.

Signalling rate is missing from this paragraph but appears in the next paragraph, unconnected to its remainder, which discusses equalization.

Breaking this paragraph into shorter paragraphs would benefit the reader.

Also, signaling rate and modulation should be described together and separately from the other information. The best place seems to be the previous, one-line paragraph, which describes the service interface being instantiated.

Similarly applies to all C2C annexes.

SuggestedRemedy

Candidate text will be supplied.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The commenter has not identified anything incorrect that needs to be fixed.

The content of these annexes is consistent with Annexes in 802.3-2015 and P802.3bs.

Pending review of proposed changes and task force discussion.

Cl **135C** *SC* **135C.1** *P* **336** *L* **50** # 121

Ran, Adee Intel

Comment Type **E** *Comment Status* **D**

The third and fourth paragraphs of this annex contain too much information. They talk about definition of link, loss budget, NRZ modulation, AC coupling, recommendation about -3 dB point, seem to have no logical order and are dificult to follow.

The rest of the annex is short and concise paragraphs.

Signalling rate is missing from this text but appears in the next paragraph, unconnected to its remainder, which discusses relation to OIF documents.

Breaking these paragraphs into shorter paragraphs would benefit the reader.

Also, signaling rate and modulation should be described together and separately from the other information. The best place seems to be the previous, one-line paragraph, which describes the service interface being instantiated.

Similarly applies to all C2M annexes.

SuggestedRemedy

Candidate text will be supplied.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The commenter has not identified anything incorrect that needs to be fixed.

The content of these annexes is consistent with Annexes in 802.3-2015 and P802.3bs.

Pending review of proposed changes and task force discussion.

Cl **135D** *SC* **135D.1** *P* **343** *L* **1** # 117

Ran, Adee Intel

Comment Type **E** *Comment Status* **D** *<withdrawn>*

The paragraphs about 50G (L1) and 100G (L26) are separate and mostly repeat the same information. They should be merged and reordered to address both cases, and state the differences.

SuggestedRemedy

Candidate text will be supplied.

Proposed Response *Response Status* **Z**

PROPOSED REJECT.

This comment was WITHDRAWN by the commenter.

Cl **135E** *SC* **135E.5.3** *P* **352** *L* **1** # 82

Maki, Jeffery Juniper Networks

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

Figure 135E-1 shows that 50GAUI-2 C2M and 100GAUI-4 C2M require FEC. No where in 135E.5.3 Major capabilities/options is it listed that FEC is mandatory. Furtermore, what FEC code is mandatory is not listed.

SuggestedRemedy

List the mandatory FEC code to make a compliant chip-to-module interface.

Item: FEC50; Feature: 50GBASE-R RS-FEC; Subclause: 134; Value/Comment: Device implements Clause 134 RS-FEC for 50GBASE-R; Status: M; Support: Yes [ ]

Item: FEC100; Feature: 100GBASE-R RS-FEC; Subclause: 91; Value/Comment: Device implements Clause 91 RS-FEC with RS(544,514) for 100GBASE-P; Status: M; Support: Yes [ ]

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Since this Annex does not specify an FEC therefore a PICS item is not required.

The specific FEC for a PHY is specified for each PHY type in the associated PMD clause and is summarized in Clause 131 and Clause 80.

With full editorial license, in 135E.1 add text that explains the following:
- The FEC and other sublayers for each PHY that may use a 50GAUI-2 or 100GAUI-4 are summarized in Tables 80-4a and 131-3 and normatively specified in the corresponding PMD Clause.
- The positioning of the 50GAUI-2 and 100GAUI-4 relative to other sublayers is specified in 135.1 with further examples in Annex 135A.

Cl **135F** *SC* **135F.1** *P* **357** *L* **7** # 146

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **A**

There is nothing called 50GAUI-1 C2C or 100GAUI-2 C2C channel operating margin (COM) in 120D.4, and the normative requirement for this annex is in 135F.4.

SuggestedRemedy

Change The normative channel compliance is through 50GAUI-1 C2C or 100GAUI-2 C2C channel operating margin (COM) as described in 120D.4" to "The normative channel compliance is determined by the 50GAUI-1 C2C or 100GAUI-2 C2C channel operating margin (COM) specified in 135F.4".
Similarly in 135B.1, 135D.1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Replace:
"The normative channel compliance is through 50GAUI-1 C2C or 100GAUI-2 C2C channel operating margin (COM) as described in 120D.4. Actual channel loss could be higher or lower than that given by Equation (120D–1) due to the channel ILD, return loss, and crosstalk."

With:
"The 50GAUI-2 C2C or 100GAUI-2 C2C channel is specified in 135F.4. The informative channel insertion loss is described in 120D.1."

Cl **135F** *SC* **135F.1** *P* **357** *L* **8** # 145

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **R**

Make consistent with 120D.1, except for the "Note that" which should not be used - it means nothing and can be confused with a NOTE.

SuggestedRemedy

Add another sentence: For this equation the channel loss at the Nyquist frequency is lower than or equal to 20.457 dB.

Response *Response Status* **C**

REJECT.

The loss at Nyquist for the channel is specified in 120D.1 and thus it is not necessary to respecify it here.

Since the intention of the Annex is to reuse the specifications in Annex 120D, replication of specifications was purposely avoided.

Cl **135F** *SC* **135F.3.2** *P* **357** *L* **25** # 65

Hidaka, Yasuo — Fujitsu Lab. of America

Comment Type **E** *Comment Status* **D** *<bucket>*

120D.3.3 does not exist.

SuggestedRemedy

Change 120D.3.3 to 120D.3.2.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **135F** *SC* **135F.3.2.1** *P* **357** *L* **28** # 176

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **D** *<late>*

For the precoding request function, the PMA needs to know when the update is complete. To best accomplish this task, the configuration of the Precoder state should be managed entirely by management processes (which is how TxEq is done). MDIO registers 1.600-1.603 provide the precoder control over each end of the link. When the request flag in 1.604 is asserted, 1.605 and 1.606 are used indicate the desired setting, but changing that setting in 1.600-1.603 should be done via management. Once the requested status and configurations align, the request flag is lowered. Clarification is needed to specify that this is how the operation should be done.

SuggestedRemedy

Change 135F.3.2.1 to be:

135F.3.2.1 Precoder request (optional)

The precoder request is an optional capability for a 50GAUI-1 C2C or 100GAUI-2 C2C receiver. If implemented, it shall operate as described in this subclause.

The precoder request is generated for each input (Tx and Rx) on each lane (0 and 1). The variables that control the precoding request are specific for each input and lane.

A 50GAUI-1 C2C or 100GAUI-2 C2C input may generate a request to change the precoder state on a given interface and lane by setting the variables request_precoder_tx_in_i or request_precoder_rx_in_i (where i is 0 to 1) to indicate the desired precoder setting per lane and interface. A precoder request from a 50GAUI-1 C2C or 100GAUI-2 C2C receiver is generated in an implementation specific manner. A 50GAUI-1 C2C or 100GAUI-2 C2C receiver that does not implement precoder request always sets request_precoder_tx_in_i, request_precoder_rx_in_i, request_precoder_tx_in_flag, and request_precoder_rx_in_flag to 0.

When a 50GAUI-1 C2C or 100GAUI-2 C2C supports precoder request and a request_precoder_tx_in_i differs from it's precoder_tx_in_en_i the request_precoder_tx_in_flag is set to 1. When a 50GAUI-1 C2C or 100GAUI-2 C2C supports precoder request and a request_precoder_rx_in_i differs from it's precoder_rx_in_en_i the request_precoder_rx_in_flag is set to 1. When request_precoder_tx_in_flag is 1, the request is fulfilled by setting the precoder_rx_out_en_i of the remote transmitter and the precoder_tx_in_en_i of the local receiver to the state of the request_precoder_tx_in_i. When request_precoder_rx_in_flag is 1, the request is fulfilled by setting the precoder_tx_out_en_i of the remote transmitter and the precoder_rx_in_en_i of the local receiver to the state of the request_precoder_rx_in_i.

If a Clause 45 MDIO is implemented, the variables request_precoder_rx_in_flag and request_precoder_tx_in_flag are accessible through register 1.604 (see 45.2.1.116l), variables request_precoder_rx_in_i are accessible through register 1.605 (see 45.2.1.116m), variables request_precoder_tx_in_i are accessible through register 1.606 (see 45.2.1.116n), variables precoder_tx_in_en_i are accessible through registers 1.603 (see 45.2.1.116k), variables precoder_rx_in_en_i are accessible through registers 1.601 (see 45.2.1.116i), variables precoder_tx_out_en_i are accessible through registers 1.600 (see 45.2.1.116h), and variables precoder_rx_out_en_i are accessible through registers 1.602 (see 45.2.1.116j).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **135G** *SC* **135G.5.3** *P* **365** *L* **1** # 83

Maki, Jeffery — Juniper Networks

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

Figure 135G-1 shows that 50GAUI-1 C2M and 100GAUI-2 C2M require FEC. No where in 135G.5.3 Major capabilities/options is it listed that FEC is mandatory. Furtermore, what FEC code is mandatory is not listed.

SuggestedRemedy

List the mandatory FEC code to make a compliant chip-to-module interface.

Item: FEC50; Feature: 50GBASE-R RS-FEC; Subclause: 134; Value/Comment: Device implements Clause 134 RS-FEC for 50GBASE-R; Status: M; Support: Yes [ ]

Item: FEC100; Feature: 100GBASE-R RS-FEC; Subclause: 91; Value/Comment: Device implements Clause 91 RS-FEC with RS(544,514) for 100GBASE-P; Status: M; Support: Yes [ ]

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Since this Annex does not specify an FEC, therefore a PICS item is not required.

The specific FEC for a PHY is specified for each PHY type in the associated PMD clause and is summarized in Clause 131 and Clause 80.

With full editorial license, in 135G.1 add text that explains the following:
- The FEC and other sublayers for each PHY that may use a 50GAUI-1 or 100GAUI-2 are summarized in Tables 80-4a and 131-3 and normatively specified in the corresponding PMD Clause.
- The positioning of the 50GAUI-1 and 100GAUI-2 relative to other sublayers is specified in 135.1 with further examples in Annex 135A.

Cl **136** *SC* **136.7** *P* **194** *L* **19** # 192
Slavick, Jeff Broadcom Limited

Comment Type **E** *Comment Status* **D** *<bucket><late>*

Editors note has served it's purpose

SuggestedRemedy

Delete editors note

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the Working Group ballot closed.]

See #27.

Cl **136** *SC* **136.7** *P* **194** *L* **19** # 27
Anslow, Pete Ciena

Comment Type **E** *Comment Status* **D** *<bucket>*

The editor's note says it will be removed after D1.3

SuggestedRemedy

Delete the note

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **136** *SC* **136.7** *P* **194** *L* **19** # 76
Healey, Adam Broadcom Ltd.

Comment Type **E** *Comment Status* **D** *<bucket>*

The editor's note states that it was supposed to self destruct after Draft 1.3.

SuggestedRemedy

The information in the note appears to be stale. Remove it.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See #27.

Cl **136** *SC* **136.7** *P* **194** *L* **41** # 199
Slavick, Jeff Broadcom Limited

Comment Type **T** *Comment Status* **R** *logic <late>*

In Table 136-6 the PMD status variable should not have _# since each lane has it's own instance of the logic running. The exception is for the signal_detect_#.

SuggestedRemedy

In Table 136-6 remove the _# from rx_trained, local_frame_lock, training, training_failure from the PMD status variable column.

Response *Response Status* **C**

REJECT.

[Editor's note: This comment was received after the Working Group ballot closed.]

This format has precedence in all previous multi-lane clauses. See Table 84-3, Table 85-3, Table 92-3, and Table 93-3.

Cl **136** *SC* **136.7** *P* **194** *L* **41** # 200
Slavick, Jeff Broadcom Limited

Comment Type **T** *Comment Status* **A** *logic <late>*

In Table 136-6 there is no PMD status variable rx_trained. The equivalent variable is local_trained

SuggestedRemedy

Change rx_trained_# to local_trained in Table 136-6

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the Working Group ballot closed.]

Indicating the lane number in the variable name has precedence in previous multi-lane clauses. See Table 84-3, Table 85-3, Table 92-3, and Table 93-3.

Change rx_trained_# to local_trained_# (# = 0 to 3).

Cl **136** *SC* **136.7** *P* **194** *L* **42** # 198

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **A** *logic <late>*

In Table 136-6 the PMD status variable for Frame lock # is listed as local_frame_lock. No variable by that name exists, it should be local_tf_lock

SuggestedRemedy

Change local_frame_lock_# to local_tf_lock in Table 136-6

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the Working Group ballot closed.]

Indicating the lane number in the variable name has precedence in previous multi-lane clauses. See Table 84-3, Table 85-3, Table 92-3, and Table 93-3.

Change local_frame_lock_# to local_tf_lock_# (# = 0 to 3).

Cl **136** *SC* **136.8.11.1.3** *P* **202** *L* **39** # 193

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **A** *training <late>*

P(j=0) is first precoded bit if you start at index 0, but would be the previous bit if you start at index 1. The text is stating that for the first symbol of the training pattern that this precoded, P(j-1)=0 in Equation 135-1.

SuggestedRemedy

Change "so that P(j=0) in Equation (135-1) is set to 0." to "so that P(j-1)=0 in Equation (135-1) for the first PAM4 symbol of the training pattern."

Response *Response Status* **C**

ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

The text matches Table 136-8 with the interpretation that the index of the first PAM4 symbol is 1.

Implement the suggested remedy.

Cl **136** *SC* **136.8.11.2.1** *P* **203** *L* **38** # 94

Dudek, Mike — Cavium

Comment Type **E** *Comment Status* **D** *<bucket>*

Wrong Reference.

SuggestedRemedy

Change 136.8.11.3.4 to 136.9.3.1.3

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **136** *SC* **136.8.11.3.3** *P* **205** *L* **13** # 194

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **A** *training <late>*

The Receiver Frame Lock bit is forced to 0, only during a training startup condition. It should also be forced low when in the TIMEOUT and TRAINING_FAILED states. local_tf_lock is forced low, but that does not force an ENCODE_STS to occur (the function that currently encodes transmitted status bit for receiver frame lock based on local_tf_lock)

SuggestedRemedy

Change the 2nd paragraph of 136.8.11.3.3 to be "Receiver frame lock shall be set to 0 when the variable training is false and it shall not be set to 1 until training and local_tf_lock are both true."
Remove "local_tf_lock is mapped to the receiver frame lock bit," from the definition of ENCODE_STS

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the Working Group ballot closed.]

In 136.8.11.3.3, Change the 2nd paragraph
FROM "Receiver frame lock shall be set to 0 upon entering TRAINING mode and shall not be set to 1 until local_tf_lock is true."

TO "Receiver frame lock shall be set to 0 when the variable training is false, and shall not be set to 1 until training and local_tf_lock are both true."

In 136.8.11.7.2, in the definition of ENCODE_STS, delete
"local_tf_lock is mapped to the receiver frame lock bit,".

Cl **136** *SC* **136.8.11.3.5** *P* **205** *L* **24** # 99

Dudek, Mike — Cavium

Comment Type **T** *Comment Status* **R** *training*

The control field and status fields are differential Manchester Coded and therefore inherently DC balanced. The Parity bit is not required for DC balance. In any case adding a parity bit to a binary sequence won't make it balanced anyway.

SuggestedRemedy

Delete the sentence "Even parity ensures that the transmitted control and status fields (see 136.8.11.1.2) are DC balanced.

Response *Response Status* **C**

REJECT.

Differential Manchester encoding (unlike the original Manchester encoding) is not always DC balanced. "1" cells are inherently balanced, but since a "0" cell is a run of 8 UI with no internal transition, it is only balanced by another "0" cell, so the sequence is balanced if the number of "0" cells is even.

Since there is an even number of fields and the the parity cell makes the number of "1" cells in these fields even that in turn also makes the number of "0" cells even.

Cl **136** *SC* **136.8.11.5** *P* **206** *L* **7** # 115

Ran, Adee — Intel

Comment Type **TR** *Comment Status* **A** *training*

This subclause defines the behavior of the receiving side of a coefficient update request. However, there is no description of the behavior of a requestor.

There are underlying assumptions for this handshake protocol: a request should be maintained until the status acknowledges it was received and handled. Then it should be replaced with a "hold" request and acknowledged with "no change" before a new request can be initiated.

These assumptions or expected behavior are not stated, and should be.

SuggestedRemedy

Candidate text will be supplied.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See #170.

Cl **136** *SC* **136.8.11.5** *P* **206** *L* **9** # 170

Zvi, Rechtman — Mellanox

Comment Type **T** *Comment Status* **A** *training*

The Coefficient update state machine in figure 136-9 defines the transmitter behavior upon peer receiver requests. While the requestor flow is not explicitly defined in the clause.
Resubmission of comment #36 against D1.3

SuggestedRemedy

Need to add a definition of the requestor behaviour.
Presentation will be sent.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the proposal in slides 7 and 8 of http://www.ieee802.org/3/cd/public/July17/rechtman_3cd_01_0717.pdf, with editorial license.

Cl **136** *SC* **136.8.11.5** *P* **206** *L* **9** # 202

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **A** *training <late>*

The algorithm in this section does not set coef_sts = not_upd, that is done in Figure 136-9. But when you change the coef_req from INC/DEC/NOEQ to HOLD that is a change in the coefficient request bits. So now you have the FSM (Figure 136-9) and this algorithm fighting each other. This algorithm would set coef_sts = UPDATED for HOLD (but not change the setting) while the FSM sets the response properly to NOT_UPDATED

SuggestedRemedy

Change "When a change to the coefficient select or coefficient request bits is detected" to "When a request to update a coefficient setting is detected in the coefficient request bits" to limit the scope of this code to execute only when you go from HOLD -> INC/DEC/NOEQ

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the Working Group ballot closed.]

The comment highlights a valid issue and a correction is required.

Based on the resolution of comment #170, a change of coeffient select can also cause this procedure to be called. However, a change from any request to HOLD should not call this procedure.

Since this procedure implements UPDATE_Cn, which is a state diagram function, it does not need to state when it is called.

Change the first paragraph of 136.8.11.5 FROM
"When a change to the coefficient select or coefficient request bits is detected, the corresponding coefficient update is performed in a manner consistent with the following algorithm."
TO
"The behavior of the UPDATE_Cn function is consistent with the following algorithm."

Cl **136** *SC* **136.8.11.5** *P* **206** *L* **9** # 201

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **A** *training <late>*

Update to the coefficients is only done upon a change in request bits, not a change in select.

SuggestedRemedy

Remove "coefficient select or" from the first sentence of 136.8.11.5

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the Working Group ballot closed.]

Note that the resolution of comment #170 makes the text that this comment adresses correct, since a change in coefficient select can cause an update to the coefficients.

The response to comment #202 changes this text and solves the problem.

Cl **136** *SC* **136.8.11.7.1** *P* **208** *L* **20** # 203

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **D** *<bucket><late>*

coef_sts has more enumerations then are listed.

SuggestedRemedy

Add "equalization limit, coefficient at limit and equalization limit" to the list of valid values for this variable.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136** *SC* **136.8.11.7.1** *P* **208** *L* **40** # 190

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **A** *training <late>*

local_tf_lock should be soley based on the state of Figure 136-8. Another comment is changing the definition of the transmitted Receiver Frame Lock status bit to handle the case when training fails. So we no longer need to force this local status bit low in training failure. While in training failure it's a useful debug status bit to know if you do have training frame lock or not.

SuggestedRemedy

Change the definition of local_tf_lock to be: "Boolean variable that is true when the training frame marker positions have been identified and is false otherwise."

Response *Response Status* **C**

ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

Resolve with #194.

Cl **136** *SC* **136.8.11.7.1** *P* **209** *L* **37** # 177

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **A** *<late>*

tp_mode is based on the received frames. To help clarify that, it would be useful to change it's name to remote_tp_mode

SuggestedRemedy

Change tp_mode to remote_tp_mode throughout Clause 136. (Table 136-6, Figure 136-7, 136.8.11.7.1)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the Working Group ballot closed.]

[Editor's note: The clause/subclause were changed from 138/138.8.11.7.1 to 136/136.8.11.7.1.]

See comment #118.

Cl **136** *SC* **136.8.11.7.1** *P* **209** *L* **38** # 118

Ran, Adee — Intel

Comment Type **T** *Comment Status* **A** *training*

The variable tp_mode is defined as the status of the partner. There is also a local status which is sent to the partner, but does not have a variable associated with it. This may be confusing and actually this variable is incorrectly used in 136.8.11.7.2. Other similar settings have local and remote variables.

SuggestedRemedy

Rename tp_mode to remote_tp_mode, and add a local_tp_mode variable.

Add a subclause after 136.8.11.4 similar to it, to describe the behavior when a change in the "Modulation and precoding request" including setting local_tp_mode.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy with editorial license.

Cl **136** *SC* **136.8.11.7.2** *P* **209** *L* **54** # 195

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **A** *training <late>*

ENCODE_STS maps local_rx_ready into the transmitted status frame. But it's only called when the remote partner modifies his transmitted frame. So when the local side transitions to TRAIN_REMOTE state, until the partner sends a change in his Control Frame they won't see that you're done. The local side should push it's local_rx_ready status to the partner based on it's state.

SuggestedRemedy

Remove ", local_rx_ready is mapped to the receiver ready bit" from the definition of ENCODE_STS
To help clarify which variable is mapped into the transmitted status bit add "(local_rx_ready = true)" to the end of 2nd sentence of 136.8.11.3.1, and add "(local_rx_ready = false)" to the end of the 3rd sentence.

Response *Response Status* **C**

ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

In 136.8.11.7.2, in the definition of ENCODE_STS, delete ", local_rx_ready is mapped to the receiver ready bit".

In 136.8.11.3.1, add the clarifying parenthesized text as suggested.

Cl **136** *SC* **136.8.11.7.2** *P* **210** *L* **1** # 119

Ran, Adee Intel

Comment Type **TR** *Comment Status* **A** *training*

tp_mode is defined as the remote status. The local status should be encoded.

SuggestedRemedy

Change to use local_tp_mode (to be added per another comment).

Response *Response Status* **C**

ACCEPT.

See comment #118.

Cl **136** *SC* **136.8.11.7.2** *P* **210** *L* **1** # 196

Slavick, Jeff Broadcom Limited

Comment Type **T** *Comment Status* **A** *training <late>*

tp_mode is based on received frames. ENCODE_STS updates the status field of the transmitted frames, which should not be based on tp_mode, but based on our local logic acting upon the received tp_mode_req from the far end.

SuggestedRemedy

Remove ", and tp_mode is mapped to modulation and precoding bits (see 136.8.11.3.2)" from the definition of ENCODE_STS
The current definition in 136.8.11.3.2 sufficiently defines how the local status bits are set.

Response *Response Status* **C**

ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

See comment #118.

Cl **136** *SC* **136.8.11.7.5** *P* **212** *L* **18** # 84

Stover, David Analog Devices

Comment Type **E** *Comment Status* **D** *<bucket>*

Timer execution keyword "start" is upper case in some states (TRAIN_LOCAL, LINK_READY), lower case in others (TIMEOUT); should be consistent.

SuggestedRemedy

Change "Start" to "start" in states TRAIN_LOCAL, LINK_READY.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **136** *SC* **136.8.11.7.5** *P* **213** *L* **4** # 197

Slavick, Jeff Broadcom Limited

Comment Type **T** *Comment Status* **A** *training <late>*

The training FSM maybe run through a reset sequence without the PMD being reset. When that happens, the Frame_lock and Coeff_Update FSM blocks should also be placed into their Reset states.

SuggestedRemedy

Add "+ mr_restart_training" to the entry condition of OUT_OF_FRAME in Figure 136-8 and to the entry condition of "OUT_OF_SYNC" in Figure 136-9

Response *Response Status* **C**

ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136** *SC* **136.9.3** *P* **216** *L* **10** # 73

Hidaka, Yasuo Fujitsu Lab. of America

Comment Type **E** *Comment Status* **D** *<bucket>*

Some references to 120D are wrong. In 120D, the name of variable J4 was also changed to J4u.

SuggestedRemedy

In Table 136-11, change the reference of 120D.3.1.1 for the output jitter to 120D.3.1.8.
In Table 136-11, change the reference of 120D.3.1.2 for the Signal-to-noise-and-distortion ratio to 120D.3.1.6.
In PICS in 136.14.4.3, change the subclause of TC10 from 120D.3.1.2 to 120D.3.1.6.
In PICS in 136.14.4.3, change the subclause of TC12 from 120D.3.1.1 to 120D.3.1.8.
In Table 136-11, change "J4" to "J4u".
In 136.9.4.2.3, item e) on P221, change "J4" to "J4u" at 3 locations (on L1, L3, and L5).
Change "J4" to "J4u" in Equation (136-6) at 2 locations.
Change "J4" to "J4u" in Equation (136-7).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **136** *SC* **136.9.3** *P* **216** *L* **11** # 143

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **R** *Electrical <NSR>*

J4, now called J4u (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 J3u (1.875e-4 per bit) is a good match to the spec BER - just as J4u is a good match to the BER of 1e-5 for 120D. Also, not all edges cause errors. We can make the spec better (more accurate, less performance left on the table) and reduce test time. Futher, the jitter at TP2 won't be the same as at TP0a in 137.9.2 (expected to be more).

SuggestedRemedy

Change J4 to J3u. Choose the limit at TP2 considering jitter limit at TP0a and the mated compliance board crosstalk specs, among other factors.

Response *Response Status* **U**

REJECT.

The suggested remedy lacks sufficient detail required for implementation - the limits for TP2 are not included.

The commenter is encouraged to suggest and build consensus for specific limits at TP2, as well as the suggestion to change J4u to J3u.

(resolve with #144)

Cl **136** *SC* **136.9.3** *P* **216** *L* **22** # 122

Ran, Adee — Intel

Comment Type **E** *Comment Status* **D** *Editor's note*

The editor's note should be removed at some point if there is no discussion of suggested changes in SNDR, SNR_ISI, and SNR_TX.

SuggestedRemedy

Unless other comments prevent this, remove this note.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **136** *SC* **136.9.3.1.3** *P* **218** *L* **27** # 163

Hegde, Raj — Broadcom Ltd.

Comment Type **T** *Comment Status* **A** *Electrical*

The current draft lists 3 options for the initial transmit equalizer coefficient values based on the variable ic_req in Table 136-12.
The values 'preset1', 'preset2', and 'preset3' for ic_req correspond to no equalization, 6dB of pre-cursor only equalization, and 6dB of post-cursor only equalization, respectively.
Though 6dB of tx-equalization may be needed to meet the BER target on channels close to the spec limit, such high level of tx-equalization, particularly in the post cursor, is not necessary to obtain initial frame-lock on these long channels. Hence the coefficient configuration corresponding to the 'preset 3' setting seems unnecessary.
Moreover, 6dB of post-cursor equalization is definitely excessive for short and medium length channels and could lead to dead-zones and prevent the CDRs from achieving initial frame lock.
It could also be noted that the reference receivers in Clauses 136 and 137 do not need 6dB of post-cursor equalization even on spec-limit channels to achieve the target BER.

SuggestedRemedy

Replace the post-cursor equalization only option with a configuration that provides a combination of both pre and post cursor equalization.
In addition to addressing the concerns raised above, this may also on average reduce the number of coefficient updates needed to meet the BER target over the range of channel losses supported by the spec.
Replace the coefficient settings corresponding to preset 3 with the following:
c(-2): 0+/-0.05 c(-1): -0.15+/-0.05 c(0): 0.75+/-0.05 c(1): -0.1+/-0.05

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Replace the coefficient settings corresponding to preset 2 with the following:
c(-2): 0+/-0.025
c(-1): -0.15+/-0.05
c(0): 0.75+/-0.05
c(1): -0.1+/-0.05

Cl **136** *SC* **136.9.3.1.3** *P* **218** *L* **28** # 188

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **D** *<bucket><late>*

136.9.3.1.3 states that when Figure 136-9 enters the OUT_OF_SYNC state the TxEq should be set according to Table 136-12 (Preset1 = NoEq). However, in Figure 136-9 there is no "load" of that Equalization value.

SuggestedRemedy

Add a call to "UPDATE_IC" into the OUT_OF_SYNC state before the ENCODE_STS call.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the Working Group ballot closed.]

Update Figure 136-9 to implement the suggested remedy.

Cl **136** *SC* **136.9.4.2** *P* **220** *L* **12** # 124

Palkert, Thomas — Molex

Comment Type **TR** *Comment Status* **A** *Electrical*

COM limits and cable attenuation limits do not reflect current cable characteristics

SuggestedRemedy

Cable test data shows that COM should be changed to 3.5 and attenuation changed to 18dB

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Reviewed palkert_3cd_01b_0717.

No change to COM in this comment.

In Table 136-14, increase the maximum loss of the cable at 13.28 GHz to 17.16 dB.

In Table 136-13, increase the loss in the test 2 so that cable assembly loss (max) is 17.16 dB, and other values in test 2 change accordingly.

In Table 136A-1, change IL_Camax from 16.06 dB to 17.16 dB, and change IL_Chmax accordingly.

Update Figure 136A-1 to reflect the changed values.

Editorial lincese granted to make consequential changes.

Cl **136** *SC* **136.9.4.2.2** *P* **220** *L* **28** # 72

Hidaka, Yasuo — Fujitsu Lab. of America

Comment Type **TR** *Comment Status* **D** *Electrical*

Test channel of receiver interference tolerance test is specified as the cable assembly meets the requirements of 136.11 and the cable assembly test fixture meets the requirements of Annex 136B. However, as explained in hidaka_3cd_01a_0517.pdf and hidaka_060717_3cd_adhoc-v2.pdf, the cable assembly just meeting the requirements of 136.11 allows use of a cable assembly with the worst return loss, which will cause interoperability problems between compliant channel and compliant Rx. As explained in hidaka_3cd_02_adhoc-v2.pdf, the return of of the test channel for Rx ITT is important to improve margin for interoperability. We should specify the Rx-side return loss of the test channel tighter than the return loss of the compliant channel so that a good test channel is always used for Rx ITT.

SuggestedRemedy

Change the sentence of 136.9.4.2.2
"The test channel is the same as the one defined in 110.8.4.2.2, except that the cable assembly meets the requirements of 136.11 and the cable assembly test fixture meets the requirements of Annex 136B."

to

"The test channel is the same as the one defined in 110.8.4.2.2, except that the cable assembly meets the requirements of 136.11, the cable assembly test fixture meets the requirements of Annex 136B, and the differential return loss of the test channel measured at Rx test reference including the cable assembly meets Equation (92-38)."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

For task force discussion.

Cl **136** *SC* **136.9.4.3.2** *P* **222** *L* **33** # 112

Dudek, Mike Cavium

Comment Type **TR** *Comment Status* **D** *Electrical*

It is possible that with the added jitter the COM could be below the 3dB even with no noise added. This would over-stress the receiver.

SuggestedRemedy

Add an extra sentence to the first paragraph. With the applied jitter of Case E in table 120D-7 the COM as calculated by the method in 136.9.4.2 is equal or greater than the value given in table 136-13 for all lanes.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The comment highlights an issue, but the suggested remedy only refers to case E, while this should be met for all cases.

Also, it is ambiguous as to what happens if this requirement is not met. This can be solved by adding an informative NOTE.

Apply the following changes:

In the first paragraph, append "The test channel COM, calculated per 136.9.4.2.3 with the jitter-stressed transmitter output, shall not be lower than the value in Table 136-13."

Change NOTE to NOTE 1.

Add NOTE 2: "The A_DD (equation 136-6) and sigma_RJ (equation 136-7) calculated from transmitter measurements in this test may be higher than the values in Table 136-15. A suitable channel should be chosen in order to meet the COM requirement with these values."

Cl **136** *SC* **136.11** *P* **223** *L* **42** # 113

Dudek, Mike Cavium

Comment Type **TR** *Comment Status* **A** *Cable*

Equation 92-27 for the differential return loss gives 5.3dB return loss at 13.28GHz. This is not the 6dB listed and is a relatively poor value and could lead to significant differences between system performance with a real host and the COM calculated with the single 110 Ohm host board trace equivalent. Work on backplanes and C2C (e.g. Hidaka_3cd_01a_0317, Dudek_3bs_02_0517) has shown that this affect is significant and it would be better to test COM with nominal impedances and have a guard band between the channel COM and the Interference tolerance COM.

SuggestedRemedy

Change 6 to 5.3 Change the COM value to 3.5dB. In table 136-15 change the value of Rd to 50 Ohm, the value of Zc to 95 Ohm, On page 224 line 40 change the value of COM to 3.5dB. Change the impedance of the test trace from TP0 to TP1 and TP4 to TP5 to 100 Ohm by changing on page 226 line 41 from "using zp = 151 mm in length, representing an insertion loss of 6.42 dB at 13.28 GHz on each PCB." to "using Zc = 100 Ohm and zp = 151 mm in length, representing an insertion loss of 6.42 dB at 13.28 GHz on each PCB." Also change to 3.5dB in PICS CA8.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.

In Table 136-14, Change "Minimum differential return loss at 13.28 GHz" from 6 dB to 5.3 dB.

The rest of the suggested remedy requires more consensus building.

See also #71

Cl **136** *SC* **136.11** *P* **224** *L* **13** # 100

Dudek, Mike Cavium

Comment Type **T** *Comment Status* **A** *Cable*

The value of Tr used in Clause 137 is 12ps (120D (56G per lane C2C) is 13ps. It was 8ps for the 25G NRZ clause 110). As it is expected that the same ASICs are likely to be used for the backplane and copper cable specifications this risetime should be aligned with that in Clasue 137.

SuggestedRemedy

Change 8ps to 12ps.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The value in the baseline proposal was 12 ps. The current value was copied from 802.3by in D1.0 (which was an error) and wasn't changed since then.

Implement the suggested remedy.

Cl **136** *SC* **136.11.2** *P* **197** *L* **12** # 98

Dudek, Mike — Cavium

Comment Type **T** *Comment Status* **A** *Cable*

The reference in 92.8.3.6 provides the loss at 12.8906GHz (the Nyquist frequency for that clause) . As the Nyquist frequency is different in this clause it would be helpful to provide the loss at that frequency here. However equation 92-8 gives an attenuation 10.11 dB at 13.28 GHz which conflicts with th 10.07dB shown in Figure 136A-1.

SuggestedRemedy

Either
Add the following sentence between "92.8.3.6" and "Annex 136A".

Either
Note that the recommended maximum insertion loss from TP0 to TP2 or from
TP3 to TP5 is 10.11 dB at 13.28GHz GHz

Change Figure 136A-1 and table 136A-1 to show 10.11 dB for the losses between TP0 and TP2 and between TP3 and TP5 and in the equation. Increase the 28.9dB total budget to 28.98dB and change the NOTE to say the host connector is allocated 0.66dB of additional Margin, and on page 368 line 39 change the connector loss to 1.73dB and on line 41 change the value to 10.11dB
Or (preferred as I don't think we want to increase the budget and I think we may want to further amend this curve to allow fly over cable results.)
Don't refer to 92.8.3.6. Create a local section with the same content except that the equation becomes. 0.08 + 0.57sqrt(f) + 0.596f and -19.109 + 2.119f and the note says 10.07dB at 13.28GHz. Refer to this section in Table 136-7 instead. Also refer to this equation on page 369 lines 12 and 40 and page 368 line 40.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add subclause 136.9.3.2 "Insertion loss TP0 to TP2 or TP3 to TP5" with content similar to 92.8.3.6 with the following equation replacing the reference to Eq. 92-8:

0.08 + 0.57sqrt(f) + 0.596f, 0.01 = f < 14
-19.109 + 2.119f, 14 = f = 19

Revise sentence beginning with "Note" to indicate loss of 10.07 dB at 13.28 GHz consistent with the new equation.

Refer to the new equation in 136 instead of the reference to 92.8.3.6. (92-8)
P197, L12
P197, L40
P368, L40
P369 L12
P369 L40

Cl **136** *SC* **136.11.7** *P* **224** *L* **31** # 9

Hajduczenia, Marek — Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

"Channel Operating Margin" acronym is defined here for the first time, but used extensively before

SuggestedRemedy

Move the definition of acronym to its first use

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The acronym is defined on its first use, in 136.9.4.2, which refers to this subclause.

The definition is repeated here for convenience of readers that may get to this subclause without going through 136.9.4.2.

Cl **136** *SC* **136.11.7** *P* **225** *L* **6** # 164

Li, Peng — Intel

Comment Type **TR** *Comment Status* **D** *Cable*

Cd =1.8e-4 nF. On the other hand, the CEI-56G-LR-PAM4 Rev06 (the latest version) has Cd=1.6e-4 nF which is better and enables larger solution space for channels, and that is what application is asking for. In practice, most of the SERDES vendors play in both markers with the same SERDES. So it is logical to make them aligned to the better one.

SuggestedRemedy

Change Cd to 1.6e-4 nF.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **136** *SC* **136.11.7** *P* **225** *L* **8** # 101

Dudek, Mike — Cavium

Comment Type **T** *Comment Status* **D** *<bucket>*

Formatting of the table has gone wrong.

SuggestedRemedy

It should be 30mm for the test 2 Zp, and 1.1e-4 for Cp

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See #74.

Cl **136** *SC* **136.11.7** *P* **225** *L* **8** # 69

Hidaka, Yasuo — Fujitsu Lab. of America

Comment Type **E** *Comment Status* **D** *<bucket>*

New lines between the values for z_p = 30mm, C_p = 1.1 x 10^-4 nF, Z_c = 90 ohm in Table 136-15 are lost.

SuggestedRemedy

Insert new lines to separate values.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See #74.

Cl **136** *SC* **136.11.7** *P* **225** *L* **8** # 74

Healey, Adam — Broadcom Ltd.

Comment Type **E** *Comment Status* **D** *<bucket>*

In "Value" column in the first row, missing line break between "30" and "1.1 x 10^(-4)".

SuggestedRemedy

Insert line break. There is a similar problem in Table 137-5 (page 243, line 22). There is also some inconsistent justification of value fields (some left, some center). Re-format to be consistent.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **136** *SC* **136.11.7** *P* **225** *L* **9** # 71

Hidaka, Yasuo — Fujitsu Lab. of America

Comment Type **TR** *Comment Status* **R** *Cable*

As explained in hidaka_061417_3cd_01_adhoc.pdf, the limit of variation of compliant channels will grow, if we use a single reference value for the COM impedance parameters, and the single reference value is different from the nominal value. In order to minimize the variation of compliant channels, we should use the nominal value as the single reference value, or we should use multiple reference values. Reduction of variation helps to improve margin for interoperability, which is not guaranteed in the current specification. When we change the COM impedance parameters, we should also consistently change A_v, A_fe, A_ne to get the same signal amplitude at TP0a from reference Tx in COM, and we should also change the COM value to avoid changing the pass / fail status of existing channels. The consistent changes required to A_v, A_fe, and A_ne were reported in hidaka_060717_3cd_adhoc-v2.pdf slide 12. The consistent change required to COM value was reported in hidaka_061417_3cd_01_adhoc.pdf slide 14-18.

SuggestedRemedy

Change the following COM parameter values in Table 136-15:

Package Z_c from 90 ohm to 95 ohm
R_d from 55 ohm to 50 ohm
A_v from 0.44 V to 0.415 V
A_fe from 0.44 V to 0.415 V
A_ne from 0.63 V to 0.604 V

In the second paragraph of 136.11.7.1, P226, L31, change
"the parameter values given in Table 92-12"
to
"the parameter values given in Table 92-12 excepting that Z_c is 100.0 ohm".

For clarification of the intention of the value, in the parameter column of Table 136-15, change
"Package transmission line characteristic impedance"
to
"Package transmission line nominal characteristic impedance".

In Table 136-14, change the value of Minimum COM from 3 dB to 3.3 dB.

In the third paragraph of 136.11.7, P224, L40, change
"shall be greater than or equal to 3 dB"
to
"shall be greater than or equal to 3.3 dB".

Response *Response Status* **U**

REJECT.

hidaka_3cd_01_0717 was reviewed. There is no consensus to make the proposed changes.

The commenter is encourged to build consensus on a proposal in the ad hoc meetings.

Cl **136** *SC* **136.11.7** *P* **226** *L* **19** # 114

Ran, Adee Intel

Comment Type **E** *Comment Status* **R** *Editor's note*

The editor's note should be removed at some point if there is no discussion of suggested changes in Z_c.

SuggestedRemedy

Unless other comments prevent this, remove this note.

Response *Response Status* **C**

REJECT.

There are other comments that suggest changes in Z_c (#71, #113). Further work on this was encouraged, so the note should not be deleted for now.

Cl **136** *SC* **136.11.7.1.2** *P* **227** *L* **10** # 135

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **A** *Cable*

For 200GBASE-CR4, the aggressor zp could be shorter than the victim zp, because of different routes out of a big IC package and routing on the PCB, but 151-72 = 79 mm = 3.1" difference is not credible, considering that a long path in the package can go with a shorter path on the PCB.

SuggestedRemedy

Maybe zp = 110 mm for 200GBASE-CR4 and 100GBASE-CR2 aggressor.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change zp from 72 mm to 110 mm for the aggressor traces for all cable assembly types.

Scale the insertion loss as appropriate.

Cl **136** *SC* **136.14.3** *P* **231** *L* **10** # 102

Dudek, Mike Cavium

Comment Type **T** *Comment Status* **A** *MDI*

The PICS only cover the SFP to QSFP options.

SuggestedRemedy

Either add PICS for all the other options (and combinations) or delete these existing PICS.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The type of a cable assembly is obvious and need not be declared in a form. Given the number of MDI options, there are too many combinations to list. There is no need to list any specific combinations in this Clause.

Delete items FFSS, FFQS, FFQQ.

(resolve with #104)

Cl **136** *SC* **136.14.4.4** *P* **233** *L* **26** # 103

Dudek, Mike Cavium

Comment Type **T** *Comment Status* **D** *<bucket>*

The Requirement in 136.9.4.1 is for a FEC symbol error rate not BER.

SuggestedRemedy

Change "PMD BER better than 10-4" to "Meets FEC symbol error rate requirement"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **136** *SC* **136.14.4.6** *P* **234** *L* **27** # 104

Dudek, Mike Cavium

Comment Type **T** *Comment Status* **A** *MDI*

Need to add the other MDI options.

SuggestedRemedy

Add them.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add new item for uQSFP.

Add two new items for two eight-lane connectors, QSFP-DD and OSFP.

Change "feature" and "value/comment" for all five items to use the specific receptacle names.

Cl **136A** *SC* **1** *P* *L* # 95
Dudek, Mike Cavium

Comment Type **E** *Comment Status* **D** *<bucket>*

It is better to make a direct reference rather than refering to 92A which then refers to the equation in 92.10.3.

SuggestedRemedy

Change the reference to equation 92-27.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Change P371 L4 reference 92A.6. to equation 92-27

Cl **136A** *SC* **136A.7** *P* **371** *L* **11** # 105
Dudek, Mike Cavium

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

The tables don't have different specifications for different cable types.

SuggestedRemedy

Delete "for the cable type being used"

Response *Response Status* **C**

ACCEPT.

Cl **136B** *SC* **136B.1.1.6** *P* **373** *L* **14** # 142
Dawe, Piers Mellanox

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

Just as for the QSFP connector, we will need better crosstalk to support PAM4 with the SFP connector.

SuggestedRemedy

When we have information about recent test fixtures' performance, tighten max. NEXT from 1.8 mV rms towards 1.5 as feasible, by changing "shall meet the specification in Table 110B-1." to e.g. "shall be less than 1.6 mV." TR because it may take a while to get the information.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change the NEXT requirement for SFP28 mated test fixtures to be less than 1.6 mV.

Implement with editorial license.

Cl **136B** *SC* **136B.1.1.6** *P* **373** *L* **30** # 106
Dudek, Mike Cavium

Comment Type **T** *Comment Status* **D** *<bucket>*

The specification for the multi-lane mated test fixture needs to include more than QSFP.

SuggestedRemedy

Change "The QSFP28" to "The multi-lane". Change the title of table 136-2 replacing QSFP28 with "multi-lane. The PICS also need to be amended to include the additional test fixtures.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **136B** *SC* **136B.2.3** *P* **376** *L* **14** # 107
Dudek, Mike Cavium

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

The PICS for the test fixture for QSFP needs to refer to the more stringent XTALK spec.

SuggestedRemedy

Change the HTF2 and CATF2 references from 92.11.1 to 136B.1.1

Response *Response Status* **C**

ACCEPT.

[Editor's note: change subclause from 136.2.3 to 136B.2.3]

Cl **136C** *SC* **136C.1** *P* **377** *L* **22** # 96
Dudek, Mike Cavium

Comment Type **E** *Comment Status* **D** *<bucket>*

It would read better if the "enabling a 3m length" were not split by the parenthsis (2 places).

SuggestedRemedy

Change "The 50GBASE-CR is a single-lane cable assembly (and can also be implemented as a multiple version using a four-lane or eight-lane plug for high density applications), enabling a 3 m length" to
"The 50GBASE-CR is a single-lane cable assembly enabling a 3 m length(and can also be implemented as a multiple version using a four-lane or eight-lane plug for high density applications). "

Make the similar change in the next sentence.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **136C** *SC* **136C.1** *P* **377** *L* **38** # 108

Dudek, Mike — Cavium

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

It would be good to be explicit that there are no restrictions on the combinations of connectors and numbers of lanes.

SuggestedRemedy

In Section 136C.3.1 state as the last sentence. "Cables using any combination of MDI's and number of lanes are acceptable form factors.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add sentence to end of paragraph 136C.3 P378, L30
Cable assembly form factors consisting of any combination of MDIs and number of lanes that meet the requirements of 136.11 are acceptable.

Cl **136C** *SC* **136C.3.1** *P* **378** *L* **36** # 109

Dudek, Mike — Cavium

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

It would be good to add the cross cables to this section.

SuggestedRemedy

After "on both ends". Insert "One plug to one plug cables can also have different cable plugs on each end for example QSFP28 on one end and uQSFP on the other end.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

After "on both ends.", insert the new sentence:
"One plug to one plug cables can also have different cable plugs on each end."

Cl **136C** *SC* **136C.3.2** *P* **379** *L* **27** # 111

Dudek, Mike — Cavium

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

"two 50Gb/s links" isn't very explicit and it would be good to be more precise and describe the 100G scenario as well.

SuggestedRemedy

Replace "two 50Gb/s links" with "two 50GBASE-CR links or one 100GBASE-CR2 link"

Response *Response Status* **C**

ACCEPT.

Cl **136C** *SC* **136C.3.3** *P* **380** *L* **9** # 189

Slavick, Jeff — Broadcom Limited

Comment Type **T** *Comment Status* **D** *<bucket><late>*

Figure 136C-3 is a example of a 1 to 4 plug

SuggestedRemedy

Change "two-plug" to "four-plug"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136D** *SC* **136D** *P* **382** *L* **1** # 97

Dudek, Mike — Cavium

Comment Type **ER** *Comment Status* **A**

It would be better to introduce the normative MDI section ahead of the application information.

SuggestedRemedy

Move 136D to be 136C.

Response *Response Status* **C**

ACCEPT.

Cl **136D** *SC* **136D.1** *P* **382** *L* **50** # 110

Dudek, Mike — Cavium

Comment Type **T** *Comment Status* **D**

The MDI needs to be consistent with the cable specs as well.

SuggestedRemedy

Add 136.11

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

[Editor's note: changed subclause from 136D. to 136D.1.]

Cl **136D** *SC* **136D.2.3** *P* **386** *L* **11** # 166

Kolesar, Paul CommScope

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

Reference is made to the microQSFP MSA using footnote 22. The refrence is to an MSA website that may not be permanent.

SuggestedRemedy

Refer to a permenent reference or consider deletion of the reference.

Response *Response Status* **C**

REJECT.

[Editor's note: Changed subclause from 2.3 to 136D.2.3.]

The "IEEE-SA Standards Board Operations Manual" 6.4.6 and "IEEE-SA Standards Style Manual" 10.5.1 both recognize that some standards may not be permanent and may change without control, yet allows them as references with some conditions.

This and other similar references are consistent with references in 802.3-2015. For instance, footnote 19 on page 68 of 802.3-2015 Section 1 says to the following:
"SFF specifications are available at ftp://ftp.seagate.com/sff".

Cl **136D** *SC* **136D.2.4** *P* **387** *L* **4** # 167

Kolesar, Paul CommScope

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

Reference is made to the QSFP-DD MSA using footnote 23. The refrence is to an MSA website that may not be permanent.

SuggestedRemedy

Refer to a permenent reference or consider deletion of the reference.

Response *Response Status* **C**

REJECT.

[Editor's note: Changed subclause from 2.4 to 136D.2.4.]

See the response to comment #166.

Cl **136D** *SC* **136D.2.5** *P* **388** *L* **4** # 168

Kolesar, Paul CommScope

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

Reference is made to the OSFP MSA using footnote 24. The refrence is to an MSA website that may not be permanent.

SuggestedRemedy

Refer to a permenent reference or consider deletion of the reference.

Response *Response Status* **C**

REJECT.

[Editor's note: Changed subclause from 2.5 to 136D.2.5.]

See the response to comment #166.

Cl **136D** *SC* **136D.3** *P* **389** *L* **1** # 29

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **D** *<bucket>*

Annex 136D PICS is blank

SuggestedRemedy

Fill out the PICS proforma.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See comment #169.

Cl **136D** *SC* **136D.3.3** *P* **390** *L* **4** # 63

Cheng, Weiying Coriant

Comment Type **E** *Comment Status* **D** *<bucket>*

Is there any reason to have an empty table here? If there is no change, remove it. Otherwise, add changes for the PICS.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See comment #169.

Cl **136D** *SC* **136D.3.3** *P* **390** *L* **6** # 75

Healey, Adam — Broadcom Ltd.

Comment Type **T** *Comment Status* **D** *<bucket>*

The major capabilities/options and PICS proforma tables are blank.

SuggestedRemedy

Complete the tables.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See comment #169.

Cl **136D** *SC* **136D.3.3** *P* **390** *L* **6** # 169

Kolesar, Paul — CommScope

Comment Type **T** *Comment Status* **D** *<bucket>*

There are no PICS stated, yet there are "shall" statements in the clause at page 382 lines 42, 43, 47; page 384 line 1;

SuggestedRemedy

Create PICS for each shall statement.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: Change subclause from 3.3 to 136D.3.3.]

Editor to implement appropriate PICS for Annex 136D.

Cl **136D** *SC* **136D.3.4** *P* **390** *L* **18** # 64

Cheng, Weiying — Coriant

Comment Type **E** *Comment Status* **D** *<bucket>*

Is there any reason to have an empty table here? If there is no change, remove it. Otherwise, add changes for the PICS.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See comment#169.

Cl **137** *SC* **137.9** *P* **241** *L* **1** # 136

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **R** *Electrical <NSR>*

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 Working Group ballot and if things don't improve, reduce the 30 dB objective and 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.

Response *Response Status* **U**

REJECT.

No specific change to the draft is suggested.

Cl **137** *SC* **137.9.1** *P* **241** *L* **11** # 138

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **A** *Electrical*

Consistency - 120D.2 has an exception for the upper frequency for the test fixture.

SuggestedRemedy

Do the same here.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Equation 93-1 defines reference insertion loss and the effect of extending the frequency range is expected to be minor. For equation 93-2, the effect of return loss above 25 GHz on interoperability is also expected to be minor.

However, consistency with 120D is good and the description and wording can be improved.

Change FROM
"which are connected to the MDI through the test fixtures described in 93.8.1.1 and 93.8.2.1"

TO
"The location of TP0a and the electrical characteristics of the test fixture used to measure transmitter characteristics are defined in Figure 93-5 and 93.8.1.1, respectively, with the exception that the upper frequency for Equation 93-1 and Equation 93-2 is 26.5625 GHz.

The location of TP5a and the electrical characteristics of the test fixture used to measure receiver characteristics are defined in Figure 93-10 and 93.8.2.1, respectively, with the exception that the upper frequency for Equation 93-1 and Equation 93-2 is 26.5625 GHz".

Adjust punctuation as necessary.

Cl **137** *SC* **137.9.1** *P* **241** *L* **11** # 137

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **A** *Electrical <NSR>*

Now that the return loss spec has been tightened (Eq 137-1), the allowed return loss of the test fixture (in 93.8.1.1) is too close to the limit and ruins the measurement. There is a similar problem in 120D.
Per 93.8.1.1, "The effects of differences between the insertion loss of an actual test fixture and the reference insertion loss are to be accounted for in the measurements"

SuggestedRemedy

Tell the user to de-embed the test fixture return loss, or tighten the TF RL spec?
Making the IC implementer responsible for the test fixture seems appropriate, as the test fixture is custom designed for that IC and the IC is soldered onto it.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See Comment #141.

If the exception is retained, add similar text enabling de-embedding to the Tx Return loss measurement as in #141.

Cl **137** *SC* **137.9.2** *P* **241** *L* **21** # 140

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **R** *Electrical*

Output residual ISI SNR_ISI (min) 43 dB is way too high - probably can't measure the IC through the test fixture and cables, even test equipment fails this limit. The warning NOTE in 120D.3.1.7 notes the issue (for 34.8 dB), but doesn't solve it.

SuggestedRemedy

It may be necessary to move away from the SNR_ISI method.

Response *Response Status* **U**

REJECT.

dawe_3cd_02_0717 was presented.

The comment highlights an issue in the current draft, but there was no consensus for adopting any of the proposed solutions.

The commenter is encourged to build consensus and bring a new proposal.

See #139.

Cl **137** *SC* **137.9.2** *P* **241** *L* **22** # 139

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **R** *Electrical <NSR>*

Signal-to-noise-and-distortion ratio (min) 32.5 dB is too high (even worse than 120D) - probably can't measure the IC through the test fixture and cables. I suspect there is double counting of jitter in SNDR and as jitter, in COM.

SuggestedRemedy

Remove the double counting. Reduce the SNDR limit to something that can reasonably be measured, or change the measurement method.

Response *Response Status* **U**

REJECT.

dawe_3cd_02_0717 was presented.

The comment highlights some issues in the current draft, but there was no consensus for adopting any of the proposed solutions.

The commenter is encourged to build consensus and bring a new proposal.

Cl **137** *SC* **137.9.2** *P* **241** *L* **24** # 144

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **R** *Electrical*

J4u in 120D (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 J3u (1.875e-4 per bit) is a good match to the spec BER - just as J4u is a good match to the BER of 1e-5 for 120D. Also, not all edges cause errors. We can make the spec better (more accurate, less performance left on the table) and reduce test time.

SuggestedRemedy

Change J4 to J3u, max 0.106 UI (from eq 136-6 and 7). In Eq 136-6 and 136-7 and the NOTE, change Q4=3.8906 to Q3=3.2905, Q(Q3) = 5 x10^-4.

Response *Response Status* **U**

REJECT.

Note that the suggested change (J4u to J3u) seems to enable a shorter measurement while keeping the same sigma_RJ and A_DD for COM, by changing the conversion equations (136-6 and 136-7).

The task force discussed the suggested remedy. Since currently both clauses 136 and 137 use the same equations, there is preference to make changes to both clauses together. There is no consensus for changing just this clause.

See comment #143.

Cl **137** *SC* **137.9.3** *P* **241** *L* **32** # 66

Hidaka, Yasuo — Fujitsu Lab. of America

Comment Type **T** *Comment Status* **A** *Electrical*

Table 120D-6 specifies insertion loss at 13.2813 GHz, not 13.28 GHz.

SuggestedRemedy

Change 13.28 GHz to 13.2813 GHz in item 2 and item 3.

Response *Response Status* **C**

ACCEPT.

Cl **137** *SC* **137.9.3** *P* **241** *L* **36** # 67

Hidaka, Yasuo — Fujitsu Lab. of America

Comment Type **T** *Comment Status* **A** *Electrical*

It is written as "Receiver jitter tolerance (see 120D.3.2.2) is tested using the test channel in item 3)." but which "item 3)" is not clear.

SuggestedRemedy

Change "the test channel in item 3)" to "the test channel of receiver interference tolerance for Test 2 (high loss)".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

There is only one "item 3)" in this subclause, and there is a cross-reference to it, so there should be no ambiguity.

However, the wording can be improved.

Change "the test channel in item 3)" to "the test channel used for receiver interference tolerance Test 2 (see item 3)".

Cl **137** *SC* **137.9.3.1** *P* **241** *L* **46** # 141

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **A** *Electrical*

The low frequency RL at 14.25 dB is insignificant for signal integrity compared with the 8.7 dB at 6 GHz. This RL is much tighter than CEI-56G-LR at low (and high) frequency (although apparently looser between 4 and 9 GHz).

SuggestedRemedy

Change 14.25 - f to 12 -0.625f

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.

This issue was discussed in 802.3bs and resulted in a change to the similar specification (Comment #r02-41).

In 137.9.3.1 (Receiver input return loss), append the following text to the first paragraph: "The test fixture return loss may be de-embedded from the return loss measurements."

No need to add this in 137.9.2 (Transmitter characteristics) since it refers to 120D.3.1.1, where a similar change was applied by 802.3bs (indirectly through Table 120D-1). Update exceptions if necessary.

Implement with editorial license.

Cl **137** *SC* **137.10** *P* **243** *L* **20** # 165

Li, Peng — Intel

Comment Type **TR** *Comment Status* **D** *Cable*

Cd =1.8e-4 nF. On the other hand, the CEI-56G-LR-PAM4 Rev06 (the latest version) has Cd=1.6e-4 nF which is better and enables larger solution space for channels, and that is what application is asking for. In practice, most of the SERDES vendors play in both markers with the same SERDES. So it is logical to make them aligned to the better one.

SuggestedRemedy

Change Cd to 1.6e-4 nF.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **137** *SC* **137.10** *P* **244** *L* **31** # 123

Ran, Adee Intel

Comment Type **E** *Comment Status* **A** *Editor's note*

The editor's note should be removed at some point if there is no discussion of suggested changes in Z_c.

SuggestedRemedy

Unless other comments prevent this, remove this note.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolution of comment #70 changed Z_c to a value that was in consensus.

Remove the note.

Cl **137** *SC* **137.10.** *P* **243** *L* **21** # 68

Hidaka, Yasuo Fujitsu Lab. of America

Comment Type **E** *Comment Status* **D** *<bucket>*

New lines between the values for z_p = 30mm, C_p = 1.1 x 10^-4 nF, Z_c = 90 ohm in Table 137-5 are lost.

SuggestedRemedy

Insert new lines to separate values.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See #74.

Cl **137** *SC* **137.10.** *P* **243** *L* **23** # 70

Hidaka, Yasuo Fujitsu Lab. of America

Comment Type **TR** *Comment Status* **A** *Electrical*

As explained in hidaka_061417_3cd_01_adhoc.pdf, the limit of variation of compliant channels will grow, if we use a single reference value for the COM impedance parameters, and the single reference value is different from the nominal value. In order to minimize the variation of compliant channels, we should use the nominal value as the single reference value, or we should use multiple reference values. Reduction of variation helps to improve margin for interoperability, which is not guaranteed in the current specification. When we change the COM impedance parameters, we should also consistently change A_v, A_fe, A_ne to get the same signal amplitude at TP0a from reference Tx in COM, and we should also change the COM value to avoid changing the pass / fail status of existing channels. The consistent changes required to A_v, A_fe, and A_ne were reported in hidaka_060717_3cd_adhoc-v2.pdf slide 10. The consistent change required to COM value was reported in hidaka_061417_3cd_01_adhoc.pdf slide 9-13.

SuggestedRemedy

Change the following COM parameter values in Table 137-5:

Z_c from 90 ohm to 95 ohm
R_d from 55 ohm to 50 ohm
A_v from 0.44 V to 0.415 V
A_fe from 0.44 V to 0.415 V
A_ne from 0.63 V to 0.604 V

For clarification of the intention of the value, in the parameter column of Table 137-5, change
"Package transmission line characteristic impedance"
to
"Package transmission line nominal characteristic impedance".

Response *Response Status* **C**

ACCEPT.

A simliar change was accepted in 802.3bs for D3.3 (r02-55). The proposed value for A_v and A_fe is slightly different from the one in 802.3bs (0.418 V) due to the difference in the transition time in the COM parameter table.

Implement suggested remedy.

Cl **138** *SC* **138.1** *P* *L* # 26

Alan Flatman LAN Technologies

Comment Type **E** *Comment Status* **R**

PMD types do not mention reach, hence inconsistent.

SuggestedRemedy

Delete reach statement from clause 138.1 to remove error and make consistent with other PMD overviews

Response *Response Status* **C**

REJECT.

All optical PMD types define the reach somewhere in the Clause.

Clause 138 is consistent with Clauses 95, 112, and 123. Although clauses 86 and 52 do not include reach in the introduction, it seems helpful to give an indication of reach early in the clause.

Cl **138** *SC* **138.5.7** *P* **260** *L* **20** # 156

Dawe, Piers Mellanox

Comment Type **E** *Comment Status* **R**

PMD_global_transmit_disable function

SuggestedRemedy

PMD global transmit disable function (although PMD transmit disable function would be better). Similarly in 139.5.6 and 140.5.6.

Response *Response Status* **C**

REJECT.

The used format is the same as in force Clause 88 and several other clauses in P802.3bs. While this is not correct it would be better to change all clauses together in the revision project.
After that has been done, it should be taken into cd to maintain full consistency across various clauses.

Cl **138** *SC* **138.7** *P* *L* # 47

King, Jonathan Finisar

Comment Type **T** *Comment Status* **A** *TDECQ*

Consequent to the changes to TDECQ to use a T spaced reference equalizer and the approx half symbol rate bandwdth reference receiver, TDECQ measurements will increase by about 0.9 dB.
In order not to fail transmitters that would pass the D2.0 definiton of TDECQ, the TDECQ value should increase by 0.9dB. Other specs are also affected

SuggestedRemedy

Subject to task force review, implement the proposd changes for clause 138 in king_3cd_03_0617 with editorial license .

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Apply changes shown in slides 9 - 22 in http://www.ieee802.org/3/cd/public/July17/king_3cd_01a_0717.pdf with editorial license

Cl **138** *SC* **138.7.1** *P* **262** *L* **17** # 147

Dawe, Piers Mellanox

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

This PMD needs more study, and knowing what TDECQ is feasible is probably the key.

SuggestedRemedy

While in WG ballot, show evidence of technical feasibility for the numbers in the spec: eyes, receiver waterfall plots, TDECQ measurements and so on. Adjust the draft as appropriate. TR because this could take a few meeting cycles.

Response *Response Status* **U**

REJECT.

[Editors note: This comment is a repeat of comment 42 against draft 1.3]

No specific changes to the draft suggested.

Task force participants are encouraged to prepare consensus presentations with proposals for specific changes to the draft if necessary.

Cl **138** *SC* **138.7.1** *P* **262** *L* **18** # 127

Dawe, Piers — Mellanox

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

It seems that it is 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 (up to 4/2 dB worse than the SRS test?) With some of the changed low-bandwidth TDECQ being used to equalize the reference receiver's own bandwidth, this issue becomes more apparent.
This is an issue for all the PAM4 optical PMDs, although it may be worse for MMF because of the high TDECQ limit.

SuggestedRemedy

Define TDECQrms = 10*log10(A_RMS/(s*3*Qt*R)) where A_RMS is the standard deviation of the measured signal after the 13.28125 GHz filter response. s is the standard deviation of a fast clean signal with OMA=2 and without emphasis, observed through the 13.28125 GHz filter response (around 0.7 - can be calculated when the filter bandwidth is stable). Set limit for TDECQrms according to what level of dirty-but-emphasised signal we decide is acceptable, add max TDECQrms row to the table. Alternatively, if the same relative limit is acceptable for all PAM4 optical PMDs, the limit could be in the TDECQ procedure 121.8.5.3 as proposed in P802.3bs D3.2 comment r02-35.
Similarly in clauses 139, 140.

Response *Response Status* **U**

REJECT.

A similar comment was made to P802.3bs D3.2 via comment r02-35, which was rejected.

Insufficient evidence of the claimed problem and that the proposed remedy fixes the problem. A contribution is invited that demonstrates the problem (a waveform that passes TDECQ but cannot be decoded by a reasonable receiver implementation) and that the proposed additional requirement prevents this issue from occurring.

Cl **138** *SC* **138.7.1** *P* **262** *L* **19** # 155

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **D** *<bucket>*

Table 121-6 and 124-6 say Extinction ratio, each lane (min), while tables 122-9, 122-10, 138-8, 139-6 and 140-6 say Extinction ratio (min).

SuggestedRemedy

Consistency would be good. As adding the extinction ratios of the lanes together makes no sense, it seems that extinction ratio could go without "each lane", like modulation format, SMSR, spectral width, and some others. If so, nothing to do in P802.3cd.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

For consistency with previous multi-lane clauses, change 'Extinction ratio' to 'Extinction ratio, each lane (min)'

Cl **138** *SC* **138.7.1** *P* **262** *L* **26** # 10

Hajduczenia, Marek — Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

Footnote c is separated visually from a) and b) for some reason

SuggestedRemedy

Please apply proper format so that a), b), and c) have the same line spacing

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **138** *SC* **138.7.5** *P* *L* # 45

King, Jonathan — Finisar

Comment Type **T** *Comment Status* **A** *TDECQ measurement BW*

Comment r01-21 against P802.3bs D3.1 has changed the TDECQ reference measurement bandwidth to approximately half the symbol rate in GHz, consistent with a reference equalizer which is a 5 tap T spaced equalizer.
Keep the TDECQ definition for 50GBASE-SR, 100GBASE-SR2 and 200GBSE-SR4 consistent with this change, by changing the TDECQ measurement bandwidth to 11.2 GHz, consistent with a reference equalizer of half the symbol rate convolved with the effective filtering function of the worst case link.

SuggestedRemedy

Change:
"The combination of the O/E and the oscilloscope used to measure the optical waveform has a fourth-order Bessel-Thomson filter response with a bandwidth of 12.6 GHz" to:
"The combination of the O/E and the oscilloscope used to measure the optical waveform has a fourth-order Bessel-Thomson filter response with a bandwidth of 11.2 GHz."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Editor's note: this comment applies 138.8.5

See resolution to comment #47

Cl **138** *SC* **138.8.2** *P* **265** *L* **18** # 148

Dawe, Piers Mellanox

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

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, which I believe is suitable for measuring center wavelength and RMS spectral width - although it would be good if someone else could confirm this. Clause 115 refers to IEC 61280 and not TIA/EIA-455-127-A, which should be TIA-455-127-A anyway.

SuggestedRemedy

Delete "TIA/EIA-455-127-A or", revise PICS OM2 in 138.11.4.4.

Response *Response Status* **C**

REJECT.

A contribution is invited that confirms that the features of TIA/EI-455-127-A are entirely covered by IEC 61280-1-3:2010.

Cl **138** *SC* **138.8.5** *P* **265** *L* **44** # 159

Ghiasi, Ali Ghiasi Quantum and H

Comment Type **TR** *Comment Status* **R** *TDECQ*

Based on 802.3bs contributions an oscilloscope BW of 12.6 GHz will results in exccess TDECQ penalty or transmitter will require pre-emphasis which will impact peak to average ratio
See http://www.ieee802.org/3/bs/public/17_05/way_3bs_01a_0517.pdf
http://www.ieee802.org/3/bs/public/17_05/traverso_3bs_01a_0517.pdf

SuggestedRemedy

Suggest to increase the BW to at 16 GHz

Response *Response Status* **W**

REJECT.

The difference between 13.28 GHz anti aliasing filter bandwidth used in the single mode clauses and the 12.6 GHz in clause 138 of D2.0 is intended to represent the penalty due to the worst case bandwidth of 100m of OM4 multimode fiber.
Note that resolution to comment #47 changes this bandwidth to 11.2 GHz.

Cl **138** *SC* **138.8.5** *P* **265** *L* **44** # 150

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **A** *TDECQ measurement BW*

If the SMF TDECQ bandwidth stays low and MMF follows, the special TDECQ bandwidth for MMF will need changing.

SuggestedRemedy

Revise the 12.6 GHz.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response to comment #47

Cl **138** *SC* **138.8.5.1** *P* **265** *L* **5** # 160

Ghiasi, Ali Ghiasi Quantum and H

Comment Type **TR** *Comment Status* **A** *TDECQ*

Based on 802.3bs contributions 5 T/2 equalizer will be to short to equalize the link and will result in excessive yield loss
See http://www.ieee802.org/3/bs/public/17_05/way_3bs_01a_0517.pdf
http://www.ieee802.org/3/bs/public/17_05/traverso_3bs_01a_0517.pdf

SuggestedRemedy

Suggest replacing 5 T/2 equalizer with 5 T spaced equalizer

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response to comment #47

Cl **138** *SC* **138.8.5.1** *P* **265** *L* **50** # 11

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

"5 tap" is a compound adjective

SuggestedRemedy

Change to "5-tap"
Same with "T/2 spaced" to "T/2-spaced"

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Throughout 802.3-2015 and P802.3bs, the prevalent phrase is "<number> tap" without hyphen.

Cl **138** *SC* **138.8.5.1** *P* **265** *L* **50** # 42

King, Jonathan Finisar

Comment Type **T** *Comment Status* **A** *TDECQ*

Comment r01-21 against P802.3bs D3.1 has changed the reference equalizer for 200GBASE-FR4, 200GBASE-LR4, 400GBASE-FR8, and 400GBASE-LR8 to a 5 tap, T spaced equalizer.
Keep the TDECQ definition for 50GBASE-SR 100GBASE-SR2 and 200GBASE-SR4 consistent with this.

SuggestedRemedy

In 138.8.5.1 change "5 tap, T/2 spaced" to "5 tap, T spaced"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See resolution to comment #47

Cl **138** *SC* **138.8.5.1** *P* **265** *L* **51** # 39

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **D** *<bucket>*

Comment r01-3 against P802.3bs D3.1 has added "The sum of the equalizer tap coefficients is equal to 1." at the end of the first paragraph of 121.8.5.4 and 122.8.5.4.

SuggestedRemedy

Keep the two drafts in sync by adding "The sum of the equalizer tap coefficients is equal to 1." at the end of the first paragraph of 138.8.5.1 and 139.7.5.4

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **138** *SC* **138.8.8** *P* **266** *L* **27** # 151

Dawe, Piers Mellanox

Comment Type **T** *Comment Status* **A** *SECQ*

The MMF SECQ bandwidth (presently 19.34 GHz) should align with the MMF TDECQ bandwidth (presently 13.28125 GHz).

SuggestedRemedy

Make them the same. Make other updates to track changes in P802.3bs, if appropriate, e.g. 140.7.5 38.68 GHz.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The clause 138 TDECQ bandwidth represents the convolution of a reference receiver bandwidth and a worst case channel.

SECQ does not include the worst case channel.

The correct TDECQ bandwidth for clause 138 for a T spaced reference equalizer is addressed in comment 47.

The SECQ bandwidth for a T spaced reference equalizer should be half the symbol rate, consistent with changes made in 802.3bs draft 3.2.

In 138.8.8 change
"the combination of the O/E and the oscilloscope has a fourth-order Bessel-Thomson filter response with a bandwidth of 19.34 GHz"
to
"the combination of the O/E and the oscilloscope has a fourth-order Bessel-Thomson filter response with a bandwidth of approximately 13.28125 GHz"

.

Cl **138** *SC* **138.8.8.1** *P* **266** *L* **41** # 12

Hajduczenia, Marek Charter Communicatio

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

Table 138-13 contains frequency bands with clear statement on what happens below 40 kHz. What happens above 10 LB? Is it specified or not?

SuggestedRemedy

Consider adding entry for f>10LB with value of Not specified, for clarity. Othersise, remove first row and add a statement that area <40kHz and above 10LB is not specifieid

Response *Response Status* **C**

REJECT.

138.8.8.1 is consistent with many other in force optical clauses, including 52, 95, 112.

Cl **138** *SC* **138.9.2** *P* **267** *L* **10** # 52

Graber, Steffen Pepperl+Fuchs

Comment Type **E** *Comment Status* **D** *<bucket>*

Hazard Level1M

SuggestedRemedy

Change to: Hazard Level 1M (add space)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **138** *SC* **138.9.2** *P* **267** *L* **10** # 13

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

missing space in "Hazard Level1M"

SuggestedRemedy

Change to "Hazard Level 1M"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **138** *SC* **138.10.1** *P* **268** *L* **41** # 14

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

Different ways to define a term inline: in some locations, it is italicized, in some sorrounded with "", in others - no special markup exists

SuggestedRemedy

Please consider using consistent approach, at least within this draft. Suggested ""

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Remove italics for "channel" in 138.10.1

Cl **138** *SC* **138.11.4.4** *P* **275** *L* **12** # 55

Shariff, Masood CommScope

Comment Type **ER** *Comment Status* **D** *<bucket>*

The terms OM3, OM4, and OM5 are used in several place in the standard to designated Optical Multimode cables as defined by ISO/IEC/JTC 1/SC 25/WG 3. It is confusing to use the same designations for other purposes in this document.

SuggestedRemedy

Change the designations of the Optical Masurement Method to OMM instead of OM

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The designations are consistent with many other optical clauses, including 52, 53, 68, 86, 95, 121, 122, 123, 139, 140.

Cl **138** *SC* **138.11.4.5** *P* **298** *L* **14** # 56

Shariff, Masood CommScope

Comment Type **ER** *Comment Status* **D** *<bucket>*

The terms OM3, OM4, and OM5 are used in several place in the standard to designated Optical Multimode cables as defined by ISO/IEC/JTC 1/SC 25/WG 3. It is confusing to use the same designations for other purposes in this document.

SuggestedRemedy

hange the designations of the Optical Masurement Method to OMM instead of OM

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The designations are consistent with many other optical clauses, including 52, 53, 68, 86, 95, 121, 122, 123, 139, 140.

Cl **139** *SC* **139.5.1** *P* **281** *L* **1** # 15

Hajduczenia, Marek — Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

Different ways to designate Test Points - in Figure 139-2, these are deisgnators in large circles, in other locations, there are just labels, or slanted trapezoids.

SuggestedRemedy

Please use consistent symbols for test points, at least within this draft - not asking for any global alignment .

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The draft is not broken with respect to indications of test points.
Trapezoids are generally used to indicate optical multiplexers and demultiplexers which are absent in Clause 139 and 140.
The draft is not broken with respect to indications of test points

Cl **139** *SC* **139.6** *P* *L* # 48

King, Jonathan — Finisar

Comment Type **T** *Comment Status* **A** *tdecq*

Consequent to the changes to TDECQ to use a T spaced reference equalizer and the approx half symbol rate bandwdth reference receiver, TDECQ measurements will increase by about 0.9 dB.
In order not to fail transmitters that would pass the draft 2.0 definiton of TDECQ, the TDECQ value should increase by 0.9dB. Other specs are also affected

SuggestedRemedy

Subject to task force review, implement the changes proposed for clause 139 in king_3cd_03_0617, with editorial license .

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response to comment #47

Cl **139** *SC* **139.6.1** *P* *L* # 37

Stassar, Peter — Huawei

Comment Type **T** *Comment Status* **A** *extinction ratio*

Following up to comment #44 to D1.3 and to remain consistent with agreed modifications to 200/400GBASE FRx/LRx in Clause 122 of draft D3.2 of 802.3bs, the minimum extinction ratio in Table 139-6 should be reduced from 4.5 to 3.5 dB for both 50GBASE-FR and 50GBASE-LR.
While initially it was proposed in comment #44 to put the burden of 0.1 dB completely on the trasnmitter, in http://www.ieee802.org/3/cd/public/adhoc/archive/stassar_061417_3cd_adhoc-v2.pdf, presented during the CD Ad Hoc call on 14 June 2017 with presentation, it was proposed to put the burden of 0.1 dB completely on the receiver. An updated presentation will be submitted to the Berlin meeting in July 2017.

SuggestedRemedy

Make the following modifications to Clause 139:
Table 139-6
Change Extinction ratio (min) from 4.5 dB to 3.5 dB

Table 139-7
Change Receiver sensitivity (OMAouter) (max):
From -7.3 dBm to -7.4 dBm for 50GBASE-FR
From -8.8 dBm to -8.9 dBm for 50GBASE-LR.
Change Stressed receiver sensitivity (OMAouter) (max):
From -5 dBm to -5.1 dBm for 50GBASE-FR
From -6.3 dBm to -6.4 dBm for 50GBASE-LR.

Table 139-8
Change Power budget (for maximum TDECQ):
From 6.6 dB to 6.7 dB for 50GBASE-FR
From 9.3 dB to 9.4 dB for 50GBASE-LR.
Allocation for penalties (for maximum TDECQ):
From 2.6 dB to 2.7 dB for 50GBASE-FR
From 3 dB to 3.1 dB for 50GBASE-LR.

Table 139-14
Change maximum value for each discrete reflectance:
From -39 dB to -40 dB for 8 reflectances for 50GBASE-FR
From -40 dB to -41 dB for 10 reflectances for 50GBASE-FR
From -38 dB to -39 dB for 10 reflectances for 50GBASE-LR

Response *Response Status* **C**

ACCEPT.

Cl **139** *SC* **139.6.1** *P* **283** *L* **36** # 152

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **R** *power budget*

PAM4 optics is still new and raw, we are still debugging the specification methodology, and we have seen too little experimental information showing technical and economic feasibility. However, stassar_061417_3cd_adhoc-v2 shows plenty of receiver sensitivity margin (although not yet shown with SSPRQ). As more measurements with with new receiver designs and the new TDECQ method become available, it appears the optical power levels can be reduced and the spec as in this draft will be uneconomic (particularly 50GBASE-FR which should be low cost, low power, convenient for quad or octal packaging).

SuggestedRemedy

Bring more evidence for what optical power levels and TDECQ limits are right, including TDECQ measurements with SSPRQ, and correlation to actual receiver performance. Based on evidence, reduce all the optical power levels for 50GBASE-FR and 50GBASE-LR by 0.5, 1 or 1.5 dB (with other adjustments for other reasons). Review the TDECQ limit.

Response *Response Status* **U**

REJECT.

The suggested remedy does not propose a specific change to the draft.

Cl **139** *SC* **139.6.1** *P* **283** *L* **47** # 153

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **A** *extinction ratio*

Following up on D1.2 comments 138 and 200, D1.3 comment 44, and changes in 802.3bs D3.2 Clause 122. A lower extinction ratio limit allows for cost reduction of a range of optical transmitter technologies, and, depending on technology, improved performance. See dawe_3cd_01_0517 and references, anslow_01_0517_smf, king_3cd_02_0317, and stassar_061417_3cd_adhoc-v2, which shows that this PMD type has receiver sensitivity margin available.

SuggestedRemedy

Reduce the extinction ratio limit from 4.5 dB to 3.5 dB.
In Table 139-7, reduce the unstressed and stressed receiver sensitivities by 0.1 dB.
In Table 139-8, increase the power budgets and allocations for penalties by 0.1 dB.
In Table 139-14, for 50GBASE-FR, change -39 to -40 and -40 to -41, and for 50GBASE-LR, change -38 to -39.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using response to comment #37.

Cl **139** *SC* **139.6.1** *P* **284** *L* **1** # 16

Hajduczenia, Marek — Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

Footnotes to Table 139-6 got separated from the pain table

SuggestedRemedy

Please glue the footnotes to table, unless it is physically impossible to make them stay with the table.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **139** *SC* **139.7.1** *P* **285** *L* **49** # 125

Dawe, Piers — Mellanox

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

Scrambled idle used in this project isn't defined in 82.2.11. Table 136-13 says "Scrambled idle encoded by RS-FEC", and Table 95-9, Test patterns, has a note "The pattern defined in 82.2.11 as encoded by Clause 91 RS-FEC for 100GBASE-SR4."

SuggestedRemedy

Add note in the style of Table 95-9.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In Table 139-9 make the following changes...
Change "scrambled idle" to "scrambled idle encoded by RS-FEC"
Change "82.2.11" to "82.2.11, 134"
Apply a footnote to "82.2.11" stating:
"As modified by Clause 133".

In Table 140-9 make the following changes...
Change "scrambled idle" to "scrambled idle encoded by RS-FEC"
Change "119.2.4.9" to "82.2.11, 91"

Cl **139** *SC* **139.7.1** *P* **286** *L* **19** # 126

Dawe, Piers — Mellanox

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

For SRS testing, while Table 138-12 following 802.3by Table 95-10 allows PRBS31Q, scrambled idle (with FEC) or valid 50GBASE-SR, 100GBASE-SR2, or 200GBASE-SR4 signal, but this Table 139-10 (following the older 802.3ba?) allows only PRBS31Q and scrambled idle. The 58-bit scrambler is so long that we can't tell the statistics of RS-FEC encoded scrambled idle from any other valid 50GBASE-R signal. RF, which is a valid 50GBASE-R signal, is often more convenient than scrambled idle. Table 89-10 (40GBASE-FR) also allows PRBS31, scrambled idle or valid 40GBASE-R signal.

SuggestedRemedy

Change "3 or 5" to "3, 5, 6 or valid 50GBASE-R signal". Also in Table 140-10.

Response *Response Status* **U**

REJECT.

The recommended test patterns 3 (PRBS31Q) or 5 (scrambled idles) are more than adequate for SRS testing. The current approach is used in in-force SMF Clauses 87 and 88 and in progress (for P802.3bs) Clauses 121, 122 and 124. For consistency with corresponding Clauses in P802.3bs the pattern set should stay as it is.

SSPRQ (pattern 6) is intended only for transmitter testing. Therefore it is not relevant for this test and may overstress the receiver.

Cl **139** *SC* **139.7.2** *P* **286** *L* **25** # 149

Dawe, Piers — Mellanox

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

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, which I believe is suitable for measuring wavelength, and also SMSR. It would be good if someone else could confirm this. Clause 115 refers to IEC 61280 and not TIA/EIA-455-127-A, which should be TIA-455-127-A anyway.

SuggestedRemedy

Change the subclause heading from "Wavelength" to "Wavelength and side mode suppression ratio (SMSR)". Delete "TIA/EIA-455-127-A or", here and in 140.7.2. Revise the PICS.

Response *Response Status* **C**

REJECT.

A contribution is invited that confirms that the features of TIA/EI-455-127-A are entirely covered by IEC 61280-1-3:2010 and to confirm that IEC 61280-1-3:2010 has a suitable method for SMSR.

Cl **139** *SC* **139.7.5.1** *P* **287** *L* **41** # 161

Ghiasi, Ali — Ghiasi Quantum and H

Comment Type **TR** *Comment Status* **R** *tdecq*

Assuming we change the TDECQ equalizer from 5 T/2 spaced to 5 T spaced it would better to slighlty reduce the BW
See http://www.ieee802.org/3/bs/public/17_05/way_3bs_01a_0517.pdf
http://www.ieee802.org/3/bs/public/17_05/traverso_3bs_01a_0517.pdf

SuggestedRemedy

Suggest using a BW of 16 GHz

Response *Response Status* **W**

REJECT.

The measurement bandwidth should remain identical to the bandwidth adopted in P802.3bs SMF clause 121, because in the specification in Clause 139 is intended to be consistent with the multi lane application specified in P802.3bs.
See also resolution to comment #47.

Cl **139** *SC* **139.7.5.2** *P* **288** *L* **40** # 17

Hajduczenia, Marek — Charter Communicatio

Comment Type **E** *Comment Status* **D** *<bucket>*

DGD used without definition

SuggestedRemedy

First definition is on page 293 under Table 139-12. Need to be moved in here since it is the first use in text

Proposed Response *Response Status* **W**

PROPOSED REJECT.

DGD is listed in list of abbreviations.
Same style as in-force Clause 87, 88 and 95

Cl **139** *SC* **139.7.5.3** *P* **288** *L* **44** # 154

Dawe, Piers — Mellanox

Comment Type **T** *Comment Status* **R** *tdecq*

After the change in reference receiver bandwidth, we need to either increase the TDECQ limits and make consequent changes including to budget and unstressed sensitivity; and/or change the definition (zero basis) of TDECQ.

SuggestedRemedy

Changing the zero point of TDECQ (in P802.3bs Eq 121-12) seems easy to do in the short term and less confusing in the long term, which would involve a small or no adjustment to the optical spec numbers in this draft.

Response *Response Status* **C**

REJECT.

The zero point of TDECQ should not be changed because this is not done in Clause 121 of P802.3bs and because the specification in Clause 139 is intended to be consistent with the multi lane application specified in P802.3bs.
See also response to comment #47

Cl **139** *SC* **139.7.5.4** *P* **288** *L* **49** # 40

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **A** *tdecq*

Comment r01-21 against P802.3bs D3.1 has changed the reference equalizer for 200GBASE-FR4, 200GBASE-LR4, 400GBASE-FR8, and 400GBASE-LR8 to a 5 tap, T spaced equalizer.
Keep the TDECQ definition for 50GBASE-FR and 50GBASE-LR consistent with this change.

SuggestedRemedy

Change "5 tap, T/2 spaced" to "5 tap, T spaced"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response to comment #42

Cl **139** *SC* **139.7.5.4** *P* **288** *L* **49** # 162

Ghiasi, Ali — Ghiasi Quantum and H

Comment Type **TR** *Comment Status* **A** *tdecq*

Based on 802.3bs contributions 5 T/2 equalizer will be to short to equalize the link and will result in excessive yield loss
See http://www.ieee802.org/3/bs/public/17_05/way_3bs_01a_0517.pdf
http://www.ieee802.org/3/bs/public/17_05/traverso_3bs_01a_0517.pdf

SuggestedRemedy

Suggest replacing 5 T/2 equalizer with 5 T spaced equalizer

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

See response to comment #42

Cl **139** *SC* **139.7.7** *P* **289** *L* **15** # 133

Dawe, Piers — Mellanox

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

With the lower receiver bandwidth, measuring RIN in approximately the signaling rate (twice as much) seems too much; 1/2 to 3/4 would be better. A T-spaced equalizer cannot independently adjust for good ISI and RIN filtering, so can an adequate estimate of RIN can be obtained as a by-product of the TDECQ procedure? While a T/2-spaced equalizer could enhance the RIN, it would not choose to do so if RIN were a problem, so a T-spaced reference equalizer and a T/2-spaced product equalizer are compatible from this point of view, I think. As 52.9.6 says, this RIN method is intended for components (TOSAs) not a "system level test" suitable for a complete optical module.
This is much the same as P802.3bs D3.2 comment r02-39.

SuggestedRemedy

Review; reduce the bandwidth and simplify RIN measurement to a Qsq measurement (see 68.6.7) or eliminate as appropriate. Remove 135.5.10.2.4 Square wave (quaternary) test pattern and any associated registers.
Similarly in 140.7.9.

Response *Response Status* **U**

REJECT.

The suggested remedy suggests 2 different approaches to change the draft.
Changing the RIN measurement to a Qsq measurement has not been demonstrated to provide the same safeguards that are expected from the RIN requirement.
Eliminating the RIN measurement was discussed in the response to comment #130 against D2.0 of P802.3bs on the basis that "The transmitter RINxOMA spec is intended to screen out potentially bad transmitters even if the noise correction required by the TDECQ test is not very accurate."

Cl **139** *SC* **139.10.3** *P* **294** *L* **27** # 58

Brown, Matt
MACOM

Comment Type **E** *Comment Status* **D** *<bucket>*

"400GBASE-LR" should be "50GBASE-LR"

SuggestedRemedy

Change "400GBASE-LR" to "50GBASE-LR"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **140** *SC* **140.6** *P* **306** *L* **23** # 44

King, Jonathan
Finisar

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

In Comment #47 to D1.3 (with associated presentation http://www.ieee802.org/3/cd/public/May17/dawe_3cd_01_0517.pdf) a case was made that lowering the extinction ratio from 5 to 3.5 dB for 100GBASE-DR would enable lower cost transmitters.
In several presentations (http://www.ieee802.org/3/cd/public/May17/king_3cd_01_0517.pdf and http://www.ieee802.org/3/cd/public/May17/anslow_3cd_01_0517.pdf) it was demonstrated that for an ER of 3.5 dB the increase in MPI penalty could be limited to 0.3 dB while not creating an unstable performance conditions where the link would be close to collapsing.
Since P802.3bs adopted an ER of 3.5 dB for 400GBASE-DR4 in D3.2 it would be extremely desirable to also specify a minimum ER or 3.5 dB also for 100GBASE-DR to achieve the highest level of consistency between both specifications and implementations.

In

SuggestedRemedy

In Table 140-6 change the minimum extinction ratio from 5 to 3.5 dB.
In the row for Outer Optical Modulation Amplitude (OMAouter) (min) add "for extinction ratio >= 5 dB" to the existing power level and add another "line" starting with "for extinction ratio <5 dB" with value 0 dBm.
In the row for Launch power in OMAouter minus TDECQ (min) add "for extinction ratio >= 5 dB" to the existing power level and add another "line" starting with "for extinction ratio <5 dB" with value -1 dBm.

In Table 140-8:
In the row for Power budget (for max TDECQ) add "for extinction ratio >= 5 dB" to the existing level and add another "line" starting with "for extinction ratio <5 dB" with value 5.9 dB.
In the row for Allocation for penalties (for max TDECQ) add "for extinction ratio >= 5 dB" to the existing level and add another "line" starting with "for extinction ratio <5 dB" with value 5.9 dB minus max channel insertion loss per Table 140-12.

In Table 140-12:
Change the maximum channel insertion loss for 6 x -35 dB reflectances from 2.7 to 2.6 dB.

All with editorial license.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: The editor changed the clause/subclause from 138/138.7 to 140/140.6 and added page/line 306/23]

Implement the changes in dawe_3cd_01_0717 slides 11, 12, and 13.

Cl **140** *SC* **140.6.1** *P* **306** *L* **33** # 128

Dawe, Piers — Mellanox

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

PAM4 optics is still new and raw, we are still debugging the specification methodology, and we have seen too little experimental information showing technical and economic feasibility. As measurements with the new TDECQ method and with new receiver designs become available, it may be that optical power levels can be reduced and the spec as in this draft would be uneconomic.

SuggestedRemedy

Bring more evidence for what optical power levels and TDECQ limits are right; in particular, TDECQ measurements with SSPRQ, and correlation to actual receiver performance. Based on evidence, reduce all the optical power levels for 100GBASE-DR by 0.5 or 1 dB (with other adjustments for other reasons). Review the TDECQ limit.

Response *Response Status* **U**

REJECT.

The suggested remedy does not propose a specific change to the draft.

Cl **140** *SC* **140.6.1** *P* **306** *L* **40** # 46

King, Jonathan — Finisar

Comment Type **T** *Comment Status* **A** *tdecq*

Consequent to the changes to TDECQ to use a T spaced reference equalizer and the approx half symbol rate bandwdth reference receiver, TDECQ measurements will increase by 0.9 dB.
In order not to fail transmitters that would pass the D2.0 definiton of TDECQ, the TDECQ value should increase by 0.9dB. Other specs are also affected

SuggestedRemedy

Subject to task force review, implement the changes proposed for clause 140 in king_3cd_03_0617with editorial license .

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See resolution to comment #47

Cl **140** *SC* **140.6.1** *P* **306** *L* **43** # 129

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **A** *extinction ratio*

Following up on D1.2 comments 139 and 211, D1.3 comment 47, and changes in 802.3bs D3.2 Clause 140. A lower extinction ratio limit allows for cost reduction of a range of optical transmitter technologies, and, depending on technology, improved performance. See dawe_3cd_01_0517 and references, king_3cd_02_0317, king_3cd_01_0517 and anslow_3cd_01_0517.

SuggestedRemedy

Reduce the extinction ratio limit from 5 dB to 3.5 dB. Change the OMA-TDECQ limit to -1.3 dBm for Ext R >= 5 dB (as now), -1 dBm for Ext R < 5.
Modify note b from:
Even if the TDECQ < 1 dB, the OMAouter (min) must exceed these values.
to: Even if the TDECQ < 1 dB for an extinction ratio of >= 5 dB or TDECQ < 0.9 dB for an extinction ratio of < 5 dB,
the OMAouter (min) must exceed this value.
In Table 140-8, change the power budget from 5.6 to 5.6, 5.9 depending on extinction ratio. Change the allocation for penalties to 5.6, 5.9 minus max channel insertion loss per Table 140-12, depending on extinction ratio.
In Table 140-12, change the maximum channel insertion loss for 6 x -35 dB reflectances from 2.7 to 2.6 dB
Editorially, follow the example of Clause 122.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #44.

Cl **140** *SC* **140.6.1** *P* **306** *L* **43** # 59

Hayakawa, Akinori — Fujitsu Laboratories

Comment Type **TR** *Comment Status* **A** *extinction ratio*

An extinction ratio of 100GBASE-DR should be consistent with 400GBASE-DR4.

SuggestedRemedy

In Table 140-6, change the Extinction ratio (min) value from 5 to 3.5 dB.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #44.

Cl **140** *SC* **140.6.2** *P* **307** *L* **15** # 130

Dawe, Piers — Mellanox

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

The damage threshold here is +6.5 dBm while the max Tx power is +4. For 400GBASE-DR4 the damage threshold is +6.5 dBm while the max Tx power is +4 again, so the usual 1 dB margin. Is there another transmitter type at max 6.5?

SuggestedRemedy

Should this damage threshold be changed to +5?

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Table 140-7:
Change damage threshold from 6.5 to 5 dBm

Cl **140** *SC* **140.7.4** *P* **309** *L* **14** # 132

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **D** *<bucket>*

140-6.The

SuggestedRemedy

missing space

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **140** *SC* **140.7.4** *P* **309** *L* **14** # 28

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **D** *<bucket>*

Space missing in "Table 140-6.The"

SuggestedRemedy

Add the space.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **140** *SC* **140.7.5** *P* **288** *L* **37** # 158

Ghiasi, Ali — Ghiasi Quantum and H

Comment Type **TR** *Comment Status* **R** *tdecq*

Due to potential movement in reference equalizer in Cl 121 suggest to explicitly define the reference EQ in CL140

SuggestedRemedy

Suggest replacing 5 T/2 equalizer with 5 T spaced equalizer

Response *Response Status* **W**

REJECT.

For consistency with Clause 124 in P802.3bs, reference is made to the definition of the reference equalizer in Clause 121 of P802.3bs, where the change to 5 T spaced equalizer has been made.

Cl **140** *SC* **140.7.5** *P* **308** *L* **48** # 131

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **A**

Most of these definitions identify the pattern to use by reference to Table 140-10. 140.7.5 (TDECQ) and 140.7.9 (SRS) don't, leaving the associated rows in the table without effect.

SuggestedRemedy

For consistency, should 140.7.5 and 140.7.9 identify the pattern too?

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In 140.7.5 change "The signaling rate of the test pattern generator is as given in Table 140-6." to "The signaling rate of the test pattern generator is as given in Table 140-6 and uses a test pattern specified for TDECQ in Table 140-10."

In 140.7.9 change "The signaling rate of the test pattern generator and the extinction ratio of the E/O converter are as given in Table 140-6." to "The signaling rate of the test pattern generator and the extinction ratio of the E/O converter are as given in Table 140-6 using test patterns specified in Table 140-10."

Cl **140** *SC* **140.7.5** *P* **309** *L* **47** # 41

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **A** *tdecq*

Comment r01-21 against P802.3bs D3.1 has changed the TDECQ measurement bandwidth for 400GBASE-DR4 to "approximately 26.5625 GHz".
Keep the TDECQ definition for 100GBASE-DR consistent with this change.

SuggestedRemedy

Change:
"The combination of the O/E converter and the oscilloscope has a fourth-order Bessel-Thomson filter response with a bandwidth of 38.68 GHz" to:
"The combination of the O/E converter and the oscilloscope has a fourth-order Bessel-Thomson filter response with a bandwidth of approximately 26.5625 GHz."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response to comment #47

Cl **140** *SC* **140.7.5** *P* **309** *L* **47** # 53

Hanan, Leizerovich — MultiPhy

Comment Type **T** *Comment Status* **A** *tdecq*

The bandwidth of 38.68GHZ is not updated to 400GBASE-DR4

SuggestedRemedy

Either update the value or place a reference to 124.8.5.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response to comment #47

Cl **140** *SC* **140.7.5** *P* **309** *L* **47** # 157

Ghiasi, Ali — Ghiasi Quantum and H

Comment Type **TR** *Comment Status* **R** *tdecq*

Assuming we change the TDECQ equalizer from 5 T/2 spaced to 5 T spaced it would better to slighlty reduce the BW
See http://www.ieee802.org/3/bs/public/17_05/way_3bs_01a_0517.pdf
http://www.ieee802.org/3/bs/public/17_05/traverso_3bs_01a_0517.pdf

SuggestedRemedy

Suggest using a BW of 32 GHz

Response *Response Status* **W**

REJECT.

The measurement bandwidth should remain identical to the bandwidth adopted in P802.3bs SMF clause 124, because in the specification in Clause 140 is intended to be consistent with the multi lane application specified in P802.3bs.
See also resolution to comment #47.

Cl **140** *SC* **140.7.5** *P* **309** *L* **48** # 60

Hayakawa, Akinori — Fujitsu Laboratories

Comment Type **TR** *Comment Status* **A** *tdecq*

A bandwidth of a fourth-order Bessel-Thomson filter response for TDECQ measurement should be consistent with 400GBASE-DR4.

SuggestedRemedy

Change "38.68 GHz" to "approximately 26.5625 GHz".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response to comment #47

Cl **140** *SC* **140.7.9** *P* **310** *L* **28** # 134

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **R** *jitter*

The lack of consistency between the low frequency jitter specs in 802.3bs affects 802.3cd also. Here is P802.3bs D3.2 comment r02-40 for those who have not been following this issue. Depending how this inconsistency is fixed, there may be little or no explicit change in the P802.3cd draft.
Following up on P802.3bs D3.0 comment 153 and D3.1 comment 55: if the jitter corner frequency for 26.5625 GBd (NRZ and PAM4) is 4 MHz, the low frequency ends of the jitter masks must align or be in the right order if expressed in time vs. frequency, i.e. should scale with signalling rate if in UI. If this is not done, the required depth of the LF jitter buffer in the 2:1 muxes in a 400GBASE-DR4 module is unbounded and the low frequency jitter generation requirements on the module become unreasonable. Compare 87.8.11.4 and 88.8.10: 4 MHz for 10.3125 GBd, 10 MHz for 25.78125 GBd. History: anslow_3bs_04_0316 does not contain reasoning, refers to ghiasi_3bs_01_0316 which does not address wander and buffering. ghiasi_3bs_01a_0116.pdf#page=15 shows FIFOs but does not establish a workable spec. Slide 14 shows they can be avoided: this is what we have for 400GAUI-8 or 400GAUI-16 with 400GBASE-xR8. I have no evidence that the problems described in the [fourth] sentence have been considered or solved by the [P802.3bs] committee.

SuggestedRemedy

Add another exception for the SRS procedure, with a table like Table 121-12 replacing second row after the header row:
80 kHz < f <= 250 kHz 4e5/f
250 kHz < f <= 500 kHz 1e11/f^2
1 MHz < f <= 4 MHz 2e5/f
Or, with the UIs doubled vs. Table 121-12:
f < 40 kHz Not specified
40 kHz < f <= 4 MHz 4e5/f
4 MHz < f <= 10 LB 0.1
Increase the TDECQ limit to share the burden appropriately between transmitter and receiver.
This option means the 100G/lane receiver has to tolerate no more timing slew rate (in ps/us) than that agreed for 50G/lanes.
Or, increase jitter by 50% and corner frequency by 33%:
f < 40 kHz Not specified
40 kHz < f <= 6 MHz 4e5/f
5.333 MHz < f <= 10 LB 0.075
and add an exception in 124.8.5 that the CRU corner frequency is 5.333 MHz. Increase the TDECQ limit to share the burden between transmitter and receiver.
To do the job properly with the first option, in 124.8.5 we should add another exception to the CRU with a corner frequency of 4 MHz and a slope of 20 dB/decade (in 121.8.5.1): add a pole at 250 kHz and a zero at 500 kHz. I am advised that this can be done in hardware (in software, anything is possible).

Response *Response Status* **U**

REJECT.

One option in the suggested remedy is proposing to place an extra burden on the receiver by allowing transmitters with a higher level of TDECQ which may be due to ISI and also by requiring a higher level of jitter tolerance.
The commenter has not demonstrated that this extra burden is less onerous than putting a buffer in the PMA.
For the second option in the suggested remedy the commenter is invited to build consensus for an increase of the corner frequency to be above 4 MHz.

Cl **140** *SC* **140.9** *P* **312** *L* **32** # 43

King, Jonathan — Finisar

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

Table 140-12 has incorrect values for some of the connector combinations, because the MPI penalty was underestimated.

SuggestedRemedy

Change the allowed insertion loss for the cell for 6 x 35 dB connectors to 2.6 dB.

Change the allowed insertion loss for the cell for 6 x 35 dB plus 1 x 45 dB connectors to 2.5 dB.
see presentation king_3cd_01_0517

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In reference to http://www.ieee802.org/3/cd/public/May17/anslow_3cd_01_0517.pdf the proposed change to "the allowed insertion loss for the cell for 6 x 35 dB plus 1 x 45 dB connectors to 2.5 dB" is not necessary.

Resolve using the response to comment #44.

Cl **140** *SC* **140.11.4** *P* **318** *L* **1** # 57

Shariff, Masood — CommScope

Comment Type **ER** *Comment Status* **D** *<bucket>*

The terms OM3, OM4, and OM5 are used in several place in the standard to designated Optical Multimode cables as defined by ISO/IEC/JTC 1/SC 25/WG 3. It is confusing to use the same designations for other purposes in this document.

SuggestedRemedy

hange the designations of the Optical Masurement Method to OMM instead of OM

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The use of OM3, OM4 and OM5 in the PICS has been established in many in force clauses, 52, 53, 58, 59, 60, etc.